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BY

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Is Heightened Political Uncertainty Priced in Stock Returns? Evidence from the 2014 Scottish Independence Referendum.

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Abstract

We contribute to a growing literature on economic and financial impacts of political uncertainty by assessing whether heightened uncertainty associated with an important political event is priced into stock returns. Our particular study looks at the period surrounding the 2014 Scottish Independence Referendum, although we argue that our approach and findings have wider relevance to assessing impacts of other political events, including Brexit. Using company data and portfolio-level analysis we document significant variation in returns and demonstrate that uncertainty betas help predict the cross-sectional dispersion of returns. These findings are robust to inclusion of controls (standard risk factors), but no longer hold when a Scottish specific uncertainty measure is replaced with UK-wide measures of either economic policy uncertainty or stock market uncertainty, adding support to the hypothesis that our findings are driven by referendum related uncertainty. We conclude that heightened political uncertainty was priced during the period surrounding the referendum, i.e. that uncertainty averse investors succeeded in gaining compensation for holding the volatile stocks of Scottish headquartered companies.

(168 words)

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1. Introduction

Political uncertainty now seems to be a prominent and persistent feature in our economic landscape. This fact is motivating considerable research that seeks to improve our understanding of the economic and financial impacts of political uncertainty. The ultimate aim of these studies is generally to assist policymakers, managers and investors in taking remedial action to limit the impacts of political uncertainty. Prominent and recent examples of such studies include Carriero, Clark and Marcellino (2018), Hill, Korczak and Korczak (2019), Phan, Nguyen, Nguyen and Hegde (2019) and Waisman, Ye, and Zhu (2015). Perhaps as we see more cases in which it is politicians' actions that generate and/or prolong political uncertainty, such studies can also have a role in cautioning politicians not to ignore the ways in which their actions, however well intentioned, in the longer-term have very real consequences.

Our paper contributes to this growing literature through seeking to assess whether heightened political uncertainty is priced in stock returns, that is, we assess whether or not uncertainty averse investors were successful in demanding extra compensation for holding stocks in companies that were exposed to heightened political uncertainty. More specifically, we examine company-level data on stock returns of companies headquartered in Scotland whose shares were listed on the London Stock Exchange (LSE). We examine raw company-level returns and conduct portfolio-level analysis of excess returns during the period of heightened political uncertainty in the run up to, and aftermath of, the 2014 Scottish Independence Referendum.

The choice of this referendum based case study is motivated by the desire to focus on a period: (i) in which heightened political uncertainty was tangible; (ii) which had the clear potential to impact differentially on an identifiable group of companies (i.e. those head quartered in Scotland as opposed to the all stocks listed on the LSE); and (iii) for which the time frame of the heightened political uncertainty is relatively tightly defined. On all these points, particularly the last two, the Scottish Independence Referendum contrasts with another obvious candidate, the Brexit Referendum.

The core dataset we exploit was constructed and used previously in Darby and Roy (2019): they identified all listed companies that were head quartered in Scotland over a sample spanning 2010 through to the end of 2015, tracking both new entrants and exits. However, in contrast to this earlier paper, in which the ensuing analysis was based on a specially constructed capitalization weighted Scottish stock price index, in the present paper we focus on company-level data and analysis of repeated cross-sections of portfolio-level returns.

Our initial analysis provides evidence that higher volatility Scottish stocks do yield greater average returns during the period of heightened political uncertainty in the run up to, and aftermath of, the Referendum. This allows us to infer that investors holding these stocks were compensated for their exposure to greater risk. We draw on a methodology proposed in Bali, Brown, Tang (2017), which they originally applied to an investigation of the role of economic uncertainty in the US in the cross-sectional pricing of individual stocks and equity portfolios. A similar approach has subsequently been used in a number of later studies, including by Gao, Zhu, O'Sullivan and Sherman (2019) for the UK, but has not previously been used to look at the impact of uncertainty generated by the Scottish Independence Referendum.

More specifically, we use company-level data at daily frequency to estimate of the conditional volatility (CV) of returns, then rank stocks from high to low volatility on each trading day using the previous day's estimated CV. We next construct artificial portfolios that are long in the highest volatility stocks and short in the lowest volatility stocks. We then present portfolio-level analysis in which we compare the characteristics of raw portfolio-level returns across several alternative artificial portfolios that differ only by the number of companies included in the high and low volatility groups. Each portfolio is assumed to be held for one day then rebalanced daily. Our results on the relative performance of high and low volatility stocks allow us to infer that portfolios consisting of the highest volatility stocks yield returns that are the greatest, on average, over the period examined; so we can infer that investors were compensated for their exposure to greater volatility. Again, following the methodology in Bali et al. (*op cit.*) we go on to examine whether this finding with respect to raw returns is robust to the inclusion of standard risk factors. While these risk factors are standard in concept, in order to implement the approach outlined above we need to construct measures of each of the risk factors relevant to the Scottish context. We provide full details on how we go about this in section 3.4 of the paper.

The next stage of our portfolio-level analysis aims to check whether the higher yields identified can be accounted for by heightened political uncertainty in the period surrounding the independence referendum. Our chosen methodology requires us to put forward a proxy for Scottish political uncertainty; our proposed measure is the estimated conditional volatility of returns in the constructed Scottish stock price index over the period surrounding the referendum, as generated in Darby and Roy (2019).

We estimate a series of rolling regressions to gain estimates of how sensitive each individual company's stock returns are to our uncertainty proxy. Each regression is run over a fixed window of 125 trading days and generates an estimated uncertainty beta for a given company on a given day (the final day of the window). Rolling the sample on by one day at a time results in a time series of estimated uncertainty betas for each company. The estimated uncertainty betas for all companies on a given day are then used to sort the stocks into groups that form new artificial portfolios. We then perform portfolio-level tests that demonstrate portfolios which are long in stocks with the lowest uncertainty beta and short in stocks with the highest uncertainty beta yield a significant uncertainty premium. Our results suggest that uncertainty averse investors were successful in demanding extra compensation to hold stocks with a negative uncertainty beta and were willing to pay high prices for stocks with a positive uncertainty beta. The portfolio-level results described above were demonstrated to be robust to the inclusion of the standard controls in the form of the market, size, value and momentum risk factors.

In order to check whether these key findings are indeed driven by Scottish specific uncertainty over the period surrounding the Referendum we investigate whether we can replace our Scottish specific uncertainty measure with a frequently used proxy for UK-wide economic policy uncertainty. The fact that our repetition of the portfolio-level analysis based on the alternative uncertainty measure fails to identify any significant uncertainty premium allows us to be more confident that our key findings are indeed driven by Scottish specific heightened political uncertainty over our sample period.

As a final check on our key results, we construct a Scottish uncertainty risk factor (full details are provided in section 4.4), and test whether the inclusion of this uncertainty risk factor, alongside those for market, size, value and momentum, is able to eliminate our previous finding that positive abnormal returns are earned by highly volatile stocks. Our results indicate that the augmented factor model reduces estimated abnormal returns such that they are close to zero, and eliminates their statistical significance.

Overall, our results indicate that heightened political uncertainty around the time of the 2014 Scottish Independence Referendum was priced: i.e. uncertainty averse investors were successful in demanding extra compensation to hold volatile stocks of Scottish headquartered companies both in the run up to the referendum and in the aftermath of the referendum result. Furthermore, our results indicate that part of the costs of Referendum related political uncertainty was borne by companies, who faced a higher cost of capital.

To the extent that generating heightened political uncertainty is a definite choice of the politicians who propose and/or support such referendums, while we acknowledge they hopefully do so while believing that their preferred outcome will result in a brighter collective future, our results suggest they should factor in the kind of (unintended, but possibly protracted) adverse impacts that referendum related uncertainty can generate. That significant impacts are found in the case of the Scottish Independence Referendum, and persisted for some time after the result of the vote became clear, suggests that even greater detrimental impacts on companies would be likely to follow from the Brexit Referendum, particularly given the surprise result of the vote relative to polls and betting odds, and given the protracted and continuing period of post-Brexit Referendum uncertainty.

The remainder of our paper is structured as follows: Section 2 provides an overview of related literature. Section 3 briefly outlines a timeline of key events in the run up to, and the aftermath, of the Scottish Independence Referendum. Section 4 sets out the econometric methodology, then presents and interprets our empirical results, while section 5 concludes.

2. Related literature

A solid theoretical foundation for examining the stock market implications of political uncertainty is provided by Pástor and Veronisi (2012, 2013). They consider two types of uncertainty in their 2012 paper, both of which are likely to have been relevant in the run up to, and aftermath of, the Scottish Independence Referendum:

i) policy uncertainty, which is uncertainty about how current government policy will change (in our case this equates to uncertainty about the referendum result and about policy once the result is known); and

ii) impact uncertainty, which concerns uncertainty about the impact that changes in policy will have on the profitability of the private sector (note that this element of uncertainty remains even in the rare situation of the policies that will be adopted once the result is known having been fully specified and committed to but each side, prior to the actual vote).

They use their model to demonstrate that both aspects of political uncertainty begin to affect the volatility of stock returns before any actual policy changes take place due to fluctuations in investors' assessments of the probability of a policy change as well as their beliefs about the likely policy impacts. They go on to show that political uncertainty commands a risk premium independently of fundamental economic shocks. A new development in their 2013 paper arises from their consideration of learning about the political costs associated with potential new policies, and this element of the specification generates the result that stocks command a higher risk premium in the face of political uncertainty when the economy is weaker. Finally, they explain that reactions at the time of the actual change may be weak if the change is widely anticipated, but can be strong if investors' are caught by surprise. In both papers, Pástor and Veronisi use US data to provide some empirical support for their theoretical predictions. Their analysis has clear relevance to the case of a closely contested election and/or referendum in which the outcome of the vote and the nature of the policy changes that may ensue are unclear, even after the outcome is known.

While there is very little existing literature on the impacts of referendum related uncertainty, there is a substantial literature looking at the impacts of electoral uncertainty on stock market volatility. Illustrative examples include Goodell and Vähämaa (2013) who focus on six US presidential elections and find that as the probability of the eventual winner changes, the implied volatility of the S&P 500 index increases. Li and Born (2006) also investigate stock data around the time of US presidential elections and find that, when an election does not have a candidate with a dominant lead, both stock market volatility and average returns rise. Vuchelen (2003) analysed Belgian data and stressed that, within a coalition based political systems, election results may eliminate some possibilities but that more decisive positions on policy generally only become clear once a new coalition has been announced,

Examples of cross-country studies include Pantzalis, Stangeland and Turtle (2000) who find evidence of positive abnormal returns in the two-week period prior to elections, in their analysis of 33 countries. Bialkowski, Gottschalk and Wisniewski (2008) show that elections are accompanied by significant hikes in stock market volatility, which are more pronounced during closely contested races, in their study of data for 27 OECD countries. They also point to cases in which the excessive volatility could not be resolved quickly, for example, when the political orientation of the government changes or when an election is inconclusive.

We can draw on these election based studies to stress several potential parallels with referendum outcomes: (i) when there is no clear side in the lead in pre-vote polls; and (ii) when, even after the result is announced, the timing and nature of the next steps after the vote are unclear.

Among the small number of papers that investigate the stock market impacts of referendums is one study that focuses on Canada's 1995 Quebec Referendum; two that investigate impacts of the 2014 Scottish Independence Referendum; and one that looks at the impacts of uncertainty in the run-up to the UK's 2016 Referendum on its continued membership of the European Union, commonly referred to as the 'Brexit Referendum'.

Taking these in turn, Beaulieu, Cosset and Essaddam (2005) investigate the short run effect of the 1995 Quebec referendum on the stock returns of Quebec firms relative to those of firms with similar characteristics that are not headquartered in Quebec. They show that the uncertainty around whether Quebec would remain within the Canadian Federation or not affected the stock returns of the Quebec firms and that the impact varied with the political risk exposure of the firms. However, they did not explicitly investigate the extent to which uncertainty was priced.

Darby and Roy (2019) investigate stock market uncertainty associated with the Scottish Independence Referendum, using the same core dataset exploited in this paper. They find that the conditional volatilities of FTSE returns and of returns in a constructed Scottish stock market index can be described by the same GARCH parameters up to five months prior to the referendum date, but that there is significant divergence thereafter. They further demonstrate that movements in the relative conditional volatility of Scottish versus FTSE returns occur around key dates that were significant during the campaign and in the months following the vote, reaching a peak just as opinion polls suggested the referendum race was too close to call; falling immediately after the result was announced; then climbing again prior to the publication of the Smith Commission report (which made recommendations on how to deliver on a commitment regarding further devolution that was given by the parties who wanted Scotland to remain within the UK group just days prior to the vote).

Importantly, our results provide support for the assertion that the Scottish Independence Referendum itself did not entirely resolve the uncertainty faced by both companies and investors. The continuation of heightened uncertainty beyond the announcement of the Referendum result motivates our analysis of a sample period that continues beyond the day of the vote. Nonetheless, Darby and Roy (*ibid.*) find no significant GARCH-in-mean effects, which suggests heighted risk was not priced at this aggregate level, but notably, they left analysis of disaggregated data for future work, and this is what we pick up on in the present paper.

Acker and Duck (2015) provide analysis of company-level stock returns in the run up to the Scottish Independence Referendum. They argue that investors appear to pay attention to opinion polls and betting odds about the likely referendum result and provide evidence that political risk associated with the referendum was priced. They further argue pricing of uncertainty was especially apparent in a small group of stocks.

Finally, Hill, Korczak and Korcazak (2019) investigate some stock market impacts of political uncertainty associated with the UK's 2016 'Brexit' referendum. Like Acker and Duck, they focus on the sensitivity of firms' stock returns to changes in the probability of the referendum result calculated from bookmakers' odds, and focus on the a sample spanning the referendum campaign.

A downside of the studies by both Acker and Duck (op cit.) and Hill et al. (op cit.) is that their analysis stops on the date of the vote, so they can only comment on the stock price reactions to polls and betting odds up to and including the immediate impact of the eventual referendum result. In the case of the Brexit Referendum it is worth remembering that, relative to poll results and betting odds published during the campaign, the result of the vote was a major surprise (with perhaps the exception of some betting odds in the final hours before the result was announced). Indeed Hill et al. note that is a role for follow-on research on how companies have continued to be affected by Brexit-related uncertainty during the post-referendum (and pre-exit) period. Presumably, post exit analysis will also become relevant as wider impacts, details of the new 'regime' and post-exit policy frameworks finally begin to evolve.

While our view is that the omission of any post referendum analysis is unfortunate, it also seems highly likely that the existing pre-referendum results from these studies, while significant, will understate the full impacts of referendum related uncertainty. In reality, in both the Brexit and Scottish Independence cases, the referendum results themselves did not immediately resolve uncertainty about future policy. In the Scottish case, the future course of policy remained unclear even after the 'No' vote, because the status quo had already been ruled out by the political parties who wanted Scotland to remain within the UK (and had the vote gone the other way, there were various aspects of future arrangements and policies that had yet to be resolved). News on various aspects of the intended way forward only became clearer after the publication of the Smith Commission report with its recommendations for the further devolution of powers to the Scottish Government.

Likewise, while there were undoubtedly elements of significant Brexit related uncertainty during the campaign period, and this may indeed have had notable impacts, the extent of the uncertainty and of its impacts in that pre-referendum period would surely pale into insignificance relative to the staggering heights of Brexit related uncertainty that became evident after the referendum result was known.

At the time of writing, more than three years after the vote, much of this uncertainty about the timing and nature of exit from the EU has yet to be resolved. On this basis, it is not hard to argue that an investigation of the stock market impacts of the Brexit vote should ideally incorporate a focus on the period since the result, rather than, or perhaps in addition to, the period prior to the result. Furthermore, these impacts may be kept distinct from the actual impacts of EU exit, the majority of which will only be felt once more is revealed about what will actually happen and when. Another fact to keep in mind is that very few UK listed companies (or those across Europe and elsewhere) are likely to escape any impacts from Brexit related uncertainty. In contrast, we believe that the 2014 Scottish Independence Referendum provides a relatively contained case study in which it is reasonable to expect listed companies headquartered in Scotland to be affected differentially to those non-Scottish listed firms included in the FTSE over a relatively tightly defined period.

But what of the future? While we believe it is reasonable to argue that any continuing impacts of the 2014 Independence Referendum would have diminished, particularly as Brexit related issues began to dominate, there are strong reasons to believe that uncertainty regarding a second Scottish Independence Referendum is on the rise again. First, because of the major contrast in the overall outcome of the Brexit vote, i.e. the narrow UK-wide win for the ‘Brexiteers’, and the revealed preferences of voters in Scotland, who were strongly in favour of ‘Remain’. Second, there is dissatisfaction among many Scottish voters, and in the Scottish government, with protracted post-referendum uncertainty and distractions; and third there are growing explicit calls for a second Scottish Independence Referendum, e.g. Scottish First Minister Nicola Sturgeon announced a target date for another independence referendum in the second half of 2020 during a speech in May 2019. More recently, on the appointment of Boris Johnson as the new UK prime minister in July 2019, and given the widely reported commitment he gave for the UK to leave the EU on 31 October 2019 with or without a deal, 'come what may' and 'do or die' has served to generate louder calls for an alternative option of Independence for Scotland. Nicola Sturgeon has gone on to state that the Scottish government will continue to make preparations to give people in Scotland the choice of becoming an independent country." On this basis, there is growing need to learn more about the impacts of referendum related political uncertainty.

All the referendum related studies referred to above focus on the behavior of stock returns at a time of obviously heightened political uncertainty. When investigating whether this uncertainty is priced, it is important to control for other commonly used risk factors and to cross check results against the possible impacts of other measures of uncertainty that may potentially be relevant. In what follows we draw on established methodologies to do this. We also make use of a UK wide measure of economic policy uncertainty (EPU) provided by Baker Bloom and Davis (2013, 2016).

In fact, Baker et al. provide a range of country specific measures of EPU. Their indices are constructed using information on daily counts of articles in selected quality newspapers that contain the following trio of terms: “the economy”, “policy” and “uncertainty”. They infer that increases in a given country’s EPU index indicate that businesses, households, the government and other policymakers face heighted uncertainty with respect to the expected economic policies and/or the likely impacts of policies, which may in turn harm macroeconomic performance and impact on stock returns.

These EPU measures are now used widely in empirical studies seeking to investigate various potential impacts of policy related uncertainty. Examples include the empirical evidence presented in Pástor and Veronisi (2013), in support of the predictions of their theoretical model, also by Brogaard and Detzel (2015) who examined US cross-section and time series data and found that heightened economic policy uncertainty, as captured by movements in EPU, result in investors demanding risk premia in asset markets. The Baker et al. data also features in work by Hu, Kutan and Sun (2018) and Gao et al. (2019). In contrast, Bali et al. (2017) used the US economic uncertainty index from Jurado, Ludvigson, and Ng (2015) and data on each stock trading in the New York Stock Exchange, American Stock Exchange and NASDAQ to estimate stocks’ exposure to uncertainty.

A common feature of the last three papers is that they seek evidence on the impacts of economic policy uncertainty on excess returns within an extended CAPM model of the kind suggested by Fama and French (1993) Cathart (1997) and others. Other relevant work that similarly looks at the dispersion of stock returns includes Ang et al. (2006), and Adrian and

Rosenberg (2008). They show that stocks that are less sensitive to market wide volatility tend to earn higher returns than stocks that are more sensitive to market wide volatility; and that these results are robust to the inclusion of the other common risk factors. Finally various studies, beginning with Schwert and Seguin (1990), Ng, Engle and Rothschild (1992) and Engle and Ng (1993) motivate us to account for the impact of market wide volatility on the performance of individual stocks and portfolios of high and low volatility stocks. In our view it is important to take into account the likelihood that returns will systematically be greater for small capitalization stocks and systematically lower for stocks with low market-to-book ratios or price-to-earnings ratios. Carhart's model adds a momentum factor that is intended to capture any 'momentum premium' attributed to stocks that show a tendency to continue rising if it is going up or conversely to continue declining if it is going down.

Bali, Brown and Tang (2017) is a particularly pertinent study that finds uncertainty to be a significant predictor of the cross-sectional dispersion in future stock returns, before and after controlling for other well-known risk factors. Hu, Kutan and Sun (2018) apply a similar approach to Chinese data, showing that investors require a premium to hold those Chinese A shares that are sensitive to Baker et al.'s measure of US EPU. Gao et al. (2019) show that Baker et al.'s measure of UK EPU has power in explaining a cross-section of UK stock returns, but that the EU and US measures of EPU are not priced into UK returns; again these results are found when they control for other common risk factors.

Our own approach is informed by the studies discussed above. However, we make the following distinctive contributions to this existing literature: (i) we adapt standard methods in order to construct risk factors for the relevant Scottish listed companies (detailed in Section 3.2) from available daily data; (ii) we extend the usual risk factors to include a measure that captures heightened political uncertainty in the period surrounding the 2014 Scottish Independence referendum; and (iii) whilst controlling for the standard risk factors, we provide a clear test of whether heightened political uncertainty in the run up to and the aftermath of the referendum was priced into stock returns.

3. Choice of sample, data used in estimation and construction of risk factors

In this section, we explain our choice of sample period and justify our choice by outlining elements of the timeline relevant to the Independence Referendum. We also document the data used in our analysis and describe the construction of the Scottish risk factors that are used in our subsequent regression analysis.

3.1 *Sample period and the timeline of the Scottish Independence Referendum*

Our sample period runs from April 6th 2010 to June 4th 2015. We make this choice so as to span key dates relevant to the referendum. There is general agreement that the seeds of the referendum were sown following the 2007 Scottish Parliament election, at which the Scottish National Party (SNP) ended Labour's eight-year dominance at Holyrood. At this point, Alex Salmond became First Minister and led the minority Scottish Government. However, it was the following Scottish Parliament election of 5th May 2011 when the SNP gained a majority of MSPs that Alex Salmond argued he had the mandate to hold the Referendum. He quickly stated his intention to hold the Scottish Independence Referendum in the second half of the term.

After extensive negotiations, on 15th October 2012, the UK and Scottish governments signed the Edinburgh Agreement that set out the necessary constitutional arrangements for the Referendum. On 30th January 2013, the wording of the referendum question was agreed. The date of the vote (17th September 2014), was announced on 21st March 2013. The Referendum result was announced on 18th September 2014: 55.3% voted against independence and 44.7% voted in favour with the turnout of the electorate hitting a record high of 84.6%. The result led the UK Prime Minister, David Cameron, to immediately establish the Smith Commission, which was charged with looking at options for further devolution. The Smith Commission reported on 27th November 2014 and legislation based on the recommendations of the Commission's Report was ultimately implemented in the Scotland Act 2016, which received Royal Assent on 23rd March 2016.

In order that our sample period allows us to capture heightened uncertainty associated with these key events in the run up to and the aftermath of the referendum, and also gives us the ability to capture any further responses once the Smith Commission's recommendations were published, our sample beings on April 6th 2010, one month before the UK General Election, and extends to 4th June 2015, one month after the 2015 UK General Election. This choice of end date has the added advantage of avoiding conflating any effects of Brexit related uncertainty, which came later.

3.2 *Scottish companies' stock returns data and the risk-free rate of return*

Following Darby and Roy (2019), we restrict our analysis to companies listed on the London Stock Exchange (LSE) and head quartered in Scotland. We track companies that were listed throughout the sample period, as well as new listings and de-listings. Table 1, summarizes the number of Scottish listed companies in each year of the sample period. As with Beaulieu et al.'s (2006) study of the Quebec referendum, our core company-level and portfolio-level analysis includes the sub-set of these companies that were listed on the date of referendum, giving a total of 48 Scottish listed companies from which we exclude the Royal Bank of Scotland (RBS)[1] .

[Table 1 Here]

Daily data on share prices and monthly data on market capitalization were downloaded from DataStream. We use capitalization weights to construct a proxy for daily returns on the Scottish market portfolio for which capitalization weightings are applied to the closing price of each Scottish company's stocks, every trading day. The risk-free rate of return is represented by the daily data on the UK three-month Treasury bill rate, which are obtained from the Xfi Centre for Finance and Investment at the University of Exeter.

3.3 Proxies for Uncertainty

In order to examine whether our findings are sensitive to the chosen measure of uncertainty, we consider three different proxies. The first is Darby and Roy's (2019) measure of Scottish specific uncertainty, which is the estimated conditional volatility of returns on the value-weighted Scottish stock price index. The second proxy we consider is the corresponding measure of UK wide stock market volatility, based on the estimated conditional volatility of stock returns from an EGARCH model of returns on the FTSE all share index. Finally, we also employ the UK economic policy uncertainty index (EPU) as developed by Baker et al. (2016) and downloaded from their website, as a proxy for more general UK-wide economic policy uncertainty.

[Figure 1 Here]

[1] The location of the headquarters is important for our study - as argued in Darby and Roy (2019) political uncertainty related not only to the effect that the independence referendum would have on the Scottish economy but also to its potential impact on fundamental legal and constitutional structures, economic rules and regulations and the applicability of global treaties, all of which would have a significant impact on companies headquartered in Scotland. Also, in line with this earlier paper, Investment Trusts are excluded from this sample because they are best seen as investment vehicles that have a limited 'footprint' within the local economy. Finally, the exclusion of RBS is justified since this company received a substantial bailout during the 2008-9 financial crisis and during our sample period the UK government still held over 80% of RBS shares.

3.4 Construction of Risk Factors

The main risk factors we use are those suggested in Fama and French's (1993) three-factor model and Carhart's (1997) four-factor extension. Fama and French argued that the size and value factors capture a dimension of systematic risk that is not captured by market beta in the Capital Asset Pricing Model (CAPM). The size effect seeks to capture the fact that small capitalization stocks tend to earn investors higher returns than stocks with a large market capitalization. The value effect attributes superior performance of stocks with a low price-to-book ratio compared to those with a high price-to-book ratio. Carhart's model adds a momentum factor that is intended to capture any 'momentum premium' attributed to stocks that show a tendency to continue rising if it is going up or conversely to continue declining if it is going down.

Data on risk factors for the UK stock market are readily available from Xfi Centre for Finance and Investment at the University of Exeter and are described in Gregory, Tharyan and Christidis (2013). However, for this study we require risk factors specific to the Scottish market. We now turn to explaining how we construct these.

The Scottish excess market return (*Mkt*) is measured as the difference in the return on the value-weighted portfolio of Scottish stocks and the yield on Treasury bills. The size risk factor (*Size*) is the difference in returns on a portfolio comprising of small stocks and a portfolio of large stocks; in this paper the Scottish *Size* is calculated by forming a portfolio each trading day that shorts the upper 40% of the Scottish stocks, and longs the lower 40% of the listed companies headquartered in Scotland and holding for one trading day before reforming[2]. The value risk factor (*Value*) is the difference in returns between a portfolio of value stocks with high book-value to market-value ratios and a portfolio of growth stocks with low book-value to market-value ratios. The Scottish *Value* factor is estimated as the daily return on the highest 40% of stocks by book-to-market ratio minus the daily return on the lowest 40% of stocks and holding for one trading day. Finally, the momentum risk factor (*Momentum*) is measured as the difference between the returns on the best performing stocks over the past year and the worst performing stocks. For the Scottish *Momentum*, the stock returns for the Scottish companies are ranked over the previous 250 trading days (i.e. around 1 year). A factor mimicking portfolio is then constructed by longing the top performing 40% of Scottish stocks and shorting the worst performing 40% of Scottish stocks over the previous

[2] Given our sample size, we use the 40% criteria to ensure that there are sufficient stocks in each portfolio.

250 trading days, reformed daily. Following Gregory et al. (2013), all portfolios are value weighted using the market capitalization of each stock.

Summary statistics for UK risk factors and for our constructed Scottish risk factors are set out in Table 2.

[Table 2 Here]

Important points to note are that there is no discernable difference in the means of the *Mkt* risk factor and little difference in the means of the others, but the standard deviations of all the Scottish risk factors are greater than those for shares included in the FTSE all-share index.

4. Empirical methodology and results

In this section, we set out our empirical methodology then present and interpret our results.

4.1 Company-level analysis

Our first step is to use company-level data at daily frequency to estimate the conditional volatility (CV) of returns; specifically we estimate an AR(1)-TGARCH(1,1) model for each company's stock returns. The estimated mean and conditional volatility equations are set out in [4.1] below[3].

$$r_{i,t}=\mu_i+\rho_i r_{i,t-1}+\varepsilon_{i,t} \quad \text{where } \varepsilon_{i,t}|\Omega_{t-1}\sim N(0,h_t) \qquad [4.1]$$

$$h_{i,t}=\sigma_{i,t}^2=\varpi+\alpha\varepsilon_{i,t-1}^2+\gamma d_{t-1}^{+}\varepsilon_{i,t-1}^2+\beta\sigma_{i,t-1}^2$$

where $r_{i,t}$ is the stock return of company *i* at time *t*, $\varepsilon_{i,t}$ is the disturbance term, Ω_{t-1} is the information set, $h_{i,t}$ is the conditional volatility of the stock returns of company *i*, and d_t^{+} is a dummy variable which takes the value 1 if $\varepsilon_{i,t} > 0$.

4.2 Investigating the relative performance of high and low volatility stocks

We next use the individually estimated company-level CVs to group stocks into portfolios

[3] In the one case in which this model failed to converge, an AR(1)-GARCH(1,1) was used instead.

consisting of the highest and lowest volatility stocks. More specifically, the estimated CVs for the previous day are used to rank individual stocks from high to low volatility on a daily basis. Next, artificial portfolios are constructed by holding the 8 stocks with highest volatilities and shorting 8 ones with lowest volatilities. For robustness checks, we also construct 10 and 12 stock portfolios. The artificial portfolios are assumed to be held for one trading day and are rebalanced daily. A sequence of forward-looking daily returns for each artificial portfolio is then observed over the whole sample period.

The sequences of portfolio-level returns are then examined to evaluate the relative performance of high- to low- volatile stocks. The results shown in Table 3, Panel A allow us to infer that high volatility portfolios, earn daily returns of more than 0.1% on average (equivalent to a monthly return of more than 2.02%) over the period examined while the low volatility portfolios earn daily returns of just 0.02% on average. From this, we have demonstrated that the portfolios consisting of the highest volatility stocks do yield significantly greater average raw returns, so can infer that investors were compensated for their exposure to great volatility.

[Table 3 Here]

We further examine whether or not this initial finding with respect to raw returns is robust after controlling for standard risk factors such as the market, size, value and momentum (as proposed by Jensen (1968), Fama and French (1993), Carhart (1997)):

$$r_{p,t} = \alpha_p + \beta_j F_{tO} + \upsilon_{p,t} \qquad [4.2]$$

where $r_{p,t}$ is the excess return on high minus low volatile portfolios (*HML* volatility) over the risk-free rate. F_{tO} is a matrix of risk factors for market, size, value and momentum (as described in section 3.4, we construct specific variants of these risk factors). β_j is a matrix of risk factor loadings. α_p is a measure of return adjusted by the aforementioned risks. A significant and positive estimate of α_p indicates that the higher raw return generated by high volatility stocks cannot be explained by the standard risk factors and that investors require a further risk premium for holding these stocks. The t subscripts denote time.

Key components of the results of estimation of variants of equation 4.2 are presented in Table 3, Panel B. The table shows the estimated alphas for the High 8 minus Low 8 portfolio

(Panel B, column (i)), i.e., a portfolio long in the highest 8 volatile and shorting the lowest 8 volatile stocks along with the equivalent results for the High 10 minus Low 10 and High 12 minus Low 12 portfolios which are presented in Panel B columns (ii) and (iii) respectively.

All columns of Table 3, Panel B, report positive and statistically significant alphas on the mimicking portfolios, even after controlling for Scottish specific measures of other well-known risk factors. This suggests that the superior performance of highly volatile stocks cannot be attributed to the combined effects of market, size, value and momentum risks. These results motivate us to continue exploring what the major causes of the higher return achieved by highly volatile stocks might be. In particular, we are interested in testing whether heightened political uncertainty is a factor in explaining the superior average performance of the most volatile stocks.

4.3 Is Uncertainty Priced?

The next stage of our portfolio level analysis aims to investigate whether or not the heightened uncertainty in the run up to, and aftermath of, the 2014 Scottish Independence Referendum was priced in the cross-section of Scottish stock returns. If Scottish stocks are exposed to political uncertainty risk, and if this risk is systematic, i.e., difficult to diversify, investors would require a premium for holding uncertainty sensitive stocks. Our chosen methodology requires us to select a proposed measure of heightened uncertainty. We use the Scottish specific measure from Darby and Roy (2019). In the first step, for each stock and for each day in our sample, we estimate the uncertainty betas (β_i^{UNC}) from daily rolling regressions of excess stock returns on the relevant uncertainty measure (UNC) over a 125-day fixed window (i.e., over the preceding 6 months) regressions are repeated for all Scottish stocks provided there is sufficient data to run a minimum of 36 consecutive rolling regressions[4]. We do this while controlling for the market, size, value and momentum risk factors (discussed in Section 3.4) as indicated in equation 4.3:

$$r_{i,t} = \theta_i + \beta_i^{UNC} UNC_t + \delta_i F_t^O + \varepsilon_{i,t} \qquad [4.3]$$

where $r_{i,t}$ is the excess return of stock i on day t, UNC_t is the relevant uncertainty measure, β_i^{UNC} measures the stock's sensitivity to the measure of political uncertainty, F_t^O is a matrix of risk factors for market, size, value and momentum and t subscripts denote time. We then

[4] We require that at least 36 daily observations be available for variables estimated over the past 125 days.

use the estimated uncertainty betas to sort the stocks into groups and perform portfolio-level tests that allow us to demonstrate that portfolios that are long in stocks with the lowest uncertainty beta and short in stocks with the highest uncertainty beta do yield a significant uncertainty premium. In order to check whether these key findings are driven by Scottish specific uncertainty over the period surrounding the Independence Referendum we investigate what happens when we replace our Scottish specific uncertainty measure with a Baker *et al.*'s frequently used proxy for UK-wide economic policy uncertainty (EPU).

For each day, portfolios formed by sorting in descending order individual stocks based on their estimated uncertainty betas. Value-weighted uncertainty risk-mimicking portfolios are constructed as the difference between the 'low minus high' portfolios, e.g. Low 45% minus High 45% and are reformed daily. We conduct robustness checks by assigning stocks to either high/low 40% or high/low 45% value weighted portfolios based on the estimated beta, β^{UNC} for Scottish companies. As explained by Bali et al. (2017) and Gao et al. (2019), the portfolio with the lowest beta (which could be negative) is associated with the highest risk of political uncertainty and hence uncertainty-averse investors demand a premium in the form of higher expected returns to hold this portfolio and *vice versa*. We also use UK wide data to test whether the Scottish specific uncertainty and/or a UK wide political uncertainty is priced[5]. We conduct robustness checks by assigning stocks to either High/low 30%, High/Low 35% or High/Low 40% value weighted portfolios based on the estimated beta β^{UNC} for the UK market.

In the second step, we estimate the alpha of the $\beta_{i,t}^{UNC}$ sorted portfolios using three different factor models to examine whether the excess return of the low-beta portfolio over the high-beta portfolio can be explained by the existing risk factors, market, size, value and momentum as set out below

$$r_{u,t} = \alpha_{u1} + \beta_1 r_{m,t} + v_{i,t} \qquad [4.4]$$

where $r_{u,t}$ is the daily return on the low minus high political uncertainty beta portfolios. β_1 is the risk factor loading and $r_{m,t}$ represents returns on the benchmark portfolios. α_{u1} is a measure of abnormal returns having controlled for the market return.

[5] For the UK market, we employed the conditional volatility of the FTSE All Share as the UK uncertainty measure rather than Baker's EPU measure as Gao et al. (2019) have previously shown that the UK EPU is priced in the cross-section of UK stock returns.

We additionally control for the rest of the well-established risk factors through estimating the variants shown below

[4.5]

$$r_{u,t} = \alpha_{u3} + \beta_1 r_{m,t} + \beta_2 Size_t + \beta_3 Value_t + \beta_4 Mom_t + v_{i,t} \qquad [4.6]$$

where β_j, j = 1, 2, … ,4 are the risk factor loadings and $r_{m,t}$, $Size_t$, $Value_t$, and Mom_t are the returns on the benchmark factor portfolios for market, size, value and momentum risks respectively. α_{ui} is a measure of return controlling for the well-established risk factors and can be used as a test statistic to evaluate the predictive power of the political uncertainty risk factor.

Table 4 presents the magnitude and statistical significance of the risk adjusted returns (alphas) from the three factor models [4.4]-[4.6] with t-statistics in parentheses.

[Table 4 Here]

Starting with the simplest results, shown in Table 4 Panel A, there is clear evidence that the measure of Scottish specific uncertainty provided in Darby and Roy (2019) is priced into the stock return of Scottish companies over our sample period. Specifically, we find that the Low 40% minus High 40% uncertainty beta portfolio yields a daily significant excess return of 0.096%, 0.069% and 0.073% against the CAPM, Fama French (1996) three-factor and Carhart (1997) four-factor models respectively. We find that this result remains robust when we look at the Low 45% minus High 45% portfolio, which also shows positive and significant alphas at the 10% significance level, as shown in Table 4, Panel B (i).

In order to seek further assurance that these key findings are indeed driven by Scottish specific uncertainty over the period surrounding the 2014 Scottish Independence Referendum we investigate whether or not we can replace our Scottish specific uncertainty measure with Baker et al.'s (2016) frequently used proxy for UK-wide economic policy uncertainty (see Table 4, Panels A and B, row (ii). The fact that our repetition of the portfolio-level analysis based on this alternative uncertainty measure fails to identify any significant 'uncertainty premium allows us to be more confident that our significant findings in Panel A row (i) and

Panel B row (i) are indeed driven by Scottish specific heightened political uncertainty over our sample period; we find no evidence in support of a role for UK wide economic policy uncertainty in predicting Scottish stock returns.

Panels C and D of Table 4 provide results for the UK stock market. The results in Panel C clearly show that the FTSE All-share conditional volatility is not priced; and in panel D, we show that the Scottish specific uncertainty measure is not priced in the cross-section of UK stock returns either.

Overall, we find that during the period surrounding the 2014 Scottish Independence Referendum, investors were successful in demanding a premium in order to hold stocks with low sensitivity to Scottish specific uncertainty, while it seems that investors in UK stocks were able to diversify their portfolios in the face of UK-wide uncertainty and did not require a premium for either Scottish specific uncertainty or UK wide economic policy uncertainty.

4.4 Explaining abnormal returns

As a final check on our key results, we construct a Scottish uncertainty risk factor and test whether the inclusion of this uncertainty risk factor, alongside those for market, size, value and momentum, is able to eliminate our previous finding that positive abnormal returns are earned by highly volatile stocks. Essentially this is an extension of Carhart's four-factor model:

[4.7]

where $r_{p,t}$ is excess return on portfolios of high minus low volatile stocks over the risk-free rate and Sun_t denotes the estimated Scottish political uncertainty risk factor. This risk factor is calculated as the daily return on low minus high beta portfolios related to the Scottish uncertainty measure.

[Table 5 Here]

Table 5 presents the magnitude and statistical significance of the estimated coefficients with t-statistics in parentheses. To be consistent with our earlier findings from Section 4.2, we report results for high/low volatility portfolios consisting of 8, 10 and 12 stocks respectively in Panels A, B and C. Whilst it is clear that our findings are sensitive to alternative portfolio sizes - a significant but very small alpha is obtained for the High/Low 10 stocks portfolio - the estimated alphas in Panels A and C respectively indicate that the superior performance of high- to low-volatility stocks is explained by the Scottish political uncertainty risk factor. In addition, the loadings on our Scottish constructed risk factors for market, size, value and political uncertainty are all statistically significant at the 1% level, suggesting a good predictive power of our ‘five-risk factor’ model in [4.7]. These findings remain robust if we omit the now insignificant momentum risk factor.

Overall, there is a striking comparison to be made between the insignificant estimated alphas in Table 5 and the significant positive estimated alphas reported in Table 3. We infer that the exposure of highly volatile stocks to heightened Scottish uncertainty is a likely explanation for the positive contemporaneous correlation between individual stock returns and their volatility. This again implies that investors were successful in demanding higher returns to compensate for their exposure to heightened uncertainty in the run up to, and aftermath of, the 2014 Scottish Independence Referendum.

5. Conclusion

Political uncertainty looks likely to remain a prominent and persistent feature in our economic landscape. Brexit related uncertainty has now been a feature for more than three years and is continuing. Meanwhile, dissatisfaction with current UK politics has put a (second) Scottish Independence Referendum back on the agenda. Using available data, we have sought to gain greater understanding of the nature of the exposure of companies to uncertainty associated with a major political event. This endeavour should help managers, investors and policy makers to enhance their understanding of the impacts of political uncertainty and to determine the appropriate action to take to limit its impacts.

We set out to assess whether heightened uncertainty associated with an important political event is priced into stock returns. More specifically, we focused on detailed company- and portfolio-level analysis of companies listed on the London Stock Exchange and head quartered in Scotland over the period of heightened political uncertainty in the run up to, and aftermath of, the 2014 Scottish Independence Referendum. Our initial results provide evidence that higher volatility Scottish stocks do yield greater average returns. Our portfolio-level analysis refined our inference, and was shown to be robust to the inclusion of a range of Scottish specific, but otherwise standard, risk factors. We then demonstrate that uncertainty betas help predict the cross-sectional dispersion of returns. These findings were also robust to inclusion of Scottish specific risk factors, but no longer held when our proxy for Scottish uncertainty was replaced with a UK-wide measure of economic policy uncertainty, thereby adding support to the hypothesis that our findings are driven by referendum related uncertainty over the chosen sample period. Overall, our results are consistent with the hypothesis that heightened political uncertainty was priced in the period surrounding the referendum, i.e. that uncertainty averse investors succeeded in gaining extra compensation for holding volatile stocks of Scottish headquartered companies.

Our findings add to the less disaggregated results in Darby and Roy (2019), showing that investors were able to diversify their portfolios to in the face of UK-wide economic policy uncertainty and stock market uncertainty over our sample period, but were successful in demanding compensation for holding the equity of Scottish companies. This suggests that part of the cost of referendum related uncertainty was therefore borne by companies. By raising risk permia, uncertainty destroys some market value and raises the cost of capital to the affected companies. Choosing to generate heightened political uncertainty is a definite choice, which is presumably presented in the hope of achieving a brighter future, but we argue that politicians should not ignore the adverse effects of the uncertainty they generate.

Our findings relate to a specific case – the period surrounding the 2014 Scottish Independence Referendum. However, we believe that there is a growing need to learn more about the impacts of political uncertainty and that our findings have wider relevance. We have argued that evidence from a campaign period is unlikely to be sufficient, and that the sample period investigated should extend beyond the date of the vote, because the result of the vote rarely resolves the uncertainty. This is surely important in the case of any analysis of the effects of Brexit related uncertainty and in the case of growing calls for another Scottish Independence Referendum. We suggest that results reported elsewhere in relation to the Brexit Referendum will surely understate the true impacts, and that further empirical research is needed.

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Table 1: Number of Scottish Companies Listed on London Stock Exchange

	2010	2011	2012	2013	2014	2015
No. of companies	56	56	51	48	48	45
Entrants during this year	4	3	2	0	1	0
Exits during this year	1	3	7	3	1	3

Source: Darby and Roy (2019)

Table 2: Descriptive Statistics of Four Risk Factors (Scottish and UK)

Results in Panel A relate to Scottish stock market. The return on the value weighted portfolio of Scottish stocks (excluding RBS) is used to represent the market return. The SMB factor is the holding period (value weighted) return on a portfolio that longs the smallest 40% of Scottish stocks and shorts the biggest 40% of Scottish stocks from the previous day, reformed daily. The HML factor portfolio is the daily return on the highest 40% of stocks by book-to-market ratio (BTM) minus the daily return on the lowest 40% of stocks by BTM and holding for one day. The Momentum (MOM) portfolio is the holding period (value weighted) return on a portfolio that longs the top 40% of Scottish stocks and shorts the worst 40% of Scottish stocks over the previous 250 trading days, reformed daily. The risk-free rate is the yield on three-month Treasury bills. Results in Panel B relate to UK stock market. Data on the existing risk factors is sourced from Xfi Centre for Finance and Investment (XiFI), University of Exeter and described in Gregory et al. (2013).

	Mkt	Size	Value	Mom
Panel A: Scottish Stocks				
Max	0.0451	0.0692	0.1663	0.0662
Min	-0.0549	-0.0602	-0.1099	-0.0548
Average	0.0004	-0.0000	-0.0002	-0.0006
Std	0.0104	0.0135	0.0161	0.0126
Panel B: FTSE All-share Stocks				
Max	0.0515	0.0193	0.0189	0.0353
Min	-0.0449	-0.0196	-0.0168	-0.0439
Average	0.0004	0.0003	-0.0001	-0.0001
Std	0.0096	0.0053	0.0047	0.0066

Figure 1: Proxies of Political Uncertainty in Scottish Markets

Source: Darby and Roy (2019)

Source: Darby and Roy (2019)

Source: Baker, Bloom and Davis (2016)

Table 3: The Performance of High- Relative to Low-volatility Stocks

Panel A of this table presents the average and standard deviations of returns on portfolios consisting of highest or lowest volatility stocks. For all Scottish stocks, condition volatilities by company are estimated by running a simple AR(1)-TGARCH(1,1) model. Where the AR(1)-TGARCH(1,1) model fails to converge, a GARCH(1,1) model is estimated. Then the time series of returns on high volatility stocks minus low volatility stock returns is tested against the CAPM, Fama French (1996) three-factor and Carhart (1997) four-factor models respectively. Panel B of this table reports the alphas of these regressions with t-statistics in parentheses. * represents significance at 10%, ** represents significance at 5% and *** represents significance at 1%. * represents significance at 10%, ** represents significance at 5% and *** represents significance at 1%. The return on the value-weighted portfolio of Scottish stocks (excluding RBS) is used to represent the market return. The SMB factor portfolio is the holding period (value weighted) return on a portfolio that longs the smallest 40% of Scottish stocks and shorts the biggest 40% of Scottish stocks from the previous day, reformed daily. The HML factor portfolio is the daily return on the highest 40% of stocks by book-to-market ratio (BTM) minus the daily return on the lowest 40% of stocks by BTM and holding for one day. The Momentum (MOM) portfolio is the holding period (value weighted) return on a portfolio that longs the top 40% Scottish stocks and shorts the worst 40% of Scottish stocks over the previous 250 trading days, reformed daily. The risk-free rate is the yield on three-month Treasury bills. The number of stocks included in high/low volatility portfolios is selected arbitrarily and included for robustness purposes.

	High-Low 8 Stocks (i)	**High-Low 10 Stocks (ii)**	**High-Low 12 Stocks (iii)**
Panel A: Raw Returns			
High Volatility Ave. (%)	0.132	0.133	0.112
High Volatility Std.	0.020	0.017	0.015
Low Volatility Ave. (%)	0.018	0.026	0.023
Low Volatility Std.	0.005	0.005	0.005
Panel B: Abnormal Returns (Alphas, %)			
CAPM:	*0.099	**0.095	**0.078
	(1.908)	(2.115)	(1.977)
Fama and French	*0.080	**0.078	*0.063
	(1.747)	(2.018)	(1.850)
Carhart	*0.081	**0.081	**0.067
	(1.743)	(2.075)	(1.964)

Table 4: The Policy Uncertainty Risk Factor in Scottish and UK Markets

Results in Panel A and B relate to Scottish stocks. Panel C and D present results related to UK stocks that are historically included in the FTSE 250 index. For all stocks, each day political uncertainty risk for stock i is estimated by regressing stock i's returns over the previous 125 trading days (minimum 36 consecutive rolling regression requirement for stock inclusion) on the Political Uncertainty Proxy along with market, size, value and momentum factors. A stock's political uncertainty risk is the beta on this Political Uncertainty Proxy. Scottish stocks are sorted into either low/high 40% (in Panel A) or low/high 45% (in Panel B) value weighted portfolios based on beta and held for one day before reforming the portfolios. Since the FTSE 250 index includes a much larger number of stocks as compared to the Scottish stock market, we sort UK stocks into either low/high 30%, 35% and 40% value weighted portfolios based on beta. The time series of the low political uncertainty beta portfolio minus the high political uncertainty beta portfolio is tested against the CAPM, Fama and French (1996) three-factor and Carhart (1997) four-factor models. This table reports the alphas of these regressions with t-statistics in parentheses. For Scottish stocks, we consider two proxies of uncertainty – conditional volatility of the Scottish stock market index and the Baker et al. (2016) Economic Policy Uncertainty. We consider another two proxies of uncertainty for UK stocks – conditional volatility of FTSE All Share (in Panel C) and conditional volatility of the value-weighted portfolio of all Scottish stocks (in Panel D). * represents significance at 10%, ** represents significance at 5% and *** represents significance at 1%. The return on the value-weighted portfolio of Scottish stocks (excluding RBS) is used to represent the market return. The SMB factor is the holding period (value weighted) return on a portfolio that longs the smallest 40% of Scottish stocks and shorts the biggest 40% of Scottish stocks from the previous day, reformed daily. The HML factor portfolio is the daily return on the highest 40% of stocks by book-to-market ratio (BTM) minus the daily return on the lowest 40% of stocks by BTM and holding for one day. The Momentum (MOM) portfolio is the holding period (value weighted) return on a portfolio that longs the top 40% Scottish stocks and shorts the worst 40% of Scottish stocks over the previous 250 trading days, reformed daily. The risk-free rate is the yield on three-month Treasury bills.

	CAPM	Fama and French	Carhart
Panel A: Scottish Market (Low/High 40%)			
(i) Alpha (%): Scot Conditional Volatility	**0.096	*0.069	*0.073
	(2.395)	(1.822)	(1.990)
(ii) Alpha (%): UK Economic Policy Uncertainty	-0.001	0.007	0.007
	(-0.038)	(0.172)	(0.176)
Panel B: Scottish Market (Low/High 45%)			
(i) Alpha (%): Scot Conditional Volatility	*0.071	*0.067	*0.065
	(1.942)	(1.918)	(1.884)
(ii) Alpha (%): UK Economic Policy Uncertainty	0.014	-0.018	-0.010
	(0.410)	(-0.514)	(-0.290)
Panel C: UK Market (Conditional Volatility of UK Stocks)			
(i) Alpha (%): Low/High 30%	0.004	0.012	0.009
	(0.196)	(0.814)	(0.632)
(ii) Alpha (%): Low/High 35%	0.002	0.016	0.012
	(0.135)	(1.190)	(0.891)
(iii) Alpha (%): Low/High 40%	0.003	0.016	0.017
	(0.209)	(1.347)	(1.393)
Panel D: UK Market (Conditional Volatility of Scottish Stocks)			
(i) Alpha (%): Low/High 30%	-0.001	0.009	0.004
	(-0.038)	(0.606)	(0.244)
(ii) Alpha (%): Low/High 35%	0.003	0.005	0.011
	(0.172)	(0.395)	(0.763)
(iii) Alpha (%): Low/High 40%	0.004	0.008	0.017
	(0.240)	(0.678)	(1.328)

Table 5: The Performance of the 'Five-factor' Risk Model

This table presents results of regressing stock or portfolio returns on the four well-known risk factors along with the estimated Scottish political uncertainty risk factor. It tests whether adding the political uncertainty risk factor eliminates abnormal returns as presented in the previous results. Results in Panel A relate to the portfolio consisting of high- minus low-volatility stocks, where stock volatilities are estimated by running either a AR(1)-TGARCH(1,1) or a GARCH(1,1) model. Eight stocks included in the high- and low-volatility stock portfolios, respectively. Results in Panel B and C also relate to high- minus low-volatility stocks, but include ten and twelve companies in the high and low-volatility portfolios. Results in Panel D relate to all Scottish stocks where either a AR(1)-TGARCH(1,1) or a GARCH(1,1) converges. * represents significance at 10%, ** represents significance at 5% and *** represents significance at 1%. The return on the value weighted portfolio of Scottish stocks is used to represent the market return. The SMB factor is the holding period (value weighted) return on a portfolio that longs the smallest 40% of Scottish stocks and shorts the biggest 40% of Scottish stocks from the previous day, reformed daily. The HML factor portfolio is the daily return on the highest 40% of stocks by book-to-market ratio (BTM) minus the daily return on the lowest 40% of stocks by BTM and holding for one day. The Momentum (MOM) portfolio is the holding period (value weighted) return on a portfolio that longs the top 40% of Scottish stocks and shorts the worst 40% of Scottish stocks over the previous 250 trading days, reformed daily. The risk-free rate is the yield on three-month Treasury bills.

	Alpha	Mkt	Size	Value	MoM	Uncertainty
Panel A: High-minus-low Volatility Stocks (High/Low 8 Stocks)						
Coeff	0.000	***1.024	***0.829	***0.156	-0.029	***0.108
tval	(1.461)	(15.266)	(8.992)	(5.074)	(-0.276)	(2.797)
Panel B: High-minus-low Volatility Stocks (High/Low 10 Stocks)						
Coeff	*0.000	***0.932	***0.688	***0.168	0.052	**0.082
tval	(1.814)	(16.514)	(8.867)	(6.503)	(0.584)	(2.521)
Panel C: High-minus-low Volatility Stocks (High/Low 12 Stocks)						
Coeff	0.000	***0.858	***0.618	***0.137	0.078	**0.067
tval	(1.573)	(17.444)	(9.138)	(6.059)	(1.003)	(2.374)
Panel D: Scottish Stocks						
Average	0.000	0.709	0.210	0.057	0.112	0.025
Std.	0.001	0.486	0.639	0.179	0.775	0.094
% sig	21.7%	89.1%	43.5%	37.0%	45.7%	26.1%