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An empirical analysis

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RESUMEN

Esta investigación analiza la relación endógena entre la inestabilidad política y el crecimiento económico en Ecuador durante el periodo (1972-2013). Tras reconocer la multidimensionalidad de la inestabilidad política se utilizó un Análisis de Componentes Principales (PCA) y se obtuvo tres indices para esta variable: estabilidad democrática, inestabilidad del régimen y estabilidad del gobierno. Igualmente, al tomar en cuenta la relación endógena entre la inestabilidad política y crecimiento económico se utilizó un Modelo de Vectores Autoregresivos (VAR) y un Modelo de Correción de Errores de Vectores (VECM). Se evidenció que el único índice político que afecta al crecimiento económico tanto en el corto como en el largo plazo es la estabilidad del gobierno. Este índice presenta una relación negativa en el corto plazo, pero una positiva en el largo plazo. Por su parte, el crecimiento económico solo afecta en el corto plazo a la estabilidad democrática.

Palabras clave: Ecuador, inestabilidad política, crecimiento económico, VECM, VAR

ABSTRACT

This paper analyzes the endogenous relationship between political instability and economic growth in Ecuador throughout the period 1972-2013. After acknowledging the multidimensional trait of political instability a Principal Component Analysis (PCA) was used and three political instability index were obtained: democratic stability, regime instability and government stability. Additionally, taking into consideration the endogenous relation between the variables both Vector Error Correction Model (VECM) and Vector Autoregressive Model (VAR) were applied. There is evidence that the only political instability index that affects economic growth is government stability with a negative effect in the short run, but a positive effect in the long run. Meanwhile, economic growth only affects in the short run the political index: democratic stability.

Keywords: Ecuador, political instability, economic growth, VECM, VAR

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1 Introduction

In general the relationship between politics and economics is crucial, since the former establishes the way a society is organized and the distribution of society's resources through institutions. For example, at government level, leaders used instruments such a as fiscal policy and monetary policy in order to influence the economic activity and reach political objectives such as win elections or keep the power. In this sense political institutions affects the dynamics of production, distribution and consumption of goods and services within a country. On the other hand, economics is always a key variable that not only contributes to government stability, but to the implementation or the maintenance of political institutions.

Specifically, Ecuador has suffered from long periods of political instability and volatile economic growth. Regarding the former, since its foundations as a republic, Ecuador has registered dictatorships, coups d'etat, anti-government demonstrations, disputes between the state powers, massive strikes, among other political turmoil. Sometimes the same Ecuadorians considered their country ungovernable, and each president has tried to "refound the country". Meanwhile economic activity in the Andean country has been driven by its commodity exports. Hence, in a way Ecuador's economic growth rates respond more to external forces rather than to a sustainable economic plan figured by politicians. At the same time Ecuadorian presidents' economic management with a short term perspective and populist policies have been detrimental to economic growth in the long run but contributed to government stability in the short run. In this regard, it is important to analyze the relationship between these two variables in order to understand which is an obstacle for the development of the other, and Ecuador's development per se.

In order to analyze this relationship between political instability and economic growth in the case of Ecuador it is important to define political instability. Hence, due to the multidimensional trait of this variable, a Principal Component Analysis was used. The different components obtained were: democratic stability, regime instability and government stability. Additionally, taking into consideration the endogeneity between economic growth and political instability both Vector Autoregressive Model (VAR) and Vector Error Correction Model were applied. In

this research I found that the only political instability index that affects economic growth is government stability with a negative effect in the short run, but a positive effect in the long run. While, economic growth only affects politics through democratic stability.

This paper is organized as follows. The second section presents the literature review. The third section analyzes the dynamics between political instability and economic growth in Ecuador. The fourth section shows the data and the econometric models. The fifth section concludes.

2   Literature Review

The relationship between political instability and economic growth has been extensively studied, since there is an important bidirectional link between the political environment and economic activity. In this sense, many scholars suggest that there exists a negative effect of political instability on economic growth (Barro, 1991; Barro & Lee, 1994; Mauro, 1995; Alesina & Perotti, 1996; Perotti, 1996; Alesina et al., 1996; Chen & Feng, 1996; Asteriou & Price, 2000; Carmignani, 2001; Jong-A-Pin, 2009). This effect is mainly caused by political uncertainty which emerges after political turmoil affecting economic policy, the enforcement of property rights and, eventually, repelling investment (Alesina & Perotti, 1996). Other scholars such as Aisen & Veiga (2011) argue that the channels of transmission between political instability and economic growth are through a lowering of the rates of productivity growth and, to a smaller degree, physical and human capital accumulation.

In the same way, political instability contributes to the implementation of populist or myopic policies that keep the leader in office, but are detrimental to economic growth (Carmignani, 2003; Herrera et al., 2015). Among these myopic policies are the creation of subsidies, the increase of government expenditure, the delaying of structural reforms, devaluation contributing to the trade-off between inflation and unmeployment (Carmignani, 2003). In fact, Grilli & Tabellini (1991), Crain & Tollison (1993), Haan et al. (1999), Roubini & Sachs (1989) support the existence of a positive relationship between deficits, debt accumulation and political turmoil. Meanwhile, Annett (2000) and Darby et al. (2000) find the same correlation between political

instability and the share of total revenues used as government expenditure. This finding is in line with the classical political business cycle theory, which sustains that in order for the incumbent to stay in office, he will reduce unemployment below normal rates through the use of monetary and fiscal policy; but, following the elections, an imminent rise in inflation is expected (Faust & Irons, 1999).

Nevertheless, not all research supports the relationship between political instability and economic growth. Levine & Renelt (1992), Benhabib & Spiegel (1997), Sala-i Martin (1997), Svensson (1998), Campos & Nugent (2002), found no significant relationship between these variables. Svensson (1998) in particular showed that controlling for the quality of property rights, there is no effect from political instability on private investment and therefore on economic growth. Additionally, Campos & Nugent (2002) separate the short term and long term effects, and show that after taking away the Sub-Saharan African countries from the sample; the long-run causal relationship between political instability and economic growth vanishes.

In Ecuador there has been a large descriptive research regarding the relationship between these two variables, although no empirical analysis has been conducted yet. Schuldt (1994) studied the political cycles during 1983-1994 and concluded that all Ecuadorian presidents in that period used political cycles as an instrument to win elections or to boost their popularity. Pachano (2007) and Freidenberg & Pachano (2016) agree and by means of a descriptive analysis from 1979 to 2013 provide support to this perspective, establishing that most of the presidents employed adjustment policies at the beginning of their periods but at the end they finished with economic populist policies. Nevertheless, Polga & Mejia (2011) did not find any link between economic performance and political instability, since the only case in which a president was overthrown due to economic reasons was the coup d'etat against Jamil Mahuad. The two other coups d'etat analyzed in his paper –Bucaram and Gutierrez– respond more to political reasons than to economic motivations. Polga & Mejia (2011) argue that during the fall of Bucaram from power the link between economic activity and political instability was weak, while Gutiérrez was overthrown during an economic boom. However, in a new research Basabe & Polga (2017) establish that the necessary condition for a coup d'etat take place is social turmoil.

When defining political instability, the problem that arises is the different dimensions this

variable can present. In fact, there exist political dynamics beyond the probability of a government change such as: political polarization, ethnic fragmentation, regime stability, government stability, violence, among others (Alesina & Perotti, 1996; Feng, 1997; Aisen & Veiga, 2011; Jong-A-Pin, 2009). Hence, to consider just one variable as a measure of political instability limits the scope of analysis. In this sense, there are several indicators that take into consideration multiple political variables to represent the different dimensions of political instability (Alesina & Perotti, 1996; Campos & Nugent, 2002; Jong-A-Pin, 2009; Aisen & Veiga, 2011). In order to capture these dimensions, one of the most frequent tools used is principal component analysis (PCA) which reduces the multiple variables proxies of political instability into a few components (Alesina & Perotti, 1996; Campos & Nugent, 2002; Aisen & Veiga, 2011).

In addition to the multidimensionality of political instability, when analyzing the relationship between political instability and growth, the problem of endogeneity emerges. This means that, on the one hand, poor economic conditions can lead to the emergence of political instability; but that, on the other hand, political instability can negatively affect economic growth. In this sense, there is a bidirectional relation of causality between these two variables. Several studies analyze the endogeneity relationship concluding that there is little evidence that political instability Granger causes economic growth (Alesina et al., 1996). Since the relationship between these two variables only appear when adding to the research Sub-Saharan African countries (Campos & Nugent, 2002). However, other show evidence of the relationship between these two variables and finds that causation goes from economic growth towards political violence (Jong-A-Pin, 2009).

Finally, regarding the methodology used in order to solve the problem of reverse causation, one solution has been the use of simultaneous equations (Alesina & Perotti, 1996; Chen & Feng, 1996; Feng, 1997; Svensson, 1998; Annett, 2000). However, recent studies have employed techniques such as the Generalized Methods of Moments (GMM) (Jong-A-Pin, 2009; Aisen & Veiga, 2011). Most of these analyses, however, use panel data. When focusing on a country-specific analysis techniques such as the GMM does not apply. In this sense, other methods such as Vector Autoregressive Models (VAR) have been used when analyzing political business cycles in the US (Faust & Irons, 1999). Campos & Karanasos (2007) use a Power ARCH model

to disentangle the relationship between growth, and political instability in Argentina. Asteriou & Price (2000) employ a GARCH Model when analyzing the interaction of these two variables in the UK. Hence, different approaches have been used to address the problem of endogeneity between political instability and economic growth.

3 Political Instability and Economic Growth in Ecuador- A historical perspective

Political instability has been a constant throughout Ecuadorian history. Since Ecuador's foundation as a republic in 1830, its polity has been characterized by coups d'etat, the creation of new constitutions, the fragmentation of political parties, political personalization, conflicts of interest between the Legislative and the Executive powers, lack of support and representation of the Executive power in Congress, and volatility in economic growth rates. In fact, Ecuador has had twenty constitutions that on average lasted nine years ruling over two presidential terms(Andrango et al., 2016). This political instability is not different from Ecuador's economic activity, since its economic growth responds mainly to the volatility of the commodity prices that constitute its main exports. During the 1930s, Ecuador's economy relied heavily on the exports of cocoa beans, during the 50s on bananas and since 1972 on oil. In this sense, one factor that explains the existing periods of political stability has been the significant resources obtained from high commodity prices. These resources had been used by most of Ecuadorians presidents, or military leaders had in order to influence the economy and stay in power.

3.1 Presidents: political instability and the economy

In the following section each presidential period since 1968 to 2013 will be analyzed. The start point of analysis is 1968, since is the beginning of José María Velasco Ibarra's mandate, which was in power in 1972, the beginning of the period analyzed in this paper. Thus, in order to analyze his presidential mandate, his complete period was included in the descriptive analysis.

3.1.1   José María Velasco Ibarra (1968-1972)

In 1968, Velasco Ibarra, the politician considered to be the most populist president of Ecuadorian history, was elected President for the fifth time with 32.8% of the votes. Among his proposals he promised to "achieve economic and social equality, eliminate the peasants' humiliating conditions, monitor oil contracts, and centralize the government" (Espinosa, 2000). Nevertheless, from the beginning of his mandate, Velasco faced political turmoil. One of the factors that boosted his government political instability was the major changes in his cabinet. Specifically, regarding the removal of four ministers of finance in the first two years of his government. The first minister to be changed was the ministry of Agriculture due to the imposition of a tax to sugar exports. In the same way, three out of the four removed ministers of finance were deposed because of conflict of interests. The first minister was removed since he tried to increase income tax collections, the second was changed because of lack of expertise, the third one tried to combat smuggling in customs, and the forth was removed because he applied economic reforms in order to correct the fiscal deficit.

Regarding his relationship with the Legislative, in 1969 the liberal party withdraw its support from Velasco Ibarra and he established a new alliance with the populist party –the Concentracion de Fuerzas Populares (CFP in Spanish)– and its leader Assad Bucaram. In order to strengthen the Executive power, Velasco Ibarra tried to amend the constitution but faced an important opposition in the Legislative. The tension between these two powers increased whenever Congress had to approve the government's budget. At the beginning of 1970, political instability increased. Social protest sponsored by college students demanding free entrance to the university was one of the triggers for Velasco Ibarra declaring himself a dictator in June, 1970. During his dictatorship, which lasted a year and seven months, he attacked the media, repressed the opposition and students. He ordered the prison of the political leader Francisco Huerta and exiled Assad Bucaram to Panama. Nevertheless, Velasco Ibarra called new elections to be held in 1972.

In the economic realm, Velasco Ibarra began its term with a recovering economy. GDP growth was 4,62% in 1967. However, in the first year of his government the economy grew by

just 1,9%. In the two following years the economy growth rates were 4,66% and 6,8%. Inflation rates were moderate. In 1968 it was 4,31%, the next year 6,32% and in its last year it decreased to 5,12%. Public debt grew during his term by 79,5%, reaching $248 millions of dollars at the end of 1972. The main reason was that during Velasco Ibarra's government the oil pipe began to be built as well as the oil refinery. In addition, as promised during his campaign, he revised the oil contracts with Texaco-Gulf (Espinosa, 2000).

3.1.2 Guillermo Rodriguez Lara (1972-1976)

In 1972, a military coup against Velasco Ibarra took place because the heads of the army believed that it was necessary to control the revenues of oil exports and to forbid Assad Bucaram –the front-runner in the presidential election– to become president. However, Rodriguez Lara who was the head of the dictatorship managed its government and the economy based on oil exports. Ecuador not only took advantage oil production but also from the rise in oil prices, which in 1974 was US$63 per barrel. Without any opposition, but with autocratic political institutions, the regime of Rodriguez Lara was characterized by being nationalistic, revolutionary and placed the state as the main actor in the Ecuadorian economy (Freidenberg & Pachano, 2016). The government nationalized oil production, exploration and trade with the Law of Hydrocarbons. This law established that 80% of the participation in oil related activities should accrue to the state (Espinosa, 2000). The Ecuadorian State Oil Corporation (CEPE in Spanish) was created and given 25% of Texaco's shares. Likewise, Ecuador became a member of the Organization of the Petroleum Exporting Countries (OPEC). Within a framework of import substitution industrialization (ISI), his government established imports controls. Nevertheless, one of its main offers –an agrarian reform– did not occur.

Regarding economic performance, due to the start of oil exports, in the first year of Rodrgiguez Lara's term the economy grew 13% –the highest growth rate in Ecuadorian history–, 11,2% in the year thereafter, and 10,97% in 1975. At the end of his term's last year, Ecuador's exports were 464% relative to 1971. Thanks to the large oil revenues, Ecuador finished paying off the English debt acquired during the independence wars. Important infrastructure was built such as highways and government loans were given to boost production. Hence, oil re-

sources increased Ecuadorians' purchasing power reorienting social relations and giving rise to the emergence of a middle class (Espinosa, 2000).

Despite the large amount of resources, the military government increased expenditure, and acquired debt, which grew by 57,2% in just three years. Additionally, due to the large amount of dollars in the economy inflation soared to 13,01% in 1973 and in 1974 it increased by 23,32%. In his last year of government exports decreased by 20% due to the fall in oil prices, which reached $12 per barrel. Additionally, Rodriguez Lara established an rise of 60% of taxes on exports.

Regarding political instability, Rodriguez Lara decreed state of siege at the beginning of his term and kept it for its entirety. Among his authoritarian actions were the confinement of important leaders of the opposition in the Amazon and the imprisonment of teachers and journalists. Also, Rodriguez Lara established special courts in which subversion crimes were prosecuted. Nevertheless, his authority softened at the end of his term. Since many of his promises were not fulfilled –such as the state modernization– Rodriguez Lara lost popular support and together with the pressure of foreign companies and actors within the military circle an attempt of a coup took place in September of 1975 (Freidenberg & Pachano, 2016). Four months later with the support of the leaders of the army, the navy and the air force, Rodriguez Lara was overthrown from power. In sum, during Lara's dictatorship political support and stability were derived from oil resources.

3.1.3 Triumvirate (1976-1979)

On January 11, 1976 a moderate group of the Army deposed General Rodriguez Lara and a triumvirate composed by the main heads of the army: Poveda, Luis Duran and Luis Franco governed until 1979. Their period was stable since its main objective was to restore the army's integrity and reestablished a democratic regime in Ecuador. To do this, they created three commissions. The first one had to write a new constitution, the second one had to amend the constitution of 1945 and the third one had to create an Elections and political parties law (Espinosa, 2000). However, as Freidenberg & Pachano (2016) established democratization in Ecuador did not occur thanks to social and political pressures as in other countries in Latin America, but it

was a decision of the army and the process was under their control. Nevertheless, the dictatorship exercised oppressive actions such as: the imprisonment of Monseigneur Leonidas Proaño together with 50 members of the church, the imprisonment of politicians from the christian party and oppression against unions. However the most violent repression occurred in October 18th, 1977, when workers of the Aztra sugarmill were assassinated with their families due to a strike. The number of workers dead were unknown.

Regarding the economy, Ecuador grew in lower rates than in previous years. In 1976, the GDP grew 7,39%, however in 1977 it slightly increased 1,6%- the lowest growth rate in a decade-. In 1978, the economy grew 5,7% and in 1979 3,73%. Clearly portraying the dependence on oil prices, since in 1976 oil prices went down to $6.65 dollars per barrel affecting the economic growth of 1977. Hence, due to the declined in oil prices the triumvirate acquired debt aggressively increasing the foreign debt in four years in 309%. According to Espinosa (2000) in this period the country began to acquired debts in order to pay previous debts. Inflation during these period grew on average 11,7%. Regarding the oil sector, the triumvirate finished the oil contracts with Gulf, the oil refinery began its operations in 1977, and a new Law of hydrocarbons was enacted in 1978. As in Lara's government, the triumvirate prioritized investment in infrastructure and with the debt acquired the following projects were financed: popular housing plans, the expansion of Guayaquil's port, the Esmeralda's airport among other. The Triumvirate removed exports taxes to banana, coffee beans, tuna and other sea products to boost the economy (Espinosa, 2000).

3.1.4 Jaime Roldós (1979-1981)

Democratization took place in 1979, when presidential elections were held. From the six presidents that run for office, only Jaime Roldós and Sixto Durán Ballén went to ballotage, and the former won with 68,49% of votes (Freidenberg & Pachano, 2016). Roldós proclaimed himself a left wing president who was going to fight for the poor and social equality, as being member of the populist political party CFP. People believed that democracy will bring economic growth, decrease inequality, and well being for the population. However, democracy was not a solution for all their demands and political instability began. At first political instability emerged from

the lack of support in the Legislative. Even though, Roldós political party CFP won 40,6% of the seats in Congress, the party removed their support from the President due to the disputes with its main leader and the president of the Congress: Assad Bucaram. The support was removed even before Roldós swore as president. Hence, Jaime Roldós only had the support of the five congressmen of the Vicepresident party: Democracia Popular (DP in spanish). The tensions between the two functions of the state took forms such as: a law approved by the Congress by which minimum wage was raised against the Executive will, the blockage against tax increase, the approval of underfunded budgets, the threats of political judgements against the president and vice president and the reduction of the budgets of some government entities. Additionally, on January 1981 Ecuador began a war with Peru. The war lasted only ten days, but left a considerable increase in foreign debt and hundreds of dead soldiers.

At the beginning of Roldós' mandate the economic activity was slightly stable, however it began to worsen because of two factors: the under founded budgets and the war with Peru in 1981. In this regard, Roldós established some adjustment measures in order to balanced public finances. In March of 1981, he raised the prices of gasoline, electricity, transport fees, and forbade the cars imports (Pachano, 2007). In sum, during his mandate the Ecuadorian economy grew on average 3,31%, even though oil prices posted at $70 per barrel in 1978 and $100 per barrel in 1980. Inflation maintained at 10,26% in 1979, 13,04% in 1980 and 16,38% in 1981; and foreign debt increased in 56%.

3.1.5   Osvaldo Hurtado (1981-1984)

On May 24, 1981, Roldós had a plane accident in which he died, and his vicepresident Osvaldo Hurtado became president. Hurtado received a weak economy, that together with null support in the Congress make his presidential term one of the most unstable in the Ecuadorian democracy. During the electoral campaign Hurtado proclaimed to belong to the center-left, but in practice he implemented right-wing policies due to the economic situation (Andrango & Grijalva, 2016). He had to face a deteriorated economy due to the fall in oil prices-in 1982 they posted at $68,46-the large fiscal deficits and the debt acquired in previous years. Additionally, in the same year a drought hit the coast and later on floods destroyed banana, cocoa beans and coffee plantations;

deteriorating Ecuador's exports. Finally, in the same year as many other Latin American countries, Ecuador defaulted on its debt. Hence in 1983 and in 1984, Ecuador acquired two loans from the IMF in order to stabilize the economy. Some adjustment measures conditioned on the loans included the removal of subsidies from basic goods such as milk and flour (Gachet et al., 2011), the rise on gasoline prices in 100% and sucre's devaluation in 254%. During 1982 and 1983, Ecuador "entered in a game of repetitive reactions: adjustment measures, protest from the business sector, union and student mobilizations and setbacks in the adjustment measures implemented" Espinosa (2000).

Finally, in order to maintain the democratic ordered and prevent an economic collapse, Hurtado executed the sucretization. A process in which the government took responsibility and subsidized the private sector's foreign debt. Hence, the state paid the debt of the private sector in dollars but the private sector paid back to the government in sucres (Andrango & Grijalva, 2016). These unpopular measures ended up increasing unemployment, inequality and high inflation rates. In 1983, inflation raised to 48,4% and the real minimum wage in 1984 dropped 25,2%. Hence, the economic situation made the government of Hurtado faced political turmoil and contributed for his popularity be the lowest since democratization (38% of executive approval). As a result, the economy presented a marginal growth of 0.61% in 1982 and one year later for the first time since 1966 the economy decreased in -0,33%.

Regarding political instability, there were two fronts of opposition Hurtado had to face. The opponents in the Congress and the people in the streets that were not satisfied with the adjustment measures implemented. Hence, opposition such as the right wing political party Partido Social Cristiano (PSC), who even though were supposed to be aligned with Hurtado's economic policies since they benefit the enterprise sector, opposed in every bill the government tried to pass in the Congress. Regarding social protest, the highest turmoil was on October,1982 due to the elimination of subsidies which not only unions gathered against Hurtado, but the enterprise elite too. In this sense, Hurtado's government and political instability showed in the street respond to the economic situation, but political instability emerged from the Congress respond more to political interests rather than ideology.

3.1.6 Leoón Febres Cordero (1984-1988)

On May, 1984 León Febres Cordero won the presidential election with a marginal difference of 3,08% of votes against the left wing candidate Rodrigo Borja. As a right wing and pro market president, his term was characterized by the fall in oil prices, the decrease in oil production- due to an earthquake- and political authoritarianism. As in the last government, Febres Codero began applying adjustment measures-the same measures he opposed when he was president of Guayaquil's chamber of commerce- in order to stabilize the fiscal accounts. Febres Cordero signed three agreements with the IMF, in 1985, 1986 and 1987. Among the adjustments measures prescribed were: the removal of subsidies, the liberalization of interest rates and the exchange rate, the increase in gasoline prices in 200%, the increase in electricity prices, the rise of the Value Added Tax (VAT) and the devaluation of the sucre in 331%. Additionally, Febres Cordero implemented a second sucretizacion, with longer terms and lower interest rates in comparison to the one applied by Hurtado, subsidizing more the private sector. This provoked that Ecuador's GDP grew 2,62% in 1984, 3,94% in 1985, 3,46% in 1986 and due to an earthquake that damage the oil pipeline the Ecuadorian economy decreased -0.25% in 1987, since oil could not be exported during seven months.

Regarding political instability, Febres Cordero had to face a strong opposition since its party Partido Social Cristiano (PSC) hold only 12,68% of seats in the Congress in the first year. However, the strategy he applied was to send laws as economically urgent, so the Congress had few time to analyze them. Since his second year, he achieved a majority in the Congress through "camisetazos". A procedure in which some congressman change his/her party afiliation in exchange for political favors or money. During his presidency the guerrilla "Alfaro Vive Carajo" emerged. In the process of fighting the guerrilla violations against human rights including disappearances and tortures were registered. In order to improve his presidential approval that in 1986 was 37,5% and achieved a majority in the midterm elections, Febres Cordero ended the austerity policy and increased public expenditure. As Schuldt (1994) established: Febres Cordero used the political business cycle, eliminating the adjustment measures in periods of pre electoral campaign. However, in the parliamentary elections of 1986, the opposition acquired

the 54,4% of seats in Congress and the official party had a minority representation (Pachano, 2007). In 1987, his dictatorial actions contributed to be kidnapped by a group of the army. In his last year of mandate, many corruption scandals appeared and in order to maintained his popularity Febres Cordero increased social expenditure, even though the economic crisis the country was facing.

3.1.7 Rodrigo Borja (1988-1992)

In 1988, Rodrigo Borja and Abdalá Bucaram passed to ballotage and the former won with 54% of the votes. Rodrigo Borja, who had ran for president two times before, was a left wing candidate. Nevertheless, as the other presidents he had to implement austerity policies and signed three agreements with the IMF. Additionally, the Sucre was devaluated in 260%, gasoline prices increased in 1522%, energy in 45% and the tax to special consumption was created. Likewise, imports were restricted, subsidies were eliminated, public expenditure decreased and labor and tax reforms were established (Pachano, 2007). Throughout his mandate GDP grew on average 3,7%, being 1989 the year that registered the lowest growth with 1,0% and 1991 the year with the highest growth 4,2%. Oil prices were stable, on average they posted at $27,38 per barrel. In 1989, inflation increased in 75,64%, but it went down in 1990 and 1991 to 48%. Unemployment decreased reaching its minimum in 1990 since 1981 with 6.1%, but inequality and inflation increased. (Andrango & Grijalva, 2016)

Regarding political instability, for the first time after democratization the President had political support in the Congress. His party Izquierda Democratica (ID) hold 42,25% of the seats in Congress. Nevertheless, during the Congress mid term elections, the government party lose 19 seats due to the inflation and the economic situation. As Pachano (2007) stated, even though of this privilege situation the possibilities to applied a sustainable economic program were nulls. Borja's policies were different of what he proposed during campaign; and his pro market policies make their allies separate. Schuldt (1994) stated that even though previous governments tried to established adjustment policies, Borja was the one to deepen these policies. He promoted laws such the Law of labor flexibilization, Law of free zones and the Mineral law. For these reasons, its main party allied in Congress the Democracia Popular (DP) removed their sup-

port. Additionally in June, 1990 Borja faced riots and instability provoked by the indigenous movement.The indigenous strikes and revolt is considered the most important social event during the period (1979-1997). For the first time, indigenous people realized the power they have and their capacity to paralyze the country. Therefore, their demands were accepted, specifically to consider Ecuador as a plurinational state (Espinosa, 2000). Finally, during Borja's government the guerrilla "Alfaro Vive Carajo" gave up their weapons and reintegrated the society as a political party.

3.1.8 Sixto Durán Ballén (1992-1996)

In 1992, Durán Ballén took power with 57,32% of the votes. During his mandate, it was expected the application of important reforms in order to liberalize the economy, since Durán Ballén himself was a politician of right tendency and his vicepresident from the conservative party Alberto Dahik was too. Nevertheless, Durán Ballén had to face political opposition in the Congress since his party PUR-which was recently created in order to participate in the presidential election- only had 15,58% of the seats in the Congress between 1992 to 1994. While in the last two years of his presidency, the support deteriorated even more and the party only hold 3,9% of the seats of the Congress or just two representatives. In this sense, in order for the government pass any law; instruments of negotiations such as the "camisetazo" as in León Febres Codero's presidency were employed. This instrument was the detonator for the highest point for political instability in his government. Durán Ballén's vicepresident Alberto Dahik was impeached due to the illegitimate use of public resources. The scandal was called "reserved expenditures" in which the vice-president used national security resources in non related activities such as: donations, acquisition of goods in order to buy votes from the opposition in the Congress (Basabe & Polga, 2017).

However, President Durán Ballén's popularity was stable and higher than the previous presidents. On average he sustained an executive approval of 43%. This approval gave him the confidence to called upon a referendum that included topics such as: the amendment of the Constitution, the possibility of independent politicians be elected, the prohibition to congressman to manage public funds and the possibility to be reelected to a public entity. Nevertheless,

in 1995 when Ecuador entered again in war with Peru the referendum was stopped. After 32 days of war in which both parties claim military victory, Ballén reached 52% of executive approval. However, in 1996 his approval fell and it was portrayed in the lost of a new referendum proposed to the citizenship. Sixto Durán Ballén was the last president to finish his presidential term before 12 years of highly unstable politics.(Andrango & Grijalva, 2016)

In the economic realm during Ballén's presidency the Ecuadorian economy grew in average 2,46%, even though oil prices continued decreasing,reaching $21 dollars per barrel in 1994. As his main objective was to reduce inflation through fiscal austerity and through a pegged float exchange rate, inflation reached its minimum point since 1982 at 22,88%. At the same time, the minimum wage increased in real terms and posted at $129,8, the highest value since 1988. Ballén applied liberal reforms through the Law of the modernization of the state which created the National Council of State Modernization, which its main objective was to reduce the role of the state in the economy. Hence state owned companies such as: Cemento Nacioinal, Selva Alegre and the Aztra sugarmill were sold. Even though oil prices were not as high as before, other traditional exports such as bananas, shrimp and flowers boosts economic growth.

3.1.9 Abdalá Bucaram (1996-1997)

In 1996, Abdalá Bucaram won the presidency with a slight difference of 8,94% of the votes against Jaime Nebot. Throughout his brief mandate, corruption was the main trait including nepotism and the embezzlement of public funds. In the economic realm, Abdalá tried to introduced convertibility,a fixed pegged between the sucre and the dollar since July, 1997. Additionally in his short term he applied adjustment measures, however at the end he reversed some of them(Pachano, 2007). In 1996, the economy grew 1,7% and inflation posted at 24,3%. Government expenditure was used to maintain his populist offers made in campaign. However, political turmoil began when the government increased the price of basic goods: gas, electricity, drinking water(Espinosa, 2000).

Abdalá who was considered a populist president began the era of political instability that ended 10 years later. He only stayed in power for 120 days, since the Congress alleged that Abdalá was mentally disabled to govern. According to the Constitution his/her Vicepresident

should take the power, however Rosalia Arteaga who held the post only stayed in power for three days. The president of the Congress Fabián Alarcón was design by the Legislative to be President for a period of 18 months(Andrango & Grijalva, 2016).

3.1.10   Fabián Alarcón (1997-1998)

After four days of the coup against Abdalá Bucaram and after the Supreme Court rejected Rosalia Arteaga's arguments to become president, Fabián Alarcón-who was then President of Congress- was sworn in as head of state. He served for 15 months as President.

In 1997 the Ecuadorian economy grew at 4,32%, inflation increased in 30,64%, oil prices started to diminished and posted at $23,02 dollars per barrel.

Regarding the political realm, Alarcón called upon a Constituent Assembly in order to draft a new Constitution and called upon election to be held in 1998.

3.1.11   Jamil Mahuad (1998-2000)

Jamil Mahuad a right wing politician, former major of Quito and a militant of the Democracia Popular party won the presidential election in 1998. He won with 51,16% of the votes and a marginal difference of 2,3% over Álvaro Noboa. Mahuad's presidency was characterized of ending the border conflict with Peru, he faced the worst economic crisis in Ecuadorian history and the adoption of the dollar as national currency.

Before the election, a new Constitution was drafted and approved in 1998 with liberal traits, in which the role of the state was diminished. One of the objectives of the Constitution of 1998 was to eliminate the conflict of interests between the Legislative and the Executive. Hence, the latter was given more power and the former was limited its policymakig capacities. However, it did not protect president Jamil Mahuad to present problems and negotiate with the Congress. Hence, as in previous governments one source of political stability in Mahuad's government originated in the Congress. His party Democracia Popular held 28,45% of the legislative seats, and in order to govern Mahuad incurred in coalitions with different parties that had different ideologies. The first coalition was with Febres Cordero party, Partido Social Cristiano PSC, from which the government party shared a market oriented vision regarding the economy. This

coalition helped Mahuad passed the ratification of "the Ecuador-Peru peace treaty in 1998,the adoption of a 1 percent tax on all financial transactions,and the government's tribute and finance reform, which included important fiscal, budgetary, and financial reforms (Mejía Andres, 2011) Nevertheless, when the president tried to raise the Value Added Tax from 10% to 15%, the coalition felt apart.

Mahuad's presidency was hit by the Asian crisis which contributed to the fall in commodity prices. Oil prices felt in -41.9% in 1998, additionally the economy faced the effects of the natural disaster of El Niño, and high inflation (52,24% in 1999). All these factors contributed to a bank holiday that led to the bankruptcy of some of the main Ecuadorian banks, and led to the economic contraction of 4,73% in 1999 and the substitution of Ecuador's national currency -the sucre- with the US dollar in 2000. Due to the economic crisis, Ecuador was unable to pay its foreign debt and defaulted. Mahuad removed the subsidies for gas, diesel and electric energy, and in compensation he created a conditional cash transfer program called the Poverty Bonus, which targeted the poorest. However, the financial crisis led to the worst social crisis in Ecuador's history. Urban poverty increased in 1999 by 7.3 percentage points, harming 63.2% of the population. This is the highest level for the whole period analyzed, meaning that the social improvement reached before the crisis was fully reverted. Likewise, urban indigence increased in 1999 by 9.1 percentage points, reaching 31,1% of the population. Unemployment climbed to its maximum with 14,4%, and inflation reached 52.2% in 1999 and 96% in 2000, while income inequality increased to its maximum in Ecuadorian history: 60.13 according to the Gini Index. Because many people were not able to find jobs in Ecuador, around 4,66% of Ecuador's population between 1999 and 2002 migrated, mainly to Spain and the United States.

Due to all these events, many social groups, specially the indigenous population and its movement CONAIE protested.The highest day of manifestations was on January 21st, 2000, when 1,500 of indigenous people with the help of the Army overthrown Jamil Mahuad. During three hours the country was governed by a Governing Board conformed by the indigenous leader Antonio Vargas, the colonel Lucio Guitérrez and the judge Carlos Solórzano.(Andrango & Grijalva, 2016) Meanwhile, the Congress approved a resolution which stated the acceptance of a non existent resignation from Mahuad and appointed Gustavo Noboa as President (Mejía An-

dres, 2011).

3.1.12   Gustavo Noboa (2000-2002)

After the coup d'etat against Jamil Mahuad, Gustavo Noboa was designated president and his mandate began on January 22, 2000 and ended on January 15, 2003. During his mandate Noboa did not face political instability originated in the Congress, but in the streets sponsored by the indigenous movement CONAIE. Noboa great challenge was the economic recovery from the worst crisis Ecuador had lived.

In his three years of government, Noboa had to faced the economic recovery and specially high inflation rates due to the adjustment the dollarization provoked. Inflation registered at 96.04% in 2000-the highest in Ecuadorian history-, 37,67% in 2001 and 12,48% in 2002. National poverty posted at 61,6% and inequality measured by the gini index set at 56,50 in 2000. The economy grew on average 2,3%, oil prices posted on average at $25,02 dollars per barrel and oil production grew in 6,12% in 2003, since in 2002 the heavy crude oil pipeline (OCP) was built. Another input to the Ecuadorian economy in these years were the remittances. It is calculated that around 4,6% of Ecuador's population flew to other countries in order to find better economic conditions (Andrango & Grijalva, 2016).

Additionally, Noboa acquired two loans from the IMF on April, 2000 and on May 2001. The conditions for the first loan were the increase of gasoline prices, gas prices, a tax reform, among others. The conditions for the second loan were an inflation target of 25,8%, an average economic growth of 4% and a government deficit of 3% (CAIC, CAIC)

3.1.13   Lucio Gutiérrez (2003-2005)

After being one of the leaders of the coup d'etat against Jamil Mahuad, Lucio Gutiérrez presented himself as a political outsider with left-wing proposals. His candidacy was supported by the indigenous party Pachakutik and maoist party MPD. He won the presidential elections with 54,38% of the votes and a difference of 8,76% over Álvaro Noboa. However, as president he made pro-market decisions and maintained a stable economy; but not the political sphere.

During Gutierrez period the Ecuadorian economy grew on average 5,01%, presenting the

highest economic growth rate since 1975 in 2004, 8,22%. Inflation began to moderate and in 2004 it set at 2,7%, the lowest rate since 1962. However, Gutierrez did not face high oil prices and his government received on average $33,38 dollars per barrel. One March, 2003, GutiÉrrez acquired a loan from the IMF and some of the conditions were: the increase in gas, gasoline and electricity prices. Additionally intentions of privatizing the oil sector, electricity and telecommunications were discussed. Nevertheless, in his period, real minimum wage increased and income inequality decreased significantly.(Andrango & Grijalva, 2016)

During Gutierrez's government that lasted two years and four months, the main source of political instability was the cost and popular disagreement of the different concessions he gave to opposition parties. Gutiérez began his government with a left wing coalition, however eight months later it disintegrated (Mejía Andres, 2011). After applying IMF conditions and market oriented policies, both parties Pachakutik and the MPD took distance from the government. Hence, due to the market orientation the government was taking, the PSP-the government party-made a new coalition with the PSC a right wing party. Nevertheless, this coalition lasted 15 months and promoted the negotiation of a bilateral free trade agreement with the United States,the approval of the 2004 fiscal budget,and a PSC-led reshuffling of Supreme Court judges (Mejía Andres, 2011). However, after multiple corruption accusations the PSC took distance and started a presidential impeachment together with the left parties: Pachakutik and ID.

In order to keep the power, Gutiérrez made another coalition but now with Bucaram's political party and Álvaro Noboa's party: PRE and PRIAN respectively. Hence, to maintain these political support a new Supreme Court was established. The Supreme Court called "Pichi Corte" due to the nickname of Guillermo Castro Dager, who presided the Court and was a close friend of Abdalá Bucaram; immediately dropped corruption charges against Bucaram and let him return from exile. Together with the multiple corruption accusations, this triggered the citizenship anger who started protesting in the streets specifically in Quito. On April 20, opposition parties "falsely declared that the president had "abandoned office" and proceeded to replace him with his constitutional successor, Vice President Alfredo Palacio (Freidenberg & Pachano, 2016).

3.1.14   Alfredo Palacio (2005-2006)

After Lucio Gutiérrez was overthrown, his vice president Alfredo Palacio took power and ruled for one year. During his mandate, oil prices began to rise, starting the beginning of Ecuador's second oil boom. Hence, social spending increased as well, in 2006 it augmented 10,12%. In general, the Ecuadorian economy grew in 2005 at 5,29% and in 2006 at 4,4%.Inflation maintained stable at 2,4% in 2005 and 3,03% in 2006.

Alfredo Palacio designated the economy professor Rafael Correa as his Economy minister, who would be the next president. During his three months in the ministry, Correa implemented socialist reforms and acquired popularity and the acceptance of the people. One of them was the elimination of the oil reserve fund called FEIREP. However, when Diego Borja was in charge of the Economy ministry, a new the Law of hydrocarbon was enacted. This law established that the surplus of oil revenues should be redistributed between the state and the oil companies in at least 50%.

Political instability emerged in Palacio's one year-presidency in the form of major cabinet changes, specifically in the Economy ministry. After Correa resigned, there were in total 5 ministers that occupied this office. Additionally, as in previous governments Palacio faced the lack of support in the Legislative. Hence, the Congress stopped Palacio's attempt of impulsing a referendum in order to install a Constituent Assembly.

3.1.15   Rafael Correa (2007-)

Rafael Correa, a left wing political outsider won the presidential elections with 56,67%, with a difference of 13,34% over Álvaro Noboa. His mandate was the starting point of political stability and he became the president with the most political capital in Ecuador's democratic history. Correa has been elected three times president (2006, 2009, 2013), he had won two referendums (2008,2011) and drafted a new Constitution. All these political achievements had as source the second oil boom.

His government registered on average an oil price per barrel of $85.57 and the highest in the country's history in 2011 ($102,77 per barrel). This provoked that once again the Ecuadorian

economy be driven by oil prices. The economy grew on average 4,29%, having its maximum in 2011 with an economic growth of 7,8% due to the highest oil price and its minimum in 2015 with 0.16% since oil price per barrel reached \$42,12. The greatest oil revenues made Correa increased the government spending reaching the 40% of GDP. Due to the money injected by the government in the economy, inflation also rose presenting its maximum in 2008 with 8%. Nevertheless, since 2013 oil prices went down and as in the first oil boom, in order to maintain social spending the government acquired expensive loans.

Due to the great amount of oil resources that strengthens the state capacity, Correa has been able to co-opt all state branches. Hence, the relationship with the Legislative that has been an obstacle for all the previous presidents after democratization, for Correa has been its support and ally. In the period 2009-2013, Alianza PAIS-the government party- held 47,58% of the legislative seats. For the term 2013-2017, Alianza PAIS got 100 seats in the Assembly (72,99%). For the first time, in the Ecuadorian history the government party held the absolute majority in the Legislative. All this support made the Executive pass all the law projects without any obstacle. More over, Rafael Correa had overused its faculty of co legislator and the majority of laws have been originated in the Executive Branch in both Legislative periods (2009-2013,2013-2017). In the first one, 55% of the enacted laws were originated from the Executive (Andrango, 2013) and in the second period- until May 2016- the rate was 63%(Legislativo, Legislativo). Nevertheless, Correa has not been able to diminished cabinet instability, as in previous regimes (Polga, 2013). Likewise, due to the President's public attacks on several journalists and national newspapers, democracy and freedom of the press has be questioned.

The most important revolt Correa faced was the "30S"-since it happened on September 30th, 2010. This day members of the National Police struck due to a law sponsored by the Executive which diminished their benefits.The police occupied the National Assembly and some streets. However, the chaos was spread to the whole country since people started looting due to the lack of police control. Correa went to the police headquarters and after giving a speech, he was escorted to the police hospital. He alleged to be kidnapped and when the army rescued the President, shootings started between the police and the army and a officer was killed. (Universo, Universo)

As stated before since oil revenues were the source of Correa's political capital, after oil prices fell Correa started facing social turmoil. The main strikes occurred on April, May and June, 2015; due to labor reforms, law projects regarding the surplus value and inheritance. Additionally, the government experienced social conflicts in the jungle as a result of mining and oil projects. Finally, during the last months of his mandate, public workers related to the oil state company Petroecuador have been accused of corruption.

4   Data and Empirical Model

As stated in section II, most of the research regarding the relationship between political instability and economic growth for the case of Ecuador has been descriptive. Hence, the main objective of this paper is to demonstrate if there is an empirical link between these two variables, as presented below.

4.1   Data

The data on economic and political variables were taken annually, since there is not much variation in political variables when considered them monthly. The economic data which includes real GDP and oil production were taken from the Ecuadorian Central Bank (BCE, BCE). The variable real oil price was taken from Andrango & Grijalva (2016). The sources of the political variables were: Polity IV (Gurr & Marshall., 2013), the Cross-National Time-Series Data Archive (Banks & Wilson, Banks & Wilson), and Freedom House (FreedomHouse, 2016) as described in more detail in Table 1 and Appendix A.

4.2   PCA Analysis

As explained above, we use Principal Component Analysis (PCA) to reduce the multiplicity of variables representing political instability and to identify the different patterns of association between them. We used 24 variables representing the different dimensions of political instability. All the variables' description, meanings and measurements are explained in Appendix A.

Table 1: Descriptive statistics

Variable	Obs	Mean	St.Dev	Min	Max
Log GDP	42	17.154	.523	16.145	18.024
Log oil production	42	11.635	.432	10.260	12.183
Real oil prices	42	48.099	26.532	13.369	102.77
Democ	42	5.836	3.24	0	9
Autoc	42	1.061	1.864	0	5
Durable	42	6.897	5.639	0	20
Democracy	42	0.775	0.421	0	1
Xrreg	42	2.448	0.818	1	3
Xconst	42	4.918	2.243	1	7
Assassinations	42	0.102	0.367	0	2
General Strikes	42	0.571	0.841	0	3
Government Crises	42	0.3254	0.625	0	2
Purges	42	0.102	0.367	0	2
Riots	42	0.346	0.723	0	3
Revolutions	42	0.265	0.490	0	2
Anti Government Demonstrations	42	0.897	1.357	0	5
Size of Cabinet	42	17.224	5.628	9	31
Number of Major Cabinet Changes	42	0.469	0.615	0	2
Changes in Effective Executive	42	0.387	0.570	0	2
Realized Coup	42	0.142	0.353	0	1
Years in office	42	3.758	2.031	.66	8
Freedom House Political Rights	42	4.904	1.605	1	6
Freedom House Civil liberties	42	5.047	.622	4	6
Number of Seats of the Largest Party in the Legislative	49	21.857	20.349	0	100
Number of Legislative Elections	42	.285	.456	0	1
Legislative Effectiveness	42	1.551	.914	0	3
Constitutions	42	.081	.276	0	1

In order to determine the number of components that explain most of the variance of the data and that are linear combinations of the variables, we used the scree test. According to this test, the number of components that should be retained is determined by those components

lying on the steep curve. Hence, as presented in Appendix B three components have the largest eigenvalues and explain 56.21% of the variance contained in all the variables. Since there may be correlation between the variables, the dimensions were not forced to be orthogonal and the components were rotated.

As presented in Table 2 the first component has high loadings for variables related to democratic stability, the second to regime instability and the third to government stability.

Table 2: Principal Component Analysis

Number of obs.	42			
Number of comp.	3			
Trace	24			
Rho	0.6431			
Variable	**Comp1**	**Comp2**	**Comp3**	**Unexplained**
Democ	0.3426			.04001
Autoc	-0.3417			.03837
Durable				.5671
Democracy	0.3413			.0247
Yearsinoff			0.4745	.2961
Xrreg	0.3121			.0995
Xconst	0.3390			.05706
FHpr	0.3424			.05591
FHcl				.3828
Assassinations				.8132
General Strikes			-0.4161	.3573
Government Crises		0.4498		.4101
Purges		0.4076		.4778
Riots				.8455
Revolutions		0.4345		.4649
AntiGovernment Demonstrations				.5853
Size of Cabinet			0.4123	.3331
Number of Major Cabinet Changes				. .3087
Changes in Effective Executive				.246
NumberofSeatsLargestPartyi			0.4827	.2267
Realized Coup		0.4827		.2233
Number of Legislative Elections				.7978
Legislative Effectiveness	0.3341			.07069
Constitutions				.8431

Figure 1: Components derived from PCA

Source: Author
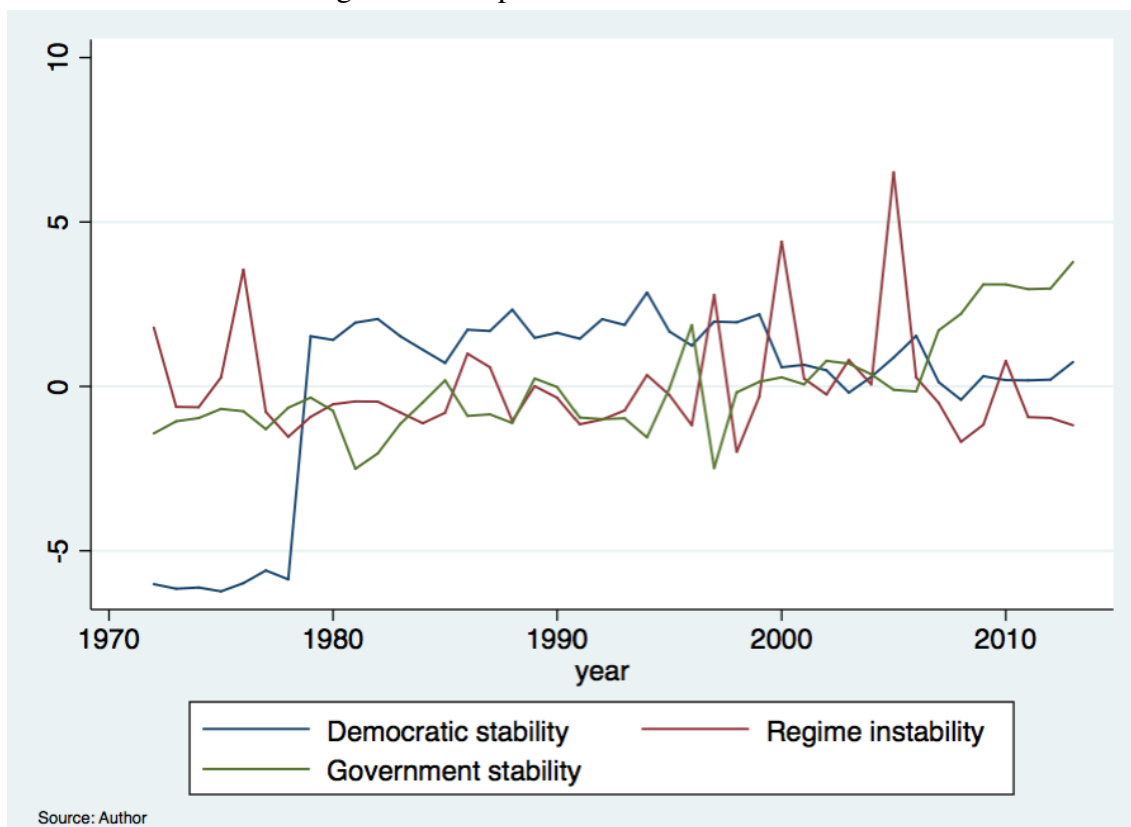
4.2.1 PC1 Democratic stability

Figure 1 shows that democratic stability has not been constant over the period. This component represents the linear combination of the variables democ, autoc (negative sign), xconst, xrreg from Polity IV, political rights from Freedom House, democracy: a dummy variable representing the democratic period and legislative effectiveness from (Banks & Wilson, Banks & Wilson).

Democ is an operationalized variable that includes institutions that reflect alternation in policies and leaders, constraints on the exercise of power by the executive and the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation. Autoc operationalizes the lack of competitiveness of political participation, the deficiency of regulation of participation, the absence of openness and competitiveness of executive recruitment, and the deficit of constraints on the chief executive. Xconst summarizes the extent of institutionalized constraints on the decision making powers of chief executives. Xrreg describes the regulation of

Chief Executive and is classified in three categories: unregulated, designational/transitional and regulated. Unregulated alludes to changes in chief executive occur through forceful seizures of power. Designational/transitional occurs when chief executives are chosen by designation within the political elite, without formal competition. Regulated is presented when chief executives are determined by hereditary succession or in competitive elections (Gurr & Marshall., 2013). Political rights from Freedom House alludes to the rights that enable people to participate freely in the political process, including the right to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives who have a decisive impact on public policies and are accountable to the electorate (FreedomHouse, 2016). Legislative effectiveness is encoded into four different options: none, ineffective, partially effective and effective. There is none legislative effectiveness when no legislature exists. Ineffective legislative occurs when activity may be of a "rubber stamp" character; domestic turmoil may make implementation of legislation impossible and effective executive may prevent the legislature from meeting. Partially effective alludes to a situation in which the effective executive's power substantially outweighs, but does not completely dominate, that of the legislature, Effective represents the possession of significant governmental autonomy by the legislature (Banks & Wilson, Banks & Wilson).

Figure1 shows a structural break in 1979, when Ecuador returned to democracy, being this the turning point from which most values become positive. Hence, high scores of the democratic stability index mean correspond to more democratic traits. Additionally, the figure shows how democracy has deteriorated over time, specifically since 1999 and even more since 2007, however it presents a slight improvement since 2012. This is due to the low scores of political rights protection presented in the last decade, and the larger influence of the Executive. While this component presents variation over the years, it is clear that there is a negative trend since 1994.

4.2.2 PC2 Regime instability

The second component represents regime stability. The major loadings are government crises, purges, revolutions, and realized coups from (Banks & Wilson, Banks & Wilson). Govern-

ment crisis describes any rapidly developing situation that threatens to bring the downfall of the present regime, excluding situations of revolt aimed at such overthrow. Purges refers to any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition. Revolutions operationalizes any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government (Banks & Wilson, Banks & Wilson). Hence, as presented in Figure 1 the highest points correspond to years in which a coup d'etat occurred (1997, 2000 and 2005). Yet, there is also variation originated from the other variables. For example, the series presents a peak in 2010 that corresponds to the 30S event, when members of the national police upraised against the government. In this sense, this component represents regime instability since it includes variables that threaten the constitutional order. It not only incorporates government crisis, but coups d'état that are a threat to the regime in general. Therefore, higher values of this component represent a rise in the propensity of the regime to collapse. Figure 1 confirms the lack of regime stability that was described in the second section.

4.2.3 PC3 Government stability

The third component has as its major loadings years in office, general strikes with negative sign, size of cabinet and number of seats of the largest party in the legislative from (Banks & Wilson, Banks & Wilson). General strikes refers to any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority (Banks & Wilson, Banks & Wilson). Hence, it represents government stability per se, since it encloses all the elements or characteristics a government can present in order to stay in power. It encompasses not only the relationship between the Executive and the Legislative which have been a source of political instability as explained in section III, but also the capacity of the government to stay in power as measured by the size of the cabinet. As shown in Figure 1, higher values of this component represent more stability. In contrast to the regime instability component, this component increases since 2006. However, it also reinforces the idea that during the 90's and until 2006, Ecuador had high rates of government instability.

4.3   Specification of the Model

Taking into consideration that there are three main components from the PCA representing the different dimensions of political instability, each of them was analyzed in a different model. Several studies have used structural equations in order to estimate both political instability and economic growth jointly due to the endogeneity between these variables (Alesina & Perotti, 1996; Chen & Feng, 1996; Svensson, 1998; Annett, 2000). Because of the challenges of identifying the structural equations of economic growth and political instability for Ecuador and to avoid specification errorr we estimate a Vector Autoregressive Model (VAR) or a Vector Error Correction (VECM) depending on the characteristics of each series as in Faust & Irons (1999). The baseline of each model includes a proxy variable for political instability obtained from the PCA, the log of real GDP, log of oil production and as an exogenous variable real oil prices.

4.3.1   Model 1- Democratic stability

After analyzing the endogenous variables log of GDP, log of oil production and democratic stability (PC1), and as exogenous variable the lagged difference of oil prices it is evident that all variables present unit roots (Appendix C). However, there is no cointegration between them (Appendix D). Hence, in order to analyze the relationship between democratic stability and economic growth the following VAR was used:

$$\Delta LGDP_t = \alpha_0 + \alpha_1 \Delta LGDP_{t-1}$$
$$+ \beta_1 \Delta PC1_{t-1} + \gamma_1 \Delta PROIL_{t-1} + \delta_1 \Delta Oil_{t-1} + \varepsilon_1$$
$$\Delta PC1_t = \beta_0 + \alpha_2 \Delta LGDP_{t-1}$$
$$+ \beta_2 \Delta PC1_{t-1} + \gamma_2 \Delta PROIL_{t-1} + \delta_2 \Delta Oil_{t-1} + \varepsilon_2$$
$$\Delta PROIL_t = \gamma_0 + \alpha_3 \Delta LGDP_{t-1}$$
$$+ \beta_3 \Delta PC1_{t-1} + \gamma_3 \Delta PROIL_{t-1} + \delta_3 \Delta Oil_{t-1} + \varepsilon_3$$

4.3.2   Results Model 1

Table 3: Estimation results : VAR Model 1

Variable	Coefficient	(Std. Err.)
Equation 1 : $\Delta\,\mathrm{LGDP}_{t-1}$		
$\Delta\,\mathrm{LGDP}_{t-1}$	0.282	(0.131)**
$\Delta\,\mathrm{PC1}_{t-1}$	-0.003	(0.003)
$\Delta\,\mathrm{PROIL}_{t-1}$	0.003	(0.020)
$\Delta\,\mathrm{LDOIL}_{t-1}$	0.001	(0.000)***
Intercept	0.024	(0.006)***
Equation 2 :$\Delta\,\mathrm{PC1}_{t-1}$		
$\Delta\,\mathrm{LGDP}_{t-1}$	12.064	(7.238)*
$\Delta\,\mathrm{PC1}_{t-1}$	-0.102	(0.153)
$\Delta\,\mathrm{PROIL}_{t-1}$	-1.017	(1.109)
LDOIL	-0.011	(0.014)
Intercept	-0.207	(0.321)
Equation 3 : $\Delta\,\mathrm{PROIL}_{t-1}$		
$\Delta\,\mathrm{LGDP}_{t-1}$	-0.705	(0.696)
$\Delta\,\mathrm{PC1}_{t-1}$	-0.017	(0.015)
$\Delta\,\mathrm{PROIL}_{t-1}$	-0.250	(0.107)**
$\Delta\,\mathrm{LDOIL}_{t-1}$	0.001	(0.001)
Intercept	0.063	(0.031)**
	* Significance at the 10% confidence level	
	**Significance at the 5% confidence level	
	*** Significance at the 1% confidence level	
	Number of obs=40	

The VAR shows that the variables affecting economic growth in the case of Ecuador are the lagged difference of oil prices and the lagged difference of the log of GDP. This finding highlights the importance of oil in the Ecuadorian economy in the period analyzed. This result coincides with the analysis presented before, as in the empirical research of Andrango & Grijalva (2016) and Borja (2014). Nevertheless, the democratic stability index does not affect economic growth in the short run. This is consistent with the fact that during the two periods of strongest economic growth in Ecuador the country was under a military dictatorship and under Rafael Correa's presidency, which has been accused of non-democratic practices.

However, lagged economic growth does affect democratic stability. Taking into consideration that a greater value of democratic stability (PC1) means that Ecuador has improved its democracy, then the lagged difference of economic growth contributes positively to the demo-

cratic stability in Ecuador. This finding provides evidence for Ecuador of Lipset's theory of modernization, which states that "the the more well-to-do a nation, the greater the chances that it will sustain democracy" (Lipset, 1959).

Finally, only the lagged difference of oil production affects negatively oil production. This result is intuitive since efforts to increase oil production materialize in a discrete way. For instance, once a new pipeline is finished, production increases significantly, but following that pipeline, production tends to vary marginally until there is a new large investment to boost it.

4.3.3 Model 2- Regime instability

In order to analyze the relationship between regime instability and economic growth, it is necessary to test for stationary and cointegration. As shown in Appendix C and Appendix D, both oil production, oil prices, and real GDP present unit roots. However, the regime instability index (PC2) is stationary (Appendix D). For this reason, we cannot estimate a Vector Error Correction Model (VECM) in which all variables need to have the same degree of integration. We run a Vector Autoregressive Model (VAR) considering as endogenous variables the difference of log of the GDP, the difference of oil production and the index of regime instability (PC2) in levels and as exogenous variable the lagged difference of oil prices. The second model specification is the following:

$$\Delta LGDP_t = \alpha_0 + \alpha_1 \Delta LGDP_{t-1}$$
$$+ \beta_1 PC2_{t-1} + \gamma_1 \Delta PROIL_{t-1} + \delta_1 \Delta Oil_{t-1} + \varepsilon_1$$
$$PC2_t = \beta_0 + \alpha_2 \Delta LGDP_{t-1}$$
$$+ \beta_2 PC2_{t-1} + \gamma_2 \Delta PROIL_{t-1} + \delta_2 \Delta Oil_{t-1} + \varepsilon_2$$
$$\Delta PROIL_t = \gamma_0 + \alpha_3 \Delta LGDP_{t-1}$$
$$+ \beta_3 PC2_{t-1} + \gamma_3 \Delta PROIL_{t-1} + \delta_3 \Delta Oil_{t-1} + \varepsilon_3$$

Table 4: Estimation results : VAR 1974-2013

Variable	Coefficient	(Std. Err.)
Equation 1 : Δ LGDP$_{t-1}$		
Δ LGDP$_{t-1}$	0.276	(0.133)**
PC2$_{t-1}$	0.001	(0.002)
Δ PROIL$_{t-1}$	0.002	(0.020)
Δ LDOIL$_{t-1}$	0.001	(0.000)***
Intercept	0.024	(0.006)
Equation 2 : PC2$_{t-1}$		
Δ LGDP$_{t-1}$	2.352	(9.556)
PC2$_{t-1}$	0.024	(0.159)
Δ PROIL$_{t-1}$	0.133	(1.465)
Δ LDOIL$_{t-1}$	-0.010	(0.019)
Intercept	-0.104	(0.423)
Equation 3 : Δ PROIL$_{t-1}$		
Δ LGDP$_{t-1}$	-0.705	(0.706)
PC2$_{t-1}$	-0.006	(0.012)
Δ PROIL$_{t-1}$	-0.259	(0.108)**
Δ LDOIL$_{t-1}$	0.001	(0.001)
Intercept	0.061	(0.031)
	* Significance at the 10% confidence level	
	**Significance at the 5% confidence level	
	*** Significance at the 1% confidence level	
	Number of obs=40	

4.3.4 Results Model 2

As presented in Table 4, the variables that affect economic growth are the lagged difference of oil prices and the lagged difference of economic growth. There is no relationship between regime instability (PC2) and economic growth in the short run. This supports Polga & Mejia (2011) argument that only the coup d'etat against Jamil Mahuad had economic motivations.

Likewise, none of the other variables (oil production, oil prices) has an effect on regime instability. This could be explained because regime instability is the maximum point in the spectrum of political instability. Hence, economic growth, oil prices and production could be the triggers for the first stage of riots or anti government demonstrations, but a regime collapse occurs only after a series of factors accumulate as explained by (Basabe & Polga, 2017). Finally, the change in oil production is affected negatively by the lagged difference of oil production as in the previous model.

4.3.5 Model 3 - Government stability

After testing the series of government instability (PC3), economic growth and oil production, all of them present unit roots (Appendix C), the lags needed are two and there exists a cointegration of order 1 (Appendix D). Therefore, the right model to analyze the interactions among them is a VECM. This model analyzes the relationship between time series that are not covariance stationary, but are cointegrated. Hence, there is a linear combination of the series that is stationary or I(0), while each independent series is I(1). A VECM is a system of equations where each variable is explained by its own lagged differences and the lagged differences of the other endogenous variables, plus a lagged error-correction term. The error correction term represents the long-run equilibrium relationship between the series, while the lagged differences represent the short-run effects. The specification of the model is the following:

$$\Delta LGDP_t = \alpha_0 + \alpha_{LGDP}\theta_{t-1} + \alpha_1 \Delta LGDP_{t-1}$$

$$+ \beta_1 \Delta PC3_{t-1} + \gamma_1 \Delta PROIL_{t-1} + \delta_1 \Delta Oil_{t-1} + \varepsilon_1$$

$$\Delta PC3_t = \beta_0 + \beta_{PC3}\theta_{t-1} + \alpha_2 \Delta LGDP_{t-1}$$

$$+ \beta_2 \Delta PC3_{t-1} + \gamma_2 \Delta PROIL_{t-1} + \delta_2 \Delta Oil_{t-1} + \varepsilon_2$$

$$\Delta PROIL_t = \gamma_0 + \gamma_{PROIL}\theta_{t-1} + \alpha_3 \Delta LGDP_{t-1}$$

$$+ \beta_3 \Delta PC3_{t-1} + \gamma_3 \Delta PROIL_{t-1} + \delta_3 \Delta Oil_{t-1} + \varepsilon_3$$

This system of equations represents the dynamics between government instability, oil production and economic growth, and the lagged change in real oil prices as an exogenous variable. The speed of adjustment parameters α_{LGDP}, β_{PC3} and γ_{PROIL} represent the short term deviation from the long term cointegration relationship. The lagged differences of the explanatory variables represent the short-run causality on the left-hand side variables.

4.3.6 Results Model 3

The cointegrating equation presents the long term relationship between the non-stationary variables. The equation below presents the coefficients of this relationship with the standard errors in parenthesis.

$$\theta = LGDP - 0.108PC3 - 0.630LPROIL - 9.993$$

$$(0.10)^{***}(0.03)^{***}$$

This equation shows that there is a positive feedback from government stability and oil production to economic growth. Specifically, the relationship suggests that in the long run government stability contributes 0.10 index points to GDP growth, while oil production contributes 0.63 points.

The VEC Model (Table 5) relating government stability, oil production and GDP growth

Table 5: Estimation results: VECM 1974-2013

Variable	Coefficient	(Std. Err.)
	Equation 1 :Δ LGDP$_{t-1}$	
_ce1$_{t-1}$	-0.136	(0.044)***
Δ LGDP$_{t-1}$	0.153	(0.136)
Δ PC3$_t$	-0.009	(0.004)**
Δ PROIL$_t$	-0.032	(0.022)
Δ LDOIL$_{t-1}$	0.001	(0.000)**
Intercept	0.028	(0.006)
	Equation 2 : Δ PC3$_t$	
_ce1$_{t-1}$	5.458	(1.943)***
Δ LGDP$_{t-1}$	4.756	(6.043)
$\Delta PC3_t$	0.038	(0.195)
$\Delta PROIL_t$	1.794	(0.997)*
Δ LDOIL$_{t-1}$	0.000	(0.012)
Intercept	-0.004	(0.264)
	Equation 3 : Δ PROIL$_t$	
_ce1$_{t-1}$	0.616	(0.240)***
Δ LGDP$_{t-1}$	-0.092	(0.747)
Δ PC3$_t$	0.050	(0.024)**
Δ PROIL$_t$	-0.104	(0.123)
Δ LDOIL$_{t-1}$	0.002	(0.001)
Intercept	0.039	(0.033)
	* Significance at the 10% confidence level	
	* Significance at the 5% confidence level	
	**** Significance at the 1% confidence level	
	Number of obs=40	

as endogenous variables and as exogenous variable the lagged difference of oil prices, presents a short-run Granger causality between the lagged change in government stability (PC3) and the lagged change in oil prices towards real GDP growth. In this sense, taking into consideration that higher values of the government stability index represent a more stable government, this means that in the short run an increase in government stability in the last year will have a negative impact in economic growth on the current year. Although this result might sound counterintuitive, it represents Ecuador's economic and political dynamics. Most of the presidents faced a trade-off between governance through populist policies or political instability and a healthy economy. As explained in section III, from Febres Cordero until Mahuad, most of the Ecuadorian presidents employed adjustment policies at the beginning of their periods that contributed to a sustainable economy in the long run. However, in the short run when they

faced anti-government demonstrations due to the policies adopted, they set back part or all of the adjustment measures and applied economic populist policies in order to remain in power, but which are detrimental to economic growth (Pachano, 2007; Freidenberg & Pachano, 2016).

In the long run –as shown by the cointegrating equation– the relationship between government stability and economic growth is positive. This is in line with the findings of several authors (Barro, 1991; Perotti, 1996; Alesina et al., 1996; Chen & Feng, 1996; Asteriou & Price, 2000; Carmignani, 2001; Jong-A-Pin, 2009). Additionally, the speed of adjustment regarding GDP is significant, negative and less than 1 as required. The other variable significant to GDP growth is the lagged change in oil prices, as in the previous models.

In the short-run, the only variable significantly affecting government stability is the lagged change in oil production. A positive change in a period before regarding oil production will contribute to the stability of government in power. The mechanism through which this relationship operates is through oil revenues generated by oil production. As presented in section III, most of the governments that have registered larger oil revenues have used these resources to boost social spending and to provide other economic benefits to the population in order to remain in power. Additionally, throughout Ecuador's political history economic resources have been used in exchange of political favors (Freidenberg & Pachano, 2016) in order to maintain governability. Hence, the source of government stability has been oil production.

In the short run, economic growth does not affect government stability. This seems to be the case in Ecuador because political instability originated in conflicts between the Legislative and the Executive power do not respond to economic situations, but to political conflicts of interests. This was the case during the presidencies of Hurtado, Febres Cordero, Borja, Durán Ballén, Bucaram, and Gutiérrez.

Finally, only the lagged change in government stability Granger causes an increase in oil production. The reason is that a stable political environment leads to an increase in oil production due to the reduction in uncertainty. This finding reinforces the findings of Alesina & Perotti (1996), who conclude that the political uncertainty following political turmoil affects the enforcement of property rights and repels investment.

5 Conclusions

After analyzing the three dimensions of political instability: democratic stability (PC1), regime instability (PC2) and government stability (PC3), and their endogenous relationship with economic growth, there is no evidence that democratic stability affects economic growth. However, economic growth does affect democratic stability providing supporting evidence of Lipset's theory of modernization in the case of Ecuador. In the same way, when analyzing regime instability (PC2) there is no evidence of a negative impact on economic growth in the short run.

The only political variable that presents an effect on economic growth both in the short run and in the long run is government stability (PC3). In the short run it has a negative effective since it captures the dynamics of backtracking from adjustment measures and the implementation of populist policies that are detrimental to economic growth. However, in the long run it presents a positive relationship, as presented in the cointegration equation. More government stability contribute to political certainty, stable institutions, therefore more confidence and more investment that boosts economic growth. In the same way, government stability has a positive effect in oil production. However, neither regime instability nor democratic stability affect oil production.

As presented in section III and IV oil production affects government stability because oil revenues provide available resources to use in social spending and maintain government's popularity and state capacity.

The only variable in the three models that affects economic growth is oil, showing the relevance of oil resources and specially the change in the oil price in the Ecuadorian economy. Finally, in the three models, the lagged difference of oil production affects negatively oil production. As explained before, this result is robust and appeared in the three models since efforts to increase oil production materialize in a discrete way.

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Appendix A

Variables description

Table 6: Variables description

Variables	Description	Source
Democ	Democracy contains three interdependent elements. One is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Second is the existence of institutionalized constraints on the exercise of power by the executive. Third is the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation.	Gurr, Jaggers & Marshall 2013
Autoc	Autocracy operationalization includes: competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive.	Gurr, Jaggers & Marshall 2013
Durable	The number of years since the most recent regime change (defined by a three-point change in the POLITY score over a period of three years or less) or the end of transition period defined by the lack of stable political institutions (denoted by a standardized authority score).	Gurr, Jaggers & Marshall 2013

Xrreg	Regulation of Chief Executive is classified in three categories encode:Unregulated: Changes in chief executive occur through forceful seizures of power. Designational/Transitional: Chief executives are chosen by designation within the political elite, without formal competition. Regulated: Chief executives are determined by hereditary succession or in competitive elections.	Gurr, Jaggers & Marshall 2013
Xconst	This variable refers to the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities	Gurr, Jaggers & Marshall 2013
Freedom House Political rights	Political rights enable people to participate freely in the political process, including the right to vote freely for distinct alternatives in legitimate elections, compete for public office, join political parties and organizations, and elect representatives who have a decisive impact on public policies and are accountable to the electorate.	Freedom House 2015
Freedom House Civil rights	Civil liberties allow for the freedoms of expression and belief, associational and organizational rights, rule of law, and personal autonomy without interference from the state.	Freedom House 2015

Assassinations	Any politically motivated murder or attempted murder of a high government official or politician.	Banks 2016
General Strikes	Any strike of 1,000 or more industrial or service workers that involves more than one employer and that is aimed at national government policies or authority	Banks 2016
Major Government Crises	Any rapidly developing situation that threatens to bring the downfall of the present regime - excluding situations of revolt aimed at such overthrow.	Banks 2016
Purges	Any systematic elimination by jailing or execution of political opposition within the ranks of the regime or the opposition	Banks 2016
Riots	Any violent demonstration or clash of more than 100 citizens involving the use of physical force	Banks 2016
Revolutions	Any illegal or forced change in the top government elite, any attempt at such a change, or any successful or unsuccessful armed rebellion whose aim is independence from the central government	Banks 2016

Anti-government Demonstrations	Any peaceful public gathering of at least 100 people for the primary purpose of displaying or voicing their opposition to government policies or authority, excluding demonstrations of a distinctly anti-foreign nature.	Banks 2016
Size of Cabinet	Refers to the number of ministers of "cabinet rank", excluding,undersecretaries, parliamentary secretaries, ministerial alternates, etc. Includes the president and vice-president under a presidential,system, but not under a parliamentary system	Banks 2016
Major Cabinet Changes	The number of time in a year that a new premier is named and/or 50%,of the cabinet posts are assumed by new ministers.	Banks 2016
Changes in Effective Executive	The number of times in a year that effective control of executive power,changes hands. Such a change requires that the new executive be independent of his predecessor	Banks 2016
Number of Seats of the Largest Party	Contains the number of seats held by the largest party in the lower house of each country's national assembly.	Banks 2016
Size of Legislature Lower House	Contains the total number of seats in the lower house	Banks 2016
Coups d'État	The number of extra constitutional or forced changes in the top government,elite and/or its effective control of the nation's power structure in a given year.	Banks 2016

Legislative Effectiveness	Legislative Effectiveness	Banks 2016
Constitutions	Dummy if a new constitutions is drafted	Author
Years in office	Years in office of an elected president	Author

Appendix B

PCA- Components Selection

Figure 2: PCA scree plot test
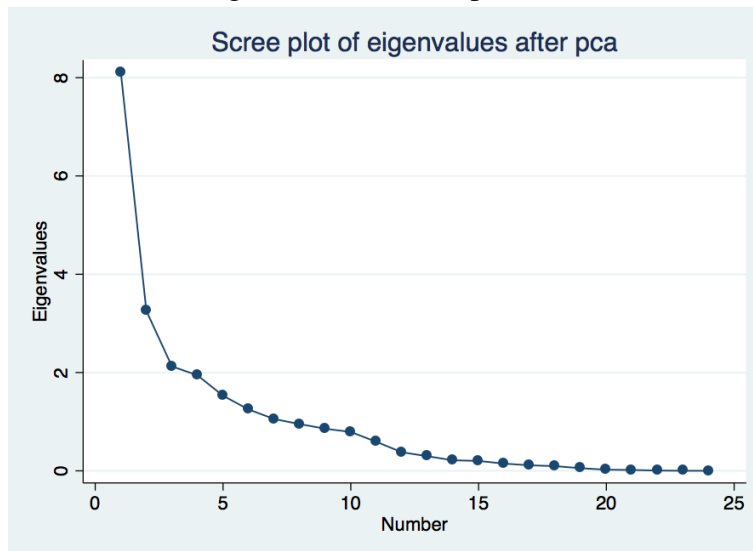
Appendix C

Unit root tests

Table 7: Unit root tests

	Augmented Dickey Fuller Test	Philips-Perron Test
Level		
LGDP	-1.418	-0.640
LPROIL	0.747	-0.925
OIL	-1.795	-6.765
PC1	-2.348	-6.165
PC2	-6.239***	-39.089***
PC3	-1.759	-5.355
First Difference		
D.LGDP	-4.730***	-32.337***
D.LPROIL	-13.491***	-49.506***
D.OIL	-6.274***	-37.268***
D.PC1	-6.826***	-44.668***
D.PC3	-8.614***	-44.008***
	* Significance at the 10% confidence level * Significance at the 5% confidence level **** Significance at the 1% confidence level Number of obs=40	

Appendix D

Cointegration tests

Table 8: Cointegration test Model 1

Cointegration test Model 1 (LGDP, PC1, LPROIL)					
Johansen tests for cointegration					
Trend= constant					
Lags=2					
Number of obs=40					
Sample=Sample:1974 - 2013					
Maximum rank	**Parms**	**LL**	**Eigenvalue**	**Trace statistic**	**5% critical value**
0	15	-398.52636	.	21.6949*	29.68
1	20	-392.62355	0.25557	9.8893	15.41
2	23	-387.69345	0.21847	0.0291	3.76
3	24	-387.67889	0.00073		

Table 9: Cointegration test Model 3

Cointegration test Model 3 (LGDP, PC3, LPROIL)					
Johansen tests for cointegration					
Trend= constant					
Lags=2					
Number of obs=40					
Sample=Sample:1974 - 2013					
Maximum rank	**Parms**	**LL**	**Eigenvalue**	**Trace statistic**	**5% critical value**
0	15	-389.91751	.	51.5277	29.68
1	20	-367.39282	0.67575	6.4783*	15.41
2	23	-364.15368	0.14952	0.0000	3.76
3	24	-364.15368	0.00000		

Appendix E

Post estimation tests

E.1 Model 1

E.1.1 Residual Autocorrelation

Table 10: Residual Autocorrelation Model 1

Residual Autocorrelation Test Model 1			
Lagrange Multiplier Test			
Lag	chi2	df	Prob>2
1	13.1221	9	0.15716
2	5.4340	9	0.79495

The Lagrange Multiplier shows evidence that there is no residual autocorrelation.

E.1.2 Normally Distributed Disturbances

Table 11: Normally distributed disturbances tests

Jarque-Bera test				
Equation		chi2	df	Prob >chi2
D_LGDP		9.981	2	0.00680***
D_PC1		861.617	2	0.0000***
D_LPROIL		112.488	2	0.00000***
ALL		984.086	6	0.00000***
Skewness test				
Equation	Skewness	chi2	df	Prob >chi2
D_LGDP	-.79986	1.880	1	0.03890**
D_PC1	4.2056	6.389	1	0.00000***
D_LPROIL	-1.5986	17.037	1	0.00003***
ALL		139.21	3	0.00001***
Kurtosis test				
Equation	Kurtosis	chi2	df	Prob >chi2
D_LGDP	4.8518	0.593	1	0.44108
D_PC1	24.124	15.212	1	0.00010***
D_LPROIL	10.568	95.450	1	0.00000***
ALL		844.870	3	0.00000***

The tests show that we reject the null hypothesis of error normality. However, this should not create a problem because if the errors are not normally distributed but are independently and identically distributed with zero mean and finite variance (which should be the case since there is no evidence of autocorrelation), the estimates are still consistent but not effcient (Stata Corp., 2013).

E.1.3   VAR Stability-Stationarity

Table 12: VAR Stability-Stationarity

VAR Stability-Stationarity		
Eigenvalue		**Modulus**
-.3240231		.324023
.1275536	+.1358998i	.186383
.1275536	-.1358998i	.186383

As the 12 shows all the eigenvalues lie inside the unit circle, hence the VAR satisfies the stability condition.

E.2   Model 2

E.2.1   Residual Autocorrelation

Table 13: Residual Autocrrelation Test Model 2

Residual Autocrrelation Test Model 2			
Lagrange Multiplier Test			
Lag	chi2	df	Prob>2
1	10.3992	9	0.31914
2	4.9642	9	0.83742

The Lagrange Multiplier shows evidence that there is no residual autocorrelation.

E.2.2   Normally distributed disturbances

The tests present evidence to reject the null hypothesis of error normality. However, as in the previous model this should not create a problem because if the errors are not normally distributed but are independently and identically distributed with zero mean and finite variance.

Table 14: Normally Distributed Disturbances Tests

Jarque-Bera test				
Equation		chi2	df	Prob >chi2
D_LGDP		3.951	2	0.13868
PC2		81.802	2	0.0000***
D_LPROIL		112.335	2	0.00000***
ALL		198.087	6	0.00000***
Skewness test				
Equation	Skewness	chi2	df	Prob >chi2
D_LGDP	-.56394	2.120	1	0.14537
PC2	2.2469	33.656	1	0.00000***
D_LPROIL	-1.6674	18.534	1	0.00002***
ALL		54.310	3	0.00001***
Kurtosis test				
Equation	Kurtosis	chi2	df	Prob >chi2
D_LGDP	4.0481	0.593	1	0.44108
PC2	8.3747	15.212	1	0.00010***
D_LPROIL	10.502	93.801	1	0.00000***
ALL		143.777	3	0.00000***

E.2.3 VAR Stability-Stationarity

Table 15: VAR Stability-Stationarity

VAR Stability-Stationarity	
Eigenvalue	Modulus
.2828675	.282868
-.2538009	.253801
.01217472	.012175

All the eigenvalues lie inside the unit circle, hence the VAR satisfies the stability condition.

E.3   Model 3

E.3.1   Residual Autocorrelation

The Lagrange Multiplier shows evidence that there is no residual autocorrelation.

Table 16: Residual Autocrrelation Test Model 3

Residual Autocrrelation Test Model 3			
Lagrange Multiplier Test			
Lag	chi2	df	Prob>2
1	12.7249	9	0.17545
2	6.7590	9	0.66220

E.3.2 Normally distributed disturbances

The tests present evidence to reject the null hypothesis of error normality. However, as in the previous model this should not create a problem because if the errors are not normally distributed but are independently and identically distributed with zero mean and finite variance.

Table 17: Normally distributed disturbances tests

Jarque-Bera test				
Equation		chi2	df	Prob >chi2
D_LGDP		1.712	2	0.42488
D_PC3		10.543	2	0.00514***
D_LPROIL		18.652	2	0.00009***
ALL		30.907	6	0.00003***
Skewness test				
Equation	Skewness	chi2	df	Prob >chi2
D_LGDP	-.2916	0.567	1	0.45150
D_PC3	-.73888	3.640	1	0.05642*
D_LPROIL	-1.1318	8.541	1	0.00347***
ALL		12.747	3	0.00522***
Kurtosis test				
Equation	Kurtosis	chi2	df	Prob >chi2
D_LGDP	3.8289	1.145	1	0.28459
D_PC3	5.0352	15.212	1	0.00860***
D_LPROIL	5.4631	95.450	1	0.00147***
ALL		844.870	3	0.00041***

E.3.3 VECM Stability-Stationarity

The test shows that the VECM specification imposes 2 unit root. This could represent a problem in the estimated model since the cointegration equation is not stationary.

Table 18: VECM Stability-Stationarity

Eigenvalue		Modulus
3.368324		3.36832
1.147447		1.14745
1		1
1		1
.3309601		.33096
-.1445431		.144543