

Article

The Effects of Direct Democracy on Stock Market Risk and Returns: An Event Study from Switzerland

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Abstract: The aim of this study was to determine whether referendums affect stock price risks and returns, using an event study approach. Daily end period data for the Swiss stock market index, the STOXX European market index, and the Swiss/US exchange rate running from the beginning of 2004 to June 2021, along with the EGARCH model, were applied to determine the effects on both the market's return and volatility. The results suggest that the day after the referendum, there was little evidence of a positive effect on stock returns. However, using a longer window of three days before and after the referendum, there was evidence of a positive effect from the referendum on the market's returns and a negative effect on its volatility. Analysing the effects of referendums on both asset returns and risks allows for a more comprehensive assessment of how they impact on the economy, with these results supporting previous studies that found a positive effect on economic returns, and also showing they can reduce risks.

Keywords: event study; referendum; stock market returns; risk; financial

1. Introduction

This study aimed to assess whether direct democracy as represented by referendums affects the national stock market, and its implications for company finances and performance. Using data from Switzerland, a country that frequently uses referendums on a variety of different issues, we analysed the extent of any effects the referendums have on stock market return and risk. There has been a rich seam of research which has analysed how democracy affects the economy, especially economic growth. This study aimed to contribute to the literature by assessing how referendums affect equity markets and, therefore, the wider economy. We aimed to evaluate the effects of referendums in general as a democratic process on the performance of the stock market and therefore the wider economy rather than test any specific issue in a referendum, as has been done previously. This is because multiple referendums are held on specific days in Switzerland, with the referendums covering myriad topics. In addition, we analysed the referendum rather than its announcement, as we were testing the effects of the choices made in the referendum, rather than the announcement on what the referendums will be on and when. We used an event study in association with the EGARCH model to determine if the referendum affects both returns and volatility or risk.

Recently, direct democracy in the form of referendums has made the headlines, as the restructuring of the constitution in Italy in 2016 and the Greek referendum on debt restructuring in 2015 among others have produced results which were not expected by the political elite. In addition, both Europe and the USA have experienced a recent rise in populist politics, as citizens choose to become more directly involved in the political process. This has highlighted the differences between the elected representative politicians, with their dependency on unelected experts, and the electorate regarding many important issues, such as drug use and incomes policy, a phenomenon referred to as 'democratic drift' by Matsusaka (2020). Frey and Schaltegger (2021) have argued that there are important implications for income distributions and, therefore, equality arising from referendums.



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Many countries, such as Switzerland and the USA, have long histories on referendums, with the US states recently experiencing the highest number of referendums in a year. The rise in the popularity of referendums coincides with increasing disapproval with the ruling elite, who are frequently viewed as out of touch and overtly affected by special interest groups ([Matsusaka 2018](#)). The gap in the literature I seek to fill relates to the lack of an analysis on how referendums as a whole influence the financial markets and risk, as most studies to date have concentrated on the effects of direct democracy on incomes, equality and public expenditure and finances, although many studies have analysed how individual referendums affect stock price returns, especially the Brexit referendum.

The referendum¹ that has possibly received the most publicity was the Brexit referendum in the UK in 2016, which was a vote on whether the UK should leave the European Union (EU). The UK voted to leave, despite most MPs in all the main parties supporting the remain campaign. As [Ramiah et al. \(2017\)](#) note, this vote affected financial markets, although the effects varied across industries. Switzerland is one of the few countries that have opted to use referendums and initiatives to allow the wider population to decide on key issues on a country basis, which have included relations with the EU, defense, the environment, and many other diverse issues. Although most countries hold referendums occasionally to decide important decisions, such as the UK on whether to leave the EU, Switzerland often has over ten referendums in a year. New Zealand is another country that holds frequent referendums, but not on the scale of Switzerland.

In general, studies have found that increased levels of democracy increase economic growth ([Acemoglu et al. 2019](#)), and this suggests that increasing democracy with referendums could have a beneficial effect on the economy, so would be perceived positively by investors. This in turn could lead to an increase in stock prices when referendums occur. Other studies such as [Feld and Matsusaka \(2003\)](#) have found that referendums lead to a reduction in government spending, which again could be beneficial to equity returns. In their study, they used data for the Swiss cantons rather than national data, and found that referendums tend to reduce government expenditure by approximately 19%, on average.

Switzerland has a long tradition of direct democracy in the form of referendums and initiatives, which can be at the municipal, cantonal and federal levels. Initiatives differ to referendums in that they can be proposed by individuals in Switzerland in order to make changes to the federal constitution. Referendums are decided by parliament in order to decide on specific issues. For an initiative to be successful and be put to the popular vote, they need to obtain the required number of signatures. Currently this is 100,000 signatures, which must be obtained within 18 months. If this takes place, then parliament cannot block the vote, but can launch a counterproposal of its own to run at the same time. The main criteria for deciding on the topic are that only a single topic can be voted on at a time, and the vote should not infringe on human rights. The referendums are usually on a Sunday when markets are closed.

The referendums themselves can be divided into two forms, the mandatory referendum to change the Swiss constitution or to join an international organisation, such as the European Union, or to introduce emergency laws at the federal level for more than a year. Optional referendums can also be introduced by individuals in order to decide on an existing piece of legislation. This requires at least 50,000 signatures to enable it to go to the vote or if it is new legislation 100,000 signatures. The sample of referendums and initiatives included in the sample contains examples of all these types of federal votes, as well as some counterproposals.

As there are usually multiple referendums on a particular day, it is not possible to determine the effect of a specific referendum on the financial markets, so the aim was to determine how direct democracy in general affects the markets, if at all. Previous studies have found positive effects on the economy from being more democratic, in which case we could expect the use of direct democracy to have a positive effect on the markets. For instance, [Acemoglu et al. \(2019\)](#) show that democracy causes growth, using a dynamic panel approach. It could also be that a referendum is likely to produce a potentially

more prudent effect on the economy than leaving decisions to parliaments. For instance, [Feld and Matsusaka \(2003\)](#) found that referendums are more likely to produce lower public spending and therefore a lower need to raise taxes.

There is no consensus on whether direct democracy benefits the economy and political process, with some suggesting the form of democracy makes little difference to the economic outcomes. An argument that it makes little difference concerns the median voter theorem ([Downs 1957](#)), which, under certain assumptions, means that all parties gravitate towards the median voter, in terms of policies and appeal. If this is the case there is no need for direct democracy, as referendums are likely to support the viewpoint of the median voter. The argument against direct democracy is that voters lack the knowledge to make correct informed decisions. It has also been argued that there is insufficient interest in referendums to make them worthwhile, although [Matsusaka \(2020\)](#) has noted that some recent referendums, such as the Irish referendum on abortion, have attracted near-record turnouts.

If voters lack the necessary information to make informed decisions, then the outcomes including economic outcomes from referendums are likely to be worse than when legislators decide issues. A model by [Maskin and Tirole \(2004\)](#) indicated that where voters lack access to expert opinions, then representative government performs, on the whole, best. [Kessler \(2005\)](#) argues that if direct referendums are used too often, they act as a disincentive for the authorities to collect the relevant information, which leads to a more uninformed government and worse outcomes for the economy. There is also a fear that direct democracy can lead to free-riding and be subject to spillover effects. [Hall et al. \(2021\)](#) found evidence of free-riding and spillover effects in the referendum for Georgia's 2010 trauma care funding amendment. They found that voters living near trauma centres in neighbouring states were more likely to oppose increased funding than those living further away from a neighbouring centre. However other studies such as [Lang et al. \(2018\)](#), have not found any evidence of spillover effects between states, this time over land conservation.

Issue bundling is a key feature of representative government, along with candidate bundling, whereby different candidates in the same party will hold different positions on issues, but agree a common stance within parties, inevitably leading to candidates supporting issues which their constituents may not approve of, such as large infrastructure projects that benefit the wider economy but damage the environment in certain constituencies. For instance, in the Brexit referendum in 2016, the voters in some counties overwhelmingly supported Brexit, but none of the elected representatives supported it. Thus, the more referendums, the fewer individual issues the candidates need to run on, which means that voters can send stronger messages to the government when they vote ([Besley and Coate 2003](#)).

Following the introduction, the related literature is discussed and then the event study methodology used here is described. Following the methodology, the data and results are analysed and finally, there is a conclusion and the policy implications are discussed.

2. Literature Review

2.1. Referendums and the Economy

Much of the literature is concentrated on the debate over whether referendums, as a means of taking decisions, are beneficial overall and in particular, beneficial to the economy. [Matsusaka \(2005, 2018\)](#) has discussed the theoretical and empirical approaches to determining whether direct democracy with referendums is better than representative government, finding support for both positions. The literature contains a variety of arguments regarding the success or otherwise of referendums or, more generally, direct democracy. The main argument for direct democracy is that there exists an agency problem between the voters and their elected representatives. This can be due to problems with the monitoring of the representatives, effective means of disciplining the office holders ([Peltzman 1984](#)) as well as a general inertia in the political system. [Matsusaka \(2020\)](#) has suggested that there exists a problem around the world of 'democratic drift', as, due to the complexity of modern issues, the politicians transfer the decision-making process to unelected experts, which has weakened the link between the politicians and the electors.

As an alternative to referendums, increased use of opinion polls has been suggested as a way to continue with representative government without any need for increased direct democracy. However, [Matsusaka and McCarty \(2001\)](#) found that opinion polls tend to be poor predictors of how individuals will vote on issues at elections. This could be because the outcomes of opinion polls can often be driven by how the question is asked and the context of the opinion poll.

When determining empirically if direct democracy or representative government perform best in terms of economic outcomes, the problem arises that it is difficult to tell if the referendum forced the policy to be enacted or whether it would have been legislated for anyway. Equally, the threat of a referendum could force the government to accept policies. To overcome this, most studies compare the effects in states or cantons where there are referendums, with those that do not have them whilst controlling for individual state/canton effects. [Matsusaka \(2018\)](#) suggests that overall, policies tend to be more in agreement with the majority viewpoint due to holding referendums, and that this allows the majority of voters to overcome the powers of special interest parties to influence the government policies.

2.2. Referendums and Fiscal Policy

The issue that has been analysed the most regarding referendums, is whether fiscal policies should be applied by legislators, especially government spending issues. For instance, [Feld and Matsusaka \(2003\)](#) analysed the outcomes of referendums in the Swiss cantons relating to spending decisions in each canton. Some of the Swiss cantons are required to have a referendum if a spending decision exceeds a certain threshold, although not all the cantons require this. This study found that the referendums reduced the amount of spending by 19%, whilst controlling for the differences across the cantons. This finding is repeated across other similar studies, along with the decision to have lower taxes. Although [Galletta \(2021\)](#), using Swiss data, finds that representative government tends to produce more fiscally conservative electorates than assembly government. In addition, studies suggest that the use of referendums leads to more conservative policies being chosen by the electorate. For instance [Gerber \(1999\)](#) finds that US states are more likely to have the death penalty if they have some form of direct democracy.

A variety of studies have made use of the Swiss data to determine how direct democracy affects economic outcomes. [Frey and Schaltegger \(2021\)](#) have used data on Swiss cantons to determine if initiatives and referendums affect income distributions. They found that the initiatives have tended to decrease the wealth of the top earners, whereas the incomes of upper-middle income earners have risen. However, this tends to apply to the initiatives rather than to the popular referendums.

2.3. Referendums and Event Studies

Although there is little analysis of how referendum or forms of direct democracy themselves affect the economy using event studies, event studies have been used to determine whether specific referendums affect economic outcomes, such as the Brexit referendum in the UK, although these have tended to be aimed more at supply chains and trade rather than economic growth. For instance, [Davies and Studnicka \(2018\)](#) estimated the abnormal returns for the FTSE 350 market index in the days after the Brexit vote. These abnormal returns were then regressed on factors such as the firm's global value chain (GVC), which measures how dependent the firm is on international supplies. The main finding was that those firms with a GVC based on the EU performed less well than the UK market as a whole, as a result of the votes outcome. However, their findings were industry-specific, with differences across industries.

[Ramiah et al. \(2017\)](#) also conducted a post-Brexit event study, again using the main UK industrial and market returns. They too found differing results across industries following the vote, with banking and finance performing the worst, with a cumulative abnormal return over 10 days of -15% , whereas aerospace and defense had a CAR of $+7\%$, suggesting

it would benefit from the Brexit referendum. Other industries experienced no significant effects from Brexit. Bashir et al. (2019) analysed the effects of the Brexit referendum on stock and foreign exchange markets, finding that after Brexit, the European markets became more negatively correlated. Although there are fewer studies incorporating the effects on volatility of a referendum, Sita (2017), used a GARCH model to determine how the Brexit vote affected market volatility and sentiment, finding shifts in stock trading patterns as a result of the referendum.

2.4. Political Events and Stock Returns

There has been a substantial amount of research into how political events in general affect stock price returns and volatility, as well as investor sentiment driven by political factors such as climate change. Hillier and Loncan (2019) use an event study to analyse how stock price returns and volatility are affected by political events, particularly how political connections to firms and exposure to foreign capital may affect them. Using Brazilian data, they show how political connections and foreign capital exposure can transmit risks from political events to the stock market returns and volatility.

There are alternative ways of measuring the strength of a political events, for instance in a study by Nisar and Yeung (2018), they show that political events in the UK, as represented by Twitter comments can affect stock price movements, especially over the shorter time window. Kaminski and Gloor (2014) found similar results again using the shorter time windows, finding evidence of a positive correlation between Twitter moods and market movements. A further study by Reboredo and Ugolini (2018) uses a VAR and Twitter sentiment to analyse the effects on renewable energy stock prices and volatility. They found little evidence that the sentiment affects stock prices or volatility, although the sentiment divergence produces feedback effects on the volatilities and trading volume.

3. Data and Methods

The main hypothesis tested was that referendums have a short-term effect on the Swiss stock market index in terms of both the return and volatility. The event study approach was used to test these hypotheses as described by Binder (1998), which analysed the effects of the referendum on the Swiss stock market return and volatility. This approach in using stock returns in an event study has been used extensively in the literature, such as Castillo and Falzon (2018), who determined the impact from cyberattacks on the stock returns of a sample of cybersecurity firms. The approach used in this study was to determine the effect on the Swiss market return based on the model in Equation (1) with the inclusion of a dummy variable which takes the values of 1 for the event and 0 otherwise². The effect of the referendum was also measured regarding the volatility or risk of the share price, by including a dummy variable in the conditional variance equation. This approach has been used previously with models based on the generalised autoregressive conditional heteroskedastic (GARCH) model. For example, Mensi et al. (2014) used a FIGARCH model, to determine any effects of OPEC announcements on oil prices and volatilities, whilst Morley (2019) used the EGARCH model for oil discoveries.

In this study, we applied a standard EGARCH(1,1)-m model as developed by Nelson (1991) to determine the volatility effects³. This approach has some advantages over other models, for instance the GARCH(1,1) model, because it incorporates an asymmetric effect into the model and also solves potential problems with the non-negativity constraint. This approach adds impulse dummy variables into the mean and variance equations to account for the effects of the referendum. The basic model is as follows:

$$\Delta \ln s_t = \alpha_0 + \alpha_1 \sigma_t^2 + \alpha_2 vix_t + \alpha_3 D_t + u_t \quad (1)$$

$$\ln(\sigma_t^2) = \lambda + \phi \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \beta \left[\left| \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} \right| - \sqrt{\frac{2}{\pi}} \right] + \nu D_t + \phi vix_t \quad (2)$$

where lns_t is the stock market price, which is logged and differenced to create a return. vix_t is the vix volatility index based on the S & P 500 stock market index and measures world financial risk or the ‘fear index’. The vix is included to control for the effects of international financial risk, given the international nature of the Swiss markets. We would expect an increase in the risk of international financial markets to reduce the return on Swiss equities but increase their volatility. This was also used as a robustness test of the main results, although the vix variable tends to be significant, running the models without this variable has little effect on the overall results. D_t are dummy variables representing the window following the referendum, u_t is an error term, and σ_t^2 is the conditional variance of the error term. There are four different-sized windows used in the models, the first is the day after the referendum, the second the day before and after, the third is a three-day window before and after the referendum and the final model is a ten-day window⁴.

All the stock market data and exchange rates are logged and differenced, so transforming to return format. If a gearing effect applies then the coefficient on the asymmetric term (γ) should be negative, such that a negative shock increases volatility, as the level of borrowing relative to the property value will rise, increasing the riskiness of the property. The parameter ϕ captures simple persistence in volatility and β measures the ARCH type of effect. If the dummy variable in the mean equation (α_3) is positively signed it indicates that following the referendum, there is a positive effect on the Swiss market returns. If the dummy variable in the variance equation (v) is positively signed it suggests that the referendum has increased the volatility or risk of the market returns.

A secondary set of tests were then carried out as a robustness test using the market model from (1) along with the addition of the European market index (Stoxx600) and the exchange rate, to control for the effects of movements in European shares generally and the foreign exchange markets on the Swiss economy and therefore market returns. As Switzerland is a safe haven currency and is reliant on exports, movements in the Swiss currency could affect the stock market. So the models would then be:

$$\Delta lns_t = \alpha_4 + \alpha_5 \sigma_t^2 + \alpha_6 vix_t + \alpha_7 D_t + \alpha_8 lnex_t + v_t \quad (3)$$

$$\Delta lns_t = \alpha_9 + \alpha_{10} \sigma_t^2 + \alpha_{11} vix_t + \alpha_{12} D_t + \alpha_{13} stoxx_t + v_t \quad (4)$$

where $stoxx_t$ is the European stock market and $lnex_t$ is the bilateral exchange rate with the US dollar. Additionally the EGARCH(1,1) specification from Equation (2) was used with this model, along with the addition of the exchange rate sometimes as an extra determinant of the conditional volatility. Finally, we also used the [Glosten et al. \(1993\)](#) GJR-GARCH-m model as an alternative asymmetric model to the EGARCH model. This model takes the following form:

$$\Delta lns_t = \alpha_{14} + \alpha_{15} \sigma_t^2 + \alpha_{16} vix_t + \alpha_{17} D_t + \alpha_{18} \Delta lnstoxt + v_t \quad (5)$$

$$\sigma_t^2 = \beta_0 + \beta_1 \sigma_{t-1}^2 + \beta_2 v_{t-1}^2 + \beta_3 v_{t-1}^2 I_{t-1} + \beta_4 D_t \quad (6)$$

where the asymmetric effect is captured by the I_{t-1} term, $I_{t-1} = 1$ if v_{t-1} is >0 , I_{t-1} is 0 otherwise. If the asymmetric term is positive, then the negative shocks increase volatility. The hypotheses tested were:

Hypothesis 1. *Referendums have a positive and significant effect on the returns of Swiss equities.*

Hypothesis 2. *Referendums reduce the volatility and risk of Swiss equities.*

The data runs from the beginning of May 2004 through to June 2021 and is daily. The return data consists of the return on the Swiss stock market index, the Vix is the CBOE index of volatility of the S& P 500, the bilateral exchange rate is the Swiss franc/ US dollar rate. The data begins in 2004 as this was the earliest available data for the exchange rate. All the data were obtained from Yahoo Finance. There were 54 dates when referendums

were held at a federal level in Switzerland, usually with multiple referendums on a wide range of issues, including the economy, international relations and social issues. The main months for holding the referendums were February, May, September and November, but other months were used too. On the day of the referendum the markets were closed, so this day does not appear during the windows.

4. Estimation Results

In Table 1, the summary statistics are presented, the unit root tests show that the data is all stationary. In addition a test for the ARCH effect was conducted on the models to determine if the EGARCH model was appropriate, the test statistic for ARCH(12) was 431.8, indicating a significant ARCH effect is present in the data, justifying the use of the EGARCH model. This result was robust over different lag lengths and mean model specifications. The Engle and NG sign and size test was also conducted to determine if there was any asymmetry in the relationship, with the statistic of 132.02 which is significant at the 1% level of significance. The residuals follow a Gaussian distribution. In Figure 1, there is a plot of the conditional variance of the Swiss market index, without the referendum dummy variables. It shows that the market volatility increased sharply at the end of 2008, during the financial crisis, at the end of 2014 during the Eurozone crisis and at the beginning of 2020 during the coronavirus pandemic. However, there is not an obvious pattern of the volatility rising in particular months when the referendums tend to be held.

Table 1. Summary Statistics.

Variable	Mean	Standard Deviation	Max	Min	Unit Root
lns	0.0002	0.0109	0.1079	−0.1013	−64.5234 ***
lnex	0.0001	0.0072	0.1761	−0.0923	−69.9762 ***
vix	18.9364	9.1941	82.6900	9.1400	−4.8136 ***

Notes: *** indicate significance at the 1% level of significance.

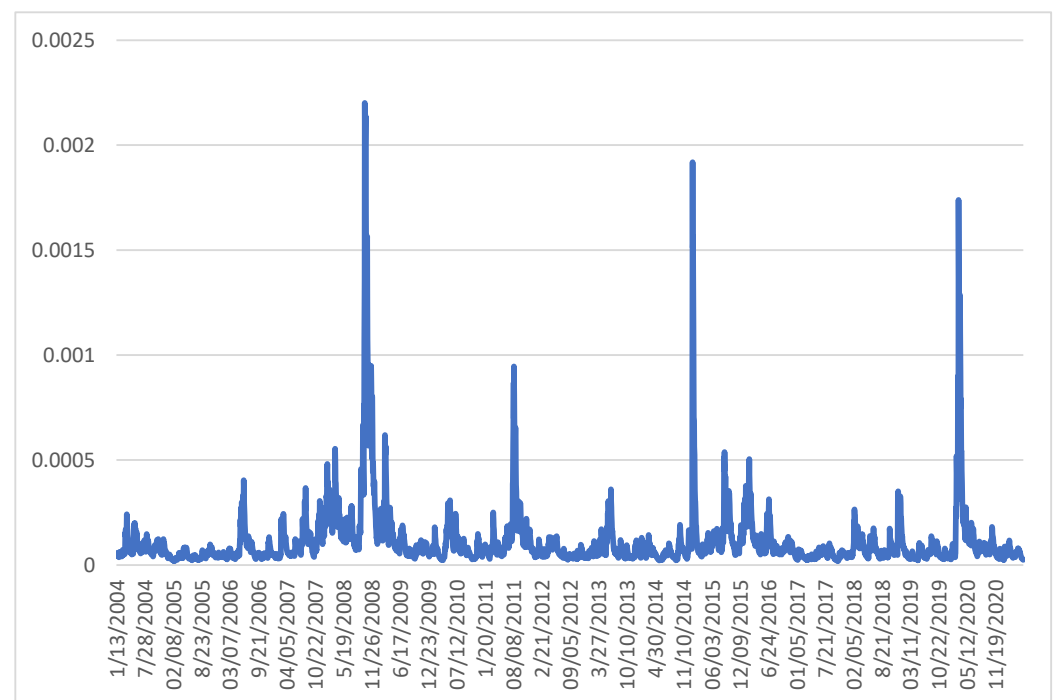


Figure 1. The conditional variance of the Swiss market index.

In Table 2 Equations (1) and (2) are estimated with the four dummy variables for the differing window sizes. Model 1 has just the dummy variable after the referendum, it shows that although having a positive effect, it is not significant. The dummy variable

has a negative effect on the volatility, but again it is not significant. Similar results are obtained when there is a window of a day either side of the referendum in model 2 and with the ten-day window in model 4, with both effects being insignificant. However, with the three-day window, the dummy has a positive effect which is significant at the 10% level of significance, suggesting the referendum has had a slight positive effect on stock price returns. As expected, the vix is significant in all specifications, although the effect is very small, with a value of approximately -0.00003 in most specifications, with an increase in volatility or risk reducing the market return. Similarly, the variance in the mean equation has a positive and significant effect, suggesting that an increase in international financial risk also increases the riskiness of Swiss equities.

Table 2. Estimates of the event study using the EGARCH(1,1) model.

Variable	1	2	3	4
α_0	0.003 *** (8.223)	0.003 *** (8.165)	0.003 *** (7.973)	0.003 *** (8.022)
α_1	10.562 *** (4.481)	10.677 *** (4.537)	10.902 *** (4.632)	10.849 *** (4.573)
α_2	−0.000 *** (8.995)	−0.000 *** (9.012)	−0.000 *** (9.053)	−0.000 *** (9.024)
α_3	−0.001 (1.433)	−0.000 (0.640)	0.001 * (1.856)	−0.000 (0.328)
Variance Eqn				
λ	−1.662 *** (11.028)	−1.670 *** (11.032)	−1.693 *** (11.110)	−1.685 *** (11.002)
φ	0.858 *** (63.122)	0.857 *** (62.787)	0.855 *** (62.194)	0.856 *** (61.659)
γ	−0.160 *** (13.915)	−0.160 *** (13.904)	−0.159 *** (13.765)	−0.159 *** (13.916)
β	0.175 *** (13.007)	0.174 *** (12.855)	0.176 *** (12.673)	0.174 *** (12.247)
ν	−0.153 (1.432)	−0.089 (1.564)	−0.066 *** (2.936)	−0.009 (1.122)
ϕ	0.010 *** (9.051)	0.010 *** (9.063)	0.010 *** (9.147)	0.010 *** (9.038)
LL	14,306	14,305	14,307	14,304

Notes: *** (*) indicate significance at the 1% (10%) level of significance. See Equations (1) and (2) for details on the parameters. The models 1,2,3 and 4 refer to a single day after the event, 1 day window, 3 day window and 10 day window respectively.

In the variance equation, the three-day dummy is negative and significant, suggesting the referendum has reduced the volatility or risk of the Swiss market. In addition, the variance equation is well specified, with evidence of the asymmetric effect and a fairly long persistence in the volatility, with about 85% of the volatility persisting after a day. The finding that referendums seem to affect market risk more than the return has been found in other studies, such as [Chan and Wei \(1996\)](#), who found for that for some firms on the Hong Kong market political news affects the stock price volatility but not the return. However, they distinguished between two types of stock, one that did most business domestically and one that did it abroad (China). They suggested a substitution effect between the two depending on whether news (or in this case referendum result) is positive or negative, which could cancel out any returns but lead to increased volatility.

Other studies have also found a significant effect of referendums on market volatility, such as [Sita \(2017\)](#) and [Darby and Roy \(2019\)](#), who found significant effects arising from the referendums on the market volatility or risk. However, both were on specific referendums rather

than referendums as a whole. [Darby and Roy \(2019\)](#) found that the Scottish independence vote increased market volatility or risk, when the polls indicated the vote would be close.

The size of the window can often have an important effect on the result, as found in this study. For instance, [Nisar and Yeung \(2018\)](#) have analysed the effect of twitter political discussions on stock price returns, using a UK based political event. They found that short windows often of about 2 days provided the best results and some evidence of a causal effect, although not always significant. This short window may reflect the nature of the political event, which would be covered in the media just before and just after for a couple of days, which would influence the views of market investors for that short time-period, but after a couple of days the issue is likely to be less prominent in the media.

Table 3 contains some robustness tests, in which the bilateral exchange rate with the US dollar is incorporated into the mean equation. In model 1. It is also added to the variance equation, but as it was not significant it was removed from the subsequent specifications. Overall this has not made much of a difference on any of the models, although when the dummy after the referendum is used in model 1. It is now significant at the 10% level of significance, having a negative effect on returns. The effect on the three day window remains significantly positive, now at the 5% level of significance. In all cases the exchange rate has a significant effect on the stock price returns in Switzerland. Similarly with the variance equation, only the three day window is significant. Overall the results are in accord with [Matusaka \(2005\)](#) in that the presence of a referendum, regardless of the topic, tends to be positive.

Table 3. Estimates of the event study using the EGARCH model with exchange rates.

Variable	1	2	3	4	5
α_4	0.003 *** (7.849)	0.003 *** (7.721)	0.003 *** (7.706)	0.003 *** (7.497)	0.003 *** (6.443)
α_5	9.395 *** (4.367)	9.451 *** (4.427)	10.487 *** (4.492)	9.596 *** (4.477)	10.690 *** (4.243)
α_6	−0.000 *** (8.251)	−0.000 *** (8.231)	−0.000 *** (8.792)	−0.000 *** (8.280)	−0.000 *** (7.552)
α_7	−0.002 * (1.687)	−0.000 (0.513)	0.001 * (1.757)	−0.000 (0.226)	0.001 *** (2.576)
α_8	−0.124 *** (6.556)	−0.123 *** (6.470)	−0.141 *** (7.534)	−0.120 *** (6.428)	
Variance Eqn					
λ	−1.377 *** (8.514)	−1.379 *** (8.475)	−1.713 *** (11.654)	−1.394 *** (8.465)	−1.935 *** (10.682)
φ	0.882 *** (61.188)	0.882 *** (60.782)	0.853 *** (64.305)	0.881 *** (59.786)	0.833 *** (50.631)
γ	−0.176 *** (11.523)	−0.178 *** (11.793)	−0.160 *** (13.460)	−0.178 *** (11.746)	−0.160 *** (11.374)
β	0.146 *** (6.368)	0.145 *** (6.331)	0.173 *** (12.210)	0.145 *** (6.321)	0.196 *** (11.879)
ν	−0.151 (1.126)	−0.085 (1.196)	−0.061 *** (2.748)	−0.016 (1.281)	−0.125 *** (4.091)
ϕ	0.008 *** (7.106)	0.008 *** (7.097)	0.010 *** (9.466)	0.008 *** (7.099)	0.011 *** (8.674)
ϑ	1.229 (0.584)				
LL	14,264	14,263	14,193	14,262	10,862

Notes: *** (*) indicate significance at the 1% (10%) level of significance. See Equations (3) and (2) for details on the parameters. The models 1,2,3,4 and 5 refer to a single day after the event, 1 day window, 3 day window and 10 day window and the sample being limited to post October 2008 respectively.

The final robustness test in Table 3. was to limit the data to running from October 2008 to the end of the sample, to determine if removing the main events of the financial crisis, especially the collapse of Lehmans Brothers in September 2008, affects the result for the three day window model. It has produced much the same result as with the full sample, except both dummy variables are now more significant.

Table 4 contains the results from adding the European stock market index to both the full sample and post-crisis sample with the 3 day window. Although the effects of the stock returns for the 3 day window have now become insignificant, even at the 10% level, overall the results are not much changed, although as expected the return on the European market has a highly significant positive effect on the return of Swiss shares. In addition using the GJR-GARCH-m model as an alternative asymmetric effect has little influence on the results, being similar to the EGARCH results, with the asymmetric effect being significant. Overall these results follow the literature discussed in Matsusaka (2020) in that overall the outcomes arising from direct democracy tend to be positive.

Table 4. Estimates of the event study using the EGARCH/GARCH model with STOXX returns.

Variable	1	2	3		4
α_9	0.001 *** (2.221)	0.000 (1.738)	0.000 ** (2.022)	α_{14}	0.000 *** (2.268)
α_{10}	18.870 ** (2.542)	5.523 * (0.706)	7.425 (0.935)	α_{15}	6.058 (0.984)
α_{11}	−0.000 *** (3.407)	−0.000 ** (1.977)	−0.000 ** (2.258)	α_{16}	−0.000 *** (3.414)
α_{12}	0.000 (1.592)	0.000 ** (1.107)	−0.001 (0.716)	α_{17}	0.000 (1.235)
α_{13}	0.795 *** (119.941)	0.764 *** (107.937)	0.764 *** (106.961)	α_{18}	0.797 *** (139.349)
Variance Eqn					
λ	−1.883 *** (9.234)	−1.251 *** (7.197)	−1.296 *** (6.821)	β_0	0.000 *** (8.153)
φ	0.851 *** (50.218)	0.904 *** (63.440)	0.902 *** (57.863)	β_1	0.864 *** (83.656)
γ	0.028 *** (3.043)	0.049 *** (4.563)	0.053 *** (4.754)	β_2	0.142 *** (12.000)
β	0.192 *** (12.043)	0.206 *** (11.742)	0.210 *** (11.627)	β_3	−0.068 *** (6.195)
ν	−0.049 *** (4.492)	−0.095 *** (4.248)	−0.088 (0.414)	β_4	−0.000 *** (3.664)
ϕ	0.008 *** (7.928)	0.004 *** (5.191)	0.004 (4.985) ***		
LL	16,538	12,119			16,480

Notes: *** (**) (*) indicate significance at the 1% (5%) (10%) level of significance. See Equations (3), (2), (5) and (6) for details on the parameters. The models 1,2 and 3 refer to a three-day window, model 1 and 2 uses EGARCH, model 3 is the GJR-GARCH-m model and model 2 has the sample limited to post October 2008.

As a further robustness test, a dummy variable representing a single issue has also been added to the specification instead of the common dummy variable, as it could be argued that pooling the topics in the referendums together could lead to positive and negative results cancelling each other out. The two most common issues in Switzerland are tax and immigration, so dummy variables were included on dates only when these issues were voted on. The results in column 3 represent just the tax dummy variable, as this was the most clear-cut of the issues with the Swiss usually voting for less tax. A dummy variable was also tried for immigration, although this was less clear-cut, as the outcome of

the votes depended on the wording of the vote, sometimes it supported more immigration and sometimes less. The results show that both dummy variables are not significant, so these specific votes did not affect either the risk or return.

5. Conclusions

The overall finding was that the use of referendums has a positive effect on the stock price returns whilst reducing risk. The effects of referendums on financial markets and therefore the wider economy appear to vary depending on the size of window for the effect. If a three-day window is used there is evidence that the referendum has a slight positive effect on stock returns and a negative effect on their volatility or risk. The results remain similar when the model is re-specified with the addition of the exchange rate and European market index. Similarly, reducing the sample to just the time period after the financial crisis has little effect on the result.

This suggests that there is a positive effect stemming from the referendums in terms of a reduction in the risk in the markets and slight positive return, depending on the window length. This coincides with other studies on referendums, who tend to find a positive effect overall, as argued in [Matsusaka \(2020\)](#). However, the results differ to those on a specific referendum, who have found that it can increase risk in the short term. For instance, [Darby and Roy \(2019\)](#) found that the referendum on Scottish independence increased market volatility and risk, especially when the opinion polls suggested the vote would be close. [Ramiah et al. \(2017\)](#) also found that the Brexit referendum in the UK adversely affected some industries but benefited others. This study differs to these in that it analyses the effects of the referendum across a large number of different issues, which on balance have reduced the financial market risks.

The main policy implications from the study are similar to those in [Matsusaka \(2018\)](#), in that increased direct democracy tends to be beneficial overall and in terms of the economy. This would suggest that countries should use more forms of direct democracy to determine the optimal policies, as the outcomes tend to benefit the economies. This could be because with direct democracy, the entire population is contributing to the decision, are more likely to choose the optimal policy or because as the policy has the backing of the population at large, they are more incentivised to ensure its success. However, to control the costs of the referendums, there should be a reasonable gap between the same or similar questions being put to the voters, such as a twenty-year interlude.

The main shortfall of the study is that we have not been able to disaggregate the referendums, as usually in Switzerland there are multiple referendums on the same date. Future studies should try to disaggregate the data so as to determine if the different forms of referendum have differing outcomes. In addition, future studies could include more control variables in the models, such as trading volume and alternative risk measures such as credit default swap premia. Further research could also be conducted on the surprise element in a referendum and how the difference between the actual and expected result affects stock prices, as the expected data becomes available. For investors, the results indicate that in Switzerland when the referendums are being held, it is usually a good time to invest within a few days of the referendum, when risk falls and there can be a slight positive return.

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Notes

- ¹ The term ‘referendum’ is used here to cover both referendum and initiatives, the latter referring to moves by the voters to have a referendum, as opposed to the representative government holding a referendum to gain support or otherwise for one of its policies.
- ² The dates of the referendums are 16 May 2004, 26 September 2004, 28 November 2004, 5 June 2005, 25 September 2005, 27 November 2005, 21 May 2006, 24 September 2006, 26 November 2006, 11 March 2007, 17 June 2007, 24 February 2008, 1 June 2008, 30 November 2008, 8 February 2009, 17 March 2009, 27 September 2009, 29 November 2009, 7 March 2010, 26 September 2010, 28 November 2010, 13 February 2011, 11 March 2012, 17 June 2012, 23 September 2012, 25 November 2012, 3 March 2013, 9 June 2013, 19 September 2013, 24 November 2013, 9 February 2014, 18 May 2014, 28 September 2014, 30 November 2014, 8 March 2015, 14 June 2015, 28 February 2016, 5 June 2016, 25 September 2016, 27 November 2016, 12 February 2017, 21 May 2017, 24 February 2017, 4 March 2018, 10 June 2018, 23 September 2018, 25 November 2018, 10 February 2019, 19 May 2019, 9 February 2020, 27 September 2020, 29 November 2020, 8 March 2021, 13 June 2021.
- ³ All estimation used Maximum Likelihood, in a couple of models, where there was no convergence using the software’s initial values, other vlaues were inserted until convergence was obtained.
- ⁴ In all cases the window refers to trading days.

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