"Presidential Approval in Chile: the Macro Politics approach"

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Abstract

The study of Presidential approval has been largely studied in the States and in industrialized democracies founding strong evidence to support the hypothesis that the state of the economy and the public perceptions about the economy are strong predictors of Presidential Approval variation. Analyzing the case of Chile from 1991 to 2011 I argue that the electorate from non industrialized democracies differs from the patterns identified by previous research. I support the hypothesis that the Chilean case can be analyze as an counterfactual to the vast research in this topic.

I. Introduction

Presidential approval has been largely studied in the States (Erikson, MacKuen, & Stimson, 2002; Lewis-Beck, 1988; Mueller, 1970; Neustadt, 1966) and in industrialized democracies (Duch & Stevenson, 2008; Lewis-Beck, 1986, 1990). Researchers have written thousands of pages analyzing how the electorate evaluates their authorities. This is an important topic in American Politics since the first time that the question "Do you approve or disapprove of

the way that [president's name] is handling his job as president?" was asked in 1938 by the Gallup poll.

There exists the assumption that Presidential Approval is an important indicator of how good or bad the President is perceived and evaluated by the electorate. Following Erikson and Tedin (2010, p. 118) we can understand Presidential Approval is an important characteristic since it is considered as a measure of the President's political support. On the same line, popular Presidents can use their support in order to promote policy proposals at the Congress.

Researchers found significant evidence to explain both Presidential Approval and vote intention for incumbents by political and economic performance variables. Authors argue that Presidential Approval and the vote intention responds to variations of political events and also to variation of the macroeconomic indicators such as Inflation and Unemployment rate. They called this mechanism the Vote-Popularity (VP) function (Lewis-Beck & Paldam, 2000; Nannestad & Paldam, 1994; Paldam, 1981, 1991).

More recent research introduced the concept of "rational expectations" to the model, arguing that the electorate considers the previous political and economic performance to generate expectations about the future, and then evaluate the President (Erikson et al., 2002, p. 80). The same group of researchers argued that the electorate can behave as Peasants or Bankers; this means that they consider only their personal and current economic situation ("Peasants") or on the other hand they consider the country and future economic expectations to evaluate the President ("Bankers") (MacKuen, Erikson, & Stimson, 1992).

The vast theoretical and empirical evidence has focused on the States and Industrialized democracies. Nevertheless, should we expect to find similar results using different countries? Is it possible to identify similar patterns under different economic and political institutions? In this paper I test this paradigm focusing in a non-industrialized Latin-American country: Chile. I will identify whether the Chilean population behave as Peasants or Bankers over the past 20 years.

II. Literature Review

We identify three main schools or paradigms to explain how the electorate generates political evaluations or attitudes: Columbia, Michigan or Rochester schools (Bartels, 2010; Lau & Redlawsk, 2006). Each of these theoretical voting schools emphasized different variables to explain how people vote and how they evaluate their presidents. In this part of the paper, I summarized the theoretical models in order to identify the key variables that would explain the presidential approval.

Columbia Model

The systematic study of political behavior started more than 80 years ago, specifically by Paul Lazarsfeld at Columbia University. He and his team were pioneers using surveys to analyze the electoral behavior. According to the evidence found by them (Berelson, Lazarsfeld, & McPhee, 1954; Lazarsfeld, Berelson, & Gaudet, 1944) long-term variables, such as social class or religion are strong predictors of the people's preferences. Considering this evidence, the authors argue that political preferences and attitudes are

constant among time and is not easy for any subject change his attitude so readily, because they are constantly reinforced "by face-to-face interactions with like-minded acquaintance's" (Bartels, 2010, p. 240). Following this paradigm, we should expect that Presidential Approval be mainly driven by the socioeconomic status (SES) or religion of the respondents, rather than other variables or personal characteristics.

Michigan School

A second School or paradigm is known as the Michigan Model. Angus Campbell and Robert Kahn started their research by the end of 1940's at Michigan University. This school argues that political preferences and attitudes are forged in early life process, Party Identification being one of the most significant variables when generating political evaluations or attitudes, such as vote or the Presidential Approval. The authors also argued that identification with a political party would be stable and characterized "by a persistent adherence and resistance to contrary influence" (Campbell, Converse, Miller, & Stokes, 1960, p. 146). Following the Michigan School paradigm, we should expect that Party Identification will be the most relevant variable when evaluating the President, rather than any other individual's characteristics.

Rochester School

The third paradigm is known as Rochester or Rational Choice School. In this paradigm different researchers argue that the electorate considers different variables to generate and alter their political attitudes. This is a really important distinction with the previous two models, since we should expect that the electorate change or react to different incentives,

such as political or economic outcomes, identifying a more diverse and dynamic electorate than the one described previously by Lazarsfeld or Campbell.

The rational choice school argues that the electorate considers the state of the economy when generating political attitudes, presidential approval and elections. The two seminal and most prominent researches in this topic were made by Anthony Downs (1957) and Vladimer O. Key, Jr. (1966). Both authors argued that the electorate considers the state of the economy when generating political evaluation or voting decisions (Linn, Nagler, & Morales, 2010, p. 375).

Anthony Downs was the first to introduce spatial models of electoral competition, arguing that voters select candidates from a continuum based on their ideological proximity, tending to the center or median values. On this process, the electorate should select a candidate close to their position in this continuum, the most likely to deliver the best economic performance. This is a really important assumption, since all the previous evidence argued that the electorate only responded to long term variables, such as religion, SES or Party Identification. When considering the Downs assumptions, we define a new type of electorate who react to changes of the political parties and the candidates.

Another important contribution to this paradigm was made by V.O. Key. In his 1966 work he argued that the electorate used the elections as referenda, punishing the incumbent if they lead a bad or poor economic term, or rewarding the incumbents otherwise. Another interpretation of this process is to understand the elections as a “retrospective” evaluation of the President, a discussion that will be analyzed later. This research goes in the same

direction than the one made by Downs, supporting the hypothesis of a rational electorate, who reacts to short term variables, such as the economic performance outcomes.

All this research was not conclusive until 1971, when Gerald Kramer (1971) published "Short-Term Fluctuations in U.S. Voting Behavior, 1896-1964". He demonstrated when analyzing unemployment, inflation and income, there exists a strong positive correlation between increasing real income and the incumbent party at the congressional vote, bigger than the impact of the unemployment and inflation variations.

Another essential aspect of Kramer's research is that he focused on aggregated data rather than individuals, an important discussion in this topic. It was not until Kinder and Kiewiet (Kiewiet, 1983; Kinder & Kiewiet, 1981) that the concept of "pocketbook" or "egotropic" voting and "sociotropic" voting was introduced. Researchers wanted to test whether the electorate responds to their own personal economic conditions or to the national aggregated economy. The mechanism is straight forward: a "sociotropic" electorate will consider the aggregate economy situation when generating political preferences or evaluations or the electorate can consider their personal ("egotropic" or "pocketbooking") economic situation, rather than the aggregated national economic situation. If we follow the Downsonian theory, we should expect that the electorate would be egotropic, since they look for a candidate that improves their economic situation. But at the same time we can have a different interpretation, arguing that it is also rational to assume that the electorate would behave sociotropically, because if the country is having a good time, it is highly likely that individuals will also enjoy the benefits of the national economic growth.

The ego/sociotropic discussion is also relevant to the analysis of Presidential Approval. According to the discussion and the evidence we should expect that the electorate consider the national economic performance rather than the personal economic situation when evaluating the President. This is one of the most relevant findings to support the idea of analyzing Presidential Approval at an aggregated level rather than an individual. As Kiewiet and Rivers (1984, pp. 381-382) exemplifies the personal economic situation can be biased by individual fortune or misfortune. As an example, it is difficult that an individual blame the President if he loses his job, or on the other hand, an individual can surprisingly receive an inheritance and improve his economic situation. Both situations are not related to any macroeconomic performance or policy promoted by the incumbent, so it doesn't seem likely to punish or reward him in any of these examples.

One of the most salient work in this issue was published by Kramer (1983) who argued that personal economic conditions might have 2 problems. First, personal economic conditions are a product of governmental and non-governmental economic policies, making impossible to an average citizen to determine which portion of his income is related to the incumbent competence or not. Second, the national economic conditions are likely to be constant, not being easy to distinguish how they affect a single election. This process is known as the "Kramer's fallacy". Another literature that support this assumption was made by Page and Shapiro's (1983) portrayal of "The Rational Public" to the "miracle of aggregation"—the tendency for randomness and error at the individual level to cancel out in a large electorate (Bartels, 2010, p 249).

As mentioned before, the beginning of this discussion assumed that elections are considered as referenda. Nevertheless, a vast literature asked whether the electorate considers only the previous economic performance or do they consider future expectations, looking forward in time.

The seminal works are two competing arguments that support totally different time horizons. On one hand Downs argued that the electorate looks to improve their future economic situation, voting for the candidate or party that offers them the higher expected utility. On the other hand V.O. Key argued that the electorate punish or rewards the incumbents based on their previous economic performance.

In this discussion we find mixed results. Morris Fiorina's work (1978, 1981) followed Key's assumption of elections as referenda. This discussion leads to another also important definition: How the electorate understands the elections? In the case of retrospective evaluations the electorate behaves with no sophistication, only considering previous experience. But on the prospective voting assumption the electorate is complex and sophisticated, because they choose among expectations of future performances of the economy under the policies offered by different candidates. This means that they generate expected scenarios or outcomes according to the different candidates and parties' platforms.

Nevertheless, there is evidence supporting both behaviors: retrospective and prospective. As an example, the results of different research (Kernell, 1978; Lewis-Beck, 1988; Mueller, 1970) showed strong evidence supporting that both socio and egotropic variables have strong impacts on Presidential Approval. There is evidence that support the hypothesis

that the prospective variables are more important when there is an open seat elections and incumbents are more likely to be evaluated retrospectively (Linn et al., 2010, p. 381).

More recent research using aggregated data analyzed the impacto of subjective evaluations on Presidential Approval. MacKuen, Stimson and Erikson (1989; 1992) analyzed the consequence of economic outcomes and subjective expectations of the personal future economy, they found that "Presidential Approval is a function of electorate's collective expectations about the economic future" (1992, p.605) arguing that American electorate behave as "Bankers" because they use "rational expectations, anticipating the future economic situation, rewarding or punishing the President for economic events before they happen" (1992, p. 597). On the other hand, "Peasants" are those who would consider only the economic experience or previous performance to generate political evaluations.

The previous approach was broadly developed later by the same authors in "The Macro Polity" (Erikson et al., 2002). The Macro Polity argues that one of the substances of the presidential approval is the Presidential Competence: Economic performance. The authors identified an electorate that looks "for confidence in the future they want the President to be in charge and to seem in charge" (p.31). Another characteristics of the electorate described in the Macro Polity is that they take advantage of current information about the future to judge the President, being an electorate farsighted, rather than myopic. Finally, the authors argue that the electorate uses all the information available, respond to events and current conditions, anticipating them rather than just wait and react.

This paradigm assumes a sophisticated electorate, totally different to the one described by Columbia or Michigan Schools, and also different to the electorate that only considers their

current economic situation or nothing but the previous experience. This sophisticated electorate gathers information, analyze it and generate future possible scenarios and outcomes, and then evaluate the incumbent. This assumption is useful when considering the Chilean case, because now we have a type of electorate that might be similar or not to the Chilean.

From a comparative perspective we found studies made primarily by Duch & Stevenson (2008) and the research made by Lewis-Beck and his coauthors (Eulau & Lewis-Beck, 1985; Lewis-Beck, 1986, 1990; Lewis-Beck & Stegmaier, 2000; Paldam, 1991). Beyond the particular results of the mentioned works, the most relevant conclusion is that these researches tested the economic voting in countries different than the States, focusing primarily in European industrialized democracies, finding evidence to support the existence of the economic vote paradigm, with some minor variations.

Following the summaries made by Nannestad & Paldam (1994) and Lewis-Beck & Paldam (2000) explaining the V-P Function outcomes we should expect significant results using aggregated rather than individual data. The most important economic performance variables are the unemployment and the inflation (known as "The Big-Two"). Nevertheless, sometimes the real growth or real disposable income works better than unemployment[1] (Nannestad & Paldam, p.216). Finally, we should expect significant coefficients of both retrospective and prospective variables, with small differences on the coefficients.

Finally, the economic vote paradigm is the one that led this research, because I will analyze how the economy and the rational expectations affect the Presidential Approval. Using the

[1] A good example of this case is the research made by Shapiro and Conforto (1980)

case of Chile I will analyze whether the Chilean electorate behaves as "Peasants", considering primarily the current economic performance and perceptions, or as "Bankers", this means that they consider principally the perceptions about the future, when evaluating the Presidents. I expect to find statistically significant coefficients for all the variables that I will include on the model, nevertheless, I am skeptical about the directionality of the coefficients, since there is no previous evidence that support one or the other directionality. The only previous published research analyzing the impact of economic outcomes on elections in Chile considered the dictatorship period (Panzer & Paredes, 1991), where it is likely to assume than a significant part of the electorate was worried about factor others than the economy when voting.

The main hypotheses that lead this research are as follows:

$H_{(1)}$ Presidential Approval can be explained by the V-P function

$H_{(2)}$ Economic performance indicators have a negative direction on PA

$H_{(3)}$ The electorate behaved as Peasants rather than Bankers, this means that the coefficient of the current economic indicators and rational expectations are bigger than the rational expectation about the future.

III. Chile as a case of study

Since the return to the democracy in Chile in 1990, after almost 20 years of dictatorship, there have been 5 democratic and competitive presidential elections. As shown in Table N1, in 1989 a Christian Democrat, Patricio Aylwin, was elected with a 55% percent of the preferences. On 1992 another Christian Democrat, Eduardo Frei, who's the son of a former Chilean President 1964-1970, was elected by 58% of the preferences[2].

The following 3 presidential elections were elected on run-off since none of the candidates received the majority of the vote share on the first round. In 1999 Socialist Ricardo Lagos was elected by 51% of the preferences. On 2005 another Socialist was elected, Michelle Bachelet received a 53% of the preferences. This is the first woman elected as President in the Chilean democratic history.

The last presidential election was a change compared with the previous 20 years. For the first time in 50 years a right-wing candidate was elected as a President by a democratic election. Sebastián Piñera, who lost on the previous election against Michelle Bachelet, received 52% of the preferences. It is important to recall that direct reelection is forbidden in Chile, nevertheless, a candidate was elected from one of the 2 biggest political coalitions: the center-left-wing "Concertación", who elected 4 of the 5 Presidents. And the right-wing coalition "Alianza" elected Piñera as President.

Table N1. Chilean Presidents since return of democracy on 1989

Name	Pol. Party	Year elected	Years in Office	Vote share elected
Patricio Aylwin	Christ. Dem	1989	4	55.2 %
Eduardo Frei	Christ. Dem	1993	6	57.9%

[2] http://elecciones.gov.cl/

Ricardo Lagos	Socialist	1999	6	51.3%
Michelle Bachelet	Socialist	2005	4	53.5%
Sebastián Piñera	Ind (right-wing)	2009	4	51,6%

The Chilean case is identified as a successful democracy example in Latin America (Mainwaring & Scully, 2009) because of the strength of the political institutions and also the successful economic reforms made by the Dictatorship and promoted from the return of the democracy by the center-left political coalition. Chile has the highest UNDP Human Development Index in Latin America (.8) and ranks 44th all over the world (UNDP, 2011, p. 126). On the other hand, poverty levels has decreased dramatically from 41% in 1987 to 15% on 2009, and the GDP per capita has increased by 5 times in 20 years, from USD$2.427 in 1990 to USD$12.000 on 2010[3]. All these economic transformations make me assume that since the Chileans started enjoying the benefits of economic growth and democratic stability would make them consider these factors when generating economic and political evaluations. On the next section I describe the data I'm using and the methods to test my hypothesis.

[3] http://data.worldbank.org/country/chile

IV. The Model

According to the literature review I will follow the economic voting theory testing whether aggregated economic performance indicators, such as unemployment and inflation (called "the big-two" on the literature), and the actual and future economic perceptions explains the variation of Presidential Approval in Chile for the past 20 years.

Model:

$$Presidential\ Approval = \beta_1(lagged\ Pres.App.) + \beta_2(Actual\ economic\ perceptions) + \beta_3(Future\ economic\ perceptions) + \beta_4(Inflation) + \beta_5(Unemplouyment) + D_i(Presidents) + u_i$$

I will also include dummies variables for four of the five Presidents considered on the research. According to the literature reviewed doing this I will improve model fit because these dummies variables capture the variation among different terms.

V. Data description

In order to identify the how the economic performance and rational perceptions about the economy interacts with Presidential Approval is necessary to disentangle this relationship analyzing their interaction by parts.

I use aggregated data on Presidential Approval and the economic perceptions from a poll made by the Centro de Estudios Públicos[4]. This poll has a national representative sample and is made in person. The timing when this poll is made is variable every year. From this

[4] www.cepchile.cl

poll I am using the Presidential Approval, the Respondent's opinion toward the actual and future country economic situation. They make at least 2 polls by years, but some years they did more than 4. In a next section I will discuss the impact of the timing of each poll, analyzing the data as a Time Series.

The second group of variables is the indicators of the country economic performance: inflation and unemployment, known as the "big two" on the VP Function (Lewis-Beck & Paldam, 2000, p. 114). These variables come from the Chilean Central Bank and the Chilean Economy Ministry. The macroeconomic indicators were matched to the same month that the CEP poll was made.

The dependent variable is Presidential Approval, which is the Respondents opinion to the question: "Independently of your political position, do you approve or disapprove the way the President "JD" is handling his job?" and the answer categories are "Approve", "Disapprove" or "Do not approve or disapprove".

The rational economy perceptions are the respondent's answers to the questions: "How would you describe the country's economic situation?" and the answer categories are 1"Very bad" 2"Bad" 3"Neither good nor bad" 4 "Good" 5 "Very good"; the second variable is the respondent's answers to the question: Do you think that in 12 months the country economic situation will ...?" and the answer categories are 1 "Get worse" 2 "Won't change" 3 "Get Better". For both rational expectations variables I am registering the percentage of respondents who answered that the actual economic situation is "Good" or "Very Good". On the future rational expectation case I am registering the percentage of the respondents who said that the future economic situation will be "Better".

Dependent variable: Presidential Approval

Presidential Approval in Chile from 1991 has been highly volatile. In general we can observe "Honeymoon" evaluations, this means that the first months the evaluations get better and then start to decline over time, in three Presidents. Presidents Frei and Piñera didn't receive that kind o evaluation from the electorate; their support decreased from the firsts evaluations.

Presidential Approval has an average value of 45.7%, with a minimum of 23% and a maximum value of 77.5%. The Standard Deviation is 10.7, which imply a highly volatile value. Table N1 shows the statistics descriptive for each Chilean President since 1991.

Table N2. Presidential Approval in Chile 1991-2011

	Years in Office	Polls N	Mean	Std. Dev.	Min	Max
Aylwin	4	6	51.5%	0.0216	0.4844	0.5417
Frei	6	11	39.2%	0.0713	0.2806	0.5010
Lagos	6	11	49.4%	0.0799	0.4060	0.6066
Bachelet	4	8	50.1%	0.1403	0.3887	0.7748
Piñera	2 (of 4)	4	34.5%	0.1162	0.2300	0.4500
Total	22	40	45.7%	0.1071	0.2300	0.7748

Source: made by the author using CEP Polls. www.cepchile.cl

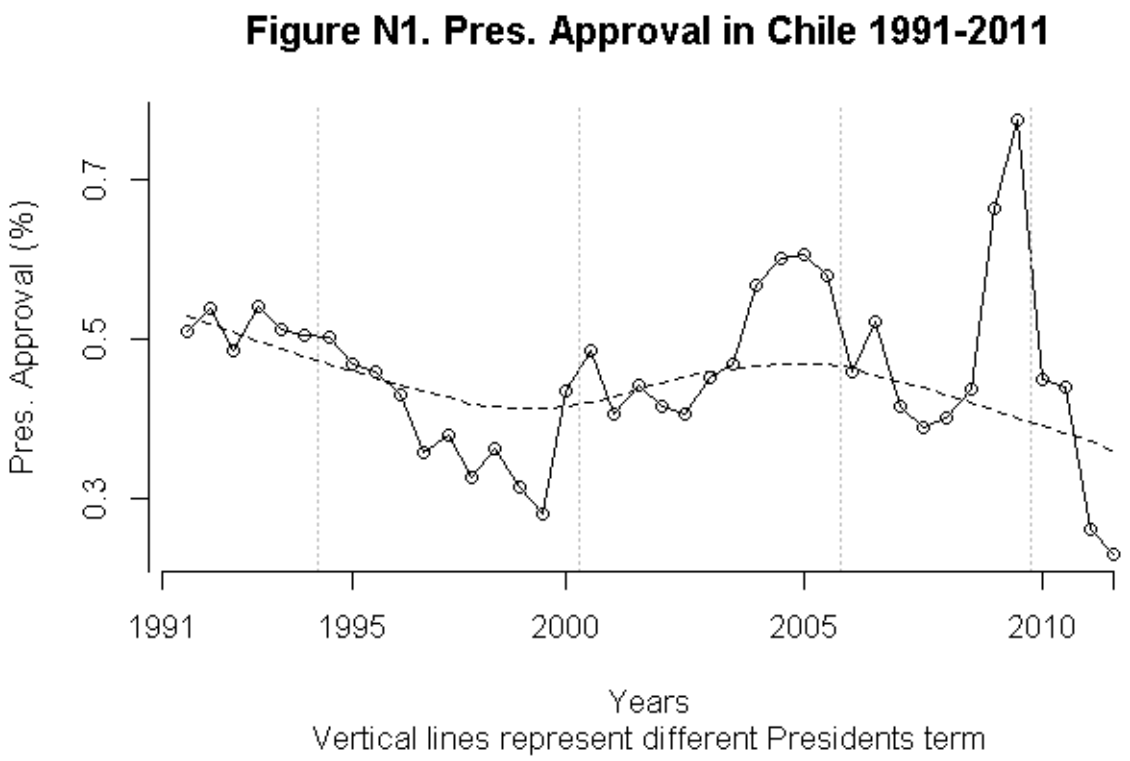


Figure N1 illustrate the Presidential Approval variation for the past 20 years. There is no information for the polls made in 1990, because they used a different question to evaluate the President. The first term, under Patricio Aylwin, Presidential Approval did not have significant variations; nevertheless we can observe a decreasing tendency. From a political perspective it is important to recall that this was the first government democratically elected after the dictatorship. The second term, under Eduardo Frei, shows a strong decreasing line, starting with a support close to the 50% and ended up about 30% of support. The third term, under Ricardo Lagos, shows a huge increase by the second half of his term. The most volatile evaluation is present on the fourth term, under Michelle Bachelet, who after having a support close to the 40% in 2006 jumped to the highest support ever seen in Chile by the end of his term, 75%. The current President lacks of

public support, starting with 45% of the public support by the second year of his administration is the President with the lowest support ever seen (23%).

Independent Variables: Perceptions about the economy

Two of the independent variables are the Respondents opinions toward "how do they evaluate the country's actual economic situation" and "how do they think the country's economic situation will be in 12 months". The answer categories for the former question are "Very bad", "Bad", "Neither bad or good", "Good" and "Very good".". On the other hand the answer categories to the latter question are "Worse", "Same" or "Better". Following Erikson et al (2002) and Duch & Stenvenson (2008) I will register the percentage of Respondents who thinks that the actual economic situation (ACTUAL) is "good" or "very good"; for the future economic situation (FUTURE) perception I will register the percentage of Respondents who thinks that will be "Better"

Table N3. Rational economic expectations

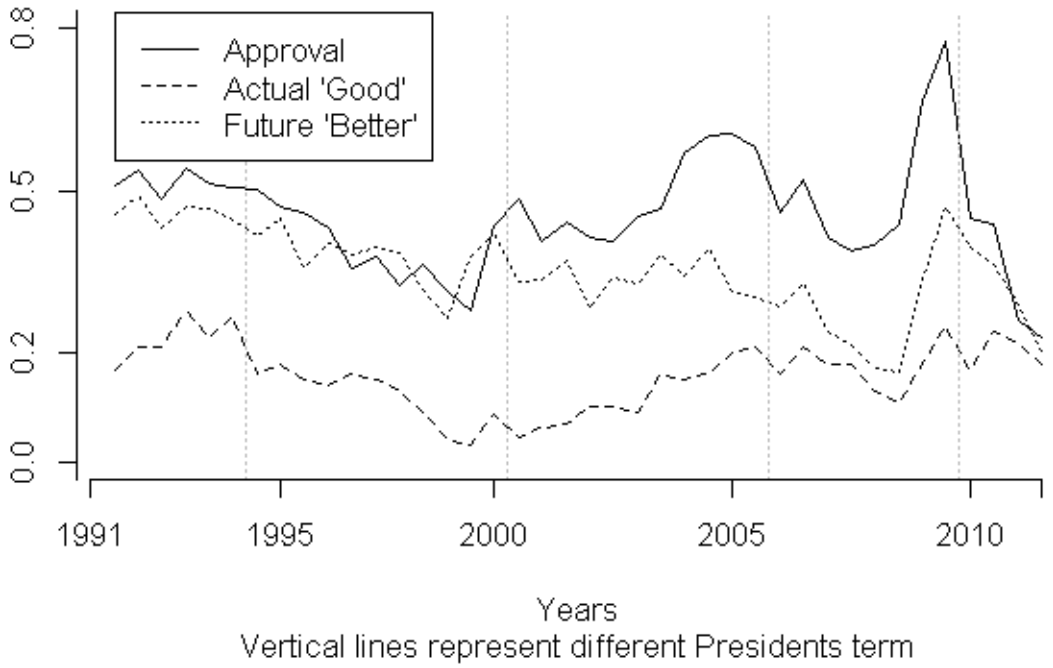
	n	Mean	Min	Max	SD
Actual	40	0.1561	0.0300	0.2800	0.0624
Future	40	0.3530	0.1661	0.4904	0.0828

Source: made by the author using CEP Polls. www.cepchile.cl

Table N3 shows the statistical descriptive of the evaluation of the actual economic situation and the rational expectation about the future. There is a more enthusiastic or optimistic perception about the future than the evaluation of the current economic situation. One third of the population expect to have better economic situation on the future, meanwhile 15% of the electorate evaluate the actual economic situation as better than the past year.

Looking on Figure N2 we can see that until the year 2000 the economic perceptions and Presidential Approval followed a similar decreasing pattern. Between the year 2000 and 2008 the perception about the future tend to decreased and not follow the Presidential Approval and the actual evaluation behavior. At 2009 suddenly all variables jumped, and decreased dramatically with the new government arrival. The lowest levels of the perceptions happened by the end of Frei government, in the middle of the Asiatic economic crisis.

Figure N2. Pres. Approval and Perceptions about the economy



Economic indicators

The other two independent variables are the country economic situation variables unemployment and inflation. The Unemployment is the rate between the employed and the labor force or people able and willing to work. The inflation is defined as the rise in the general level of prices of goods and services in an economy over a period of time. These variables are published by the Chilean Central Bank monthly. In order to synchronize these indicators with the other variables I matched the monthly indicator with the poll month.

Table N4 shows the general descriptive statistics of both economic indicators. The average value of the Inflation was about 6%, with a Standard Deviation of 5%, which implies that distribution is highly heterogeneous or disaggregated from the mean. It is important to recall that the highest level of inflation was about 25%, in the beginning of the democratic period. Figure N3 is more illustrative to see this.

The average Unemployment rate was 8%, with a minimum of 5.3% and a maximum of almost 12%. The Standard Deviation is 1.7%, which implies a distribution much more homogeneous or close to the mean than the Inflation distribution, for example.

Table N4. Economic performance indicators

	N	**Mean**	Min	Max	Std. Dev.
Inflation	40	6%	-0.0194	0.2384	0.0510
Unemployment	40	8.2%	0.0534	0.1177	0.0167

Source: made by the author using Chilean Central Bank and Economy Ministry data

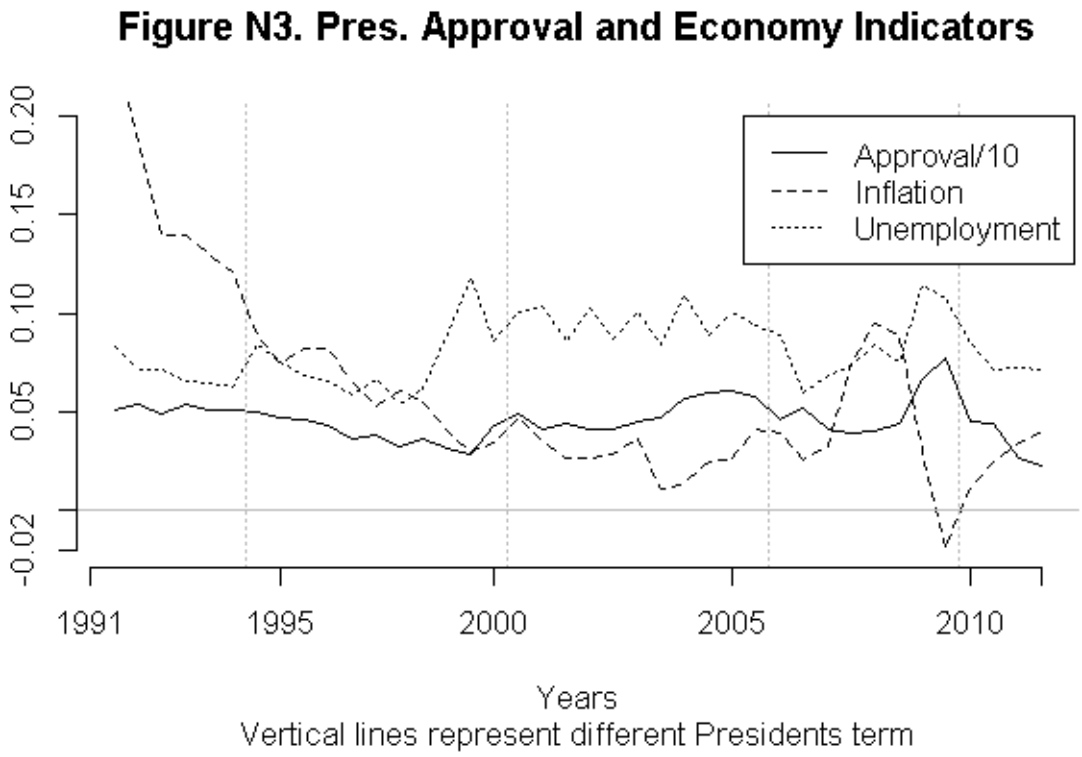


Figure N3 shows Presidential Approval and the economic indicators, Presidential Approval was divided by 10 just for graphical presentation purpose. As we can see on the figure the new democratic elected government received the country with high levels of inflation. The one decreased dramatically until 1998. On the other hand we can see how the Inflation raises from 1998 and nothing seems to happen with the Presidential Approval.

Unemployment has a similar behavior than the Presidential Approval, which is counter intuitive. According to the theory we should expect an exactly opposite change in both variables; this means that if unemployment increased we should expect a decrease in Presidential Approval. This graphical representation is particularly important to have an initial idea of the coming statistical analysis and the results we should see.

Correlation among variables

The correlation matrix is a useful resource to have a first impression of how the variables interact with each others. According to the correlation shows in Table N5, the Presidential approval is autoregressive, as expected.

Table N5. Correlations table

	Presidential Approval
Lagged P. App	0.7650*
Actual	0.4519*
Future	0.4237*
Inflation	0.0320
Unemployment	0.3356*

* Statisitcally significant <=.05

Both economic perceptions have positive and statistically significant values, also as expected. Both economic indicators do not have the expected sign. On the other hand, as we saw on the graphical representation, Unemployment rate has a positive and statistically significant coefficient, which is not as expected. We should expect a significant and negative correlation for both economic indicators, according to the theory described in the literature review.

Finally, the previous data description is the first step to analyze how the independent variables interact with Presidential Approval. In 2 out of 4 variables we got results as expected, but in the Unemployment case we got counterintuitive results, this can be a methodological error on the measurement that I did or an important finding of this

research, which would be a counterfactual to the majority of the previous published research made in the States and Europe.

VI. Statistical analysis

In order to answer the research questions and test the hypothesis I will run Ordinary Least Squares (OLS). Following Gelman & Hill (2007, pp. 31-33) discussion about using OLS models we can argue "that this is a method that summarizes how the average values of a numerical outcome variable vary over subpopulations by linear functions of predictors". OLS can be used to represent relationship between variables rather than just comparing averages outcomes. OLS "can be used to predict and outcome given a linear function of the predictors, and the coefficients can be thought of a comparisons across predicted values among averages in the data".

According to the previous description it is clear that since linearity is assumed the coefficients could predict values outside a reasonable range. It is important to have in mind the minimum and maximum values of each variable in order to make accurate interpretations. On the other hand when dealing with multiple predictors, the coefficients are complicated to interpret, because it is contingent on the other variables on the model.

Since the dataset is an aggregated time series, I will follow Erikson *et al* (2002, p. 32) indications, the first step is to identify what class of time series data are we working with. As mentioned before, this dataset could be considered as a time series with some precautions. First of all we have the timing issue; there is no constant timing between the

polls. We have two observations for each year since 1991; nevertheless, there was only one poll on years 1994 and 1998. I did test for time series data sets in order to determine that I have cointegration, avoiding spurious causality and no serial correlations problems. After running these tests we are in conditions to trust in the results of the OLS models. All the tests and results are shown on the Appendix B "Time Series".

Once I tested that I have a conintegraged varibles , showed in the Appendix B "Time Series", I am in conditions to test whether Presidential Approval is autoregressive or not. The following models analyze final model by parts and the final model integrate all the elements.

Table N6. Model N1 OLS coefficient for lagged approval over PA

	Approval
L1.approval	0.783***
	(0.191)
L2.approval	-0.183
	(0.242)
L3.approval	0.068
	(0.240)
L4.approval	-0.601**
	(0.275)
L5.approval	0.561
	(0.349)
L6.approval	-0.128
	(0.275)
Constant	0.224*
	(0.118)
Observations	34
R-squared	0.533

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

According to the results on Model N1 Presidential Approval is autoregressive, this means that part of its change or variation is explained by most recent values and/or variation AR(1). According to the literature, this is an important reason to consider the analysis of the Presidential Approval as an endogenous or lagged model. On the other hand, this is the justification to include the lagged coefficient on the final model. According to the model, for each point increasing on the lagged Presidential Approval, the current Presidential Approval increases by almost .8 points

Model N2 shows the result of regressing the economic rational expectations over the Presidential Approval. According to the literature, these two variables are the most important when explaining the Presidential Approval and also the Vote Intention (V-P Function).

Table N7. Model N2, OLS Rational expectation over Pres. Approval

	Approval
Actual	0.600**
	(0.253)
Future	0.397**
	(0.190)
Constant	0.223***
	(0.067)
Observations	40
Adjusted R-squared	0.249
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

When looking at the coefficients on Model N2, we can see that both variables are statistically significant and have positive coefficients, as expected. For every point increasing on the percentage of the population who thinks that the actual economic

condition is better than the past, the Presidential Approval increases by .6 points. On the other hand for every point increasing on the percentage of people who expect to have a better economic condition on the future the Presidential Approval increases by almost .4 points.

There is an important aspect to recall from Model N2, according to the literature review, industrialized democracies tend to behave as "Bankers" since they consider the perceptions about the future rather than the actual perceptions of the economy. In this model we can see that the coefficient for the actual economic situation is higher than the perceptions about the future economic situation, which means that the Chilean electorate tends to behave rather as "Peasants" than "Bankers". The previous finding seems to be a counterfactual to the previous evidence coming from the literature review.

The next step is to regress the economic indicators over Presidential Approval. According to the literature review Unemployment and Inflation are defined as the most important economic indicators in order to analyze the Presidential Approval variation, they are called the "big-two". According to the results from Model N3 the Inflation has no statistically significant impact on the variation of the Presidential Approval. The Unemployment has statistically significant positive coefficient, which in principle is countersense, since the literature review, and the common sense, says the Presidential Approval decreases when having bad economic performance, such as increasing unemployment or inflation.

Table N8. Model N3, OLS Economic Indicators over Pres. Approval

	Approval
Inflation	0.438
	(0.350)
Unempl	2.708**
	(1.070)
Constant	0.209**
	(0.100)
Observations	40
Adjusted R-squared	0.103

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

When reading the coefficients from Model N3 we can say that for every point increasing on the unemployment rate, the Presidential Approval increases by almost 3 points. This is a surprisingly not expected coefficient. As mentioned before, there are two alternatives explanations to this: this can be a methodological error on the measurement that I did or an important finding of this research, which would be a counterfactual to the majority of the previous published research.

The following step is to analyze all the variables together. Model N4 shows the coefficients for regressing the economic perceptions and economic indicators over Presidential Approval. According to the results all the coefficients are significant with the exception of Inflation. On the other hand, we have the expected signs for the perceptions variables, but not on the Unemployment. Model N4 has 40 observations and explains 54% of the variance of Presidential Approval.

Table N9. OLS Coefficients for different Model4 thru Model 6

	Model (4)	Model (5)	Model (6)
Actual	1.003***	0.483*	0.957***
	(0.213)	(0.267)	(0.321)
Future	0.373**	0.266*	0.564***
	(0.156)	(0.150)	(0.195)
Inflation	0.041	-0.022	0.350
	(0.266)	(0.317)	(0.483)
Unempl	3.862***	2.532***	2.301***
	(0.811)	(0.871)	(0.742)
Approval_l1		0.610***	0.179
		(0.182)	(0.178)
Aylwin			0.028
			(0.082)
Frei			0.097*
			(0.054)
Lagos			0.161***
			(0.051)
Bachelet			0.196***
			(0.042)
Constant	-0.150	-0.194**	-0.299***
	(0.093)	(0.090)	(0.094)
Observations	40	35	35
Adjusted R-squared	0.542	0.665	0.811

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

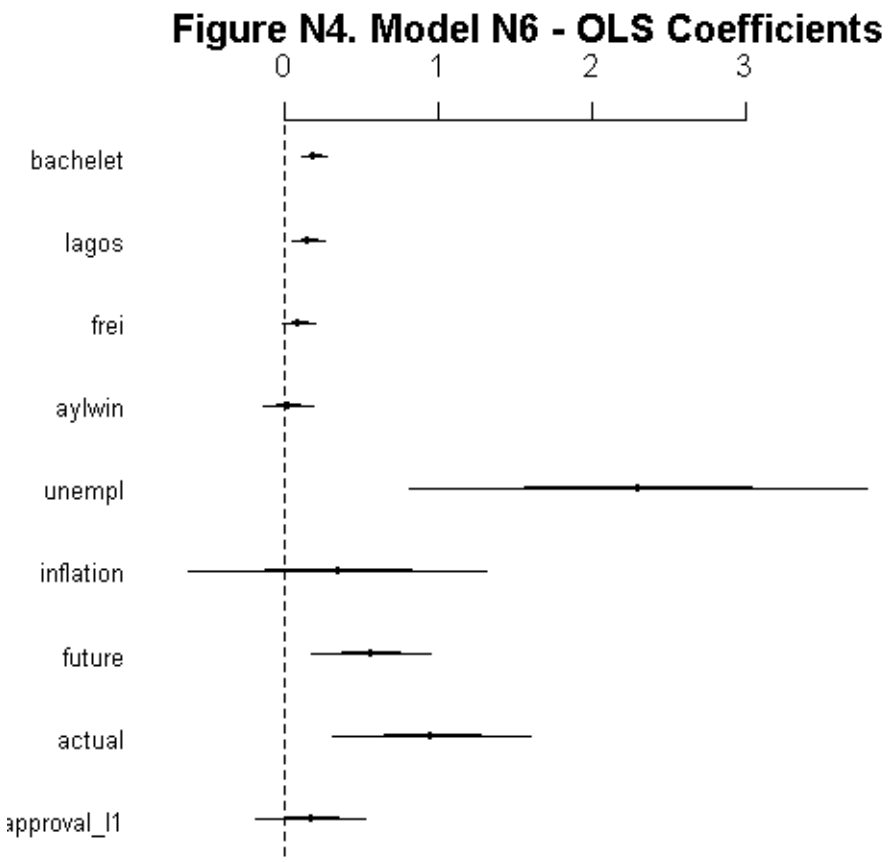
The following step is to include the lagged Presidential Approval to the model. Model N5 shows the OLS coefficients of adding the lagged Presidential Approval to the model. According to Model N5 adding the lagged coefficient of the dependent variables increases the variance explained to a 65%. It is important to notice that the final model loses 5 observations, one per each President, because I dropped the first lagged value for each President. A common mistake when analyzing lagged political indicators is to impute the

last presidential support of each President as the first lagged Presidential Approval for the next incumbent. Doing this procedure we impute somebody else's evaluation to the President, that's why the first lagged presidential support is the first evaluation made to the same incumbent.

When considering Model N5 coefficients we can see that the Actual perceptions decreases the value estimated from 1 to .483, the Future variable decreases from .373 to .266, the Unemployment coefficient decreases from 3.8 to 2.5. The change of the coefficients, compared to Model N4, implies that part of the variation of each of the included betas is absorbed by the variation of the previous Presidential support value. The estimated coefficient for the lagged Presidential Approval is .6 which implies that every point increasing on the previous Presidential Approval lead to an increase of .6 points on the current Presidential support.

The final model, Model N6, include dummies variables for the first 4 Presidents. According to the literature review doing this we should improve the fit of the model. According to the Adjusted R squared value including the dummies variables increased the model explained variance to 81%. According to the evidence reviewed on the literature review it is normal to have high R squared values using aggregating data.

Figure N4 shows graphically the estimated coefficients from Model N6. Each line represents the 95% confidence interval for each coefficient, the broader inner line shows the 50% confidence interval and the point in the middle of each line represents the estimated β or coefficient.



According to the results shown on Figure N4 we can see that the highest coefficient is for the Unemployment, according to the model, for each point increased on the rate of unemployment the Presidential Approval increases by 2.3 points. The Inflation coefficient is not distinguishable from zero. When considering the estimated coefficients of the rational expectation variables we see that for each point increasing on the parentage of public evaluating the country actual economic situation as "Good" the Presidential Approval increases by almost 1 point (.957). For every point increasing on the percentage of people who expect to have a country economic situation "Better" on the future the Presidential Approval increases by .56 points. The estimated coefficient of the lagged

Presidential Approval is not distinguishable from zero. The estimated coefficient for Aylwin President is not distinguishable from zero. Frei estimated coefficient is .097, which means that his average support was 10 percentage points higher than the first two years in office of the current President. The Lagos estimated coefficient is .16 and Bachelet almost .2.

The results of the final model show expected and not expected coefficients. The coefficients of the macroeconomic indicators are completely counter intuitive when considering all the previous published research. According to the evidence from the States and from industrialized democracies the coefficients of the "big-two" economic indicators, unemployment rate and inflation, should be statistically significant and negative. Using the Chilean case as an example from the past 20 years we can say that this is a counterfactual to the previous literature. This finding has two possible implications. First of all, as a new democracy Chile suffered from high levels of inflation when receiving the country from the dictatorship (25%). One of the main economic tasks of the first democratic government was to reduce it, and they were able to reduce it to less than the half of the original level. At the same time it is likely to assume that since Chile was returning to the democracy the public was worried about different thinks than the economy. Second, we can use the responsibility assumption described on the literature - which implies that the electorate assumes that the President is responsible of the country economic performance, and that is the reason because they punish or reward him – to argue that the Chilean electorate do not consider the state of the national economy as a responsibility of the President. An alternative explanation to this, which is not tested on this research, is that the Chilean

electorate considers the state of the national economy as a result of the international economic situation[5].

When considering the perceptions variables we can see that the coefficient of the actual perceptions are bigger than the rational expectations about the future. The literature review described evidence supporting the hypothesis that both perceptions are significant explaining Presidential Approval variation, but on the States and industrialized democracies the estimated coefficient for the "Future" expectation are bigger than the coefficients estimated for the "Actual" evaluation. That's why Erikson *et al* (2002) described the American electorate as Bankers and not Peasants, because they reward or punish the incumbent based on the rational expectations about the future, anticipating the future country economic situation.

The coefficient of the lagged Presidential Approval on the final model is also counterintuitive. The lagged Presidential Approval coefficient was significant on model N5, when not considering the President dummies, but it is no longer statistically significant on the final model. I offer two alternative explanations to this. The first alternative explanation is related to the data used in this research. That might be the case that the timing between the polls, which is not constant, affects the impact of the lagged support, since it is not the same to use a lagged observation of the past 4, 6 or even 12 months on the same model. The second alternative explanation, the one I prefer, is related to a different aspect, not tested on this research. Since the lagged coefficient of the Presidential Approval was no

[5] This is not tested on this research, but the public have been asked about who do they think is the responsible of the economic crisis on 1998 ("Asiatic crisis") and the 2010 international economic crisis and most of the electorate blame the international economic situation. Evidence from this can be found in a different Chilean poll (ADIMARK) which is made monthly and by telephone since Michelle Bachelet government. www.adimark.cl

longer significant on the model when introducing the dummies variables for each President it is likely to assume that maybe the Presidential support relies on different variables, for example the personal characteristics of the Presidents. When looking at the graphical presentation of the Presidential Approval and the independent variables over time there is no clear reason to explain, as an example, the abrupt support increase at the end of Michelle Bachelet. Researchers have shown that this change can also be explained because of her "charisma" or the public "sentimental" perceptions that they have about the incumbent (Cabezas & Navia, 2010).

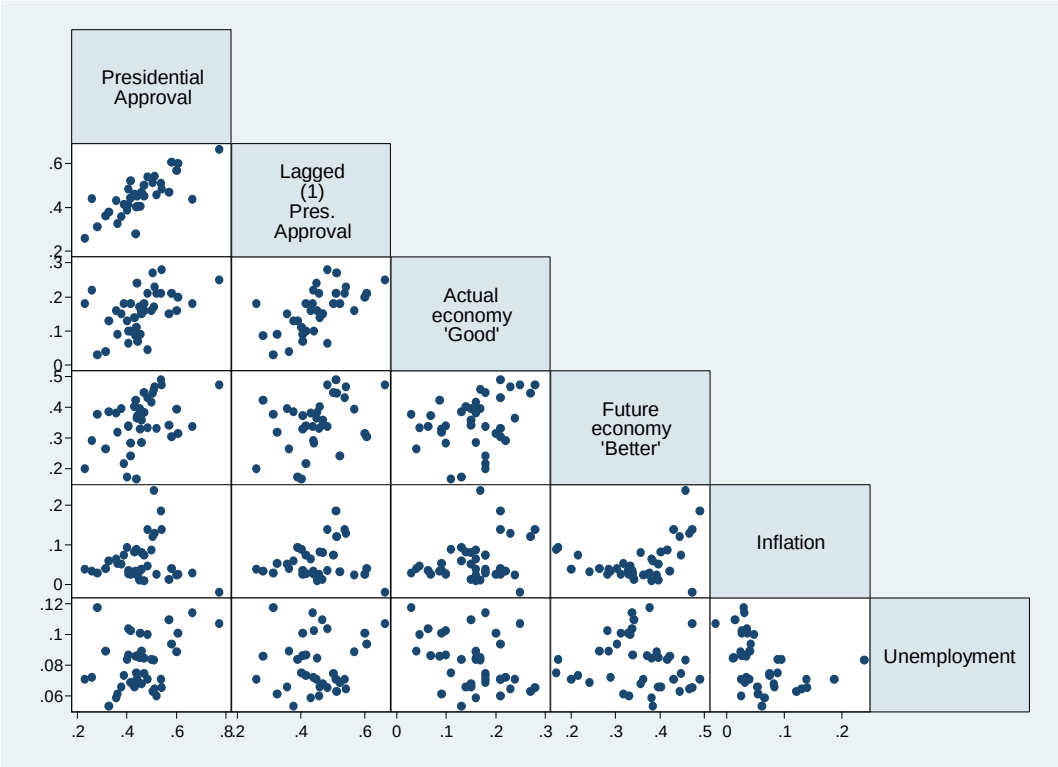
When analyzing the previous results we have enough evidence to support the hypothesis that the Chilean electorate, since the return to the democracy in 1990, behave as "Peasants" rather than "Bankers" when evaluating the President, because they consider primarily the current evaluations, rather than the rational expectations about the future. On the other hand, when considering the economic performance of the country, the Inflation has no impact and the unemployment has a significant positive coefficient. I argue that this is a counter factual to the previous research, supporting the hypothesis that when analyzing countries different than the States or other industrialized democracies, the electorate differs from the patterns from those countries.

Finally, the previous evidence let me argue that in the Chilean case, in contrast to the advanced economies and democracies from Europe and the States reviewed in by the literature, what matters to the electorate seems to be the politics rather than the economy. Following the Clinton's slogan, we should say than in the Chilean case "it's the politics stupid!"

Appendix A - Descriptive statistics

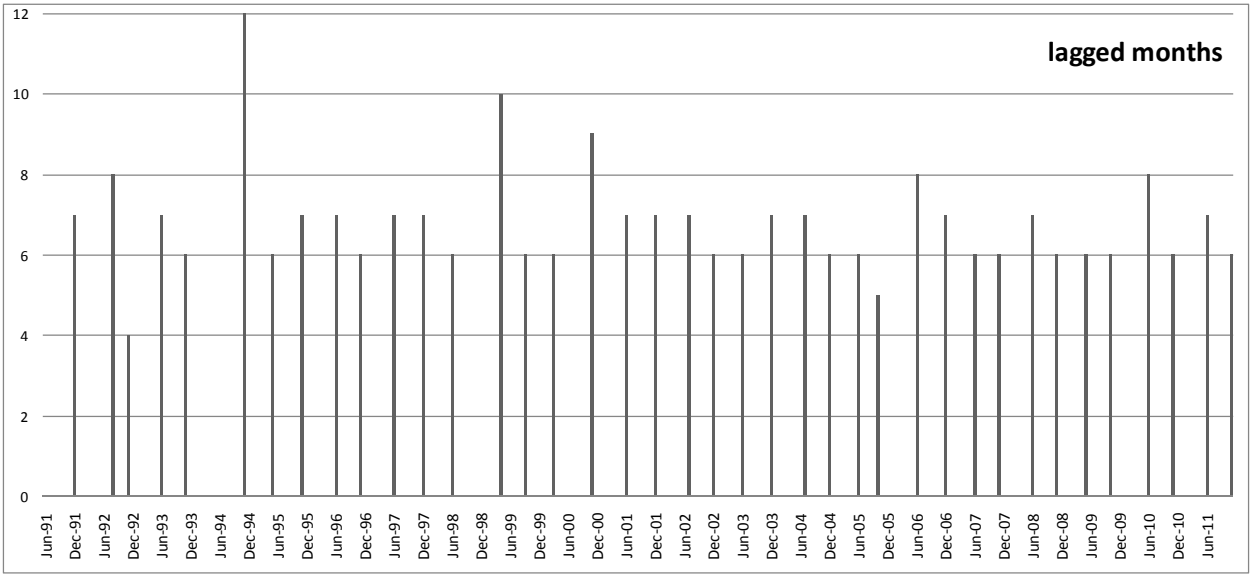
```
.
Summary statistics: mean, sd, min, max
  by categories of: presidents (Presidents)

presidents |    actual    future  inflat~n    unempl
-----------+----------------------------------------
    Aylwin |  .2283333  .4606615  .1591622  .0697891
           |  .0411906  .0207696  .0450167  .0074714
           |       .17  .4312329  .1209036  .0630128
           |       .28  .4903692  .2384671  .0835119
-----------+----------------------------------------
  Bachelet |      .175  .2772426  .0457456  .0839625
           |  .0437526  .1022576  .0381571  .0188061
           |       .11   .166113 -.0194088  .0600989
           |       .25  .4724253  .0947413  .1143086
-----------+----------------------------------------
      Frei |  .1197455  .3786423  .0603712  .0750285
           |  .0505719  .0513488  .0202695  .0183387
           |       .03  .2631229  .0293848    .05342
           |       .18  .4477711   .088552  .1177861
-----------+----------------------------------------
     Lagos |  .1225909  .3384022  .0287673  .0963066
           |  .0561212   .033581  .0108549  .0085251
           |     .0459     .2819  .0107277  .0845266
           |       .21  .3932136  .0468418  .1098662
-----------+----------------------------------------
    Pinera |     .2025  .3123741  .0274709    .07475
           |  .0330404  .0870525  .0121841  .0068496
           |       .17        .2  .0116444      .071
           |       .24  .3959866   .039281      .085
-----------+----------------------------------------
     Total |  .1561425  .3529724  .0602836   .081853
           |  .0624077  .0827988   .051051  .0167227
           |       .03   .166113 -.0194088    .05342
           |       .28  .4903692  .2384671  .1177861
--------------------------------------------------

.
```

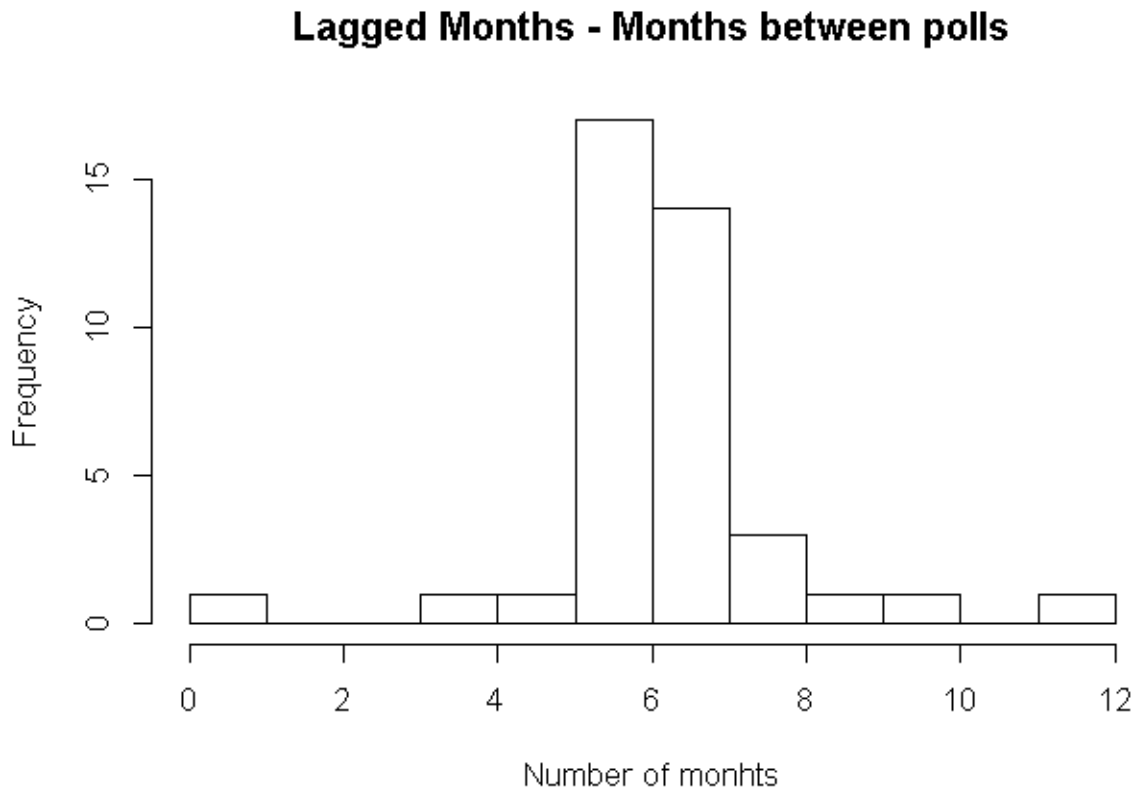
```
 pwcorr approval approval_l1 actual future inflation unempl, sig star(.05)
obs

             | approval approv~1   actual   future inflat~n   unempl
-------------+------------------------------------------------------
    approval |   1.0000
             |       40
             |
 approval_l1 |   0.7650*  1.0000
             |   0.0000
             |       35       35
      actual |   0.4519*  0.6024*  1.0000
             |   0.0034   0.0001
             |       40       35       40
      future |   0.4237*  0.3662*  0.3344*  1.0000
             |   0.0064   0.0305   0.0350
             |       40       35       40       40
   inflation |   0.0320   0.0853   0.2801   0.3484*  1.0000
             |   0.8447   0.6261   0.0800   0.0276
             |       40       35       40       40       40
      unempl |   0.3356*  0.1234  -0.3887* -0.1103  -0.4176*  1.0000
             |   0.0342   0.4801   0.0132   0.4981   0.0073
             |       40       35       40       40       40       40
```



Appendix B – Time Series

Timing among polls: as shown on the following two figures the timing between polls is not constant. In general we have one semester between each measure, but in some cases we do have one year and on other 4. This mechanism might be affecting the lag coefficient, since the previous evaluation 6 months ago seems to be more important than the one 9, 10 or 10 months ago.




Lagged Months - Months between polls
Frequency
0
5
10
15
0
2
4
6
8
10
12
Number of monhts

Time series test

I examine for non-stationary using the Unit Root (Dickey-Fuller) Test for each variable in the model. Additionally, I examine the Durbin Watson to test for serial correlation of each variable.

For N=39 and K=1, the dL=1.43 and dU=1.54 at the 0.05 level of significance. Since the Durbin Watson d-statistic of approval (1.73), actual (2.33), future (1.80) and unemployment (2.11) are larger than the upper limit; I cannot reject the null hypothesis of no serial correlation. However, the DW of inflation (1.45) falls in the uncertainty area, close to the lower limit. Consequently, I could reject the null hypothesis of no serial correlation.

The Dickey-Fuller test (DF) critical value for N=39at the 0.05 level of significance is -2.961. Only in the case of unemployment I can reject the null hypothesis that there is unit root, inferring stationarity since the t-value |-3.27| is larger than the critical value. However, I fail to reject the null hypothesis in the case of lagged approval |-2.40|, actual |-2.26|, future |-2.40|. Finally, even when inflation has a DF of |-4.47|, I will examine this variable again because it seems to have problems of serial correlation according to the previous analysis.

I test again for non-stationarity including the trend in the analysis. In this case, I get similar results compared with the previous step. For N=39 and K=2, the dL=1.38 and dU=1.60 at the 0.05 level of significance. The Durbin Watson d-statistic of approval (1.74), actual (2.33) and, future (1.71) are larger than the upper limit; thus I cannot reject the null hypothesis of no serial correlation. However, DW of inflation (1.42) falls in the uncertainty are and close to the lower limit. That means it could reject the null hypothesis of no serial correlation.

The Dickey-Fuller test (DF) critical value for N=39 and K=2 at the 0.05 level of significance is |-3.544|. Thus I fail to reject the null hypothesis that there is a unit root in the case of approval |-2.33|, actual |-2.24| and, inflation |-2.03|. The DF of future |-3.42 | is larger than the 10% critical value |-3.20|.

Finally, I test non-stationarity for these variables using the Augmented Unit Root (Dickey-Fuller) Test. For DW test and N=38 and K=3, the dL=1.32 and dU=1.66 at the 0.05 level of significance. Therefore, I cannot to reject the null hypothesis of no serial correlation in the case of approval (2.05), actual (1.98), future (2.06) and, inflation (1.69), which mean I can infer no serial correlation for the all variables.

The Dickey-Fuller test (DF) critical value for N=38 and K=2 at the 0.05 level of significance is |-3.548|. In this part, I can reject the null hypothesis that there is a unit root in the case of future |-3.76|, inferring stationarity; meanwhile, I cannot to reject the null hypothesis for approval |-2.60|, actual |-1.62| and, inflation |-3.19|.

Considering that some of the variables have unit roots, I test the residuals for co-integration. For N=39 and K=1, the dL=1.43 and dU=1.54 at the 0.05 level of significance. Since The DW d-statistic is 1.97, I fail to reject the null hypothesis of no serial correlation. On the other hand, the t-value of the lagged residuals is |-5.85|, which is larger than the DF critical value |-2.961| at the 0.05 level of significance. Consequently, I can reject the null hypothesis that there is a unit root, inferring stationarity.

Adding a trend and the lagged term representing the difference in the residuals I obtain the same conclusion. Consequently, the residuals are stationary. Considering that variables are co-integrated, I estimate an OLS model to conduct the time series analysis.

Time series test - Output

```
. tsset id
        time variable:  id, 1 to 40
                delta:  1 unit

. gen diff_app=approval-L1.approval
(1 missing value generated)

. reg diff_app L1.approval

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =    5.76
       Model |  .041046814     1  .041046814           Prob > F      =  0.0215
    Residual |  .263466848    37  .007120726           R-squared     =  0.1348
-------------+------------------------------           Adj R-squared =  0.1114
       Total |  .304513662    38  .008013517           Root MSE      =  .08438

------------------------------------------------------------------------------
    diff_app |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.3223747   .1342714    -2.40   0.021    -.5944343   -.0503151
             |
       _cons |   .1419589   .0635696     2.23   0.032     .0131546    .2707631
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  2,    39) =  1.731544

. dfuller approval, reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.401            -3.655            -2.961            -2.613
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.1415

------------------------------------------------------------------------------
  D.approval |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.3223747   .1342714    -2.40   0.021    -.5944343   -.0503151
             |
       _cons |   .1419589   .0635696     2.23   0.032     .0131546    .2707631
------------------------------------------------------------------------------

.
```

```
. *actual
. gen diff_actual=actual-L1.actual
(1 missing value generated)

. reg diff_actual L1.actual

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =    5.12
       Model |  .009026813     1  .009026813           Prob > F      =  0.0297
    Residual |  .065274884    37  .001764186           R-squared     =  0.1215
-------------+------------------------------           Adj R-squared =  0.0977
       Total |  .074301697    38  .001955308           Root MSE      =    .042

------------------------------------------------------------------------------
 diff_actual |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.2442489   .1079786    -2.26   0.030    -.4630343   -.0254635
             |
       _cons |   .0382446   .0180907     2.11   0.041     .0015894    .0748999
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  2,    39) =  2.334466

. dfuller actual, reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.262            -3.655            -2.961            -2.613
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.1845

------------------------------------------------------------------------------
    D.actual |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.2442489   .1079786    -2.26   0.030    -.4630343   -.0254635
             |
       _cons |   .0382446   .0180907     2.11   0.041     .0015894    .0748999
------------------------------------------------------------------------------

.
```

```
. *future
. gen diff_future=future-L1.future
(1 missing value generated)

. reg diff_future L1.future

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =    5.77
       Model |  .021015085     1  .021015085           Prob > F      =  0.0214
    Residual |   .13468057    37  .003640015           R-squared     =  0.1350
-------------+------------------------------           Adj R-squared =  0.1116
       Total |  .155695655    38  .004097254           Root MSE      =  .06033

------------------------------------------------------------------------------
 diff_future |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.2938548   .1222978    -2.40   0.021    -.5416538   -.0460558
             |
       _cons |   .0982573   .0447039     2.20   0.034     .0076787    .1888359
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  2,    39) =  1.807515

. dfuller future, reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.403            -3.655            -2.961            -2.613
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.1410

------------------------------------------------------------------------------
    D.future |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.2938548   .1222978    -2.40   0.021    -.5416538   -.0460558
             |
       _cons |   .0982573   .0447039     2.20   0.034     .0076787    .1888359
------------------------------------------------------------------------------


. *inflation
. gen diff_inflation=inflation-L1.inflation
(1 missing value generated)

. reg diff_inflation L1.inflation

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =   19.77
       Model |  .006046608     1  .006046608           Prob > F      =  0.0001
    Residual |  .011313694    37  .000305776           R-squared     =  0.3483
-------------+------------------------------           Adj R-squared =  0.3307
       Total |  .017360302    38   .00045685           Root MSE      =  .01749

------------------------------------------------------------------------------
diff_infla~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
   inflation |
         L1. |   -.244449    .054971    -4.45   0.000    -.3558309   -.1330672
             |
       _cons |   .0097606   .0043611     2.24   0.031     .0009242     .018597
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  2,    39) =  1.450548

. dfuller inflation, reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -4.447            -3.655            -2.961            -2.613
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0002

------------------------------------------------------------------------------
 D.inflation |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   inflation |
         L1. |   -.244449    .054971    -4.45   0.000    -.3558309   -.1330672
             |
       _cons |   .0097606   .0043611     2.24   0.031     .0009242     .018597
------------------------------------------------------------------------------

.
. *unempl
. gen diff_unempl=unempl-L1.unempl
(1 missing value generated)

. reg diff_unempl L1.unempl

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =   10.69
       Model |  .002221088     1  .002221088           Prob > F      =  0.0023
    Residual |  .007685774    37  .000207724           R-squared     =  0.2242
-------------+------------------------------           Adj R-squared =  0.2032
       Total |  .009906862    38  .000260707           Root MSE      =  .01441

------------------------------------------------------------------------------
 diff_unempl |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      unempl |
         L1. |  -.4537983   .1387788    -3.27   0.002    -.7349908   -.1726058
             |
       _cons |   .0369502   .0116294     3.18   0.003     .0133869    .0605136
------------------------------------------------------------------------------
```

```
. dwstat

Durbin-Watson d-statistic(  2,    39) =  2.118538

. dfuller unempl, reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.270            -3.655            -2.961            -2.613
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0163

------------------------------------------------------------------------------
    D.unempl |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      unempl |
         L1. |  -.4537983   .1387788    -3.27   0.002    -.7349908   -.1726058
             |
       _cons |   .0369502   .0116294     3.18   0.003     .0133869    .0605136
------------------------------------------------------------------------------

.
. *Unit root, adding trend (time)
. *approval trend
. reg diff_app L1.approval id

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  2,    36) =    2.88
       Model |  .042023607     2  .021011803           Prob > F      =  0.0690
    Residual |  .262490055    36   .00729139           R-squared     =  0.1380
-------------+------------------------------           Adj R-squared =  0.0901
       Total |  .304513662    38  .008013517           Root MSE      =  .08539

------------------------------------------------------------------------------
    diff_app |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.3178685   .1364275    -2.33   0.026    -.5945564   -.0411806
             |
          id |  -.0004465   .0012199    -0.37   0.716    -.0029205    .0020275
       _cons |   .1492505   .0673411     2.22   0.033     .0126763    .2858247
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  3,    39) =  1.744939

. dfuller approval, trend reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.330            -4.251            -3.544            -3.206
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.4175
```

```
------------------------------------------------------------------------------
D.approval   |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.3178685   .1364275    -2.33   0.026    -.5945564   -.0411806
       _trend |  -.0004465   .0012199    -0.37   0.716    -.0029205    .0020275
        _cons |    .148804   .0669904     2.22   0.033     .0129412    .2846668
------------------------------------------------------------------------------

.
. *actual trend
. reg diff_actual L1.actual id

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  2,    36) =    2.54
       Model |  .009190518     2  .004595259           Prob > F      =  0.0929
    Residual |  .065111179    36  .001808644           R-squared     =  0.1237
-------------+------------------------------           Adj R-squared =  0.0750
       Total |  .074301697    38  .001955308           Root MSE      =  .04253

------------------------------------------------------------------------------
 diff_actual |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.2449621   .1093563    -2.24   0.031    -.4667471   -.0231772
             |
          id |   .0001821   .0006052     0.30   0.765    -.0010454    .0014095
       _cons |   .0345318   .0220867     1.56   0.127     -.010262    .0793256
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  3,    39) =  2.338978

. dfuller actual, trend reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                             ---------- Interpolated Dickey-Fuller ---------
                Test         1% Critical       5% Critical      10% Critical
              Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -2.240           -4.251           -3.544            -3.206
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.4674

------------------------------------------------------------------------------
D.actual     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.2449621   .1093563    -2.24   0.031    -.4667471   -.0231772
       _trend |   .0001821   .0006052     0.30   0.765    -.0010454    .0014095
        _cons |   .0347139   .0217543     1.60   0.119    -.0094058    .0788336
------------------------------------------------------------------------------

.
. *future trend
. reg diff_future L1.future id

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  2,    36) =    5.88
       Model |   .03834123     2  .019170615           Prob > F      =  0.0062
    Residual |  .117354425    36  .003259845           R-squared     =  0.2463
```

```
-------------+----------------------------           Adj R-squared =  0.2044
       Total |  .155695655    38  .004097254           Root MSE      =   .0571

------------------------------------------------------------------------------
 diff_future |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.5042176    .147379    -3.42   0.002    -.8031162    -.205319
             |
          id |  -.0023848   .0010344    -2.31   0.027    -.0044828   -.0002869
       _cons |   .2234161   .0688257     3.25   0.003     .0838312     .363001
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  3,    39) =  1.714077

. dfuller future, trend reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                             ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.421            -4.251            -3.544            -3.206
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0486

------------------------------------------------------------------------------
D.future     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.5042176    .147379    -3.42   0.002    -.8031162    -.205319
      _trend |  -.0023848   .0010344    -2.31   0.027    -.0044828   -.0002869
       _cons |   .2210313   .0680127     3.25   0.003     .0830952    .3589674
------------------------------------------------------------------------------

.
. *trend inflation
. reg diff_inflation L1.inflation id

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  2,    36) =   10.01
       Model |  .006205789     2  .003102894           Prob > F      =  0.0003
    Residual |  .011154513    36  .000309848           R-squared     =  0.3575
-------------+------------------------------           Adj R-squared =  0.3218
       Total |  .017360302    38   .00045685           Root MSE      =   .0176

------------------------------------------------------------------------------
diff_infla~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   inflation |
         L1. |  -.2824978   .0766813    -3.68   0.001    -.4380147   -.1269808
             |
          id |  -.0002488   .0003471    -0.72   0.478    -.0009526    .0004551
       _cons |   .0172986   .0113963     1.52   0.138    -.0058142    .0404113
------------------------------------------------------------------------------
```

```
. dwstat

Durbin-Watson d-statistic(  3,    39) =  1.423227

. dfuller inflation, trend reg

Dickey-Fuller test for unit root                   Number of obs   =        39

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -3.684            -4.251            -3.544            -3.206
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0234

------------------------------------------------------------------------------
D.inflation  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   inflation |
         L1. |  -.2824978   .0766813    -3.68   0.001    -.4380147   -.1269808
       _trend |  -.0002488   .0003471    -0.72   0.478    -.0009526    .0004551
        _cons |   .0170498   .0110768     1.54   0.132     -.005415    .0395147
------------------------------------------------------------------------------

.
. *Augmented DF - IV gen lagg diff
. gen lag_diff=diff_app[_n-1]
(2 missing values generated)

. reg diff_app L1.approval id lag_diff

      Source |       SS       df       MS              Number of obs =      38
-------------+------------------------------           F(  3,    34) =    2.35
       Model |  .052071798     3  .017357266           Prob > F      =  0.0897
    Residual |  .251131917    34  .007386233           R-squared     =  0.1717
-------------+------------------------------           Adj R-squared =  0.0987
       Total |  .303203715    37  .008194695           Root MSE      =  .08594

------------------------------------------------------------------------------
    diff_app |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.4180996   .1607649    -2.60   0.014    -.7448132    -.091386
             |
          id |  -.0000226    .001297    -0.02   0.986    -.0026583    .0026132
    lag_diff |    .204879   .1820875     1.13   0.268    -.1651673    .5749253
       _cons |   .1866149   .0762055     2.45   0.020     .0317466    .3414832
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  4,    38) =  2.045154

. dfuller approval, lags(1) trend regress

Augmented Dickey-Fuller test for unit root         Number of obs   =        38

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)             -2.601            -4.260            -3.548            -3.209
```

```
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2796

------------------------------------------------------------------------------
D.approval   |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    approval |
         L1. |  -.4180996   .1607649    -2.60   0.014    -.7448132    -.091386
         LD. |    .204879   .1820875     1.13   0.268    -.1651673    .5749253
       _trend |  -.0000226    .001297    -0.02   0.986    -.0026583    .0026132
        _cons |   .1865923   .0759732     2.46   0.019     .0321963    .3409884
------------------------------------------------------------------------------

.
. *actual
. gen lag_diffactual=diff_actual[_n-1]
(2 missing values generated)

. reg diff_actual L1.actual id lag_diffactual

      Source |       SS       df       MS              Number of obs =      38
-------------+------------------------------           F(  3,    34) =    2.75
       Model |  .014184396     3  .004728132           Prob > F      =  0.0579
    Residual |  .058496181    34  .001720476           R-squared     =  0.1952
-------------+------------------------------           Adj R-squared =  0.1241
       Total |  .072680578    37   .00196434           Root MSE      =  .04148

------------------------------------------------------------------------------
 diff_actual |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.1854934   .1146653    -1.62   0.115    -.4185212    .0475345
             |
          id |   .0004573   .0006158     0.74   0.463    -.0007941    .0017088
lag_diffac~l |  -.2587191   .1658782    -1.56   0.128    -.5958242    .0783861
       _cons |   .0184974   .0230787     0.80   0.428    -.0284043     .065399
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  4,    38) =  1.967584

. dfuller actual, lags(1) trend regress

Augmented Dickey-Fuller test for unit root         Number of obs   =        38

                              ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -1.618            -4.260            -3.548            -3.209
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.7854

------------------------------------------------------------------------------
D.actual     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |
         L1. |  -.1854934   .1146653    -1.62   0.115    -.4185212    .0475345
         LD. |  -.2587191   .1658782    -1.56   0.128    -.5958242    .0783861
       _trend |   .0004573   .0006158     0.74   0.463    -.0007941    .0017088
        _cons |   .0189547   .0227328     0.83   0.410    -.0272438    .0651532
------------------------------------------------------------------------------
```

```
.
. *future
. gen lag_difffuture=diff_future[_n-1]
(2 missing values generated)

. reg diff_future L1.future id lag_difffuture

      Source |       SS       df       MS              Number of obs =      38
-------------+------------------------------           F(  3,    34) =    4.80
       Model |  .045852247     3  .015284082           Prob > F      =  0.0068
    Residual |  .108291448    34  .003185043           R-squared     =  0.2975
-------------+------------------------------           Adj R-squared =  0.2355
       Total |  .154143695    37  .004166046           Root MSE      =  .05644

------------------------------------------------------------------------------
 diff_future |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.6330794   .1681583    -3.76   0.001    -.9748182   -.2913406
             |
          id |  -.0027805    .001109    -2.51   0.017    -.0050343   -.0005267
lag_difffu~e |    .247626   .1688553     1.47   0.152    -.0955292    .5907813
       _cons |    .277491   .0782728     3.55   0.001     .1184215    .4365604
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  4,    38) =  2.055157

. dfuller future, lags(1) trend regress

Augmented Dickey-Fuller test for unit root         Number of obs   =        38

                             ---------- Interpolated Dickey-Fuller ---------
                Test         1% Critical       5% Critical      10% Critical
              Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -3.765            -4.260            -3.548            -3.209
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0184

------------------------------------------------------------------------------
D.future     |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      future |
         L1. |  -.6330794   .1681583    -3.76   0.001    -.9748182   -.2913406
         LD. |    .247626   .1688553     1.47   0.152    -.0955292    .5907813
      _trend |  -.0027805    .001109    -2.51   0.017    -.0050343   -.0005267
       _cons |   .2747105   .0773788     3.55   0.001     .1174579    .4319631
------------------------------------------------------------------------------

.
. *inflation
. gen lag_diffinflation=diff_inflation[_n-1]
(2 missing values generated)
```

```
. reg diff_inflation L1.inflation id lag_diffinflation

      Source |       SS       df       MS              Number of obs =      38
-------------+------------------------------           F(  3,    34) =    5.96
       Model |  .005208989     3   .00173633           Prob > F      =  0.0022
    Residual |  .009905395    34  .000291335           R-squared     =  0.3446
-------------+------------------------------           Adj R-squared =  0.2868
       Total |  .015114384    37  .000408497           Root MSE      =  .01707

------------------------------------------------------------------------------
diff_infla~n |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   inflation |
         L1. |  -.2820098   .0885005    -3.19   0.003    -.4618645   -.1021552
             |
          id |  -.0004369    .000356    -1.23   0.228    -.0011604    .0002865
lag_diffin~n |   .2849766   .1377785     2.07   0.046      .004977    .5649762
       _cons |   .0228829   .0120334     1.90   0.066    -.0015719    .0473377
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  4,    38) =  1.686171

. dfuller inflation, lags(1) trend regress

Augmented Dickey-Fuller test for unit root         Number of obs   =        38

                             ---------- Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)            -3.187            -4.260            -3.548           -3.209
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0871

------------------------------------------------------------------------------
D.inflation  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   inflation |
         L1. |  -.2820098   .0885005    -3.19   0.003    -.4618645   -.1021552
         LD. |   .2849766   .1377785     2.07   0.046      .004977    .5649762
      _trend |  -.0004369    .000356    -1.23   0.228    -.0011604    .0002865
       _cons |    .022446    .011705     1.92   0.064    -.0013416    .0462335
------------------------------------------------------------------------------

.
. *Test for cointegration
. reg approval actual future inflation unempl aylwin frei lagos bachelet

      Source |       SS       df       MS              Number of obs =      40
-------------+------------------------------           F(  8,    31) =   18.79
       Model |  .371182419     8  .046397802           Prob > F      =  0.0000
    Residual |  .076541889    31  .002469093           R-squared     =  0.8290
-------------+------------------------------           Adj R-squared =  0.7849
       Total |  .447724308    39   .01148011           Root MSE      =  .04969

------------------------------------------------------------------------------
    approval |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      actual |   1.008301   .2130529     4.73   0.000     .5737766    1.442825
      future |   .7203885   .1684829     4.28   0.000     .3767653    1.064012
   inflation |   .4573417   .3462582     1.32   0.196    -.2488565     1.16354
```

```
      unempl |   2.378116   .6782519     3.51   0.001     .9948124     3.76142
      aylwin |  -.0111427   .0663543    -0.17   0.868    -.1464733    .1241878
        frei |    .066895   .0400213     1.67   0.105    -.0147289    .1485189
       lagos |   .1585345   .0342882     4.62   0.000     .0886033    .2284656
    bachelet |   .1854115   .0318355     5.82   0.000     .1204826    .2503405
       _cons |  -.2745394   .0820366    -3.35   0.002    -.4418542   -.1072246
------------------------------------------------------------------------------

. predict z, resid

. gen z_lag=z[_n-1]
(1 missing value generated)

. gen z_diff=z-z_lag
(1 missing value generated)

.
. reg z_diff z_lag

      Source |       SS       df       MS              Number of obs =      39
-------------+------------------------------           F(  1,    37) =   34.23
       Model |  .070532592     1  .070532592           Prob > F      =  0.0000
    Residual |  .076236724    37  .002060452           R-squared     =  0.4806
-------------+------------------------------           Adj R-squared =  0.4665
       Total |  .146769316    38   .00386235           Root MSE      =  .04539

------------------------------------------------------------------------------
      z_diff |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       z_lag |  -.9603387   .1641386    -5.85   0.000    -1.292915   -.6277623
       _cons |   .0003363   .0072686     0.05   0.963    -.0143914    .0150639
------------------------------------------------------------------------------

. dwstat

Durbin-Watson d-statistic(  2,    39) =  1.974021

.
. *the variables are cointegrated, then I can estimate the OLS coefficients
. reg approval approval_l1 actual future inflation unempl aylwin frei lagos bachelet

      Source |       SS       df       MS              Number of obs =      35
-------------+------------------------------           F(  9,    25) =   17.22
       Model |  .380360816     9  .042262313           Prob > F      =  0.0000
    Residual |  .061364708    25  .002454588           R-squared     =  0.8611
-------------+------------------------------           Adj R-squared =  0.8111
       Total |  .441725524    34  .012991927           Root MSE      =  .04954

------------------------------------------------------------------------------
    approval |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 approval_l1 |   .1789335   .1775853     1.01   0.323    -.1868103    .5446772
      actual |   .9567305   .3206681     2.98   0.006     .2963022    1.617159
      future |    .563873   .1950703     2.89   0.008     .1621181    .9656279
   inflation |    .349988   .4829582     0.72   0.475    -.6446831    1.344659
      unempl |   2.300919   .7424772     3.10   0.005     .7717587     3.83008
      aylwin |   .0282846   .0815069     0.35   0.731     -.139582    .1961512
        frei |   .0974624   .0536153     1.82   0.081    -.0129604    .2078851
       lagos |   .1605307   .0509585     3.15   0.004     .0555797    .2654817
    bachelet |   .1963684   .0415817     4.72   0.000     .1107291    .2820076
       _cons |  -.2987104   .0944078    -3.16   0.004    -.4931469    -.104274
------------------------------------------------------------------------------
```

```
. durbina

Number of gaps in sample:  4

Durbin's alternative test for autocorrelation
------------------------------------------------------------------------------
    lags(p)  |          chi2               df                 Prob > chi2
-------------+----------------------------------------------------------------
       1     |          0.395               1                   0.5299
------------------------------------------------------------------------------
                        H0: no serial correlation

. durbina, robust

Number of gaps in sample:  4

Durbin's alternative test for autocorrelation
------------------------------------------------------------------------------
    lags(p)  |          F                  df                 Prob > F
-------------+----------------------------------------------------------------
       1     |        0.389           (  1,   24 )              0.5386
------------------------------------------------------------------------------
                        H0: no serial correlation

. bgodfrey

Number of gaps in sample:  4

Breusch-Godfrey LM test for autocorrelation
------------------------------------------------------------------------------
    lags(p)  |          chi2               df                 Prob > chi2
-------------+----------------------------------------------------------------
       1     |          0.566               1                   0.4518
------------------------------------------------------------------------------
                        H0: no serial correlation

.
end of do-file

.
```

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