1. Introduction

The decision made by the UK to leave the EU as a result of the referendum held on 23 June 2016, commonly known as Brexit, undoubtedly represents a significant shock to the UK economy. In particular, the resulting increase in uncertainty can be expected to have a significant short-run impact on financial markets as well as sizeable-long run effects on real economic activity owing to substantial structural changes to the economy. The present stud.,5 on f(c)4(t)-n p

led to an exchange rate depreciation, and a further fall of the British currency is expected by most analysts.

The time series properties of expected risk indicators are clearly of great interest. One of the most informative is the IVI index, which can be viewed as a "fear" index. It is the European counterpart to the better known VIX index for the Chicago stock market that most of the literature has examined. In particular, Whaley (2000) suggests that the VIX can be interpreted as an 'investor fear gauge', that reaches higher levels during periods of market turmoil. It is an implied volatility index: the lower its level, the lower demand is from investors seeking to buy protection against risk and thus the lower is the level of market fear. Most papers analysing the VIX have focused on its predictive power for future returns (e.g., Giot, 2005; Guo and Whitelaw, 2006; Chow et al., 2014, 2016; Heydon et al., 2000). Fleming et al. (1995) were the first to analyse the persistence of this index and found that its daily changes follow an AR(1) process, whilst its weekly changes exhibit mean reversion, and there is no evidence of seasonality or long-memory behaviour in the VIX was also detected by Koopman et al. (2005), Corsi (2009) and Fernandes et al. (2014), as well as by Huskaj (2013) in its volatility. By contrast, Li, Ji and Yu-Fang (2014) found no evidence of long memory. Finally, Caporale et al. (2017) used two different long-memory approaches (R/S analysis with the Hurst exponent method and fractional integration) to assess the persistence of the VIX index over the period 2004-2016, as well as some sub-periods (pre-crisis, crisis and post-crisis). They found that its properties change over time: in normal periods, the VIX exhibits anti-persistence (there is a negative correlation between its past and future values), whilst during crises its persistence increases.

and therefore provides useful information to market participants for the purpose of risk management. It is forward-looking, and can be seen as an indicator of market sentiment/fear. Similarly, the British pound's IV index are measures of markets expectations of volatility conveyed by option prices. In particular, the British pound's IV series measure the market's expectation of volatility implied in the prices of the corresponding (at-the-money) currency options over a given time horizon, which is 3 months in our case. For example, the 3-month British pound-US dollar option gives the right to exchange British pounds for US dollars depending on the expected swings in the former vis-à-vis the latter over the following 90 days.

All the series are from Thomson Reuters Datastream and span the period from 1 January 2014 to 31 October 2017, therefore the post-Brexit subsample is approximately 35 percent of the full sample.[2] This allows to make a meaningful comparison between the estimated values before and after the Brexit referendum.

in Table 2, which shows the estimated values for a selected group of bandwidth parameters, $m = 25, \ldots (1), \ldots (35)$, the results being very sensitive to the chosen bandwidth. Here there is evidence of mean reversion in the case of IVI as well as EUR-GBP IV for some bandwidth parameters; for GBP-USD IV and GIomers GIomeP

At this stage concerns about economic growth and financial trading undoubtedly are playing a role, and a well-structured Brexit deal would lessen if not eliminate them.

4. Conclusions

This paper examines the effects of Brexit on uncertainty in European financial markets. More specifically, it applies (parametric and semi-parametric) fractional

becoming more persistent as well as more sizeable in most cases and affecting investment strategies. Although it is too early to express a view on the long-term effects of Brexit (especially on the real economy), undoubtedly there has been a short-term negative impact on financial markets. Achieving an appropriate Brexit deal in the near future appears to be of paramount importance for the British economy.

References

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Table 1: Estimates of d for the whole sample based on parametric approaches

i) No autocorrelation			
	No regressors	An intercept	A linear time trend
IVI	0.88 (0.83, 0.93)	0.87 (0.82, 0.92)	0.87 (0.82, 0.92)
USD-GBP IV	1.00 (0.95, 1.05)	1.00 (0.97, 1.05)	1.00 (0.97, 1.05)
EUR-GBP IV	0.97 (0.92, 1.02)	0.95 (0.90, 1.01)	0.95 (0.90, 1.01)
GBP-JPY IV	0.97 (0.92, 1.02)	0.96 (0.92, 1.02)	0.96 (0.92, 1.02)
ii) With autocorrelation			
	No regressors	An intercept	A linear time trend
IVI	0.82 (0.75, 0.91)	0.80 (0.72, 0.90)	0.80 (0.72, 0.90)
USD-GBP IV	0.92 (0.86, 1.01)	0.95 (0.87, 1.04)	0.95 (0.87, 1.04)
EUR-GBP IV	0.89 (0.81, 0.98)	0.86 (0.80, 0.94)	0.86 (0.80, 0.94)
GBP-JPY IV	0.89 (0.83, 0.97)	0.87 (0.82, 0.94)	0.87 (0.82, 0.94)

In red evidence of mean reversion

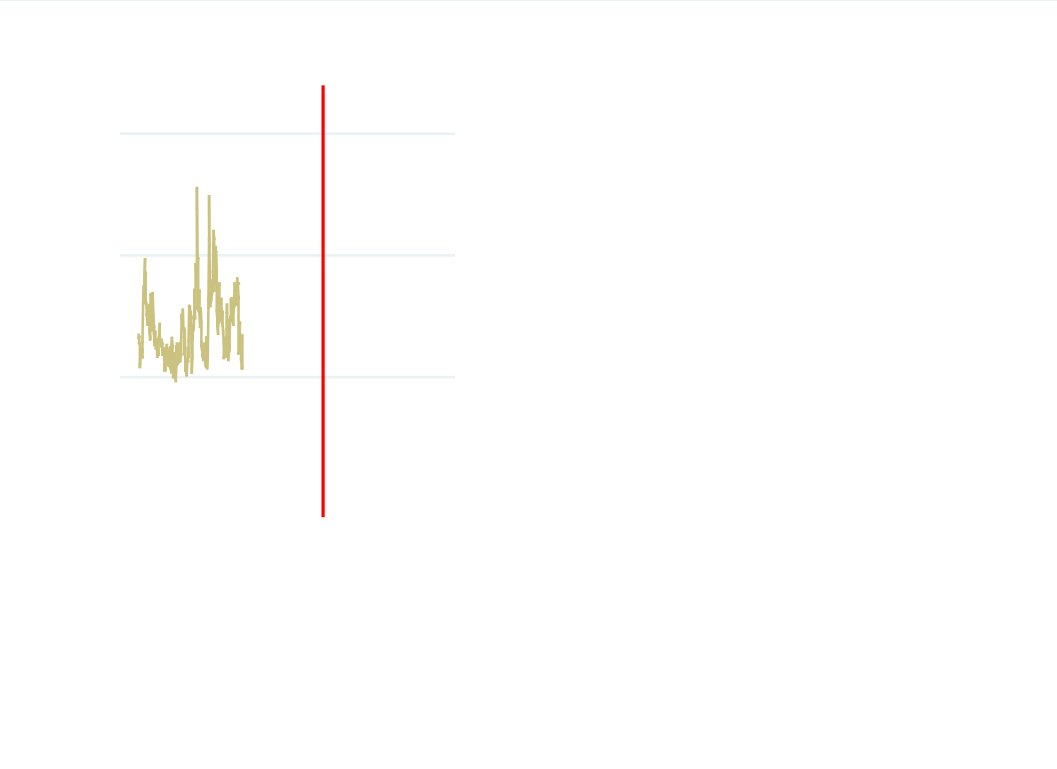
Table 2: Estimates of d for the whole sample using semi-parametric approaches

	IVI	IV USD-GBP	IV EUR-GBP	IV JPY-GBP
25	0.510	0.955	0.848	0.996
26	0.528	0.949	0.837	0.995
27	0.554	0.955	0.830	1.000
28	0.562	0.977	0.844	1.022
29	0.575	0.963	0.824	1.012
30	0.591	0.944	0.818	1.023
31	0.620	0.965	0.835	1.041

Table 3: Estimates of d for the subsamples before and after the Brexit referendum based on parametric approaches

i) No autocorrelation		
No regressors	An intercept	A linear time trend

Figure 1: The IVI and British pound's IVs



The vertical red line corresponds to 23 June 2016, the date of the Brexit referendum.

Figure 2: The UK EPU Index

The vertical red line corresponds to 23 June 2016, the date of the Brexit referendum. Source: the data are from Baker et al (2016a).

Figure 3: Estimates of d for each subsample using semi-parametric methods