A Work Project, presented as part of the requirements for the Award of a Masters Degree in Finance from the Faculdade de Economia da Universidade Nova de Lisboa

TREASURY BOND RETURNS AND U.S. POLITICAL CYCLES

CARLOS MIGUEL SILVA FREIXA

(MASTERS IN FINANCE Nº86)

A Project carried out with the supervision of:

Prof. João Amaro de Matos

Lisboa, 12th June 2009

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Abstract

This work-project complements the existing studies on the linkage between financial investments returns and the political cycles, by relating Treasury bond returns and Presidential cycles. Previous research shows that stock market tends to behave better during Democratic presidencies, and in this work it is shown a compatible result, with long-term Treasury bonds having higher absolute, and excess returns during Republican Administrations. This difference is not explained by business cycles and there are no significant differences in risk, as measured by the volatility of returns, between the two political cycles. Empirical evidence is also found showing that there are better economic and financial conditions to invest in T-bonds' markets during Republican than during Democratic Administrations.

Keywords: Treasury Bond Returns, Political Cycles, Political Economy

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I - Introduction

This work-project provides evidence about the relationship between the Treasury bond returns and the political cycles in the United States. The influence of political and Presidential cycles in the capital markets returns is a considerable aspect since both Republicans and Democrats have different ideas and pursue different policies. These differences affect directly the financial market returns, not only by different economic and financial measures but also with different law revisions. On the other hand, there can also be other line of thought, in which policies followed by Presidents are not so different, and when elected, the President and the majority in power will have the tendency to adopt strategies and measures that might help a future re-election, and so financial returns should be totally independent from political variables. Despite this last hypothesis, Treasury bond returns are largely connected with the monetary and fiscal policies adopted by Governments, because they directly influence interest rates, and consequently bond markets. The differences between the two ideologies are known, whereas Democratic Administrations are expected to follow expansionary policies with more public sector intervention and employment stimulation, alternatively, Republican Administrations normally pursue the lowering of taxes, interest rates and inflation. So, these different approaches should have a direct impact in public expenditures, public debt level, Gross Domestic Product, inflation and interest rates level that ultimately influence Treasury bond returns. The purpose of this study, as stated before, is to analyze empirically the differences in political cycles of returns and from that extrapolate what are the "best" regimes for investors to increase the weight of Government bonds in their portfolio allocations.

The economic environment that offers better conditions to invest in Bonds, is generally the economic state with low inflation and low interest rates, because it lowers the opportunity cost of investing in bonds, making coupon payments more attractive relatively to interest rate remunerations. Historically, in the 20th Century, there were periods in which the conditions were favorable to invest in bonds, like the last 20 years of the last century, and the beginning of the 2000's, with low interest rates and low inflation. On the contrary, since the end of the World War II and the beginning of 1980's there were periods with high inflation, and with high interest rates with instability in debt markets, creating then a bear market for fixed income investments. Long-term bonds are important and are held by investors mainly for two reasons: they are good instruments to assume long-term hedging positions, and also this type of bonds, normally, has a premium over short-term investments, and this premium can be used for speculative motives.

This work is organized as follow, firstly it is presented the literature review with the description of similar findings by previous research, afterwards data and methodology description with explanation of main results. The results are then compared with tests in subsamples using additional robustness statistical tests. It is also analyzed whether the excess returns differences are due to different risk assumed in the two cycles. This will be accessed estimating the volatilities of returns in the two parties' cycles. Finally, some limitations of the work-project are presented, as well as alternative methodologies, and further research topics.

Literature Review

There are not many studies showing the relationship between bond returns and political cycles. However, the relationship of stock returns and Presidency cycles is

widely approached in different papers, like Hensel and Ziemba (1995) who study the returns between small and big caps during both administrations, finding that during Democrats, indifferently of cap size, stock returns are significantly higher. In a more recent study performed by Santa Clara and Valkanov (2003), the authors reach similar conclusions. Using CRSP value weighted index returns as proxy for monthly stock market returns, from 1929 to 1998, they find that during Democrat Administrations, excess returns on the stock market are much higher compared with Republicans. Interestingly they also find that the risk is higher during Republican cycles, so the excess return is not a compensation for higher risk, constituting in this way a puzzle. From a macroeconomic point of a view, and using similar methodology, Elliot (2006), in his working-paper finds that from 1949 to 2005 real GDP growth is 5,1 percent in average during Democratic Administrations, which is more than the double from Republicans 1,9 percent. For real GDP per capita the results are similar. He also tested whether the effect of Congress was higher on GDP compared with the effect of Presidential Administrations, because it is the Congress that decides on law material and approves the Government budgets. The impact of Congress in GDP was not statistically different from zero, so he concludes that the party in the Administration works as a better explanatory variable for political cycles. From all, the most recent study is from Ramchander Simpson and Webb (2008), in which they demonstrate the relationship of Real Estate Investment Trusts (REIT) returns and political cycles. Contrary to the previous results on the above cited papers, the authors find that the REIT excess returns are much higher during Republican presidencies. The result is still significant when they control for the monetary policy, using for control a dummy variable defining the expansionary or loosening monetary policy, depending on the FED decision of lowering

or increasing interest rates. They also conclude that the evolution of these returns is much higher during the two last mandate years specially for Republican mandates. The importance of political gridlock, defined as the control of the majority of Congress, Senate and Presidency is also studied, and the authors find that political gridlock controlled by the same party helps the REIT returns, being these returns higher again during Republican leaderships in all parts of the gridlock, independent from tightening or loosening monetary policy. Wrapping up, all these papers present recent studies on the relation of political variables with the economic and financial conditions. The goal of this study is to complement the research presented, using different financial returns, but with similar methodology, testing also the inferred conclusions, while adding more updated results.

II - Data and Methodology

To examine the difference between returns on Treasury bonds along with presidencies, it will be carried out a mean-variance approach using an OLS regression with dummy variables. This regression is computed using the long term Treasury bonds total returns (LTR), but also with excess returns on three month Treasury bill and inflation. The first and principal regression specification is:

$$LTR_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + e_t \quad (1)$$

The variable *LTR* stands for the returns on long-term Treasury bonds, and *RP* and *DM* are the constructed dummy variables, in which *RP* assumes 1 if on that quarter is a Republican President and 0 if it is Democratic, while *DM* assumes exactly the opposite values. The coefficients for β_1 and β_2 correspond to the average returns for Democrats and Republicans respectively. The explanatory variable is lagged, because the political decisions are expected to influence interest rate markets with some delay.

This methodology only captures the evolution of the total returns in absolute form, but for a more precise analysis, the evolution of excess returns should be investigated. One can apply the same equation to the two types of excess returns defined, first with excess returns on three month Treasury bill:

$$LTR_t - TBL_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + e_t \quad (2)$$

and secondly excess returns calculated over inflation:

$$LTR_t - INF_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + e_t \quad (3)$$

These three equations presented provide the starting and principal results for the analysis, because, in case of having differences in these values, there is an historically disparity between Republicans and Democrats. After these regressions, other tests are performed to increase the robustness of the previous results. Using the same methodological approach as before, tests can be made to sub-samples to confirm the previous results, and at the same time helping to distinguish and find possible different trends within the overall sample.

The list of Presidents was obtained from the White House web page, and for cycle definition it was assumed that the presidential cycles started at the signature day. In case of the existence of two presidents in the same quarter, it was assumed that the person with more time within the quarter ran the entire quarter. The cycle could also be defined with the election date, yet, for this type of returns, the difference in cycle definitions is too small to produce considerable changes in interest rate markets and influence final results. The main quantitative variables used are LTR, TBL, and INF, and all of them were obtained from the database available at Prof. Amit Goyal webpage. LTR is based on the Ibbotson Yearbook series; TBL is based in NBER macro history

data base until 1933, and from 1933 to 2007 it is obtained from the Federal Reserve Bank at St. Louis (FRED); INF is retrieved from Consumer Price Index (All urban Consumers) from the Bureau of Labor Statistics. The statistical descriptions, Presidential cycles definition, and Dummy Variable descriptions are present in Appendix - Table 1, Table 2 and Table 3.

III – Main Findings

a) *Overall Results*

Using the full sample of quarterly returns, since 1926 to 2008, in which there are 169 quarters with Democrat presidency and 159 for Republican presidencies, there are high differences in long term Treasury bond returns between Democrats and Republicans. The average return for Republican presidencies is 1,969 percent per quarter, twice as much as for Democrat presidencies, which have 0,849 percent per quarter in average. This implies that the average per year during Republican Administrations is 7,876 percent and during Democratic Administrations is 3,360 percent. This is in line with what was expected ,because Democratic presidencies are linked with more inflation and higher GDP growth, and on the other hand Republicans prefer low inflation and lower interest rates and taxes, which favor the investment on bonds. The difference of the two values being equal to zero is rejected, so there is statistical evidence for high differences on the returns between the two parties. This disparity is even higher when the difference between the excess returns over three month T-bill is verified. In this test, during Democratic cycles the quarterly return was 0,105 percent (0,42 percent per year), and these values are not statistically different from zero, while Republicans have 0,834 percent on a quarterly basis (3,33 percent per year). Once again, statistically, the two averages are different from each other, but the

quarterly standard deviations of the coefficients are quite similar, 0,315 percent for Democrats and 0,357 percent for Republicans on a quarterly basis. As to excess returns on inflation, the results are again higher in Republican Administrations, because both average returns are statistically different from zero, and Republicans present 1,830 percent (7,320 percent annually), and Democrats present 0,606 percent (2,424 percent annually). All the values presented, statistical tests, and computational definitions for regressions are presented in Appendix – Table 4.

In conclusion, there is statistical evidence that the Treasury bond returns are different within political cycles. With this outcome, investors directly or indirectly see in Republican presidencies conditions to add more financial gains to their bond investments. Normally, Government debt is seen as riskless, or at least as a financial investment with less risk. However, it is possible that differences in returns may be just a consequence of the increased risk from Republican presidencies. Other feasible explanation to the differences found is the type of policies followed by the governments. In this case the party in power is really important to the investor's decision, considering that these policies have different consequences depending on the investments and investor types. While the impacts of the political decisions on stock markets can affect market prices more rapidly (for instance news about different government actions can have an anticipated impact on stock indexes), on the other hand, the decisions on Government debt emissions, interest rates fixation, and inflation control policies, which are more likely to affect fixed income investors, have a much slower impact on debt market prices. Finally, results are coherent to the economic premises and with previous research on similar subjects.

b) *Tests in subsamples*

As stated above, to consign more assurance to the overall results, tests in sub-samples will be executed in order to confirm the evolution of results in different periods. The overall sample was divided in two subsamples, the first one ranges from 1926:Q1 to 1961:Q4, which translates into 144 observations after adjustments, with 82 quarters for Democrats and 61 quarters for Republicans. The second sub-sample ranges from 1962:Q1 to 2007:Q4, including 184 observations, with 76 quarters for Democrats and 108 quarters with Republicans in presidency. This division is set to split the sample in two parts, according to different periods in the 20th century, because while the first has significant history and economic marks like 1929 Depression, the World War II, and the Economic Boom of the 50's, the second subsample is more stable, with only the Vietnam war as a significant U.S. historical mark. Naturally, there were also some important shocks, like the oil shocks and the Cold War, but it was a period with higher economic growth and with characteristics that favored the investment in financial assets.

For the first sub-sample and starting with the long-term Treasury bond returns, Republican Administrations still present higher average returns, 0,921 percent (3,0684 percent) compared with 0,724 percent (2,896 percent annually) on Democratic Administrations. Yet, these averages are statistically not different from each other, and so, there were no real differences in long-term returns in this period. For the second sub-sample, the difference not only is statistically different from zero, but also the behavior of long-term bonds returns during Republican presidencies is exceedingly positive. For Republicans the returns in this period were 2,576 percent (10,304 percent annually), while for Democratic Presidencies it is only 0,982 percent (3,928 percent annually). It is

during this second period that the major difference between the two parties is established.

Regarding excess returns on T-bill, one surprising result happens in the first sub-sample. Unlike in total returns analysis, Democrats have higher excess returns on short-term T-bill from 1926 to 1961. In this period the average for Republicans cycles is 1,264 percent per year, while for Democrats is 2,272 percent per year. This is the only time in all analysis that the difference in returns was higher during Democrat cycles, but statistically, both averages for the two parties are not different from zero. In the second sub-sample, Republican cycles present a very good excess return on short-term T-bill, with 1,134 percent (4,536 percent annually), and Democrat cycles had a negative return with –0,387 percent (-1,548 percent annually). Though, this last value is not statistically different from zero, which is in line with the overall results for the excess returns on T-bill. As to excess returns on inflation, the results once again are in line with the results obtained until now. In the first subsample, there is a difference of –0,521 percent between the two average returns that is not statistically different from zero. The results change in the second sub-sample because the quarterly difference is now –1,577 percent, a value that is statistically different from zero, so once again Treasury bond returns are higher during Republican presidencies. Concluding, tests in sub-samples attested generally the overall result using periods with different economic conditions that could influence the results. The major conclusion is that the source of the difference in returns is more established in the second part of the century. In the first part there were differences in returns but were not very high or statistically meaningful. The second part of the analyzed period favored more investors, which had a debt market with more

liquidity, more debt issuing, and other conditions favorable to the investment in fixed income securities, allowing to highlight the discrepancy in returns during Presidencies.

c) Tests Using Other Control Variables

On the results presented until now, it is assumed that political cycles are independent from returns. However, returns may be correlated with other variables that can also influence the presidency cycles. To manage this possibility, variables that can impact on returns, should be controlled. In literature review, studies were presented showing that GDP growth is different during the two administrations with economic growth being much higher during Democrat presidencies. Taking this result in consideration, the evolution of returns may be correlated with economic growth, implying that the party in power might not directly affect returns. Also, different fiscal policies and Government expenditure decisions can alter the size of debt issued by Governments, and consequently impact on prices and bond returns. To control for economic growth, and expenditures it will be used quarterly real GDP growth, and Government expenditures growth, respectively. Both variables were obtained from the Federal Reserve Economic Data (FRED) databases. Statistical description is available in Appendix – Table 1. Both variables are quarterly, however there is only data available starting 1947:Q3, so for the first 20 years, the impact of these variables will not be measured. The methodology used will be similar as before, and the regressions will be equal to equation (1), (2) and (3), but adding controls for GDP and Government expenditures:

$$LTR_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + \alpha_1 GDP_{t-1} + \alpha_2 EXP_{t-1} + e_t \quad (4)$$

$$LTR_t - TBL_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + \alpha_1 GDP_{t-1} + \alpha_2 EXP_{t-1} + e_t \quad (5)$$

$$LTR_t - INF_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + \alpha_1 GDP_{t-1} + \alpha_2 EXP_{t-1} + e_t \quad (6)$$

These equations will only be tested for two samples: first using all the new variables sample, 1947:Q3 to 2007:Q4, and next using the second sample, 1962:Q1 to 2007:Q4. It is also in this second sample that previous results presented the major differences between the two parties, so the impact of these variables on final results, if significant, should be more meaningful in this sub-sample. Even when adding these two new control variables, results on the second sub-sample are very similar to the initial regressions, despite a small widening of the gap for the returns and excess returns on T-bill. Regarding excess returns on inflation, the difference decreases (-1,35 percent compared with –1,57 percent) but it is still significant. Finally GDP growth and Public expenditures growth are not statistically significant in all equations, so these variables do not have great impact on the explanation of long-term Treasury bond returns. Even so, controlling for these variables can be helpful to eliminate possible correlation between Presidency cycles and economic performances. However as seen before, the overall conclusions are not modified and there is even more assurance that the main results encountered before are indeed considerable.

Additionally other set of variables could be used to attest the conclusions, like the level of monetary aggregates, yield spreads, or other possible macroeconomic variables. Notwithstanding, the variables used in this work to control for financial and economic influence, directly or indirectly are related with other possible explanatory variables, and ultimately one is controlling for the other possible variables. Furthermore, by adopting excess returns over inflation, the influence of macroeconomic factors is previously eliminated, and the same logic applies to excess returns over T-bill for monetary policy factors.

d) Return and Risk

Santa Clara and Valkanov in their work test for differences in risk during both Administrations since one of the possible explanations for higher excess returns on stock markets encountered is the higher risk assumed from investors, meaning that the stock investors perceive Republicans as more risky than Democrats. This possible explanation also holds for Government bond markets, and the result can also be justified by the level of interest rates, which is normally lower during Republicans, but still not withdrawing the possibility of having a risk premium embedded in the excess of returns. To measure the risk difference between the two parties, it will be used the same methodology as before, but in this case the dependent variable is the squared root of the difference of to average of total returns on long term Treasury bonds. So the regression held is:

$$VLT_t = \beta_1 DM_{t-1} + \beta_2 RP_{t-1} + e_t \tag{7}$$

$$\text{with: } VLT_t = \left(LTR_t - \overline{LTR} \right)^2$$

This methodology was also applied to excess returns on T-bills and inflation. With the results of this equation, a standard deviation for the returns can be calculated, because, the dummy variable gives the average of the squared deviations from the mean, which is the variance. Volatility, measured as the standard deviation is the squared root of the estimated dummy. The results show that there are not significant differences in risk, because the squared root differences from the average deviations are not statistically different from each other. Even so, the calculated standard deviation of returns are higher in Republican mandates for the three types of returns. However the difference is not very high, and specially in the last part of the sample, differences in

volatility are very similar. Despite being an apparent evidence for higher volatility during Republican presidencies, when analyzed the period where differences in returns are higher, the volatilities estimations are not different from each other. This implies that the market does not anticipate a premium over Republican presidencies, and differences in risk are not the source for return discrepancy. The estimated results, data, and methodology are described in Annex – Table 6.

e) Relationship between Stock Market Returns and Long-Term Bond Returns

Whenever stock markets are not good investments, common sense states that investors should be driven to others more secure and return-safer, preferentially Treasury bonds. As mentioned before, it is showed empirically in other papers that stock markets behave better during Democratic presidencies, and in this work is shown that returns on T-bonds are in average better during Republican administrations. The results obtained in this paper are then coherent with previous research of the subject but using different assets. It must not be forgotten that stocks and bonds are driven by different factors other than political variables. Stocks normally follow earnings expectations, and company's performances that are more related to the economic cycles, while bonds are more dependent on the monetary side, inflation and monetary levels. Using the LTR, and the CRSP index as proxy for stock market risks, the correlation coefficient between long-term returns and stock market is 0,119. Even with a low value, correlation is positive. So historically there is a positive correlation between long-term bond returns and stock market returns, which is not conclusive for the hypothesis of negative relation between the two types of returns.

f) Limitations of this work and Further Research

Returns are a measure and depend on many factors. In this work it is investigated whether long term Treasury bond returns were different within the political cycles, using the long-term returns defined as in Ibbotson series. But, there are short-term and long-term investors, and these results can vary for instance, if the holding period of the bond changes, or if the investment horizon and risk aversion are different from investor to investor. The variables chosen to justify this work are adequate and consistent, but there are also other aspects linked with monetary policy and the financial system that can matter to the analysis, for example, the person who runs the Federal Reserve (FED) and consequently the monetary policy. However, the objective of this work was to investigate if in both Republican and Democrat presidencies the return averages were different, and not to analyze every aspect that could influence the return on Government bonds.

The methodology used in this work is actually very simple. Using regressions which only take dummy variables to distinguish the different political impacts on returns, and controlling for other variables that might influence shifts in returns, these equations help obtain good results for the proposed subject. Some robustness tests were performed assuming different samples, and other explanatory variables. Nevertheless, there can also be some problems with this methodology, because in this case the test assumes that the dummy variable is constant over the sample, and the significance tests applied to this value are subjected to this hypothesis. Though, it is possible to have changes in the level of the dummy that are not influenced only by political tests, implying that the conclusions about the significance of the political dummies could be wrongly taken. This might be corrected by adding more control variables to justify the

changes in level of the dummies. In this work two were used (GDP and Government expenditures growth), but there are other variables that perhaps should be included, and omitting them can lead to erroneous results. The use of dummy variables to capture the effect of political cycles is not broadly accepted, and for instance there are different methodologies defended by Caporale and Gried (2005). To overcome this problem of unexplained jumps in the series wrongly attributed to the political variables, they present tests based on Bai and Perron methods, identifying the break points and the structural changes in the intercepts, applying then different confidence intervals for the significance tests on the dummy variables. There are also other critiques to the use of dummy variables to explain differences in qualitative variables. In their paper Powell, Shi, Smith and Whaley (2005) alert to the problem of data mining in explanatory variables, stating that dummy variables are persistent through time and can suffer from autocorrelation, turning the results of the regressions spurious and with the significance of the regressor wrongly accepted. They use simulations of stock market returns against a series of independent simulated dummy variables, and they conclude that there is no evidence of difference in stock returns between parties since the mid 1800's.

In the development of this work, the relationship between the long-term Treasury bond returns and the party controlling in Congress (Senate and House of Representatives) was also tested. A priori, testing this relationship is interesting because major legislative and budget decisions are approved in Congress. The results were not significant because Democrats were in majority in Congress for most part of the time (252 quarters) compared to Republicans (72 quarters), and the statistical results were not good enough to get any reliable conclusions.

IV – Concluding Remarks

This empirical work shows that the long-term Treasury bond returns are higher in Republican Administrations. This implies that, under Republicans the economy has higher probability of facing low interest rates and low inflation leading to higher returns on bonds. To sum up, the major conclusions from this work are:

1. The average long term Treasury bond returns is significantly higher during Republican Administrations with an annually average returns of 7,876 percent (from 1926 to 2007), while this value for Democrat presidencies is 3,396 percent. These differences are uphold for excess returns on inflation and three month T-bill. The conclusions are also supported with sub-sample tests.
2. These differences between presidencies are still significant when controlling for macroeconomic factors (GDP growth and Government Expenditures Level).
3. Excess returns on Republican Administrations are not explained by excess risk, meaning that values for standard deviations of returns are not distant for Democrats and Republicans.
4. The findings in this work project are updated and coherent relatively to other empirical studies that test the similar relationships on other financial assets.
5. The methodology used is simple, and not statistically complex, but gives valid results. Even with robustness tests, still, there is the possibility of presence of data mining, and possible autocorrelation on dummy variables.
6. The results stated on this work-project are based on historical data, and just by themselves do not help predict any future returns. They may be useful to distinguish policies followed by different administrations making possible to anticipate movements on Government debt markets.

V – References

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VI – Appendix

Table 1 – In this table are presented the statistical values for the quantitative variables used. The mean and standard deviation are presented in annualized percentages, and in brackets are these quarterly values in percentage points. It is also presented values for autocorrelation up to lag 4 (in quarters).

Table 1 - Economic and Financial Variables

	LTR	LTR-TBL	LTR-INF
Mean	5.704 [1.426]	1.92 [0.481]	4.949 [1.237]
Standard Deviation	8.584 [4.292]	8.692 [4.346]	8.695 [4.347]
Autocorrelation:			
1	-0.052	-0.058	-0.044
2	0.029	0.020	0.033
3	0.107	0.104	0.108
4	0.013	0.005	0.015
	GDP	**EXP**	
Mean	3.227 [0.807]	2.417 [0.604]	
Standard Deviation	1.969 [0.985]	6.044 [3.022]	
Autocorrelation:			
1	0.329	0.484	
2	0.181	0.374	
3	-0.020	0.258	
4	-0.113	0.124	

Table 2 – In this table are presented the list of Presidents, and the party in presidency that were considered in this work. The dates represent signature days, so it is considered a cycle when the presidency officially starts and not on election dates.

Table 2 - Presidencial Cycles

	Republican/Democrat	Mandate Start	Mandate End
Calvin Coolidge	R	02-08-1923	04-03-1929
Herbert Hoover	R	04-03-1929	04-03-1933
F.D. Roosevelt	D	04-03-1933	12-04-1945
Harry Truman	D	12-04-1945	20-01-1953
Dwight Eisenhower	R	20-01-1953	20-01-1961
John Kennedy	D	20-01-1961	22-11-1963
Lyndon Johnson	D	22-11-1963	20-01-1969
Richard Nixon	R	20-01-1969	09-08-1974
Gerald Ford	R	09-08-1974	20-01-1977
Jimmy Carter	D	20-01-1977	20-01-1981
Ronald Reagan	R	20-01-1981	20-01-1989
George Bush	R	20-01-1989	20-01-1993
Bill Clinton	D	20-01-1993	20-01-2001
George W. Bush	R	20-01-2001	20-01-2009

Table 3 – Presidential cycles distribution by Republicans and Democrats (in quarters).

Table 3 - Political Variables			
Presidency	**1926:Q1 - 2007:Q4**	**1926:Q1 - 1961:Q4**	**1962:Q1 - 2007:Q4**
Republicans	159	83	76
Democrats	169	61	108
Total	328	144	184

Chart 1 – Evolution of quarterly returns on long-term Treasury bonds. Sample: 1926:Q1 - 2007:Q4

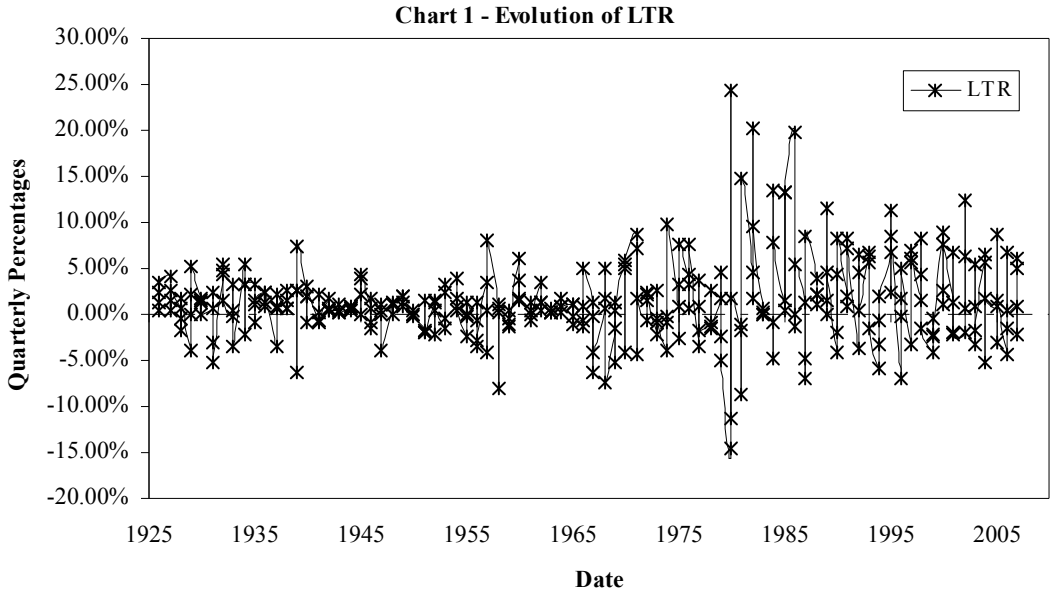

Chart 2 – Evolution of Inflation and three month Treasury Bill. Annualized percentages .Sample: 1926:Q1 - 2007:Q4

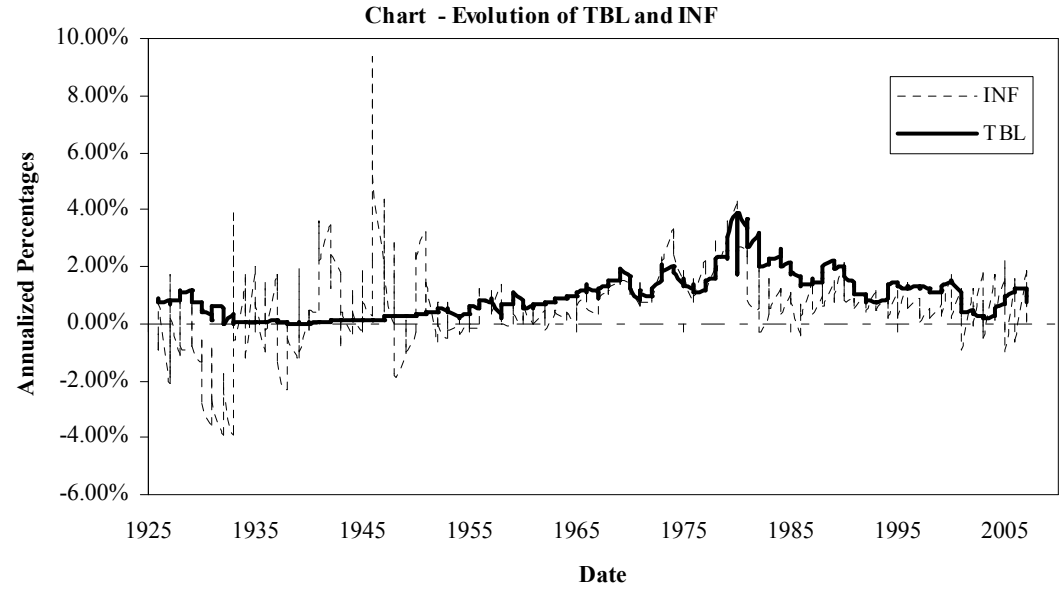

Table 4: This table presents the values for regressions (1), (2) and (3). *DM* and *RP* are the explanatory variables. The first horizontal line, for *DM* and *RP* set is the coefficient value of the regression, the second line value is the standard deviation of the coefficient estimation, and the last line value in parenthesis is the p-value for the null hypothesis that the coefficient is equal to zero. $\overline{R}^2$ is the adjusted R^2 for the regressions. All regressions were calculated using OLS with Newey West estimator corrections for autocorrelation and heteroskedasticity. *Diff* is represents the difference of the two coefficients (*DM-RP*). The values in this subset are result for the Wald Tests on coefficient restrictions. The first value is the absolute difference, the below value is the standard deviation of the difference, the value in parenthesis is the p-value for the F-test, and the p-value in brackets is the value for the Chi-Square test. Both tests are used to test the significance under the null hypothesis, that the difference in the coefficients is equal to zero.

Table 4 - Results

	1926:Q1 - 2007:Q4			**1926:Q1 - 1961:Q4**			**1962:Q1 - 2007:Q4**		
	LTR	***LTR-TBL***	***LTR-INF***	***LTR***	***LTR-TBL***	***LTR-INF***	***LTR***	***LTR-TBL***	***LTR-INF***
DM	0.849	0.105	0.606	0.724	0.568	0.493	0.982	-0.387	0.726
	0.303	0.315	0.262	0.221	0.226	0.227	0.582	0.602	0.504
	(0.054)	(0.738)	(0.021)	(0.001)	(0.0131)	(0.032)	(0.093)	(0.52)	(0.151)
RP	1.969	0.834	1.83	0.921	0.316	1.014	2.576	1.134	2.304
	0.357	0.357	0.372	0.351	0.360	0.375	0.518	0.524	0.519
	(0.000)	(0.02)	(0.000)	(0.009)	(0.381)	(0.007)	(0.000)	(0.031)	(0.000)
N		328			144			184	
$\overline{R}^2$	0.014	0.003	0.016	0.001	0.002	0.004	0.016	0.014	0.015
Diff	-1.120	-0.728	-1.225	-0.197	0.252	-0.521	-1.594	-1.521	-1.577
	0.468	1.919	0.453	0.415	0.425	0.445	0.779	0.468	0.704
	(0.017)	(0.232)	(0.007)	(0.6358)	(0.554)	(0.243)	(0.042)	(0.468)	(0.026)
	[0.016]	[0.233]	[0.006]	[0.6351]	[0.553]	[0.241]	[0.040]	[0.016]	[0.025]

Table 5: This table presents the results from equations (4) ,(5) and (6). The methodology and results exhibit is similar to the regression in table 4.

Table 5 - Results

	1962:Q1 - 2007:Q4			1947:Q3 - 2007:Q4		
	LTR	***LTR-TBL***	***LTR-INF***	***LTR***	***LTR-TBL***	***LTR-INF***
DM	0.382	-0.631	0.536	0.777	-0.387	0.546
	0.923	0.967	0.563	0.632	0.663	0.931
	(0.3684)	(0.514)	(0.341)	(0.220)	(0.559)	(0.558)
RP	2.462	0.957	1.894	2.126	0.855	2.168
	0.619	0.638	0.466	0.460	0.469	0.628
	(0.000)	(0.1359)	(0.001)	(0.000)	(0.069)	(0.000)
GDP	8.625	22.054	-0.587	-0.910	2.558	15.161
	-22.147	57.442	27.51	29.526	31.266	54.722
	(0.697)	(0.701)	(0.983)	(0.9754)	(0.934)	(0.782)
EXP	12.240	7.103	-0.993	-0.787	0.314	8.794
	54.188	22.262	6.89	7.571	7.463	22.194
	(0.822)	(0.750)	(0.885)	(0.917)	(0.966)	(0.692)
N		184			242	
$\overline{R}^2$	0.007	0.021	0.007	0.007	0.003	0.006
Diff	-1.629	-1.588	-1.35	-1.348	-1.243	-1.622
	0.853	0.875	0.639	0.668	0.0682	0.86
	(0.057)	(0.714)	(0.034)	(0.044)	(0.069)	(0.061)
	[0.056]	[0.069]	[0.033]	[0.43]	[0.068]	[0.059]

Table 6: Estimated values relative to equation (7). The dependent variables are VTL (total returns), VTL2 (excess returns on T-bill), and VTL3(excess returns on inflation). All estimations were performed using OLS and Newey-West estimators to correct for autocorrelation and heteroskedasticity on residuals. $\overline{R}^2$ is the adjusted R^2 for the regressions. The first horizontal lines are the coefficient estimated for the average of squared deviations from the mean values. *Diff* is the difference between the coefficients (*DM-RP*), The values in this subset are result for the Wald Tests on coefficient restrictions. The first value is the absolute difference, the below value is the standard deviation of the difference; the value in parenthesis is the p-value for the F-test, and the value in brackets is the p-value for the Chi-Square test. Both tests are used to test the significance under the null hypothesis, that the difference in the coefficients is equal to zero. On the last part of the table are presented the volatility values based on the estimations. The first values are the squared roots of the coefficients yielding the quarterly volatility, while the last two lines represent the annualised values for volatility (quarterly standard deviation annualization factor square-root of 4).

Table 6 - Risk Analysis Results

	1926:Q1 - 2007:Q4			**1926:Q1 - 1961:Q4**			**1962:Q1 - 2007:Q4**		
	VTL	***VTL2***	***VTL3***	***VTL***	***VTL2***	***VTL3***	***VTL***	***VTL2***	***VTL3***
DM	14.885	19.029	15.421	4.45	5.969	5.086	25.998	32.963	26.426
	3.922	4.19	3.871	1.303	1.186	1.234	6.996	13.048	11.028
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.017)
RP	21.744	22.67	22.174	7.819	10.514	7.953	29.812	29.713	30.414
	3.540	2.950	3.570	1.499	2.236	1.878	5.934	4.715	6.056
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N		328			144			184	
$\overline{R}^2$	0.001	0.001	0.001	0.012	0.017	0.007	0.000	0.000	0.000
Diff	-6.858	-3.64	-6.753	-3.369	-4.544	-2.866	-3.813	3.222	-3.988
	5.286	5.129	5.266	1.986	2.672	2.252	9.174	13754	12.602
	(0.195)	(0.478)	(0.200)	(0.092)	(0.091)	(0.205)	(0.678)	(0.815)	(0.752)
	[0.194]	[0.477]	[0.1998]	[0.0899]	[0.081]	[0.203]	[0.677]	[0.814]	[0.7517]
				Volatility					
DM	3.858	4.362	3.927	2.110	2.443	2.255	5.099	5.741	5.141
RP	4.663	4.761	4.709	2.796	3.243	2.820	5.460	5.451	5.515
DM	7.716	8.724	7.854	4.219	4.886	4.510	10.198	11.483	10.281
RP	9.326	9.523	9.418	5.592	6.485	5.640	10.920	10.902	11.030