

Political budget cycles in Latin America: fiscal policy
effectiveness or regulated markets?

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Para Ma, Pa y mi pequeña Elena

Abstract

Within the Political Budget Cycle theory (PBC), it is well known that reelection-seeking incumbents have incentives to manipulate economic outcomes through fiscal policy. However, there is no research to assess the conditions under which manipulating taxes and spending *effectively* serve those interests of political survival. In our first chapter, we argue that the incentives to do so will depend on the extent to which output can be effectively affected in the short-run. Our theory suggests that politicians follow such strategy with different degrees of information, and shows why some incumbent presidents have been more successful in manipulating the fiscal policy than others using a sample of 13 Latin American countries between 1980 and 2005.

Our second chapter estimates the macroeconomic effects of exogenous fiscal policy shocks with a three variable Structural Vector Autoregression (SVAR) model. Our sample country is Costa Rica, for which there is no literature on the topic. Using quarterly data from 1991 until 2009, we found a negative and small impact of fiscal policy on output, while a small positive of revenue.

Based on these results, we decided to test the existence of an indirect tool the incumbent may still have through the regulated price industries. Our theory suggests that a regulator-agency will choose the price which maximizes the political support for the incumbent government-regulator. We provide evidence with monthly data from 1986 until 2014, from a wider regulated market: Costa Rica. We also provide insights on the effect of elections on gasoline prices (as a proxy for regulated markets) for a panel of ten Latin American countries of annual data from 2001-2012. And we contribute to the literature by proposing a non parametric approach describing the relationship between prices in regulated markets and election timing.

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Introduction

Our thesis is empirical in nature and primarily deals with political cycles in relation to fiscal policy and regulated markets. Political incumbents in democracies have a wide variety of tools with which to change and sculpt the social and economic environment of a country. The way they carry this out depends on their ideology, existent political constraints and their own motivations, among many other factors. One of their motivations seems to be of common sense: they want to be re-elected or, if re-election is not allowed by law, they want their political party to continue in power. The Political Budget Cycle theory (PBC) supports this electoral motivation, stating that incumbents try to manipulate the economic conditions to maximize their popularity, thus increasing the probability of staying in power.

The main goal of this thesis will be, through three different fields of analysis, to provide a better understanding of political cycles, fiscal policies and regulated markets in developing countries, specifically in Latin America. We will explore how the political cycle theory has evolved from being budget related to being in alliance with the regulated markets. Mainly because of all the research done on PBC, as time has gone by it has turned out to be more difficult to conclude a uniform way of manipulating spending before the elections; actually most empirical research in its favor, happens to be very context specific. It is an interesting puzzle, as stated by Iversen and Soskice (2006:434), as to why there is so little consensus on the evidence for a widespread and significant political manipulation of the economy.

It has been forty years since Nordhaus proposed the political business cycles theory (PBC), arguing that electoral timing caused an increase in government spending so the voters would feel

economically better off, signaling that the incumbent was competent and increasing his chances of being re-elected. In democracies, it is well known that reelection-seeking incumbents have incentives to manipulate economic outcomes through fiscal policy. The cost of this manipulation will vary across time and space, as there are different ways of implementation, and of course a wide diversity of contexts. Some politicians will govern under situations where manipulation is cheap, given that the impact of their fiscal policy is more effective, while others must proceed employing much more effort with the aim of influencing the state of the economy and therefore the *economic-vote*.

However, there is no research to assess the conditions under which manipulating taxes and spending *efficiently* serve those interests of political survival. Therefore, in our first chapter we argue that the electoral return of spending an additional unit varies dramatically according to other economic contextual variables, and in the same direction, the sensibility of the PBC towards its real electoral efficiency depends on them. While some past research emphasizes other conditional arguments such as the proximity to the next election, or the level of trade openness, we state that under some economic contexts there is simply no incentive to manipulate the fiscal policy at all, while in other conditions those incentives are augmented.

Our argument is that there is an objective and measurable impact in terms of effectiveness of increasing public spending (or decreasing taxes) before an election, which determines the cost an incumbent has to incur when manipulating to gain votes for the next election. If manipulating the fiscal policy is absolutely ineffective, then its cost is infinite. Incentives to implement an expansionary fiscal policy, as the next election approaches, will depend on the extent to which output can be efficiently affected in the short-run. Our theory suggests that politicians follow such strategy with different degrees of information, and shows why some incumbent presidents have been more successful in manipulating the fiscal policy than others using a sample of 13 Latin American countries between 1980 and 2005.

In our second chapter we intend to indirectly test PBC's main assumption, being that the fiscal policy can impact on the economic context, having an effect on voters' decisions at the polls. Even if there are context conditions that allow a change in fiscal policy as we demonstrate in the first

chapter, its impact may not be perceivable by consumers and therefore not the best strategy for the incumbent if he is seeking re election. In order to examine the dynamic responses of output and determine if fiscal expansive measures (increasing spending or reducing taxes) have a positive effect on economic growth we estimate the macroeconomic effects of exogenous fiscal policy shocks in Costa Rica (for the first time) using a three variable Structural Vector Autoregression (SVAR) model and quarterly data from 1991 until 2009.

Implicitly, in this chapter, we also test the main assumption of the PBC theory. As stated, we believe that knowing the fiscal policy effectiveness in Costa Rica or any other country through the effect of its short term multiplier allows us to test if it is possible for the incumbent to manipulate the economy's output through fiscal policy. It is true, though, that we do not have information on how well familiarized are the politicians with this technical knowledge. According to Drazen (2000:2), if voters respond to good economic conditions, they are more likely to vote for the incumbent if an expansionary fiscal policy provides higher growth. However, even if good economic conditions help an incumbent's chances of reelection, it is not very clear that fiscal manipulation per se will be effective as politicians may have very limited ability to successfully manipulate the economy because of a lack of technical ability to time the expansion accurately enough for it to occur just before the elections.

After exploring the efficiency of fiscal policy through its multiplier and acknowledging that most of the empirical evidence of the last decade on PBCs has proven to be context-conditioned (considering the results of our first chapter) we decided to test the existence of an indirect tool the political incumbent may still have through the regulated price industries.

Is there a relationship between political cycles and prices in regulated industries? The main purpose of our third chapter is to provide significant empirical evidence of the effect elections may have on regulated industry prices. For its development, we focused on two different samples; firstly, a panel data for ten countries in Latin America with annual data (from 2001-2012) using the price of gasoline as a proxy for the regulated industry and secondly, one which explores the Costarican case, with monthly data from 1986 until 2014.

Our theory is based on Peltzman's work (1976) and Paiva (1996) which reveal as a formal theoretical model that a regulator-agency will choose the price which maximizes the political support for the incumbent government-regulator. With this chapter we also contribute to the literature by proposing a non parametric approach which supports our hypothesis on the relationship between the prices in regulated markets and the election timing.

Chapter 1

Political Budget Cycles and Fiscal Policy Effectiveness in Latin America

Abstract

It is well known that reelection-seeking incumbents have incentives to manipulate economic outcomes through fiscal policy. However, there is no research to assess the conditions under which manipulating taxes and spending *effectively* serve those interests of political survival. We argue that the incentives to implement an expansionary fiscal policy, as the next election approaches, will depend on the extent to which output can be effectively affected in the short-run. We test using a sample of 13 Latin American countries between 1980 and 2005, whether incumbents' strategies are sensible to the economic conditions under which fiscal manipulation is more or less effective to shape citizens' perceptions about the economy.

1.1 Introduction

Incumbents have a wide variety of tools to change and sculpt the social and economic environment of a country. The way they do it depends on their ideology, existent political constraints and their own motivations, among many other factors. One of their motivations seems to be of common sense: they want to be re-elected. The Political Budget Cycle theory (PBC) supports this electoral motivation, stating that incumbents try to manipulate the economic conditions to maximize their popularity, thus increasing the probability of staying in power.

The cost of this manipulation will vary across time and space, as there are different ways of implementation, and of course a wide diversity of contexts. Some politicians will govern under situations where manipulation is cheap, given that the impact of their fiscal policy is more effective, while others must proceed employing much more effort with the aim of influencing the state of the economy and therefore the *economic-vote*. Therefore, we argue that the electoral return of spending an additional unit varies dramatically according to other economic contextual variables, and in the same direction, the sensibility of the PBC towards its real electoral effectiveness depends on them. While some past research emphasizes other conditional arguments such as the proximity to the next election, or the level of trade openness, we state that under some economic contexts there is simply no incentive to manipulate the fiscal policy at all, while in other conditions those incentives are exacerbated.

This area of current investigation, in political economy, emerged around the 1970's with the aim of explaining the behavior of policymakers before elections as, in democracies, candidates compete, *ceteris paribus*, by signaling an improvement in each voter's present situation; if they are elected the voter will be better-off. Its precursor was Kalecki (1943), who introduced a new theory where business cycles were caused by political events; he explained that if governments carry out public investment, or subsidize consumption, and in addition, its expenditure is financed by borrowing and not by taxation, the effective demand for goods and services may increase until full employment is reached. Furthermore, Nordhaus (1975) concludes that, in a perfect democracy, there is a predictable pattern of policy: in early years there will be austerity and, at the end of the in-office

period, there will be a feast: parties will make decisions biased against future generations, in order to remain in office, because voters will benefit from full employment.

Since then, several political economists have included electoral motivations in their theoretical¹ studies of policymaking. Nevertheless, empirical research² on the topic, analyzed through policy instruments (i.e. fiscal expansion³) has not reached a consensus in support or against the theory and common perception of the existence of a PBC, differ in regularity, magnitudes and significance.

It is an interesting puzzle, as stated by Iversen and Soskice (2006:434), why is there so little consensus on the evidence for a widespread and significant political manipulation of the economy? Or as Lewis-Beck (1988) state, if the economy influences the vote (which it does) and politicians want to be re-elected (which they do) how can there not be an opportunistic PBC? In other words, research has showed that the state of the economy influences the voting decisions of individuals and political economy theory has assumed that politicians have an opportunistic or partisan utility function, meaning they want to be re-elected or their party to remain in power. Based on this, *how come there is so little consensus on the evidence for an opportunistic Political Budget Cycle?*

Our argument is that there is an objective and measurable impact in terms of effectiveness of increasing public spending (or decreasing taxes) before an election, which determines the cost an incumbent has to incur when manipulating to gain votes for the next election. If manipulating fiscal policy is absolutely ineffective, then its cost is infinite. But when it is effective, increasing government spending is expected to have real effects on the economy. Politicians assess the fiscal cost of the number of votes they need to remain in power. We would expect that when the incumbent faces electoral disadvantage –i.e. the electoral ineffectiveness of manipulating the fiscal policy is high, it increases the size of the PBC. It is precisely when new votes are expensive that we would predict to observe the largest PBC.

¹Hibbs (1977), Tufte (1978), Frey and Schneider (1978), Beck (1987) and Person and Tabellini (2000), Shi and Svensson (2006), Duch and Stevansson (2008), for example.

²Garrett (1998), Bernhard and Leblang (1999), Oatley (1999) and Boix (2000), Iversen and Soskice (2006), Streb et al.(2009), Barberia and Avelino (2011), among many others.

³There would be an expected change on the policy before the elections take place.

In recent decades Latin America has been marked by political instability and macroeconomic fluctuations, therefore a significant share of the literature directed at PBCs in developing democracies has focused on it. One of the most often cited arguments on the topic says we should expect to find greater political budget cycle effects in developing democracies because of the level of development of their political institutions.⁴ In addition, Schuknecht (2000) has argued that political institutions such as the legislature, the judiciary, central banking authorities, and the media may not be autonomous or institutionalized in the early stages of democracy.

Given this empirical background, our aim is to measure for the region, the electoral effectiveness of the fiscal policy with the elasticity of the demand for money with respect to the interest rate within the IS-LM framework, giving evidence for some understudied aspects within PBC theory. If the money demand is highly sensitive to the interest rate, a small increase in the interest rate will be enough to restore the market equilibrium after a fiscal expansion, with no expected effect on the level of output. We estimate whether the effectiveness of manipulating fiscal policy affects PBC in a sample of 13 Latin American countries between 1980 and 2005.

One of the main restrictions in empirical studies, is the difficulty of measuring the turning point of the political cycle -when the government begins implementing policies with an opportunistic goal. Most researchers have employed a dummy variable to capture the effect of this point in time, meaning they select the time of the change; in general, they test in a yearly basis before elections. Although this measure is the standard, it is subjective and could be inaccurate, affecting the results. The moment for fiscal manipulation can vary for a vast amount of reasons, taking different timing for each of them. More importantly, if the sign of policies is reversed after elections, lower frequency data may mask PBCs because the effects in the election year cancel out.⁵ Therefore, one of our contributions by using quarterly data is to overcome this drawback, giving a greater scope when looking at the electoral timing effects on the behavior of fiscal manipulation.

Next a brief review of the theoretical background and empirical evidence will be given, followed by the econometric analysis and discussion of results. Finally, section four concludes and discusses

⁴Persson and Tabellini 2003, Keefer 2005, Keefer and Khemani 2005, Brender and Drazen 2005 and Gonzalez 2002

⁵see Akhmedov and Zhuravskayas (2004) study on Russia

areas for further research.

1.2 Theoretical Background

The theoretical basis for the present analysis is given on one hand by the PBC theory, stated by Nordhaus (1975), and on the other hand, by the Mundell-Fleming approach, which relates government spending with its impact on total output. This section aims to link the theoretical framework to our argument for the subsequent explanation of our hypotheses.

1.2.1 Pre electoral fiscal manipulation

According to Drazen (2000a), there are three (main) ways in which policymakers' behavior may be affected by re-election uncertainty. Firstly, they may choose policies to influence the probability of remaining in power; if they can do this, they will choose policies to try to increase this probability, which may have significant effects on economic outcomes. Secondly, when there is a chance that someone with different preferences may replace the policymaker, he will have an incentive to opt for policies that will influence his successor's policy choices by changing the constraints the successor will confront. And finally, even when the policymaker cannot affect the probability of remaining in office, or the policies of his successor, uncertainty about who will hold office can have important effects on economic results.

Schumpeter (1939) discussed the electoral motivations that may guide government policies in his study of business cycles, then Kalecki (1943) described them, and Kramer (1971)⁶ linked for the first time economic conditions to election outcomes, regressing votes received by the incumbent party to growth rate of real per capita income and the inflation rate for that year. He found that the votes going to the incumbent party were inversely related to the inflation rate and positively related to the growth of income.

A few years later, Nordhaus (1975:187-188) developed a model of economic cycles determined by political events, which was called the *Political Business Cycle model*, PBC. He argued that the basic

⁶He studied the percentage of the vote going to the Republican candidates for the House of Representatives between 1896 and 1964 by the state of the economy.

difficulty in making inter-temporal choices in democratic systems has to do with the high discount rate for future consumption, as the implicit weighting function on consumption has positive value during the electoral period, but is zero or very small in the future. One of his main conclusions had to do with the predictability pattern of policy: an incumbent's term in office starts with relative scarcity in the first years of governance, but ends with a larger expenditure right before elections.

Since Nordhaus, several studies have tested whether unemployment, inflation or real income affect the vote for the incumbent, in order to confirm Kramer's results. Fair (1978) found that the change in real economic activity (real per capita GNP or the change in unemployment) in election years has an important effect on votes for the president. Additionally, he found that voters apparently have a high discount rate on past economic performance; they just consider one year or two before the election. In the same line, Duch and Stevenson (2008) argue that governments that manage strong economic growth during their office period are more likely to be re-elected.

The main assumptions of these early and subsequent models were that elected leaders in control of monetary policy were able to manipulate (successfully) the economic activity and surprising myopic voters who formed their opinions based solely on past incumbent performance and inflation rates (Avelino and Barberia, 2011). Still, research has evolved, going from *myopic voters*,⁷ to a context with *rational voters*, (first and second-generation models) where voters take the pre-electoral economic situation as an indicator of government performance. Thus, an election year expansion demonstrates the incumbent's governing ability.⁸

As well, studies have argued that monetary surprises are an unconvincing driving force for political business cycles, so they have included and tested models that emphasize fiscal policy as the motivating force for opportunistic cycles (Drazen 2000a). Their basic rationale is that governments manipulate their fiscal policy to increase the probability of an electoral success. Based on empirical research, a significant number of recent studies have argued that PBCs are more acute and more marked in the case of less developed countries (Block 2002a, 2002b; Block et al. 2003; Shi and

⁷Basic assumption in the first generation of PBC models; voters never learn from their mistakes; each government lets them believe that they deviate from the long run Phillips curve, and they fall for the trick.

⁸For the formal explanation of both generations of PBC model please refer to Appendix 1.

Svensson 2002, 2006; Schuknecht 2000).

Along the empirical results, theories have made important advances in two important realms (Drazen 2000a). Firstly, models including those developed by Rogoff and Siebert (1988) and Rogoff (1990) have incorporated forward-looking, rational expectations. And secondly, they have researched the effects of right and left-wing party orientation on macroeconomic outcomes during and after elections (Alesina 1987). Accordingly, the objectives for the policy-maker to remain in office are characterized as *partisanship*⁹ when the incentive is to implement a specific program, and/or *opportunistic*¹⁰, when the aim is to remain in power. The partisan model predicts that left-wing governments will generate an economic expansion while the right-wing governments a contraction early to mid-way through their terms. The opportunistic, predicts that Presidents whose parties consequently hold on to the Presidency at the next election will have expanding economies as the election approaches.

Although a distinction is drawn between these reasons, Drazen (2000a) argued that, in order to implement their preferred policies, partisan policymakers, may display opportunistic behavior, as they need to be in office in order to implement those policies. Therefore, realistically, we consider these as complementary and recognize combinations between opportunistic and partisan incentives.

The incentive for fiscal manipulation before elections exists, but the capability to remain in office clearly will depend on the ability to implement the policies which maximize the utility for those who elect them: a small group, a single individual or all the population, limited by factors such as institutional constraints, the cost of losing office and the exchange-rate regime.

Whether governments are able to manipulate their fiscal policy in order to get a positive growth result in the election period is the main debate in the literature on PBC. The empirical evidence is diverse, even when the studies are for the same country. For example, when analyzing the United States' PBC, Alesina has tested, through different articles, the temporary partisan electoral effects on real outcomes. He argues, according to Grier (2008:337-338) that because un-modeled tempo-

⁹Hibbs (1978) and Alesina (1987)

¹⁰Nordhaus (1975) and Rogoff and Sibert (1988)

rary partisan effects can look like opportunistic cycles, any empirical evidence of the latter can be discounted. Faust and Irons (1999), on the other hand, conclude that there is no evidence for an electoral influence in the US economy. They state that Alesina's evidence is the product of an under-specified regression model and endogenous regressors. But Grier (2008) finds a significant influence of elections on quarterly real GDP growth when controlling for multiple lags of interest rate changes, inflation, money growth, among many other variables.

Based on empirical research, a significant number of studies have argued that PBCs are more acute and more marked in the case of less developed countries (Block 2002a, 2002b; Block et al. 2003; Shi and Svensson 2002, 2006; Schuknecht 2000). Specifically for Latin America, Ames (1977) found that government expenditures rose prior to and after the 65 elections that took place in seventeen Latin American countries between 1948 and 1970 ¹¹ Considering the same group of countries, Ames (1987) reports that government expenditures increased by 6.3% in the pre-election year and decreased by 7.6% in the year after the 82 elections that took place between 1947 and 1982.

There are other studies considering the political determinants of government spending and budget deficits for sub-sets of Latin American democracies, which have produced evidence in favor of PBCs (Amorim Neto and Borsani 2004; Mejia Acosta and Coppedge 2001). The latter, controlled for different political determinants in a study of eight Latin American countries between 1983 and 1998, finding that budget deficits worsen during elections, though government expenditures are not found to increase. Amorim Neto and Borsani (2004) confirmed those findings by analyzing the influence of presidential and cabinet effects in ten Latin American countries between 1980 and 1998. The authors argue that fiscal difficulties during the electoral time are driven by the reluctance of governments to increase taxes. Barberia and Avelino (2011) used data from the entire sample of eighteen Latin American democracies for the period between 1973 and 2008, confirming that elections provoke increases in the fiscal deficit, but that the pattern is not contingent on a country being in the early phase of its democratic transition.

More recently, Kaplan and Thomsson (2016) challenge the idea that politicians use budget

¹¹only post-election spending proved to be statistically significant.

deficits as a PBC tool by incorporating the financial constraints they face into an electoral framework. They argue that when highly indebted governments rely more on international bond markets, as opposed to bank lending, politicians alter the way they respond to voters. Their theoretical argument suggests that greater ownership dispersion among global creditors (bond financing regime) should decrease budgets deficits generally, and reduce macroeconomic cyclicalities around elections. They test their hypothesis for a panel of 16 Latin American countries from 1961 to 2011, and show that politicians exhibit more fiscal discipline when they fund a greater share of their spending through decentralized bond markets during election periods.

1.2.2 Theoretical Background Model

For the theoretical analysis of the relationship between fiscal policy effectiveness and the behavior of the PBC, and in accordance with Clark and Hallerberg (2000:325), we are going to assume that fiscal policy, controlled by elected officials, manipulates taxation and expenditure to obtain a desired macroeconomic outcome. Similarly, we hold the standard PBC assumption that elected officials receive benefits when there is an electorally timed increase in growth and employment, which compensates the negative impact of such strategy on inflation rates.

The incumbent/government (*i*) and central bank (*cb*) each have preferences over macroeconomic outcomes; these are represented by a quadratic loss function, describing the deviations from their ideal values for unemployment and inflation:¹²

$$L_j = (y - y_j^*)^2 + \beta_j(\pi - \pi_j^*)^2, \text{ where } j = i, cb \quad (1.2.1)$$

where π and y are inflation and output, π^* and y^* are the actor's ideal plans, and β is the weight the actor attaches to inflation stabilization relative to the output goals.

We assume preferences between and among actors will be reflected in their ideal rate of growth and that they share an ideal of zero rate inflation; hence, $\pi_i^* = \pi_{cb}^* = 0$. On top, both actors would like to stabilize the economy at its natural rate of growth.¹³

¹²Clark and Hallerberg (2000).

¹³The level of growth consistent with price stability.

As stated before, we assume the government has an opportunistic utility function, therefore, incumbents will try to push output above its natural rate before elections to gain support. Hence, during the electoral period, preferences change

$$y_i^* = k_i y^n \quad (1.2.2)$$

where y^n is the natural rate of growth, and $k > 1$ for electoral periods, and $k = 1$ in non electoral times.

We assume the central bank is independent, hence, it will not have pressure from the incumbent. As a result, the bank's preferred growth rate will be the same in electoral and non electoral periods,

$$y_{cb}^* = k_{cb} y^n, \quad k = 1 \quad (1.2.3)$$

Both actors can affect the economy through the manipulation of a short-term, expectations-enhanced Phillips curve:

$$y = y^n + \mu(\pi - \pi^e) + \phi g \quad (1.2.4)$$

where π^e is the existent rate of expected inflation in time t , from sticky wage contracts signed at time $t - 1$; g is the government expenditure, ϕ is the effectiveness of fiscal policy transmission, and μ is the effectiveness coefficient for monetary policy transmission.

The government will choose the level of budget (g) to minimize its loss function. Substituting the government's preferred level of output (y_i^*) in the Phillips curve process,

$$L_i = (y^n + \mu(\pi - \pi^e) + \phi g - k_i y^n)^2 + \beta_i (\pi - \pi_i^*)^2 \quad (1.2.5)$$

The central bank observes the level of spending chosen by the government and responds by setting inflation (such that it increases with π^e), and the tendency to push output above its natural rate. Minimizing its loss function, we obtain its preferred level of inflation (π).

$$L_{cb} = (y^n + \mu(\pi - \pi^e) + \phi g - k_{cb}y^n)^2 + \beta_{cb}(\pi - \pi_{cb}^*)^2 \quad (1.2.6)$$

$$\frac{\partial L_{cb}}{\partial \pi} = 0 \implies \pi = \frac{1}{\mu + \frac{\beta}{\mu}}[\mu\pi^e - y^n(1 - k_{cb}) + \phi g] \quad (1.2.7)$$

The government anticipates and incorporates it into the budget, setting net government spending propensity to push the economy above the natural rate of growth and inflationary expectations,

$$\frac{\partial L_i}{\partial g} = 0 \implies g_{elect} = \frac{1}{\phi}[y^n(k_i - 1) - \mu(\pi - \pi^e)] \quad (1.2.8)$$

Now, in non electoral periods as $k_i = 1$; the reaction function turns into

$$g_{ne} = \frac{1}{\phi}[\mu\pi^e] \quad (1.2.9)$$

From these equations, we can study the effect of the electoral period on fiscal policy decisions, from the difference between equilibrium policies in the electoral and non electoral periods,

$$g_{PBC} = g_{elect} - g_{ne} = \frac{1}{\phi}[y^n(k_i - 1)] \quad (1.2.10)$$

We argue that the contextual variable, *fiscal policy transmission effectiveness*, represented by ϕ will change through time and by knowing this elasticity, politicians can predict how effective and cheap their fiscal policy might be. Hence it is necessary to study the behaviour of this relationship,

$$\frac{\partial g_{PBC}}{\partial \phi} = -\frac{1}{\phi^2}[y^n(k_i - 1)] \quad (1.2.11)$$

According to the result of (1.2.11), there is always a negative relationship between the effectiveness measure of fiscal policy and the level of expenditure chosen by the government during the electoral period, because $(k_i - 1)$ will always be positive in electoral times. From this result we build our hypotheses in order to define the impact of elections on fiscal policy when its effectiveness changes,

- *Hypothesis 1* - When the money demand elasticity is low, the amplitude of the PBC will be

larger, as the effort from the incumbent would have an effect on output; its fiscal policy would be more effective.

- *Hypothesis 2* - When the money demand elasticity is high, then it is hard to distinguish a PBC, as the level of manipulation needed would be too expensive in order to have an effect on the economy.
- *Hypothesis 3* - The effect of fiscal policy manipulation can be measured before elections (as expansionary) or after (when it contracts), both effects should cancel out.

Even though the previous model provides information on the fiscal multiplier and its behavior in electoral and non electoral periods, we consider further explanation on the multiplier, this time within the Mundell-Fleming framework.

Fiscal policy effectiveness

We will consider the effectiveness of fiscal policy through the elasticity of money demand, M_d , with respect to the interest rate, based on the standard Mundell-Fleming model. As we know, the *Goods Market* within this model is represented by the IS curve:

$$AD = [C + cTR + c(1 - t)Y] + (I - bi) + G + NX \quad (1.2.12)$$

where, C is consumption, TR are transfers, Y is income, I is autonomous investment, i is the interest rate, G is the government expenditures and NX is net exports. Knowing that $Y = AD$, and with some rearrangement, we obtain

$$Y = A + c(1 - t)Y - bi, \text{ where } A = C + cTR + I + G + NX \quad (1.2.13)$$

This expression of Y , can be simplified as $Y = \alpha_g(A - bi)$, where the multiplier $\alpha_g = \frac{1}{1 - c(1 - t)}$. This multiplier along with the sensitivity of investment with respect to the interest rate determine the steepness of the IS curve. As we can see, fiscal policy can affect the multiplier through taxes, and can affect A through government expenditure or transfers.

The *Money Market* is represented by the LM curve:

$$\frac{M}{P} = kY - hi \quad (1.2.14)$$

where h reflects the sensitivity of the real money balances to the interest rate and k depicts the sensitivity of real money balances to the level of income. From this equation, we observe that the greater the responsiveness of the demand for money to income (k) and the lower the responsiveness to the interest rate (h), the steeper the LM curve will be.

To obtain the equilibrium level of income: $IS = LM$,

$$Y^* = \frac{h\alpha_g}{h + kb\alpha_g}A + \frac{b\alpha_g}{h + kb\alpha_g} \frac{M}{P} \quad (1.2.15)$$

or equivalently

$$Y = \gamma A + \gamma \frac{b}{h} \frac{M}{P} \quad (1.2.16)$$

Showing that the equilibrium level of income depends on two exogenous variables: the autonomous spending (A), which includes C, I, G, TR and NX , and the real money stock, $\frac{M}{P}$. In the same way, the equilibrium level of interest rate can be obtained,

$$i^* = \frac{k\alpha_g}{h + kb\alpha_g}A - \frac{1}{h + kb\alpha_g} \frac{M}{P} \quad (1.2.17)$$

which is equivalent to

$$i^* = \gamma \frac{k}{h}A - \gamma \frac{1}{h\alpha_g} \frac{M}{P} \quad (1.2.18)$$

From the interaction between the goods and money market we obtain the fiscal multiplier, which entails how effective fiscal policy might be on manipulating the level of output;¹⁴ the impact of a change in government expenditure, G , on total output, Y , within this framework will be given by

$$\frac{\partial y}{\partial g} = \gamma, \text{ where } \gamma = \frac{h\alpha_g}{h + kb\alpha_g} \quad (1.2.19)$$

¹⁴The next chapter incorporates the latest study on fiscal multipliers as it is the theory behind the estimation of the dynamic effects of Costa Rica's fiscal policy.

where γ is the fiscal government spending multiplier, h reflects the sensitivity of the real money balances to the interest rate, k depicts the sensitivity of real money balances to the level of income, b is the responsiveness of investment to the interest rate and α_g is the multiplier which suggests that output changes when autonomous spending (including investment) changes; that change in output can be larger than the change in autonomous spending.

Studying γ , we can see that it is less than α_g , since $\frac{h}{h+kb\alpha_g}$ is < 1 .¹⁵ From the expression in the above equation, we see that it approaches zero, when h is very small, and it approaches α_g when h goes to ∞ . Likewise, a large value of b or k would diminish the impact of fiscal policy over the level of output.¹⁶

The comparative statics from Clark and Hallerberg's (2000:327) work were developed assuming strict scenarios under the Mundell-Fleming framework, i.e. capital is either mobile or immobile, exchange rates are either fixed or flexible. Therefore the only combination of circumstances where both fiscal and monetary policy could have some effect on output, $0 < \phi < 1$, and $0 < \mu < 1$, would be in a closed economy. For the case with fixed exchange rates and fully mobile capital, for example, they standardize the parameters of monetary and fiscal policy effectiveness so that, $\phi = 1$, and $\mu = 0$. In contrast, this study does not assume strict scenarios where capital is fully mobile or immobile to define the behavior of the effectiveness of fiscal policy.

1.3 Latin American Context, from 1980 until 2005

Before empirically evaluating our hypotheses, it is important to set the historical-economic context of the studied region. The countries of Latin America are widely heterogenous, even though, their proximity and shared economic characteristics have allowed for some of its countries to experience similar episodes such as debt crisis, transitional democratic periods, currency movements, to mention some. We will focus on 25 years of its economic and political history, from 1980 until 2005; specifically on the episodes which contextualize our study and may provide important insights about

¹⁵ $\frac{h}{h+kb\alpha_g} \implies h < h + kb\alpha_g$, from which we conclude that, $kb\alpha_g > 0$

¹⁶ A high level of k means an increment on money demand as income increases, and therefore an increment on the interest rate; combining it to a high level of b , it implies a significant reduction in private aggregate demand.

the results obtained.

Politically and in terms of competitive elections, many countries of the region experienced the transition to democracy between 1974 and 1990: Argentina, Bolivia, Brazil, Chile, Dominican Republic, Ecuador, El Salvador, Guatemala, Peru and Uruguay. While countries such as Panama and Paraguay returned to democracy in the mid 1990s. In many cases, Mexico is considered to have initiated a process of political liberalization and democratic transition mirrored in the defeat of the hegemonic party, PRI (Partido Revolucionario Institucional), in the presidential elections of the year 2000, when Vicente Fox from PAN (Partido Accion Nacional) party won.

In general terms, reelection continues to be prohibited in most Latin American countries; some exceptions within our sample are Carlos Saul Menem in Argentina in 1995, Fernando Henrique Cardoso in 1994 for Brazil, and Hugo Chavez in Venezuela in the 2000. And unlike parliamentary democracies, elections are typically held on a fixed schedule in presidential democracies such as those found in Latin America. Of course, there are some exceptions. Fueled by a case of hyperinflation, Siles Suazo anticipated presidential elections one year earlier than the end of his term in 1985 in Bolivia. Similarly, in Argentina, Rafael Alfonsin ceded power earlier than anticipated though only a few months earlier than planned. After only two years in office, President de la Rúa resigned from the Argentine presidency in 2001 in light of massive protests and a spiraling economic crisis.

Economically, the seventies were lived under the model of Import Substitution Industrialization, ISI, which advocates replacing foreign imports with domestic production, aiming to reduce foreign dependency. Governments followed this model implementing subsidies, taxing agriculture and transferring resources towards different industries. They allowed negative real lending interest rates, and high tariffs to imported goods. Also, monetary issuance was a policy frequently used. By the end of this decade there were severe changes on the Latin-American economical context: the external vulnerability and the wrongful monetary and fiscal policies determined the end of ISI, dominated by high inflation and fiscal deficits.

By 1982, almost all Latin American countries were immerse in a deep economical crisis; high ex-

ternal debt levels, excessive expenditure and stabilizing policies based on exchange rate movements were the common ground. In August, Mexico announced a unilateral moratorium on servicing their debt. In the world markets, there was a significant increase in interest rates and a worsening of terms of trade. Between 1982 and 1984 the region's GDP became stagnant, fixed investment decreased around 5% of Latin-American annual production and the regional current account deficit became 2.1%.

Among other things, the strong devaluation¹⁷ suffered by the nations' currencies boosted high inflation levels, aggravated by the dependency they had with the external capital goods and productive inputs. Because of currency movements and higher interest rates, the external debt payments had a larger share of the financial responsibilities which grew rapidly. Also, some monetary policies implemented worsened the inflation levels. As a consequence, real wages fell affecting employment levels.

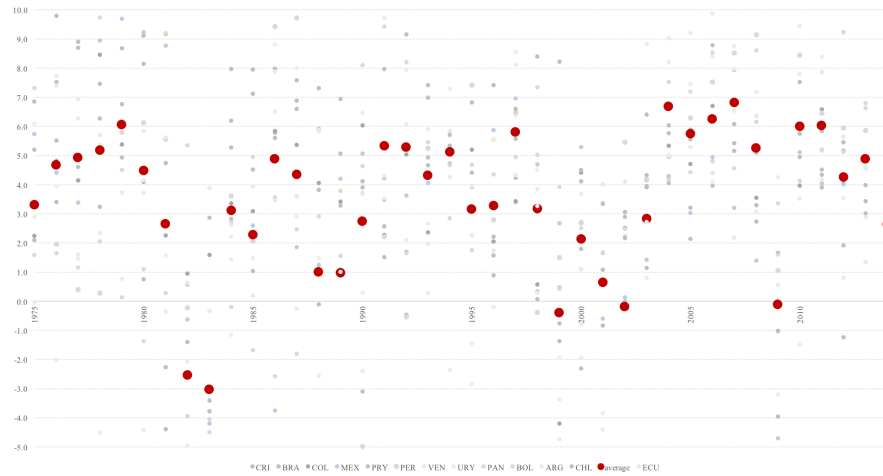
This situation demanded extreme measures, the programs of structural adjustment were implemented with the intention of generating positive trade balances. Public expenditure diminished greatly in real terms and there was a general public concern of tax obligations. Some countries decided to reduce their public expenditure, such as Argentina, Bolivia, Ecuador, Peru and Venezuela, while others as Costa Rica, Mexico and Uruguay, increased their income. But in general terms, the adjustment processes tried different ways of increasing government revenue; there were cases of privatization and savings increments in Argentina, Colombia, Costa Rica and Chile, indirect taxes in Ecuador, social security contributions in Argentina and Uruguay and tax increases in Colombia and Uruguay, to name some. A reduction in the government's action margin was one of the consequences of the adjustment programs as a large percentage of their revenue was used to pay external debt services.

During the nineties this tendency changed as the Latin-American economy returned to grow, but still its growth was moderate and unstable; in 1995 and 1999 change in GDP per capita decreased or turned negative, for example. Both of these cases resulted from external shocks: in 1995

¹⁷See appendix 01 for graphic information.

Mexico suffered from the investors' loss of confidence, affecting the whole region, while in 1998 and 1999 it was the effects of the Asian crisis which had an adverse influence because of the volatility of capital inflows to emerging markets given the movements in their exchange rates. In general, there was a contagion effect over developing countries but specially on those with low international monetary reserves, weak financial systems and an overvalued currency.

Figure 1.1: Latin America - Gross Domestic Product

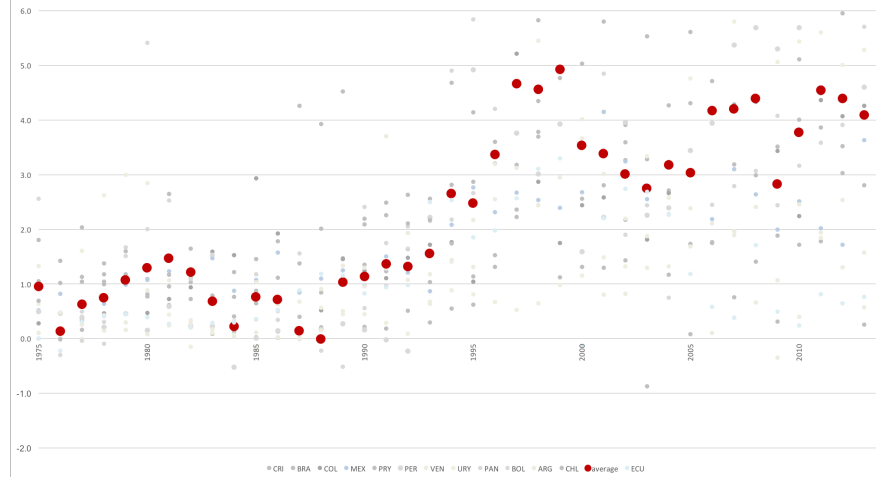


This external sensibility was a consequence of the new role exports had as boosters of the economy. Which also implied significant reforms to economic institutions in order to have consistency with trade openness (lowering tariffs, eliminating protective trade barriers and modifying exchange rate regimes) and to recover foreign investors' trust. By the end of the eighties, beginning of the nineties Latin America addressed the Washington Consensus¹⁸ which gave policy advice towards fiscal discipline, a redirection of public expenditure priorities toward fields offering both high economic returns and the potential to improve income distribution (primary health care, primary education, and infrastructure), tax reform (to lower marginal rates and broaden the tax base), interest rate liberalization, a competitive exchange rate, trade liberalization, liberalization of inflows of foreign direct investment, privatization, deregulation (to abolish barriers to entry and exit), and secure

¹⁸John Williamson originally coined the phrase in 1990 to refer to the lowest common denominator of policy advice being addressed by the Washington-based institutions to Latin American countries as of 1989.

property rights. ¹⁹

Figure 1.2: Latin America - Net Inflows of Foreign Direct Investment as percentage of GDP



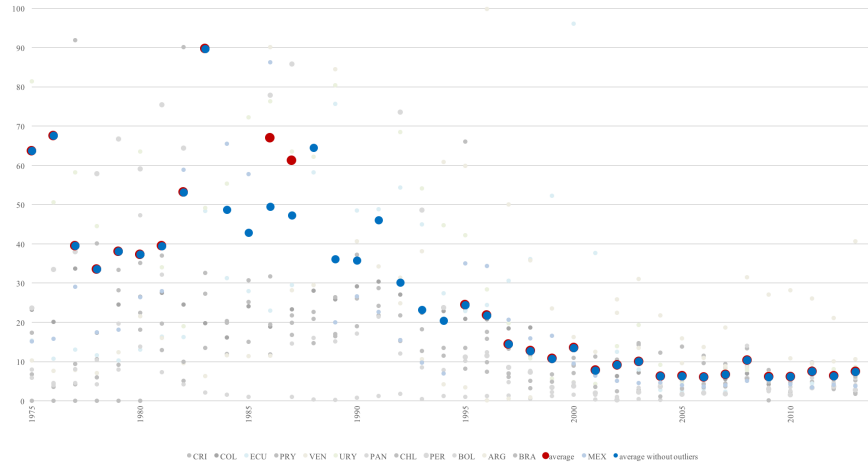
This *new* policy framework contributed to stop hyperinflation and to soothe past un-adjustments. The region started regaining trust and capital inflows came back. The crisis from the eighties had been so serious that the rebound was significant in relative terms. In this context, the political situation stabilized with some exceptions (Alberto Fujimori in Peru), democratically elected governments were institutionalized.

With all its limitations, this new expansion phase has allowed Latin America to overcome one of its biggest hindrance, inflation. The observed consumer price index had extreme values over 900% in some cases but since 1990 a lower trend has been observed. There were critical moments for Peru, Argentina, Bolivia and Brazil, between 1984 and 1994, were this index overpassed 500%, still, after 1995, the levels, on average, have been below 15%. We know that a controlled inflation level is vital for firm confidence and maintaining the purchasing power of wages.

Inflation control and fiscal responsibility came together along with reforms to the public sector.

¹⁹as in the Global Trade Negotiations Home page from Harvard University, <http://www.cid.harvard.edu/cidtrade/issues/washington.html>

Figure 1.3: Latin America - Consumer Price Index

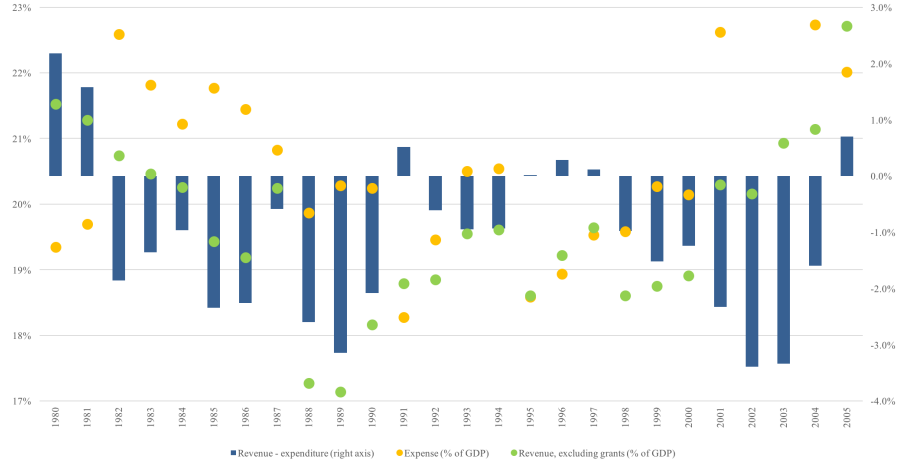


In general terms, states became smaller, privatizations of state owned companies took place aiming for market competition, and financial sectors were reformed -starting with Central Banks which became more independent from the Executive. Fiscal deficits were controlled by increasing public revenue, which was helped by the economy's growth. Starting the new decade, there was a boom in the region given the rebound effect of the late nineties' and the better social and political climate. Also, the economies were less vulnerable given their *partial modernization*.

Although these effects were important, the external situation had a significant role as well. World economy was growing rapidly given the boom in China and India and the solid pace of developed economies; world GDP was 4.9% in 2014 and 4.5% in 2015. Also, the Federal Reserve of the United States fostered an unusual liquidity level which turned to be the monetary policy of developed countries giving access to cheap financing for public and private sectors. Therefore Latin-America's GDP grew 5.7% in 2004 and 4.7% in 2005 on average (refer to graph 01).

Given larger revenues and lower interest rates and the unpleasant experience of the debt crisis, Latin-American governments decided to invest in lowering debt levels and accumulating international reserves. Our next graph shows how the fiscal balance (revenue minus expenditure) ended as

Figure 1.4: Latin America - Average Revenue and Expenditure as percentage of GDP



a surplus in the year 2005.

This political and economical context enclose the most significant episodes for our empirical research; even though, there where *sets* of years were the incumbent's ability to manipulate the economy seemed reduced, our interest is to test if the behavior was somewhat different when elections approached. Our next section explains the empirical model and data characteristics, to proceed with the results' analysis.

1.4 An Empirical Approach

Given the theoretical background in the previous section and earlier empirical studies on electoral cycle,²⁰ we will employ a multivariate regression model to characterize the relationship between a specific fiscal variable y in country i and year t , $y_{i,t}$, and the electoral cycle; it can be depicted in a general manner as:

$$y_{i,t} = \sum_{j=1}^k \beta_j y_{i,t-j} + \sum_{j=1}^m \gamma_j x_{j,i,t} + \delta_E E_{i,t} + \lambda z_{i,t} + \eta z_{i,t} E_{i,t} + \sum_{j=1}^n \Phi_j t_{j,t} + \mu_i + \varepsilon_{i,t} \quad (1.4.1)$$

²⁰As Streb *et al* (2009:434)

where $x_{j,i,t}$ is a vector of m controls, $E_{i,t}$ is a dummy election variable, $z_{i,t}$ is a proxy variable for the elasticity of money demand with respect to the interest rate, $t_{j,t}$ is a time control variable, μ_i is a specific country effect, and the term $\varepsilon_{i,t}$ is a random error that is assumed independent and identically distributed. From our hypotheses we would expect a positive relation between the election dummy variable and a fiscal policy expansion, and the proxy for money demand elasticity, $z_{i,t}$, to be significant. This specification represents a dynamic panel model, where the dependent variable is a function of its own lagged levels, a set of controls and the electoral timing conditioned effect of the money demand elasticity.

Thirteen Latin American countries²¹ make up the panel data for this research; it is strongly balanced. The time period considered is from the first quarter of 1980 until the last quarter of 2005, which gives a total of 1352 observations.

According to the theoretical model developed in the latter section, we are interested in the incumbent's ability to boost a fiscal expansion during the electoral period, therefore, the dependent variable of our model will be the central government's balance (revenue²² - expenditure) as percentage of the GDP. Therefore, the expected sign of the electoral dummy is negative. The *budget balance* must be smaller when elections take place as expenditure would increase or taxes would decrease. We include the fourth lag of the dependent variable, supporting the decision on the Akaike information criteria test, with the purpose of controlling for temporal stickiness in the government's fiscal position.

Given the heterogeneity in income and growth rates across the region, it is important to include economic controls, the level of economic development, defined as the log of the gross domestic product per capita will be included as it considers the different rates at which each country reached its development level since the 80's. Also,²³ we select the growth rate of real GDP as control variable because it captures the effects of the business cycle on the budget surplus (the pro-cyclical behavior

²¹Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela. Because of data availability, Dominican Republic, El Salvador, Honduras and Guatemala could not be included in the sample.

²²Considering grants

²³following Shi and Svensson (2006) and the theoretical model.

of tax collection, among others, can cause an increment in booms and a fall in recessions). It is fair to mention, that both variables related to GDP behave differently within the model; not necessarily a bigger GDP would imply a larger GDP per capita. As to time effects, we introduce *time* variables such as quinquennial dummies for the whole sample, and quarterly dummies to control for seasonality in each country.

Our variable of interest, the elasticity of M_d with respect to the interest rate, i , was estimated as the change of money supply, M1 (currency in circulation, travelers' checks, demand deposits and other checkable deposits), with respect to the change of the real interest rate; in order to include the effect of expected inflation.²⁴

Our sample considers 66 elections, detailed in the table above, which are coded as a dichotomous variable: one in the quarter in which a regular election occurs and zero otherwise. Following Streb (2011), we will also look at the pre and post electoral effects of fiscal manipulation. Nordhaus' (1975) framework stated that the monetary stimulus before elections is compensated afterwards to avoid long run consequences for inflation. In accordance, a contractive fiscal policy should be observed after elections; Ames (1987) found empirical evidence to support the hypothesis for Latin America. On the same line, Persson and Tabellini (2003) came across a similar result for a panel of 60 democracies. Therefore we include two other variables, the first, ele , is equal to one for the four quarters before elections, and the second, $elep$, is equal to one in the four quarters after elections.

²⁴From our theoretical model, and according to the second generation models of PBC, we assume that $\Pi_t^e = E(\Pi_t|I_{t-1})$.

Figure 1.5: Latin America - Election Dates

Year	I quarter	II quarter	III quarter	IV quarter
1980		Bolivia, Peru		
1981				
1982	Costa Rica	Colombia	Mexico	
1983	Paraguay			Argentina, Venezuela
1984	Ecuador	Panama		Uruguay
1985		Peru	Bolivia	
1986	Costa Rica	Colombia		
1987				
1988	Ecuador, Paraguay		Mexico	Venezuela
1989		Arg, Bol, Pan, Par		Brazil, Chile, Uruguay
1990	Costa Rica	Colombia, Peru		
1991				
1992		Ecuador		
1993		Bolivia, Paraguay		Chile, Venezuela
1994	Costa Rica	Colombia, Panama	Mexico	Brazil, Uruguay
1995		Argentina, Peru		
1996		Ecuador		
1997		Bolivia		
1998	Costa Rica	Colombia, Ecuador, Paraguay		Brazil, Venezuela
1999		Panama		Argentina, Chile, Uruguay
2000		Peru	Mexico, Venezuela	
2001		Peru		
2002	Costa Rica	Bolivia, Colombia		Brazil, Ecuador
2003		Argentina, Paraguay		
2004		Panama		Uruguay
2005				Bolivia, Chile
2006	Costa Rica	Colombia, Peru	Mexico	Brazil, Ecuador, Venezuela
2007				Argentina
2008		Paraguay		
2009		Ecuador, Panama		Bolivia, Chile, Uruguay
2010	Costa Rica	Colombia		Brazil
2011		Peru		Argentina
2012			Mexico	Venezuela
2013	Ecuador	Paraguay, Venezuela		Chile
2014	Costa Rica	Colombia, Panama		Bolivia, Brazil, Uruguay
2015				Argentina
2016		Peru		

Table 02

General Characterization of Variables

Variable	Obs	Mean	Std dev	Min	Max
Gvt Balance	1119	-2.0113	5.0514	-74.8403	13.0623
GDP _{real}	1323	0.0069	0.0223	-0.0896	0.861
GDP _{percapita}	1336	10.076	3.0649	5.6814	14.502
Md _{elast}	1098	-1.4961	44.366	-1064.3	536.2
Ele	273	0.194	0.396	0	1
Elep	268	0.191	0.393	0	1
PBC	472	0.053	0.578	-1	1

Table 02 provides a full characterization of each variable. The basic structure of the pooled regression model would be:

$$\begin{aligned}
 GvtBalance = & \beta_0 + \beta_1(GDP_{real})_t + \beta_2(\log GDP_{percapita})_t + \beta_3(ele)_t + \\
 & \beta_4(elep)_t + \beta_5(Md_{elast})_t + \beta_6(LDV)_{t-4} + \beta_7(ele \times Md_{elast}) + \mu_i
 \end{aligned}
 \tag{1.4.2}$$

For our model, we assume the government has an opportunistic utility function and that elected officials control fiscal policy (taxes and expenditure) but they rely on having a majority in all houses supporting them in order to succeed. A lagged dependent variable is included based on the assumption that past levels of fiscal policy influence the levels in future years. Because of our argument, interactions between elections and the *Md* elasticity are necessary. The modeling of the interaction between these variables is matter of interest as each factor influence the decision making process by themselves but also, its interaction may have an effect on the political budget cycle.

Given our theoretical background model we know that when *Md_eelasticity* is large, a small change in the interest rate would recover the equilibrium after a fiscal expansion shock, leaving the output without effect. Therefore, from our hypotheses, we would expect that when the *Md_eelasticity* is low, the fiscal balance should decrease in pre electoral quarters: we expect a positive sign between

the interaction of the pre electoral dummy and the elasticity measure. In summary, we expect a negative sign from our pre electoral dummy variable, a positive sign from the interaction effect pre elections and $Md_{elasticity}$, and the inverse for post electoral timing.

Jorge Streb and Pablo Garofalo kindly provided the quarterly real interest rate and GDP figures in nominal and real terms. To calculate the latter, they followed the Fernandez (1981) distribution procedure, available in MATLAB, using quarterly import series. Appendix 03 shows their computation.²⁵ The fiscal and GDP data are from IFS, International Financial Statistics from IMF, and the population numbers were taken from the WDI, World Development Indicators, from WB.

1.4.1 Econometric Analysis

Normally, the analysis of panel data has to consider the classical problems of serial correlation and unit heterogeneity. Before dealing with them and with the intention of avoiding other series problems, non-stationarity tests were done. As we know, in a non-stationary time series, its expected value at time t to be determined by the expected value taken at t_0 , causing estimation problems²⁶ On this matter, the Fisher test was done; it is based on the p-value of n independent tests and considers that all series are non-stationary, against the alternative that at least one of them in the panel is stationary. There is no evidence in this model of a unit root either in the original nor the transformed series as the null hypothesis of non-stationarity was rejected.

Although the countries considered are supposed to be similar a *grosso modo*, it is impossible to think of them as homogenous. Hence, the heterogeneity condition is one of the problems we may have. Unit heterogeneity can have three different causes: individual effects, interaction variables, and omitted variables. Its definition is important because if the individual effects are significant, for example, OLS estimation would be biased and inconsistent. In order to determine the presence of heterogeneity, an analysis of the cross sectional variation and the variance over time of the sample countries is made. Table 03 helps with a part of this evaluation since it shows the decomposition of

²⁵This represents a caveat of the present investigation, as the results will depend on this calculation.

²⁶Cointegration would be needed.

the standard deviation in two components: between and within variation.

Table 03
Cross Sectional Time Series Summary of Statistics

Variable	Specification	Mean	Std dev	Min	Max	Observations
<i>GvtBalance</i>	overall	-2.0113	5.0514	-74.840	13.0623	$N = 1119$
	between		-2.2006	-7.0372	1.9506	$n = 13$
	within		4.6793	-69.8144	12.1199	$T = 86.0769$
<i>GDP_{real}</i>	overall	0.0069	0.0223	-0.0896	0.0861	$N = 1323$
	between		0.0023	0.0042	0.0122	$n = 13$
	within		0.0222	-0.0949	0.0885	$T = 101.769$
<i>LogGDP_{pc}</i>	overall	10.0762	3.0649	5.6814	14.5015	$N = 1336$
	between		3.2042	5.8000	14.4118	$n = 13$
	within		0.1276	9.5995	10.5535	$T = 102.769$
<i>Md_{elasticity}</i>	overall	-1.4961	44.3658	-1064.3	536.20	$N = 1098$
	between		3.2647	-9.0466	4.1524	$n = 13$
	within		44.2548	-1060.3	530.55	$T = 84.4615$

As intuitively expected, the log of real GDP per capita, has a larger between-countries variation than within, all the other independent variables reflect their differences among countries as the within variation is bigger. Almost all variation comes from the heterogeneity within the countries and not between them, but it has to be tested before making any conclusions. Hence, specification tests were done in order to contrast the Gauss-Markov theorem²⁷ and determine if the estimators are the best linear unbiased estimators, BLUE.

The Breusch-Pagan test for heteroskedasticity showed a probability outcome of 0.0000, therefore, the null hypothesis of constant variance was rejected. To test the omitted variable bias, a possible reason for heteroskedasticity, the Ramsey regression specification-error test was applied. The null hypothesis that the model has no omitted variables was rejected.²⁸ The source of this bias

²⁷In this case we will have a BLUE estimator if the errors are homoskedastic and are not serially correlated.

²⁸P-value = 0.0000, rejecting the null hypothesis of no omitted variable bias.

could be the exclusion of individual effects or the presence of interaction variables.

High multicollinearity between two explanatory variables makes it harder to identify the unique effect of each variable on the dependent variable; to check for the presence of this problem, the variance inflation factors test(VIF) was done. It calculates the centered or uncentered VIFs for the independent variables specified in a linear regression model. Each independent variable has a VIF value. If the mean VIF value is larger or equal to four, then there is a multicollinearity problem. In the present case the mean VIF was 1.01; the minimum value was for the elasticity measure, 1, the same values as the GDP per capita. Consequently, there is no problem with multicollinearity.

From these tests, we can confirm that the pooled time-series violate three of the standard assumptions about the error process. First, errors are contemporaneously correlated, such that errors in country A at time t are correlated with errors in country B at time t . Second, the error process²⁹ displays panel heteroskedasticity, meaning that the variances of the error differ among countries. And third, there might be serial correlation within the same country such that errors at time t are correlated with errors at time $t + 1$.

Assuming that we have a one-way error component model for the disturbances of this panel, the errors $u_{i,t}$ would be compounded by an unobservable individual specific effect, m_i , and a remainder disturbance, v_i . The Fixed Effects, FE, model assumes m_i , as fixed parameters to be estimated and the remaining disturbances stochastic with v_i independent and identically distributed. The independent variables are assumed independent of v_i for all i and the null hypotheses, H_0 , states that all the individual effects, m_i , are the same and equal to zero.

As well, tests for heteroskedasticity and serial correlation were done for the FE model. Using the procedure derived by Wooldridge (2002:282-283) to test for autocorrelation in panel-data models, the null hypothesis of no autocorrelation was rejected, with a probability value of 0.0012. At the time of testing heteroskedasticity, a modified Wald statistic was used, which tests the hypothesis: $\sigma_i^2 = \sigma^2$, homoskedasticity; it was rejected ($p = 0.0000$). Hence, there is a problem of autocorrelation

²⁹Beck and Katz (1995).

and heteroskedasticity with this model, as well as omitted variable bias.

Table 3

Summary of Results - Fixed and Random effects

Dependent Variable: Government Balance

	Model 1	Model 2	Model 3	Model 4
LDV	0.645*** (0.032)	0.646*** (0.032)	0.705*** (0.0296)	0.706*** (0.0296)
GDP _{real}	10.70* (6.4562)	11.29* (6.4796)	8.002 (6.4214)	8.636 (6.4468)
GDP _{pc}	-4.124** (1.8558)	-4.049** (1.8563)	-0.0517 (0.0452)	-0.0503 (0.0452)
Md _{elast}	0.00159 (0.0026)	-0.000657 (0.0031)	0.00178 (0.0027)	-0.000762 (0.0031)
Ele	-0.209 (0.2952)	-0.205 (0.2954)	-0.296 (0.2963)	-0.292 (0.2964)
Elep	0.186 (0.2975)	0.195 (0.2976)	0.236 (0.2979)	0.244 (0.2979)
Elep _{elast}		0.00774 (0.0392)		0.00443 (0.0394)
Ele _{elast}		0.00906 (0.0062)		0.0102 (0.0062)
cons	38.01** (17.91)	-1.048* (0.5646)	37.25** (17.917)	-0.098* (0.5653)
N	875	875	875	875
Rsq	0.416	0.4175		
Adj Rsq	0.3995	0.3997		
AIC	4800.699	4802.442		

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The alternative to the FE model is the Random Effects model, RE, which assumes m_i random, and independent from v_i . In addition, the explanatory variables are independent of m_i and v_i for all i . For this model there is no test for autocorrelation; by its assumptions it is ruled out. Even though this model is an appropriate specification if there would be a random sample from a large population, its estimation results were analyzed and compared.

The Breusch and Pagan Lagrangian multiplier test was done to determine that the null hypothesis of homoskedasticity is rejected at the 10% level, $p = 0.0602$. Before treating the heteroskedasticity problem, the interaction effects (between the election variables and the elasticity measure) are included in the models, in order to test the hypotheses and to control for the omitted variable bias. Table 04 display the results for FE and RE, with and without the interaction effects. Model 1 and 3 are the base line models as they consider the main-effects only. In all the models presented, although the sign on the electoral dummies is the one expected, none of our main variables of interest turned out significant.

The Hausman test was done to be confident that FE model would give better results for our model. Through the development of its specification test, Hausman showed that his null hypothesis could be used to compare b_{within} and $b_{between}$. The null hypothesis establishes that the difference among coefficients is not systematic for this model, therefore, it is rejected in all cases,³⁰ leading to conclude that the fixed effects model is consistent while the random effects model is not.

Including a lagged dependent variable, LDV, into a fixed effects model causes Nickell-bias, meaning that the error term would be correlated with the LDV, but because our panel has $T > N$, the estimator is still consistent.

The tests done after obtaining the results from the FE model show that the heteroskedasticity and autocorrelation problem persists. Each of these violations is likely to diminish the estimated value of standard errors, altering the estimation of significance of the coefficients. Hence the selected procedure has to solve both problems without generating too many undesired effects. The fitted

³⁰The probability value = 0.0006 and 0.0369.

panel data model, Beck and Katz (1995) panel corrected standard errors, is used for this purpose.

The linear regression with Panel Corrected Standard Errors (PCSE) gains explanatory leverage from cross-national and cross-temporal data, while correcting for possible spatial and temporal correlation of errors. We estimated several models, specifying different scenarios of error correction. Along with it we included three different measures of the electoral timing, *ele*, *elep* and *PBC*, were included. The latter, following Streb (2011) as it responds to our third hypothesis: the effects of fiscal manipulation before elections, cancel out with the decrease in government balance after elections. *PBC* is a dummy variable equal to 1 for the electoral year, -1 for the post election year and 0 otherwise.

As seen in the previous section of the context of Latin America, the region is well known as one of the more heterogenous and even when some economic context is shared their history can be completely different in terms of political reactions, for example. Therefore, country dummies were included to control for country specific effects. The next tables, 05 and 06, show the results accounting for individual effects and specify the way in which the errors were corrected.

We can observe that with the PCSE methodology, some estimated coefficients are different from before. Looking at our variables of interest, even when having our expected sign, electoral dummies are not significant, but the interaction between the pre electoral quarters and the M_d elasticity is positive and significant. This result confirms our hypothesis: when money demand elasticity increase, fiscal policy becomes less effective and therefore it is more expensive in terms of balance to manipulate.

Table 05

Summary of Results - Panel Corrected Standard Errors

Dependent variable: Government Balance

Electoral variable: Ele (before elections) and Elep (after elections)

	Model 5	Model 6	Model 7
LDV	0.646*** (0.0503)	0.638*** (0.0527)	0.624*** (0.0551)
GDP _{real}	11.29* (6.012)	9.96 (6.086)	10.20* (5.852)
GDP _{pc}	-4.049** (1.9110)	-4.024* (2.1711)	-4.757** (2.1901)
Md _{elast}	-0.000662 (0.00295)	-0.000749 (0.00282)	-0.00161 (0.00207)
Ele	-0.205 (0.2976)	-0.114 (0.3279)	-0.11 (0.3342)
Elep	0.195 (0.2887)	0.15 (0.3174)	0.0634 (0.3222)
Elep _{elast}	0.00774 (0.03183)	0.0143 (0.03132)	0.0116 (0.031)
Ele _{elast}	0.00906* (0.00481)	0.0107** (0.00427)	0.00989** (0.00431)
cons	30.60** (15.181)	30.35* (17.244)	36.08** (17.390)
N	875	875	875
Rsqr	0.5061	0.4757	0.5129
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.Next table depicts the results of the PCSE with individual effects and the *PBC*; it also specifies

the type of error correction implemented for each model.

Table 06

Summary of Results - Panel Corrected Standard Errors

Dependent variable: Government Balance

Electoral variable: PBC (before and after elections)

	Model 8	Model 9	Model 10
LDV	0.647*** (0.0499)	0.640*** (0.0523)	0.626*** (0.0549)
GDP _{real}	11.40* (5.977)	9.955 (6.054)	10.37* (5.8234)
GDP _{pc}	-3.927** (1.9111)	-3.952* (2.1634)	-4.694** (2.1771)
Md _{elast}	-0.000525 (0.00293)	-0.000559 (0.0028)	-0.00154 (0.00206)
PBC	-0.327* (0.1907)	-0.269 (0.2071)	-0.24 (0.2075)
PBC _{elast}	0.00878* (0.00474)	0.0103** (0.00466)	0.00966** (0.00426)
cons	30.00** (15.1823)	29.81* (17.1842)	35.58** (17.2853)
N	875	875	875
Rsqr	0.5071	0.4774	0.5145
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

From table 06 we observe the coefficient of our interaction effect between *PBC* and the elasticity, the difference from the results of Table 05, is that the *PBC* variable considers the effect before and after the elections. Given this last result, we may think the effect before the elections is stronger when considering the elasticity as it is evident from model 08 that if it is not the case, the coefficient

has the opposite sign. The PBC's coefficient of -0.327 indicates that there is a negative effect on the government balance when considering four quarters before and four quarters after elections take place; in fact, the government should be on average, 0.327 smaller than the other quarters not considered as PBC.

Given that our interaction effect between one of the electoral dummies and the elasticity of money demand turned significant in all PCSE models, it is valuable to remember that the coefficient of a two way interaction effect indicates the number of units that the slope of fiscal manipulation on the electoral year, changes according to the elasticity measure. Hence the value of 0.0107 from model 06, for Ele_{elast} means that the way in which fiscal manipulation behaves during an election year will be affected positively given the measured elasticity. But this effect is just considering the interaction's coefficient. When considering all the coefficients of the interaction effects regression and comparing them with those only considering the 'main effects', there are major differences as the latter models estimate relationships averaging across all levels of the other predicted variable, while in the 'product term' models, conditional relationships are estimated, centered in a specific value of the other independent variable included in the interaction effect (Jaccard and Turrisi, 2003:24).

To contrast the specification for the models in Tables 05 and 06, and as a measure of robustness, we decided to estimate the model but without individual effects. Still, the results turned to be pretty similar from the ones just analyzed from Table 05 and 06.³¹

Broadly, these results seem robust: the interaction of PBC_{elast} along with the interaction of Ele_{elast} are consistently positive and significant. Meaning there is a significant relationship between the M_d elasticity and the level of government balance, during electoral periods. Still, we cannot say this is overwhelmingly conclusive as the electoral dummies did not reflect a significant relation with our dependent variable, with the only exception of model 06.

Looking at these results and considering a political perspective, we may say there is evidence that the fiscal balance from Latin American governments behave differently when elections approach

³¹Result tables are depicted in appendix 04 and 05 respectively.

context conditioned to the behavior of each country's elasticity of money demand. Incumbents will not try to influence the fiscal balance when doing so can be expensive because money demand will react even with a small change in the interest rate, hence, an expansive fiscal policy would have no effect.

1.5 Final Remarks

The Political Business Cycle theory states that there is a predictable pattern in fiscal policy, as an incumbent's term in office starts with relative scarcity in the first years of governance but ends with a larger expenditure right before elections as voters take the pre-electoral economic situation as an indicator of government's performance. But could it be expected that there will be the same pattern of government spending (before elections) and timing to start manipulating in countries with different characteristics?

We argue that fiscal manipulation is arbitrated by the contextual variable of fiscal policy effectiveness, which is determined by a time and unit specific set of economic conditions. In this sense, given the context of the recent economic crisis, which affected globally in different ways and scales, the PBC theory becomes an important tool to analyze and understand recovery policies and subsequent changes in the political environment because it help us defining policy reaction functions. Hence, it may contribute to the resurgence of the academic debate related to the return of Keynesian policies. It should be noticed that leading economies as the USA and the UK experienced elections during the turbulent period of 2008-2010 that resulted in changes in office. Even though both countries were experiencing much of the same disease and were forced to execute monetary policies like quantitative easing, their fiscal policies were not homogeneous and varied from tax exemptions, expense reductions or augmented levies on some products.

Despite the scope of this assessment was not centered on the effects of the crisis in specific countries nor an evaluation of recovery policies, it may become a contribution to further work. It was the purpose of this study to contribute to the discussion of the PBC topic, by estimating the magnitude

and significance of the political business cycle moderated by M_d elasticity. The evidence found timidly favored the hypothesis of the existence of the PBC in Latin American countries, not only as a pre-electoral fiscal expansion, but also having an effect on the periods after the election takes place.

Nevertheless, there are three important considerations for further research. Firstly, this was mainly a domestic economy exercise, as the relationship between different countries was only captured through the net exports component of GDP. It would be of great significance to do a similar exercise including external variables such as exchange rate and trade openness. Secondly, we believe the level of debt is crucial when considering Latin American countries. As said by Kaplan and Thomsson (2016), politicians still operate according to the standard electoral logic, assuming voters respond to economic conditions, but their incentives change when their governments are deeply indebted to global bond markets. And thirdly, each country's institutional context may condition the existence of PBC.

A smaller flaw from this study that should be considered for future research is the quarterly PBC calculation that was done by Streb and Garofalo as the method applied may embrace lots of information, which can obscure its precision. In addition, the selection of how to measure the fiscal policy effectiveness may not be the most faithful, it could be that politicians take into account other measures, i.e the fiscal multipliers from neo-Keynesian models.

This research has the advantage of offering a better accuracy for the moment when elections take place; there is a difference if elections are in February or December, which is imperceptible if the effect is measured with a yearly dummy variable. Because there was an omitted variable bias problem, it may be thought that the other domestic factors, which influence the incentives and constraints on fiscal manipulation, should be included.

The analysis showed a comparatively large within variation among the sample of variables; as a result, a more detailed study of time (considering different time periods, for example) could provide valuable contributions. Additionally, the quarters from the 80's decade present lots of missing values, especially for Peru and Paraguay, so making subsamples could give a richer analysis. Other possible

source of problems may arise from determining the context-conditional circumstances relevant for the analysis. As mentioned and observed from the economic and political context given, each country's experience may have significant differences which may interfere when estimating cross sectional time series models.

Appendix

Appendix1

Political Business Cycle Theory: first and second generation models

First Generation Models

The traditional opportunistic model, utilizes the long term Phillips curve, LRPC, when $\pi_t = \pi_t^e$, the inflation rate is equal to the expected inflation rate, and a short run, SRPC, when $\pi_t = \pi_{t-1} + \pi_t^e$.

With the assumption that quantities respond more rapidly to changes than prices, the government could manipulate the macroeconomic forces to reduce unemployment in the short run without worrying of the inflationary effect that comes afterwards. If voters ignore future inflation, the decrease in unemployment must provoke a raise in the number of voters for the incumbent party, increasing its chances for re-election. There is further advantage in countries in which the government has some discretion in choosing the election date, as the party in power may ensure that elections occur under favourable economic conditions.

It can be observed that if elections are in period $t+1$, the incumbent can expand aggregate demand by manipulating monetary or fiscal policy, AD, going from point A to B. In B, inflation is greater than expected, $\pi_{t+1} > \pi_t = \pi_{t+1}^e$, and growth is above the natural level, $y_{t+1} > y^*$. The election will take place at the end of period $t+1$, with high growth and inflation increasing quietly.

The model represents the theoretical argument that before each election, growth will be higher and unemployment will be lower than normal, with a subtle increase in inflation. After elections, a more considerable increment on inflation that will be reversed generating a recession. Alesina et al (1997, p. 22) characterize this economic cycle as ineffective, as it creates volatility without any gains, it may increase average inflation without positive returns in average growth or unemployment.

Rational Opportunistic Models

Whether governments are able to manipulate certain circumstances in order to get a positive growth result is the main debate in the literature of PBC. The study has evolved from myopic voters, as stated above, to a context with rational voters where they take the pre-electoral economic situation as signal of government's performance; if they produce an election year expansion, they demonstrate their governing ability.

The ability to remain office clearly will depend on the ability to achieve the policies, which maximize the utility of those who elect them, a small group, a single individual or all the population. This situation can be interpreted as a principal-agent problem, where decisions influencing the welfare of one individual or group (the principal) are taken by someone else (the agent); in this case, the voter would be the principal and the elected the agent. The key question is how the actions of the agent can influence the decision of the principal.

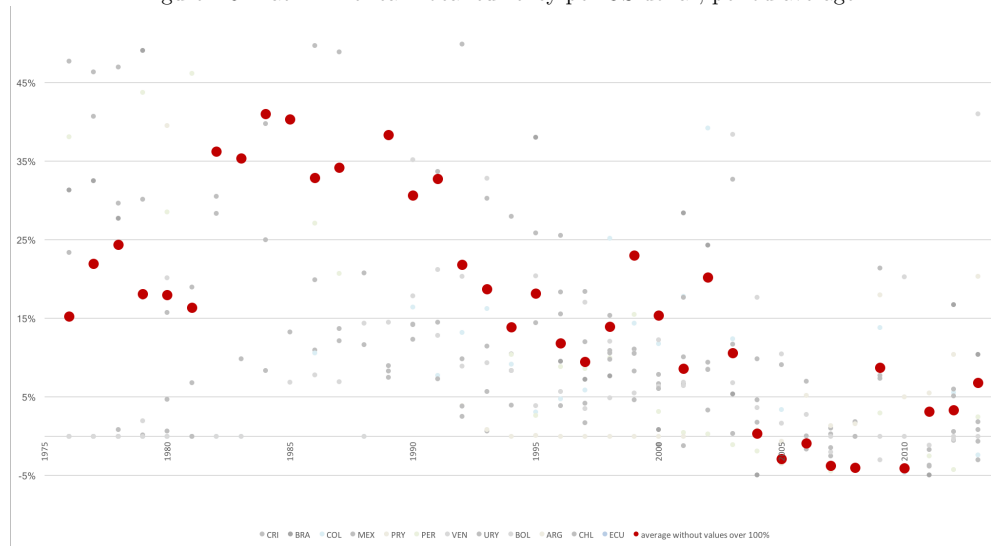
Through elections, the agent who is more competent and/or whose objectives harmonize those of the electorate will be chosen and those who fail to accomplish them will be punished. Trying to signal as much competence as possible, policymakers' behaviour leads to a political business cycle, these are the second-generation models. In this case, voters' rationality acts as a constraint on how opportunistic politicians can be; hence, the cycles in these models compared to the first generation, have a shorter life, are smaller in magnitude and are less regular.

There have been different formalizations of this concept; in order to compare the assumptions of both generations, Persson and Tabellini's (1990) version is reviewed as it has a more direct relation with the Phillips curve argument. Following Rogoff and Sibert (1988) many variants of the rational voter / opportunistic PBC model have appeared; the main difference is based on the ability to manage the economy. Even though, they predict, as the myopic voters models, that governments will increase spending, run deficits, or maybe create some inflation prior to elections.

Appendix 2

Official exchange rate annual change

Figure 1.6: Latin America - local currency per US dollar, period average



Appendix 3

Distribution of annual GDP at quarterly frequency Source: Streb et al (2011:28)

Quarterly GDP data is available for a few countries during short periods in the International Financial Statistics (IFS) of the IMF, so we disaggregate annual GDP data at quarterly frequency using import data.

Real GDP and imports in constant dollars are $I(1)$ series, while their first differences are $I(0)$. In general, the residuals of the unrestricted regression in levels of real GDP against real imports follow a random walk, but when the first differences of these variables are used the null of a random walk can be rejected according to the Augmented Dickey-Fuller (ADF) tests.

Hence, we follow the approach proposed by Fernandez (1980) when the residuals of the regressions in levels are non-stationary, but the first differences are stationary. The methodology is to apply the distribution technique of Denton (1971) to construct a high frequency series from a low frequency series, which is solved by minimizing a quadratic loss function, using the sum of the squares of the differences between the first differences of the series to be estimated and the first differences of the high frequency series, subject to the constraint that the sum of the variations of the estimated high-frequency series must add up to the actual annual variation. To distribute yearly real GDP on a quarterly basis, the coefficients of the restricted regressions of real GDP against imports in dollars, deflated by the US CPI, were used.³²

As to nominal GDP, it is first deflated by the CPI and then distributed using imports in dollars, deflated by the US CPI. The use of the CPI to deflate the nominal series is dictated by its availability on a quarterly basis. With our quarterly estimates of real GDP, the CPI is used to construct the nominal GDP series. The annual sum of the estimates of nominal GDP differ from the original series, so we apply a correction factor using the ratio between the estimated nominal GDP and the nominal GDP reported by the IFS to divide the estimated series. This correction factor insures that the annual sum of the estimated series adds up to the actual annual figure; to make sure there were

³²These coefficients were estimated using the MATLAB package.

no jumps in the series, we reviewed the annual correction factors, finding them practically constant for each country.

Appendix 04

Summary of Results - Panel Corrected Standard Errors

Dependent variable: Government Balance

Electoral variable: PBC (before and after elections)

	Model 11	Model 12	Model 13
LDV	0.706*** (0.046)	0.658*** (0.050)	0.685*** (0.051)
GDP _{real}	8.636 (6.0119)	7.402 (6.0658)	6.95 (5.8623)
GDP _{pc}	-0.0503 (0.04367)	-0.0483 (0.05138)	-0.0406 (0.0493)
Md _{elast}	-0.000763 (0.00294)	-0.000831 (0.00279)	-0.00168 (0.00211)
Ele	-0.292 (0.29872)	-0.182 (0.33595)	-0.166 (0.34036)
Elep	0.244 (0.2897)	0.174 (0.32485)	0.123 (0.3281)
Elep _{elast}	0.0043 (0.03264)	0.0127 (0.03186)	0.0106 (0.03182)
Ele _{elast}	0.0102** (0.00488)	0.0120** (0.00476)	0.0115*** (0.00442)
cons	-0.98** (0.55335)	-1.227* (0.63769)	-1.453** (0.6418)
N	875	875	875
Rsqr	0.4884	0.4537	0.4834
Indiv Effects	No	No	No
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix 05

Summary of Results - Panel Corrected Standard Errors

Dependent variable: Government Balance

Electoral variable: PBC (before and after elections)

	Model 14	Model 15	Model 16
LDV	0.707*** (0.046)	0.687*** (0.049)	0.687*** (0.051)
GDP _{real}	8.844 (5.9781)	7.44 (6.0371)	7.147 (5.8376)
GDP _{pc}	-0.0514 (0.04355)	-0.0494 (0.05103)	-0.0418 (0.04912)
Md _{elast}	-0.000647 (0.00291)	-0.0000655 (0.00277)	-0.0016 (0.0021)
PBC	-0.395** (0.19295)	-0.319 (0.21309)	-0.298 (0.21212)
PBC _{elast}	0.00996** (0.00481)	0.0116** (0.0047)	0.0113*** (0.00437)
cons	-1.082** (0.54073)	-1.202* (0.62278)	-1.442** (0.62726)
N	875	875	875
Rsqr	0.4899	0.4555	0.4853
Indiv Effects	No	No	No
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 2

The dynamic effects of fiscal policy in Costa Rica

Abstract

This paper estimates for the first time the macroeconomic effects of exogenous fiscal policy shocks in Costa Rica using a Structural Vector Autoregression (SVAR) model. The model follows the three variable SVAR framework proposed in the seminal paper on this topic by Blanchard and Perotti (2002). We do this in order to examine the dynamic responses of output and determine if fiscal expansive measures (increasing spending or reducing taxes) have a positive effect on Costa Rica's economic growth. Implicitly we will also be testing one of the assumptions of the Political Budget Cycles (PBC) theory; fiscal policy is a tool the incumbent has to create a PBC. We use quarterly data from 1991 until 2009.

2.1 Introduction

Markedly after the financial crisis of 2008, the debate among economists about the impact of fiscal policy on the economy grew significantly. Governments have decided to implement important stimulus programs even though empirical research results lack consensus on the effectiveness of fiscal policy as an economic stimulant. The two well-known theoretical streams on the matter maintain their fundamentals and support in the discussion: the *neoclassicals* maintain the idea that government spending has different effects than those predicted by *neo-Keynesian* models, as empirically, on several occasions private consumption and GDP increased significantly while government spending was severely cut. The effects on consumption and real wages are the opposite; for the *neo-Keynesians*, these will increase as their models consider not only the labor supply shift because of the wealth effect but also a shift on the labor demand curve as the aggregate demand increases (real wage increases).

This study intends to provide further evidence on the characterization of the dynamic effects of shocks in government spending and taxes on economic activity. Evaluating these effects is an essential input for any political economy decision. In case of a recession, it is necessary to determine if fiscal policy, defining its impact and timing, can be a suitable instrument. We implement a structural VAR approach, which is widely used on this literature, but generally for developed economies, mainly because of the difficulty of obtaining complete and good quality data for other countries. For an emerging economy as Costa Rica, the effects of its fiscal policy have never been estimated individually.

Fiscal policy in the context of developing economies remains relatively understudied in the literature. To estimate the dynamic effects of fiscal policy shocks on the Costa Rican economy, we will examine the dynamic responses of output, and determine if fiscal expansive measures (increasing spending or reducing taxes) have a positive effect on Costa Rica's economic growth. Implicitly we will also be testing one of the main assumption of the Political Budget Cycles theory, PBC, which states that political incumbents can affect the economy through fiscal policy. The few existing studies are an important platform even though they remain open to criticism on the basis of methodological

grounds (i.e.using annual data).

It is just lately that this topic has gained a particular importance, not necessarily because of its theoretical development but because of its empirical implications. It was with the financial crisis of 2008 that some countries, as those in the European Union, realized fiscal policy was the only instrument governments had to impact the economy and respond to external shocks. Even though, this impact is not the same for every country; what empirical evidence has shown is that country specific characteristics may alter the fiscal policy's capacity of having an impact on the economy.

For example, Costa Rica has Constitutional mandates and several laws that set expenditure targets which have turned its fiscal situation somewhat rigid as generally, these mandates were created without a correspondent financing source and represent approximately 40% of government's expenditure. We support the argument that the effectiveness of fiscal policy must be measured from a perspective considering these specific characteristics. Therefore, we are aiming to contribute to the debate by characterizing the dynamic effects of shocks in government spending and taxes on output in an emerging economy with a history of fiscal imbalance and legal constraints. Also, with our results we would determine if the empirics support the *Keynesian* theory or not, while considering the weight of the legal framework on the multiplier. By the end of the study we should be able to determine if fiscal policy is an effective instrument for the Costa Rican government to implement as an answer to external shocks or with electoral purposes.

The structural VAR approach implemented by Blanchard and Perotti (2002:1330) has been the common standard to answer these questions. There are mainly two reasons for the selection of this approach. First, fiscal variables move for many reasons, of which output stabilization is rarely predominant; there are exogenous fiscal shocks with respect to output. Second, decision and implementation lags in fiscal policy imply that, at high enough frequency there is little or no discretionary response of fiscal policy to structural contemporaneous movements in activity. Thus, with enough information about tax and transfer systems, we can estimate the automatic effects of structural movements in activity on fiscal variables, and by implication, obtain estimates of fiscal policy shocks. Having identified these shocks, we can then trace their dynamic effects on GDP and

its components. Knowing how the variables respond to government spending shocks helps us with the analysis of the effectiveness of fiscal policy in a developing economy.

Results of Blanchard and Perotti (2002:1331) show government spending shocks as having a positive effect on output, and positive tax shocks as having a negative effect. The size and persistence of these effects vary across specifications and sub periods; yet, the degree of variation is not such as to cloud the basic conclusion. It is part of the development of this research to propose a different identification process to contrast with the one used by the authors and evaluate the robustness of the main conclusions.

Evaluating the size of fiscal multipliers often depends on having quarterly data to identify the exogenous fiscal policy shocks, our Costa Rican sample goes from the first quarter of 1991 until the fourth quarter of 2009. For the system of equations, we achieve identification modifying some of the restrictions outlined by Blanchard and Perotti (2002).

As a subsequent objective, knowing the fiscal policy effectiveness in Costa Rica or any other country through the effect of its multiplier in the short term, implicitly allows us to test the main assumption of the PBC theory: is it possible for the incumbent to manipulate the economy's output through fiscal policy? According to Drazen (2000:2), if voters respond to good economic conditions, they are more likely to vote for the incumbent, if an expansionary fiscal policy provides higher growth. However, even if good economic conditions help an incumbent's chances of reelection, it is not very clear if fiscal manipulation per se will be effective to create these conditions or if politicians have the technical knowledge on the topic to be an advantage. This research will deal with the former.

Therefore, we would add to the utility of fiscal multipliers its valuable input to the incumbent when choosing between the tools they may have to influence the economy within the electoral timing. Still, we are not assuming politicians will use this technical analysis, but it would be helpful as input for their decisions.

The rest of the chapter is organized as follows: section II presents the theoretical background, to

be followed by a brief characterization of Costa Rica's economy, specifically variables affecting fiscal policy or its multiplier. The methodological issues are presented in section IV, including the main specification of the model and its identification. Section V discusses the data and the econometric analysis, while section VI concludes with a brief summary of results, its implications for Costa Rican public policy and material for further research.

2.2 Literature Review

The importance of properly identifying the role of exogenous government spending shock on the economy is immense. In policy making, it is vital for a government to assess the impact of its spending in order to define the effectiveness of its fiscal policy and implement it properly. In this order, knowing the size of fiscal multipliers is essential. And, even though the importance of fiscal policy has never been argued, the effects it has on economic activity in sign and magnitude varies; different research has shown opposite conclusions which rely on a wide range of key assumptions.

Fiscal policy has different effects on growth when considering the short, medium or long run. In general, in the short run the effects are felt through the aggregate demand, while in medium or long run they work through aggregate supply. There are multiple contrasting theoretical models on the topic, as the *Keynesian* and *neo Keynesian* predict responses from fiscal policy on aggregate consumption and demand, hence GDP, while the *neo classical* expect null or even negative effects. An expansive fiscal policy under the *Keynesian* view would boost consumption and private investment, therefore, a shift on the aggregate demand would follow. Under the *neo classical* view, the same expansive fiscal policy, would decrease consumption, as only the structural policies can have an effect on aggregate demand. Also, if there is an inflation target, there would be a pressure on prices that would raise interest rates affecting private investment.

Within economic theory, the effects of fiscal policy on growth will depend on the considered time horizon, the assumptions on the behavior of economic agents and the credibility of the decisions taken by government. The traditional *neo Keynesian* theory assumes a medium time horizon,

with myopic agents who will not consider the government's (public sector) inter temporal budget constraint on their decision making process, idle capacity in the economy and rigid wages. Broadly, it would be expected a positive public spending multiplier, larger or equal to one in the short run if the spending is financed with the same amount of taxes.

On the other hand, the *neoclassical* theory assumes rational consumers, infinite horizon, an agent's inter temporal budget constraint which considers the one of the public sector and take consumption decisions with long run perspectives (Modigliani's life cycle theory and Friedman's permanent income theory). An increase in government expenditure today would come with an increase in taxes in the future, meaning the present value of the disposable income would not change. As agents foresee this scenario, there are no changes in their consumption. Therefore, fiscal policy is neutral (Ricardian equivalence), independently on how it is financed, an increase in government expenditure has no effect over consumption or GDP. Theoretical estimates derived from general equilibrium Real Business Cycle (RBC) models such as Baxter and King (1993) generally strengthened this view.

There is another kind of models which consider non linearities, for example Sutherland (1997) considers that agents will behave in the Keynesian manner when the public debt stock is low and differently when there is an excessive debt level that threatens future generations with insolvency. The non linearity comes from the probabilities of the public sector's insolvency, if it is low, individuals will not consider the possibility of tax increments in the near future, but if it is high, they save as a tax increase would be imminent.

When considering the empirical evidence on the topic, the picture is not consistent either. In general, positive short term output multipliers from expansive fiscal policies, expenditure expansion or tax cuts have been the result of structural macro models and VAR analysis, but the evidence shows different results (in magnitude and duration), and has been developed within different frameworks. For example, Romer and Romer (2008) found that a change in fiscal policy of one % of GDP, increases GDP by an amount close to 1% and by as much as 2% or 3% when the effect peaks a few years later. Giuliadori and Beetsma (2005) and Beetsma et al. (2006) have explored the effects that domestic fiscal shocks exert on foreign exports in the EU countries, finding that trade spillovers are

significant. Corsetti and Muller (2006) identify fiscal shocks for the US, Canada, the United Kingdom and Australia, concluding that twin deficits phenomena are more limited in relatively closed economies and with less persistent fiscal shocks. On the other hand, there is evidence of negative fiscal multipliers from Perotti's (2004) research on OECD countries.

With U.S. data, Blanchard and Perotti (2002) found that expansionary fiscal shocks increase output. Following a direct expenditure shock, private consumption reacts positively and private investment reacts negatively. The identification method proposed by them has also been applied to U.S. data in Perotti (2002), who uses a five-variable VAR, which includes GDP, the GDP deflator, government direct expenditure, net revenue and the interest rate.

In contrast to developed economies, where a wide variety of studies can be found, research on developing economies is not as broad. Still, this does not make a difference when looking for consensus on empirical results, as from the literature available we observe differences in magnitude, duration and sign. From structural macro models, Bose, Haque, and Osborn (2007) considered the disaggregated expenditure finding that public investment in education and total expenditure on education are the only items which had a positive correspondence with economic growth. Research from Chile's fiscal policy by Cerda et al.(2005) contradicts the standard Keynesian theory results, with a negative multiplier. They state their result as part of the evidence for the theoretical argument that with a fiscal expenditure increment, individuals anticipate larger taxes on the future and therefore, reduce permanent income which translates in decreasing private expenditure and GDP. But Gualu (2013) shows that an increase in government spending would lead to a short-lived expansion of output and consumption, an immediate deterioration of net exports and an appreciation or no effect on exchange rates for nine developing countries¹; all fiscal multipliers are greater than one.

Estevao and Samake (2013) find that, differently from advanced economies, fiscal consolidation in low income countries has only a small temporary negative effect on growth while raising medium term output. Iltetzki et al.(2013) appeal to the economic heterogeneity and sustain that the impact of government expenditure shocks will depend on key country characteristics (level of development,

¹Chile, Colombia, Dominican Republic, Malaysia, Mexico, South Africa, Thailand, Tunisia and Uruguay.

exchange rate regime, openness to trade and public indebtedness). With a dataset of 44 countries², they found that the output effect of an increase in government consumption is larger in industrial than in developing economies; that the fiscal multiplier is relatively large in economies operating under predetermined exchange rates but is zero in economies with flexible exchange rates. They also found that fiscal multipliers in open economies are smaller than in closed economies and are negative in high-debt countries.

A general drawback in the studies for developing countries is the quality of the data as in many of them, quarterly data is recently available, therefore time series are quite short. Many researchers have decided to use interpolated annual data leaving out significant information on the real behaviour of the variables considered. In fact, as stated by Iltzetzi et al.(2013:242) the use of quarterly data that is collected at a quarterly frequency is essential for the validity of identifying assumptions used in SVAR models. In addition, data reported at a quarterly frequency but collected at an annual frequency may lead to spurious regression results.

Even though there is some research on developing economies, data availability is scarce for a full panel of Latin American economies. In fact, Costa Rica has almost never been part of a sample; from our knowledge there are two studies which include Costa Rica as part of a panel of developing economies and then, there is a paper from IMF (Estevao and Samake, 2013) which estimates the fiscal multiplier for Central American countries but with annual data. The panel estimations, are a doctoral thesis by Mouhamadou (2014:60), who develops a panel SVAR approach and states that the government spending shock is persistent and its impact on GDP is quasi simultaneous, positive and lasts relatively long. Secondly, there exists a working paper by Contreras and Batelle (2014) who estimate fiscal multipliers by using a GMM estimator and lagged dependent variables as instruments in the SVAR model finding a positive and larger fiscal multiplier in developing countries in comparison to high-income economies.

Estevao and Samake (2013:4-5) state that for the first time in pertinent literature, they estimate short and medium term fiscal multipliers for Central American countries³. They depart from

²Does not include Costa Rica.

³Among others in the sample

Blanchard and Perotti (2002) but because of data limitations they use cointegrating techniques to identify key terms in the vector autoregression's (VAR) variance-covariance matrix; specifically, they used structural vector error-correction model, SVECM, techniques. Their results for Central America, suggest that fiscal consolidation hurts output only in the short term. Their spending multipliers range from -0.01 in Nicaragua to -0.44 in Panama. For Costa Rica, the response of output growth to current expenditure⁴ impact multiplier was -0.044 and the cumulative had a result of 0.7626 .

The models that have used the SVAR framework have differences specially on the way each identifies a fiscal policy shock. According to Castro and Hernandez (2007:1006) these approaches can be summarized in four:

- identification of fiscal policy shocks by using dummy variables to capture specific episodes such as military build ups (Vietnam, for example) done by Burnside et al.(1999); Ramey and Shapiro (1998); Edelberg et al.(1999).
- Impose sign restrictions on the impulse response functions as Faust (1998), Mountford and Uhlig (2002),
- identification of fiscal shocks based on a Choleski ordering, as in Favero (2002) or Fata's and Mihov, (2001),
- finally, by exploiting decision lags in policy making and information about the elasticity of fiscal variables to economic activity as has been done by Blanchard and Perotti (2002), and Perotti (2004).

Estevao and Samake (2013) added a fifth approach which takes into consideration the longer-run properties of fiscal variables, economic activity, among others that enter the VAR model, generally in the form of vector error-correction model (VECM). They state that this approach can be seen as an extension of the Blanchard and Quah(1989) methodology.

We follow Blanchard and Perotti's (2002) seminal approach, employing a three-variable VAR, which includes GDP, government direct expenditure and net revenue. Its methodology has been

⁴Considering other variables for debt feedback and financial constraints. For more information about it, refer to Estevao and Samake (2013).

widely applied in the literature as it was the first analysis that solved the identification problem, associated with earlier stylized facts on the co-movement of spending, taxes and income (Kuckuck and Westermann, 2013). Also, since SVARs require only a minimum set of assumptions, it is a simple methodology to apply to different data sets. Blanchard and Perotti (2002) used quarterly data to be able to make the assumption that government expenditure does not respond to the cycle, and estimate tax elasticities a priori to account for the cyclical response of taxation to the business cycle. As said by Borg (2014:6) this methodology has been utilized quite considerably in country-specific studies, and is generally accepted as a valid starting point in a context where literature about fiscal multipliers in a particular country is at its infancy. This is certainly the case for Costa Rica.

With the above as background the aim of this paper is to provide evidence on the effectiveness of fiscal policy on GDP for an emerging economy such as Costa Rica and test implicitly the main assumption of the Political Budget Cycle theory. This theory's conclusions are based on the possibility and effectiveness the incumbent has to manipulate results in the economy by using available tools, such as fiscal policy.

This theory relies on the findings of Kramer (1971) and Nordhaus (1974). After Kramer's (1971) research⁵ on the relation between economic conditions and election outcomes, Nordhaus (1975:187-188) developed a model of economic cycles determined by political cycles, which was called the *Political Business Cycle model*, PBC. He argued that the basic difficulty in making inter-temporal choices in democratic systems has to do with the high discount rate for future consumption, as the implicit weighting function on consumption has positive value during the electoral period, but is zero or very small in the future. One of his main conclusions had to do with the predictability pattern of policy, as an incumbent's term in office starts with relative scarcity in the first years of governance, but ends with a larger expenditure right before elections.

Whether governments are able to manipulate their fiscal policy in order to get a positive growth result within the electoral period is the main debate in the literature on PBC.⁶ The empirical evi-

⁵He regressed votes received by the incumbent party to growth rate of real per capita income and the inflation rate for that year. He found that the votes going to the incumbent party were inversely related to the inflation rate and positively related to the growth of income.

⁶Refer to appendix 1 for a reference of the results for short term fiscal multipliers in emerging market economies

dence is diverse, even when the studies are for the same country. Therefore, testing if the available manipulating tool for the incumbent, fiscal policy, is effectively affecting output seems like a relevant finding to complement the debate within the PBC theory. If fiscal policy is very effective or not would be a valuable piece of information for incumbents when deciding how to manipulate the economic results with electoral purposes.⁷

2.3 Background Empirical Model

2.3.1 The VAR Model

Vector autoregressive models (VAR) explain the endogenous variable solely by their own history and deterministic regressors. They are set as a system where each variable is regressed on a constant and on k of its own lags as well as on k lags of the other variables; each equation in the VAR will contain the same set of determining variables (Gottschalk, 2001). In its basic form, a VAR consists of a set of K endogenous variables $y_t = (y_{1t}, \dots, y_{Kt})'$. The VAR(p) process is then defined as,

$$y_t = A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t \quad (2.3.1)$$

with A_i are ($K \times K$) coefficient matrices for $i = 1, \dots, p$ and u_t is a K -dimensional process with $E(u_t) = 0$ and time invariant positive definite covariance matrix $E(u_t u_t') = \Sigma_u$ (white noise). Our basic VAR specification is

$$Y_t = A(L)Y_{t-1} + U_t \quad (2.3.2)$$

where $Y_t \equiv [R_t, G_t, X_t]'$ is a three dimensional vector in the logarithms of quarterly taxes (R_t), spending (G_t), and GDP (X_t), all in real, per capita, terms.⁸

$A(L)$ explicitly defined is $A(z) = A_1 + A_2 z + \dots + A_p z^{p-1}$ and $U_t \equiv [r_t, g_t, x_t]'$ is the correspond- (EME) and low income countries (LIC).

⁷This does not mean we assume incumbents are as informed as to know which are the fiscal multipliers and based on them make their decisions, but it would definitely be interesting to consider a model (within PBC) with informed and not informed policy makers.

⁸To express the variables in real terms, GDP deflator was used.

ing vector of reduced-form disturbances, which in general will have nonzero cross correlations, which means there is an orthogonality restriction. $A(L)$ is a distributed lag polynomial that allows for the coefficients at each lag to depend on the particular quarter q that indexes the dependent variable.

The AB Model

The structural VAR (SVAR) departs from the reduced form VAR model; a VAR(p) model can be interpreted as a reduced form model. A SVAR model is its structural form and is defined as

$$Ay_t = A_1^*y_{t-1} + \dots + A_p^*y_{t-p} + B\varepsilon_t \quad (2.3.3)$$

It is assumed that the structural errors, ε_t , are white noise and the coefficient matrices A_i^* for $i = 1, \dots, p$, are structural coefficients that differ in general from their reduced form counterparts. A SVAR model can be employed to identify shocks and trace them, and specifying unique impulse responses by imposing restriction on the matrices A and/or B . Therefore, according to the imposed restrictions, three types of SVAR models can be distinguished: A , B and AB models. We will focus on the latter which considers the restrictions simultaneously of both models, A , and B ⁹. From the A model we consider that there are instantaneous relations between the observable variables directly. And from the B model, we include the interpretation of the structural part of the changes or shocks of the observable variables. Therefore it is common to identify the structural innovations ε_t directly from the forecast errors or reduced form disturbances u_t .

For the AB model, a simultaneous equations system is formulated for the errors of the reduced form model rather than the observable variables directly. Thereby the model accounts for the shift from specifying direct relations for the observable variables to formulating relations for the innovations (Lutkepohl, 2005:364). In this model we arrive at,

$$Au_t = B\varepsilon_t$$

⁹The A model sets the B matrix to be I_K and the minimum number of restrictions for identification is $K(K-1)/2$. The B model sets the A matrix to I_K and the minimum number of restrictions to be imposed for identification is the same for the A model

where $\varepsilon_t \sim (0, I_K)$. We get from the above equation that,

$$u_t = A^{-1}B\varepsilon_t$$

and hence, $\Sigma_u = A^{-1}BB'A^{-1'}$. Where the two matrices A and B have K^2 elements each. Thus, we need additionally $2K^2 - \frac{1}{2}K(K+1)$ restrictions to identify all $2K^2$ elements of A and B , at least locally. From our symmetric variance-covariance matrix of the reduced form shocks, we have six distinct parameters, which can be used for the estimation of our A and B matrices.

There are however, nine free parameters to be estimated in both A and B after imposing 1's on the diagonal of A . This is a common practice in SVAR models and is a form of normalization of the system. As well, if the diagonal is restricted to ones, with the A model, then a globally unique solution is obtained (Lutkepohl, 2005:359). Which is fundamental in order to be able to reflect isolated shocks in the components of U_t .

SVAR models have been widely used for the analysis of monetary and fiscal policy transmission mechanisms as they allow a shock analysis, which is the closest approximation of a controlled experiment available in empirical economics. Reverse causality can be a concern in these models, but it is not an issue because by tracing the dynamics of the system to a structural shock, the causality is pinned down by the identification process to go from fiscal policy shock to the other variables in the model (Gottschalk, 2001:26-27).

2.4 Costa Rica and its fiscal policy

From empirical literature and a theoretical point of view, there is no consensus on the size of fiscal multipliers for emerging markets and low income countries,¹⁰ or even an idea if they should be expected to be higher or lower than those of advanced economies. Still, there are some economic factors which may influence the result upwardly or downwardly. According to IMF's technical note (2014:5) the factors that may increase fiscal multipliers are:

¹⁰Refer to appendix 1.

- Consumption smoothing behavior is less prevalent when: liquidity constraints arise in less developed financial markets and, agents are less forward looking if there is too much instability.
- Monetary policy response is less effective.
- Automatic stabilizers are lower.
- When government debt tends to be lower.

On the other hand, factors which affect in a decreasing manner the multiplier are:

- Precautionary saving may be larger in a more uncertain environment.
- Inefficiencies in public expenditure management and revenue administration.
- Some countries may sustain lasting positive output gaps due to supply constraints.
- Economies are smaller and more open.
- Higher interest rate spreads

The aim of this section is to characterize most of these factors for the studied country in order to understand its context and evaluate the results obtained while providing the necessary information for further comparison with other papers/countries on the subject.

Costa Rica has been a constitutional republic since 1949 and it is known as one of the most stable democracies in Latin America. According to the OECD's latest assessment on Costa Rica (2016:6),¹¹ in the past three decades, real GDP per capita has nearly doubled, as the economy has evolved from a rural and agriculture-based economy to one with high value-added industries linked into global value chains. The process of opening up to international trade and attracting foreign direct investment (FDI) that started in early 1980s has diversified the country's production structure, boosted exports and labour force utilization. As it is a small open economy,¹² shocks to its trading partners, notably the United States, will have an important impact on growth, though its limited exposure to China (5% of exports) protects it from the import decline of that country. The output

¹¹OECD Economic Surveys, Costa Rica, February 2016.

¹²As seen in appendix 02.

gap has moved within a range between -3% and 2% .¹³

The country's financial market, evaluated through the *financial development index* estimated by the International Monetary Fund (IMF) has improved during the last two decades as there are more financial institutions, there is better institutional access and an improved efficiency. In comparison to other emerging markets, there is good institutional access (ATMs and bank branches per 100,000 adults) but a lower institutional efficiency (high interest rate spread, high overhead costs and high net interest margins). Also, the country is behind on institutional depth due to the low level of credit to GDP as well as small mutual fund and insurance industries. Actually, according to (2016), Costa Rica's financial development is below the predicted levels given its income per capita, government size and macroeconomic stability.¹⁴

Virtually universal health care,¹⁵ pension and primary education systems¹⁶ have led to relatively low infant mortality, long life expectancy (close to 80 years) and low poverty by Latin American standards. Costa Rica is one of the pioneers in universal access to primary education in Latin America. Spending on education amounts to 6.9% of GDP and there is a constitutional mandate to raise it to 8% .¹⁷ The historical commitment to education has translated into high literacy rates and almost full enrollment in primary education.

As we know, to fulfill all these goals which impact development, growth, inequality and social inclusion, fiscal policy has public expenditure, taxes and debt, which are required to be properly managed by the pertinent institutions. Hence, there are factors from political economy, institutional capacity, fiscal sustainability and efficiency costs from taxes and debt which can limit fiscal policy's effectiveness. That is why this section intends to provide a more detailed discussion of Costa Rica's characteristics. It is important to understand its context for evaluating the results of this research and for further comparison with other papers on the subject.

¹³Annex 03 reflects its behavior.

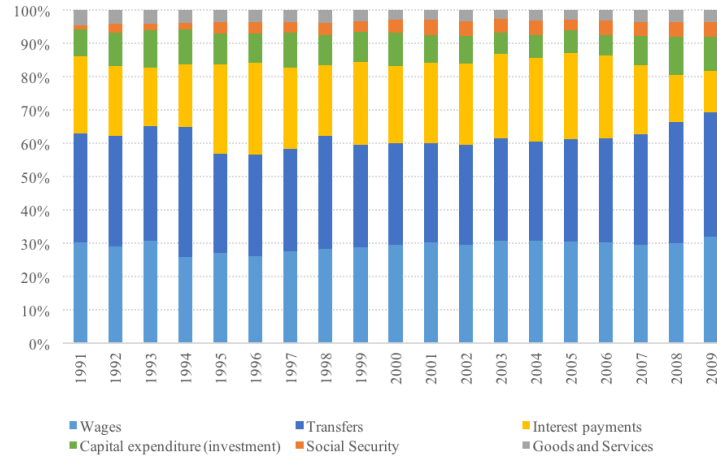
¹⁴Refer to appendix 04 for a graphical reference.

¹⁵ranks similar to the OECD average in health and environment.

¹⁶Education stands out for its large gap with OECD countries.

¹⁷In the OECD, only some Nordic countries and New Zealand spend a higher share of GDP on education

Figure 2.1: Costa Rica - Government Expenditure



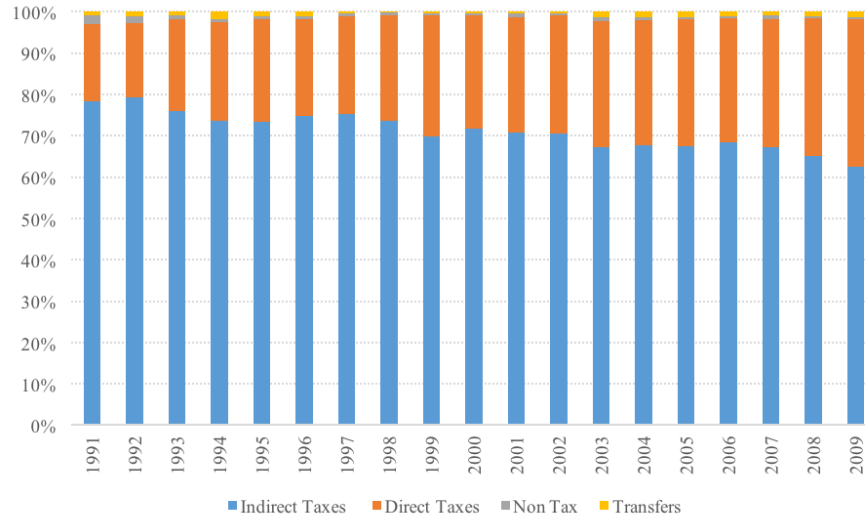
Public Finances

Costa Rica has what has been described as an inflexible government expenditure structure. According to its Treasury approximately 34% of its budget corresponds to constitutional mandated spending and 23% to legal mandate spending. About 92% of these mandates are allocated in the health, education, security and social protection sectors, which are key for the country’s development strategy. The Education Ministry and the Judiciary Power represent 75% of all mandate spending. The other 25% goes to the Social Development Fund,¹⁸ the National Roads Council,¹⁹ municipalities, social security pension fund,²⁰ and the National Child Welfare Agency.²¹ Although, when looking closely, it is evident that it is spent mainly in wages; not the most productive component.

This behavior is extrapolated to the total central government’s expenditure structure, its major components are wages and transfers. Another significant determinant is interest payment. These three major expenses represent more than 80% of total expenditure. Central government spending²², between 1991 and 2006, represented from 11% to 13% of GDP, while in 2009 it was 14.6%.

¹⁸Fondo de Desarrollo Social y Asignaciones Familiares (FODESAF)
¹⁹Consejo Nacional de Vialidad (CONAVI)
²⁰Regimen no contributivo de pensiones de la Caja del Seguro Social
²¹Patronato Nacional de la Infancia (PANI)
²²without interest payment

Figure 2.2: Costa Rica - Government Revenue



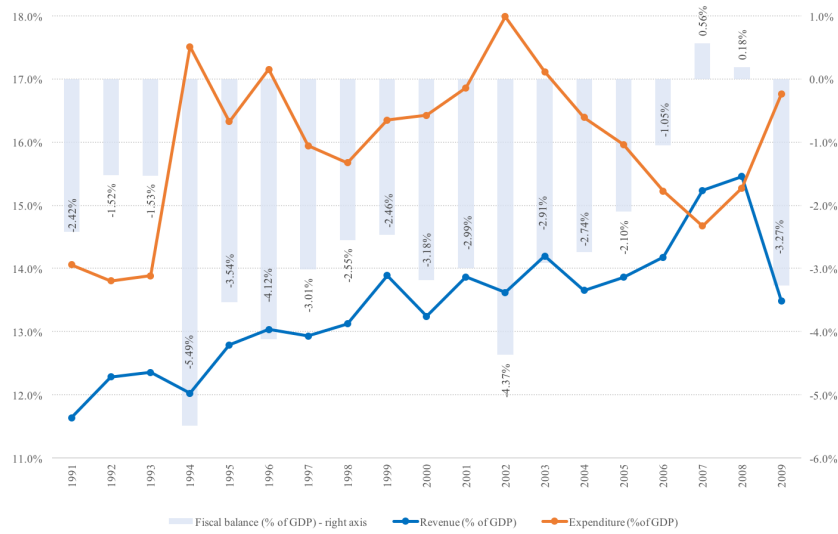
It is evident from our next graph that the government's revenue comes mainly from taxes, specifically from indirect ones. Its tax level is close to the Latin American average but substantially lower than in OECD countries. Social security contributions account for about 34% of total government revenue, against 18% in Latin American and 27% among OECD countries. Tax evasion, a narrow tax base and low marginal tax rates affect the contribution of income taxes and VAT.²³ A large amount of personal income is not taxed since the tax-free threshold is around twice the average wage in the private sector.

Because of the difference between revenue and expenditure, Costa Rica has significant fiscal deficits. Most of which has been financed through internal and external debt which has represented as much as 40% of GDP for some years. From our sample, the country only experienced a superavit in the year 2007 and 2008 (0.56% and 0.18% respectively).

There is another vital characteristic to consider from Costa Rica's government finances: its public sector is highly fragmented, resulting in the Legislative Assembly approving less than half of

²³The current standard VAT rate is 13%, considerably below the 19.1% average rate for OECD countries

Figure 2.3: Costa Rica - Fiscal Balance



total public sector expenditure. As stated in OECD’s latest assessment on this country, spending from agencies with some degree of autonomy, namely deconcentrated and decentralized institutions and public corporations is not subject to parliamentary approval. The yearly budgets of these institutions, as those of the public corporations, are approved by the Comptroller General, and approval is from a legal rather than a policy standpoint. In addition, there is no effective mechanism to ensure that these agencies’ objectives are aligned with those of the central government.

In summary, Costa Rica’s fiscal stance has some structural weaknesses such as high debt levels (with respect to GDP), high dependency on income from few sources, low tax burden, strong dependance on indirect taxes and an excessive rigidity of its expenditure structure. Given these characteristics and their effect on fiscal multipliers, we are expecting a small fiscal multiplier for Costa Rica. Still a formal analysis is needed in order to conclude if this is true.

2.5 An Empirical Approach

It is quite difficult to empirically-evidence the causal relation between fiscal policy and economic growth not only because the level of complexity between variable interactions but because of the difficulty on having satisfactory measures of them. Spending and taxes typically react automatically to the business cycle through so-called “automatic stabilizers.” Still it is non disputable the influence the level and composition of government expenditure and income have on the macroeconomic cycle and on the GDP’s trend. Hence, to estimate fiscal multipliers it is necessary to isolate fiscal policy shocks from the initial influence of economic conditions, Estevao and Samakae (2013:6).

In addition, data availability limits the scope for estimating multipliers. The VAR approach relies on the existence of reliable data over a long period of time. Government expenditure and taxation affect GDP, as they are not independent, to estimate the effects of one, it is necessary to include the other. Hence, we consider a budget breakdown between expenditure and revenue. Ideally, government spending would consider total purchases of goods and services and its revenue would be taxes minus transfers (including interest payments). Costa Rica’s data availability is limited, but we were still able to collect a quarterly dataset of government expenditure and revenue. Even though we found monthly data, for the purposes of this research we will use the quarterly sample, as a shock in fiscal policy is assumed, will take longer than a month to have an effect on GDP.

This research seeks to investigate the fiscal policy transmission mechanism in Costa Rica during the period 1991-2009, by estimating the quantitative impact using output multipliers. In line with the fiscal multiplier literature, a fiscal shock is defined as a random unanticipated discretionary shock. The primary fiscal policy experiments included in this paper are shocks to government expenditure, and to tax revenue.²⁴

After careful analysis of the literature and the availability of data in Costa Rica, the identification strategy employed is a SVAR approach a la Blanchard and Perotti (2002). We estimate a

²⁴does not include transfers: net-taxation

three equation SVAR model even though in the literature there are larger systems²⁵, but because the number of restrictions required increases with the size of the system and there is not a clear way on how to define these restrictions and the economic theory they would follow, we decided to only include the three main variables without imposing a predetermine theory. With this approach, we are not only following the seminal paper but trying to overcome one of the main criticisms to the SVAR models: the widespread use of informal restrictions may give rise to data mining.²⁶ Also, this methodology is generally accepted as a valid starting point in a context where there is few (or none) research on fiscal multipliers in a particular country.

2.5.1 The Data

The variables specified in our baseline VAR model include real government expenditure, real government income and real GDP. Public Finance Statistics, in Costa Rica, have gone through some methodological changes through time, with the purpose of being more standardized according to international norms. Its downside is that every time a new methodology is implemented, the previous one is discontinued, making data series not matchable and short lived. That is why the longest quarterly data existing on government expenditure goes from 1991 until 2009 and is provided by Costa Rica's Treasury Office.²⁷

The methodology of this data series is cash flow based, therefore, central government income (or total taxes) sums all *indirect* taxes as sales and consumption, *direct* taxes as personal tax and corporate profits, and *specific* taxes as those on banana and coffee exports. Central government expenditure considers consumption of goods and services and capital investment (including transfers for public and private sector). All three variables are going to be in per capita terms and logged. The population and consumer price index statistics are from Costa Rica's National Statistics Office (INEC).²⁸

²⁵considering exchange rate regimes, inflation targeting objectives, debt levels, trade openness, among others.

²⁶For example, an eight variable model may imply twenty eight restrictions to identify the impulse response functions and there is no clear or explicit way in to define them and the economic theory they should follow.

²⁷In Spanish, Ministerio de Hacienda.

²⁸Instituto Nacional de Estadística y Censo.

As stated before, Costa Rica’s government expenditure is inflexible, therefore we calculated the portion of expenditure which is consumption of goods and services and how much they represent from the total government expenditure, as we are interested in the part of the expenditure which can be changed with certain easiness by the incumbent. As well, we considered the revenue without transfers.

From the characterization of the previous section, we know that Costa Rica has tended to have a negative fiscal balance in the years of the sample. This imbalance has turned to be one of Costa Rica’s most important problems as income structure has not changed, by any major political reform, but expenditure has kept increasing. This expansion in expenditure comes from the great number of legal and constitutional mandates which create an end-use for financial resources but do not create the correspondent source of income. Therefore, more than two thirds of this country’s expenditure is defined by law or constitutional mandate, or goes to pay wages.

The descriptive statistics of each variable are presented in Table 01, based on real and per capita terms.

Table 1
Time Series Summary of Statistics

Variable	Expenditure	Revenue	GDP
Mean	3.188	4.025	4.918
Median	3.167	4.010	4.912
Maximum	3.477	4.286	4.912
Minimum	2.996	3.853	4.796
Std Deviation	0.096	0.106	0.068
Skewness	0.922	0.517	0.276
Kurtosis	4.013	2.354	1.999
Observations	76	76	76

2.5.2 Identification

A crucial issue, as mentioned, in the estimation of a structural model is the identification of the empirical model. As stated by Lutkepohl (2005:364), a simultaneous equation system is formulated

for the errors of the reduced form model rather than the observable variables directly. Thereby, the model accounts for the shift from specifying direct for the observables to formulating relations for the innovations. Following Blanchard and Perotti's (2002:1333) identification methodology, we have

$$r_t = a_1 x_t + a_2 e_t^g + a_3 e_t^r \quad (2.5.1)$$

$$g_t = b_1 x_t + b_2 e_t^r + b_3 e_t^g \quad (2.5.2)$$

$$x_t = c_1 r_t + c_2 g_t + c_3 e_t^x \quad (2.5.3)$$

where e_t^r , e_t^g , and e_t^x are the mutually uncorrelated structural shocks that we want to recover. As part of the identification process an orthogonality restriction is imposed, which according to Bernanke (1986:52), the intuition behind it relies on the fact that the structural innovations are exogenous, unobservable for the econometrician and do not have common causes, hence, it is natural to treat them as approximately uncorrelated. Which does not mean that there is no contemporaneous correlation between the variables in the model. Structural innovations will be, then, the driving force behind the stochastic dynamics of the variable in the model. Illustrating these restrictions and their implications in matrix notation, the AB relationship is,

$$\begin{bmatrix} 1 & 0 & -a_1 \\ 0 & 1 & -b_1 \\ -c_1 & -c_2 & 1 \end{bmatrix} \times \begin{bmatrix} r_t \\ g_t \\ x_t \end{bmatrix} = \begin{bmatrix} a_3 & a_2 & 0 \\ b_2 & b_3 & 0 \\ 0 & 0 & c_3 \end{bmatrix} \times \begin{bmatrix} e_t^r \\ e_t^g \\ e_t^x \end{bmatrix}$$

These equations represent the reduced form disturbances which have little or no economic significance, but reflect the linear combination of the underlying structural tax, spending and private consumption shocks. We are interested in computing the impulse response functions given by the response of the model to a standard deviation shock to the structural innovations. This is why we normalise the standard deviation shocks to correspond to unit innovations; following that the variance covariance matrix is assumed to have the form $\Sigma_e = I$. Gottschalk (2001:20) emphasises that the normalisation is only about the scaling and nothing of substance is altered.

In the first equation from the system above, we observe the relation between structural move-

ments and our variables of interest. In general terms, impulse response analysis has shifted from specifying the relations between the observable variables directly, to look and interpret the structural part of their changes or shocks. In SVAR models the dynamic relationships within the economy are modelled as a relationship between shocks; they intend to model the structural changes on Y_t . For example, equation 3.2 states that structural movements in taxes within a quarter or month, r_t , can be due to three factors:

- the response to unexpected movements in GDP, captured by $a_1 x_t$
- the response to structural shocks to spending, captured by $a_2 e_t^g$, and
- the structural shocks to taxes, captured by e_t^r

The second equation from the system has a similar interpretation, which applies to structural movements in spending. Lastly, the third equation states that structural movements in GDP can be due to structural movements in spending or in taxes, or to e_t^x . As stated, there is an identification problem with this type of models (different structural models can give rise to the same reduced form) and therefore, additional assumptions (also called identifying restrictions) are needed. To identify this system, we followed an identification less restrictive than the one from Blanchard and Perotti (2002) as we let the VAR determine as many coefficients as possible by imposing the least number of restrictions on the model.

First, we have that the parameters a_1 and b_1 capture two different effects, the *automatic* effects of fiscal policy on output under existing policy rules, and the *discretionary* adjustment in fiscal policy given structural events within the quarter. The key here, for identification, is to recognise that using quarterly data practically eliminates the discretionary channel, as it takes more than a quarter to learn about a GDP shock, decide a fiscal policy response, pass the measure through the legislative power, and then, if approved, implement it. Thus, to construct a_1 and b_1 , we need the elasticities of government expenditure and of taxes on output.

Conejo et al.(2011) estimated the tax elasticity,²⁹ and its subdivision, the indirect and direct taxes elasticity to output for Costa Rica by using Ordinary Least Squares (OLS) and a detailed

²⁹Considering total income from taxes

cointegrated model for long run elasticities, along with an error correction model for the short run dynamics. Their sample includes the same years as our database, from 1991 until 2009. They arrived at a value equal to 1.11 for the long run and 0.72 for the short.³⁰ Therefore, for both model specifications we are assuming that the response to structural movements in taxes, $a_1 = 0.72$.

For b_1 , we could not identify an automatic feedback from economic activity to government purchases of goods and services as the country from our sample has a very inflexible government expenditure structure. Also, when relative volatilities for government expenditure have been estimated, the outcome shows that the government expenditure is lagged from the growth cycle of the economy given the tax collection system and the indebtedness levels. Therefore, we assume the response to structural movements in GDP to be equal to zero, $b_1 = 0$. For this assumption there is also support from the tests performed by Born and Muller (2012) and Beetsma et al. (2009) where they provide evidence that government spending will not react to output within a year, mainly because budgets are defined for a year. Besides, any modification to the budget within a quarter would probably be relatively small.

Second, to estimate a_2 and b_2 there is no clear way of distinguishing if the taxes respond to an increase on expenditure or the reverse, when the government increases taxes and spending at the same time. Therefore, there are two alternative assumptions: one is to assume that tax decisions come first, so $a_2 = 0$, and we can estimate b_2 ; the other, is to assume that spending decisions come first, so $b_2 = 0$, and we can estimate a_2 . We tried both specifications and for all models b_2 was found to be not significant. Hence, we assume $b_2 = 0$.

Third, we allow for c_1 and c_2 to be estimated by the system, as we have the three restrictions needed for the system to be just identified. This is a difference from Blanchard and Perotti's (2002) model identification, as they used the estimates of a_1 and b_1 as instruments to estimate c_1 and c_2 in a regression of x_t on r_t and g_t , as they are no longer correlated with e_t^x .³¹ In Blanchard and Perotti's model, the coefficients a_3 , b_3 and c_3 , are assumed to be equal to one.

³⁰They used the log of GDP as their tax base.

³¹This is possible as we have that $r_t' \equiv r_t - a_1 x_t$ and $g_t' \equiv g_t - b_1 x_t = g_t$; thus they can be used as instrumental variables.

Based on Spilimbergo et al. (2008) there is evidence that results of fiscal multipliers may depend on the variable identification, therefore, we decided to have a less restrictive model letting the system of equations to estimate these coefficients as well. In general, for the identification of our model we stand believing that when imposing values there has to be certainty that they are correct, because if not we would be restricting a variable behavior that can harm the estimations of the whole model.

We follow a Cholesky decomposition where government spending can affect all the variables in the system contemporaneously, shocks to the revenue will only affect real GDP the current period. Since output is ordered last, we assume it has no contemporaneous effect on any of the other two variables. Even though the Choleski decomposition is fairly popular within this kind of model, it is just one possible strategy for identification, and should only be done when the recursive ordering implied in the model is supported by technical considerations as in the present case.

With these identifying restrictions, we have the important advantage that they are quite general, and therefore are compatible with the broad spectrum of economic theories behind the relation between fiscal policy and other economic variables. Actually, it helps us to discriminate between competing theories.

2.5.3 Econometric Analysis

We start our analysis with some pre-specification tests for each variable. As we know, in a non-stationary time series, its expected value at time t to be determined by the expected value taken at t_0 , causing estimation problems.³² Broadly, generating results with appropriate standard errors requires the variables to be stationary.

On this matter, we conducted the Augmented Dickey-Fuller and Phillips-Perron tests, with trend and drift. From our three dependent variables, we did not reject the null, until it was differenced. When testing for cointegration, the null hypothesis of the Augmented Dickey Fuller test

³²Cointegration would be needed.

on the disturbances was not rejected for all three cases. The presence of unit roots suggests the possibility that variables may be cointegrated. Table 02 presents the results for each of the tests.

Table 2

Unit Root Tests for each series, p-values

	Expenditure	Revenue	GDP
Phillips-Perron	0.0031	0.9977	0.9999
Trend	0.0049	0.0000	0.0166
First differenced	0.0001	0.0000	0.0000
Augmented Dickey Fuller	0.8769	0.9760	0.9985
Trend	0.0001	0.3456	0.0061
First differenced	0.0001	0.0000	0.0142

Differencing may appear as the decision to make, but there are different views on whether the variables in a VAR model need to be stationary. Enders (2004) and Sims et al.(1990), for example, recommend against it, arguing that the goal of a VAR analysis is to have a sufficiently rich estimation rather than determining specific coefficient estimates. Enders (2004) state that using differenced variables when they are cointegrated is problematic as it throws away the information inherent in the cointegrating relationship; which leads to a misspecification error, making inference invalid. Following this approach we can find the VAR model of Mountford and Uhlig (2009). On the contrary, Blanchard and Perotti (2002), incorporate deterministic (including time and time squared as regressors) and a stochastic trend (using first differences) in their model.

Given the results reported in Table 02, we decided to test for statistical significant cointegration between government spending and revenue, using the Johansen's test. Under the trace test we did not reject the null of no cointegration, which means that there is no linear combination between these variables that yield a stationary process. Under the maximum eigenvalue test, we do not reject the null either. When we include all variables we rejected the null for both test specifications, meaning that there is a significant cointegration relationship.³³ As part of the analysis we also depicted the residuals to determine if they had a unit root. Considering all results and keeping in mind the

³³Results may be seen in annex 05 and annex 06.

purpose of this research, we decided to keep the variables for our model in levels, with a logarithmic transformation and in real and per capita terms.

Following, we conducted the lag order selection criteria test for the model specification were a quarterly dummy was included to control for seasonality. The Schwartz information criteria suggest two lags, while the Hannan-Quinn suggested three and the Akaike six lags. The outcome by the Schwartz criterion suggested fewer lags due to the way they penalize the inclusion of higher order lags. As it is a consistent criterion and because of efficiency on the estimation, we are implementing this lag length rather than the suggested by the Akaike or Hannan-Quinn. The reason why we are obtaining these different results comes from the way of treating our seasonality. If we do it in a deterministic way, we include the dummies, therefore the lags do not have to control for it. While if we do it an stochastic way, we do not include the dummies but would have to include more lags in order to control for it. We work with a seasonal dummy.

The stability condition for a VAR model implies that the variables in the model will be non-explosive; it is determined by the roots of the characteristic equation. Our model is stable as all roots lie within the unit circle.³⁴ This evidence on stability supports our decision of not differentiating our variables despite the results on the unit root tests. The LM test to check serial correlation on each lag, did not reject the null of no serial correlation for the third lag with a probability of 0.6411. As we stated before, the inclusion of the lags would take care of the stochastic seasonality as well, but still we include a dummy for the fourth quarter for seasonality control.

³⁴The values of the modulus lie within 0.9417 and 0.1791.

Table 3

Vector Autoregression Estimates

	Expenditure	Revenue	GDP
Expenditure ₋₁	0.2637 (0.1046)	-0.0021 (0.0464)	0.0103 (0.0226)
Expenditure ₋₂	0.5106 (0.1092)	-0.0733 (0.0485)	-0.0317 (0.0236)
GDP ₋₁	-1.2464 (0.5833)	0.6446 (0.2589)	0.8192 (0.1259)
GDP ₋₂	1.6572 (0.5114)	0.4126 (0.2269)	0.0639 (0.1103)
Revenue ₋₁	0.4247 (0.2057)	0.3643 (0.0913)	0.115 (0.0444)
Revenue ₋₂	-0.5390 (0.2057)	-0.0945 (0.0913)	-0.0354 (0.444)
DQ4	0.0820 (0.0170)	0.0739 (0.0076)	0.0143 (0.0037)
R-squared	0.6820	0.9492	0.9705
Adj. R-squared	0.6482	0.9439	0.9673

Given this characterization we look through our impulse response functions, IRFs, of the VAR model, to trace out the impulse (effect of an exogenous shock in one variable) on the dynamics of all other variables in the system. The magnitude of the shock is set to be one standard deviation of the variable. Hence, a 1% shock to spending produces a small effect on GDP of 0.634% within the same quarter, which apparently stays on those bounds for the rest of the period considered. Even though we have arrived at these results with the VAR specification, they can only be satisfactory if our underlying belief is that growth, revenue and expenditure do not affect each other in the same quarter. As we are not sure about this, we estimate a structural VAR model. As before, our estimation of the SVAR model will consider all variables in levels, and will include a seasonal dummy,³⁵ and two lags in accordance to the Schwartz lag length criterion.

³⁵Appendix 07 evidence the need of controlling for seasonal effects, and appendix 08 shows the Impulse Response Functions when controlling for seasonality.

Implementation of Structural VAR models is far from uniform and there exists an extensive literature debating how it should be done. As explained before, the identification process is remarkably important as it can throw significant differences in results compromised on its specification. In fact, Stock and Watson (2001) conclude that the VAR methodology can be successful in capturing the dynamics of data but that their structural implications are only as sound as their identification schemes. Then, our priority is to include the least number of restrictions and let the system identify most of the coefficients, imposing the minimum number of restrictions by ourselves. The restrictions included are based on theory and available data (as explained in the *identification* section).

As we saw above, the restrictions of our model are $a_1 = 0.72, b_1 = 0, a_2$ is unknown and therefore, will be defined by the system, as well as c_1, c_2, a_3, b_3 and c_3 . The coefficient b_2 will be set equal to 0 as it was not significant. As a system,

$$\begin{bmatrix} 1 & 0 & -0.72 \\ 0 & 1 & 0 \\ c_1 & c_2 & 1 \end{bmatrix} \times \begin{bmatrix} r_t \\ g_t \\ x_t \end{bmatrix} = \begin{bmatrix} a_3 & a_2 & 0 \\ 0 & b_3 & 0 \\ 0 & 0 & c_3 \end{bmatrix} \times \begin{bmatrix} e_t^r \\ e_t^g \\ e_t^x \end{bmatrix}$$

Keeping in mind the restrictions depicted above for the *AB* Model, the results can be observed in Table 04.

Table 4

Structural VAR Estimates - SVAR just identified

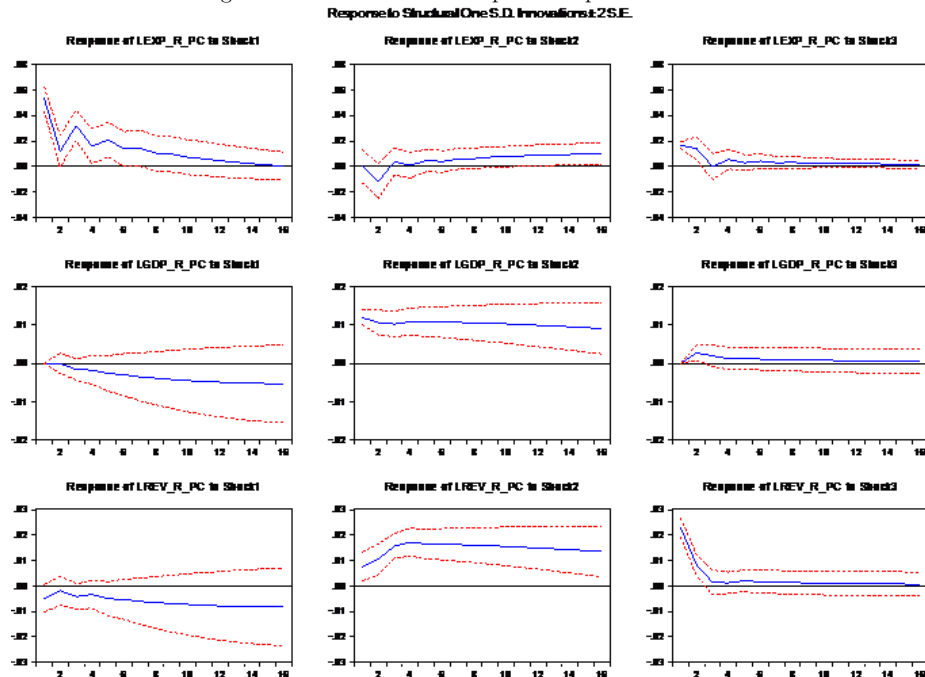
	Coefficient	Std Error	Prob.
$c(1)$	0.0912	0.0536	0.0887
$c(2)$	-0.6340	0.2371	0.0075
$a(3)$	0.0566	0.0047	0.0000
$a(2)$	-0.0056	0.0066	0.3945
$b(3)$	0.0120	0.0010	0.0000
$c(3)$	0.0245	0.0022	0.0000

These results can be depicted as the estimated matrices:

$$\begin{bmatrix} 1 & 0 & -0.72 \\ 0 & 1 & 0 \\ 0.0912 & -0.6339 & 1 \end{bmatrix} \times \begin{bmatrix} r_t \\ g_t \\ x_t \end{bmatrix} = \begin{bmatrix} 0.0566 & -0.0056 & 0 \\ 0 & 0.0120 & 0 \\ 0 & 0 & 0.0245 \end{bmatrix} \times \begin{bmatrix} e_t^r \\ e_t^g \\ e_t^x \end{bmatrix}$$

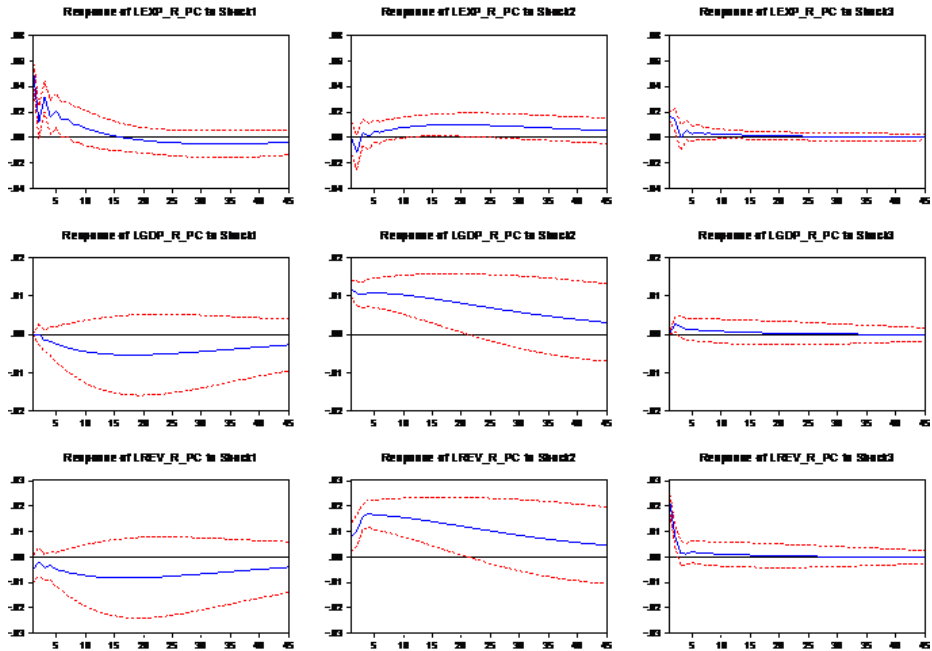
From the table above we can observe that the estimated coefficients are significant, with the only exception of a_2 . From our model specification, the coefficients of main interest are c_1 and c_2 as they reveal the response on output from unexpected movements in fiscal variables. Coefficient c_1 represents the response on output of unexpected movements in revenue, while c_2 does it but for expenditure. Therefore, these results show that there is a negative response in GDP when an unexpected structural movement in expenditure takes place. And there is a positive response when it comes from revenue or taxes. Our next figure shows the impulse response functions for this model specification in a period of four years. In the graph, shock 01 stands for a shock from expenditure, while shock 02 represents the unexpected movement in revenue.

Figure 2.4: SVAR model - Impulse Response Functions



The impulse definition comes from structural decomposition as we are interested in obtaining the accumulated results to estimate Costa Rica's fiscal multiplier. Through the IRFs it is possible to explore this reaction a bit more into the future. As an example we set four years as the time period of the graphs above. We then observe what happens to the dependent variable when there is a one standard deviation shock given to the residual of the independent.

Figure 2.5: Impulse Response Functions from a shock on expenditure
 Response to Structural One S.D. Innovations ± 2 S.E.



When looking at sixteen quarters it is not clear is the effect of a shock in expenditure on GDP is explosive, but as we can see in our next graph, when considering 45 quarters the response appears to go back to the initial level. Still, given the confidence intervals, only the first two periods after the shock have a significant result.

As part of a robustness check, we checked different lag lengths, seasonal dummies, and did another estimation considering the elasticity of sales tax to output, as it represents 35% of Costa

Rica's revenue approximately. Therefore the restrictions for our second model are $a_1 = 1.37$, $b_1 = 0$, a_2 and b_2 are set as unknowns. The results can be observed in the next table.

Table 4

Structural VAR Estimates - SVAR over identified

	Coefficient	Std Error	Prob.
$c(1)$	0.2162	0.0536	0.0012
$c(2)$	-0.6326	0.2371	0.0170
$a(3)$	0.0616	0.0051	0.0000
$a(2)$	-0.0106	0.0072	0.1428
$b(3)$	0.0120	0.0010	0.0000
$c(3)$	0.0274	0.0030	0.0000

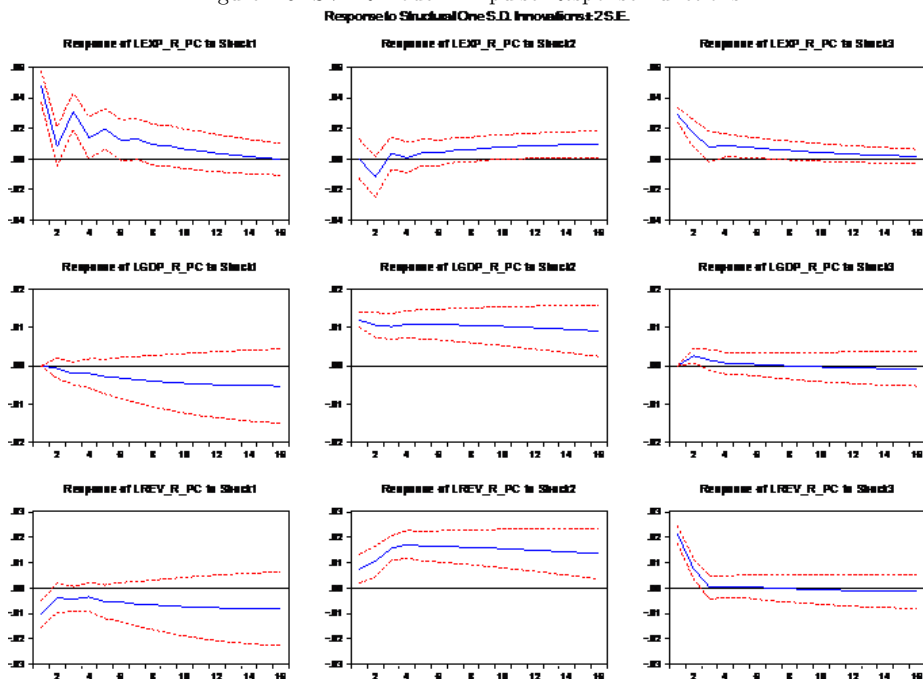
The results obtained, are very similar to the ones obtained before in terms of sign and significance and magnitude. Also, they are in line with those obtained with the straight VAR model. A one % shock on spending produces a significant impact response in output of 0.6326 within the same quarter. Figure 07 shows the impulse response functions for this model specification for a period of four years, 16 quarters.

With these results we can estimate Costa Rica's government spending multiplier. A general definition of fiscal multiplier is that it is the relation that describes the effects of changes on fiscal instruments on GDP; it is the ratio of the change in real GDP to the change in the fiscal balance (Coenen et al., 2010:10). Hence, fiscal multipliers measure the short-term impact of discretionary fiscal policy on output.

2.5.4 The Spending Multiplier

There is a wide variety of definitions for fiscal multipliers. A general one, would be that a fiscal multiplier is the change in real output given a unit increase in a fiscal variable. Thus, we would have that for our research the spending multiplier is the change in real GDP caused by a one unit increase in government fiscal policy. Thus, the fiscal multiplier measures the effect of a 1USD change in spending (or a 1USD change in tax revenue) on the level of GDP. Following Mountford and

Figure 2.6: SVAR model - Impulse Response Functions



Uhlig (2009) and Iltetzki et al.(2013:244), we focus on two specific fiscal multipliers. The *impact* multiplier would measure the effect of a one unit increase in government spending at the time of the impulse; one quarter. It is defined as,

$$\frac{\Delta X_t}{\Delta G_t} \tag{2.5.4}$$

The multiplier at horizon i , is defined in time T by,

$$\frac{\Delta X_{t+i}}{\Delta G_t} \tag{2.5.5}$$

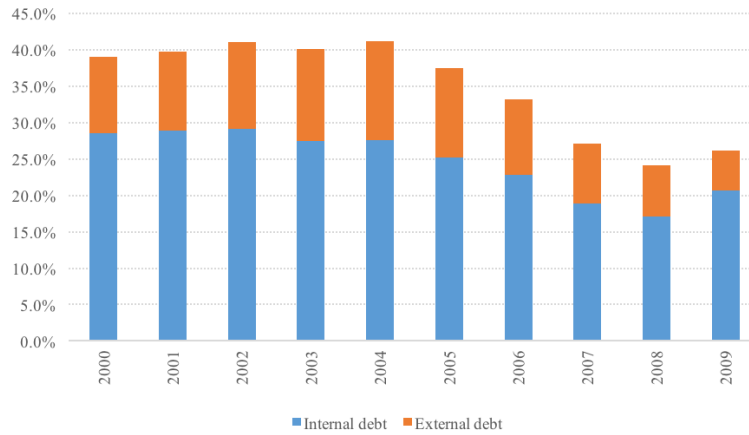
where t can be a quarter or a year depending on the frequency of the data that is used in the study. The overall multiplier describes the output response to an unspecified fiscal shock, while the revenue (spending) multiplier relates output to a discretionary change in revenue (spending). The

scarce literature, on emerging economies or low income countries, empirically estimating the multipliers suggest that they are normally smaller than in advanced economies (Estevao and Samake, 2013; Ilzetzki and others, 2013; Ilzetzki, 2011). There is some research with negative multipliers, especially when considering long periods through time and when public debt is high. IMF (2014:6) state that the fact that emerging economies' spending multipliers are lower than in advanced economies, could be related to several factors including expenditure inefficiencies and the difficulties to unwind expenditures.

Costa Rica's expenditure multiplier turned out to be equal to zero for the first period, then equal to 0.0001 for the second period and afterwards it turned to be small and negative, and not significant. This result must be a consequence of two main characteristics of its public finances: debt level and public expenditure management and revenue administration. Interestingly, the revenue multiplier is significant; its values are within a range between 0 and 0.6321 on period one and period 45 respectively.

Comparing this results to the ones from the emerging economies literature there is no much variance.

Figure 2.7: Costa Rica - Debt level as percentage of GDP



As said by IMF (2014:7), high debt countries generally have lower multipliers, as fiscal consol-

idation is likely to have credibility and confidence effects on private demand and the interest risk premium. Also, having difficulties in collecting taxes and/or expenditure inefficiencies limit the effectiveness of fiscal policy on output. For Costa Rica, it would be needed to reduce mandated spending and revenue earmarking in order to have a budgetary process more flexible in responding to unexpected shocks. In 2014, around 70% of central government expenditure was mandated by constitutional and other legal provisions; this, plus, debt servicing, leave only about 17% of the Central Government's budget for discretionary spending (OECD, 2016).

With these results we may say that for a Costa Rican incumbent manipulating fiscal policy before elections may not have the expected results. Given the estimated multipliers, probably it would not be felt by the voters in terms of output in the short run. Hence, fiscal policy is not an effective tool within the PBC theory.

2.6 Concluding Remarks

This chapter has estimated a fiscal VAR for Costa Rica in order to have a clearer idea of the effects discretionary fiscal policies may have on this nation's output. We based our model on the seminal paper of Blanchard and Perotti (2002) as it is the one of the few estimations done for this country. By following their methodology we believe give our results a leveled field for comparison within the literature. A small and negative multiplier reflects the low impact a shock from fiscal policy may have on output and flags one of this country's structural dilemmas on public finance: the extensive use of revenue earmarking and mandated spending. Reducing budget rigidities is necessary and could be complemented with the introduction of performance budgeting (based on output targets), for the government to regain fiscal policy effectiveness.

From our research and the existent literature on this topic, we can state that a simple fiscal multiplier does not exist. Its size, duration and sign will depend on several factors that can be external or within the economy. From Coenen et al. (2010:8) we know that fiscal actions are more effective when the fiscal instrument is spending or well-targeted transfers, and when in addition

monetary policy is accommodative. On the other hand, permanent stimulus, that is a permanent increase in deficits, is much more problematic because it leads to a long-run contraction in output, and substantially reduces short-run fiscal multipliers.

Iltetzki et al. (2010) use a structural VAR model to model a panel of 44 countries (excluding New Zealand) to show that the impact of government expenditure shocks depends on several country-specific factors. The results show that fiscal multipliers are larger in industrial rather than developing countries. They also find that the multiplier is relatively large in economies operating under fixed exchange rate but zero in economies operating under flexible exchange rates. Fiscal multipliers in open economies are found to be lower than in closed economies and in high-debt countries are also small. Since New Zealand is a small, open economy with a floating exchange rate, our findings fit with the stylized result that the output multipliers from fiscal policy are likely to be small.

Even when the SVAR approach allows us to have an empirical estimation, a problem with this type of models is that there are many possibilities for omitted variable bias to be present and of course, reverse causation. We tried to neutralize these caveats with the structural form, but still there can be some misspecification from the original model. For example, we can observe from the empirical studies that there is no consensus on the identification strategy.

A major concern with the SVAR methodology is the orthogonality restriction for the structural shocks. In the case of a bivariate model, the orthogonality restriction is based on the assumption that there are only two fundamental sources of shocks, which is difficult to justify when considering variables that can have an effect on both the supply and demand side of the economy, for example. This concern would suggest to model larger systems of equations, but the restrictions needed for the identification would increase as well, which is another concern in itself.

The widespread use of informal restrictions may give rise to data mining. As mentioned by Gottschalk (2001:33), since informal restrictions are often not made explicit by researchers some care is warranted when interpreting impulse response functions. He mentions that the frequent finding of the SVAR literature stating that monetary policy shocks have no long run effects on output,

may not be as precise because the underlying line of reasoning may suffer from circularity, because the long run neutrality of money is exactly one of those restrictions that may be used informally to specify the model in the first place.

%tal vez agregar lo que hemos hecho para que no sea el caso nuestro

According to Favero and Giavazzi (2007) the impulse response estimated in VAR studies of fiscal policy shocks are all biased. The reason for this is that these studies do not consider the debt dynamics that arise after a fiscal policy shock. Still, as we are focusing on the unanticipated shocks and short term dynamics we consider that our results do not have the mentioned bias.

The followed approach in this chapter only estimated the average fiscal multipliers across the sample period. Further research could extend this framework to include a time-varying setting, as we may think that fiscal policy effectiveness can change over time in accordance to a set of different economic circumstances.

With the VAR approach we are tying our economy to a linear behavior, so if any non-linearity applies, the VAR framework would not be adequate as its inferences would be misleading with respect to the real dynamics. Including the Markov-Switching model may be an option for future research, where within the regime the series maintain its linear behavior but there are two different regimes as for example business cycle states.

However, we believe that better estimation and use of multipliers can play a key role in ensuring macroeconomic forecast accuracy. Given the experience from the financial crisis, it seems as essential to measure accurately the relationship between output and fiscal stimulus in order to plan and forecast the effect of policy actions.

Appendix

Appendix1

Short-Term Multipliers in Emerging market economies and Low income countries

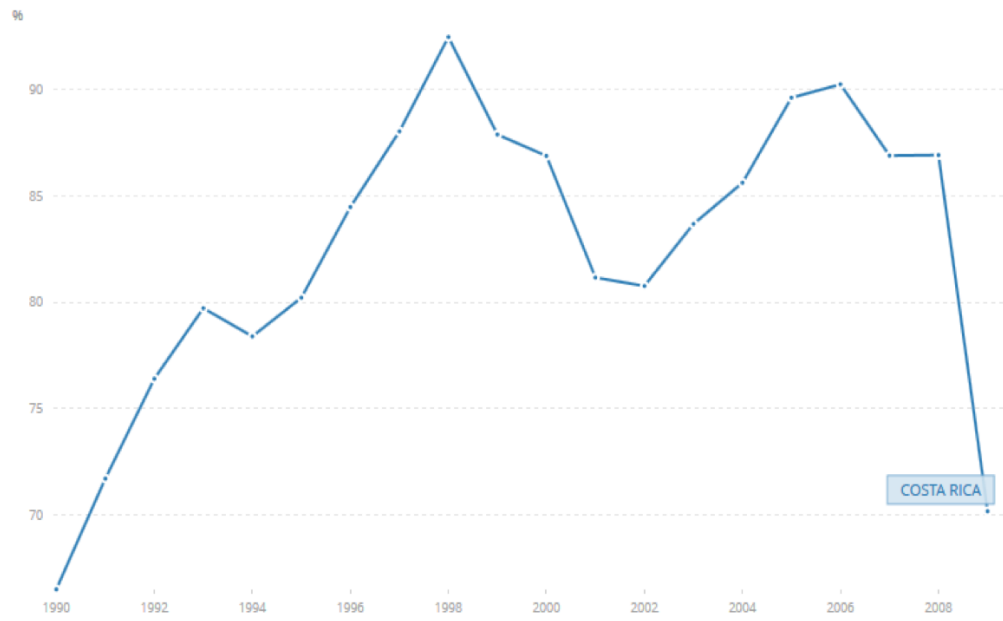
Country	Study	G	T	Notes
Argentina	Anós-Casero and others (2010)	0	0	
Bulgaria	Muir and Weber (2013)	0.2	0.4	
China	Wang and Wen (2013)	1.7/2.8	N/A	Consumption multiplier
Costa Rica	Estevão and Samake (2013)	0.2	0	
Croatia	Simovic and Deskar-Škrbic (2013)	0.8	0.6	Central government data
Dominican Republic	Estevão and Samake (2013)	0.1	0	
El Salvador	Estevão and Samake (2013)	0.2	0	
Guatemala	Estevão and Samake (2013)	0.3	0	
Honduras	Estevão and Samake (2013)	0.3	0	
Indonesia	Tang and others (2010)	-0.3	0.4	Average of different VAR specifications
Malaysia	Tang and others (2010)	0.2	0.4	Average of different VAR specifications
Malaysia	Rafiq and Zeufack (2012)*	2.7 / 2	0.1/0.2	Peak multiplier; downturn/upturn
MENAP	IMF (2014)	1.1/0.9	N/A	Oil Importers/Exporters
Nicaragua	Estevão and Samake (2013)	0.1	0	
Panama	Estevão and Samake (2013)	0.5	0	
Peru	Anós-Casero and others (2010)	0	0	
Philippines	Tang and others (2010)	0.4	0.1	Average of different VAR specifications
Romania	Stoian (2012)	0.5	0.9	
Saudi Arabia	Espinoza and Senhadji (2011)	0.3	N/A	non-oil GDP
Singapore	Tang and others (2010)	-0.2	0.5	Average of different VAR specifications
South Africa	Jooste (2012)	0.3	0.7	
Thailand	Tang and others (2010)	-0.4	1.0	Average of different VAR specifications
Panel EMs	Ilzetzki (2011)	0.2	0.3	panel, 17 Ems
Panel LICs	Kraay (2012)	0.5	N/A	Public investment only; 29 aid-dependent low-income countries. Multiplier not statistically significant.

Source: IMF, Technical note on Fiscal Multipliers.

Note: Unless otherwise noted, G denotes government investment and consumption multiplier, and T next taxes. If government consumption and investment multipliers are reported separately, we compute the simple average of the two. Short-term for most studies denotes first-year multipliers.

Appendix 2

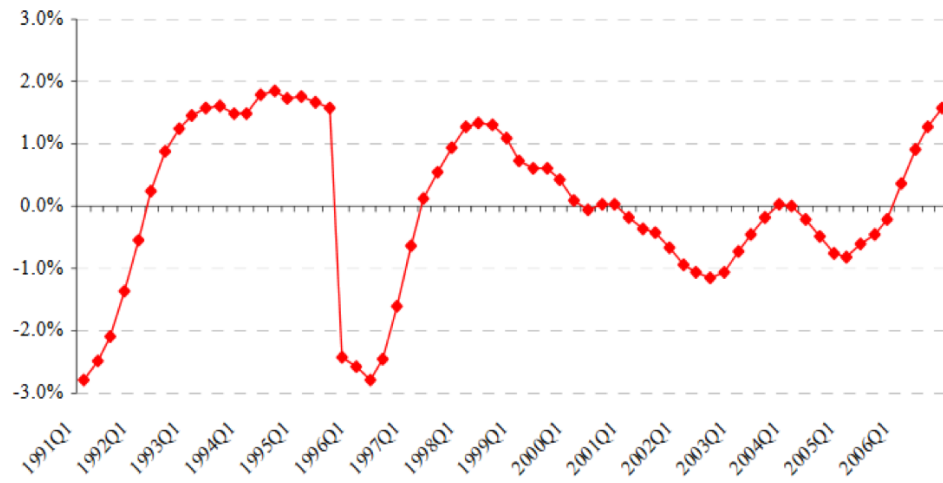
Costa Rica: trade as percentage of GDP



Source: World Bank Data

Appendix 3

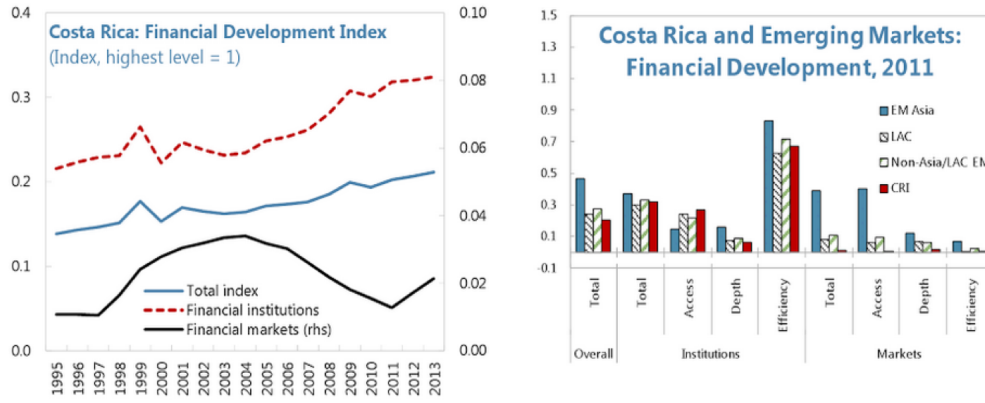
Costa Rica: output gap



Source: Banco Central de Costa Rica

Appendix 4

Financial Development of Costa Rica



Source: Heng, D. et al (2016).

Appendix 5

Annex 2.5

Johansen Test - Government Expenditure and Revenue

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Probability
None	0.1145	12.3580	0.1406
At most 1	0.0466	3.4826	0.0620

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Probability
None	0.1145	8.8753	0.2967
At most 1	0.0466	3.4826	0.0620

Appendix 6

Annex 2.6

Johansen Test - GDP, Government Expenditure and Revenue

Unrestricted Cointegration Rank Test (Trace)

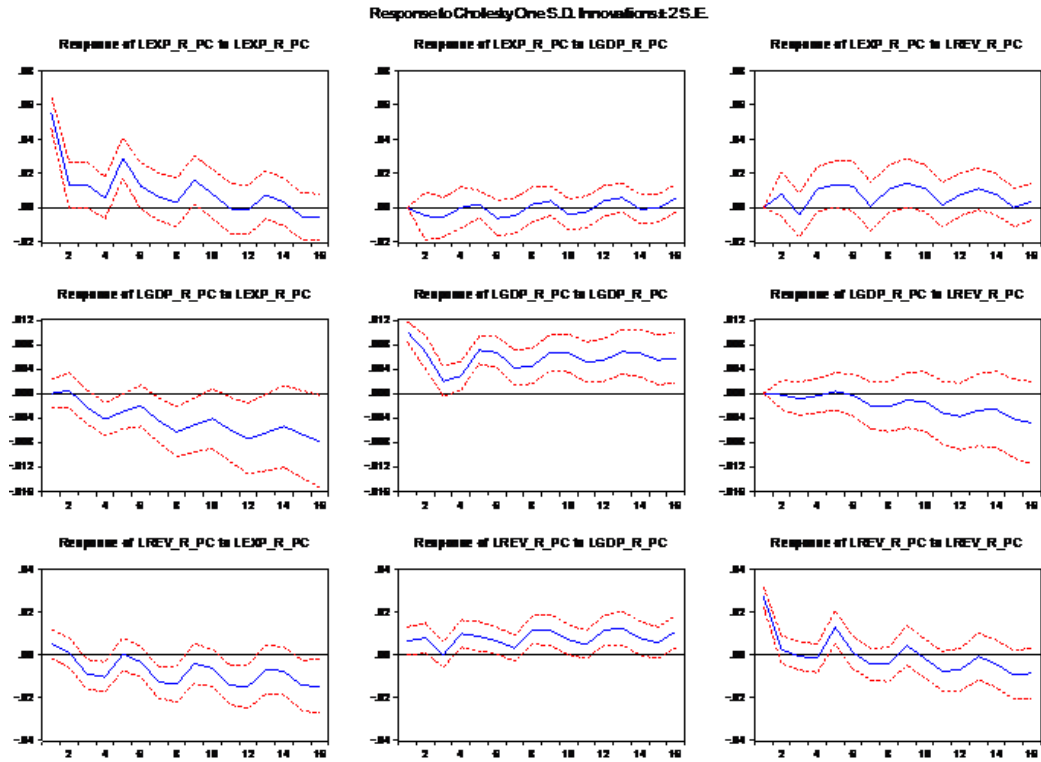
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Probability
None	0.3877	50.5550	0.0001
At most 1	0.1272	14.7516	0.0645
At most 2	0.03071	2.2772	0.1313

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Probability
None	0.3877	35.8034	0.0002
At most 1	0.1571	12.4744	0.0941
At most 2	0.03071	2.2772	0.1313

Appendix 7

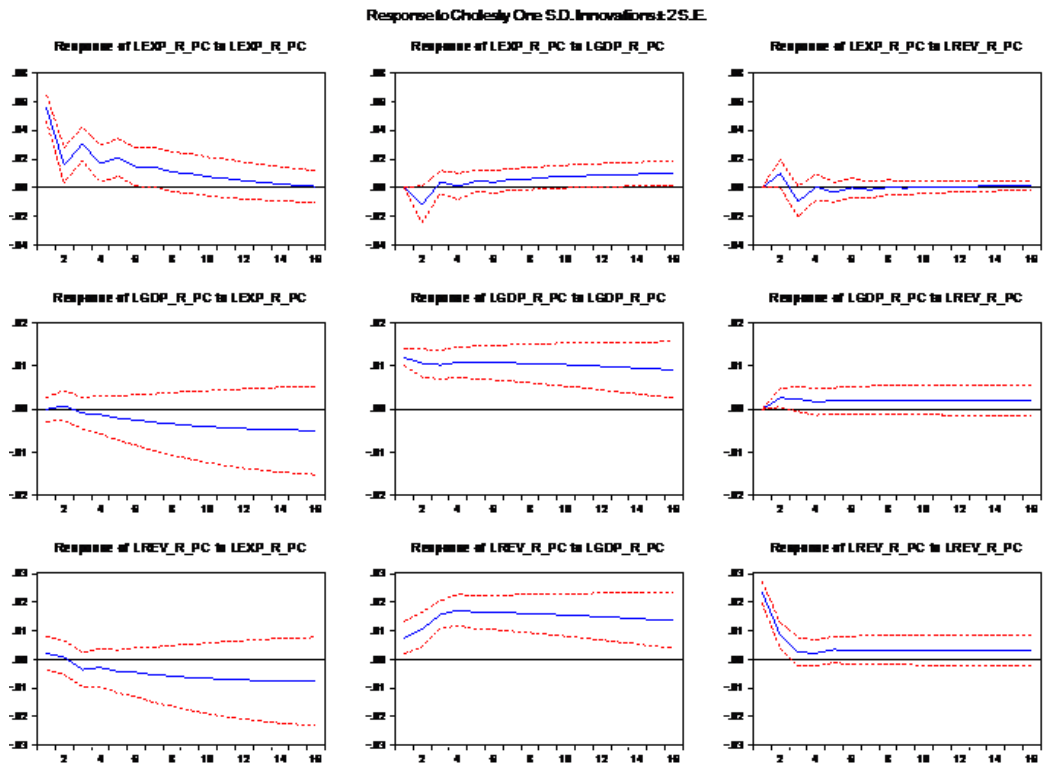
VAR - IRFs without seasonal control



Note: we represented the VAR model with four lags in order to show its seasonal behavior.

Appendix 8

VAR - IRFs with seasonal contro



Chapter 3

Is there a relationship between political cycles and prices in regulated industries?

Abstract

It is well known that reelection-seeking incumbents have incentives to manipulate economic outcomes. However, the empirical evidence has mixed results when fiscal or monetary policy are considered as the manipulating tools for the incumbent, even for the same country. Actually, most of the empirical evidence of the last decade has proven to be context-conditioned; part of this empirical evidence is the model of our first chapter. That is why, for this chapter we intend to test the existence of an indirect tool the incumbent may still have through the regulated price industries. Our theory is based on Peltzman's work (1976) and Paiva (1996) which reveal as a formal theoretical model that a regulator-agency will choose the price which maximizes the political support for the incumbent government-regulator. We show how there is a significant effect of the elections on gasoline prices (as a proxy for regulated markets) in Costa Rica, considering its monthly information from October 1986 until October 2014. We also try to generalize this finding with a panel of ten Latin American countries that considers annual data from 2001-2012. Lastly, we contribute to the literature by proposing a non parametric approach which supports our hypothesis on the relationship between the prices in regulated markets and the election timing. We found a non linear pattern showing these prices decrease before elections and afterwards, they increase.

3.1 Introduction

The Political Budget Cycle (PBC) theory has accumulated almost half a century of being studied, reviewed, modified and improved. The theory argues that a political incumbent in a country with free elections will try to increase his or her probability of being re elected by influencing the economic context through fiscal or monetary policy. Between both manipulating tools there will be differences in costs, implementation timing, degrees of freedom, etc. Hence, context is significantly important when analyzing PBCs. Based on the assumption that the incumbent signals competence through economic results, the theory expects that the incumbent starts his or her period with relative scarcity but finishes it spending significantly more, just before elections.

The empirical evidence has shown a set of mixed results. Even though during the first decades of this theory's validity, empirical research turned out to be supportive, as time has passed, the existence of better checks and balances (budget rules), along with other changes, have made it more difficult to demonstrate a consistent result on the topic, no matter if fiscal or monetary policy are considered (as manipulating tools). The way in which the incumbents can manipulate the economic outcome will depend on institutional characteristics, how close the Presidential race is, the international context, among other time changing variables. Hence, it is no surprise that the empirical evidence on PBC is diverse, even when the studies are carried out for the same country. It does not matter if you are looking at the fiscal policy tools or at the monetary policy ones. It seems intuitive, though, that politicians would try to govern as long as possible, therefore, we have looked for another kind of instrument, an indirect one, which is offered by regulated markets.

Within the theoretical models developed in the PBC literature, there are some that have rationalized the political business cycle as the equilibrium of a signaling game originated from temporary information asymmetry between government and voters. On this line, Moito and Paiva (2013) included in their theoretical model the relationship between the politician's interest in being re-elected and the option they may have to influence the voter's preferences through regulated prices. At the end, the regulator would have the incentive to set higher prices when elections are far in time securing some level of profits for the firm, and lowering the prices just before the elections to generate a

profit to the consumers who are all voters.

Price controls or reforms have been studied within their role as stabilization mechanisms in developing economies.¹ However, as said by Ozatay (2005) price controls are not only specific to these stabilization episodes. In fact, as voters dislike high inflation there might be an incentive for the opportunistic policymakers to control prices, as seen in monetary policy political cycles. To our knowledge, Paiva (1996) along with Agenor and Asilis (1997) were the first who presented a theoretical model with a tightening of price controls in pre-electoral periods.

The main purpose of this chapter is to provide significant empirical evidence of the effect elections may have on regulated industry prices. For its development, we focused on two different samples; firstly, a panel data for ten countries in Latin America with annual data (from 2001-2012) using the price of gasoline as a proxy for the regulated industry and secondly, one which explores the Costa Rican case. This country has the particular characteristic of having a strong regulated market with much influence on their inflation measure. We used monthly data from 1985 until 2013. For both cases we have obtained significant results for our variable of interest.

This chapter is presented as follows; section II describes the theoretical and empirical background for our research, followed by a detailed description of the theoretical model in section III. While section IV provides the empirical evidence, analyzing the time series with Costa Rican data and then the Latin American panel data. Conclusions are offered in section V.

¹Buffie (1998), Dornbush et al.(1990) and Edwards (1989).

3.2 Theoretical Background

The theoretical framework for the present research comes mainly from two different streams of models. Firstly, we rely on the development of political budget cycles theories which started more than forty years ago with Kramer's and Nordhaus' research. And secondly, we include the theories of political regulation and lobbying, to give evidence on how electoral cycles behave in regulated industries, exploring a little deeper in what refers to political price cycles. In this section we aim to establish all precedent theoretical and empirical arguments needed as basis for the subsequent explanation of the scope of this work.

3.2.1 Pre-electoral fiscal manipulation

We begin with the basics of the Political Business Cycles theory, PBC, which were set formally by Nordhaus (1975) with a model of economic cycles determined by political-electoral cycles. One of his conclusions had to do with the predictability pattern of policy, as an incumbent's term in office starts with relative scarcity in the first years of governance, but ended with a larger expenditure right before elections. Before Nordhaus, there had been some grasps on the topic as Kramer (1971)² had linked economic conditions to election outcomes, regressing votes received by the incumbent party to growth rate of real per capita income and the inflation rate for that year. His research stated that the votes going to the incumbent party were inversely related to the inflation rate and positively related to the growth of income.

Fair (1978) found that the change in real economic activity (real per capita gross national production, GNP, or the change in unemployment) in election years has an important effect on votes for the incumbent president. Additionally, he found that voters apparently have a high discount rate on past economic performance; they just consider one year or two before the election.

On these grounds research has evolved importantly through four decades, going from *myopic voters*,³ to a context with *rational* and *forward looking* voters (first and second-generation models)

²He studied the percentage of the vote going to the Republican candidates for the House of Representatives between 1896 and 1964 by the state of the economy.

³Basic assumption in the first generation of PBC models; voters never learn from their mistakes; each government lets them believe that they deviate from the long run Phillips curve, and they fall for the trick.

where the pre-electoral economic situation is signaled as an indicator of government's performance. Thus, an election year expansion demonstrates the incumbent's governing ability.⁴ Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabelini (1990), have rationalized the political business cycle as the equilibrium of a signaling game originated from a temporary information asymmetry between government and voters.

The objectives for the policy-maker to remain in office are characterized as *partisanship*⁵ when the incentive is to implement a specific program, and/or *opportunistic*⁶, when the aim is to remain in power. Although a distinction is drawn between these reasons, Drazen (2000) argued that, in order to implement their preferred policies, partisan policymakers, may display opportunistic behavior, as they need to be in office in order implement those policies. Therefore, studies on the topic consider them as complementary and recognize combinations between opportunistic and partisan incentives.

Even though in the first decades of this theory development empirical research turned to be supportive, as time has gone by and politicians become more sophisticated it has been more difficult to demonstrate a consistent result on the topic no matter if fiscal or monetary policy are considered (as manipulating tools).

The empirical evidence is diverse, even when the studies are for the same country. For example, when analyzing the United States' PBC, Alesina has tested, through different articles, the temporary partisan electoral effects on real outcomes. He argues,⁷ that because un-modeled temporary partisan effects can look like opportunistic cycles, any empirical evidence of the latter can be discounted. Krause's (2005:97) research indicates that pre-election real personal income growth is significantly higher under Republican administrations relative to Democratic. He determines that maximum growth in US real personal income happens in the first two or three years of a term for Democratic presidents, but the top is reached in the election year for Republican administrations. Faust and Irons (1999), on the other hand, conclude that there is no evidence for an electoral influence in the

⁴O'Mahony (2010:2).

⁵Hibbs (1978) and Alesina (1987)

⁶Nordhaus (1975) and Rogoff and Sibert (1988)

⁷according to Grier (2008:337-338)

US economy.⁸ They state that Alesina's evidence is product of an under-specified regression model and endogenous regressors. On the contrary, Grier (2008) finds a significant influence of elections on quarterly real GDP growth when controlling for multiple lags of interest rate changes, inflation, money growth, among other variables.

Drazen (2000) stated in his review of the PBC, that the main conclusion when talking about the models based on monetary policy as a manipulating tool is that they are unconvincing both, theoretically and empirically. Actually, most empirical research on this type of cycles, use a monetary policy instrument or inflation as dependent on an electoral variable to test if the policy is significantly different near elections. Under this approach, results are mixed; Alesina and Roubini (1992), Beck (1987), Golden and Poterba (1980), and Leertouwer and Maier (2001) did not find evidence of political monetary cycles for the U.S. and OECD countries, but Boschen and Weise (2003), Grier (1987), Haynes and Stone (1989), and Abrams and Iossifov (2006) did.

Another approach was examined by Shi and Svensson (2006:1367-1369), who proposed a moral hazard model of electoral competition to back up their empirical evidence which found that on average PBC are significantly larger in developing than developed countries; on average, fiscal deficits increase 1% of GDP in electoral years. In their model, the size of the electoral cycle will depend on politician's rents of remaining in power and the share of informed voters. The more private benefits politicians gain when in power, the stronger their incentives to manipulate; the more voters fail to distinguish manipulation from competence, the higher the return for the incumbent when boosting expenditure before elections.

Specifically, from Latin American, LA, PBC evidence for election-year economic manipulation is mixed at best, as stated by Kaplan (2013:73). Actually, in his book, he proposes a political austerity cycle (PAC) theory which explains that countries who rely on decentralized bond markets should shrink their budgetary deficits, reducing inflation before elections. He even expects that past hyperinflation episodes in LA have blurred the lines of partisan cycles. Considering sixteen LA countries he finds strong evidence that when governments heavily rely on external bond markets , the

⁸Opportunistic or partisan

capital exit threat leads to budget discipline and low inflation during election periods. Eslava (2006) examines three possible determinants of fiscal balances and finds that less-fragmented governments and voters with greater ability to monitor fiscal policy are related to lower deficits.

The incentive for fiscal manipulation before elections exists, but from the evidence, the capability to remain in office clearly will depend on the ability to implement the policies which maximize the utility for those who elect them: a small group, a single individual or all the population, limited by factors such as institutional constraints (i.e. weak legislatures), the cost of losing office, the central bank autonomy, the level of external indebtedness and the exchange-rate regime. Therefore, there is an important assumption, as said by Shi and Svensson (2003:68): the theory of political business cycle requires that government's policy instruments, fiscal or monetary, have an immediate impact on real economy. From our second chapter we observed that this is not the case for Costa Rica; not only the immediate effect of a shock in fiscal policy was small but, it was negative. Maybe in countries like this, regulated markets turn to be the tool for political cycles.

3.2.2 Industry regulation

As the PBC theory, Industry Regulation, has been a field of research under study for more than forty years. In principle, their models assume regulators make their market decisions (price, entry, etc.) under the pressure from different interest groups. The work of Stigler (1971) changed the focus on industry regulation, stating that instead of being a way to maximize welfare, industry regulation should be characterized as arbitrage among competing interests. His research showed equilibrium where an organized minority, i.e. the firms, could capture the regulatory agency. This result obeyed to a simple and intuitive reason, consumers have weak incentives to acquire information and actively defend their interests while producers form pressure groups to influence the industry's regulatory outcome. Within this theoretical context, the regulatory outcome will be determined between self-interest suppliers (regulators) and demanders (interest groups, firms and consumers).

As said by Trillas (2010) during the twentieth century and up to the present, the organizational solution for the challenges of price and entry regulation have been through independent agencies

as regulators. Actually, the creation of these agencies around the world, has been supported and recommended by the World Bank (WB) and the International Monetary Fund (IMF) to several developing countries, claiming that it is the most effective approach in the regulation of privatized infrastructure industries (Brown et al., 2006). But still, independent regulators are part of a complex process of power sharing.

The literature that has studied the *direct lobbying*⁹ relationship is extensive, but related to an incumbent's behavior, we mention Peltzman's work (1976) as it reveals a formal theoretical model on how a regulator-agency chooses the price which maximizes the political support for the incumbent government-regulator. He formalizes the idea that a politically concerned regulator determines a regulated price in trying to maximize his or her political support. On the same line, Person and Tabellini (2000) include the effect of lobbying on political decisions, giving a much more active role to the industry.

As mentioned before, within the PBC literature, there are different theoretical models¹⁰ that have rationalized the political business cycle as the equilibrium of a signaling game originated from temporary information asymmetry between government and voters. Between them, governments are differentiated by their level of competency, with more competent governments providing the same amount of services using fewer resources. Government's competency is set as a serially correlated stochastic variable that receives a new shock every period, providing a cause of information asymmetry, which arises from the fact that the government learns its competency shock before voters do. On this line and within the scope of this research, we reference Moito and Paiva (2013), who say that in election years, the incumbent party has an incentive to act as if it had received a high-competency shock in order to attract voters.

⁹The attempt to influence or get political favors via campaign contributions or other means.

¹⁰Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabellini (1990)

3.2.3 Price Controls and Electoral Cycles

Paiva (1996) adds a time dimension to Peltzman's (1976) model turning it into a political price cycle (PPC) in regulated industries. Paiva's model shows that an optimal price-regulation strategy results in cyclical prices. In electoral and non-electoral periods, the regulator would have the incentive to set higher prices when elections are far in time securing some level of profits for the firm, and lowering the prices just before the elections to generate a profit to the consumers who are all voters. His model is supported on an empirical test on Brazil's gasoline market from 1969 until 1982. He stated that a clear electoral timing, i.e. having elections every four years, facilitated the creation of price cycles assuming that consumers have too few incentives to acquire costly information about past prices.

As well, Agenor and Asilis (1997) researched on the interaction between price controls and electoral timing. They argue that one of the rationales supporting the use of price controls temporarily emphasizes the role these controls may have on enhancing political support; based on the premise that the stabilization program is able to stop inflation quickly so it would not be costly in terms of unemployment. Considering a small open economy, which produces one good and has three types of agents: firms, households, and the government, their study showed that an incumbent will attempt to secure the political advantage of a lower inflation rate caused by any price controls tightening to the electoral contest.¹¹ After elections, prices are adjusted sharply toward the equilibrium value. How intensively are price controls used by the incumbent for electoral purposes, will depend on uncertainty about the term in office (i.e. the incumbent owes his position to a coalition of political parties that may collapse at any moment).

Ozatay (2005:2) intends to answer with a theoretical model if an incumbent in Turkey can control public prices before elections to increase his/her chances of re-election. His model shows that under domestic debt financing an incumbent can decrease the rate of increase of public prices before elections. Having controlled and transparent processes for budget approval and implementation, and limiting debt financing are determinants of his results. His empirical results show that Turkish inflation rate in pre-electoral periods was kept significantly below the one of post electoral observa-

¹¹ Agenor and Asilis(1997:140).

tions. On a similar line but proposing a political austerity cycle, Kaplan (2013:21-22) suggests that the incumbents in Latin America accommodative fiscal or monetary policy is not set to boost the economy's growth, but aims the inflation to go down.

Paiva has developed his work during almost twenty years and his research, Paiva (2006) and Moito and Paiva (2013), has contributed to the literature improving the theoretical model and adding more empirical evidence to their hypothesis. In fact, they have given evidence of the existence of political price cycles in regulated industries for a broad sample of countries, most of them developed.¹² This is one of the main motivations of the present research, as it would be an important contribution to add evidence from emerging economies, as are the Latin American economies included in our sample. As we know, their country characteristics are quite different, which enriches Paiva's findings, complementing the overall idea of the existence of PPC. Also, we step forward a bit further and propose a nonparametric methodology to support the PPC existence.

Based on these developments and those of industry regulation is how we build the foundations for the present research.

3.3 Theoretical Background Model

From our theoretical background, it is clear that there is still an important development to be done within the political-electoral cycle theory. In this section we explain the model of Moito and Paiva (2013), which gives a clear theoretical explanation on how the regulated prices within a country can be a powerful manipulating tool with electoral purposes. Their model gives the industry a more active and explicit role in influencing regulators, and assumes consumer-voters are rational and forward-looking.

As mentioned, their model includes another dimension to the regulator's maximization problem

¹²Australia, Austria, Belgium, Brazil, Canada, Switzerland, Denmark, Finland, France, Germany, Greece, India, Indonesia, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, South Africa, Spain, Sweden, Thailand, Turkey, United Kingdom, United States. As well they have included Mexico in the panel, and done a separate time series analysis for Brazil.

explained by Peltzman's (1993) study. They modeled regulatory decisions as a lobbying game where the industry and the regulator interact to determine regulated prices and campaign donations in a dynamic setting with alternating electoral and non-electoral periods. The incentives, and therefore the optimal strategies of the regulator, change depending on the period, generating an equilibrium that characterizes a political cycle in which the regulated price is lowered in electoral periods (2013:96-97). In their model, there are three players: the government or regulator, the producers who are the lobby-industry and the consumer, who is also a voter.

At time t , the beginning of an electoral period, the government and lobbyist negotiate prices and campaign contributions, making a binding commitment about the prices to be set during the current electoral period and for the period immediately after. Then, the industry decides the amount of the campaign contributions. As explained by the authors (2013:97), there is an assumption that consumers are not organized as a pressure group and do not know the details of the agreement between industry and regulator. Elections take place every other period. In a non-electoral year, the incumbent government-regulator chooses the price that maximizes welfare and lobby contributions. In an election year, however, the incumbent may lower the regulated price to increase its chance of being re-elected.

The regulator, and its strategies, will behave differently in electoral and non-electoral periods. For the latter, there will be an incentive to set higher prices and secure some level of profit to the firm, while for the electoral, the incentive would go the other way, lowering the prices to please the consumer (voter). In their model, the industry plays an active role influencing the regulators and the industry, the consumer (voter) is rational and forward looking and the government will seek to set prices in order to maximize welfare and his chances of being re elected.

As defined by the authors, the regulator's social welfare function is a weighted average of consumer surplus and industry profits, with weights following a stochastic process. A shock that determines a higher (lower) weight on profits characterizes a pro-industry (pro-consumer) type of regulator and results in the choice of a higher (lower) regulated price (2013:97). This shock is unobserved by consumers but not for the industry lobby, as they observe the regulator's type during the

negotiations that precede the election. Even though this temporary information asymmetry gives the chance to the pro-industry regulator to mimic the pro-consumer before elections, pro-consumers can achieve a lower price for any given utility since deviations from the welfare plus contributions generate a decrease in government utility at increasing rates.

Therefore, in equilibrium, the pro-consumer regulator will set a price unachievable by the pro-industry type in order to unequivocally signal its type to consumer-voters. Unable to match this lower price, pro-industry regulators have no reason to distort the regulated price at all (Moito and Paiva, 2013:97-98). The order of events of this model is crucial as it is what drives the cycle,

Period (t) , the incumbent receives its preference shock. Afterwards, it decides the current regulated price, and commits to the industry about future prices. The industry then decides on the amount of campaign contributions. The period ends when the elections take place and the winner is announced. Period $(t + 1)$, the winner takes office until the end of period $(t + 2)$. The incumbent type is revealed to the consumer as the regulator sets the price that maximizes its social welfare function plus lobby contributions.

Period $(t + 2)$, there is a new preference shock at the beginning of this period that sets a new orientation for the incumbent. Another election will take place at the end of the period.

Therefore, periods $(t + 1)$ and $(t + 2)$ belong to the same mandate but to different electoral cycles. The electoral cycle starts in t and lasts until the period immediately preceding the next election, $(t + 1)$. The new independent shock in $(t + 2)$ resets the game.

The firm's profit function is given by

$$\pi(p) = p_t q_t(p_t) - C(q_t) \tag{3.3.1}$$

where $\pi(p)$ is the profit of the firm, p_t is the price of the regulated good q_t is the quantity produced-demanded of the good and $C(q)$ is the cost function.¹³The consumer's utility function is given by

¹³ $C_q > 0, C_{qq} > 0.$

$$U(q_t) = \phi(q_t) + \eta_t^I \quad (3.3.2)$$

where $\phi' > 0$ and $\phi'' < 0$, η is a variable related to the government's performance in areas other than the regulated market that also affect popularity. The superscript I refers to the incumbent. We can think of this as all other tools discussed in the political budget cycles theory, i.e. expansive fiscal policy. Given the prices, consumers will maximize their utility subject to their budget constraint. It follows that,

$$\eta_t^I - \eta_t^O = s_t + s_{t-1} + e(c^I - c^O) \quad (3.3.3)$$

where s_t is an *iid* stochastic variable with unimodal distribution, twice continuously differentiable with mean zero. It is assumed, that the random part of the consumers' utility function, s , follows a distribution described as,

$$g(x) = \begin{cases} f, & -\frac{1}{2f} \leq x \leq \frac{1}{2f}, \\ 0, & \text{otherwise} \end{cases}$$

The total amount spent on a campaign prior to the election is given by c^I , and e is the marginal effect on popularity of the party from a US dollar spent. Superscripts I and O refer to the incumbent and opposition parties. The consumer will maximize its utility subject to its budget constraint, given prices the demand function for the good will be $q = q(p)$ and the indirect utility V_t .

The type of politician is defined by $\alpha \in [\underline{\alpha}, \bar{\alpha}]$, with $\underline{\alpha}$, being a *pro consumer* type and $\bar{\alpha}$ being a *pro industry* type, $0 \leq \underline{\alpha} < \bar{\alpha} \leq 1$. The type α follows a stochastic process with probability μ of observing a pro-industry type: $P(\alpha = \bar{\alpha}) = \mu$. The politician, as mentioned before, receives a shock every election period.¹⁴ A new shock at the beginning of period t will define the regulator's type in periods (t) and $(t + 1)$. A new shock is given on $(t + 2)$, when the next election cycle starts.

¹⁴As mentioned by Moita and Paiva(2013:99) these shocks can be thought as a greater fluidity of political arrangements, coalition negotiations, government programs, campaign donations, among others.

The incumbent's social welfare function is

$$W(p) = \pi(p) + (1 - \alpha)S(p) \quad (3.3.4)$$

where $S(p)$ is the consumer's surplus. The incumbent will decide the regulated price in the two periods that he will be in office¹⁵ and this price maximizes his objective function in time t :

$$\Phi_t^I = \max_{p_{t+1}, p_{t+2}} [\phi U^{RA}(c) + (1 - \phi)\sigma R_{t+2}^I + W(p_{t+1}) + W(p_{t+2})] \quad (3.3.5)$$

where $U^{RA}(c)$ is the indirect utility of the independent non politician regulator, ϕ is a binary variable that is equal to 1 if there is an independent regulatory system and equal to 0 otherwise. R is the probability that the incumbent gets re-elected and σ is the weight the party places on being elected relative to social welfare. As we will focus on the case of politician regulator, we assume $\phi = 0$. The objective function becomes,

$$\Phi_t^I = \max_{p_{t+1}, p_{t+2}} [\sigma R_{t+2}^I + W(p_{t+1}) + W(p_{t+2})]$$

The opposition party has a similar objective function. The incumbent party win the elections in period t if

$$E_t[V_{t+1}^I + V_{t+2}^I - V_{t+1}^O + V_{t+2}^O] \geq 0$$

Since shocks occur in t and $t+2$ but they are stochastic, $E_t[V_{t+2}^I] = E_t[V_{t+2}^O]$, we have

$$\begin{aligned} E_t[V_{t+1}^I - V_{t+1}^O] &= E_t[\phi(q(p_{t+1}^I + \eta_{t+1}^I) - \phi(q(p_{t+1}^O - \eta_{t+1}^O))] \\ &= E_t[\phi(q(p_{t+1}^I) - \phi(q(p_{t+1}^O + s_{t+1} + s_t + e(c^I - \bar{c}))) \\ &= E_t[\phi(q(p_{t+1}^I))] - \bar{\phi} + s_t + e(c^I - \bar{c}) \end{aligned}$$

where $\bar{\phi}$ is the expected value of $\phi(q(p))$, \bar{c} , is some base amount of campaign contribution a party

¹⁵His objective function is a finite horizon maximization problem.

has if it is not in power, and the expectation is taken conditional on the information available to the public in time t . When setting the price p_t , the incumbent does not observe s_t , hence, the probability of winning is given by

$$R_t^I = P[E_t[\phi(q(p_{t+1,2}(\alpha))) - \bar{\phi} + s_t + e(c^I - \bar{c})] \geq 0] \quad (3.3.6)$$

which follows the probability distribution of s and $R^O = 1 - R^I$. When the incumbent sets the price he cannot observe the popularity shock, so there is no relation between the price and s_t . Before getting to the equilibrium conditions is important to note that in practice, prices in $t+1$ and $t+2$ are independent while prices in t and $t+1$ are not.

In this model there is no history dependence and the independence of the cycles implies that no reputation is built over time since a new shock defines a new regulator. As there is an assumption that the regulator set the prices and then the lobby decides optimally how much it will contribute to the politician's electoral campaign, the politician's decision problem is

$$\phi = \max_{p_{t+1}, p_{t+2}} W(p_t) + W(p_{t+1}) + \sigma R_t \quad (3.3.7)$$

subject to

$$\pi(p_t) + \pi(p_{t+1}) - c = 2\bar{\pi}c \geq 0,$$

where $2\bar{\pi}$ is the amount of profits the industry must earn and R_t is given by equation (6). Given the assumption on the distribution of s , the equation (6) can be rewritten as

$$R_t = \frac{1}{2} + f[E_t(S(p_{t+1})) - \bar{S}(p)] + fe(c - \bar{c}) \quad (3.3.8)$$

Equations (7) and (8) are used to solve the equilibrium prices. When assuming symmetric information¹⁶ we have that voters know the regulator's type and understand the trade-off he faces. Hence, the regulator has no incentives to distort the price in an electoral period: $p_t^* = p_{t+1}^*$.

¹⁶For this paper we are going to show the case where information is asymmetric, as it is the theoretical basis for our empirical model. The other cases: symmetric information and Independent Regulatory Agency can be found in Moito and Paiva (2013).

Our interest is to focus on the asymmetric information case. Following Moito and Paiva (2013:103) by substituting equation (8) and using the constraint on firm's profits, the regulators' maximization problem given by (7) can be rewritten as

$$\phi = \max_{p_{t+1}, p_{t+2}} G(\alpha, p_t) + G(\alpha, p_{t+1}) + \sigma \left[\frac{1}{2} + f(E_t(S(p_{t+1})) - \bar{S}(p)) - fe(2\bar{\pi} - \bar{c}) \right] \quad (3.3.9)$$

where $G(\alpha, p) = (1 + \sigma fe)\pi(p) + (1 - \alpha)S(p)$ is the politician's utility. Therefore, the regulator's maximizing function is

$$\phi = \max_{p_{t+1}, p_{t+2}} G(\alpha, p_t) + G(\alpha, p_{t+1}) + \sigma f E_t(S(p_{t+1})) \quad (3.3.10)$$

Solving the model recursively, from time $t + 1$ to time t : when there are no elections ($t + 1$), the price that maximizes the politician's welfare and lobby contributions will be p_{t+1} , as this is the price the regulator had committed to with the industry when negotiating campaign contributions. Actually it is the same as when there is full information.¹⁷ This means that $p_{t+1}^s = p_{t+1}^*$, where s stands for signaling equilibrium.

For the electoral years, in equilibrium, the incumbent politician adopts a strategy according to its type; if *pro-industry*, he will set $p^s(\bar{\alpha}) = p^*(\bar{\alpha})$ and $\lambda(p^*(\bar{\alpha}) - p^s(\bar{\alpha})) = 0$;¹⁸ if *pro-consumer*, the strategy will be $p(\underline{\alpha}) < p^*(\underline{\alpha})$ and $\lambda(p^*(\underline{\alpha}) - p(\underline{\alpha})) > 0$. Any voter that assigns probability one to being a high type, when observing $p(\bar{\alpha})$ and assigns probability one of being a low type when observing $p(\underline{\alpha})$ is consistent with this equilibrium.¹⁹

The theorem²⁰ presented by Moito and Paiva(2013:104) represents a separating sequential equilibrium of the game as

$$p^s(\underline{\alpha}) = p^*(\bar{\alpha}) - \lambda^{-1}[\sigma f E_t[S(p_{t+1}(\underline{\alpha})) - S(p_{t+1}(\bar{\alpha}))]]$$

¹⁷The result from the symmetric information model is $p^*_i = \frac{\partial C(q_i)}{\partial q_i} - (\sigma fe + \alpha) \frac{q_i}{q}$.

¹⁸For the proof, see Appendix A of Moito and Paiva (2013).

¹⁹Same result as Spence (1973): the least favorite one does not signal his type as he will be recognized in equilibrium.

²⁰For the proof, refer to Appendix B in Moito and Paiva (2013:104).

where $\lambda(p^*(\underline{\alpha}) - p^s(\underline{\alpha})) > 0$ is the distortion of the *pro-consumer* type. This distortion, according to the authors,²¹ is a function of the difference between the probability that each type wins the elections, of how the incumbent weights his objective function and of the variance of the random shock on voter's preferences:

- The greater the difference between probabilities, the more distortion the lower type will introduce to be distinguished from the higher type.
- The more weight the politician places on being reelected, compared to the consumer welfare, the more he will distort.

It is straightforward, in equilibrium the *pro-industry* type receives more campaign contributions from the lobby than the *pro-consumer* type.

From this model, the emerged equilibrium consists of fully rational political price cycle in a regulated industry, where the incumbent lowers the price before elections to benefit the consumer and raises it after elections to give some profit to the lobbyists. More specifically, during non-electoral times, policy distortions because of the lobby activity will have their full dimension. While in electoral times, they will decrease. In equilibrium, the *pro-consumer* government/regulator will distort and lower the regulated price to differentiate themselves from the *pro-industry* regulators. Therefore, an empirical implication is that political cycles will only take place when a *pro-consumer* is in office, which happens with probability $(1 - \mu)$.

Before we review our empirical analysis, it is important to distinguish that the theoretical background model works as a general framework of reference for regulated industries, in order to better understand the mechanism behind a PPC. But this does not mean there can not be differences with the evidence for specific sectors or countries. In fact, for our chosen sample the oil industry even when managed by autonomous institutions are basically in hands of the public sector.²² The differ-

²¹Moito and Paiva(2013:104).

²²For example, the state company in Mexico is Petroleos Mexicanos (Pemex), and in Brazil it is Petroleo Brasileiro (Petrobras).

ence lies in the level of independence each of these firms may have with respect to the government. If they are completely independent they would act as the producer/lobbyist from the model, and if they are not, they would be part of pre electoral manipulation directly from the government. In any case this should not affect our findings as our interest is to determine if there is an *electoral pattern* in the behavior of the prices of regulated goods.

3.4 Empirical Evidence

Having explained the theoretical relationship between the politician's interest in being re-elected and the options they may have to influence the voter's preferences through regulated prices, it is in our interest to provide some new empirical evidence on the topic. For this, we will focus on two different samples, the Costa Rican case study and a panel data for ten countries in Latin America.

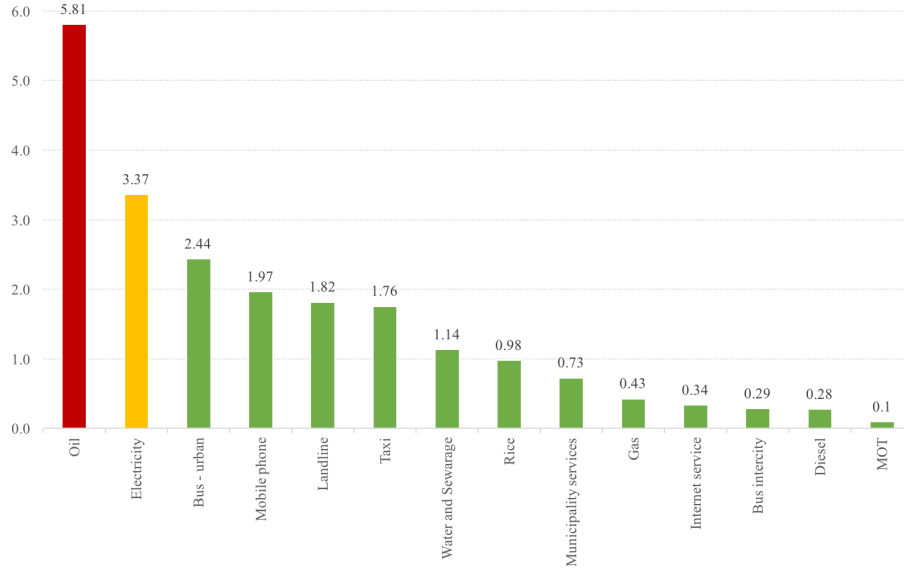
3.4.1 The case for Costa Rica

The case selection for Costa Rica was made because of its particular characteristic of having a regulated market with a strong influence in their inflation measure, which is actually divided into regulated inflation and non-regulated. We will test the political price cycle theory, considering all regulated goods and services. We have stated that one of the options for the incumbent to manipulate the economy and therefore increase the probability of being reelected, comes from the prices of the regulated markets. We found an exceptional country case as it measures through its regulated price index the inflation that comes specifically from these goods and services. Therefore, it is an ideal variable to determine if there is a political price cycle in Costa Rica. Its results will complement those of Moito and Paiva (2006, 2013).

Our variable of analysis is as specific as it gets, regulated prices index, and comprises the following prices: water service, municipality services, electricity, gas, gasoline, diesel, rice, car technical revision (MOT), internet, urban and intercity bus fare, taxi fare, telephone landlines service and mobile service. All of them have a significant and almost immediate effect on a household's (voter's)

income. Our next graph shows their weight in the consumer's price index.

Figure 3.1: Consumer Price Index, weighting of regulated goods and services



From an ownership perspective, we have the advantage that even though some are owned by the state²³ and others are owned privately, in terms of their weight on the CPI's index, they are similar, 54.8% and 45.2% respectively.²⁴ Also, the firms owned by the state were created as autonomous institutions²⁵ which implies they must act as such.²⁶

As we are interested in characterizing the relationship between the regulated-prices index and the electoral cycle, we have illustrated the behavior of the regulated markets index for the past twenty eight years emphasizing the moments in time where elections have taken place to have a sense of its behavior.

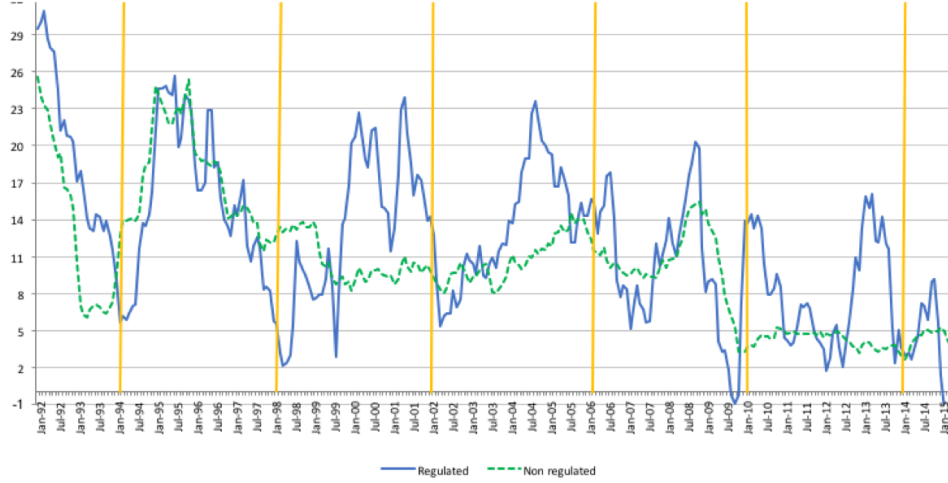
²³Water service, municipality services, electricity, gas, gasoline and diesel.

²⁴Considering as private does which are part of a competitive market.

²⁵Costa Rican Institute of Aqueducts and Sewers was created in 1953 as a decentralized organism

²⁶If not, we have already assumed that from our theoretical background model the difference would come from their level of independence which in any case would help the incumbent with its manipulation purposes for the electoral process.

Figure 3.2: Consumer Price Index, regulated goods and services, 1986-2014



Apparently there is a pattern of a decreasing trend of the index just before elections, which would support our hypothesis. Still this is the first sight at the data, a deeper and statistical significant analysis is needed. To do so, we will employ a standard regression model; in a general manner,

$$y_t = \beta_j y_{t-j} + \gamma_j x_{j,t} + \delta_E E_t + \Phi_j s_{j,t} + \epsilon_t \quad (3.4.1)$$

where $x_{j,t}$ is a vector of m controls, E_t is a dummy election variable, s is a seasonal control variable, and the term ϵ_t is a random error that is assumed independent and identically distributed. The variables included are: the monthly series of the regulated-prices index, the international oil price measured in US dollars and the monthly index of economic activity. The time period considered is from January 1985 until June 2009, for a total of 294 observations. From our hypotheses we would expect a negative sign on the election dummy variable, E_t , and for it to be significant. The electoral variable is dichotomous, coded 1 in the month in which a regular election occurs, and 0 otherwise.

Following Streb (2011), we will also look at the *pre* and *post* electoral effects of fiscal manipulation. In accordance, we are able to appreciate the electoral effect before and after the elections

take place. That is why we include the variable *PPC*, which is equal to -1 six months before the elections and equal to 1 six months after the elections. Given our theoretical background, a significant positive coefficient in *PPC* would imply that the increment in prices after elections is larger than the decrease experienced before. Meaning for those who own the firms²⁷ of regulated goods or services a positive compensation for their support before elections. We would expect for this to be the case as it would be counterintuitive for firms to accept a negative return at the end of the cycle.

Table 1 presents the general characteristics of all the variables we include in the model.

Table 01

Cross Sectional Time Series Summary of Statistics

Variable	Obs	Mean	Std dev	Min	Max
Regulated price index	294	0.12445	6.05546	-14.0487	19.5043
International oil price	294	3.21647	0.54919	2.2905	4.8870
Economic activity index	222	5.04580	0.25853	4.5979	4.8870
Election month	294	0.02041	0.14163	0	1
PPC	294	0.02041	0.51555	-1	1

We start with the non-stationary tests. Our dependent variable, the regulated-prices index, *regsa*, rejected the null of the Dickey Fuller test at ten percent, with a value of 0.0881, but it did not reject the null when a trend was considered. A similar behavior is observed with the economic activity index. The logarithm of the international price of oil did not reject the null for any of the cases or tests. Hence the decision is to include the difference of international price of gasoline. After including the international price of gasoline as differenced, there is no evidence of a unit root. Therefore, it is possible to proceed with the estimation by OLS because it relies on the stochastic process being stationary.

²⁷Public or private.

Table 02

Summary of Results - Ordinary Least Squares

Dependent Variable: Consumer's price index, regulated prices

	Model 1	Model 2	Model 3	Model 4
Intl price _{US\$}	-5.997 (3.897)	-5.212 (3.868)	-10.02** (4.927)	-8.963* (4.939)
Ele	-7.225*** (2.487)	-8.735*** (2.561)	-5.648* (3.078)	-7.184** (3.183)
PPC		1.573** (0.703)		1.566* (0.883)
Ec activity index			-2.557 (1.593)	-2.474 (1.586)
cons	0.283 (0.354)	0.279 (0.351)	13.62* (8.045)	13.2 (8.009)
N	293	293	222	222
Rsqr	0.0329	0.0494	0.0456	0.0593
Adj Rsqr	0.0262	0.0395	0.0325	0.0419

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

In a time series model our major problem is serial correlation and that is why the next estimations consider different lags of our dependent variable. The numbers of lags are set according to the information criterion, and as we specify different models, the number of lags varied as well. From all the different model specifications, we observe a constant result and it is the significance of the electoral dummy coefficient. Also, the coefficient of this variable maintains the negative sign in all cases, which means that during elections the price index of regulated goods and services in Costa Rica diminishes; as the graphical evidence in the figures above depicted. This result is also in accordance to the theoretical model, therefore it turns to be evidence for its support.

Table 03

Summary of Results - Ordinary Least Squares

Dependent Variable: Consumer's price index, regulated prices

	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Intl price _{US\$}	-6.051 (3.944)	-5.772 (3.640)	-5.195 (3.908)	-8.737* (4.913)	-5.89 (4.082)	-11.42** (5.217)
Ele	-7.114*** (2.528)	-3.978*** (2.269)	-8.798*** (2.592)	-7.248** (3.165)	-10.85*** (2.992)	-9.3484*** (3.581)
PPC			1.814** (0.739)	1.663* (0.879)	2.249*** (0.0837)	2.400** (0.979)
Ec activity index		-0.17 (1.185)		-2.721* (1.586)		-2.607 (1.618)
LDV.4		0.667*** (0.049)				
LDV.11	-0.0618 (0.06)					
LDV.12			-0.156*** (0.059)	-0.117* (0.063)	-0.159*** (0.060)	-0.118* (0.064)
cons	0.221 (0.0366)	1.016 (5.994)	0.251 (0.361)	14.47* (7.994)	-0.655 (1.287)	12.12 (8.402)
N	283	222	282	222	282	222
Seasonal control	No	No	No	No	Yes	Yes
Rsqr	0.0364	0.0485	0.0721	0.074	0.0824	0.0242

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our regression results support our hypothesis and the intuitive behavior we showed in figure 01. When we look the regulated prices' of goods and services in Costa Rica behavior within an electoral

context we find evidence that there is a significant relation; because of its p-value we are 99% sure about this, with exception of model 8 where our confidence is 95%. We know that coefficients of independent variables will show the relation between them and our dependent variable; the difference between an electoral and non electoral period correspond a negative effect on the regulated price index.

According to the different specifications of our model, the effect has a lower value of -3.978 (model 6) and the highest of -10.85 (model 9), which means that everything the same, *ceteris paribus*, the regulated price index would decrease in this amounts when we are in the considered electoral period in comparison to other timing. In terms of the consumer price index this negative effect would be translated as 0.83 and 2.28 points less when elections take place,²⁸ holding everything else the same. Their percentage significance will depend on the past value of the CPI, but as an example, if we consider the highest value obtained in the model (-10.85) and that two months before the election the CPI was 100, we would have a drop to 97.7 on the month before the elections. A monthly fall of 2.28% in the CPI is economically significant, hence, we could say then that politics do matter in explaining the downward trend on the regulated price index and consequently on the CPI. The next graph shows both scenarios on the pre electoral months as an example.

Having the regulated price index as our dependent variable does not allow us to distinguish which of the goods or services or if it is one or more, that determine this negative effect, but we do know that no matter on which it is, the effect is rapidly and directly felt by the consumers/voters.²⁹

From our data characteristics, we know that the minimum value of the regulated price index is -14.0487 and the maximum is 19.5043 . With it, we have studied the relationship between our dependent and independent variables by approximating a linear relation with the regression analysis. But we intend to relax this linearity assumption in order to complement the results obtained using a non parametric appraisal.

²⁸Because the prices of regulated goods and services weight 21%, approximately, of the consumer price index.

²⁹Annex 3 and 4 show the behavior of some of the regulated goods and services considered in the index.

Figure 3.3: Consumer Price Index, scenarios given the model results



Non parametric approach

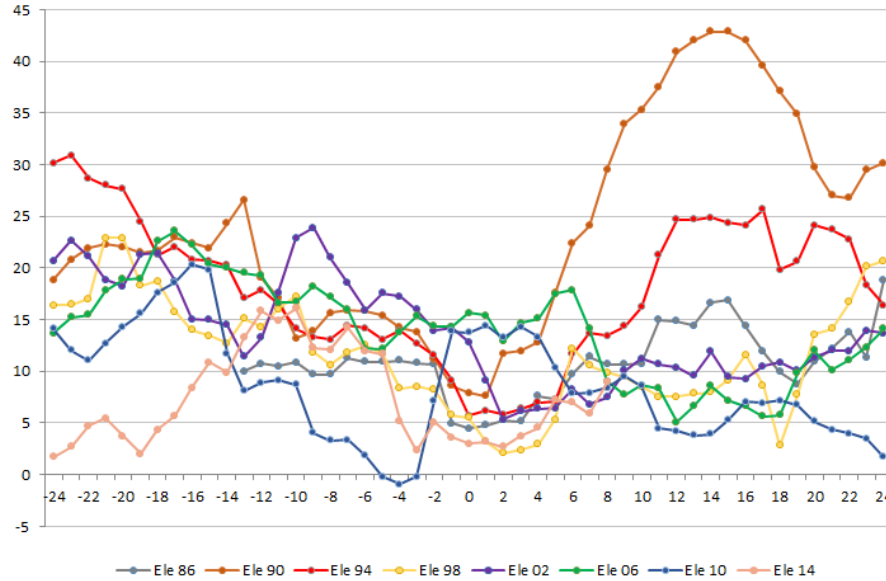
The next figure intends to depict this giving clearer evidence on the observed behavior. On the x axis we have months in a particular arrangement and on our y axis we find the values for the regulated goods price index seasonally adjusted.

The x axis represents the months before and after elections, the zero value is the actual month in which presidential elections have taken place. The negative values on the left represent the months before the elections and the positive values are the months after the elections. As national elections take place every four years, in the graph we divided the data series into two. The labels represent each of the elections, for example Ele 98 means the election of 1998. What we observe is that no matter which election we consider, it goes down as the election approaches and comes back up as it passes³⁰; therefore, our interest in defining this relationship in a non parametric estimation as well.

Even when the behavior of the series is not limited to a linear standard form, we observe that before elections, the price index of regulated goods tends to decrease. The opposite behavior is observed immediately after elections.

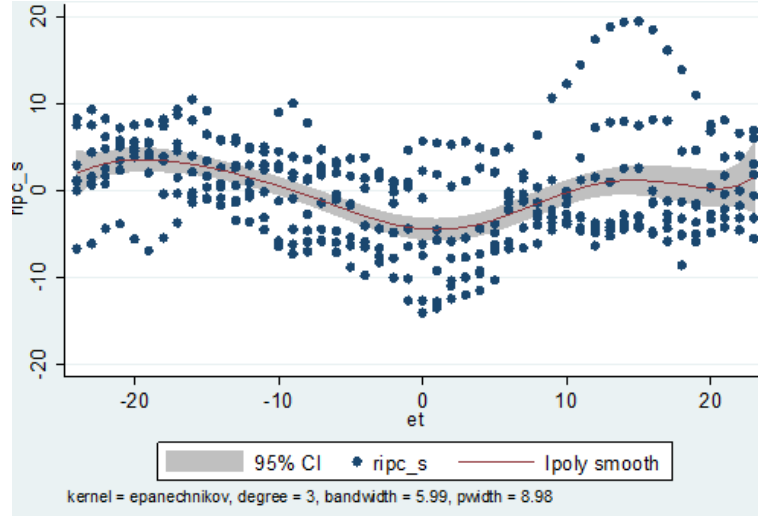
³⁰Annex 03 shows the same graph but seasonally adjusted; the relationship between election and regulated prices maintains.

Figure 3.4: Non parametric approach on the Index of Regulated Goods and Services



These results signal that the effect before elections as the prices decrease is compensated by their increment in the months after the election date. Theoretically, this is explained by the existence of organized groups of the productive sector which have some influence on the regulator. Therefore, these results along with those of the regression model seem sensible towards our hypothesis and theoretical background model; the repetitive pattern on regulated prices before and after elections is statistically significant when assuming linearity and when not. This evidence indicates an attempt from the incumbent to influence electoral preferences by persuading the regulated goods and services market, providing evidence in favor of the PPC theory. It is now our intention to generalize this finding with a panel of ten Latin American countries which considers annual data from 2001-2012.

Figure 3.5: Local polynomial smooth



3.4.2 Panel data analysis

We will begin with our Latin-American panel: a multivariate regression model, which characterizes the relationship between the selected dependent variable (from the regulated markets), y , in country i and year t , $y_{i,t}$, and the electoral cycle; it can be depicted in a general manner as:³¹

$$y_{i,t} = \sum_{j=1}^k \beta_j y_{i,t,j} + \sum_{j=1}^m \gamma_j x_{j,i,t} + \delta_E E_{i,t} + \sum_{j=1}^n \Phi_j \zeta_{j,t} + \mu_i + \varepsilon_{i,t} \quad (3.4.2)$$

where $x_{i,t}$ is a vector with elements $x_{j,i,t}$ of m controls, $E_{i,t}$ is a dummy election variable, t_t is a time control variable, μ_i is a specific country effect, and $\varepsilon_{i,t}$ is a random error that is assumed to be independent and identically distributed. From our hypotheses we would expect a significant coefficient on the election dummy variable. This specification represents a dynamic panel model, where the dependent variable is a function of its own lagged levels, a set of controls and the electoral timing.

From regulated markets, we chose the *gasoline* market as our dependent variable because when its price changes, the effect can be felt by consumers/voters almost immediately on transportation costs (which are directly affected) and in their vehicle use. Also, gasoline has an important weight

³¹Based on Streb et al. (2009:434).

within CPI components of all countries in the sample. The other important fact, is that governments have a strong influence on the price of that fuel, as it is either taxed or subsidized; and it is an homogeneous product that can be compared among the countries in the sample. There is as well, an international price reference which is widely known and spread by the media, which is updated on a daily basis. Hence, the natural logarithm of domestic gasoline prices in real terms will be our dependent variable, and will be controlled by the logarithm of oil prices in real terms, meaning the price free of any subsidy or tax; the international reference.

The *election* variable is a dichotomous dummy, coded 1 in the year in which a regular (presidential) election occurs, and 0 otherwise. Following Streb (2011), we will also look at the post-electoral effects of political price manipulation. Nordhaus' (1975) framework stated that the monetary stimulus before elections is compensated afterwards to avoid long run consequences for inflation.

In accordance to Nordhaus and within the theoretical model of Moito and Paiva (2013), our hypothesis is that a decrease in the gasoline prices should be observed before elections, but after, there should be an increment. We will test our hypothesis through a Latin American Panel and also in a non parametric way.

The model represents in a very simple way, the relationship between the evolution by country of gasoline prices (in real terms) to the real cost of oil expressed in domestic currency and the electoral years in the sample. Intuitively, we want to determine if the *variable* part of the domestic gasoline price behaves differently in electoral and non-electoral years. Our pooled regression has the following general specification,³²

$$loil_{rnat_{i,t}} = \sum_{j=1}^k \beta_j loil_{rdom_{i,t-j}} + \sum_{j=1}^m \gamma_j x_{j,i,t} + \delta_E ele_{i,t} + \mu_i + \zeta_t + \varepsilon_{i,t}$$

where *loil rnat* is the logarithm of the national price of gasoline, *loil rdom* is the logarithm of real international oil prices in domestic currency and *ele* is a dummy variable as explained before. The country specific effects, are expressed by μ_i and ζ_t represents the time specific effects; the distur-

³²Following Moito and Paiva (2013).

bances by $\varepsilon_{i,t}$.

Because of data availability for Latin American countries and the aim to have a standardized source of information,³³ the panel comprises annual series on the evolution of gasoline prices, inflation levels, measured through the CPI and exchange rates of their national currency expressed in US dollars. Our panel is conformed by Argentina, Brazil, Bolivia, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru and Uruguay, from 2001 until 2012. It is a strongly balanced panel with 120 observations, out of which 27 represent election years.

Econometric Analysis

Before dealing with the classical problems of panel data such as serial correlation and unit heterogeneity and with the intention of avoiding other series problems, non-stationarity tests were done. As we know, in a non-stationary time series, its expected that value at time t is determined by the expected value taken at t_0 , causing estimation problems. On this matter, the Fisher test was carried out; based on the p-value of n independent tests and considers that all series are non-stationary, against the alternative that at least one of them in the panel is stationary. There is no evidence in this model of a unit root neither in the original nor the transformed series as the null hypothesis of non-stationarity was rejected.

We proceeded to estimate the model by Ordinary Least Squares (OLS), which turned out with our electoral dummy as significant for the year of the elections, but not significant for the year before or after. We will consequently go through a detailed econometric evaluation of the panel in order to define the best specification for this model.

The country sample in this panel is formed of geographically close countries but which are impossible to think of as homogeneous. Specifically to our model, all countries subsidize or tax the gasoline in completely different ways. In Argentina, for example, it is supposed to be tax free but the existence of export rights distort the gasoline price with respect to the international one. In Brazil, Petrobras (one of the biggest Brazilian refineries) cannot translate international price volatil-

³³These are the countries for which The Economic Commission for Latin American Countries, ECLAC, had data available.

ity into the local prices. The oil national company of Chile (ENAP) refines almost 80% of the total demand, it is 100% state owned, and hence the price distortion may come from it. Therefore, even though price movements should be caused by movements in supply or demand, when there is a tax or subsidy, other factors distort them.

Given the Latin American context, we need to account for unit heterogeneity, which can have three different causes: individual effects, interaction variables, and omitted variables. In order to determine its presence, an analysis of the cross sectional variation and the variance over time of the sample of countries was made. Table 04 helps with a part of this evaluation since it decomposes the standard deviation in two components: between and within variation.

Table 04

Cross Sectional Time Series Summary of Statistics

Variable	Specification	Mean	Std dev	Min	Max	Observations
National oil price	overall	-1.4473	0.0505	-0.7484	0.1306	$N = 120$
	between		3.1731	-5.7098	3.6964	$n=10$
	within		0.1435	-1.8729	-0.9435	$T = 12$
Intl price _{natcurrency}	overall	2.8215	2.9502	-1.0356	8.3458	$N=120$
	between		3.0749	-0.4900	8.0444	$n=10$
	within		0.3501	1.2209	3.6653	$T=12$

As expected, the *between* variation of the national gasoline price is much higher than the *within* the same happens with the international price in domestic currency, but in this case, the effect comes from the exchange rate variation instead of the price itself. Specification tests are done in order to determine if the estimations are going to be the best linear estimator possible according to the Gauss Markov theorem.

The Breusch-Pagan test for heteroskedasticity showed a probability outcome of 0.0155, rejecting the null hypothesis of constant variance. The null of no omitted variable bias expressed in the Ramsey regression specification-error test was rejected with a p value of 0.006. This can be a

possible reason for the heteroskedasticity result. The source of this bias could be the exclusion of individual effects, which OLS does not take into account when estimating.

In accordance with these tests, we confirm that the pooled time-series violate three of the standard OLS assumptions about the error process.³⁴ First, errors are contemporaneously correlated, such that errors in country *A* at time *t* are correlated with errors in country *B* at time *t*. Second, the error process display panel heteroskedasticity, meaning that the variances of the error differ among countries. Third, there might be serial correlation within the same country such that errors at time *t* are correlated with errors at time *t* + 1.

We start with the fixed effects model, which assumes that there is a one-way error component for the disturbances of the panel, the errors u_{it} , would be compounded by an unobservable individual specific effect, m_i , and a remainder disturbance, v_i . The Fixed Effects model specification assumes m_i , as fixed parameters to be estimated and the remaining disturbances stochastic with v_i independent and identically distributed. The independent variables are assumed independent of the v_i for all *i* and the null hypotheses states that all the individual effects, m_i , are the same and equal to zero.

The alternative specification of the Fixed effects, the Random effects model was tested as well. The difference is that it assumes m_i random, and independent from v_i , in addition, the explanatory variables are independent of m_i and v_i for all *i*. For this model there is no test for autocorrelation, by its assumptions is ruled out. Even though this model is an appropriate specification, if there would be a random sample from a large population, its estimation results were analyzed and compared. Table 05 displays the results for the different specifications.

The Fixed effects are imposed in model 1 and 3; random effects in model 2 and 4. There is a difference in the electoral variable included for the models, as *Ele*, the electoral year was included, another measure of electoral timing, called *PPC* was created and included. This variable tries to compile any other electoral effect, as it is equal to 1 the year before the electoral year and equal to -1 the year after; it turned not significant.

³⁴Beck and Katz (1995).

Table 05

Summary of Results - Fixed and Random effects

Dependent Variable: National price of gasoline

	Model 1	Model 2	Model 3	Model 4
Intl price _{dom}	0.196*** (0.058)	0.178*** (0.058)	0.197*** (0.056)	0.183*** (0.056)
Ele	0.0398* (0.003)		0.0388* (0.003)	
PPC		-0.0093 (0.015)		-0.0060 (0.015)
cons	-0.0149 (0.012)	-0.0038 (0.011)	-0.0148 (0.013)	-0.0043 (0.011)
N	110	110	110	110
Rsqr	0.1158	0.0903		
Adj Rsqr	0.0165	-0.0118		
AIC	-210.5133	-207.3885		

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Because we have not solved the heteroskedasticity and autocorrelation problems, our standard errors may not be as accurate as they could, altering the estimation significance of the coefficients. Hence, the selected procedure has to solve both problems without generating too many undesired effects. The fitted panel data model, Beck and Katz (1995) panel corrected standard errors, is used for this purpose. With it, we gain explanatory leverage from cross-national and cross-temporal data, while correcting for possible spatial and temporal correlation of errors.

We estimate three different variants of error correction for both models that we have (one with *Ele* and the other with *PPC*), the results are shown in Table 06. In the overall, we do not observe changes with the panel corrected standard error estimation in terms of the significance of the variables included.

Table 06

Summary of Results - Panel Corrected Standard Errors

Dependent variable: National price of gasoline

	Model 5	Model 6	Model 7
Intl price _{dom}	0.196** (0.077)	0.193** (0.077)	0.191*** (0.067)
Ele	0.0398** (0.0200)	0.0395** (0.0200)	0.0361* (0.0190)
cons	0.0068 (0.044)	0.0074 (0.045)	0.0062 (0.056)
N	110	110	110
Rsqr	0.1984	0.1907	0.2153
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Even though our *Ele* variable is significant in all specification we have estimated, the opposite sign results. This could be attributed to the fact that the variables included are yearly, which can capture the post-election effect in itself. For example, if the election takes place during the first quarter it is probable that our dependent variable would behave differently on the other three quarters of the same year, but that is something our estimation is unable to differentiate.³⁵

³⁵The results including the variable *PPC* do not change either, they are shown in Annex 03.

Table 07

Summary of Results - Panel Corrected Standard Errors

Dependent variable: National price of gasoline

	Model 8	Model 9	Model 10
Intl price _{dom}	0.198** (0.074)	0.181** (0.074)	0.173** (0.065)
Ele	0.0384* (0.0210)	0.0372* (0.0190)	0.0321* (0.0170)
cons	-0.0147 (0.0150)	-0.0134 (0.0180)	-0.0093 (0.0170)
N	110	110	110
Rsqr	0.1162	0.0986	0.1052
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Even if we do not control for the individual effects, we get a very similar outcome: the election year variable, *Ele*, is significant while *PPC*, is not,³⁶ as we can see on Table 4. From all these results we can observe that the estimated coefficient for our electoral variable suggests a significant effect of three percent approximately during periods of presidential elections.

This counter intuitive result may be explained by what Streb and Lema (2009) call the temporal aggregation effect. They show that annual data strongly underestimate the effect of political budget cycles. They explain if elections that take place between January and December, annual data would not allow to identify the election year precisely. Different schemes have been proposed in order to overcome this caveat, for example, Barberia and Avelino (2011) count the election year when the election takes place on the second semester, if it takes place on the first semester, they consider the pre electoral year. But still pre-electoral effects may be spread out in the two years up to elections. More importantly, they state that if the sign of policies is reversed after elections, lower frequency

³⁶For the results refer to Annex 04.

data may disguise PBC evidence as the effects in the election year may cancel out, as Akhmedov and Zhuravskaya (2004) point out in their country study for Russia.

The authors, Streb and Lema, give an example to illustrate the differences between using annual or quarterly data, they state that if an election takes place in June and we assume there is a pre-electoral deterioration in the budget surplus (*surplus* = -1) during the four quarters running up to elections, followed by an improvement (*surplus* = 1) the next four quarters. In the calendar year in which elections take place, the net effect on the budget surplus is zero. Of course not all elections take place in June, when considering the other months the authors aggregate the effects by calendar year, and state that there is a serious underestimation of PBCs in the election year, since pre-electoral expansions almost cancel out with post-electoral contractions, leaving a net expansive effect that is only 25% of the total stimulus before elections.³⁷

Acknowledging their argument, it would be suitable to test our hypothesis using quarterly data but as there is scarce data for these sample of countries it is something to address in future research. Still it is an explanation of why our results, even though significant, have the opposite sign.

To test for robustness we estimate another set of models changing the variable of international price of gasoline in domestic currency, for two variables: the international price of gasoline in US dollars and the exchange rate. Table 08 shows the results, where the significance of our electoral dummy remains. We observe as well, that the exchange rate has no significant relationship with our dependent variable. Of course, the international price of oil keeps its significance as intuition would have posited.

³⁷A detailed explanation of their procedure is given in Annex 05.

Table 08

Summary of Results - Panel Corrected Standard Errors

Dependent variable: National price of gasoline

	Model 11	Model 12	Model 13	Model 14
Intl price _{US\$}	0.266** (0.0650)	0.270** (0.0640)	0.273** (0.0670)	0.247*** (0.0670)
Exchange rate	0.0957 (0.0720)	0.1070 (0.0680)	0.0484 (0.0780)	0.0501 (0.0780)
Ele	0.0414* (0.0220)	0.0412* (0.0210)	0.0413** (0.0180)	0.0360** (0.0170)
cons	-0.0199 (0.0120)	-0.0204 (0.0130)	0.0263 (0.0640)	-0.0173 (0.0150)
N	110	110	110	110
Rsqr	0.1603		0.2919	0.1650
Indiv Effects			by country	
Error Correction			Panel Specific AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.5 Concluding Remarks

For the last forty years there has been a significant evolution on the political budget cycle's theoretical framework and on the industrial regulation as well. It seems, with all the evidence available from these years that as time goes by, incumbents have implemented other type of manipulating tools, maybe less obvious.

We may think of three main elements necessary for a political cycle to exist. First, there should be a manipulating tool for the incumbent to manipulate the economy in such a way in which voters perceive it. From our findings, it seems as the regulated prices provide an alternative to the traditional monetary and fiscal policy tools. Results showed a downward tendency on prices before elections, which reverts afterwards. Second, the voter has to perceive the change in economic

conditions and interpret a positive change as competency from the incumbent. A survey made by UNIMER in Costa Rica, before the last five elections, asks for those aspects the elected incumbent should improve. Within the sample, a great majority considers the cost of living as the main factor to improve. Through the price of regulated goods and services, the consumer/voter may perceive a lower living cost. This results supports our idea that an indirect tool for the incumbent could be the regulated industry prices, specially because it becomes known quite rapidly as mass media have a constant coverage on this topic.

The third and last requirement is that there should exist a legal framework that offers enough degrees of freedom for the incumbent to be able to manipulate the economy through any of the mentioned tools. So, even though empirical evidence supporting the political budget cycles theory with fiscal or monetary policy tools is less frequent, we could say there is strong statistical evidence supporting the existence of political price cycles in Costa Rica. We know that for this country there is not an explicit interaction between the government and both regulatory agencies (Economics Ministry and the Regulating Authority of Public Services³⁸ Nevertheless these agencies do not set the prices of the goods and services, each providing firm does, even when they are publicly owned. This condition does not imply independence between them and the state, but that their relation might be a bit more complicated to define. If they were not independent and the model assumptions are maintained, we would have an incumbent with indirect control over the prices of regulated goods and services; in accordance to the Costa Rican legal framework this would not compromise any of its faculties.

Still, it would be necessary for further research to consider the mechanics of price setting and the level of independence between the government, the regulatory agency and the providing firms. It is needed to study the real impact of regulatory networks on independence, performance and accountability in order to complement the results for the Costa Rican case. As said by Maggetti (2010:6) there exist a number of trade-offs concerning the simultaneous delivery of autonomy, performance and accountability, and reliance on a single dimension is hardly sufficient to legitimize the regulatory process. He states that factual independence produces a net loss of legitimacy for

³⁸Ministerio de Economía y Comercio (MEIC) and Autoridad Reguladora de los Servicios Públicos (ARESEP).

a political system. And mentions that as a consequence, the political decision of delegating public authority to independent regulatory agencies has quite fragile normative foundations and raises potential qualms concerning its social sustainability.

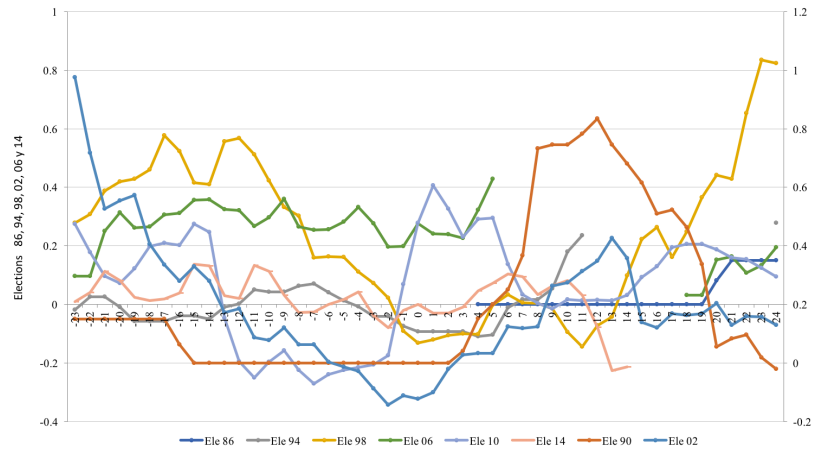
The results of this chapter intend to contribute to the theoretical debate on the existence of political cycles. Also, we pretend to show that there are other tools, such as the regulated prices that may turn to be an indirect manipulating tool for the incumbent. These results provide an objective characterization of the political price cycle for Costa Rica and gave some insights about the behavior of a set of developing countries, giving important information for future voting decisions.

This chapter contributes to the literature in five aspects. First, we provided an empirical analysis of political price cycles based on a sample of countries where it had not been tested before. Second, we were able to identify the effect for a wider sample of regulated goods. Third, we introduced a non parametric appraisal tool for the political price cycles which had not been used before and provides a complementary input for the empirical evidence. Fourth, we show that there is a significant effect between the gasoline prices and election in LA countries, which may be a starting point for future research on the area. And finally, we have given another approach through the behavior of regulated markets, to PBC theory, which can enrich past empirical results. We may even conclude that one of the tools left for the PBC theory is through political price cycles.

Annex

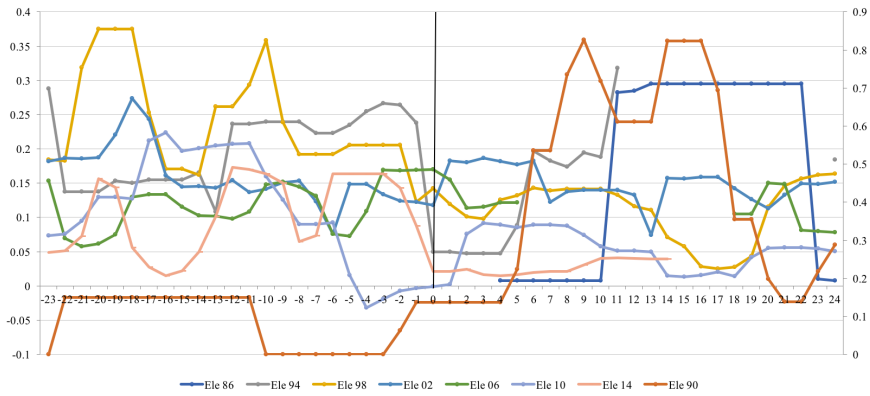
Appendix 1

Figure 3.6: Behavior of Gasoline Prices by Election



Appendix 2

Figure 3.7: Behavior of Bus Tickets by Election



Appendix 3

Annex 03

Summary of Results - Panel Corrected Standard Errors

Dependent variable: National price of gasoline

	Model 5a	Model 6a	Model 7a
Intl price _{dom}	0.178** (0.075)	0.166** (0.075)	0.171** (0.067)
PPC	-0.0093 (0.019)	-0.0080 (0.022)	-0.0071 (0.022)
cons	0.0243 (0.046)	0.0262 (0.046)	0.0232 (0.053)
N	110	110	110
Rsqr	0.1753	0.1489	0.1906
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix 4

Annex 04

Summary of Results - Panel Corrected Standard Errors

Dependent variable: National price of gasoline

	Model 8a	Model 9a	Model 10a
Intl price _{dom}	0.183** (0.0720)	0.157** (0.0710)	0.161*** (0.0620)
PPC	-0.0060 (0.0150)	-0.0049 (0.0140)	-0.0058 (0.0120)
cons	-0.0043 (0.0140)	-0.0026 (0.0180)	-0.0018 (0.0170)
N	110	110	110
Rsquared	0.1753	0.1489	0.1906
Indiv Effects	by country	by country	by country
Error Correction	No AR(1)	Common AR(1)	Panel Specific AR(1)

Std errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix 5

Figure 3.8: Simulating the effects of temporal aggregation on the budget surplus (Streb and Lema, 2009)

Simulating the effects of temporal aggregation on the budget surplus						
Quarters	elections	1st quarters	2nd quarters	3rd quarters	4th quarters	Total by quarter average annual effect
Y(-1)_Q(1)	0	0	0	0	0	0
Y(-1)_Q(2)	-1	0	0	0	0	-1
Y(-1)_Q(3)	-1	-1	0	0	0	-2
Y(-1)_Q(4)	-1	-1	-1	0	0	-3
Y(0)_Q(1)	-1	-1	-1	-1	-1	-4
Y(0)_Q(2)	1	-1	-1	-1	-1	-2
Y(0)_Q(3)	1	1	1	-1	-1	0
Y(0)_Q(4)	1	1	1	-1	-1	2
Y(1)_Q(1)	1	1	1	1	1	4
Y(1)_Q(2)	0	1	1	1	1	3
Y(1)_Q(3)	0	0	1	1	1	2
Y(1)_Q(4)	0	0	0	1	1	1

Note: surplus = -1 in four quarters up to elections, surplus = 1 in the four quarters after elections, and surplus = 0 otherwise.

This table presents a simulation where $Y(0)$ is the calendar year of elections, $Y(-1)$ is the year before, and $Y(1)$ the year after. The authors mention that for elections in the first quarter of the election year, namely $Y(0) - Q(1)$, our text-book example of a pre-electoral expansion in the deficit during the four quarters up to elections, followed by a contraction the next four quarters, implies that surplus = -1 from $Y(-1) - Q(2)$ to $Y(0) - Q(1)$, surplus = 1 from $Y(0) - Q(2)$ to $Y(1) - Q(1)$, and surplus = 0 otherwise, when the budget surplus is at its average value, normalized here at zero. The same procedure is followed for elections in the other three quarters. If we aggregate the effects by calendar year, there is a serious underestimation of PBCs in the election year, since pre-electoral expansions almost cancel out with post-electoral contractions, leaving a net expansive effect that is only 25% of the total stimulus before elections. The least affected by temporal aggregation are post-electoral fiscal adjustments, since 62.5% of the total effect is reflected the year after elections. On the other hand, if there were no post-electoral fiscal adjustments, the problem of temporal aggregation would be much less severe, since 62.5% of the total expansive effect would be reflected the calendar year of elections, 37.5% the year before.

Conclusion

In our present, the recent financial crisis brought back the debate on fiscal policy efficiency. This crisis affected all economies in one way or another, but there was not a clear policy pattern implemented as response. For example, some countries opted for lowering interest rates and keeping them practically in zero percent, while others incremented their public spending providing state jobs or investing in infrastructure. The rich academic debate has given related areas of research and opportunity to rethink important theories, the PBC theory is one of them. As introduced, our thesis is empirical in nature and dealt with political cycles in relation to fiscal policy and regulated markets. And even though, the scope of this assessment was not centered on the effects of the crisis in specific countries nor an evaluation of recovery policies, it may become a seminal contribution to a further work.

The PBC theory predicts a pattern in fiscal policy, as an incumbent's term in office starts, during the first years of governance there is relative scarcity but at the end of his or her term, the expenditure increases before elections. This increment has the purpose of singling competence, as voters take the pre-electoral economic situation as an indicator of government's performance. Therefore, this theory becomes an important tool to analyze and with it understand recovery policies and subsequent changes in the political environment because it helps us defining policy reaction functions.

We argued, in our first chapter, that fiscal manipulation is arbitrated by the contextual variable of fiscal policy efficiency, which is determined by a time and unit specific set of economic conditions. Hence, it contributes to the resurgence of the academic debate related to the return of Keynesian policies. But could it be expected that there will be the same pattern of government spending (be-

fore elections) and timing to start manipulating in countries with different characteristics? the time of this chapter was to contribute to the discussion of the PBC topic, by estimating the magnitude and significance of the political business cycle moderated by M_d elasticity.

The evidence found favored timidly the hypothesis of the existence of the PBC in Latin American countries, not only as a pre-electoral fiscal expansion, but also having an effect on the periods after the election takes place. Even though all coefficients of interest did not turned significant in the empirical testing the model seems to be quite robust. We can affirm that in the overall, from 1980 until 2005 Latin America's incumbents have behaved in a pattern of rational opportunistic manipulation, where the economy is stimulated before elections and adjustment is implemented afterwards to avoid adverse long-term consequences (Nordhaus,1975). It would be interesting for further research to determine the effect of crisis on the amplitude of political cycles.

As well, it would be valuable to calculate fiscal multipliers and include them instead of our elasticity measure, as they would also be determining the effectiveness fiscal policy may have on economic output. On the same line, further research could consider estimating measures of fiscal policy efficiency on personal consumption or rent.

Our second chapter aimed to explore one of these other measures, the fiscal multipliers estimated with a Structural Vector Autorregresion (SVAR) model. In order to examine the dynamic responses of output and determine if fiscal expansive measures (increasing spending or reducing taxes) have a positive effect on economic growth we estimated the macroeconomic effects of exogenous fiscal policy shocks in Costa Rica (for the first time). Interestingly the results obtained provide valuable input to determine Costa Rica's fiscal policy reaction function and gives information on the possibilities the incumbent could have trying to influence the economy by changing fiscal policy. Hence, its contribution is implicitly related to the PBC theory.

There are methodological caveats in VAR models that could be considered in further research. Some mention that the widespread use of informal restrictions may give rise to data mining. As mentioned by Gottschalk (2001:33), since informal restrictions are often not made explicit by re-

searchers some care is warranted when interpreting impulse response functions. According to Favero and Giavazzi (2007) the impulse response estimated in VAR studies of fiscal policy shocks are all biased as these studies do not consider the debt dynamics that arise after a fiscal policy shock.

The followed approach in this chapter tried to overcome these problems and only estimated the average fiscal multipliers across the sample period. Further research could extend this framework to include a time-varying setting, as we may think that fiscal policy effectiveness can change over time in accordance to a set of different economic circumstances.

The results of our second chapter complemented the vast empirical evidence on PBC theory that proves to be context-conditioned. These results along with those of our third chapter, incite to think there are other tools that the incumbent may implement before elections in order to increase the probability of being re elected. Exploring the relation with regulated markets provided a new focus to the topic and contributes to the theoretical debate on the existence of political cycles. Actually, the results of this chapter provide an objective characterization of the political price cycle for a set of developing countries, giving important information for future voting decisions.

Our thesis contributes to the literature in four aspects. First, it provides empirical analysis of political budget cycles, fiscal multipliers and political price cycles based on a sample of countries were it had not been tested before or research is limited. Second, we provide significant information to the debate on fiscal policy efficiency and *neo-Keynesian* theories. Third, we are able to identify a clear non linear pattern on the political price cycle of Costa Rica. This methodology could be implemented in other countries in order to broaden the empirical evidence on the topic. And fourth, it sets the basis for further research on the topic although forty years have passed sin Nordhaus stated for the first time what he called Political Business Cycles.

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