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The price of populism: Financial market outcomes of populist electoral success☆

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ABSTRACT

Following financial research on the importance of public policy for asset prices, we hypothesize that the success of populist movements impacts risk assessments in financial markets. Building a novel dataset, findings show for a sample of Western democracies that the success of populist parties has a direct impact on volatility in major domestic market indexes, measured from option prices spanning national elections. Despite its anti-capitalist rhetoric, the political insecurity generated by populist movements on the far left only partially translates into financial insecurity in the context of institutionalized democracies. In turn, we find the electoral success of right-wing populists to reduce risk assessments, which could be driven by its frequent association with rent-seeking and big business.

1. Introduction

Following the 2008 financial crisis and the subsequent recession, increasing research efforts have been dedicated to uncover the effects of political uncertainty on financial markets. Here, it has often been hypothesised that uncertainty is induced by democratic elections and the accompanying insecurity regarding future economic policy changes (Baker et al., 2016). Despite difficulties concerning measurement and causality, there is now ample empirical evidence that indicators of uncertainty increase during election times, presenting also a notable impact on a diverse range of investment related activities (e.g. Białkowski et al., 2008; Boutchkova et al., 2012; Gao et al., 2019; Julio and Yook, 2016; Kelly et al., 2016; Atanassov et al., 2018; Hanke et al., 2020).

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Increased political uncertainty has further been linked to the recent surge of populist politicians and parties, raising the important question of whether these are perceived as an organic risk factor by investors (Devinney and Hartwell, 2020). Given its strong emphasis on popular sovereignty, populism generally tends to reject external constraints (Müller, 2017), and macroeconomic literature has long highlighted the ensuing economic setbacks of populist left-wing governments in Latin America (Sachs, 1989; Dornbusch and Edwards, 1991; Edwards, 2010; Bittencourt, 2012; Grier and Maynard, 2016). Due to the important structural risks associated, markets should therefore impose substantial risk premia for the electoral victories of such movements.

As the most recent wave of populism is overwhelmingly right-wing in nature though, it is questionable whether this (hypothetical) reaction can be generalized to all types of populist movements (Edwards, 2019). In many ways, the right-wing version of populism is much more difficult to classify with respect to its economic policy intentions (Rode and Revuelta, 2015). Rhetorically, it often oscillates between a harsh anti free-trade course, and an expressive willingness to cater to the needs of big business. Contrary to earlier waves of populism, it mainly takes place in the context of high-income democracies, which exhibit strong institutionalized checks and balances (Weyland, 2020).

Reproducing a relatively recent measure to price political uncertainty on a cross-country basis by Kelly et al. (2016), this paper examines for a sample of Western style democracies, whether political populism creates uncertainty that is priced in equity option markets, and whether financial markets distinguish between populist movements on the basis of their ideology. To the best of our knowledge, our paper is the first to study these issues empirically. We do so by compiling a unique dataset of information on national elections, party programs, and prices of major equity index options. Despite the fact that populism in government will most likely affect the development of financial markets in the long-run, the empirical framework of Kelly et al. (2016) enables us to make a causal claim on the short-run fluctuations that we observe around national elections. Additionally, we extend previous theoretical work by Hanke et al. (2018) to explain how markets envisage the financial impact of ideologically motivated populism for a country's stock market, thereby driving the unique values of options spanning elections.

Interestingly, we find the immediate risk assessment made by financial markets to vary for populist parties of different ideology: The electoral success of populist parties on the far left seems to cause higher risk assessments for price risk (i.e. the risk of economic fluctuations), while tail risk (i.e. the risk of an economic crash) is affected in some specifications only. This might indicate that financial markets are partially suspicious of left-wing populism in the context of a high-income democracy, where important institutional guardrails are in place. In turn, findings show the electoral success of right-wing populist parties as unequivocally causing lower risk assessments in financial markets, both for price and tail risk. Given some of the doubtful economic policies frequently advocated by populism on the far right, this result probably reflects its explicit tendency to associate with rent-seeking interests and cater to the needs of big business.

The remainder of the paper is structured as follows: Section 2 reviews the main arguments in the relevant literature on pricing political uncertainty, and how this might be influenced by the election of populist parties. Section 3 introduces our data, research strategy, and defines the main variables. Section 4 comments the estimation results, while Section 5 offers a brief theoretical interpretation of our findings, and Section 6 concludes.

2. Financial markets, policy uncertainty, and political populism—A brief review

A growing body of empirical literature is concerned with the effects of political uncertainty on investment. Following Julio and Yook (2016), two important challenges to research in this area are the difficulties in measuring the concept of political uncertainty, and establishing a causal effect, given the high correlation of uncertainty with overall economic conditions. To circumvent these, several authors have used the timing of elections to establish differences in investment activities, relative to periods where there are no elections taking place (Durnev, 2010; Julio and Yook, 2012). Employing related strategies, authors have looked at political uncertainty and the relation to a diverse range of investment related subjects, such as direct firm investments (Julio and Yook, 2012), R&D investments (Atanassov et al., 2018), cross-border investments (Julio and Yook, 2016), the sensitivity of stock returns to political bets (Hanke et al., 2020), acquisitions during international elections (Cao et al., 2019), as well as US gubernatorial elections (Jens, 2017), the issuance of municipal bonds (Gao et al., 2019), and IPO activity during US gubernatorial elections (Çolak et al., 2017). Other papers look at the more specific effect of economic policy uncertainty on mergers and acquisitions (Bonaime et al., 2018), corporate transparency (Bird et al., 2017), firm disclosures (Boone et al., 2020), or household stock market participation (Agarwal et al., 2018).

Furthermore, evidence on a cross-country basis also supports the fact that direct and indirect measures of political uncertainty increase during times of national elections. For example, Białkowski et al. (2008) find that stock markets, as well as politically sensitive industries (see also Boutchkova et al., 2012), have significantly higher return volatility during election periods. These further increase with the closeness of election results[1], and changes in the ideological orientation of government. In a seminal contribution, Kelly et al. (2016) measure prices in equity option markets around global summits and elections, where options that span these political events are found to be relatively more expensive. The authors argue that such options provide valuable protection against the associated price, variance, and tail risks, thereby adequately captur-

[1] Margin of victory here is defined as the difference between votes for the current government coalition and the opposition.

ing the price of political uncertainty. They further show that the price of political uncertainty is higher in a comparatively weaker economy, and in the context of closer election results.[2]

In the following, we employ the general framework of Kelly et al. (2016) to assess the price of political populism in financial markets. Two important questions here are, *i*) why populism should have an impact on financial markets at all, and *ii*) whether the impact of populists politicians and parties will differ according to political ideology?

Populism with its emphasis on popular sovereignty, tends to reject external constraints per se (Müller, 2017), and this is especially apparent in the economic sphere (Edwards, 2010; 2019). Macroeconomic literature has long highlighted this feature of populist economic policies: Sachs (1989), Dornbusch and Edwards (1991), or Bittencourt (2012) show that different populist administrations with a left of center ideology (mainly found in Latin America) tend to be overly expansive in monetary and fiscal terms. Corresponding policies are implemented with the objective of pursuing growth acceleration, but they utterly fail to do so in the long-run (cf. Grier and Maynard, 2016; Herrera et al., 2019). After an initial phase of strong growth, the populist policy cycle entails a balance of payment crisis that is coupled with high inflation, quickly resulting in falling real wages and capital flight, potentially culminating in total economic collapse. Populism on the political left is thus identified as an economic perspective that emphasizes growth and income redistribution, while deemphasizing the risk of inflation, deficit finance, and external constraints, all coupled with a harshly anti-capitalist rhetoric.

Due to the fact that structural growth trends and a business friendly environment are of high importance to investors, it is therefore easy to see, why populist governments on the left would be perceived as a potential threat by financial markets. Given the harsh anti-capitalist rhetoric, markets would probably anticipate the long-run consequences of populist policies and impose risk premia at the moment that such parties gain elevated vote shares and obtain a potential access to political power.

As the most recent wave of populism is overwhelmingly right-wing in nature and is taking place in the context of high-income democracies, it is questionable whether the hypothetical reaction of financial markets can be generalized to all populist governments (cf. Rodrik, 2018a). In many ways, the right of center version of populism is much more difficult to classify with respect to its economic policy intentions (Rode and Revuelta, 2015; Fenger, 2018). Here, Mudde (2007), De la Torre (2007), and Müller (2017) highlight that all populist movements strongly emphasize the defense of "the people's interest" against those of privileged elites or anonymous market mechanisms, suggesting that ideological differences in economic policies could actually be rather small. De la Torre (2007) and Müller (2017) further highlight the personification of democracy in the movement's leader, which eventually results in a marginalization of democratic institutions and a reduction of executive constraints, as a central feature of all populist movements.[3]

In addition, populism on the right often oscillates between a harsh anti-free trade program, and a willingness to cater to the needs of big business (cf. Mudde, 2007; Müller, 2017). Along those lines, Rode and Revuelta (2015) show that all populist governments actively reduce economic freedom by eroding legal security, creating barriers to free trade, and tightening economic regulation.[4] Still, they find important ideological differences in the area of taxes and government size.

On the one hand, the highly personalist element, the strong anti free-trade tendencies of all populist movements, and associated threats of creating trade barriers should create a negative outlook for business opportunities and elevated risk premia in the event of a right-wing populist electoral success. Associated higher future costs for companies and a macro environment possibly characterized by stagflation (Devinney and Hartwell, 2021) would mean higher bond yields and equity markets trading on lower valuations. On the other hand, a prospect for tax breaks and a willingness to cater to the needs of big business could theoretically also be perceived as favorable by financial markets (cf. Funke et al., 2016). Furthermore, an anticipation of protectionist government policies might even create very specific rent-seeking possibilities for some businesses (Krueger, 1974).[5] It is questionable whether such policies will improve an overall economy in the long-rung, but they could nonetheless be perceived as positive by investors in financial markets, at least in the short-run. All in all, we can therefore not make any definite assumptions on how the electoral success of right-wing populist political movements could impact the initial risk assessment made by financial markets. These could potentially be positive or negative, depending on the dominant perception of investors.

Finally, one might also expect financial market expectations regarding populism to vary with the degree of democratic institutionalization. While populism in government has the potential to completely erode the political and economic systems of developing countries, it might presumably be perceived as a much lower threat in the context of high-income democracies that exhibit strong institutionalized checks and balances (Weyland, 2020).

[2] Their measure of election closeness is based on the poll spread or the margin of victory of the election winner vis-a-vis the runner-up.

[3] See Sáenz de Viteri and Bjørnskov (2018) for a recent empirical analysis of this idea.

[4] Interestingly, this feature markedly sets populist governments apart from other democratic regimes, where research indicates that ideology plays an important role in formulating the general direction of economic policy (e.g. Potrafke, 2010; Bjørnskov and Potrafke, 2012; Bjørnskov and Rode, 2019).

[5] Naturally, these profits would only accrue to those with the necessary political contacts, shutting out entrepreneurs that are not able to make the initial political investments in order to obtain regulatory privilege (Holcombe, 2018).

Table 1
Country specific option and market data.This table gives information on the markets and the option samples used. For each country, we report the major stock index underlying our main option data source (Datastream, DS in Column 3), the corresponding alternative index (the countries' MSCI index) underlying our second option source (OptionMetrics, OM in Column 4) and the first appearance of option data in both sources (Columns 6 and 7). Table 2 gives more information on the composition of the sample.

Country	Major Stock Index	DS Code Option Underlying	OM Option Underlying	OM SECID	DS Option Data Start	OM Option Data Start
Australia	ASX200	ASX200I	MSCI AUSTRALIA	106413	2010-01-01	2007-01-29
Canada	TSX 60	TTOSP60	MSCI CDA ETF	106417	2008-01-01	2006-03-02
Denmark	OMXC20	COSE20C	NA	NA	2012-01-01	NA
France	CAC40	FRCAC40	MSCI FRANCE	106421	2006-01-01	2011-08-10
Germany	DAX	XETRDAX	MSCI GERMANY	106427	2006-01-01	2006-11-22
Greece	Athex20	FTASE20	NA	NA	2013-01-01	NA
Italy	FTSE MIB	FTSEMIB	MSCI ITALY	106432	2007-01-01	2010-07-13
Japan	Nikkei25	JAPDOWA	MSCI JAPAN	106431	2007-01-01	2005-10-10
Mexico	IPC	U:EWW[1]	MSCI MEXICO	2011-01-01	2007-11-29	
Netherlands	AEX	AMSTEOE	MSCI NETHER-LANDS	106428	2006-01-01	2013-08-14
New Zealand	S&P/NZX50	NA	MSCI NEW ZEAL CP	144178	NA	2013-08-21
Norway	OSLO OBX	OSLOOBX	NA	NA	2010-01-01	NA
Poland	WIG20	POLWG20	MSCI POLAND CAP	142980	2013-01-01	2017-09-11
South Africa	FTSE	U:EZA[2]	MSCI STH AFRCA	116785	2009-01-01	2007-05-24
South Korea	Kospi	KOR200I	MSCI S KOREA	106426	2009-01-01	2007-07-11
Spain	IBEX35	IBEX35I	MSCI SPAIN	106425	2007-01-01	2007-06-21
Sweden	OMXS30	SWEDOMX	NA	NA	2007-01-01	NA
Switzerland	SMI	SWISSMI	NA	NA	2006-01-01	NA
Turkey	XU100	TKNAT30	MSCI TURKEY ETF	138304	2016-01-01	2013-06-24
United Kingdom	FTSE100	FTSE100	MSCI UK ETF	106420	2006-01-01	2006-05-12
United States	S&P500	S&PCOMP	S&P500	108105	2006-01-01	1996-01-04

[1] There are no options available for the Mexican IPC on Datastream, therefore we substituted the *iShares MSCI Mexico ETF*. [2] There are no options available for the South African EZA on Datastream, therefore we substituted the *iShares MSCI South Africa ETF*.

3. Data and research strategy

3.1. Options and the price of political uncertainty

Following Kelly et al. (2016), we use options written on the major national stock indexes to capture the price of political uncertainty. This is done by investigating the different properties of options spanning national election dates, in relation to a properly chosen control group. Options are very well suited for the task at hand for several reasons: First, due to the availability of options with short maturities (e.g. one month) we can make sure that they mainly protect against risk associated with certain electoral outcomes. Second, due to the variety of options available (puts and calls having different strike prices) we can analyze different types of risk associated with elections.

Option data is obtained from two different sources: First, our major source of information are option prices from countries' major stock index options, available from Refinitiv Datastream (formerly Thomson Reuters). Second, options on countries' MSCI indexes, which are traded in the United States are available through OptionMetrics' "Ivy DB US" database.[6] All options directly written on countries' main stock indexes are European options, whereas the options written on the MSCI indexes are American options. Further information on the data, indexes, and availability can be found in Table 1.

As comparative data on option prices is only attainable for a rather reduced set of countries and time periods, its availability severely limits the number of elections that we are able to analyze. The reason is that we require a sufficiently large set of options with positive open interest and liquid option prices (positive trading volume) to be available, in order to calculate the outcome variable(s). Such options are actually only available for high-income economies with very liquid financial markets. All countries and election years for which such data is available are specified with the corresponding election dates and data sources (*D*ata*S*tream or *O*ption*M*etrics) in Table 2. If data availability allows us to calculate valid measures from

[6] The OptionMetrics data was acquired during a summer school visit at the University of St. Gallen.

Table 2
Overview of elections covered and data availability. This table lists all national elections for which option data according to Section 3 is available, showing country, election date, and data sources. *DS* stands for Datastream, *OM* for OptionMetrics, and *OI COMB* denominates cases where we combine measures from both data sources using open-interest weighting, see Section 3).

Country	Date	IVD Source	IVSD Source	Country	Date	IVD Source	IVSD Source
Australia	2007-11-24	OM	OM	Norway	2017-09-11	DS	DS
Australia	2010-08-21	OI COMB	OI COMB	Poland	2015-10-25	DS	DS
Australia	2013-09-07	OI COMB	OI COMB	Poland	2019-10-13	DS	DS
Australia	2016-07-02	OI COMB	OI COMB	South Africa	2009-04-22	OM	
Canada	2008-10-14	OI COMB	OM	South Africa	2014-05-07	OI COMB	OI COMB
Canada	2011-05-02	OI COMB	OI COMB	South Africa	2019-05-08	OI COMB	OI COMB
Canada	2015-10-19	OI COMB	OI COMB	South Korea	2008-04-09	OM	OM
Canada	2019-10-21	DS*	DS*	South Korea	2012-04-11	OI COMB	OI COMB
Denmark	2019-06-05	DS		South Korea	2016-04-24	OI COMB	OI COMB
France	2007-06-17	DS	DS	Spain	2008-03-09	OI COMB	OI COMB
France	2012-06-17	OI COMB	OI COMB	Spain	2011-11-20	OI COMB	OI COMB
France	2017-06-18	OI COMB	DS	Spain	2015-12-20	OI COMB	OI COMB
Germany	2009-09-27	OI COMB	OI COMB	Spain	2016-06-26	OI COMB	OI COMB
Germany	2013-09-22	OI COMB	OI COMB	Spain	2019-04-28	OI COMB	DS
Germany	2017-09-24	OI COMB	OI COMB	Sweden	2010-09-19	DS	DS
Greece	2015-01-25	DS	DS	Sweden	2014-09-14	DS	DS
Greece	2015-09-20	DS	DS	Sweden	2018-09-09	DS	DS
Greece	2019-07-07	DS	DS	Switzerland	2007-10-21	DS	DS
Italy	2008-04-13	DS	DS	Switzerland	2011-10-23	DS	DS
Italy	2013-02-25	OI COMB	OI COMB	Switzerland	2015-10-18	DS	DS
Italy	2018-03-04	OI COMB	OI COMB	Switzerland	2019-10-20	DS	DS
Japan	2009-08-30	OI COMB	OI COMB	Turkey	2015-06-07	OM	OM
Japan	2012-12-16	OI COMB	OI COMB	Turkey	2015-11-01	OM	OM
Japan	2014-12-14	OI COMB	OI COMB	Turkey	2018-06-24	OM	OM
Japan	2017-10-22	OI COMB	OI COMB	United Kingdom	2010-05-06	OI COMB	DS
Mexico	2009-07-05	OM	OM	United Kingdom	2015-05-07	OI COMB	DS
Mexico	2012-07-01	OI COMB	OI COMB	United Kingdom	2017-06-08	OI COMB	OI COMB
Mexico	2015-06-07	OI COMB	OI COMB	United States	1996-11-05	OM	OM
Netherlands	2006-11-22	DS	DS	United States	2000-11-07	OM	OM
Netherlands	2010-06-09	DS	DS	United States	2004-11-02	OM	OM
Netherlands	2012-09-12	DS	DS	United States	2008-11-04	OI COMB	OI COMB
Netherlands	2017-03-15	DS	DS	United States	2012-11-06	OI COMB	OI COMB
New Zealand	2014-09-20	OM		United States	2016-11-08	OI COMB	OI COMB
Norway	2013-09-09	DS	DS				

Note: * OptionMetrics (OM) Data only available before 2019-06-28.

both specified sources, we derive a combined measure as the open interest weighted average, declaring it as "OI COMB" in Table 2.[7]

These limitations mean that we only have option data available for some 21 mostly Western and developed economies in the form of an unbalanced panel, with data series mainly starting as late as 2006/2007.[8] Taken together, this gives us a maximum of 67 country-election observations, all of which are listed in Table 2. This is, admittedly, not an overly large number. Nonetheless, it should be noted that this is what is currently available in terms of option data, thereby constraining our data for this study. In turn, it also means that our sample is not limited by data on political populism. It is rather the other way around: The construction of our populism indicator in the next section is essentially driven by the need of an index that is adaptable to the limited option data. For the focus of our study, it also means that we document the electoral relevance of political populism for financial markets in institutionalized democracies, most of which present an elevated level of per capita income and advanced degrees of political stability.

For each election date, we carefully select three groups of options, those that expire before, directly after, and more than one month after an election took place, explicitly following the instructions given by Kelly et al. (2016). Because options expire on a monthly grid[9], we select three monthly option expiry dates, where the first two (a and b) are chosen around the event date τ so, that neither expiry date lies within at least five days of the national elections in question. Hence, by default of these two conditions, a and b are either one or two months apart. The minimum distance requirement of five days avoids the use of options with very short maturities[10] and prevents the control group options expiring on a from being influenced by the election itself. Following Kelly et al. (2016), this is an important condition for the causal interpretation

[7] We have tried various other ways of data source selection, such as using measures with larger (average) open interest, which produces very similar results.

[8] A notable exception is the US, where S&P500 index option data is available from 1996 onward.

[9] Mostly on the second or third Thursday or Friday of each month, depending on the country. We only select those major options and ignore the less liquid options that expire on a weekly basis.

[10] These ultra-short maturity options tend to be priced inaccurately and are often excluded (e.g. Beber and Brandt, 2006).

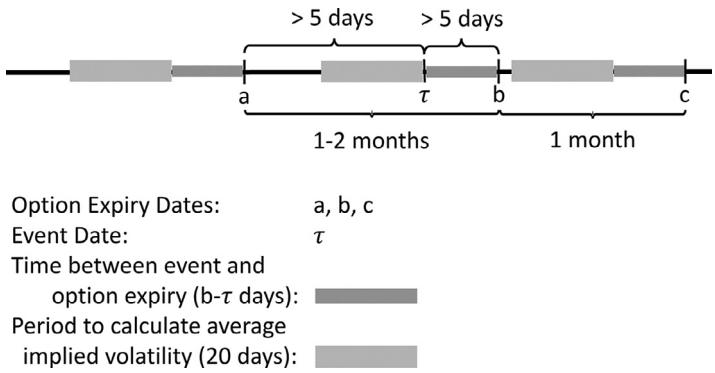

Fig. 1. Time line of option data.

of results. The third expiry date *c* (the after-event control group) is always chosen to lie one month after *b*. For illustrative purposes, this timeline is also outlined graphically in Fig. 1. In a next step, we take averages of our measures in the 20 days before the election takes place in group *b* and equivalently in groups *a* and *c*. Our final measures are then calculated as the difference between group *b* and the average of control groups *a* and *c* to capture the additional impact of the uncertainty induced by the election taking place in group *b*.

The underlying idea why Kelly et al. (2016) include options that expire shortly after each election is the following: If markets are considered to be efficient, election results should be incorporated into option prices rather quickly. Therefore, observations recorded after the election should be cleaned of the corresponding political uncertainty and only create an insurance against new unpredictable events. Evidence from Hanke et al. (2020) further suggests that it only takes a maximum of 5 to 10 days for elections to be incorporated into market prices. Notwithstanding, Appendix B.1 includes a robustness check that only employs options expiring before elections (group *a*) as control group, which produces very similar results.

This procedure of calculating our dependent variable follows a well-established literature in finance, essentially arguing that capturing such short-term fluctuations in financial markets via the timing of elections reduces causality concerns in the measurement of political uncertainty to an absolute minimum (e.g. Julio and Yook, 2012; Kelly et al., 2016). In this context, it is also important to highlight that we only look at the short-run outcomes of populist electoral support for financial markets, not the possible long-run financial market outcomes of populist governments. In the long-run, many authors agree that structural determinants will induce the rise of populist politicians into power, particularly historical inequality and weak institutions, which are facilitated by the aftermath of crises (e.g Kaufman and Stallings, 1991; Edwards, 2010; Bittencourt, 2012), arguing also more recently that financial globalization is a major determinant for the rise of right-wing populist parties to power (e.g. Funke et al., 2016; Rodrik, 2018b; Stankov, 2018; Pastor and Veronesi, 2018).[11]

Still, our dependent variable does not consider time horizons of this kind, focusing only on fluctuations of a short-term nature around the elections. The interpretation of our findings as causal then depends on the election of populist parties being reasonably independent of these short-run developments in option prices (happening within 3–4 months). It is difficult to see how the short-term evolution of financial markets should significantly determine the election of populist parties, especially when any country specific trends are further picked up by the estimation methodology. In addition, by focusing only on high-income institutional democracies, our dataset automatically excludes all developing countries with long populist histories that may not have had enough financial development to support an options market. Thus, this study is more about reasonably successful countries and their investors' immediate reactions to populism. All in all, this means that we are confident about the short-run direction of causality in our findings, especially with regard to the sample of countries we are essentially looking at.

In the following, we analyse two different measures of risk: The first is price risk, associated with sudden drops in stock prices, captured by the implied volatility of at-the-money options. The variable ***I*mplied *V*olatility *D*ifference (*IVD*)** measures the additional premium of options that insure against sudden moves in aggregate stock prices (i.e. price risk) that might be caused by national elections. It can thus be interpreted as insuring against the risk of unforeseen economic fluctuations. To capture this, we select all liquid (positive open interest and trading volume) at-the-money put and call options (delta $0.4 < |\Delta| < 0.5$) with maturity date *b* and average their implied volatilities across all selected options and over the 20 days preceding the election.

$$\overline{IV}_b = Mean\left(IV_{i,t,\text{expiry}=b} | t \in [\tau - 20, \tau - 1], i \in \{\text{set of eligible options}\}\right). \quad (1)$$

By taking averages, we avoid depending on noisy data that fluctuates from day to day and across options. For the control groups, we choose similar options that expire $b - \tau + 1$ days before *a* and *c*, respectively, and calculate time- and

[11] Notwithstanding, Remmer (2012) and more recently Bjørnskov (2019) and Margalit (2019) cast some doubt on the narrative that the structural causes of populism exclusively stem from crises and inequality. Results rather underline the potential significance of financial and economic crises for understanding electoral dynamics, highlighting a potentially important feedback loop.

cross-sectional average implied volatilities $\overline{IV}_a$ and $\overline{IV}_c$ according to Eq. (1). From these three average implied volatility measures, we subsequently calculate the *Implied Volatility Difference* (IVD_τ) for event τ as

$$\overline{IVD}_\tau = \overline{IV}_b - \frac{1}{2}\left(\overline{IV}_a + \overline{IV}_c\right). \tag{2}$$

Therefore, our outcome variable $\overline{IVD}_\tau$, measures the additional implied volatility (i.e. the premium one has to pay) to insure against price risk caused by the election and the parties involved. Following Kelly et al. (2016), this premium is paid by investors to insure against the uncertainty associated with specific political events, and therefore a direct monetary measure of this uncertainty. So because investors value security, they are also willing to pay a higher price to insure their assets against electoral outcomes they view as potentially unfavorable, which is essentially what we are capturing here. Technically, the approach to use control groups to calculate $\overline{IVD}_\tau$ accounts for country-specific slow moving time-variation in volatility that would not be entirely captured by a country-fixed effects approach. In essence, this further excludes an important potential source of endogeneity, with regard to the association with certain political events.

The second measure is tail risk, which takes into account that the price drops mentioned above might actually be very large. The ***Implied Volatility Slope Difference*** **(***IVSD***)** captures the additional premium of those options that insure against larger drops in aggregate stock prices, which can therefore be interpreted as insuring against the risk of a sudden and unexpected economic crash. To capture this possibility, we select all liquid (positive open interest and trading volume) put options with maturity date b and calculate a daily regression slope of their implied volatilities on their respective deltas (as measure of moneyness). The larger this slope, the more expensive are those options that are farther out-of-the-money and therefore protect only against very large drops in aggregate stock prices in relation to those options that only provide mild downside protection (at-the-money and in-the-money options). We require at least three option prices to calculate IVSD. Again, we average the daily slope coefficients over the 20 days preceding the election according to Eq. (3):

$$\overline{IVS}_b = Mean\left(IVS_{t,\text{expiry}=b} | t \in [\tau - 20, \tau - 1]\right). \tag{3}$$

From these three average implied volatility slopes, we subsequently calculate the *Implied Volatility Slope Difference* ($IVSD_\tau$) for event τ as

$$\overline{IVSD}_\tau = \overline{IVS}_b - \frac{1}{2}\left(\overline{IVS}_a + \overline{IVS}_c\right). \tag{4}$$

Thus, $\overline{IVSD}_\tau$ measures the additional implied volatility that investors pay to insure against tail risk around the election. So, this premium (that we multiply by 100 to make it more comparable to *IVD*) is paid by investors to protect against especially unfavorable movements of aggregate stock prices. It can be seen as an insurance against a very large short-term drop in financial market prices, as would be the case in an unexpected and rapidly unfolding economic downturn.

3.2. Measuring populist electoral support

All research that attempts to empirically capture the concept of populism has traditionally encountered the problem that there is no universally accepted definition. Depending on the discipline, the social sciences have come up with a multitude of concepts that can largely be classified into two major groups (Hawkins, 2009; Rode and Revuelta, 2015): First, the structural-economic approach identifies populism with development strategies in non-western countries (Drake, 1982), essentially defining it as a set of short sighted economic policies that are financed by monetary and fiscal expansion (Sachs, 1989; Dornbusch and Edwards, 1991). For the present purpose, the key point is that this approach places economic and redistributive objectives at the center of its definition, thus focusing almost exclusively on left-wing populist regimes in Latin America.[12]

Second, the institutional-discursive approach specifically focuses on the supposed embodiment of "the people" and their unanimous "will" in the populist leader, and its preoccupation with identifying a group of hypothetical enemies that represent the anti-nation (De la Torre, 2007; Müller, 2017). Within this dualistic vision, the good is, of course, represented by the will of the people. On the other side of this struggle are the conspiring elites that have somehow managed to subvert the will of the people (Hawkins, 2009). To have the will of the people prevail, some kind of revolution is needed. As a consequence, populists tend to identify the minority rights of liberal democracy as unjustly protecting the conspiring elites, frequently calling for their abolition. Canovan (2002) and Mudde (2004) have also referred to this particular definition of populism as a *thin ideology*.

On the political supply side, attempts to express populism in quantitative terms are essentially all based on the latter definition, where policies are ultimately labeled as populist because of the meaning ascribed to them, not because of any objective quality inherent in them (Hawkins, 2009).[13] Here, most researchers have employed some form of content analysis to capture the ideas of populism, either for politicians (Hawkins, 2009; Hawkins et al., 2019) or political parties and their programs (Jagers and Walgrave, 2007; Vossen, 2010; Pauwels, 2011). For all these indicators, coverage is either very limited, or it only focuses on populism in government.

[12] In a more recent contribution, Edwards (2010) somewhat modifies this concept to also include populism on the right.

[13] To some degree, the question remains whether measuring (or classifying) politicians and parties as populist on the basis of discourse is really enough, or whether it might also require real world action to be something observable? Also see Hawkins (2009) for an in-depth discussion of this point.

The Timbro Authoritarian Populism index measures the vote (or seat) share of parties that have been classified as populist, providing some of the most ample coverage of party populism over time (Heinö, 2016).[14] Still, apart from the fact that it only covers the countries of Europe, another potential issue is that, by nature of construction, it essentially converts the question of populism into one of black or white. The indicator does take into account that there is a varying demand for populism among the electorate, but simply pre-defines parties during certain phases as populist, or non-populist. Nonetheless, according to Hawkins (2009), Meijers and Zaslove (2021) and other scholars, populism is not constant in its presence over time, and in itself is a matter of degree.

In a somewhat different approach, Meijers and Zaslove (2021) recently employed expert surveys to measure populism of political parties in some 28 European countries. Likewise, other recent databases employ different versions of the Chapel Hill Expert Survey (Polk et al., 2017): Notably, Inglehart and Norris (2016) conceive an economic and a cultural dimension to index parties in both aspects, which they argue is a good proxy for populism. Similarly, Norris (2019) constructs an economic left-right and a populist rhetoric measure for parties. Despite these promising approaches, the underlying surveys all miss out on the time dimension that we need to analyze the elections of Table 2.

To capture the varying degree of populist content in political party messages, we therefore construct a discursive indicator from data provided in the Comparative Manifesto Project (CMP) by Lehmann et al. (2019). This database of political manifestos and electoral performance has been compiled since 2003 by the Social Science Research Center in Berlin, Germany. The database contains quantitative evaluations of electoral programs via content analyses, assigning scores on positions formulated by parties on a very diverse range of issues. Variables indicate the share of quasi-sentences in the respective category, calculated as a fraction of the overall number of allocated codes per document. The CMP contains data for more than 1000 parties from 50 countries covering most democratic elections since 1945.

In the following, we operationalize a concept based on three central ingredients that, according to Mudde (2004, 2007), Hawkins (2009), and Müller (2017), feature prominently in populist party discourse. These are:

- Anti-elitism;
- Popular sovereignty and rejection of restraints on popular decisions (external and internal);
- Identification of groups that compose “the real people” (i.e. anti-pluralism);

As the CMP does not directly measure those ingredients, we resort to a number of elements in the database that approximate them pretty well. Table 3 lists these and specifies what they measure. Among them, the rejection of internal and external constraints on popular will, the repudiation of corruption and bureaucratic inefficiency, as well as the identification of “the people” feature prominently. The final populism indicator, labelled as *POP* in all tables, is computed as the equally weighted sum of all components indicated in column 4 of Table 3. By simply adding all the elements that we identify as ingredients of populist discourse, the aggregate POP index essentially measures the share of populist quasi-sentences as a fraction of every party program.

It should be highlighted that, taken by themselves, none of these elements obviously constitute a sufficient condition for populism, but it is rather the combination of them that makes a party program potentially populist. Furthermore, it should be noted that this indicator is not based on any specific ideology, meaning that it captures right- and left-wing populist parties alike, although it naturally takes into account that populist parties will identify “the real people” with different groups, depending on their political ideology (i.e. the last four elements of column 4 in Table 3). In order not to skew the indicator in any direction with these components, we take into account two elements to identify these groups for every ideological side.

Additionally, we further construct an ideological populism scale from related elements in Table 3, labelled *PRILE* (for *P*opulism *RI*ght-*LE*ft). This principally focuses on party positions towards immigration and multiculturalism, as well as views of the different clientele groups that comprise the electorate. These have also been highlighted by other researchers as major dividing lines between different ideological varieties of populism (Müller, 2017; Devinney and Hartwell, 2020). The aggregate PRILE score is computed as the equally weighted sum of all components, using the sign indicated in column 5 of Table 3. By subtracting one group of positions from the other, our resulting scale assigns positive values to (populist) right-wing parties, and negative values to (populist) left-wing parties, with zero representing the political center. An in-depth analysis of our populism index and the ideology scale is shown in Section Appendix A, where we also compare our *POP* and *PRILE* indicators to some of the prominent populism (and accompanying ideology) measures mentioned above.

In order to aggregate our party-based populism indicator to the country level, we employ the ParlGov database by Döring and Manow (2018), which provides detailed information on the parties, elections, and cabinets of all EU members states and most OECD countries.[15] This information is used to calculate an aggregate (seat-share weighted) populism and ideology measure across parties (and candidates) for all elections listed in Table 2. An overall increase in the country level POP indicator can thus potentially be the result of two different developments: *i*) a populist party gaining higher vote shares; *ii*) the increasing adoption of populist positions by more traditional parties. As recent empirical evidence shows, an increase in political populism of specific political systems is often due to a mix of both phenomena (Rooduijn, 2014; Schumacher and van Kersbergen, 2016).

[14] Similarly, Sáenz de Viteri and Bjørnskov (2018) define chief executives as populist, if they are consistently labeled as such by the international press.

[15] We manually added data for the United States, Mexico, South Korea and South Africa, as well as several recent elections of countries that are covered by the data but have not been included yet.

Table 3
Manifestos elements employed to measure populism and populist ideology.

Name	CMP Code	CMP Description	POP	PRILE
Domain 1: External Relations				
Anti-imperialism	per103	Negative references to imperial behaviour and/or negative references to one state exerting strong influence (political, military or commercial) over other states.	+	
Internationalism: Negative	per109	Negative references to international co-operation. favorable mentions of national independence and sovereignty with regard to the manifesto country's foreign policy, isolation and/or unilateralism as opposed to internationalism.	+	
European Union: Negative	per110	Negative references to the European Community/Union.	+	
Domain 2: Freedom and Democracy				
Democracy General: Positive	per202_1	favorable mentions of democracy as the 'only game in town'. General support for the manifesto country's democracy	+	
Direct Democracy: Positive	per202_4	favorable mentions of the system of direct democracy, in particular in contrast to representative democracy. This includes the call for the introduction and/or extension of referenda, participatory budgets and other forms of direct democracy.	+	
Domain 3: Political System				
Governmental and Administrative Efficiency	per303	Need for efficiency and economy in government and administration and/or the general appeal to make the process of government and administration cheaper and more efficient.	+	
Political Corruption	per304	Need to eliminate political corruption and associated abuses of political and/or bureaucratic power. Need to abolish clientelist structures and practices.	+	
Political Authority: Party Competence	per305_1	References to the manifesto party's competence to govern and/or other party's lack of such competence.	+	
Political Authority: Personal Competence	per305_2	Reference to the presidential candidate's or party leader's personal competence to govern and/or other candidate's or leader's lack of such competence.	+	
Domain 5: Welfare and Quality of Life				
Equality: Positive	per503	Concept of social justice and the need for fair treatment of all people.		-
Welfare State Expansion	per504	favorable mentions of need to introduce, maintain or expand any public social service or social security scheme.	+	-
Education Limitation	per507	Limiting state expenditure on education.		+
Domain 6: Fabric of Society				
National Way of Life General: Positive	per601_1	favorable mentions of the manifesto country's nation, history, and general appeals.	+	+
National Way of Life: Immigration: Negative	per601_2	Statement advocating the restriction of the process of immigration, i.e. accepting new immigrants.		+
National Way of Life: Immigration: Positive	per602_2	Statements favoring new immigrants; against restrictions and quotas; rejection of the boat is full' argument. Includes allowing new immigrants for the benefit of the manifesto country's economy.		-
Law and Order: Positive	per605_1	favorable mentions of strict law enforcement, and tougher actions against domestic crime. Only refers to the enforcement of the status quo of the manifesto country's law code.	+	+
Civic Mindedness: Bottom-Up Activism	per606_2	Appeals to grassroots movements of social change; banding all sections of society together to overcome common adversity and hardship; appeals to the people as a united actor.		-
Multiculturalism General: Negative	per608_1	The enforcement or encouragement of cultural integration. Appeals for cultural homogeneity in society.		+
Domain 7: Social Groups				
labor Groups: Positive	per701	favorable references to all labor groups, the working class, and unemployed workers in general. Support for trade unions and calls for the good treatment of all employees.	+	-

Note: The sub-variables containing an underscore '_' are only available starting version 5 of the Comparative Manifesto Project (Lehmann et al., 2019). For all cases pertaining to older versions, we employ the parent variables without underscore '_'.

3.3. Additional controls

To capture the economic conditions of a country during election times that might also influence market volatility, we further introduce two basic controls to our model, where we again follow the framework of Kelly et al. (2016): First, we introduce seasonally adjusted quarterly growth of real GDP, which is taken from the OECD statistics database. This variable is simply labelled as *GDP* in all tables and is standardized to have zero mean and unit standard deviation within each country. Second, we employ return rates for the leading stock market indexes during the preceding three months (according to Table 1), as an indicator of financial market health. The data is also obtained from Refinitiv Datastream, and we label the corresponding variable as *MKT* (for market) in all tables. Standardization is not necessary here, because *MKT* contains periods of positive and negative performance by definition, aligning its interpretation with that of *GDP*. The basic logic behind both controls is that options prices will be influenced by current economic performance and investment activity.

In their paper, Kelly et al. (2016) further supplement this information with growth forecasts, and a qualitative indicator of turning points in business cycles. Both these variables are always found to be insignificant in their estimations though, and they are also not consistently available for our country sample. In addition, they raise the question of how political uncertainty might influence the implied volatility of options: Presumably, one way that populism affects financial markets in our setting is, because traders believe that future economic performance will be affected. Controlling for growth forecasts and estimates of business cycle development could thus obscure important channels of influence in our estimations. Therefore, we do not employ these variables as basic controls in our model.

4. Results

In the following, we linearly regress variables *IVD* (i.e. price risk) and *IVSD* (i.e. tail risk) on the different control variables, as well as on the *POP* and *PRILE* indicators. In order to further uncover how political populism interacts with ideology to jointly influence risk perceptions, an interaction term of the *POP* and *PRILE* variables is used in most specifications. In addition, a convex effect related to economic conditions, suggested by Kelly et al. (2016) is introduced to some regressions. The reason for employing the latter is that there should be no visible differences between the two outcome variables, while the economy is in a strong state. All t-statistics are shown using two-way clustered standard errors on the year and country level.

Table 4 shows results for the impact of populism and the full set of controls on price risk, consequently employing the *IVD* measure as dependent variable. This yields several interesting findings: First, we confirm results by Kelly et al. (2016) that the uncertainty derived from elections is reflected for price risk in option markets, as captured by the positive and significant coefficient on the constant term in column (1). More in detail, we find implied volatilities on average to be 1.31% ($t = 2.14$) larger than in their respective control groups before and after the elections. Second, neither a higher level of populist electoral success per se, nor a more right wing oriented political spectrum are significantly associated with price risk, as measured by *IVD*. Columns (2), (3), and (4) thus show that price risk is not driven by populism or ideology, when each is observed in isolation from the other. Presumably, the insignificant results on our *POP* variable essentially reflect the fact that we are not distinguishing between different types of populist parties here.

Third, this interpretation is confirmed once the interaction term of the populism index with our right-left score is included in column (5) of Table 4, where both underlying variables, *POP* and *PRILE*, now become statistically significant. The interaction term also consistently enters the equation with a significantly negative sign, meaning that right-wing populism would imply, on average, a comparatively lower price risk for protection against political uncertainty than left-wing populism. This is further analyzed below. Fourth, both economic controls, *MKT* and *GDP*, and the convex effects, enter the regression with the expected significant signs (following Kelly et al., 2016), always leaving our main findings unaltered. Finally, results are further robust to employing a two-way random effects panel estimation methodology in columns (10) and (11).

Coming back to the interaction of populism and ideology, coefficients on a linear interaction are generally difficult to interpret, because the total marginal effect that a variable exerts on the dependent variable consists of two parts: The coefficient on the interaction term multiplied by the interacting variable, as well as the coefficient on the individual variable of interest. For this reason, we graphically show the marginal effect of our $POP * PRILE$ interaction term, analogous to the results of column (7) in Table 4. The corresponding Fig. 2 shows the impact of a one standard deviation change in populism for *IVD*, dependent on political ideology.

It should be kept in mind, that a standard deviation increase in *POP* can essentially reflect some combination of two different possibilities: The electoral gains of a populist party relative to all other parties, or increases in populism of the more “traditional” parties. For this reason, we are also forced to implicitly assume a linear relationship between populist voting and financial risk in the empirical framework. Whether this adequately reflects the real-world association of the two variables is nonetheless debatable, which is why we conduct simulations on a corresponding theoretical model in Section Appendix C, further offering empirical support for the underlying mechanisms in Section Appendix D. These confirm an approximately linear relationship between both concepts. Finally, to account for our rather reduced sample size, marginal effects are not only shown with the standard method in Fig. 2, but also employing bootstrapped standard errors using a total of 500 iterations.

Table 4
Implied Volatility Differences and Political variables. In this table, we report results from OLS regressions of Implied Volatility Differences (IVD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. IVD is in percent per year, and all *t*-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Differences (IVD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	1.31**	1.21	2.82**	2.71*	4.36**	4.18***	2.01	3.41***	2.78***	2.08*	2.54***
	t = 2.14	t = 1.45	t = 2.01	t = 1.68	t = 2.20	t = 2.73	t = 1.56	t = 5.80	t = 7.91	t = 1.92	t = 3.19
POP		0.15		0.18	− 2.93***	− 3.71**	− 4.94**	− 2.44***	− 2.39***	− 4.94***	− 2.35**
		t = 0.44		t = 0.56	t = − 3.20	t = − 2.01	t = − 2.55	t = − 11.16	t = − 15.32	t = − 5.12	t = − 2.38
PRILE			1.82	1.83	3.75**	2.85**	3.45***	3.01***	2.85***	3.39***	2.91***
			t = 1.55	t = 1.57	t = 2.08	t = 2.51	t = 2.90	t = 4.07	t = 5.03	t = 4.54	t = 3.13
POP*PRILE					− 3.61***	− 3.94**	− 5.33***	− 3.02***	− 3.00***	− 5.30***	− 3.01***
					t = − 3.02	t = − 2.30	t = − 2.84	t = − 27.02	t = − 12.05	t = − 5.80	t = − 2.93
ECON						− 2.35**	− 5.38***	− 1.77*	− 2.20*	− 5.36***	− 2.33**
						t = − 2.59	t = − 6.44	t = − 1.89	t = − 1.81	t = − 4.93	t = − 2.23
ECON*$1_{ECON>0}$							7.13***		1.73	7.00***	2.10
							t = 4.72		t = 0.81	t = 3.90	t = 1.12
Observations	67	67	67	67	67	67	67	65	65	65	64
R^2	0	0	0.04	0.04	0.07	0.27	0.48	0.19	0.2	0.46	0.41

Note: *p<0.1; **p<0.05; ***p<0.01

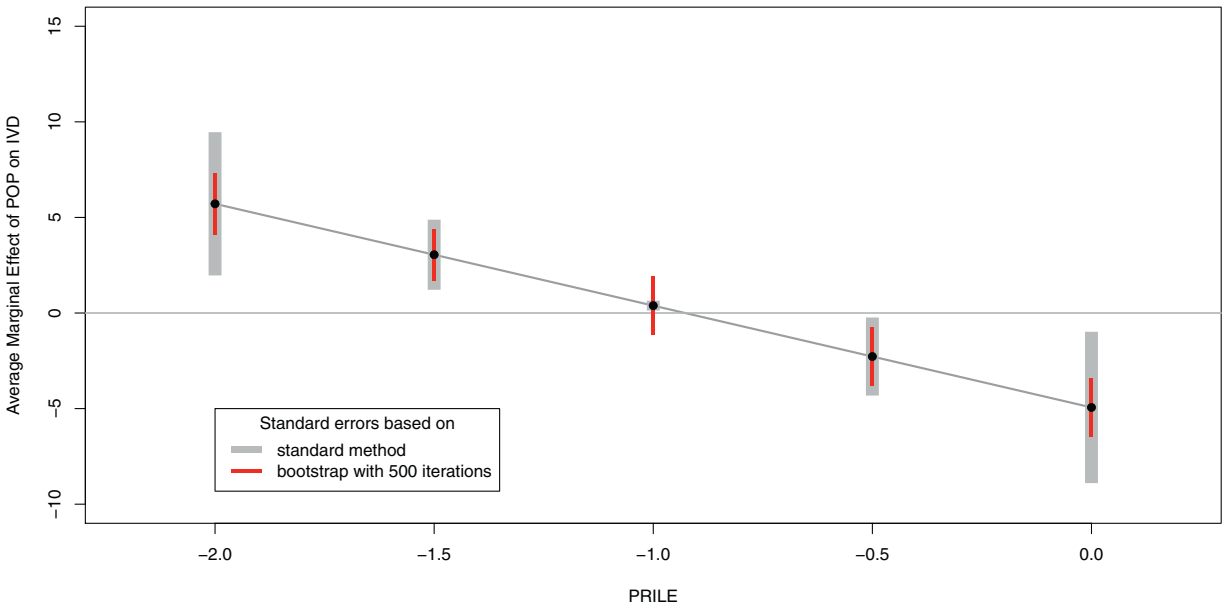

Fig. 2. Marginal effect of populism on IVD.

Before commenting on the figure, we also want to highlight that, even though variables *POP* and *PRILE* are constructed from partially similar elements, correlation between the two is actually rather small (see Section Appendix A). Fig. 2 shows that a one standard deviation increase in populism significantly raises implied volatilities by 5.71% for party systems that are on the far left end of the political spectrum. In turn, a standard deviation increase in populism for party systems that are dominated by (center) right-wing parties yields a 4.94% smaller implied volatility in relation to the full sample. In both cases we also find the margins of error (confidence intervals) to be non-overlapping and indicative of the significance of our results, even more so when we bootstrap the error bounds to account for the limited size of our sample. Although not shown, this finding is further stabilized across all the different models employing our economic controls in columns (5) to (9), and using two-way random effects panel regressions as an alternative estimation methodology in columns (11) and (12).[16]

Turning to the risk of an economic crash, or tail risk, Table 5 shows results for the impact of populism and the full set of controls on *IVSD*. Again, we find that general electoral uncertainty for tail risk in option markets is captured by the positive and significant coefficient on the constant in column (1). It shows that deep out-of-the money put options that provide protection against such tail risks are significantly more expensive around national elections than in the control groups before/after these elections. Looking at *POP* in isolation finds a marginally significant and negative impact of populism in column (2), which nonetheless disappears when jointly introduced with the variable *PRILE* (column 4). In turn, when looking at the ideology score in isolation in columns (3) and (4), we find some evidence that the electoral success of right-wing parties significantly increases political uncertainty for *IVSD* in Table 5. In any case, inclusion of the $POP * PRILE$ interaction term from column (5) onward yields very similar findings to those of the previous table. The interaction term consistently enters the equation with a significantly negative sign, meaning that right-wing populism would also imply, ceteris paribus, a comparatively lower tail risk than left-wing populism. In turn, the economic controls enter our regressions with the expected sign, albeit always insignificant (columns 6 to 11). This probably reflects the fact that past economic performance is not a good explanatory factor for explaining crash risk, which is much more politically driven, as opposed to price risk. Finally, results are again robust to employing a two-way random effects panel estimation methodology in columns (10) and (11).

Fig. 3 depicts the marginal effects graphic corresponding to column (7) of Table 5, showing the impact of a one standard deviation change in populism for *IVSD*, dependent on political ideology. Here, our story becomes further nuanced: A standard deviation increase in *POP* significantly raises tail risk for party systems that are on the far left end of the political spectrum, but only when employing bootstrapped standard errors to account for the small size of our sample. Employing the standard method, an increase of populism in combination with a left-wing ideology is inconsequential for the perceived risk of an economic crash. This probably reflects our country sample to some degree, where institutionalized democratic limits on government power might reassure investors that the overall risk of a massive financial (and economic) crash produced by the election of left-wing populist parties is rather low, at least in the short-run. In turn, a standard deviation

[16] Results are available from the authors upon request.

Table 5
Implied Volatility Slope Differences and Political variables. In this table, we report results from OLS regressions of Implied Volatility Slope Differences (IVSD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. IVSD is in percent per year, and all *t*-statistics are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Slope Differences (IVSD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	1.83***	2.79**	3.08***	4.15***	7.85***	7.40***	5.86***	6.66**	6.73**	6.23**	7.20**
	t = 3.18	t = 2.44	t = 8.38	t = 3.16	t = 4.96	t = 2.96	t = 3.44	t = 2.53	t = 2.26	t = 2.43	t = 2.11
POP		– 1.08*		– 1.16	– 5.34***	– 4.94**	- 4.39***	- 4.44***	- 4.43***	- 4.99**	- 4.77**
		t = – 1.69		t = – 1.48	t = – 3.76	t = – 2.62	t = – 4.03	t = – 2.74	t = – 2.71	t = – 2.43	t = – 2.17
PRILE			1.50***	1.54***	6.81***	6.24**	5.71**	5.68**	5.71**	6.43**	6.22**
			t = 5.99	t = 3.87	t = 3.11	t = 2.10	t = 2.29	t = 2.24	t = 2.17	t = 2.41	t = 2.32
POP*PRILE					- 6.03**	- 5.59**	- 4.91**	- 4.98**	- 4.99**	- 5.43**	- 5.33**
					t = - 2.61	t = - 2.12	t = - 2.35	t = - 2.24	t = - 2.22	t = - 2.37	t = - 2.44
ECON						- 0.35	- 1.63	- 0.61	- 0.56	- 2.17*	- 0.70
						t = - 0.32	t = - 1.61	t = - 0.60	t = - 0.41	t = - 1.79	t = - 0.53
ECON*$1_{ECON>0}$							2.86		- 0.22	3.80	- 0.24
							t = 0.86		t = - 0.12	t = 1.44	t = - 0.13
Observations	60	60	60	60	60	60	60	58	58	58	57
R^2	0	0.01	0.02	0.03	0.06	0.06	0.09	0.07	0.07	0.1	0.01

Note: *p<0.1; **p<0.05; ***p<0.01.

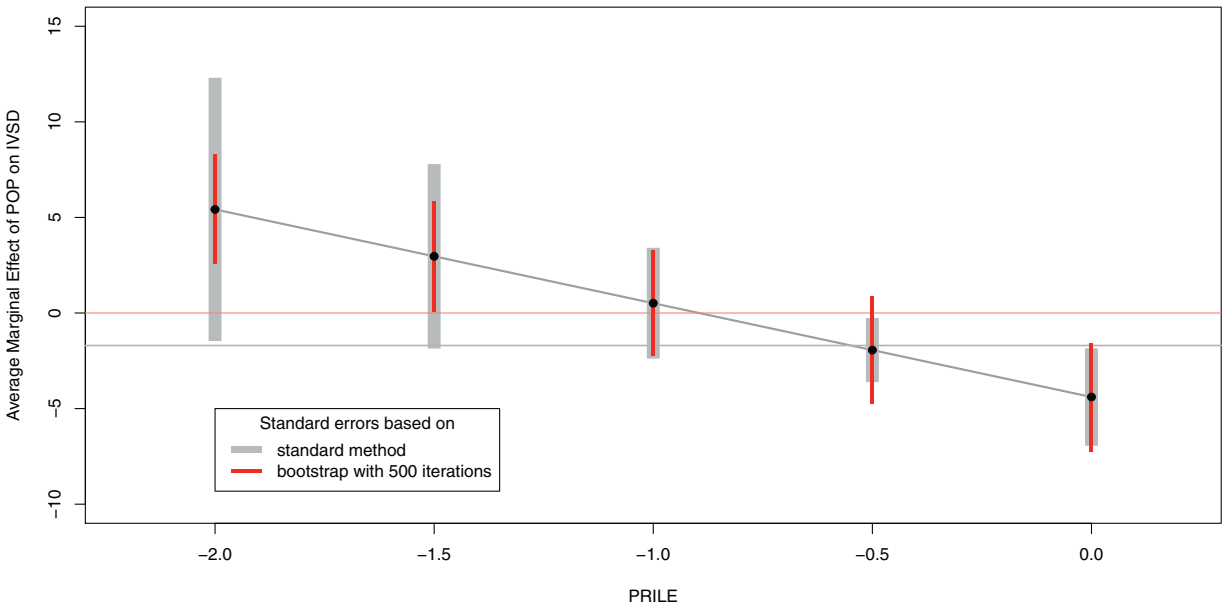

Fig. 3. Marginal effect of populism on IVSD.

increase in populism for party systems that are dominated by center right-wing parties again seems to be associated with lower tail risk, as captured in the variable *IVSD*. These findings are also robust across the different models and estimation methodologies.

Generally, findings in Table 4 and Table 5 highlight the high degree of interaction between populism and ideology for producing certain financial market outcomes, as theorized in the literature section. In fact, looking at both in isolation might wrongly suggests that electoral populism is inconsequential for financial market outcomes. According to our evidence in Fig. 2 and Fig. 3, the immediate risk assessments made by financial markets vary quite strongly for populist parties of different ideology. The electoral success of populist parties on the far left seems to cause higher risk assessments for the risk of economic fluctuations, as well as partially for the risk of an economic crash. In turn, the electoral success of right-wing populist parties is evaluated as firmly positive by financial markets. Section Appendix B shows the robustness of results to employing specifications with dummy variables, as well as alternative versions of the dependent variables.

5. A theoretical model

To better highlight the underlying theoretical mechanism behind the increase in option prices that is driven by left-wing populism, we provide a stylized example in this section. For reasons of simplicity, only two parties compete for power in this illustration, namely a (populist) left-wing party (i.e. the *R*ed party), and a (populist) right-wing party (i.e. the *B*lue party). For both, the market forms expectations in terms of risk-neutral densities to price options, taking into account all relevant policy positions. Assuming that the blue party is in power before the election, it is the blue risk neutral density in the left-hand side illustration of Fig. 4 that is used to price options on the country's major stock index. The (red) risk-neutral density of the challenger in the upcoming election is known to the market, but has no impact on the prices of options that expire before the election.

However, for options that span the election, the picture is different: Based on the contribution of Hanke et al. (2018), we can assume that the corresponding option prices are determined by a distribution that mixes risk-neutral densities with the risk-neutral election probabilities of both parties. The center illustration of Fig. 4 depicts two possible risk-neutral mixture densities, using election probabilities of 0.5 (the solid black line) and 0.7 (the dashed black line) for the red party. The resulting risk-neutral density now covers a wider area, presenting a larger standard deviation, which results in a higher option price and a larger implied volatility for options spanning the election. This is mainly due to the means of both risk-neutral densities being different from each other. Additionally, driven by the larger standard deviation of the red risk-neutral density with negative mean (negative expected returns usually go hand in hand with an increased level of uncertainty/volatility), the prominent left skew of the mixture distribution leads far out-of-the-money put options to be relatively more expensive, increasing the implied volatility slope for index options traded in this financial market. Assuming the red party were to win the election, markets would adjust with significantly negative aggregate returns and thereby shift the red risk-neutral density to be centered at the risk-free interest rate. In turn, if we assume that the blue party were to win the election, markets would adjust with significantly positive aggregate returns. This latter case is shown in the right-hand side illustration of Fig. 4.

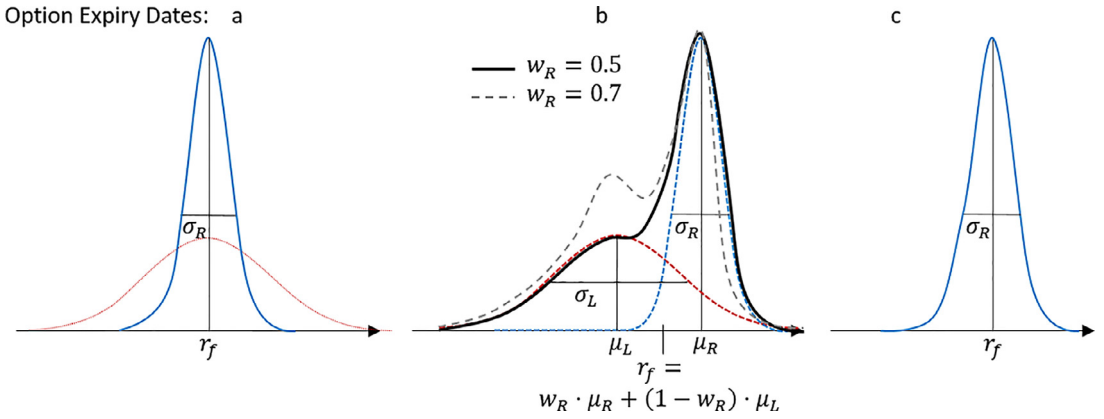

Fig. 4. Mechanisms.

Our empirical results show that higher party populism, in combination with an ideological stance on the far left, increases the tail risk measured by *IVSD*, as well as the price risk measured by *IVD*. In the model above, this is equivalent to an increase in volatility, as well as a decrease of skewness in the risk-neutral distribution. Under reasonably general assumptions, it could be shown that a decrease in skewness, in combination with an increase of volatility, is either driven by an increase of the election probability of the red party (if the election probability of the red party is below 0.5), or a shift to the left of the entire risk-neutral density function. This essentially means that the association of both outcome variables with increasing vote shares for populist left-wing parties, and/or the adoption of more extreme policy positions by those same parties, are positive and approximately linear. Formal mathematical notation of the theoretical model, as well as a simulation experiment supporting the linearity claim, are laid out in some detail in Section Appendix C.

Finally, it should be noted, that the implied volatility contained in options spanning elections is released into the market on the day after the election took place, with the size of the impact depending on the aggregate level of risk aversion. To this end, Section Appendix D analyzes measures of realized volatility, finding solid empirical support for our argument. In this context, the theoretical framework also allows us to test our hypothesis outside of the options market, which we also do in Section Appendix D. Results show that the electoral success of populism for realized volatility is equivalent to our findings on implied volatility, but employing a dataset covering more than 270 elections for 38 countries since the early1990′s. Overall, the results extracted from our model, the empirical support for the underlying mechanisms, as well as the conclusions from the simulation therefore give us an important additional degree of security in the validity of our empirical findings.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

6. Conclusion

This paper examines for a sample of Western style democracies, if political populism creates uncertainty that is priced in equity option markets, and whether these financial markets distinguish between populist movements on the basis of their ideology. To the best of our knowledge, it is the first to study these issues empirically. In order to do so, we compile a unique dataset of information on national elections, party programs, and prices of major equity index options.

As hypothesized in the theoretical outline, we find that the immediate risk assessment made by financial markets varies for populist parties of different ideology: The electoral success of populist parties on the far left merely seems to bring higher risk assessments for economic fluctuations, but for the risk of an economic crash only under some specifications. This indicates that financial markets are partially suspicious of left-wing populism in the context of a high-income democracy, where important institutional guardrails are in place. In turn, findings show the electoral success of right-wing populist parties to be evaluated as unequivocally favorable by financial markets, both for price and tail risk. Given some of the doubtful economic policies frequently advocated by populism on the far right, for example protectionism and selective tax-brakes, this result probably reflects the explicit tendency of associating with rent-seeking interests and of catering to the political demands of big business.

It should be noted here that our framework essentially does not permit claims on either, the long-run causal association of populism and financial markets, nor any possible effect of populism on financial market development in low- and middle-income countries. Sorting out these important questions is an intriguing and challenging task, which will have to be addressed by future research, when more and better data is hopefully available. Future data on political parties may also

permit further differentiation between the economic policy intentions of different right-wing populist parties to uncover the complex interplay of pro- and anti-market elements that seems to be present in this group.

Appendix A. The populism index

In this part of the Appendix, we engage in a detailed analysis and comparison of the populism database. Given that we construct a totally new measure of political populism for parties in this paper, and a corresponding populist ideology scale, the objective is to show that both variables actually pick up the concepts that we claim they are really picking up. This is important, because we essentially cannot use any of the more "established" populism measures to check the sensitivity of our results to this index, as this would always result in too few observations due to their missing time dimension for any meaningful empirical estimations. The analysis proceeds in several steps:

First, the resulting party placements produced by both measures are visualized in Fig. A.1. Here, we take the most recent election for every country (see Table 2) and plot populism (*POP*) against the right-left populism ideology scale (*PRILE*) for each country and party combination in our dataset. Fig. A.1 depicts the location of each party in the resulting populism-ideology space, labeling it as *country_party* in abbreviated form. Visual inspection shows, that notoriously populist parties on the right, such as the Danish People's Party (DF), the Dutch Forum for Democracy (FvD), or the Israeli Yisrael Beiteinu (YB) all score high on populism and are all located on the right side of the graphic, which corresponds to right-wing populist ideology. The index also clearly identifies populism on the left, where some classically populist formations also score high, such as the Greek Communist Party (KKE), or the French Communist Party (PCF) that supported Jean-Luc Mlenchon in the 2017 presidential elections, giving us some indications that we are picking up important elements of populist party discourse with our index.

Still, other parties that are often labelled as populist in public discourse score rather in the midfield of Fig. A.1, such as the United Kingdom Independence Party (UKIP), the Alternative for Germany (AfD), or the Spanish Podemos (P) party. Here, it should be taken into account though that some political systems seems to present decidedly more overall tendencies towards populist discourse than others, meaning that definitions of populism heavily depend on the context of country. In addition, several parties vary in their degree of populism quite considerably over time, giving us a partially different picture

Fig. A.1. This figures plots the Populism score (*POP*) against the - centered - Left-Right score (*PRILE*) calculated according to Section 3.2. All political information comes from the Comparative Manifesto project (CMP). We depict country-party combinations (labeled as *country_party* in abbreviated form) for the most recent election that we find in our election database (Table 2). To keep the figure readable, we only label parties, that achieve more extreme Left-Right or Populism scores. Colors indicate seat shares of the corresponding party in the most recent election.

Table A.1
Correlations of political variables for the most current election. POP and PRILE are calculated based on data from the Comparative Manifesto Project (CMP) that includes a right-left measure itself (*RILE*), the Cultural and Economic Cleavages measures (*CULT* and *ECON*) calculated according to Inglehart and Norris (2016) from the Chapel Hill Expert Survey 2019 (*CH 2019*) and the Populist Rhetoric (*POPR*) as well as the Economic Left-Right Measure (*LRECON*) depicted in the Global Party Survey 2019 (*GPS*, Norris, 2019). Finally we add the Populism measure (*POPES*) as well as the Overall left-right ideology score (*LROALL*) and left-right economic stance (*LRECON*) of the Populism and Political Parties Expert Survey 2018 (POPPA, cf. Meijers and Zaslove, 2021; 2020).

	PRILE	RILE	CULT	ECON	POPR	LRECON (GPS)	POPES	LROALL	LRECON (POPPA)
POP (CMP)	0.09	0.12	0.23	−0.18	0.28	−0.11	0.29	0.04	−0.08
PRILE (CMP)		0.73	0.59	0.57	0.36	0.49	0.26	0.66	0.50
RILE (CMP)			0.59	0.66	0.32	0.55	0.14	0.71	0.60
CULT (CH 2019)				0.46	0.65	0.46	0.39	0.71	0.41
ECON (CH 2019)					0.06	0.90	−0.24	0.80	0.95
POPR (GPS)						0.02	0.81	0.34	−0.02
LRECON (GPS)							−0.22	0.78	0.92
POPES (POPPA)								0.20	−0.23
LROALL (POPPA)									0.80

when plotting earlier elections. All in all though, no party that is usually labelled as populist is placed in the lower part of our graphic.

Second, we compare simple correlation coefficients between our populism index (*POP*), our populist ideology measure (*PRILE*), and the original Comparative Manifesto Project (CMP) ideology score (*RILE*) in Table A.1. These are again shown for the most recent election period where data is available. It can be observed in Table A.1 that we are obviously not just catching political ideology with our populism index, but seem rather to measure a concept of its own, which is largely independent of political ideology. Table A.1 further compares our measures to three other populist indicators for the same time frame, namely the already mentioned Inglehart and Norris (2016) scores for cultural (*CULT*) and economic (*ECON*) cleavages, the more recently created populist rhetoric (*POPR*) and economic left-right (*LRECON*(*GPS*)) measures by Norris (2019), and the very recent populism measure (*POPES*) by Meijers and Zaslove (2021), which also includes an overall left-right ideology score(*LROALL*), as well as a left-right economic indicator(*LRECON*(*POPPA*)). Here, it stands out that our populism indicator correlates quite decently with these other measures, especially populist rhetoric (*POPR*), populist party positions (*POPES*), and cultural cleavages (*CULT*). Still, all of these clearly seem to be more ideology driven than our own index, as is apparent from the correlations of these indicators with our variable *PRILE*. In particular, the *CULT* and *ECON* indicators by Inglehart and Norris (2016) seem to capture right-wing populism, rather than anything else. In turn, the ideology measures *LRECON*(*GPS*), *LROALL*, as well as *LRECON*(*POPPA*) all broadly seem to measure a similar concept to that of our ideology variable *PRILE*.

Third, Table A.2 further compares a list of all parties that score among the highest 30% by country in our populism indicator, to the pre-defined selection of parties made by Timbro during the same electoral time frame, which is always the last one available. To facilitate comparison, we limit parties to those with national representation covered by both datasets, and a vote share of at least 1%. It can be observed in Table A.2 that a high overlay obviously exists between both lists at the country level, further reaffirming that we capture important elements of the populism concept with our measure.

If anything, two differences stand out: First, our indicator does not identify a few parties as populist that are consistently labelled as such in the European media, at least not during the most recent electoral campaign. For example, this is the case for the Five Star Movement in Italy, the SVP in Switzerland, or Syriza in Greece, where especially the latter two have experienced a substantial moderation in recent years. In the case of Syriza, its party program actually becomes significantly less populist between the two Greek general elections of 2015, which is probably an outcome of the movement's relative electoral success (cf. Rooduijn et al., 2014). It should further be highlighted, that we can only capture populism of party programs with our index, not that of individual politicians who employ a populist rhetoric or a populist policy style, such as the Five Star co-founder and doyen Beppe Grillo for example.

Second, our index tends to identify a few of the more traditional centrist-conservative or social-democratic parties as moderately populist, which Timbro does not. Again, this often reflects recent elections, and highlights the general dynamic of electoral processes in Europe. In fact, our selection reaffirms contemporary research on the effect of populist parties for the nature of political competition, which seems to cause a gravitation of entire party systems towards more populist policy positions (Mudde, 2004; Schumacher and van Kersbergen, 2016; Wagner and Meyer, 2017; Krause and Giebler, 2020). This is nicely exemplified by the return of Forza Italia to a more populist policy style since the restoration of Silvio Berlusconi in 2017, which Timbro is simply unable to capture. Also, Timbro often does not cover the rise of new populist formations, such as Liste Pilz in Austria, or DENK in the Netherlands. Essentially, both differences highlight our original point, that populism is neither bi-dimensional nor constant over time.

Therefore, all inquiries in this section essentially point in the same direction: Our *POP* index seems to capture important elements of the populism concept in party programs. Compared to other indicators, it might be somewhat lesser driven by a specific political ideology, a concept that we further adequately pick up with the populist right-left scale *PRILE*. Differences to other indicators further arise mainly from the fact that our index seems well suited to capture variations in populist discourse over time, consequently relying much less on previous classifications of parties as either populist, or non-populist.

Table A.2
Comparison of the CMP and Timbro populist party selection. Evaluations show the most recent elections available in both databases, corresponding to results between 2014 and 2018. In our CMP based indicator, parties correspond to the top 30% of populist parties by country in the index. Parties are limited to those with national representation and at least 1% of the overall vote share. Note that there were two elections in Greece in 2015.

Country	Election date	CMP sel.	Timbro sel.	Full party name
Austria	2017-10-15	PILZ		Liste Peter Pilz
Austria	2017-10-15	FP	FP	Freiheitliche Partei sterreichs
Belgium	2014-05-25	N-VA		Nieuw-Vlaamse Alliantie
Belgium	2014-05-25	VB	VB	Vlaams Belang
Denmark	2015-06-18	Sd		Socialdemokraterne
Denmark	2015-06-18	V		Venstre
Denmark	2015-06-18	DF	DF	Dansk Folkeparti
Denmark	2015-06-18		EL	Enhedslistan
Finland	2015-04-19	DL|VAS		Demokraattinen Liitto / Vasemmistoliitto
Finland	2015-04-19	PS	PS	Sannfinlndarna
France	2017-06-18	PS		Parti Socialiste
France	2017-06-18	FN	FN	Front National
France	2017-06-18	PCF	PCF	Parti Communiste Franaise
France	2017-06-18		FI	Le France Insoumise
Germany	2017-09-24	AfD	AfD	Alternative fr Deutschland
Germany	2017-09-24	PDS/Linke	PDS/Linke	Die Linke / PDS
Greece	2015-09-20	ND		Nea Dimokratia
Greece	2015-01-25	ANEL	ANEL	Anexartitoi Ellines
Greece	2015-09-20	KKE	KKE	Kommounistik Kmma Elldas
Greece	2015-01-25	XA	XA	Chrysi Avgui
Greece	2015-01-25	Syriza	Syriza	Synaspismos Rizospastikis Aristeras
Greece	2015-09-20		Syriza	Synaspismos Rizospastikis Aristeras
Italy	2018-03-04	FI		Forza Italia
Italy	2018-03-04	LN	LN	Lega (Lega Nord)
Italy	2018-03-04		FDI	Fratelli d'Italia - Alleanza Nationale
Italy	2018-03-04		M5S	Movimento Cinque Stelle
Netherlands	2017-03-15	DENK		DENK
Netherlands	2017-03-15	50+		50PLUS
Netherlands	2017-03-15	PVV	PVV	Partij voor de Vrijheid
Netherlands	2017-03-15	PvD	PvD	Forum voor Democratie
Norway	2017-09-11	Sp		Senterpartiet
Norway	2017-09-11	RV	RV	Rdt
Norway	2017-09-11		FrP	Fremskrittspartiet
Poland	2015-10-25	PiS	PiS	Prawo i Sprawiedliwo
Spain	2016-06-26	Podemos	Podemos	Podemos
Sweden	2018-09-09	KD		Kristdemokraterna
Sweden	2018-09-09	SAP		Socialdemokraterna
Sweden	2018-09-09	SD	SD	Sverigedemokraterna
Sweden	2018-09-09		V	Vnsterpartiet
Switzerland	2015-10-18	FDP		Freisinnig-Demokratische Partei der Schweiz
Switzerland	2015-10-18	SP		Sozialdemokratische Partei der Schweiz
Switzerland	2015-10-18	PdA	PdA	Partei der Arbeit
Switzerland	2015-10-18		SVP	Schweizerische Volkspartei
United Kingdom	2017-06-08	DUP	DUP	Democratic Unionist Party
United Kingdom	2017-06-08	UKIP	UKIP	United Kingdom Independence Party

Appendix B. Robustness checks

Despite the fact that we believe our main variables to be well-crafted and the empirical strategy to strongly support the causal interpretation of estimates, we recognize that there are alternative measurement possibilities for our dependent variables, as well as different estimation strategies that could be employed. In this appendix we engage in some sensible robustness checks, so as to verify that our findings are not sensitive to any potentially arbitrary choices made throughout the paper.

First, Table B.1 and Table B.2 show a robustness check that only employs options expiring before elections as a control group. Here, Table B.1 finds almost identical results for price risk (*IVD*) to those of Table 4. Likewise, Fig. B.1 depicts the marginal effects graphic corresponding to column (7) of Table B.1, showing again very similar findings for changes in populism for *IVD*, dependent on political ideology. A one standard deviation increase in *POP* significantly raises implied volatilities for party systems that are on the far left end of the political spectrum, while a standard deviation increase in populism for party systems that are dominated by (center) right-wing parties yields a smaller implied volatility in relation to the full sample. In turn, Table B.2 only confirms the tendency of populism's ideology driven impact on tail risk (*IVSD*), but finds it to be mostly insignificant with the alternative dependent variable. This is also the case for the marginal effects

graphic shown in Fig. B.2, where we see the tendency of our earlier findings confirmed, albeit with statistically insignificant results.

Second, following again Kelly et al. (2016) we describe results of a dummy variable specification employing sample splits in Table B.3 for price risk and Table B.4 for tail risk. Here, t-statistics are again calculated using two-way clustered standard errors on the year and country level. Technically, we thus run a regression on a constant, as well as on a dummy variable splitting the data set at 0.

In a first step, we confirm whether our measure actually assigns a positive price to political uncertainty in column 1 of both tables, implying that investors were willing to pay a premium to insure against price and tail risk. This seems to be the case for both measures, which means that investors generally perceive national election times as risky, compared to times where there are no elections taking place, reproducing the most basic result obtained by Kelly et al. (2016).

In a second step, we split our sample according to different criteria, employing the political and economic variables. We calculate average *IVD* and *IVSD* within each sub-group, as well as the difference between groups and report the first-group average as well as the between-group difference. In columns (2) and (3) of Table B.3 and Table B.4, we tentatively only find *IVSD* to be significantly larger for a right wing ideology, albeit all variables always showing the expected sign. It should be noted that this finding is actually akin to those of Table 4 and Table 5, highlighting again that neither populism, nor ideology are really relevant for risk assessments in financial markets, when observed in relative isolation. The insignificant results on the *POP* dummies of Table B.3 and Table B.4 thus reflect the fact that we are not distinguishing between different types of populist parties.

In the following, columns (4) and (5) of Table B.3 and Table B.4 attempt to reproduce the impact of our interaction effect on price risk and tail risk, but employing the dummy variable together with sample splits. Columns (4) show the impact of populism, but only for the sample of countries with a left-wing ideology (below median *PRILE*). As expected, we find a positive and highly significant impact on the populism dummy, but only for *IVD*. Likewise, columns (5) show the impact of a right-wing ideology, but only for the sample of countries with a level of populism in the top 40% of the sample. Coefficients on the dummy *PRILE* are now negative and statistically highly significant, and this is the case for both dependent variables, price risk (*IVD*) and tail risk (*IVSD*). These result can be considered as a strong confirmation of our main findings from Table 4 and Table 5, especially when noting that we lose more than half of our total observations in the sample splits. Finally, columns (6) and (7) of Table B.3 and Table B.4 reproduce the impact of the economic variables in this setting, both of which are always insignificant.

B.1. Alternative specification of dependent variable

Table B.1
Implied Volatility Differences and Political variables.In this table, we report results from OLS regressions of an alternative specification of Implied Volatility Differences (IVD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. IVD is in percent per year, and all *t*-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Differences (IVD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	1.52	1.52	4.83*	4.80	7.49**	7.15***	3.05	5.88***	5.02***	3.36*	4.20***
	t = 1.38	t = 1.01	t = 1.90	t = 1.65	t = 2.29	t = 2.74	t = 1.29	t = 7.05	t = 5.31	t = 1.75	t = 3.38
POP		0.002		0.05	- 5.03***	– 6.54*	– 8.86**	– 4.20***	– 4.14***	– 8.41***	– 3.99**
		t = 0.004		t = 0.10	t = – 6.79	t = – 1.92	t = – 2.29	t = – 8.70	t = – 8.22	t = – 3.48	t = – 2.39
PRILE			4.00*	4.00*	7.15**	5.42**	6.55***	5.89***	5.67***	6.77***	5.90***
			t = 1.78	t = 1.79	t = 2.25	t = 2.58	t = 2.92	t = 4.78	t = 6.15	t = 4.32	t = 3.51
POP*PRILE					– 5.91***	– 6.55**	– 9.17**	– 4.91***	– 4.88***	– 8.87***	– 4.92***
					t = – 5.46	t = – 2.04	t = – 2.39	t = – 19.81	t = – 13.28	t = – 3.84	t = – 2.85
ECON						– 4.52***	– 10.27***	– 3.00	– 3.60	– 9.12***	– 4.04**
						t = - 3.03	t = – 5.31	t = – 1.60	t = – 1.31	t = – 4.54	t = – 2.14
ECON* $1_{ECON>0}$							13.50***		2.39	12.20***	3.69
							t = 3.72		t = 0.60	t = 3.71	t = 1.38
Observations	67	67	67	67	67	67	67	65	65	65	64
R^2	0	0	0.06	0.06	0.08	0.31	0.53	0.19	0.19	0.48	0.44

Note: *p<0.1; **p<0.05; ***p<0.01.

Table B.2
Implied Volatility Slope Differences and Political variables. In this table, we report results from OLS regressions of an alternative specification of Implied Volatility Slope Differences (IVSD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. IVSD is in percent per year, and all *t*-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Slope Differences (IVSD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	1.81	2.11	5.06***	5.57**	8.70**	5.92**	3.84**	3.61	3.47	2.17	2.51
	t = 1.63	t = 1.03	t = 3.34	t = 2.36	t = 2.03	t = 2.26	t = 2.47	t = 1.45	t = 1.23	t = 1.09	t = 0.86
POP		– 0.34		– 0.56	– 4.08	– 1.61	– 0.87	– 0.14	– 0.15	0.17	0.85
		t = – 0.26		t = – 0.54	t = – 1.10	t = – 0.68	t = – 0.49	t = – 0.05	t = – 0.06	t = 0.10	t = 0.36
PRILE			3.90***	3.92***	8.37*	4.87	4.15	3.40	3.34	2.82	2.28
			t = 3.06	t = 3.06	t = 1.70	t = 1.50	t = 1.48	t = 1.12	t = 1.09	t = 1.21	t = 0.98
POP*PRILE					– 5.09	– 2.39	– 1.47	– 0.65	– 0.63	– 0.06	0.85
					t = - 1.08	t = - 0.71	t = - 0.50	t = - 0.18	t = – 0.18	t = – 0.02	t = 0.37
ECON						– 2.18*	– 3.91**	– 2.67**	– 2.79	– 4.65**	– 3.03**
						t = – 1.74	t = – 2.17	t = – 2.11	t = – 1.61	t = – 2.51	t = – 2.11
ECON*$1_{ECON>0}$							3.87		0.47	5.11*	0.74
							t = 1.16		t = 0.18	t = 1.95	t = 0.34
Observations	60	60	60	60	60	60	60	58	58	58	57
R^2	0	0	0.11	0.11	0.12	0.21	0.25	0.27	0.27	0.25	0.18

Note: *p<0.1; **p<0.05; ***p<0.01.

B.2. Dummy variables

Table B.3
Implied Volatility Differences and Political variables. In this table, we report results from OLS regressions of Implied Volatility Differences (IVD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). All explanatory variables are standardized and dummy variables created according to whether the respective observation is positive or negative. IVD is in percent per year, and all t-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Differences (IVD)						
	(1)	(2)	(3)	$PRILE^{-}$ (4)	POP^{+} (5)	MKT (6)	GDP (7)
Constant	1.31**	1.24	0.62	– 0.85	2.42*	2.33**	
	t = 2.14	t = 0.96	t = 1.30	t = – 0.81	t = 1.82	t = 2.32	
POP (D)		0.15		2.43***			
		t = 0.11		t = 2.80			
PRILE (D)			1.36				
			t = 1.31				
ECON					– 1.91	– 1.97	
					t = – 1.18	t = – 1.45	
Observations	67	67	67	34	67	67	
R^2	0	0	0.02	0.08	0.07	0.04	

Note: *p<0.1; **p<0.05; ***p<0.01.

Table B.4
Implied Volatility Slope Differences and Political variables. In this table, we report results from OLS regressions of Implied Volatility Slope Differences (IVSD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of IVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). All explanatory variables are standardized and dummy variables created according to whether the respective observation is positive or negative. IVSD is in percent per year, and all t-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Slope Differences (IVSD)						
	(1)	(2)	(3)	$PRILE^{-}$ (4)	POP^{+} (5)	MKT (6)	GDP (7)
Constant	1.83***	2.02**	0.81	0.89	1.14	1.09	1.09
	t = 3.18	t = 2.59	t = 1.16	t = 0.88	t = 1.48	t = 1.59	t = 1.59
POP (D)		– 0.38		– 0.16			
		t = – 0.26		t = – 0.17			
PRILE (D)			2.05***		- 0.99***		
			t = 3.86		t = – 4.33		
ECON						1.20	1.20
						t = 0.79	t = 0.79
Observations	60	60	60	30	24	58	58
R^2	0	0	0.04	0	0.02	0.01	0.01

Note: *p<0.1; **p<0.05; ***p<0.01.

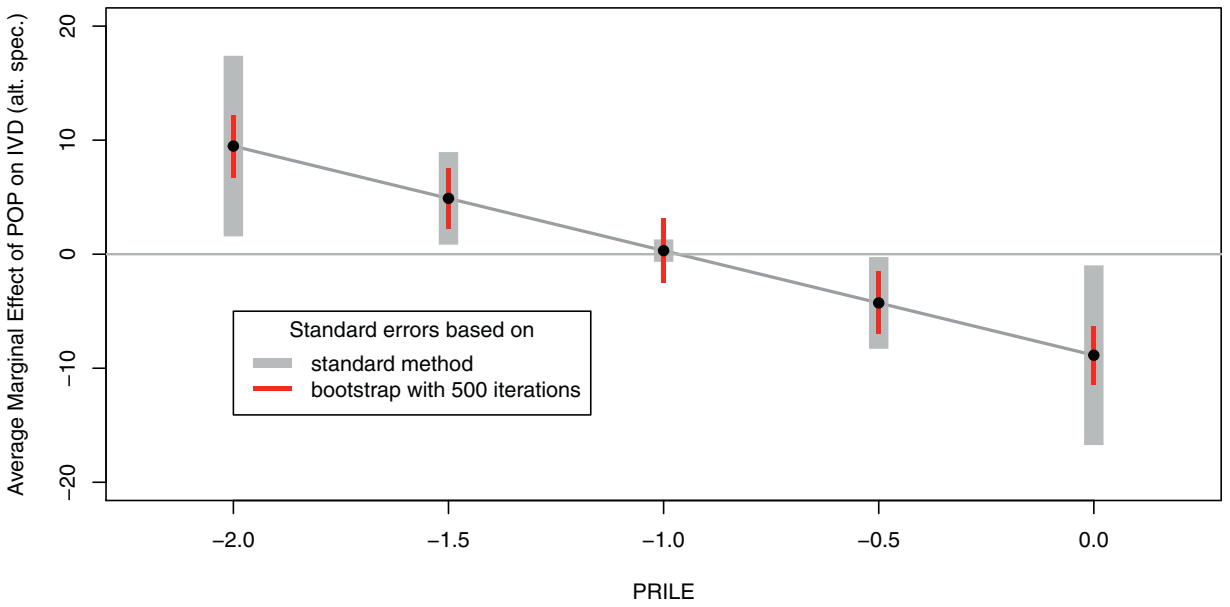

Fig. B.1. Marginal effect of populism on IVD (alternative specification).

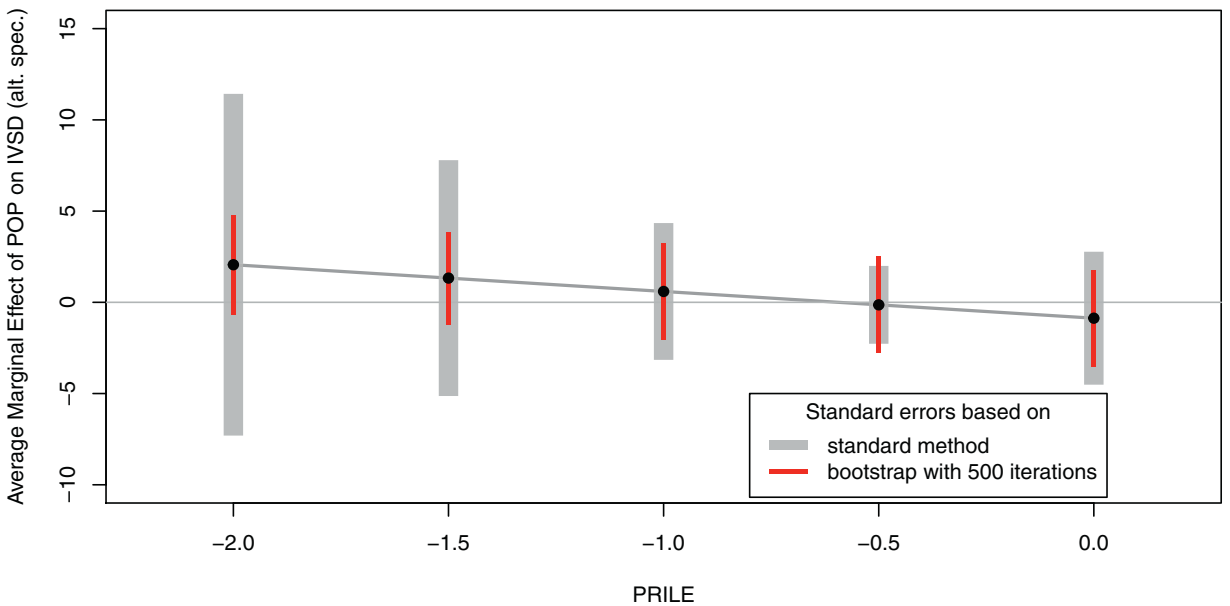

Fig. B.2. Marginal effect of populism on IVSD (alternative specification).

Appendix C. Numerical simulations

In the following, we give a more thorough mathematical explanation for the model shown briefly in Section 5. Additionally, we run a number of simulations for a reasonable range of parameters, in order to support our claim that a larger vote share for the red party, or more extreme red party policy positions, both reflecting more negative μ_R, essentially lead to the documented increases in *IVD* and *IVSD* for the entire set of parameters. Here, we also document that the relationship between both parameters and the outcome variables is approximately linear in the considered parameter space.

Let us first start by valuing options for option expiry date a under the assumption that stock returns are normally distributed and can be appropriately valued with the well known Black and Scholes (1973) and Merton (1973) (BSM) option pricing formula given below. To do so, we need the current stock price S_0^a, the option's strike price K, the corresponding risk-neutral standard deviation σ, as well as the risk-free interest rate r_f, and the option's time to maturity given by T.

$$C^{BSM}(S_0^a, K, \sigma, r_f, T) = S\phi(d_1) - Ke^{-r_f T}\phi(d_2) \text{ (Call Option)} \tag{C.1}$$

$$P^{BSM}(S_0^a, K, \sigma, r_f, T) = Ke^{-r_f T}\phi(-d_2) - S\phi(-d_1) \text{ (Put Option)} \tag{C.2}$$

$$d_1 = \frac{ln(S/K) + \left(r_f + \sigma^2/2\right)T}{\sigma T},\ d_2 = d_1 - \sigma T. \tag{C.3}$$

For all option types at all maturities and all strike prices, we derive option prices using the (constant) volatility parameter σ.

The issue of pricing gets more complex, once we want to price options that span political elections (expiry date b). In the relatively simple example described in Section 5, we can directly apply the Black-Scholes-Merton model to the Gaussian mixture distribution and derive option prices as a mixture of (slightly modified) individual BSM option prices (cf.

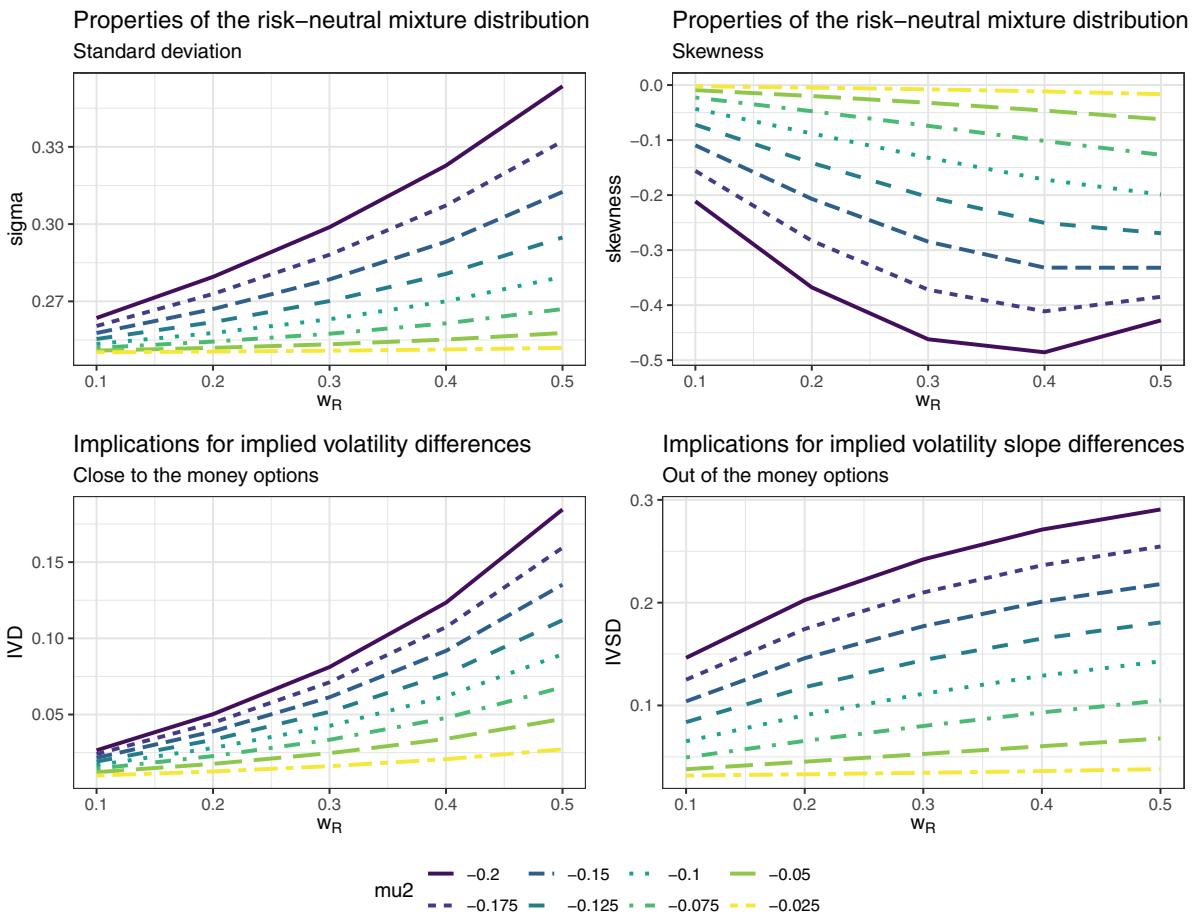

Fig. C.1. Simulation.

Ritchey, 1990; Hanke et al., 2018). The slight modification pertains to the fact, that the center of the individual densities is no longer the risk-free interest rate (which is the center of the mixed density), and we therefore have to take into account two drift parameters: μ_R for the red party, and μ_B for the blue party. This is achieved by using future values of the spot price $E_{0,R}[S_T^b] = S_0^b \cdot \exp\left[\left(\mu_i - \frac{\sigma_i^2}{2}\right)T\right]$ under the individual risk-neutral return distributions $i \in \{R, D\}$, and using Black's (1976) modified version of the BSM formula:

$$C^B(E[S_T^b], K, \sigma, r_f, T) = e^{-r_f T}\left[E[S_T^b]\phi(d_1^*) - K\phi(d_2^*)\right] \tag{C.4}$$

$$P^B(E[S_T^b], K, \sigma, r_f, T) = e^{-r_f T}\left[K\phi(-d_2^*) - E[S_T^b]\phi(-d_1^*)\right] \tag{C.5}$$

$$d_1^* = \frac{ln(E[S_T^b]/K) + \left(\sigma^2/2\right)T}{\sigma T},\ d_2^* = d_1^* - \sigma T. \tag{C.6}$$

The price of a call option based on the mixture density then is

$$C^{Mix} = \sum_{i \in \{R,D\}} w_i C^B(E_i[S_T^b], K, \sigma_i, r_f, T) \tag{C.7}$$

and a similar expression for put options. It is important to highlight here, that the two drift parameters μ_i are connected to each other via the risk-free interest rate r_f:

$$\begin{aligned} S_0^b e^{r_f T} &= w_R E_R[S_T^b] + w_B E_D[S_T^b] \\ &= w_R \cdot S_0^b \cdot exp\left[\left(\mu_R - \frac{\sigma_R^2}{2}\right)T\right] + (1 - w_R) \cdot S_0^b \cdot exp\left[\left(\mu_B - \frac{\sigma_B^2}{2}\right)T\right], \end{aligned} \tag{C.8}$$

If the red party now takes a more extreme policy stance that is also valued as such by markets, it would not only increase μ_R as a direct consequence, but also move μ_B of the blue party in the opposite direction. Next, we assume an initial situation akin to the center exhibit of Fig. 4, where the risk-neutral density of the red party lies to the left with a negative μ_R, meaning that the policy positions of the red party are valued as relatively worse by the market, than those of the blue party. An additional assumption that we have to make here is that the risk-neutral density on the left has a larger standard deviation than the one on the right, as negative expected returns are usually accompanied by an increased level of uncertainty that manifests itself in a larger $\sigma_R > \sigma_B$. These assumptions are well supported by the literature on financial markets (Hanke et al., 2018), further allowing us to draw several conclusions from this theoretical model:

1. An increase in the election probability of the red party, and/or a shift of that same party's policy intentions towards positions that are valued as more extreme by markets, always results in an increase of the standard deviation, as well as a more negative skewness of the risk-neutral (Gaussian mixture) distribution.
2. Likewise, the two measure that we use to measure the impact of an ideologically driven populist policy in option markets, namely the implied volatility and the implied volatility slope of options spanning elections, will both increase monotonically, vis-a-vis their counterpart options with expiry dates *a* and *c*. This will result in elevated levels of *IVD* and *IVSD* for the red party, just like it is documented in our empirical results.

These theoretical conclusions are supported by a following simulation experiment. In order to operationalize this simulation, we use the following initial parameters:

- The risk-free rate is set as equal to 0: $r_f = 0$, this has no impact on the results of the simulation experiment;
- The initial stock price is set so that $S_0 = 100$, which also has no impact on the results.
- The time window is set to one month, corresponding to our empirical results $T = 1/12$;
- Different strike prices are simulated, based on their level of moneyness, with levels set between 0.5 and 1.5, corresponding to strike prices K between 50 and 150.[17]
- Additionally, we evaluate different levels of $\mu_R \leq 0$, with corresponding $\mu_B \geq 0$ given by Eq. C.8, namely $\mu_R \in \{-0.2, -0.175, -0.15, -0.125, -0.1, -0.075, -0.05, -0.025\}$.
- Different weights are evaluated, meaning that $0 < w_R \leq 0.5$ essentially simulates the impact of increasing election probabilities on *IVD* and *IVSD*.
- Standard deviations σ_1 and σ_2 are modelled to be linearly increasing from 0.2 (at $\mu = 0.2$) to 0.4 (at $\mu = -0.2$) in μ, highlighting the impact of increased uncertainty for smaller (and even negative) μ. The choice of the scaling is somehow arbitrary here, but lies within reasonable boundaries, and alternative specifications do not change the nature of our simulation results.

[17] In our empirical results we follow Kelly et al. (2016) and address moneyness by the options' delta, rather than in a direct manner. This does not impact the results of our simulation.

In what follows, we generate option prices (puts and calls) for the blue party's risk-neutral density at expiry date *a*, as well as corresponding option prices for the various specifications of the risk-neutral Gaussian mixture densities, generated for expiry date *b*. In the latter case, we use the standard inversion of the BSM-formula to calculate corresponding implied volatilities. From these implied volatilities, we then calculate variables *IVD* and *IVSD*, as described in the main part of the paper.

As can be observed in Fig. C.1 all of our theoretical conjectures are confirmed by the simulation. Most importantly, an increase in the election probability of the red party, as well as a shift towards more extreme policy positions, ultimately leads to an increase in volatility and a more negative skewness.[18] Additionally, we find *IVD* and *IVSD* to be monotonically and approximately linearly increasing in both variables, which confirms our theoretical hypothesis and lends strong support to the main empirical findings of the paper.

Appendix D. Populist electoral success and realized volatility

As noted in the text, market participants hedge against the (additional) uncertainty of election outcomes, and its impact on financial markets in the options market, thereby increasing implied volatilities and - depending on the political stance of the parties - the implied volatility slope. Under rational expectations, this goes hand in hand with an increase of realized volatility on the election day, as well as - depending on the aggregate level of risk aversion - the realization of a risk premium. To this end, we conduct an analysis of realized volatility in the following, so as to offer empirical support for the mechanisms outlined in the paper.

Theoretically, the mixed risk-neutral density in Fig. 4 collapses on the day after the election has taken place, and centers again at the risk-free rate for the winning party. Thereby, the contained implied volatility is released into the market, pushing up the realized volatility of the underlying index on that same day. In addition, and this depends on whether election risk is adequately priced, the market realizes a premium for the released election risk. The size of this premium depends on the aggregate risk aversion of the market, as well as the amount of realized volatility. On top of that premium, the market also adjust in one direction or the other, depending on the election winner's μ (see Section Appendix C). Following our theoretical example in Fig. 4, the electoral victory of a (populist) left wing party will create a downward adjustment of the market to accommodate any possible future policy changes.

In sum, the return on the day after the election consists of a premium component if election risk is priced, as well as a market adjustment depending on the winner of the election. As it is currently impossible for us to disentangle the two effects, we focus solely on the impact of realized volatility, thereby taking advantage of the usual clustering effect, where volatility - once pushed up - tends to remain high for at least a small period of time. Further following the logic of *IVD* computation in Fig. 1, we calculate the 10-day realized volatility starting the day after the election, relating these figures to the 20-day volatility ending/starting 20 days before/after the election, in order to measure the *R*ealized *V*olatility *D*ifference.

Our following empirical analysis with the *RVD* measures is twofold: First, we analyze the effect of a release of implied volatility before the election on realized volatility in stock markets after the election. To this end we investigate two time windows to calculate the realized volatility after the election: a 4 day period, and a 10 day period. Both are then related to the 20-day volatility ending/starting 20 days before/after the election, just as outlined above. Table D.1 clearly documents that implied volatility before the election also induces realized volatility in the stock market after the election.

Table D.1
Realized Volatility Differences and Implied Volatility (slope) Differences. In this table, we report results from OLS regressions of Realized Volatility Differences (RVD) on Implied volatility (Slope) differences to support our claim to show that the heightened levels of implied volatilities spanning the elections realize directly after the election. RVSD is calculated as in Equation 2 but using 4 and 10 day realized volatilities directly after the election and relating it to 20-day volatilities starting/ending 20 days before/after the election. RVD as well as IV(S)D are in percent per year, all *t*-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Realized Volatility Differences (RVD)							
	RVD (10d) (1)	RVD (10d) (2)	RVD (4d) (3)	RVD (4d) (4)	RVD (10d, alt) (5)	RVD (10d, alt) (6)	RVD (4d, alt) (7)	RVD (4d, alt) (8)
Constant	- 0.0001	0.07	- 0.03	0.07	0.04	0.11	0.01	0.11
	t = - 0.001	t = 0.93	t = - 0.55	t = 1.09	t = 0.36	t = 1.01	t = 0.09	t = 1.29
IVD	0.07**		0.07**		0.09***		0.08***	
	t = 2.56		t = 2.37		t = 3.52		t = 4.27	
IVSD		0.02		0.01		0.04*		0.03**
		t = 1.48		t = 0.82		t = 1.73		t = 2.36
Observations	67	64	67	64	67	65	67	65
R^2	0.19	0.02	0.22	0.04	0.35	0.01	0.38	0.03

Note: *p<0.1; **p<0.05; ***p<0.01.

[18] Both measures are calculated using formulas given by (Wang, 2001). Findings hold for all possible parameter values, with the exception of a very small space at the extreme levels of μ_2, if at the same time weights are close to representing equal election probabilities $w_R > 0.4$.

Second, we take advantage of the fact that we can now test our hypotheses outside of the options market, repeating our baseline analysis from Section 4 with the *RVD* indicator. Employing an identical country sample (i.e. "small dataset"), we find qualitatively similar results in Table D.2 and Fig. D.2 that are, notwithstanding, statistically insignificant. This is probably due to the small amount of independent observations in our baseline data, thereby reflecting the comparatively nosier estimation of realized volatility in the *RVD*, as compared to implied volatility in the *IVD* and *IVSD* measures.

Still, because data on realized volatility is available on a much broader base than options data, we are able to repeat this analysis for a "large dataset", covering more than 270 total electoral observations for some 38 countries since the early1990/s. Data sources and the exact elections covered are all documented in Table D.4. Results are shown in Table D.3, and the corresponding Fig. D.3. Here, findings almost perfectly reproduce our baseline results from Section 4, with the electoral success of populist parties on the far left causing higher realized price volatility, while the success of center or right-wing populist parties causes lower realized price volatility. Overall, these findings show that the electoral success of populism for realized volatility is equivalent to our results on implied volatility, providing important evidence for the mechanism outlined in our theoretical section.

D.1. Small dataset

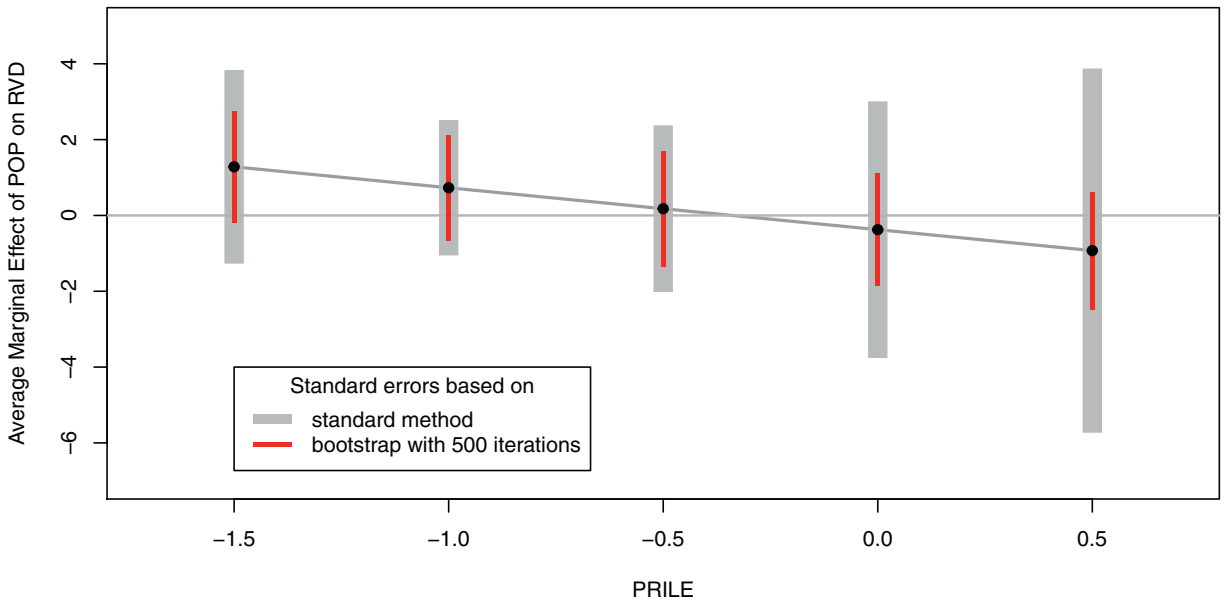

Fig. D.2. Marginal effect of populism on RVD (small dataset).

Table D.2
Realized Volatility Differences and Political variables. In this table, we report results from OLS regressions of Realized Volatility Differences (RVD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of RVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. RVD is in percent per year, and all t-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Differences (IVD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	0.07	- 0.43	- 0.01	- 0.50	0.62	0.61	- 0.04	0.79	0.97	0.18	0.74
	t = 1.04	t = - 0.55	t = - 0.09	t = - 0.56	t = 0.38	t = 0.41	t = - 0.03	t = 0.48	t = 0.64	t = 0.13	t = 0.52
POP		0.60		0.59	- 0.71	- 0.70	- 0.38	- 0.88	- 1.00	- 0.56	- 0.92
		t = 0.60		t = 0.60	t = - 0.40	t = - 0.43	t = - 0.23	t = - 0.50	t = - 0.62	t = - 0.37	t = - 0.63
PRILE			- 0.11	- 0.10	1.36	1.34	0.74	1.63	1.77	0.84	1.32
			t = - 0.54	t = - 0.46	t = 0.88	t = 0.94	t = 0.54	t = 0.97	t = 0.99	t = 0.59	t = 0.82
POP*PRILE					- 1.69	- 1.68	- 1.11	- 1.97	- 2.11	- 0.97	- 1.49
					t = - 1.04	t = - 1.12	t = - 0.71	t = - 1.14	t = - 1.14	t = - 0.68	t = - 0.96
ECON						- 0.02	- 0.41	0.19	0.27	- 0.20	0.09
						t = - 0.15	t = - 1.59	t = 1.24	t = 0.60	t = - 0.72	t = 0.29
ECON* $1_{ECON>0}$							0.82*		- 0.19	0.72	0.22
							t = 1.82		t = - 0.24	t = 1.51	t = 0.48
Observations	67	67	67	67	67	67	67	65	65	65	64
R^2	0	0.01	0	0.01	0.02	0.02	0.05	0.04	0.05	0.08	0

Note: *p<0.1; **p<0.05; ***p<0.01.

D.2. Large dataset

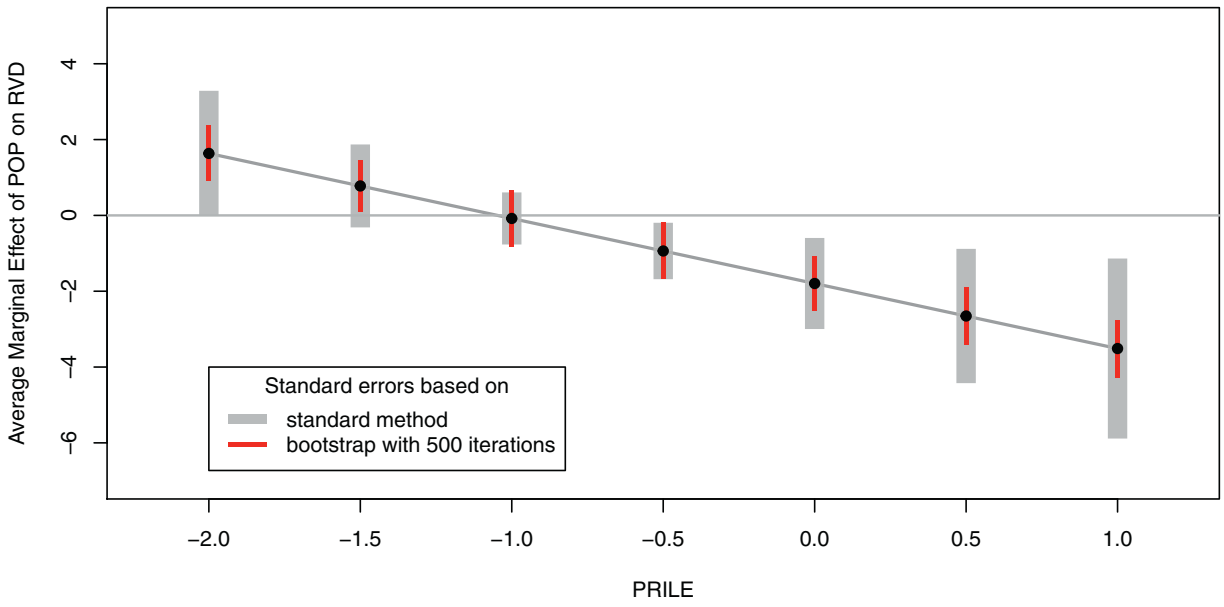

Fig. D.3. Marginal effect of populism on RVD (large dataset).

Table D.3
Realized Volatility Differences and Political variables. In this table, we report results from OLS regressions of Realized Volatility Differences (RVD) on (combinations of) the two populism variables (POP and PRILE), partly controlling for economic conditions (ECON being MKT or GDP, we additionally include an interaction term that measures the dependence of RVD on ECON in a strong economy $ECON > 0$, cf. Kelly et al., 2016). Additionally, in the last two columns we show slope coefficients for a two-way (country/year level, thereby we had to eliminate two elections from Spain that took place in the same year) random effects panel regression model (P). All economic variables are standardized to zero mean on the country level using data from 1990 through 2019 (2020) and to unit standard deviation on the regression level. All political variables are standardized to unit standard deviation within countries for all elections where we have option data available. RVD is in percent per year, and all t-statistics reported under the estimated coefficients are based on robust standard errors with two-way clustering on the year and country-level.

	Implied Volatility Differences (IVD)										
	(1)	(2)	(3)	(4)	(5)	MKT (6)	MKT (7)	GDP (8)	GDP (9)	MKT (P) (10)	GDP (P) (11)
Constant	0.13**	0.52	0.07	0.46	1.71***	1.69***	1.67***	1.47**	1.58**	1.68**	1.56**
	t = 2.51	t = 1.49	t = 0.52	t = 1.21	t = 3.00	t = 2.91	t = 2.65	t = 2.48	t = 2.48	t = 2.45	t = 2.36
POP		- 0.43		- 0.44	- 1.82***	- 1.81***	- 1.80***	- 1.58**	- 1.63**	- 1.78**	- 1.63**
		t = - 1.13		t = - 1.21	t = - 3.20	t = - 3.09	t = - 2.96	t = - 2.57	t = - 2.55	t = - 2.58	t = - 2.52
PRILE			- 0.07	- 0.09	1.50***	1.49**	1.48**	1.30**	1.33**	1.43**	1.29*
			t = - 0.53	t = - 0.66	t = 2.60	t = 2.57	t = 2.47	t = 2.18	t = 2.17	t = 2.09	t = 1.97
POP*PRILE					- 1.74***	- 1.73***	- 1.72***	- 1.56**	- 1.58**	- 1.67**	- 1.55**
					t = - 2.85	t = - 2.76	t = - 2.67	t = - 2.40	t = - 2.39	t = - 2.28	t = - 2.27
ECON						0.02	0.003	0.10*	0.18	0.01	0.12
						t = 0.30	t = 0.03	t = 1.82	t = 1.43	t = 0.09	t = 0.85
ECON*$1_{ECON>0}$							0.03		- 0.17	- 0.01	- 0.10
							t = 0.22		t = - 0.98	t = - 0.03	t = - 0.47
Observations	278	274	274	274	274	274	274	251	251	270	249
R^2	0	0.01	0	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.01

Note: *p<0.1; **p<0.05; ***p<0.01.

Table D.4
Overview of elections covered in Section Appendix D. This table lists all national elections for which stock market data according to Section Appendix D is available, showing country, Datastream Identifier and election dates.

Country	DS Mnemonic	Election 1	Election 2	Election 3	Election 4	Election 5	Election 6	Election 7	Election 8	Election 9	Election 10
Australia	ASX200I	1993-03-13	1996-03-02	1998-10-03	2001-11-10	2004-10-09	2007-11-24	2010-08-21	2013-09-07	2016-07-02	
Austria	ATXINDX	1990-10-07	1994-10-09	1995-12-17	1999-10-03	2002-11-24	2006-10-01	2008-09-28	2013-09-29	2017-10-15	2019-09-29
Belgium	BGBEL20	1991-11-24	1995-05-21	1999-06-13	2003-05-18	2007-06-10	2010-06-13	2014-05-25	2019-05-26		
Bulgaria	BSSOFIX	2001-06-18	2005-06-25	2009-07-05	2013-05-12	2014-10-05	2017-03-26				
Canada	TTOSP60	1993-10-25	1997-06-02	2000-11-27	2004-06-28	2006-01-23	2008-10-14	2011-05-02	2015-10-19	2019-10-21	
Croatia	CTCROBE	2000-01-03	2003-11-23	2007-11-25	2011-12-04	2015-11-08	2016-09-11				
Cyprus	CYPMAPM	2006-05-21	2011-05-22	2016-05-22							
Czech Republic	CZPXIDX	1996-06-01	1998-06-20	2002-06-15	2006-06-03	2010-05-29	2013-10-25	2017-10-21			
Denmark	DKKFXIN	1990-12-12	1994-09-21	1998-03-11	2001-11-20	2005-02-08	2007-11-13	2011-09-15	2015-06-18	2019-06-05	
Estonia	ESTALSE	1999-03-07	2003-03-02	2007-03-04	2011-03-06	2015-03-01	2019-03-03				
Finland	HEX25IN	1991-03-17	1995-03-19	1999-03-21	2003-03-16	2007-03-18	2011-04-17	2015-04-19	2019-04-14		
France	FRCAC40	1993-03-28	1997-06-01	2002-06-16	2007-06-17	2012-06-17	2017-06-18				
Germany	DAXINDX	1990-12-02	1994-10-16	1998-09-27	2002-09-22	2005-09-18	2009-09-27	2013-09-22	2017-09-24		
Greece	FTASE20	2000-04-09	2004-03-07	2007-09-16	2009-10-04	2012-05-06	2012-06-17	2015-01-25	2015-09-20	2019-07-07	
Hungary	BUXINDX	1994-05-29	1998-05-24	2002-04-21	2006-04-09	2010-04-25	2014-04-06	2018-04-08			
Iceland	ICEXALL	1995-04-08	1999-05-08	2003-05-10	2007-05-12	2009-04-25	2013-04-27	2016-10-29	2017-10-28		
Ireland	ISEQUIT	1992-11-25	1997-06-06	2002-05-17	2007-05-24	2011-02-25	2016-02-26				
Israel	ISTA100	1992-06-23	1996-05-29	1999-05-17	2003-01-28	2006-03-28	2009-02-10	2013-01-22	2015-03-17	2019-04-09	2019-09-17
Italy	FTSEMIB	2001-05-13	2006-04-09	2008-04-13	2013-02-25	2018-03-04					
Japan	JAPDOWA	1990-02-18	1993-07-18	1996-10-20	2000-06-25	2003-11-09	2005-09-11	2009-08-30	2012-12-16	2014-12-14	2017-10-22
Luxembourg	LUXGENI	1999-06-13	2004-06-13	2009-06-07	2013-10-20	2018-10-14					
Malta	MALTAIX	1996-10-26	1998-09-05								
Mexico	MXIPC35	1991-08-18	1994-08-21	1997-07-06	2000-07-02	2003-06-06	2006-07-02	2009-07-05	2012-07-01	2015-06-07	
Netherlands	AMSTEOE	1994-05-03	1998-05-06	2002-05-15	2003-01-22	2006-11-22	2010-06-09	2012-09-12	2017-03-15		
New Zealand	NZ50CAP	2002-07-27	2005-09-17	2008-11-08	2011-11-26	2014-09-20	2017-09-23				
Norway	OSLOOBX	1993-09-13	1997-09-16	2001-09-10	2005-09-12	2009-09-14	2013-09-09	2017-09-11			
Poland	POLWG20	1997-09-21	2001-09-23	2005-09-25	2007-10-19	2011-10-09	2015-10-25	2019-10-13			
Portugal	POPSI20	1995-10-01	1999-10-10	2002-03-17	2005-02-20	2009-09-27	2011-06-05	2015-10-04	2019-10-06		
Romania	RMBETRL	2000-11-26	2004-11-28	2008-11-30	2012-12-09	2016-12-11					
Slovakia	SXSAX16	1994-10-01	1998-09-26	2002-09-21	2006-06-17	2010-06-12	2012-03-10	2016-03-06			
Slovenia	SLOETOP	2008-09-21	2011-12-04	2014-07-13	2018-06-03						
South Africa	JSEOVER	1999-06-02	2004-04-14	2009-04-22	2014-05-07	2019-05-08					
South Korea	KOR200I	1992-03-24	1996-04-11	2000-04-13	2004-04-15	2008-04-09	2012-04-11	2016-04-24			
Spain	IBEX35I	1993-06-06	1996-03-03	2000-03-12	2004-03-14	2008-03-09	2011-11-20	2015-12-20	2016-06-26	2019-04-28	
Sweden	SWEDOMX	1991-09-15	1994-09-18	1998-09-20	2002-09-15	2006-09-17	2010-09-19	2014-09-14	2018-09-09		
Switzerland	SWISSMI	1991-10-20	1995-10-22	1999-10-24	2003-10-19	2007-10-21	2011-10-23	2015-10-18	2019-10-20		
Turkey	TRKISTB	1991-10-20	1995-12-24	1999-04-18	2002-11-03	2007-07-22	2011-06-12	2015-06-07	2015-11-01	2018-06-24	
United Kingdom	FTSE100	1992-04-09	1997-05-01	2001-06-07	2005-05-05	2010-05-06	2015-05-07	2017-06-08			
United States	S&PCOMP	1992-11-03	1996-11-05	2000-11-07	2004-11-02	2008-11-04	2012-11-06	2016-11-08			

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