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Bachelor Thesis [International Economics and Business Economics]

The effect of political uncertainty on U.S. Treasury bond and bill returns

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Abstract

We investigate the impact of political uncertainty (PU) on the return of U.S. Treasury bonds and bills that exhibit different time to maturities. In the first section of our analysis, we find a trivial relationship for both long and medium-term securities. Meanwhile, we detect a strong correlation between short-term debt and political instability. Yet, we do not gather any evidence suggesting a causal relationship between the two variables of interest. Moreover, by means of an instrumental variable approach, we find that PU has a casual impact on the return of U.S. T-bills, further proving that PU and return on bonds/bills are strongly connected for some type of securities. However, the direction of this relationship remains unclear due to the volatility in our results. As a matter of fact, the sign of the estimated coefficients varied from positive to negative, not enabling us to provide a solid conclusion.

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1. Introduction

In the past decade, there has been an extensive emphasis on the link between politics and economics. Indeed, it has been proven by many researchers that the former has a powerful influence on the latter, as the essence of politics and policy decision-making usually entails an abundant level of uncertainty, which in turn increases the overall level of instability in the market (Pan, Wang, & Yang, 2019). Therefore, it is no surprise that the relationship between economic development and political uncertainty (PU), described as the ambiguity regarding which policy the government will implement in the forthcoming (Veronesi & Pastor, 2012), became a recurrent controversial subject. Several contemporary studies conclude that political uncertainty has an unfavorable effect on the whole state of the economy. For instance, Julio and Yook (2012), and later Gulen and Ion (2015), conclude that corporate investment decreases significantly during periods of political instability. Alternatively, Baker, Bloom, and Davis (2016) found that policy uncertainty leads to a higher level of volatility in stock markets and unemployment in industries that are highly sensitive to government regulations. Despite the vast amount of literature in this field, up until now, our knowledge and acquaintance of the impact of political uncertainty on the cost of public debt is still restricted and poor. In fact, to the best of my knowledge, there has been remarkably little research on this topic.

The following study seeks to fill this void in the literature by evaluating the extent to which political uncertainty impacts the return of U.S. Treasury Bonds and Bills. Therefore, this paper aims to study the relationship between public financing in the United States and political instability by quantifying how PU is valued in the U.S. Treasury bond and bill market. Notably, one of the obstacles of this study is given by the fact that there is no immediate, accessible measure of political instability, as it is quite difficult to differentiate it from general uncertainty. Nonetheless, Baker et al. (2016) developed an index to measure policy uncertainty, which proxies changes in policy-pertinent economic uncertainty. However, even if used by several practitioners, there are some concerns regarding the exogeneity of this measurement to economic conditions. Alternatively, another popular proxy for PU among researchers is an election dummy variable. Elections are exogenous to economic development, and as such, it allows to separate the variation in political uncertainty. Nonetheless, a drawback of using the election dummy is that it does not take into account the degree of policy uncertainty amidst elections due to the low frequency of the event. Therefore, to tackle the weaknesses of the two main proxies of PU, we will test whether political uncertainty impacts Treasury bond/bill returns by using first the Baker Index as the main explanatory variable and then by using elections as a dummy variable.

Moreover, these securities are risk-free given that they are issued by the government. As a matter of fact the premium earned by investing in these securities is often relatively low. However, if we hypothesize a financial market with no frictions and restrictions, a rational investor is expected to claim larger compensation during periods of political uncertainty. Agents may demand a higher return in the interest of bearing a higher degree of risks related to lending funds to a government that may shortly be running with a different administration with contrasting policy intentions (Waisman, Ye, & Zhu, 2015). Following the capital asset pricing theory, which argues that on average higher levels of risks are compensated with higher expected returns, our first hypothesis claims that there is a positive relationship between political instability and return on government bonds and bills. Accordingly, we predict that as the level of political uncertainty intensifies in the economy, the returns an investor can earn by investing in treasury bonds and bills go up. Next, on behalf of our first hypothesis, three theoretical studies by Pástor and Veronesi (2012, 2013, 2016) argue that PU carries a risk premium in the prices of securities (Gao, Murphy, & Qi, 2019).

Furthermore, to formulate our second and final hypothesis, we based our theory on several previously written studies. First, we begin with the idea that securities that exhibit different time to maturities display a diverse level of volatilities (Hopewell & Kaufman, 1973). More specifically, on average long and medium-term bonds are less volatile than short-term bonds. A plausible explanation for this can be found in the paper written by Shiller (1979), in which he argues that bonds with longer time to maturities tend to yield lower levels of volatility due to a larger number of observations that smoothen the overall average. As a result, we expect that the relationship between political uncertainty and returns on bonds and bills is more robust for securities that display a shorter time to maturity. Accordingly, we assume that long-term securities are less responsive to a temporary climax of political uncertainty. The latter is due to the longer time until the financial contact's expiration as it is highly plausible that the level of uncertainty in the market will return to its mean value in the long term. Opposingly, investors that hold a long position in short-term securities will carry a substantially higher level of risk, as the level of uncertainty in the economy will probably still be substantial while their financial contract will expire.

In order to test our hypothesis, we first evaluate the extent to which returns of U.S. Treasury bonds and bills are related to PU by developing a simple regression analysis. Besides, we test the central relationship for securities that exhibit diverse term to maturities. We begin by using the Baker Index as the main explanatory variable, and we added several control variables to minimize concerns regarding omitted variable bias. From the analysis performed, we failed to reject the null hypothesis for medium and long-term bonds, implying that we found no evidence of an impact of political uncertainty on Treasury bonds returns. Nonetheless, we show a slightly positive and significant effect with respect to short-term securities, suggesting that returns for short-term bonds and T-Bills marginally increase as PU inflates. Next, we performed the same regression analysis, but in this case, we used the election dummy as the main variable of interest. As in the scenario before, we did not retrieve any significant result while analyzing long and medium-term securities, yet we again found significance in the main relationship for short-term debts and bills. However, surprisingly we found slightly negative coefficients, suggesting that returns decrease as political uncertainty increases. This, of course, goes against our first hypothesis and contradicts our previous findings. One potential motivation for observing these results is that during peaks of uncertainty, investors being mainly risk-averse, tend to prefer to invest in safer asset classes, as for instance Treasury bonds and bills (Riley Jr. & Chow, 1992). As a result, as the demand for these assets increases, returns are pushed downwards. Meanwhile, it still holds that investors that already hold a long position in treasuries demand higher returns to offset the higher level of risk. Accordingly, these two processes go in diverse directions by increasing returns from one side and decreasing them from the other, thus cancelling out each other and pushing the coefficient towards zero. Furthermore, on behalf of the findings, we reject the second null hypothesis, implying that there is evidence that proves that the relationship between PU and returns is stronger for short-term securities.

We next study whether there is any predictability of U.S. Treasury Bond returns arising from political uncertainty by developing several models and testing their out-of-sample performance. Importantly, for the rest of our analysis, we will focus only on short-term securities and drop election as a proxy for political uncertainty due to the low recurrence of the event. The findings suggest that there is some predictability of returns arising from PU, as we found evidence of statistically significant coefficients related to political uncertainty. However, the results are ambivalent considering that the sign of the coefficient fluctuates from positive to negative depending on the model, implying that it is still unclear the sign of the main relationship. In so far of the current results, we have no proof to argue that one of the two mechanisms described above dominates the other. Therefore, we conclude that political uncertainty does impact short-term treasury securities, but it is not yet clear how.

Up until now, our results show a correlation between political uncertainty and treasury bond and bill returns. Nevertheless, we do not cover any endogeneity concerns, if not through adding control variables to our specifications. Accordingly, we cannot make any causal inferences as we cannot rule out the possibility of our model suffering from omitted variable bias. Thus, to identify a causal relationship, we need to ensure that our results are entirely exogenous and are not driven by any other source of uncertainty or economic fluctuations. Hence, we decided to use an instrumental variable approach. Based on previously written works of literature, we develop two instrumental variables, which are highly correlated with PU and, instead, have no impact on the return on U.S. Treasury Bonds and Bills (Gulen & Ion, 2015) (Kaviani, et al., 2020). While performing the analysis, we did not find any signficant results with respect to short-term bonds, suggesting no evidence of a causal relationship but only a strong correlation. Nonetheless, we estimated statistically significant coefficients for T-bills related to PU, implying that we have enough evidence to conclude that political uncertainty has a causal relationship with U.S. T-bills returns. However, we again found inconsistent results concerning the sign of this relationship. Accordingly, the results are inconsistent with our first hypothesis but in accordance with the second one. Hence why, we notice that the significance of our results increases as the time to maturity decreases.

The remainder of this thesis proceeds as follows. Section 2 presents a literature review in which we review the existing studies on the topic. Section 3 describes the data and data sources. Section 4 describes the methodology used for our analysis. Section 5 illustrates the main results of the effect of political uncertainty on bond/bill returns. Section 6 illustrates the instrumental variable approach. Section 7 concludes.

2. Literature Review

This research is connected with two strands of research. The first one being how political uncertainty affects economic outcomes. The majority of studies in this field examine how financial markets are affected by periods of political instability. In general, there is a broad agreement among researchers that political instability has an unfavorable effect on the overall economy. For instance, Baker, Bloom, and Davis (2016) found that policy uncertainty leads to a higher level of volatility in stock markets and unemployment in industries that are highly sensitive to government regulations, such as defense, health care, and infrastructure. Similarly, in a study conducted on 27 OEDC countries, practitioners have found that volatility can quickly double around election week, driving a high level of uncertainty in the overall market (Białkowski, Gottschalk, & Wisniewski, 2008). Moreover, through a general equilibrium model, Pàstor and Veronesi (2012, 2013) studied to what extent stock prices were influenced by political uncertainty. Specifically, they predicted that on average, stock prices are negatively affected by the disclosure of new policy development. Instead, other works of literature dive into the impact that PU has on investment. Indeed, Julio and Yook (2012) and Gulen and Ion (2015) gather evidence that proves that corporate investment decreases significantly during periods of political instability. Similarly, Chen and Funke, in 2003, show that PU can be very disadvantageous to foreign direct investment made by individuals, and as such, the level of these decreases. Alternatively, the effect of PU has been studied on several different topics. For instance, different researches identify a negative association between PU and IPO (Colak, Durnev, & Qian, 2017), asset pricing (Chan & Marsh, 2021), and M&A (Bonaime, Gulen, & Ion, 2018).

Furthermore, several contributions to this debate have been made by investigating the effect of policy-related uncertainty on the cost of corporate debt. Waisman et al. (2015) show that U.S. corporate bonds are priced much higher during presidential election years than non-election ones. Likewise, Kavian et al. (2020) detect a significant positive relationship between variation in credit spread and political uncertainty changes, demonstrating that this effect is more prominent for firms that operate in regulation-intensive industries. Namely, those companies that bear high taxes and, or are dependent on public expenditures. Accordingly, PU has a significant impact on a firm's borrowing costs, and as a consequence, on average, the leverage ratio for American companies goes down midst political instability (Pan, Wang & Yan, 2019). A plausible explanation for these findings can be given by the fact that PU is highly associated with a negative decline in the amount invested by corporations. This can drive inefficient investment decisions, which can potentially increase the probability of default of the corporation (Durnev, 2010). Accordingly, investors may require a higher premium to offset the fact that they carry a higher risk level. However, up to now, the effect of political uncertainty on public debt is still an unexplored topic. In fact, the only evidence researchers have collected so far is regarding U.S. Municipal bonds and Ghanaian Treasury Bills. The findings suggest that Municipal bond yields strongly increase by seven basis points previous to an election and reverse back to the average yield afterward (Gao, Murphy, & Qi, 2019). Likewise, Osei-Assibey (2016) demonstrates that data on Ghanaian Treasury Bills empirically support the fact that rates increase during the election dates with respect to non-election period. Besides, further evidence suggests that in a period of high political instability, the price of a 6-months CDS on Greek sovereign bonds increased by 136% (Artavanis et al., 2019). Correspondingly, the following research attempt to fill this gap.

Furthermore, as mentioned in the introduction section in the second part of our analysis, we will try to estimate whether there is any kind of predictability in short-term bond and bill returns arising from political uncertainty. Thus, the second strand of literature this research is linked to has to do with forecasting bond returns. Nowadays, many individuals invest their savings in safe assets, such as U.S. Government bonds and bills. It is, thus, of critical importance to comprehend and forecast the returns on these assets. So far, several sophisticated forecasting models were developed. However, to the best of my knowledge, none of these contains political uncertainty as a determinant of U.S. Treasury returns. Previously written literature has disclosed predictability of bond returns, where inflation and real economic activity turned out to be the two most significant parameters in predicting excess returns. Correspondingly, those investors that based their trading strategies on macroeconomic variables on average gain larger returns (El Ouadghiri, Mignon, & Boitout, 2016) (Kelly, Pastor, & Veronesi, 2016). Further research on the forecasting of bond return has found that the price of bond progress in the opposite direction with respect to anticipated inflation (Pflueger & Viceira, 2011). Correspondingly, Engsted & Tanggaard (2002) demonstrate that expected U.S. inflation and bond returns change in a similar manner in the long run.

As a result, our study could contribute in several ways to the extensive existing literature. First, it would advance and support the expanding studies on the relationship between political uncertainty and economic results. Specifically, it would be the first literature to determine political uncertainty as an important factor in the pricing of U.S. Government debt/bill. Furthermore, it would also indirectly enrich the existing papers regarding the predictability of Treasury bond returns, outlining once again the scientific relevance of this paper. Concerning the social relevance of this paper, it lies in the fact that investors and financial institutions could develop and enhance their trading strategy and decision-making choices in periods of political uncertainty by taking into account the findings of the paper. This could potentially lead to higher expected returns on their portfolios. Besides, the findings of the study may be helpful and advantageous to the U.S. Government and Government debt traders, as they would have additional information on market reaction in periods of political instability.

3. Data

3.1 Treasury Bonds and Bills

In order to test our hypothesis, we retrieved monthly U.S. Treasury bond returns for different time to maturities from the CRSP database. Namely, we extracted returns for thirty years, twenty years, ten years, and five years bonds. Furthermore, given that the focus of the research is with respect to financial instruments with shorter time to maturities, we retrieved returns for one year Treasury bond, as well as ninety days and thirty day Treasury bills. The motivation behind this decision is that securities with different time to maturities display diverse levels of volatility (Hopewell & Kaufman, 1973). Moreover, as shown in Figures 1 and 2, the variation in short-term securities return should catch the level of uncertainty in the market more quickly, which also contains the one generated by political instability (Kelly et al., 2016). Moreover, the sample used for the following analysis goes from January 2000 till December 2020.

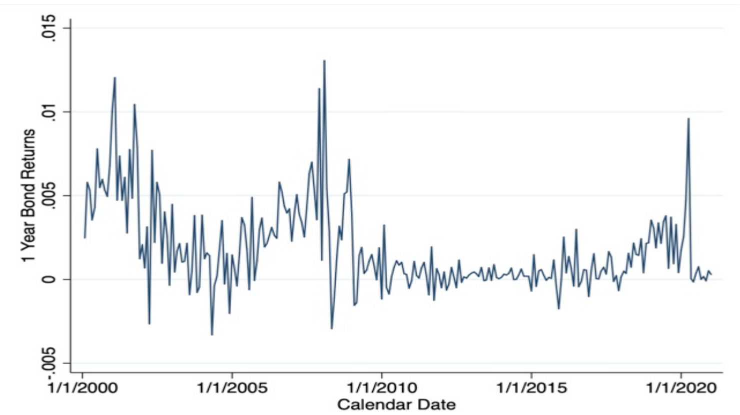


Figure 1. Returns on 1-year Treasury Bond

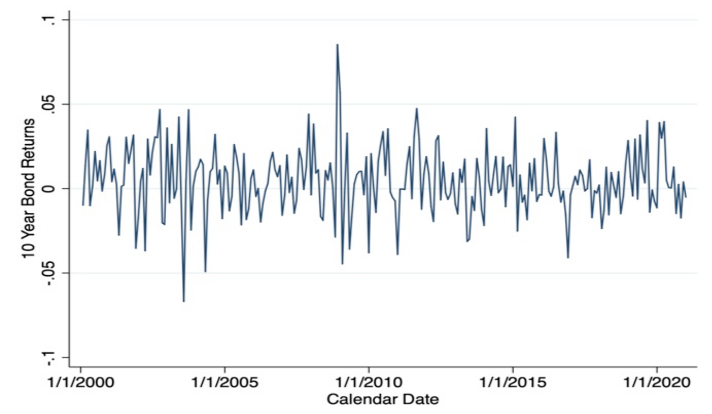


Figure 2. Returns on 10-year Treasury Bond

3.2 Political uncertainty

Concerning the data regarding PU, there is no direct measure of political instability, as it is complicated to separate it from general uncertainty. However, Baker et al., in 2016, developed an index to measure policy uncertainty, which proxies changes in policy-pertinent economic uncertainty. We will thus use the previously mention index as the first proxy for PU. The Baker index is formulated as the weighted average of three factors. Specifically, the first element counts the number of newspaper articles that include news regarding policy-related economic uncertainty. The second factor displays the uncertainty related to adjustments in the tax code, whereas the third component quantifies uncertainty by utilizing the forecast volatility of the Consumer Price Index and government spending (Scott, Bloom, & Davis, 2016). Figure 3 depicts a visual representation of the index.

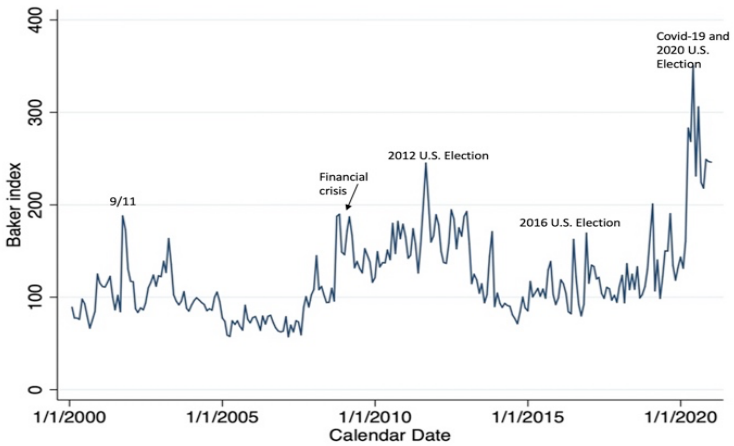


Figure 3. Political Uncertainty Index

As opposed to other proxies, it can measure the level of uncertainty that occurs between elections and quantify the level of political risks correlated with each election. However, there are some issues regarding the exogeneity of this variable to economic conditions. Intending to develop exhaustive research on the effect that political uncertainty has on Treasury debt and bill returns, we decided to use two different measurements of political instability. The second one being an election dummy variable, retrieved from the Data of Political Institutions (Cruz, Keefer, & Scartascini, 2021). The aforementioned explanatory variable takes on the value of 1, if in year t a presidential election is held in the US; and takes on the value of 0 otherwise. Elections are exogenous to economic development, and as such, it allows to differentiate the variation in political uncertainty. As Julio and Yook argued in their paper (2012), Elections can be seen as a natural experimental framework, enabling researchers to partially isolate the endogeneity between economic growth and political uncertainty. Nonetheless, a shortcoming of using the election dummy is given by the fact that it does not take into account the degree of policy uncertainty amidst elections as a result of the low frequency of the event. As a result, to account for the strengths and weaknesses of two main widely used proxies for PU, we decided to test the main relationship by using first the Baker index (Baker) as a proxy and then using elections as a dummy variable (Dummy). In this way, we will understand whether our findings are similar or differ significantly while using different measurements for PU.

3.3 Control Variables

The main barrier from drawing a causal impact of political instability on U.S. Government debt and bill returns; is the problem of isolating the exogenous variation in this uncertainty (Kelly et al., 2016). It is plausible and highly probable that PU is influenced by several variables, which in turn are correlated with the dependent variable. For instance, a considerable number of macroeconomic variables have an impact on the U.S. Treasury returns whilst also being correlated with political uncertainty. Thus, it raises several potential issues in the significance of our results, as we nearly know with certainty that there might be omitted variable bias problems. As a result, to minimize any endogeneity issue, we included distinct macroeconomic controls in our specification. More specifically, we retrieved the CPI rate and the returns on the S&P500 index from the CRSP database, where the latter variable represents an index for the U.S. stock market. Considering previously written literature, we also decided to control for the USD/EUR exchange rate (USEU) and the Industrial Production Index (IP) (Devpura, Narayan, & Sharma, 2021). Both variables were extracted from the Federal Reserve Economic Data (FRED economic data, 2021). Moreover, following the research developed by Kim et al. in 2006, we also control for M1 Money Stock (M1), Unemployment rate (UNEMP), and Real Personal Consumption Expenditure Growth Rate (PCE). The latter was retrieved from The World Bank Database. Instead, the M1 and unemployment rate variables were correspondingly downloaded from FRED and the OECD website. Finally, our time-series data ranges from January 2000 to December 2020, and to control for general economic uncertainty; we retrieved the CBOE Volatility Index (VIX) from the Wharton Research Data Service.

3.4 Descriptive Statistics

To gain a deeper understanding of the data set, the descriptive statistic, as well as the correlation matrix (Table A1 and A2), are analyzed and evaluated. More specifically, in Table A1, we report the mean, the standard deviation, the skewness, the kurtosis, and the maximum and minimum value of each variable of interest. Given that the sample period ranges from January 2000 till December 2020, we retrieved 252 observations for each variable. However, the data for the PCE variable was only available until 2019, implying that we have several missing observations. Moreover, the data concerning bond returns appears reliable as the mean decreases as the time to maturity goes down. This is in line with our prediction as investors with a long position in long-term bonds earn on average higher returns (Abramov, Radygin, & Chernova, 2015). Besides, while analyzing the time series of the main explanatory variable, namely, the Baker Index, we detected a general increasing trend with an average close to 121, a maximum of around 350, and a minimum close to 121. The following can be confirmed by looking at Figure 3. Next, concerning the second main explanatory variable, being the election dummy, all the data appears regular and in order. Indeed, we retrieved a mean of around 0.29, and not surprisingly, the maximum and minimum values are 1 and 0, respectively. Finally, no outliers appear to be present in the dataset.

Instead, concerning the correlation matrix, we detect a small but positive correlation between the election dummy and return on Treasury bonds/bills. More specifically, we notice that the longer time to maturity, the larger the correlation with the dummy. On the contrary, when we analyze the relationship between the Baker index and returns, we can see that correlation goes up as the time to maturities of bond is shorter. Besides, we can see that correlation is positive for long-term securities while negative for short-term bonds and bills. Accordingly, further investigation will be needed as so far the sign of the main relationship remains unclear. Finally, it seems that the following control variables, VIX and S&P500, have a more robust correlation to returns. In the following section, we will describe the transformation made in the data set.

4. Methodology

4.1 OLS assumptions check and Stationarity of Data Set

Given that we want to obtain consistent and possibly unbiased results, we run several tests to ensure that our data set is reliable and satisfies the Ordinary Least Square Assumptions (OLS). Firstly, we have reasons to believe that our data set may suffer from heteroskedasticity, as our sample period contains times of economic instability, for instance, the financial crisis in 2008. Therefore, we decided to run several white tests for distinct regressions that differ only by their dependent variable (White, 1980). We rejected the null hypothesis of homoskedasticity at a 5% significance level for each test, implying that the residuals' variance is not constant. Nonetheless, we can solve this issue by coding "robust" at the end of each regression we want to run. Furthermore, we have no reasons to assume that the error term has a population mean which differs from zero. Besides, even if that would be true, we included a constant in our regression, which would consequently solve the issue. Moreover, through a test developed by Godfrey and Breusch in 1978, we can detect serial correlation in the residuals. We performed this investigation for our analysis, and we found no evidence of the error term being correlated with each other. To further ensure the accuracy of the test results, we checked whether the standard errors (SE) would change significantly while using Newey-west (HAC) SE. Importantly, we found that all the estimated standard errors were identical or slightly different. Nonetheless, we will include in our final specification lagged values of the explanatory and dependent variables to minimize this potential issue even further.

Finally, the last and most important OLS assumption we will discuss in this paper is the independence between the regressor and the residuals. The previously mentioned assumption is often difficult to satisfy, especially in the setting of our study. Indeed, as mentioned in the data section, the main limitation of our study is to isolate the exogenous variation of political uncertainty, as many variables influence the latter, which in turn have an impact on our dependent variable. Again, this is why in our specification, we will include several control variables, and we will also test the main relationship with the Election dummy. Besides, we need to make sure that we have addressed any endogeneity concerns left to find a causal relationship. Thus, we want to be sure that our findings are not driven by omitted variable bias, specifically any other source of uncertainty or economic fluctuations. Hence, we will adopt an instrumental variable approach, which represents the traditional way used by researchers to address this issue and will be explained in detail later in the paper. Instead, we firmly believe that reverse causality should not be an issue in this study as it is implausible, as well as, there is no clear channel on how return on U.S. Treasury Bonds and Bills should impact the level of political uncertainty.

Furthermore, given that we have a Time-Series, we need to make sure that we also satisfy the stationarity assumptions. Accordingly, we run several Dickey-Fuller tests to check whether we need to transform the data retrieved. Nonetheless, we reject the null hypothesis at least at a 5% significance level, implying that the variables are generated by a stationary process. The results of the test performed can be found in the appendix in Table A3.

4.2 Empirical Strategy

In order to address our research question, we will first evaluate the extent to which U.S. Treasury bond and bill returns is related to political uncertainty. To do so, we will use a simple regression approach and test the main relationship for securities that display different time to maturities. More specifically, we will use a regressand that ranges from thirty days till thirty years time to maturity. As previously mentioned, we will use two different proxies for PU, namely, the Baker Index and an Election Dummy. Given that the latter does not represent a specific estimate of political instability, it is crucial to infer, based on previously written literature, that on average political instability increases during election period (Bialkowski, Gottschalk, & Wisniewski, 2008). As a matter of fact, several practitioners proved that asset prices are significantly influenced by the level of political uncertainty while elections (Boutchkova, et al., 2011). Nonetheless, nowadays, we still lack empirical evidence of political uncertainty's effect on the macroeconomy (Usenko, 2018). Yet, to guarantee more consistent and unbiased results, we control for different macroeconomic indicators. Moreover, given that we were mainly concerned about omitted variable bias, we decided to formulate our final specification by following a General to Specific (GETS) approach. Thus, we begin our analysis with the biggest possible model, and we progressively simplify the initial general specification (Campos, Ericsson, & Hendry, 2005). More precisely, we include in our general model twelve lags for each variable, and we deliberately deleted lags that appeared to be statistically insignificant. Next, considering that we are performing a multiple linear regression analysis, we choose the final regression that yields the highest R^2. Besides, to further ensure the accuracy of the models, we checked whether the adjusted R^2 would yield the same model as the standard one. From the results of the following analysis, we concluded that the two measures of the goodness-of-fit yield the same specification as best one, proving that the parameters included improve our final model. Accordingly, in order to test our main hypothesis that during periods of high political uncertainty, investors demand higher returns on U.S. Treasury bonds/bills, the following ARDL regressions are used:

1. $E(R_t) = \alpha + \beta_1(\ BAKER_t) + \beta_2(R_{t-1}) + \sum_{i=1}^{2} \beta_{3i} CPI_{t-i} + \beta_4\ (UNEMP_{t-1}) + \beta_5(IP_t) + \beta_6(PCE_t) + \beta_7\ (USEU_t)\ + \beta_8\ (M1_{t-1}) + \beta_9(S\&P500_t) + \beta_{10}(VIX_t) + \epsilon_t$

2. $E(R_t) = \alpha + \beta_1(\ DUMMY_t) + \beta_2(R_{t-1}) + \sum_{i=1}^{2} \beta_{3i} CPI_{t-i} + \beta_4\ (UNEMP_{t-1}) + \beta_5(IP_t) + \beta_6(PCE_t) + \beta_7\ (USEU_t)\ + \beta_8\ (M1_{t-1}) + \beta_9(S\&P500_t) + \beta_{10}(VIX_t) + \epsilon_t$

The two final specifications include the two main variables of interest, which are the Baker index and the election Dummy. Besides, taking into account the efficient market hypothesis developed by Malkiel in 1989, we control for the 1-month lagged Bond return. Importantly, the expected return of security i, at time t+1, is given by the return of security i, at time t (Malkiel, 1989). Besides, we will not control for the 1-month lagged return for of U.S.Treasury Bills given their remarkably short time to maturity. It follows that if we do include the previously mentioned regressor in our final specification, we retrieved fitted values, which are essentially identical to the actual values, reaching an R^2 higher than 0.9. The following can be problematic as we might suffer from overfitting the model. Therefore, we will exclude the 1-month lagged return for T-Bills securities for the sake of obtaining unbiased results. Next, to control for inflation and other macroeconomic indicators, we included two lags of CPI, 1-month lag of unemployment rate, the level of Industrial Production Index, Personal Consumption Expenditure growth rate, and the USD/EUR exchange rate, both measured at time t. We also added a 1-month lag of M1 Money Stock and the return on the S&P500 and the VIX index, both measured at time t. Finally, β_1 represents the coefficient of interest. Hence, if we reject the first null hypothesis, we expect to find a positive and significant coefficient, as it would imply that an increase in the level of PU will bring about an increase in returns. Additionally, if we reject the second null hypothesis, we will expect that the relationship between PU and Treasury bond/bills return is more robust for short-term securities (Malkiel, 1989).

Moreover, the second part of our analysis aims to determine whether there is any kind of predictability of U.S. Treasury bond and bill returns based on Political Uncertainty. Given that we want to carry out an out-of-sample evaluation, we will develop several different models, which differ significantly with respect to the previous one explained. The reason behind this choice is given by the fact that when we perform a regression analysis, we tend to include a large number of explanatory variables as the R^2 is pushed upwards each time a new parameter is added in the specifications. It follows that to obtained fitted values that are close to the actual ones, we often develop extensive models which contain several predictors. However, if we want to perform a forecasting analysis, it is more advantageous to obtain a parsimonious final specification, which uses the least possible terms while fitting the data efficiently. Several studies have proven that a non-parsimonious time-series specification can induce a reduction in forecasting precision (Ledolter & Abraham, 1981). Indeed, by including many explanatory variables, we might fit the data in our sample well. However, if we use the same specifications for forecasting in a different dataset, we will most probably have no predictive power. Implying that our model would not be externally valid but only internally. Accordingly, we want to develop a straightforward model with a limited number of predictors but which yield an excellent explanatory predictive power.

This part of the study will focus on securities that display a short time to maturity. Namely, 1-Year Treasury U.S. bond, ninety-day and thirty-day Treasury bills. Importantly, the decision not to focus the analysis on securities that exhibit longer time to maturities is given by the fact that these are less sensitive to momentary peaks of uncertainty. This is because there is more time till the expiration of the financial contract. Thus, it is more probable that the level of uncertainty in the economy will stabilize and go back to the average level in the long run. Whereas if we consider a period of PU, the holders of securities that display a short time to maturity will bear a higher level of risks since it is probable that the expiration time is during or close the time of high instability. Moreover, to develop our forecasting models, we first used the Akaike information criterion to obtain the most favorable number of lags, which is one of the most common method used by researchers. Besides, in order to formulate the best final specifications, we checked whether by following a General to Specific (GETS) approach would yield the same models. We obtained very similar specifications, yet not identical. In general, however, it is clear that by delating lags, the forecasting accuracy improve. Consequently, to achieve the best out-of-sample performance, we measured the Mean Squared Forecast Error (MSE), which can be calculated with the formula below:

$$MSE = \frac{1}{n}\sum_{i=1}^{n}\left(Y_i - \hat{Y}_i\right)^2$$

For each security we analyzed, we created two models by testing different combinations of variables. These two final specifications are the regressions that exhibit the lowest MSE, implying that are the models which yield the best out-of-sample forecast performance. Furthermore, we run a Diebold-Mariano Test to choose the optimal predicting model out of the two. The aforementioned test checks whether the MSE of the two models is statistically different from each other. Accordingly, we can be certain to choose the model that has the best out-of-sample performance. The results will be shown in the following section. However, we specifically decide not to include many lags as the impact of past values on the current one deteriorates as the number of lags increase. As a result, the predictive power of our model would decrease significantly (Ricci, Colantonio, & Gazquez, 2021). Furthermore, we used the first 12 years of our sample, from January 2000 till December 2012, to predict the last eight years, from January 2013 till December 2020. Finally, given that we have a large sample period, which includes times of high economic and overall uncertainty, such as the financial crisis of 2008, it is unrealistic to assume that the parameters remain constant throughout time. Hence, we adopted a Rolling Analysis of Time series, in which we estimated our parameters through a definite length rolling window over the sample period (Zivot & Wang, 2003). We decided to employ a medium length for the rolling window, namely of 50 observations. Accordingly, this will allow the parameters to vary relatively rapidly and take on more radical values in case the sample has changed. Meanwhile, we can obtain more precise and smooth estimates by not making the rolling window's length too short. Therefore, we opted for a balanced trade-off between accuracy and flexibility.

5. Main Results:

5.1 Regression analysis with Baker Index as variable of interest

In the following section, we will present the findings gathered by our empirical evaluation. We began our analysis by regressing U.S. Treasury bond/bill returns on our first variable of interest, namely the Baker index. As previously explained, the former is a numerical variable that in our sample ranges between 57 and 350, with an average of 121. The regressor quantifies the level of political instability in the economy. Thus, the larger the value, the higher is the level of uncertainty. Moreover, since we have reason to believe that our model may suffer from omitted variable bias, we included several control variables to minimize any endogeneity concerns. Finally, we tested this relationship for securities that display different time to maturities, ranging from 30 days till 30 years' expiration time. The results obtained from the time-series regressions are reported in Table 1.

Table 1: Regression Results for Baker Index Proxy

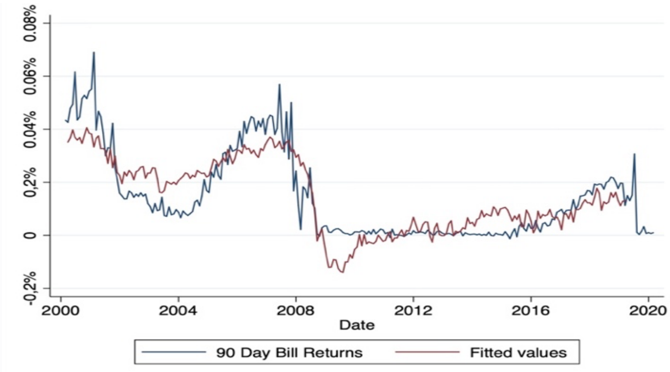
	30DBR	90DBR	1YBR	5YBR	10YBR	20YBR	30YBR
Baker (%)	0.000**	0.000***	0.001*	0.003	0.003	0.000	0.003
	(0.000)	(0.000)	(0.000)	(0.003)	(0.006)	(0.009)	(0.132)
CPI_{t-1}	0.012	-0.002	-0.076**	-0.385*	-0.642	-1.146*	-1.612*
	(0.015)	(0.016)	(0.036)	(0.222)	(0.422)	(0.687)	(0.938)
CPI_{t-2}	0.012	0.032**	0.107***	0.521**	0.921**	1.720*	2.183*
	(0.015)	(0.017)	(0.038)	(0.247)	(0.454)	(0.863)	(1.173)
IP	0.000**	0.000**	0.000**	0.001**	0.001*	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
VIX	0.000	0.000	0.000 **	0.000 **	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
S&P	0.002	-0.002	-0.007**	-0.069***	-0.111***	-0.164**	-0.226***
	(0.001)	(0.002)	(0.003)	(0.021)	(0.041)	(0.065)	(0.083)
PCE	-0.014	-0.020	0.002	0.120	0.306	0.510	1.017
	(0.015)	(0.017)	(0.045)	(0.235)	(0.400)	(0.668)	(0.957)
US/EU	-0.002**	-0.051*	-0.002	-0.013	-0.012	-0.019	-0.017
	(0.001)	(0.007)	(0.002)	(0.009)	(0.015)	(0.025)	(0.033)
$UNMP_{t-1}$	-0.043***	-0.051***	-0.045***	0.062	0.118	0.248	0.250
	(0.006)	(0.001)	(0.016)	(0.091)	(0.163)	(0.282)	(0.380)
$M1_{t-1}$	0.000***	0.000***	0.000***	0.000***	0.000*	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cons	-0.004	-0.003	-0.006	-0.071	-0.106	-0.168	-0.233
	(0.002)	(0.002)	(0.005)	(0.033)	(0.059)	(0.098)	(0.129)
R_{t-1}			0.182**	-0.048	-0.040	-0.042	-0.026
			(0.083)	(0.069)	(0.076)	(0.085)	(0.095)
R^2	0.738	0.729	0.502	0.218	0.165	0.153	0.170
A_R^2	0.726	0.717	0.478	0.180	0.125	0.112	0.129

Notes: The table reports the results of the time-series regressions. The y variables are, correspondingly from the first column to the last one: *30 and 90 days Bills Return*, and *(1-5-10-20-30) Year Treasury Bond Returns.* The dependent variables are regressed on the variable of interest and several control variables. The final specifications are estimated using Ordinary Least Squares (OLS) Analysis. Each coefficient is rounded to 3 decimal places, for complete results consult the Stata Code. The Standard Errors are reported in parentheses while the * display the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*

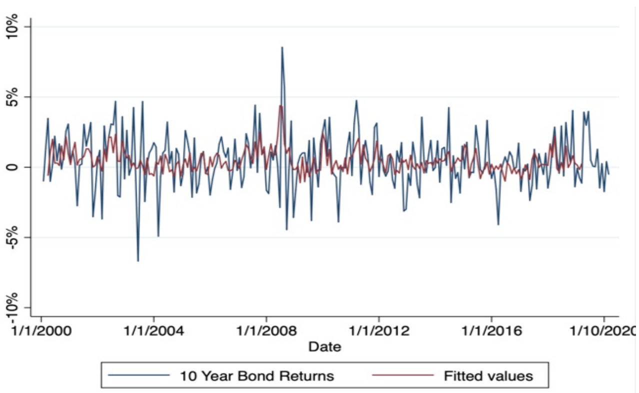
As can be seen from the table, if we consider bonds with a long time to maturity, namely the 30YBR and 20YBR, we detect that both political uncertainty coefficients are statistically insignificant, having a p-value considerably higher than 0.05. Implying that PU appears not to have an impact on U.S. bond returns. Besides, with an R^2 of around 0.16, for both regressions, the following ARDL models explain around 16% of the variation in bond returns. Representing a relatively low prediction accuracy. Indeed, the only coefficients that appear to be significant are the two lags of CPI, as well as the returns on the S&P500 index. We find that CPI has a controversial effect, as the first lag is negatively related to returns, while the second has a positive impact. Instead, more intuitively, the return on the S&P500 index, which can be considered as a proxy for economic growth, is negatively related to bond returns. Hence why, Pflueger and Viceira. (2001), developed a theory that argues that the Federal Reserve (Fed) implements quantitative easing policies after periods of economic growth. The objective of the Fed by implementing such an instrument is to repurchase issued long-term bonds, resulting in an increase in demand for Treasury Bonds, which in turns push prices up while driving returns down.

Moving on to the medium terms securities, specifically the 10YBR and 5YBR, we obtained very similar results. PU still appears not to influence Treasury returns, having very low t-statistics. Again, CPI and S&P500 have a significant effect on returns. Likewise, we found that more control variables are significant, increasing the R^2 up to 0.218 for the 5YBR regression, improving the fitting of the given sample. Instead, when we consider short-term bonds and bills, the estimated coefficients of PU appeared to be statistically significant and positive, even if very close to zero. Suggesting that as the level of political uncertainty increases, the return on short-term U.S. Treasury Bonds and Bills goes slightly up. Thus, inferring that the first hypothesis seems valid for securities that exhibit a short time to maturity at first glance. In contrast, we fail to reject the null for long and medium-term bonds. Nonetheless, from an economic perspective, our findings appear to be significantly weak as the magnitude of the effect is particularly small. Indeed, we see that when the Baker interest increase by 1, returns increase at 0.000% and 0.001% for T-Bills and short-term bond respectively, which is very negligible. Nonetheless, if we consider that the average return on T-Bills and short-term bonds is around 0.165%, we can conclude that is already considerably low per se. Accordingly, given that level of returns on these securities is minimum, it follows that PU can only have a minimal influence in terms of increasing or decreasing returns. Furthermore, as can also be seen from the difference between Figure 4 and 5, the prediction accuracy increases dramatically with respect to medium-term securities. Indeed, with an R^2 of 0.729 for the 1YBR regression, the ARDL model explains around 73% of the variation in bond returns. Hence, the findings match and are also aligned to our second hypothesis and expectations. Indeed, we predicted that the relationship between PU and returns on Bonds/Bills was more robust for short-term securities. Essentially, because long-term bonds are less perceptive to climax of uncertainty as a result of the longer period to expiration. Indeed, we gather evidence that proves that the link between long-term bonds and PU is not only weak, but it is insignificant and trivial.



Notes: The fitted values do not predict until the end of the sample period, as a result of missing observations for the PCE variable. The variable of interest is given by the Baker Index.

Figure 4. Fitted vs actual values of 90 Day Bill Returns



Notes: The fitted values do not predict until the end of the sample period, as a result of missing observations for the PCE variable. The variable of interest is given by the Baker Index.

Figure 5. Fitted vs actual values of 10 years Treasury Bond Returns

5.2 Regression analysis with Election dummy as variable of interest

In addition, to evaluate the consistency and robustness of our findings, we run the same regressions by changing only the variable of interest, specifically, from the Baker Index to an Election Dummy. The coefficients of the latter will be quite indicative, as it will reveal how and if, election can exogenously influence the return of U.S. Treasury Bonds/Bills. The summary of all the regression results and an illustration of the regression results of 90-days T-bills and 10 Year Bonds returns can be respectively found in Table 2 and Figure A1 and A2 in the appendix.

Table 2: Regression Results for Election Dummy Proxy

	30DBR	90DBR	1YBR	5YBR	10YBR	20YBR	30YBR
Election	-0.000***	-0.000***	0.000	0.000	0.001	0.001	0.002
	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)	(0.005)	(0.006)
CPI_{t-1}	0.010	-0.004	-0.077**	-0.384*	-0.638	-1.143*	-1.610*
	(0.015)	(0.017)	(0.036)	(0.220)	(0.414)	(0.682)	(0.922)
CPI_{t-2}	0.017	0.037**	0.113***	0.527**	0.917**	1.710**	2.158*
	(0.015)	(0.017)	(0.038)	(0.243)	(0.446)	(0.847)	(1.145)
IP	0.000**	0.000**	0.000***	0.001**	0.001*	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
VIX	0.000	0.000	0.000***	0.000***	0.001*	0.001	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
S&P	0.002	-0.001	-0.007**	-0.068***	-0.110***	-0.164*	-0.224***
	(0.001)	(0.002)	(0.003)	(0.021)	(0.041)	(0.065)	(0.083)
PCE	-0.015	-0.022	0.001	0.115	0.302	0.510	1.013
	(0.015)	(0.017)	(0.048)	(0.241)	(0.405)	(0.666)	(0.959)
US/EU	-0.002**	-0.001**	-0.002*	-0.015*	-0.014	-0.020	-0.020
	(0.001)	(0.001)	(0.001)	(0.009)	(0.014)	(0.025)	(0.033)
$UNMP_{t-1}$	-0.039***	-0.045***	-0.032***	0.102	0.162	0.261	0.307
	(0.005)	(0.001)	(0.011)	(0.077)	(0.140)	(0.250)	(0.338)
$M1_{t-1}$	0.000***	0.000***	0.000***	0.000***	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cons	-0.004	-0.003	-0.007	-0.075	-0.111	-0.171	-0.242
	(0.002)	(0.002)	(0.005)	(0.033)	(0.0581)	(0.096)	(0.127)
R_{t-1}			0.189**	-0.044	-0.038	-0.043	-0.027
			(0.082)	(0.068)	(0.075)	(0.085)	(0.095)
R^2	0.744	0.728	0.496	0.215	0.165	0.153	0.170
A_R^2	0.732	0.716	0.471	0.177	0.124	0.112	0.130

Notes: The table reports the results of the time-series regressions. The y variables are, correspondingly from the first column to the last one: *30 and 90 days Bills Return*, and *(1-5-10-20-30) Year Treasury Bond Returns.* The dependent variables are regressed on the variable of interest and a number of control variables. The final specifications are estimated using Ordinary Least Squares (OLS) Analysis. Each coefficient is rounded to 3 decimal places, for complete results consult the Stata Code. The Standard Errors are reported in parentheses while the * display the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*

By analyzing the table, we acknowledge similar results to the one previously evaluated for long-term bond. The coefficient of the election dummy variable is positive but statistically insignificant. While, with no surprise, the prediction accuracy of our model remains still considerably limited, with an R^2 being equal to the ones formerly found. Similarly, the findings concerning medium-term securities are almost interchangeable. Importantly, political uncertainty still appears not to be related to bond returns. However, when we look at the findings regarding short-term bonds and T-bills, we identify unforeseen results. The first difference appears to be in the statistical insignificance of the Election Dummy coefficient for the 1YBR, implying that in this scenario, PU seems not to influence short-term debt. Nevertheless, more striking are the results concerning returns on T-bills. Indeed, we found that the election coefficient is strongly significant at 1% level and somewhat negative, as it is very close to zero. Implying that during election years, the returns earned by investing in T-Bills go marginally down. Considering that we have assumed that during election years, political uncertainty increases, we thus conclude that the findings are inconsistent with our first hypothesis, as well as the previous results.

A plausible explanation for this outcome can be given by the fact that during a period of high uncertainty, such as during elections, investors tend to prefer to invest in safer asset classes. As a result, they increase demand for Treasury securities, pushing prices for bonds and T-bills up while diminishing the return earned by investors. Nonetheless, while formulating the first hypothesis, we look at the perspective of existing Treasury holders. As such, we assumed that returns would increase during periods of high PU due to the higher risk they have to bear. Theoretically, these two mechanisms go in the opposite direction by pushing return up from one side and down from the other, thus offsetting each other.

A shred of evidence supporting the preceding interpretation can be given by the negligibility of the coefficients of PU. Indeed, the estimated coefficients are always very close to zero, supporting the proposition that these two processes roughly cancel out each other. Finally, considering all the assumptions previously made, we fail to reject the null hypothesis for long and medium-term bonds, suggesting that PU has no robust effect on these assets. We instead reject the null hypothesis for short-term securities, concluding that PU does have a significant impact on T-Bills and short-term bonds. Yet, the sign of this relationship is not clear. Further evaluation will try to identify if any of the two processes prevail over the other. Concerning the second hypothesis, we reject the null that the association between PU and Treasury returns is equally strong for bonds and bills with different time to maturity. As a matter of fact, in both analyses, we detect statistically insignificant coefficients of PU for long-term securities while robust ones for assets that display a short time to maturity. Proving once again the validity of our assumption.

5.3 Out-of-sample predictability

It is crucial to note that bonds that present a long time to maturity are theoretically affected by peaks of uncertainty to a smaller extent due to the lengthier time until the termination of the financial contract. Considering also the negligibility of the findings in the previous investigation concerning these typologies of security, we will specifically focus the analysis on out-of-sample performance for short-term bonds and T-bills. Our objective, in this case, is to understand whether there is any predictability in short-term securities deriving from political uncertainty. Besides, we want to obtain the most parsimonious and powerful specification by evaluating a combination of models with different variables which are likely to drive bonds and T-Bills returns. In addition, from now on, we will only use the Baker Index as the main explanatory variable. The motivation behind this decision comes from the limitation that comes with using election as a dummy variable. Specifically, in the United States, elections are held every four years, implying a very low recurrence of the event. Suggesting that the proxy is not successful to efficiently explain the fluctuations in PU amidst election dates (Baker et al., 2016). Next, election account for the variation created only by that specific political event; yet, policy uncertainty can be generated by a wide variety of other factors. Accordingly, we began our analysis by using the 1-year U.S. Treasury bond returns as a dependent variable. After following the steps explained in the methodology section, we retrieved the following two forecasting models:

3. $R_{t+1} = \beta_0 + \beta_1 R_{t-1} + \beta_2 BAK_t + \beta_3\ (UNEMP_t)$

4. $R_{t+1} = \beta_0 + \beta_1 BAK_t + \beta_2 S\&P500_{t-1} + \beta_3 VIX_{t-1} + \beta_4\ (UNEMP_t)$

We present the results of the coefficients estimated by regressing equations 3 and 4 in Table 3.

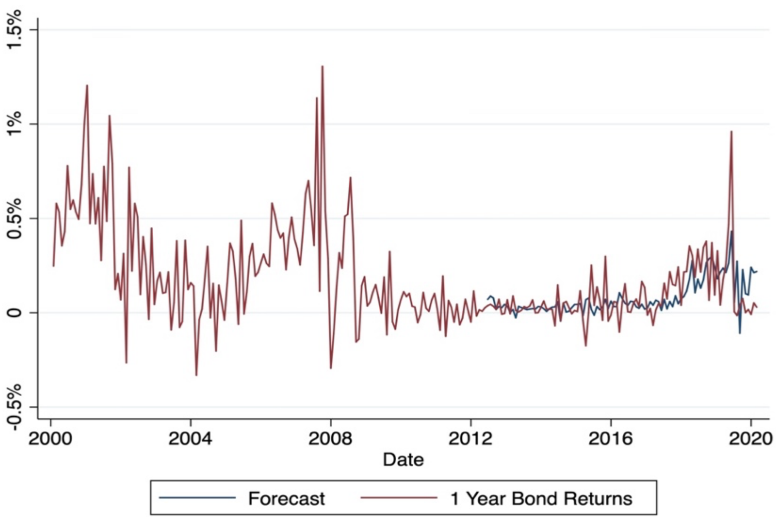
Table 3: Regression Results for equation 3 and 4

	(3)	(4)
BAK_t (%)	0.002***	0.002***
	(0.000)	(0.000)
$UNEMP_t$	-0.073***	-0.077***
	(0.011)	(0.019)
R_{t-1}	0.355***	
	(0.101)	
$S\&P500_{t-1}$		-0.006
		(0.005)
VIX_{t-1}		0.000
		(0.000)
CONS	0.001	0.001
	(0.000)	(0.001)
MSE	1.36e-06	1.54e-06

Notes: The table reports the results of the regression for equation 3 and 4. In order to estimate the following model, we used the first 12 years of our sample, from January 2000 till December 2012, to predict the last 8 years, from January 2013 till December 2020. We opted for a medium length for the rolling window of 50 months. Each coefficient is rounded to 3 decimal places, for complete results consult the Stata Code. The last row displays the Mean Squared Forecast Error (MSE), while the Standard Errors are reported in parentheses. The * displays the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*

Firstly, by analyzing Table 3, we observe that the estimated coefficients for model (3) appear to be strongly significant at a 1% significance level. More importantly, the coefficient of PU is positive, yet again roughly around 0. The same phenomena can be observed when regressing model (4), exposing the inconsistency of our first hypothesis. Nonetheless, the findings are in agreement with the preceding explanation, given the negligibility of the PU coefficients. Moreover, by regressing equation (3), we obtained a relatively low MSE of 1.36e-06. Likewise, model (4) yields an MSE of 1.54e-06, which is higher concerning the previous one, nonetheless is still considerably low. Hence, we deduce that the out-of-sample prediction accuracy of our models is rather strong. To test whether the MSE of model (3) is statistically lower than the one of model (4), we run a Diebold-Mariano Test. We obtained a p-value of 0.198. Therefore, we fail to reject the null hypothesis that two models have a statistically equivalent MSE. Therefore, we cannot conclude that model (3) yields the most accurate out of sample forecast, which is illustrated in figure 6. The above-mentioned also represents the most parsimonious model, as it contains fewer explanatory variables concerning the other model. This is theoretically more beneficial for our forecast, as parsimonious specifications tend to have a higher predictive power, yielding, on average lower MSE. Yet, in this scenario, we cannot deduce that a significant difference between models (3) and (4) exists. The illustration of the out-of-sample performance of model (4) can be seen in Figure A3 in the appendix.



Notes: The figure display the out-of-sample performance estimated with model (3)

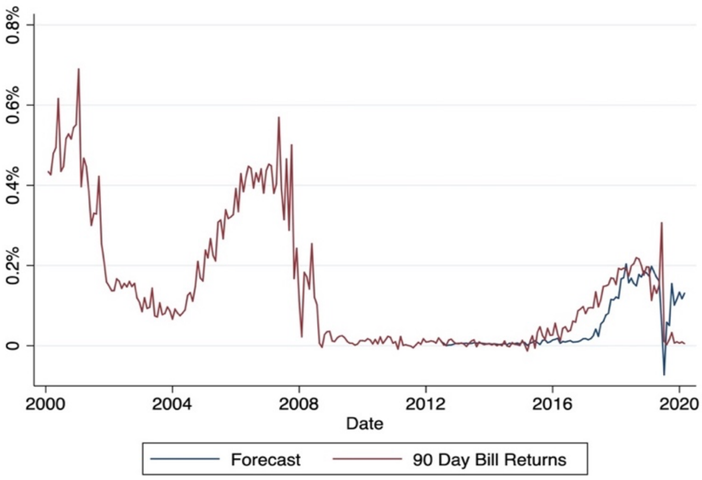
Figure 6. Out-of-sample performance of 1 years Treasury bond Returns

We next investigate the out-of-sample predictability of 90 days T-bills, by following the same approach as for the short-term bond. We thus derive the two models with the most accurate out-of-sample predictability, which are displayed below:

5. $R_{t+1} = \beta_0 + \beta_1 BAK_t + \beta_2 IP_t + \beta_3 S\&P500_t$

6. $R_{t+1} = \beta_0 + \beta_1 BAK_t + \beta_2 CPI_{t-1} + \beta_3 VIX_t$

The estimated results from models 5 and 6 are displayed in Table A4 in the appendix. The outcome of the analysis is similar to the previous one. As shown in the table, in model (5), the estimated coefficient for the proxy of PU is positive and powerfully significant. Whereas, from the analysis of specification (6), we instead retrieved a negative and statistically significant result. Despite the sign, both the coefficients are extremely close to 0, upholding the motivation given to justify the rejection of our first alternative hypothesis in the scenario presented before. With respect to the prediction accuracy of our models, we gather data that suggests a decrease in the MSE, proving a higher forecasting power. Indeed, model (6) yields an MSE of 5.0e-07, whereas model (5) appears to have even more prediction accuracy with an MSE of 2.9e-07. However, before concluding that the latter is best at forecasting, we run a second Diebold-Mariano Test between specification (5) and (6). We retrieved a t-statistic of -1.4, which is considerably low, resulting in the non-rejection of the null hypothesis. Accordingly, we infer that model (5) does not have a statistically lower MSE, invalidating its pre-eminence in forecasting. Figure 7, portrays the actual and predicted values for model (5). Instead, in the appendix, Figure A4 illustrates the out-of-sample performance of specification (6).



Notes: The figure display the out-of-sample performance estimated with model (5)

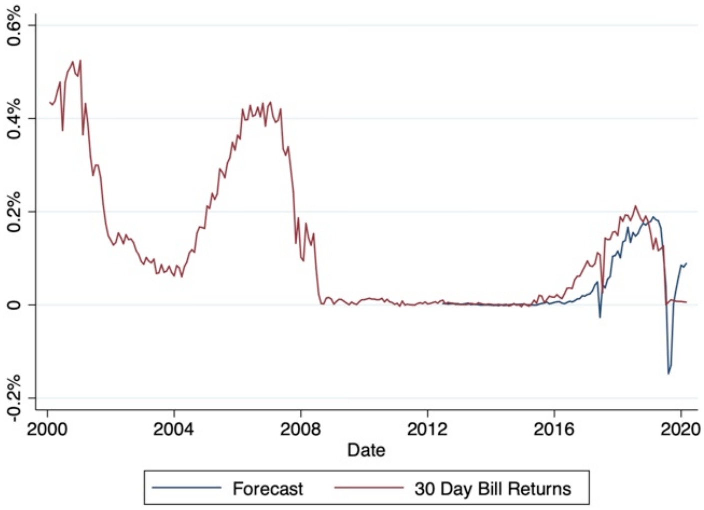
Figure 7. Out-of-sample performance of 90 Day bill Returns

Finally, we now investigate whether there is any sort of predictability in thirty-day T-bill returns arising from political uncertainty. In order to test for that, we use the same process as before. Starting from determining the optimal number of lags, through the use of the information criteria, we remove models that display a large AIC score. Then, we search for the two models which exhibit the lowest MSE, by testing several models with different combination of variables. In this setting, we found that the following models are the most effective in forecasting T-Bills returns:

7. $R_{t+1} = \beta_0 + \beta_1 BAK_t + \beta_2 IP_t + \beta_3 IP_{t-1} + \beta_4 IP_{t-2} + \beta_5 VIX_t$

8. $R_{t+1} = \beta_0 + \beta_1 BAK_t + \beta_2 CPI_{t-1} + \beta_3 S\&P500_t$

Table A5, which can be found in the appendix, presents the results for specifications (7) and (8). From the analysis of the findings, we detect a negative and significant coefficient of PU for model (8), while negative but statistically insignificant for model (7), proving once again that PU seems to influence the returns on short-term securities, yet not in the way we predicted. Indeed, the direction of this relationship is puzzling. However, also in this case, the value of the coefficients is exceptionally close to zero, suggesting that during periods of high PU, those who already hold a long position in T-Bills, will require higher returns to counteract the greater level of risk in the overall economy, pushing returns upward. Meanwhile, due to the high level of unpredictability and skepticism, more investors will move and invest in safer assets such as securities issued by the government. Therefore, increasing the demand for these assets, which consequently drives yield downwards. Accordingly, these mechanisms appear to outweigh each other, pushing the coefficients for this variable very close to 0. Next, we evaluate the forecast efficiency and precision of our two models. We find that both models display a quite strong out-of-sample performance, namely an MSE of 1.96e-07 for model (7) and of 4.37e-07 for specification (8). Finally, we perform the third and last Diebold-Mariano Test to determine which of the two models, if any, is best at predicting returns on 30-Day Treasury Bills. We retrieved a t-statistic of 1.67, which implies that at a 10% significance level, the MSE of model (7) is statistically lower than the one of model (8). Accordingly, the former model has higher predictive power, as can also be seen from the differences between Figure 8 and Figure A5.



Notes: The figure display the out-of-sample performance estimated with model (7)

Figure 8. Out-of-sample performance of 30 Day bill Returns

Finally, from the analysis performed above, we conclude that there is some kind of predictability in returns of short-term bonds and T-bills arising from political uncertainty. Indeed, as previously explained, we found that the coefficients related to PU were statistically significant, implying that the former seems to have an impact on returns. However, the sign of the coefficients varies, between positive and negative, suggesting that it is not clear in which direction this relationship goes. As a result, to explain these findings, we explain a dual mechanisms that counterbalance each other, pushing the coefficients towards 0. Until now, we have no reason to assume that one of two prevails the other. Therefore, we conclude that PU influences short-term treasury securities, but it is not yet clear how. Finally, while testing and searching for the best model, we notice that when we added the PCE control to our specifications, the MSE of our model would decreases, pushing up the forecasting accuracy. However, given that PCE has missing observations for the last year of our sample period, we decided not to include it in our final specifications. The motivation behind this decision is given by the fact that if included, our forecast would cease in the year 2019, which can potentially lead to a bias of our results.

6. Robustness Check

6.1. Relative Legislative Power

In order to find a causal relationship, we have to make sure that we have addressed any endogeneity concerns left. Hence, we want to be certain that any sort of omitted variable bias does not drive our findings. Specifically, any other source of uncertainty or economic fluctuations. Up until now, we have mitigated any issue related to endogeneity between PU and return on Treasuries bond and bills by adding several control variables. Nevertheless, we cannot argue that we ruled out the possibility of OVB. Additionally, we also use election as main explanatory variable, which we know to be exogenous to economic condition. However, election measure the level of PU only related to the specific event, yet, political instability can arise from a variety of other factors. Therefore, we cannot claim that our findings are entirely exogenous, suggesting that we found a statistically significant correlation but not a causal relationship. Hence, we decided to use an instrumental variable approach, which represents the classic way researchers use to address these limitations. The challenge here is to find a variable that is highly correlated with political uncertainty and, instead, has no impact whatsoever on the return on U.S. Treasury bonds and T-bills. We select two different instrumental variables built on previously written literature (Gulen & Ion, 2015).

The first one being an estimation of the relative legislative power of the central and leading U.S. political parties, which are the Republicans and Democrats. As Erikson et al., suggested in 1989, if we bear in mind the ceteris paribus condition, we would expect that as the relative legislative power of the majority party goes down, the level of political instability increases, resulting in a higher level of uncertainty in the overall economy. Hence, confirming the relevance condition of our IV. Meanwhile, there is not a clear way in which our instrumental variable can have an impact on U.S. Treasury bond and bill returns, if not through political uncertainty, implying that the exclusion restriction assumption of our IV is also satisfied. In order to construct our IV, we retrieved data from the official website of the U.S. Senate and the House of Representatives, which are two major legislative bodies of the United States Congress. To calculate a proxy of relative legislative power, we thus take the difference in power between the majority and minority party. In pursuance of a measurement for this proxy, we compute the difference in the percentage of legislative seats occupied by each party, Republican and

Democrats, at time t, in the Senate and the House of Representativeness, and then we take the average of the two. We assume that lower values of this variable will lead to higher policy uncertainty, as it means that the legislative power is less concentrated and centralized. Given that there are only two parties, and 435 total seats in the House of Representatives, whereas, 100 seat for the Senate, the IV at time t is computed as follow:

$$9. \quad IV_t = \left[\frac{(N^{\wedge} of\ seat\ in\ maj - N^{\wedge} of\ seat\ in\ \min)}{435} + \frac{(N^{\wedge} of\ seat\ in\ maj - N^{\wedge} of\ seat\ in\ \min)}{100}\right]/2$$

Furthermore, for the following analysis, we will focus on short-term Treasury securities, namely 1-year bond returns and 90 and 30-day T-Bills. Again, the reason behind this is the same as the one explained for the out-of-sample forecast. Instead, concerning the main variable of interest, we will again only use the Baker index as a proxy for PU on the grounds that election is already exogenous per se. Therefore, it would not add relevance to our study. Moreover, we will implement the standard two stages least squares to evaluate whether a correlation or a causal relationship drives our findings. Accordingly, we regress our presumably endogenous variable on our IV and all other control variables, resulting in the following specification:

$$10. \quad BAK_t = \beta_0 + \beta_1 IV_t + \sum_{i=1}^{2} \beta_{3,t-i} CPI_{t-i} + \beta_{4,t-1}\,(UNEP_{t-1}) + \beta_{5,t}(IP_t) + \beta_{6,t}(PCE_t) + \beta_{7,t}\,(USEU_t) + \beta_{8,t-1}\,(M1_{t-1}) + \beta_{9,t}(S\&P500_t) + \beta_{10,t}(VIX_t)$$

Moving on to the result, we found an R^2 of 0.61 from the first stage of the analysis, which is considerably promising. Indeed, the rule of thumb for a good IV argues that it should yield an R^2 that ranges from 0.2 to 0.8. As a matter of fact, if too large, it would imply that the IV chosen almost fully explains the endogenous variable, suggesting that we would still suffer from OVB. On the other hand, obtaining an R^2 that is too low would entail that the variance is still considerably large, and the estimate would result very noisy, indicating that the variable chosen is a weak instrument. Accordingly, by obtaining a model that explains around 61% of the variation in the Baker Index, we can assume that we found a relatively strong IV. Next, we retrieved the fitted values, which contain only the good variation, and we use these in the original model (1) instead of the Baker Index. We then test this relationship for the short-term securities indicated above, and the estimated results are displayed in Table 4.

Table 4: Regression Results for the second stage of 2SLS, first IV

	30DBR	90DBR	1YBR
Fitted_values (%)	-0.008***	-0.007***	-0.003
	(0.000)	(0.001)	(0.000)
CPI_{t-1}	0.008	-0.006	-0.078**
	(0.015)	(0.016)	(0.039)
CPI_{t-2}	0.033**	0.053***	0.109***
	(0.015)	(0.017)	(0.039)
IP	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)
VIX	0.000***	0.000***	0.000 **
	(0.000)	(0.000)	(0.000)
S&P	0.003**	0.003**	-0.004
	(0.001)	(0.001)	(0.003)
PCE	-0.032**	-0.037**	-0.011
	(0.015)	(0.016)	(0.038)
US/EU	-0.005***	-0.005***	-0.004**
	(0.001)	(0.001)	(0.002)
$UNMP_{t-1}$	0.065***	0.055***	0.001***
	(0.016)	(0.018)	(0.042)
$M1_{t-1}$	0.000**	0.000**	0.000**
	(0.000)	(0.000)	(0.000)
Cons	-0.015	-0.014	-0.013
	(0.003)	(0.002)	(0.007)
R^2	0.778	0.755	0.475
A_R^2	0.768	0.745	0.451

Notes: The table reports the results of the second stage of the 2SLS. The y variables are, correspondingly from the first column to the last one: *30 and 90 days Bills Return*, and 1 *Year Treasury Bond Returns.* The dependent variables are regressed on the fitted values from the regression (10) of the first stage and a number of control variables. The final specifications are estimated using Ordinary Least Squares (OLS) Analysis. Each coefficient is rounded to 3 decimal places, for complete results consult the Stata Code. The Standard Errors are reported in parentheses while the * display the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*

Importantly, political uncertainty seems not to impact the return of short-term debt due to the insignificance of the estimated coefficient. However, if we look at the results predicted for 30 and 90 days T-bills, we notice that the coefficients for PU turn out to be small, negative, and statistically significant at a 1% level, proving that the latter variable seems to have a casual impact on T-bills returns. This once again goes against our first hypothesis, as we assumed that periods of high political instability would drive returns up. Instead, the results are suggesting the opposite given the negative sign of the coefficients, implying that returns on T-bills decrease, even if slightly, during periods of higher political uncertainty. Thus, the findings further prove that the motivation given for the rejection of our first hypothesis can be potentially valid and conclusive. Indeed, given that most investors are risk-averse, during times of high uncertainty, they would rather move their assets into safer securities, such as Treasury bills and bonds, increasing their demand while pushing down returns. Previously, we have argued that this mechanism is out weighted by the fact that those agents that are heavily invested in Treasury assets will require higher returns during high PU, as they need to hold and sustain a higher level of risk. Hence, generally greater level of risk should be compensated through a higher yield of the investment.

Until now, we have concluded that PU does impact returns, yet the sign of this relationship is not clear as these two processes often push the coefficient toward zero. However, in this specific case, it appears that the coefficients are large enough to have a negative causal impact on returns. Thus, concluding that in this scenario, the first mechanism explained appears to be predominant and prevailing. As such, we reject the null hypothesis that PU is not correlated with return on U.S. Treasury Bills. However, in this scenario, it seems that the relationship between the two variables is negative, and not positive as predicted. On the other hand, we reject our second null hypothesis, suggesting instead that the aforementioned relationship is stronger as the time to maturity decreases. Indeed, we found no significant result for short-term bonds, while highly significant for T-Bills, proving that as the time to expiration shrinks, we tend to find more significant results.

6.2 Polarization of Political Party

Moreover, based on previous related literature, we developed the same analysis for a second instrumental variable (Kaviani et al., 2020). The latter represents a proxy that measures the level of polarization of the two major political parties through the DW-NOMINATE scores developed by Poole and Rosenthal (1985). We retrieved the data needed to construct the following IV from Voteview.com, a database developed by the University of Georgia. However, the data regarding the following variable is only available until 2016, implying that we have missing observations for the last years of our sample period. The DW-NOMINATE variable evaluates the time-series of ideological positions of Republicans and Democrats, established on their deputies' voting patterns. In order to test whether there is any further proof of a causal relationship, we will use the first dimension of the DW-NOMINATE scores, which represents the legislators' stance and viewpoint on government interference in the economy (Poole & Rosenthal, 2000).

We design our instrument for Political uncertainty by taking the difference between the Democratic and the Republican party scores for both the Senate and the House of Representatives. Next, we take the average between the differences in DW-NOMINATE scores for the two major legislative entities. Moreover, given that the IV displays a clear increasing trend, we will use the first difference for the sake of making our variable stationary. This is because we expect that the level of political uncertainty increases with a greater level of polarization. Indeed, if polarization is greater, parties exhibit more conflicting and divergent preferences in policies, implying a higher level of PU. At the same time, as with the other IV, there is not a clear in which our instrumental variable can have an impact on U.S. Treasury bonds and bills returns, if not through political uncertainty. Hence, also, in this case, the exclusion restriction assumption of our IV is satisfied.

Concerning the result of our first stage, we found that the coefficients of the political polarization are significant at a 1% level, further proving the relevance of our instruments. Besides, the regression yields an R^2 of 0,67, which, as explained before, is considerably high and encouraging for our analysis. We then predict the fitted values and regress returns of U.S. short-term securities on these. Table 5 displays the result of our main regression model (1) by using the fitted values instead of the Baker index. The significance of the findings is similar to the one previously found. Indeed, concerning short-term bonds, we found that the estimated coefficient for PU displays a p-value of 0.871, indicating that in this case, the latter variable has no impact on the former. Moreover, we found a significant PU coefficient at a 10% level and a 1% level for 90 and 30 days T-bills, respectively. Indicating that PU seems to casually impact returns of T-bills, suggesting again that our second hypothesis is valid and robust. As a matter of fact, we notice again that as the time to maturity goes down, the significance of the estimated coefficient of PU increases. Hence, we deduce that the relationship between PU and return on U.S. Treasury securities is stronger for short-term debt and bills. On the other hand, as can be seen from the table below, the sign of the estimated coefficient for PU appears to be small but positive for all the securities analyzed. This goes in line with our first hypothesis yet contradicts the previous findings of this section.

Table 5: Regression Results for the second stage of 2SLS, second IV

	30DBR	90DBR	1YBR
Fitted_values (%)	0.003**	0.002*	0.000
	(0.000)	(0.000)	(0.000)
CPI_{t-1}	0.006	-0.009	-0.090**
	(0.016)	(0.018)	(0.042)
CPI_{t-2}	0.005	0.025	0.105**
	(0.016)	(0.018)	(0.043)
IP	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)
VIX	-0.000**	-0.000	0.000
	(0.000)	(0.000)	(0.000)
S&P	0.002	0.001	-0.006
	(0.001)	(0.000)	(0.004)
PCE	-0.001	-0.018**	-0.008
	(0.016)	(0.018)	(0.043)
US/EU	-0.001	-0.001	-0.003
	(0.001)	(0.001)	(0.002)
$UNMP_{t-1}$	-0.064***	-0.066***	-0.003
	(0.018)	(0.021)	(0.048)
$M1_{t-1}$	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)
Cons	-0.001	-0.002	-0.008
	(0.003)	(0.003)	(0.007)
R^2	0.784	0.759	0.486
A_R^2	0.773	0.746	0.459

Notes: The table reports the results of the second stage of the 2SLS. The y variables are, correspondingly from the first column to the last one: *30 and 90 days Bills Return*, and 1 *Year Treasury Bond Returns.* The dependent variables are regressed on the fitted values from the first stage of the regression with the second IV identify, and a number of control variables. The final specifications are estimated using Ordinary Least Squares (OLS) Analysis. Each coefficient is rounded to 3 decimal places, for complete results consult the Stata Code. The Standard Errors are reported in parentheses while the * display the significance level of the coefficients.
**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*

7. Discussion and Conclusion

This thesis documents the effect of political uncertainty on U.S. Treasury bond and bill returns. Initially, we predicted to find a positive relationship between the two main variables of interest. Hence why, we expected returns on treasury bonds and bills to increase during periods of higher political uncertainty. We also forecasted that the relationship would be more robust as the time to maturity of the bond/bill goes down. As a result, throughout our analysis, we gather no proof of any sort of correlation between PU and medium and long-term securities. Meanwhile, we did not gather any evidence in favor of a causal relationship for short-term debt, yet we do have proof of a strong correlation between the two variables. Importantly, we concluded that PU has a casual impact on returns of U.S. T-bills. Finally, we have proven that these two variables are strongly connected for some securities, yet, the direction of this relationship remains unclear due to the volatility and variation in our findings. Indeed, we retrieved a similar level of significance for different analyses, yet the sign of our coefficients varied from positive to negative, not enabling us to provide a solid conclusion regarding the sign of our relationship. However, all the estimated coefficients appear small, suggesting that the two described processes potentially cancel out each other, pushing the estimated coefficients towards 0.

The explanation provided in support of our results relies on the idea that investors are more inclined to invest in safer securities during periods of high political uncertainty, such as Treasury bonds and bills. Being one of the most conservative asset classes, they are widely considered as risk-free. Accordingly, it is not strange that individuals decide to increase the share of safer assets in their portfolios. Yet, by doing so, they increase the demand for Treasury securities. As a result, prices for bonds and T-bills are driven up, diminishing the return earned by investors. Nonetheless, while formulating the first hypothesis, we look at the perspective of existing Treasury holders. As such, we assumed that returns would increase during periods of high PU due to the higher risk they have to bear. Therefore, we expected that those investors holding a long position in Treasuries would also want to be compensated for that additional risk, even considering that they hold the safest type of security.

For further research, we suggest diving deeper into these two contrasting processes, as our explanation mainly comes from a theoretical perspective, limiting its accuracy. As a matter of fact, the following represents the main limitation of our study as we obtained statistically significant results, yet the economic significance of it is relatively weak; considering that the magnitude of the effect of political uncertainty on bond and bill returns appears to be considerably small and somewhat vague. For future research, it would be interesting to check whether these phenomena take place also from an empirical perspective. For instance, the idea that investors tend to increase the share of safer securities in periods of higher political uncertainty could be proxy by the volume of trade for treasury bonds and bills. On the other hand, risk aversion can proxy the proposition of individuals wanting to be compensated during periods of higher uncertainty when holding a long position in Treasuries. Through the analyses of how these proxies interact with each other, we could potentially obtain more information regarding the effect of political uncertainty on Treasury bond and bill returns.

APPENDIX:

Table A1: Descriptive Statistics

	Obs	Mean	Std. Dev	Maximum	Minimum	Skewness	Kurtosis
Dummy	252	0.2857	0.453	1	0	0.949	1.900
Baker	252	121.4357	45.833	350.460	57.203	1.552	6.533
30YBR	252	0.0069	0.040	0.174	(0.147)	0.424	5.325
20 YBR	252	0.0065	0.031	0.144	(0.106)	0.238	4.916
10YBR	252	0.0047	0.020	0.085	(0.067)	0.077	4.257
5YBR	252	0.0039	0.012	0.045	(0.039)	0.031	3.761
1YBR	252	0.0018	0.003	0.013	(0.003)	1.473	5.835
90DBR	252	0.0014	0.002	0.007	(0.000)	1.140	3.291
30DBR	252	0.0013	0.002	0.005	(0.000)	1.092	3.005
CPI	252	0.0017	0.004	0.012	(0.019)	(0.853)	6.762
IP	252	99.7885	5.665	110.552	87.074	(0.0996)	2.090
VIX	252	19.9574	8.567	62.639	10.125	2.009	8.767
S&P500	252	0.0047	0.044	0.127	(0.169)	(0.509)	4.058
PCE	240	0.0019	0.003	0.024	(0.010)	0.605	9.753
US/EU	252	1.2061	0.163	1.576	0.853	(0.251)	2.605
UNEMP	252	0.0598	0.020	0.148	0.035	1.148	4.182
M1	252	2609.9620	2788.334	17829.6	1088.6	4.432	23.333

Notes: The table reports the observations, means, standard deviations, maximum and minimum values, Skewness and Kurtosis. The sample period ranges from January 2000 till December 2020. The sample consists of monthly observations on the variables (*30-20-10-5-1) Year Treasury Bond Returns, 90 and 30 days Bills Return, 30-Year Bond Return, the election Dummy, the Baker index,* Consumer Price Index (*CPI*) growth*, Industrial Production index, CBOE Volatility index*, *Return on S&P500,* Personal Consumption Expenditure (*PCE*) growth, *US/EU Exchange Rate*, the *Unemployment Rate* and M1 Money Stock. Thus, for each variable, 252 observations are retrieved. However, with respect to PCE, the data was available until 2019. No outliers were detected in the dataset. The brackets indicate a negative number.

Table A2: Correlation Matrix

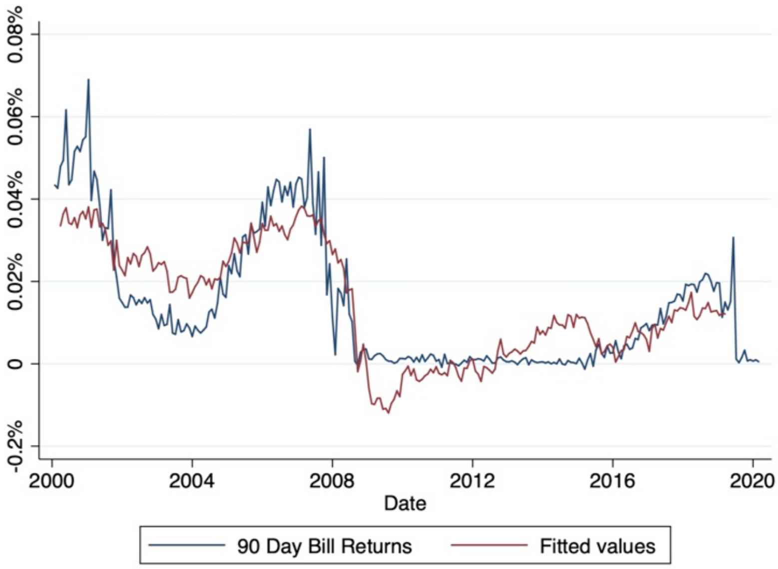
	Dummy	Baker	30YBR	5YBR	1YBR	90DBR	CPI	IP	VIX	S&P	PCE	US/EU	UNMP	M1
Dummy	1.000													
Baker	0.037	1.000												
30YBR	0.075	0.110	1.000											
5YBR	0.061	0.117	0.765	1.000										
1YBR	0.067	(0.139)	0.332	0.635	1.000									
90DBR	0.053	(0.428)	0.047	0.205	0.7522	1.000								
CPI	(0.004)	(0.161)	(0.279)	(0.180)	(0.031)	0.129	1.000							
IP	(0.008)	(0.147)	0.023	(0.058)	(0.090)	0.001	(0.015)	1.000						
VIX	0.109	0.045	0.220	0.300	0.276	0.007	(0.246)	(0.530)	1.000					
S&P	(0.111)	(0.071)	(0.307)	(0.344)	(0.273)	(0.128)	0.046	0.045	(0.346)	1.000				
PCE	(0.039)	(0.141)	0.013	(0.037)	(0.023)	0.004	(0.045)	0.032	(0.208)	0.170	1.000			
US/EU	(0.010)	0.160	(0.013)	(0.082)	(0.296)	(0.340)	0.057	0.160	(0.044)	0.086	(0.151)	1.000		
UNMP	(0.073)	0.532	(0.045)	(0.035)	(0.376)	(0.594)	(0.057)	(0.519)	0.311	0.082	(0.098)	0.526	1.000	
M1	(0.132)	0.203	(0.060)	(0.136)	(0.367)	(0.444)	(0.097)	0.739	(0.378)	0.122	0.030	(0.001)	(0.211)	1.0000

Notes: The table reports the correlation coefficients between the main variables. The sample period ranges from January 2000 till December 2020. The *20 and 10-Year Treasury Bond Returns, and 30 days Bills Return were excluded due to space constraint.*

Table A3: Dickey-Fuller test results

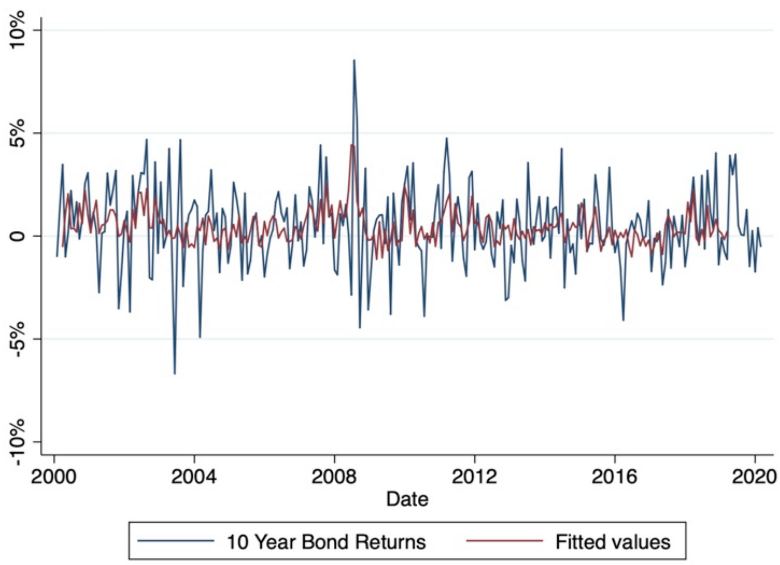
			Critical values		
	P-value	T-stat	1%	5%	10%
30YBR	0.000	-15.374	-3.990	-3.430	-3.130
20YBR	0.000	-15.719	-3.990	-3.430	-3.130
10YBR	0.000	-15.643	-3.990	-3.430	-3.130
5YBR	0.000	-14.996	-3.990	-3.430	-3.130
1YBR	0.000	-10.039	-3.990	-3.430	-3.130
90DBR	0.038	-3.516	-3.990	-3.430	-3.130
30DBR	0.047	-3.302	-3.990	-3.430	-3.130

Notes: The table reports the results of the augmented Dickey-Fuller test for returns on treasury bonds that display different time to maturities. In the second and third column we can observe the P-value and the respective T-statistic. Next, we see the critical values at a 1%, 5% and 10% significance level. We decided to include a trend term in the test, as we are mainly concerned about the presence of a tendency in our data.



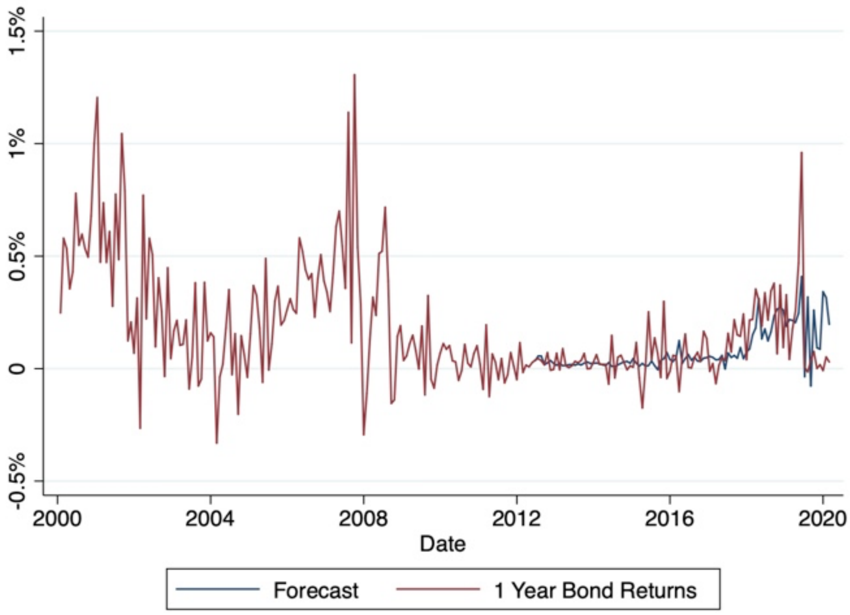
Notes: The fitted values do not predict until the end of the sample period, as a result of missing observations for the PCE variable. The variable of interest is given by the Election dummy.

Figure A1. Fitted vs actual values of 90 Day Bill Returns



Notes: The fitted values do not predict until the end of the sample period, as a result of missing observations for the PCE variable. The variable of interest is given by the Election dummy.

Figure A2. Fitted vs actual values of 10 Year Bond Returns.



Notes: The figure display the out-of-sample performance estimated with model (4)

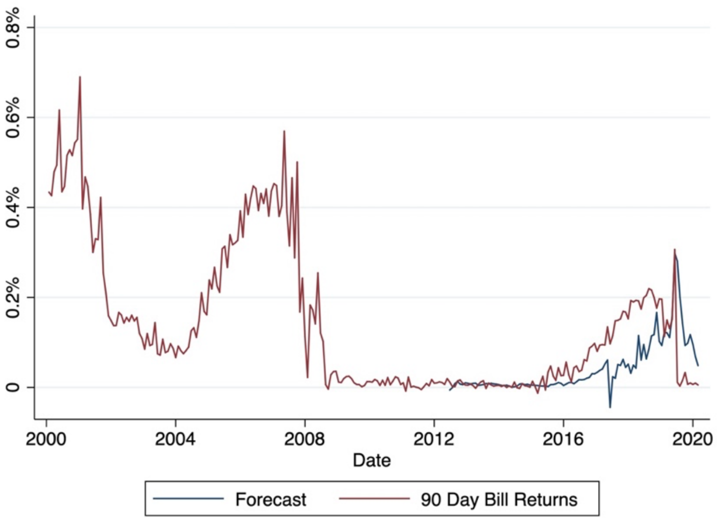
Figure A3. Out-of-sample performance of 1 Year Bond Returns

Table A4: Regression Results for equation 5 and 6

	(5)	(6)
BAK_t *(%)*	0.0000*	-0.0000***
	(0.0000)	(0.0000)
IP_t	0.0001***	
	(0.0000)	
$S\&P500_t$	-0.0023	
	(0.0016)	
CPI_{t-1}		-0.0181
		(0.0389)
VIX_t		0.0001***
		(0.0000)
CONS	-0.0145	0.0017
	(0.0023)	(0.0003)
MSE	2.9e-07	5.0e-07

Notes: The table reports the results of the regression for equation 5 and 6. In order to estimate the following model, we used the first 12 years of our sample, from January 2000 till December 2012, to predict the last 8 years, from January 2013 till December 2020. We choose a medium length for the rolling window of 50 months. Each coefficient is rounded to 4 decimal places, for complete results consult the Stata Code. The last row display the Mean Squared Forecast Error (MSE). The Standard Errors are reported in parentheses; while the * display the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*



Notes: The figure display the out-of-sample performance estimated with model (6)

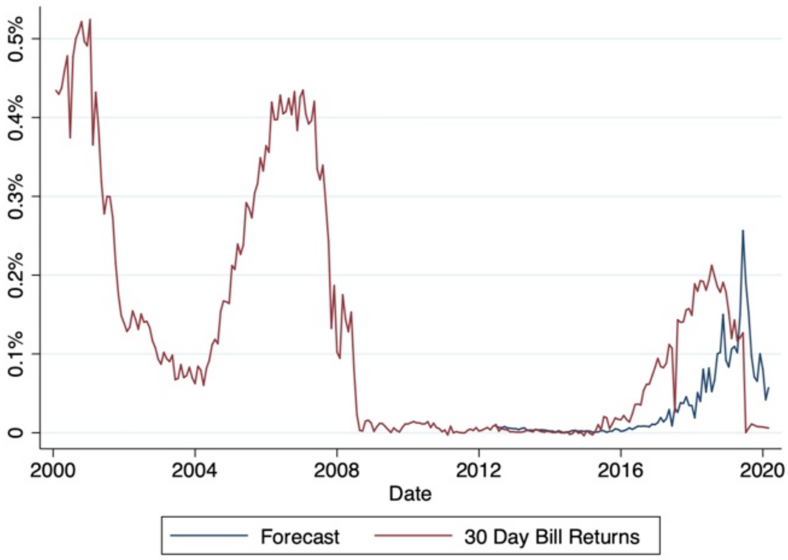
Figure A4. Out-of-sample performance of 90 Day Bill Returns

Table A5: Regression Results for equation 7 and 8

	(7)	(8)
BAK_t *(%)*	0.0000	0.0000***
	(0.0000)	(0.0000)
IP_t	0.0001***	
	(0.0000)	
IP_{t-1}	-0.0001	
	(0.0016)	
IP_{t-2}	0.0001***	
	(0.0000)	
VIX_t	0.0000	
	(0.0000)	
CPI_{t-1}		-0.0267
		(0.0365)
$S\&P500_t$		-0.0028
		(0.0020)
CONS	-0.0167	0.0018
	(0.0016)	(0.0003)
MSE	1.96e-07	4.37e-07

Notes: The table reports the results of the regression for equation 7 and 8. In order to estimate the following model, we used the first 12 years of our sample, from January 2000 till December 2012, to predict the last 8 years, from January 2013 till December 2020. We opted for a medium length for the rolling window of 50 months. Each coefficient is rounded to 4 decimal places, for complete results consult the Stata Code. The last row display the Mean Squared Forecast Error (MSE), while the Standard Errors are reported in parentheses. The * display the significance level of the coefficients.

**Significant at the 10% level | **Significant at the 5% level | ***Significant at the 1% level*



Notes: The figure display the out-of-sample performance estimated with model (8)

Figure A5. Out-of-sample performance of 30 Day Bill Returns

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