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**Social Progress, Democracy, and Economic Growth: A case
study of Ecuador**

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RESUMEN

Esta tesis analiza las relaciones endógenas existentes entre el crecimiento económico, el progreso social y la democracia, junto al efecto exógeno de los precios del petróleo para el caso ecuatoriano. Este análisis utiliza un modelo de corrección de errores de vectores cointegrados (VECM), que permite diferenciar las relaciones de corto plazo y largo plazo entre estas variables. Así, se evidenció que en el corto plazo, la variación de los precios del petróleo causa crecimiento económico, pero es perjudicial para el desarrollo humano y la democracia. Igualmente, se encontró una relación de causalidad bidireccional entre desarrollo humano e instituciones políticas. En el largo plazo, existe una relación positiva entre desarrollo humano y democracia hacia con el crecimiento económico. Mientras, el crecimiento económico y la democracia presentan un efecto positivo en el desarrollo humano en el largo plazo.

Key words: Ecuador, Economic growth, social progress, democracy, VECM.

ABSTRACT

In this paper we analyze the endogenous dynamics between economic growth, social progress and democracy, along with the exogenous effect of oil prices in Ecuador. We use a vector error correction (VEC) model, which allows the differentiation of the short-run and long-run relationships between these variables. In the short-run, oil price variation Granger causes economic growth, but hinders human development and democracy. A bidirectional causality exists between human development and political institutions. In the long-run, there is a positive relationship from human development and democracy to economic growth. A long-run relationship also exists from economic growth and democracy to human development.

Key words: Ecuador, Economic growth, social progress, democracy, VECM.

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INTRODUCTION

One of the main factors that determines the human development of countries is the way its society is organized, i.e. its institutions. Likewise, when a society's inhabitants are more educated, they will demand better political institutions. These are both inherently desirable goals for a society. However, both political institutions and human development -more generally defined- are directly affected by economic growth. This endogenous relationship between economic growth, social progress and democracy is crucial in developing countries such as Ecuador, where democracy and political institutions are not consolidated and social progress has been volatile, but where strong economic growth during the last decade has raised people's expectations of a changed society both socially and institutionally. Faced with the fall in oil prices that has occurred during the last 1½ years, Ecuador's risk is that the progress achieved (mainly in terms of social indicators) may quickly disappear. In this paper, we take a longer run perspective (1972-2013) to analyze the endogenous dynamics between economic growth, social progress and democracy in the specific case of Ecuador.¹

The thesis is organized in five sections. The first presents a review of the literature on the endogenous relationship between economic growth, human development and democracy. The second section presents a historic description of these variables for the case of Ecuador. The third and fourth present the methodology used to analyze this relationship econometrically, as well as the results obtained. The fifth section concludes.

¹ We use the terms social progress and human development interchangeably.

Literature Review

The discussion on the relationship between social progress, democracy and growth has generated various conclusions, sometimes contradicting one another. Some studies demonstrate that democracy has a positive and significant effect on economic growth (e.g. Leblang, 1997). However, others establish that democracy diminishes growth in developing countries, because certain democratic regimes are not able to implement effective public policies (Baum and Lake 2003). Acemoglu et al. (2015) contradict this argument and show that democracy does generate economic growth: after a country democratizes, its GDP per capita increases by 20% in the following 25 years.

Democracy affects economic growth through economic reforms aimed at increasing investment in education and health, thus contributing to social progress (Acemoglu, Naidu, et al., Democracy Does Cause Growth 2015) (Baum and Lake 2003) (Doucouliagos and Ali 2008). Likewise, democratic regimes often spend more in social development, incur in less social repression, have more egalitarian tax systems and distribute social expenditure (Pourgerami 1988) (Acemoglu, Naidu, et al., Democracy Does Cause Growth 2015) (Baum and Lake 2003). Regional analyses show that in Latin America democracy has contributed more to economic growth than in other regions, e.g. in Asia (Doucouliagos and Ali 2008). In a similar fashion, Heo and Tan (2001) show that in 31% of developing countries, including Ecuador, democracy Granger causes economic growth.

From a general perspective, Limongi and Przeworski (1993) argue that although politics does affect economic growth, political regimes do not capture the whole effect. There are political factors beyond democracy and authoritarianism that have an effect on economic growth. Doucouliagos and Ali (2008) distinguish between political democracy and economic freedom, and their effects on growth. They argue that protection of property rights, labor market regulations and business credit are factors that contribute to economic freedom and have a positive and direct effect on economic growth, since these factors provide incentives for productive activities. But, political democracy, which encompasses rule of law, voice and accountability, government efficiency, political stability, and vigilance on corruption, does not have a direct effect on growth. In a similar way, Pourgerami (1998) and Feng (1997) demonstrate that democracy contributes to the expansion of civil liberties and political rights, which are elements that contribute to property rights and market competition, and therefore to economic development. They conclude that there is no trade-off between democracy and economic growth.

The political factor that seem to limit economic growth and development the most is political instability. Alesina et al. (1996) argue that economic growth is lower in countries with high risks of government collapse than in politically stable ones. Political instability generates uncertainty, which reduces investment and economic growth. Likewise, Feng (1997), using simultaneous equations to account for the endogeneity between democracy, political instability and economic growth, finds that democracy has a positive indirect effect on economic growth by reducing political instability.

Miller (2015) highlights the variation within democratic regimes and shows that electoral authoritarian societies produce better results in education, health and gender equality than democratic regimes due to their greater governmental capacity. The author establishes that electoral authoritarian regimes have no free elections and unjust conditions that favor the regime, even though there are competitive elections. In this regard, Leblang (1997) states that autocratic regimes can implement public policies to improve wealth, but without any effect on economic growth. Furthermore, Martin and Plumper (2003) find that in countries with an average level of political participation, government expenditure is 2% less compared to pure democracies. The general conclusion is that government participation and expenditure in the economy varies at different levels of democracy.

In contrast to Acemoglu et al (2015), Doucouliagos and Ali (2008), as well as Baum and Lake (2003), suggest that the relationship between democracy and growth takes place through an indirect effect. Specifically, Doucouliagos and Ali (2008) find that democracy contributes to human capital, increases the level of economic freedom, decreases inflation and create political stability, all of which contribute to economic growth. In this sense, they establish that democracy contributes to human development and latter boosts economic growth. Yet, they do not find a direct effect between democracy and economic growth. In the same way, Baum and Lake (2003) use Granger causality to show that democracy improves education, and public health, again indirectly contributing to growth. They find that neither public health nor education causes democracy. Regarding, this relationship between democracy and human development, other studies show that the time frame matters. Feng (1997) concludes that in the long-run continuous growth contributes to development, and that development also has a positive effect on democracy. In the short-run, however,

where a non-democratic regime is in place, economic growth will contribute to strengthen the dictator's power and sacrifice democracy and development. Thus, the relationship between democracy and growth is positive in the long-run but negative in the short-run.

In the same way that the relationship between democracy and growth can take different directions, the relationship between democracy and social development is not fully determined. For instance, Acemoglu et al. (2013) demonstrate that democracy has a robust effect on tax revenues as a percentage of GDP, but there is no effect on inequality. These authors also show that inequality tends to grow after democratization. In addition, the relationship between democracy and human capital is endogenous: a more developed country has greater opportunities to sustain a democratic regime (Pourgerami 1988), and these regimes invest more in education. (Acemoglu, Naidu, et al., *Democracy, Redistribution and Inequality** 2013). In the health realm, some studies show that democracy is positive correlated with life expectancy (Baum and Lake 2003).

From a regional perspective, Brown and Hunter (2004) show that Latin American democracies during the period 1980-1997 invested more economic resources in education, specifically in primary education.

In the end, the relationship between social progress, democracy and growth is not clear cut. The main issue is that these variables are mutually endogenous and thus it is empirically difficult to disentangle causality. Furthermore, while most empirical work has focused on the relationship between two of them, it is clear that the three variables interact in complex ways. For instance, democracy contributes more to economic growth when the population has greater percentage of secondary enrollment

(Acemoglu, Naidu, et al., Democracy Does Cause Growth 2015).

Ecuador's social progress, politics, and economic growth

To analyze the evolution of the Ecuadorian economy during this period, I rely on the work of Gachet et al. (2011), in which during 1967-2008 eight economic cycles are identified. Since this analysis includes 5 more years, the last cycle will include them. Before the first economic cycle analyzed by these authors, the country suffered a crisis due to the drop of revenues from banana exports, the main export from 1940-1965, which led to a decrease of 3% in economic growth in 1966. In this year, the military dictatorship that governed the country since 1963 to 1966 was deposed, a provisional president took power and a new constitution was drafted.

The first economic cycle (1967 – 1973) was characterized by the discovery of oil in 1967, the construction of the Trans Ecuadorian pipeline and the beginning of the exploitation of the commodity in 1972. As shown in Figure 1, oil production boosted Ecuador's economic growth and just one year after the beginning of the exploitation the country experimented the greatest growth in the period (13% in 1973). This first economic cycle was accompanied by a political crisis ending in February 1972 with a coup against Velasco Ibarra, who was in his fifth presidency and dictatorship. General Rodriguez Lara replaced Velasco Ibarra as the head of state and established a military dictatorship characterized by nationalism and extensive government spending. As a consequence, inequality dropped to its minimum in a decade, but inflation started to rise and at the end of 1973 it was 13,01%.

During the second economic cycle (1973-1981) the economy was characterized by high oil prices and their fall towards the end. In the political realm, a military triumvirate deposed General Rodriguez Lara and governed from 1975 to 1979. Finally democratization occurred in 1979. In 1974, the price of a barrel of oil was US\$63, in 1974 it was US\$70,42 and in 1980 it reached US\$100,47 in real terms. These prices led to higher oil revenues and higher government expenditures, making the state the main actor of the Ecuadorian economy and the economy dependent on oil prices. During this period, the average GDP growth was 6,24%, presenting its maximum in 1974 with 11,2%, and its minimum in 1977 with a growth of 1,60% due to the decrease in oil revenues in previous years. As the dictatorship accelerated social expending, income inequality reached its minimum point in Ecuadorian history in 1978 with a Gini index of 38,25.

In the last years of the dictatorship, the triumvirate acquired significant debt in order to maintain economic activity. Foreign debt increased 142% in 1978 and 78% relative to the previous year. In 1978, the military triumvirate called for a Constituent Assembly and established a law of political parties in order to make feasible a democratic transition. After Ecuador's democratization on August 10th, 1979 with the election of Jaime Roldós as president, the economy started to show weaknesses. The causes were the decrease of 7,56% in oil revenues in 1981 and the war against Peru in the same year. Finally, Jaime Roldós, who was considered a populist president, died in an airplane accident on May 24th, 1981. He left a country with large macroeconomic imbalances and rising unemployment (6% in 1981).

The third economic cycle according to Gachet et al (2011) comprehends the years between 1981-1986. This period was characterized by the volatility in oil prices, economic deceleration (Figure 1), the debt crisis and natural disasters such as El Niño. The government of Osvaldo Hurtado -who was Roldós vice-president and who took power after his death- had to face all these economic problems. Even though during the electoral campaign Hurtado proclaimed to belong to the center-left, in practice he implemented policies that represents a right-wing ideology. Following other Latin American countries and the lack of economic resources, the country defaulted on its debt in 1982. In order to stabilize the government finances, Ecuador signed an agreement with the IMF, which included measures such as the removal of subsidies to basic goods such as milk and flour, and also gasoline (Gachet, Maldonado and Oliva 2011). In 1982, for the first time after 12 years of fixed exchange rate the government devalued the sucre in order to boost Ecuadorian exports. At the same time, the government took responsibility and subsidized the private sector foreign debt through a process called *sucretización*. In this process, the state paid the debt of the private sector in dollars but the private sector paid back to the government in sucres. Due to these unpopular measures, which ended up increasing unemployment and inequality, and the drop of 20,6% in the real minimum wage, the government of Hurtado faced political turmoil.

In 1984, a right wing leader, León Febres Cordero became president. During his presidency, oil prices were still falling. As a pro-market president, Febres Cordero removed more subsidies and privatized some public enterprises. (Gachet, Maldonado and Oliva 2011). He implemented the second *sucretización*, but with longer terms and a lower interest rates in comparison to the first *sucretización* and giving more

subsidies to the private sector. Nevertheless, in the social field, unemployment and the minimum wage decreased; and inequality grew 7 points between 1986-1988. In the political realm, Febres Cordero's presidency was characterized by dictatorial actions and violations of human rights, including disappearances and torture.

The fourth economic cycle (1986-1992) includes the two last years of Febres Cordero's presidential term and the 4 years in power of the leftist president Rodrigo Borja. During this period, economic activity was stable but with low economic growth; on average it was 2,78%. The only year in which GDP fell was 1987 due to an earthquake that destroyed the oil pipeline and caused the suspension of oil exports.

During the presidential term of Rodrigo Borja, oil prices recovered providing economic stability to the government and giving the president the opportunity to increase social spending. Even though most of his term was characterized by political stability, Rodrigo Borja faced riots and instability provoked by the indigenous movement. During his term unemployment decreased reaching its minimum in 1990 with 6.1%, but inequality and inflation increased.

During the years 1992-1997, the fifth economic cycle took place and liberalism and economic openness were the main objectives. In 1992, Sixto Durán Ballén, a right wing politician took power presenting as his main objective the reduction of inflation. Even though inflation was reduced reaching its minimum in 1995 at 22%, unemployment increased to 10.4% in 1996. His presidency was characterized by reducing the role of the state in the economy, and even though oil prices were not as

high as before, other traditional exports such as banana, shrimp and flowers contributed to economic growth.

Like the previous president, Durán Ballén also had to face significant indigenous demonstrations. Nevertheless, the riots were not too destabilizing and Durán Ballén was the last president in 12 years that finished the presidential term. In the social scope, Durán Ballén did not fight inequality, which in 1994 reached 54,32. Yet, the real minimum wage increased during his presidential term, especially in 1995 when it augmented in 18,65%.

In 1995, Ecuador once again was immersed in a war against Peru that cost approximately 1% of GDP. In 1996, the populist leader Abdalá Bucaram took power, but lasted only six months, after the National Congress of Ecuador declared him “mentally disabled to rule the country”. His presidency was plagued by nepotism, multiple corruption cases and riots from different groups of the society. As a consequence, on February 6th, 1997, with the support of Congress, Fabián Alarcón, then President of Congress was sworn as head of state. However, Rosalia Arteaga, Bucaram’s vice-president, protested and became president for two days before Alarcón was restored. These events marked the beginning of the Ecuadorian political instability that lasted until 2005. In the economic realm, oil prices were starting to fall. They fell 15,99% in comparison to 1996, contributing to the future economic crisis.

In the social aspect, this period presented some progress. At the beginning of the 1990s, the percentage of the population below the line of indigence and poverty reached 26% and 61,8%, respectively (ECLAC, 2015). During this period, urban

poverty decreased 5,9 percent to 55,9% in 1997. Likewise, in 1996 government's health expenditure reached its maximum with 11,06% of public spending.

The sixth economic cycle (1997-2002) presented the worst economic crisis in Ecuadorian history. After great political instability, in 1998 a new Constitution was written and Jamil Mahuad -a right wing politician- was sworn as president. He finished the border conflict and signed a Peace Treaty with Peru. His presidential term, however, was characterized by the economic crisis. The fall in oil prices (-41.9% in 1998), the effects of the natural disaster of El Niño, high inflation (52,24% in 1999) and finally a bank holiday that led to the bankruptcy of some of the main Ecuadorian banks, contributed 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 Bond, 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 percentage of the 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, protested and on January 21st, 2000 the government of Jamil Mahuad was overthrown with the help of the Army. During three hours the country was governed by a Governing Board conformed by the indigenous leader Antonio Vargas, the colonel Lucio Gutiérrez and the judge Carlos Solórzano. The next day, Mahuad's vice president Gustavo Noboa was sworn as president.

The seventh economic cycle (2002-2005) was characterized by the economic recovery but persistent political instability. During these years average economic growth was 5,4%, reaching its peak in 2004 with 8,21%. Inflation was falling and reached 2,4% in 2005, the lowest since 1962. Urban poverty and urban indigence reduced to 45,2% and 17,1%, respectively. Additionally, in 2002 the heavy crude oil pipeline (OCP) was built boosting oil production, which along with the stable oil prices contributed to Ecuador's economic growth. In the political realm, Lucio Gutiérrez -the colonel that helped overthrow Jamil Mahuad- was elected president. During his mandate, Gutiérrez made pro-market decisions and maintained a stable economy. In his period, real minimum wage increased and income inequality decreased significantly. However, due to his populist trait, the indigenous groups accused Gutiérrez of betrayal. This accusations, along with corruption acts such as nepotism, contributed to him being overthrown on April 20th, 2005.

Finally, the eighth economic cycle comprehends the years 2006-2013, and was characterized by the second oil boom in Ecuadorian history, economic and political stability, and great social progress. However, as presented in Figure 1, these achievements derived mostly from the changes in oil prices, specially in 2011 when Ecuador sold each barrel of oil at \$102,77, the highest price in Ecuador's history. In the same way, as oil prices dropped in 2009 due to the global economic crisis, Ecuador's economy grew only by 0.56%. This dynamic is also presented by poverty. Since 2002 urban poverty was decreasing, but this fall was accelerated in 2006, 2010 and 2011 when oil prices were high. In 2009 and 2013 when oil prices fell, urban poverty started to increase. Inequality also followed the same pattern and decreased until 2011 when it reached 46,21. However, in 2012 and 2013 inequality started increasing due to the fall in oil revenues. This cycle is also characterized by large social investment, which is reflected for example in education. Net primary enrollment for 2013 was 97,03% and net secondary enrollment reached 83,42%.

Finally, unemployment decreased in this period and the real minimum wage rose, contributing to social progress. In spite of the fall in unemployment, underemployment still comprises a big part of the Economically Active Population (EAP). In 2008 it was 48,78% of the EAP, a year later 50,5%, and in 2013 it was 41,25%.

In the political realm, Ecuador presented its major period of stability. After Gutiérrez was overthrown, Alfredo Palacio took power and ruled for one year. In 2007, a left wing political outsider -Rafael Correa- was sworn as president and until 2013 he has been elected for this dignity three times. Correa has become the president with the

most political power in Ecuador's democratic history. He drafted a new constitution, he controls all the state powers and, for the first time in history, the government political party has the absolute majority in the legislature. Even though political stability has been the result of the strong government derived from oil revenues, democracy has been questioned. In this sense, the second oil boom not only provoked economic growth, but political instability and social progress.

Long run relationship between economic growth, democracy and human development

In the period 1965-2013, Ecuador has been characterized by political instability, volatile economic growth, and unstable social progress. During this period Ecuador began exporting oil and its economy began to depend on its production. As portrayed in Figure 1, real GDP growth clearly follows the lagged variation in real oil prices, i.e. growth in Ecuador is determined by the price of oil. For instance, the economy decelerated when oil prices fell in 1975, 1982, 1988, 1998, 2009 and 2013, while it boomed when they increased during the years: 1974, 1980, 1987, 1990, 1996, 2008, 2010, 2011.

Figure 1: Ecuador Real GDP Growth-Presidents-Oil Prices

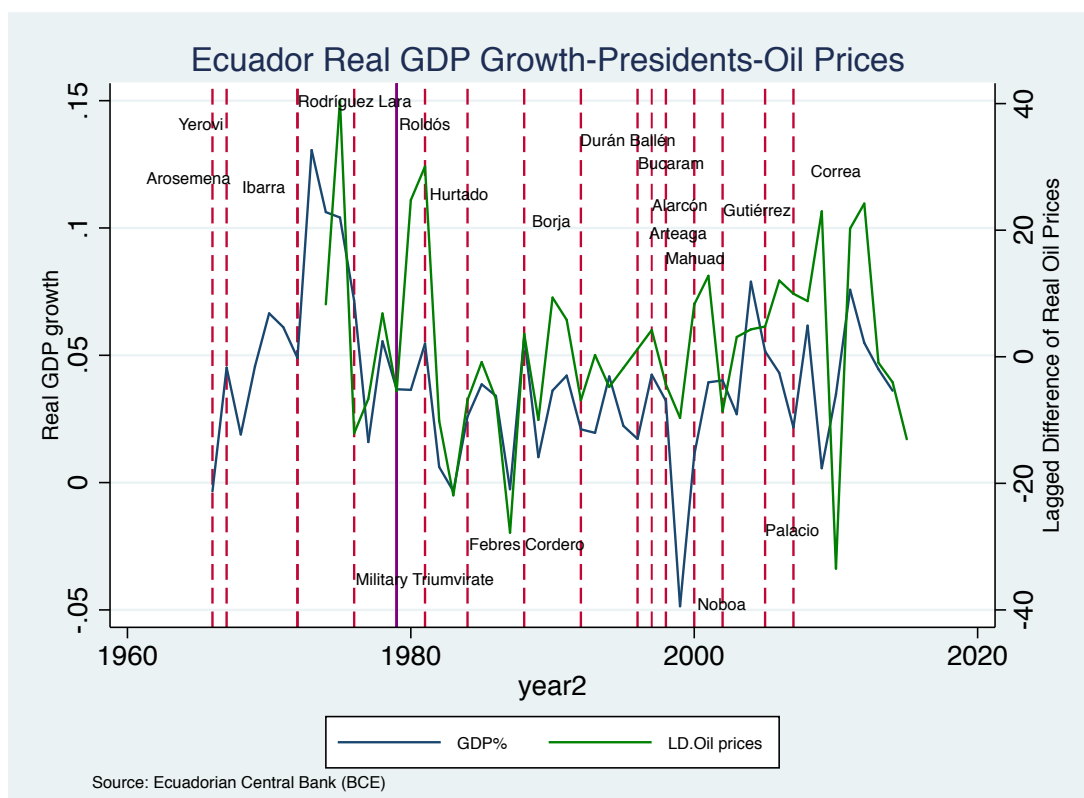
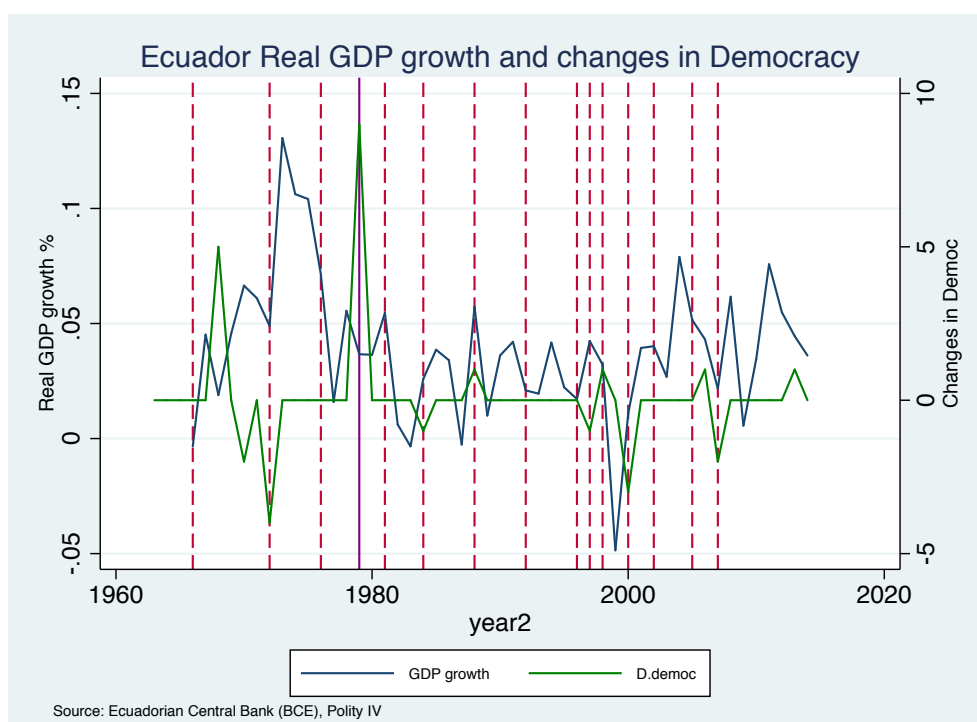


Figure 1 also shows the different governments (and presidents' last names) the country had during this period. The lack of strong political institutions is obvious: political instability has been a constant throughout these years. In the democratic period (after the purple line), there were 13 presidents when considering a 4-year period there should have been only nine. The period of highest political instability began in 1997 and lasted until 2005. However, this political instability did not respond to economic aspects, except for the overthrowing of Jamil Mahuad, but to political reasons.

When analyzing institutionalized democracy² (Figure 2) and not only irregular government changes, we can see that democracy tends to respond to economic growth. For instance, after the financial crisis in 1999 Ecuador's democracy felt 3 points in 2000, recovering thereafter once growth resumed.

Figure 2: Ecuador real GDP growth and changes in democracy

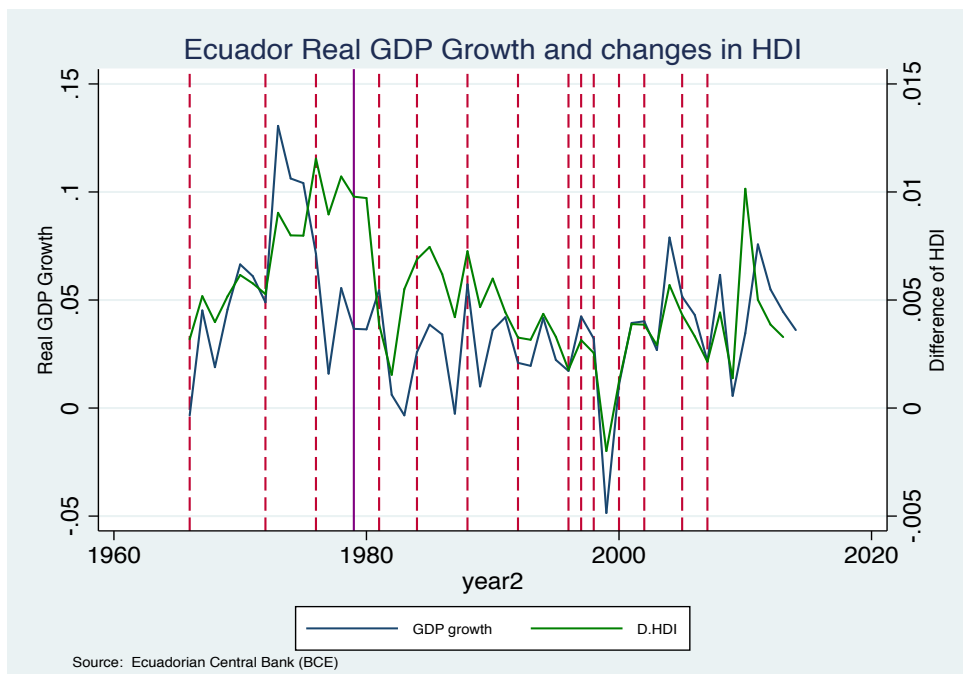


The variable that clearly follows the dynamics of the economic cycle is the Human Development Index (HDI) (Figure 3). This index is composed of three variables: life expectancy, education and income per capita, representing a good proxy for social progress. As shown in Figure 3, the major changes in HDI respond to contemporaneous growth as in 1976, 1981, 1999 or 2010. Most importantly, this relationship between HDI and growth highlight the importance of a sustained

² Democracy is measured using the DEMOC variable from Polity IV (Gurr, Jagers and Marshall 2013), which create an index of institutionalized democracy.

economic growth. During the crisis of 1999, HDI decreased; the only time in the period analyzed.

Figure 3: Ecuador real GDP growth and changes in HDI



Model

To analyze the dynamics between social progress, democracy, and growth, we propose an econometric model that highlights the short-run and long-run relationship between these constructs. To specify the model, it is first necessary to identify a variable for each one of them. The variable that captures social progress is the Human Development Index (HDI), since it includes three important social dimensions: health, education and standard of living. Economic growth is captured by real Gross Domestic Product (GDP), and for democracy an operationalized variable for institutionalized democracy has been selected. To capture the effect of the dictatorship periods, a variable that includes autocracy and democracy is used in a second model. As presented before, one of the determinants in the Ecuadorian

economy was the lagged of the change in real oil prices. For this reason, this variable is included in the model as an exogenous variable.

We propose a Vector Error Correction (VECM) Model. This model analyzes the interrelationship among multiple time series, when the series are not covariance stationary, but are cointegrated. Cointegration between series appears when a linear combination of them is stationary or $I(0)$, while each independent series is $I(1)$. In this sense, a VEC 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.

Data

The data used in the model includes real GDP taken from the Ecuadorian Central Bank (BCE), we build a Human Development Index (HDI) and real oil prices, as explained below. Democracy is taken from Polity IV, and we also use a dummy variable for dollarization. All these variables cover the period from 1965 to 2013, except for real oil prices for which data is only available from 1972 when Ecuador started to export oil. However, due to the use of first differences in the model, it has 40 observations.

HDI

Since the UNDP only provides 10 observations and a continuous series since 2010 for Ecuador's Human Development Index (HDI), we built a proxy for HDI. The UNDP

technical notes establish two steps for the construction of the HDI. The first step is to find the variables for the three dimensions: long and healthy life, knowledge, and a decent standard of living, and create the dimension indexes. As stated by the UNDP, the variable used to measure the first dimension is life expectancy at birth. This variable was taken from the World Bank, which provides a continuous series from 1960 to 2013. Knowledge is measured by mean years of schooling and expected years of schooling. Yet, for Ecuador the only variable available was mean years of schooling. This variable was subtracted and built using Barro and Lee dataset (2014) and the World Bank data. Finally, Gross National Income per capita adjusted by the Purchasing Power Parity measures the dimension of decent standard of living. In the built HDI I used Gross Domestic Product per capita as a proxy for GNI per capita, since the World Bank only provide a continuous series for the latter variable starting in 1990.

To create the dimension indices the UNDP has established “natural zeros and aspirational goals”, as presented below:

Table 1: HDI components

Dimension	Indicator	Max	Min
<i>Health</i>	Life expectancy years	20	85
<i>Education</i>	Expected years of schooling	0	18
	Mean years of schooling	0	15
<i>Standard of living</i>	Gross National Income per capita (2011 PPP\$)	100	75000
Source	UNDP (2015) Technical notes		

After these adjustments, each dimension index was calculated as established by the UNDP technical notes:

$$(1) \text{ Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

Finally, the HDI was derived by the geometric mean of the three dimensional indices:

$$(2) \quad HDI = (I_{health} * I_{education} * I_{income})^{1/3}$$

While we constructed the HDI, we are confident that it represents a good proxy for the HDI provided by the UNDP. The correlation between these two series is 0.9967 in levels and 0.944 in differences.

Democracy

Democracy is measured by *democ*, a variable taken from the Polity IV Project. *Democ* measures the institutionalized democracy through an additive eleven-point scale. This variable considers three important components: “the presence of institutions and procedures through which citizens can express effective preferences about their leaders, the guarantee of civil liberties, and constraints on the exercise of power by the executive” (Gurr, Jagers and Marshall 2013).

Log of Real GDP

The data for Real GDP is taken from the Ecuadorian Central Bank (BCE), which provides a continuous series from 1965 to 2014, with 2007 as the base year. The model uses the Log of Real GDP.

Real oil prices

Since the Ecuadorian Central Bank only provide nominal oil prices from 1972 to 2014, it was necessary to convert the variable to real terms. To convert oil prices, we use the United States Consumer Price Index (CPI) since Ecuadorian oil is sold in US dollars and the Ecuadorian inflation does not influence oil prices. We used the US Energy Information Administration CPI. Their method to convert nominal prices to real prices is the following: “divide the nominal price in a given year by the ratio of the CPI in that year to the CPI in some “base” period as presented below” (EIA n.d.):

$$(3) \text{ Real Price in period } A = \text{Nominal price in period } A * \frac{\text{CPI in Dic 2015}}{\text{CPI in period } A}$$

Polity

Polity is a variable that takes into consideration the effect of autocracy in the political system .presenting a complete picture of political institutions. Since polity is the result of subtracting the autocracy score (Autoc) from the democracy score (Democ), both variables of Polity IV, it ranges from +10 (strongly democratic) to -10 (strongly

autocratic). The autocracy score takes into consideration the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment and constraints on the chief executive (Gurr, Jagers and Marshall 2013).

Specification of the VEC Models

In order to avoid spurious relationships, we tested for a unit root in the time series and determined whether the variables are stationary. As presented in the table below, we run an Augmented Dickey Fuller (ADF) test with trend and a constant, and just with a constant. It is evident that all the variables in levels when taking into consideration the trend are not stationary or present a unit root. However, after first differentiating, no variable does present unit roots and can be considered stationary, i.e. all variables are I(1).

Table 2 : Unit Root tests

	ADF Test (Trend)	ADF Test (constant)
Level		
LGDP	-1.520	-1.418
HDI	-0.590	-3.329**
Democ	-2.156	-1.924
Polity	-2.291	-1.966
First Difference		
D.LGDP	-4.888***	-4.730***
D.HDI	-4.232***	-3.505***
D.Democ	-7.483***	-7.524***
D.Polity	-7.826***	-7.890***
	** Significance at the 5% confidence level *** Significance at the 1% confidence level	

Lag order selection

VEC Model 1

The lag order of the VECM including the Democ variable was chosen following the Final Prediction Error (FPE), the Hannan–Quinn information criterion (HQIC) method, and the Schwarz Bayesian information criterion (SBIC), which coincided that the lag order for a VAR I(1) was 2 lags (Table 3). However, since the order for a VEC model is one less than a VAR, in the specified VEC model one lag is needed.

Table 3 : Lag order selection VECM 1

```
varsoc lpibr IDH2 democ, exog(ldoilr)
```

Selection-order criteria					Number of obs = 40			
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	30.1235				.00006	-1.20617	-1.11458	-.952841
1	229.954	399.66	9	0.000	4.3e-09	-10.7477	-10.5187	-10.1144
2	249.744	39.58	9	0.000	2.6e-09*	-11.2872	-10.9208*	-10.2739*
3	254.283	9.0781	9	0.430	3.3e-09	-11.0641	-10.5603	-9.67081
4	267.824	27.083*	9	0.001	2.7e-09	-11.2912*	-10.65	-9.51788

Endogenous: lpibr IDH2 democ
Exogenous: ldoilr _cons

VEC Model 2

In the same way, as the lag order was chosen for the VECM including the Democ variable, the lag order for VECM including the Polity variable was chosen (Table 4). In this case, the variables of the VECM also need one lag.

Table 4: : Lag order selection VECM 2

```
varsoc lpibr IDH2 polity, exog(ldoilr)
```

Selection-order criteria
Sample: 1974 - 2013

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	15.0706				.000128	-.453531	-.361934	-.200199
1	214.055	397.97	9	0.000	9.6e-09	-9.95273	-9.72374	-9.3194
2	233.907	39.704	9	0.000	5.6e-09*	-10.4953	-10.129*	-9.48201*
3	239.509	11.205	9	0.262	6.9e-09	-10.3255	-9.82168	-8.93213
4	252.825	26.632*	9	0.002	5.8e-09	-10.5413*	-9.90009	-8.76794

Number of obs = 40

Endogenous: lpibr IDH2 polity2
Exogenous: ldoilr _cons

Cointegration test

To test for cointegration a Johansen test was implemented for both sets of series. This test presents one cointegrating relationships among the variables in both cases. In the first case, in which the Democ variable is included (Table 5), the null hypothesis $H_0=1$ cannot be rejected at the 5% level ($14.29 < 15.41$). In the second case, when Polity is included (Table 6), the null hypothesis $H_0=1$ cannot be rejected at the 5% level ($10.94 < 15.41$).

Table 5: Cointegration test VECM 1

Johansen tests for cointegration

Trend: constant
Sample: 1967 - 2013

Number of obs = 47
Lags = 2

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	12	243.76994	.	35.4413	29.68
1	17	254.34375	0.36234	14.2937*	15.41
2	20	261.05092	0.24830	0.8794	3.76
3	21	261.49061	0.01854		

This system of equations represents the dynamics between the three endogenous variables in levels, which are the real GDP (GDP), the Human Development Index (HDI) and democracy (Democ), and the lagged in the change of real oil prices as an exogenous variable. The speed of adjustment parameters $\alpha_{LGDP}, \beta_{HDI}, \gamma_{Democ}$ represent how GDP, HDI and democracy move back to their long-run equilibrium relation. Finally, the lagged differences of the explanatory variables represent the short-run causality on the left-hand side variables (Tao and Zestos 2002).

Results VECM (1)

The cointegrating equation represents the long run relationship between the Log of the GDP, the Human Development Index and Democracy.

$$\theta = LGDP - 10.25 HDI - 0.088 Democracy - 13.38$$

$$(1.11)^{***} \quad (0.020)^{***}$$

$$LGDP = \theta + 10.25 HDI + 0.088 Democracy + 13.38$$

$$(1.11)^{***} \quad (0.020)^{***}$$

This equation shows that there is a positive feedback from human development and democracy to economic growth in the case of Ecuador.

Table 7: VECM 1 Estimation results

Variable	Coefficient	(Std. Err.)
Equation 1 : D_LGDP		
L._ce1	0.023	(0.012)
LD.LGDP	0.089	(0.148)
LD.HDI	0.002	(0.018)
LD.Democ	-0.003	(0.002)
LD.Oil	0.001	(0.000)***
Intercept	0.036	(0.012)
Equation 2 : D_HDI		
L._ce1	0.522	(0.094)***
LD.LGDP	-3.594	(1.154)***
LD.HDI	0.298	(0.140)**
LD.Democ	0.030	(0.020)
LD.Oil	-0.004	(0.002)*
Intercept	0.604	(0.093)***
Equation 3 : D_Democ		
L._ce1	0.395	(0.802)
LD.LGDP	-1.159	(9.859)
LD.HDI	2.226	(1.197)*
LD.Democ	-0.136	(0.167)
LD.Oil	-0.020	(0.017)
Intercept	-0.800	(0.795)
	* Significance at the 10% confidence level	
	* Significance at the 5% confidence level	
	*** Significance at the 1% confidence level	

From the VEC Model (Table 7) is evident that there exists a short-run Granger causality between the lagged change in oil prices and real GDP growth. This result coincides with the analysis presented before and highlights the importance of oil prices for the Ecuadorian economy. In the short-run, neither democracy nor the Human Development index present a relationship with real GDP growth. This contradicts the finding of Heo and Tan (2001), who showed that in Ecuador, democracy Granger causes economic growth.

However, there exists a positive long-run relationship between these variables, since the error correction coefficient is 0.023 and significant. This implies that when democracy and human development increase, real GDP growth will increase too in order to adjust to the same level. This result coincides with Feng's (1997) investigation, which established that the effect between democracy and growth is positive in the long run.

The determinants in the short-run of the HDI are: lagged HDI change, lagged real GDP growth and lagged change in oil prices. Intuitively, a high HDI will present a short-run Granger causality to the HDI in the next periods. However, lagged real GDP growth and lagged change in oil prices present a negative short-run relationship with the HDI. The former can be explained by the fact that a change in the real growth rate does not cause in the short-run major social development, since the resources from real GDP growth can be directed to other channels that do not affect HDI. The latter is a clear representation of the resource curse and the negative effect of oil rents on human development. Even though, the change in oil prices was the main determinant for Ecuador's economic growth, there is a negative and direct relationship in the short-run between these two variables. While Ecuador concentrates all its efforts in oil exploitation when real oil prices changes, the country is not devoted to promote higher levels of education nor better health conditions, since the source of economic growth is oil and not human development. Additionally, oil exploitation is intensive in capital and not in high-skilled workers. This result ratifies the negative relationship regarding resource curse and human development (Karl 2007). In this sense, there is a negative short-run Granger causality between changes in oil prices and social

progress. Finally, in Ecuador democracy does not have any effect in the short-run to human development, in contrast to what panel data analysis present (Doucouliagos and Ali, 2008) (Baum and Lake, 2003). This could be explained because the periods in which social progress has significantly increased coincide with dictatorships or less democratic governments. Nevertheless, the error correction term in this equation is positive and significant, presenting a positive long-run relationship between these variables.

Democracy, does not present a long-run relationship with either real GDP or HDI. Nonetheless, in the short-run the HDI Granger causes democracy. This supports previous investigation (Pourgerami 1988) (Acemoglu, Naidu, et al., Democracy Does Cause Growth 2015) and shows that more educated, healthier, and richer people will support democracy. Due to this relationship and taking into consideration that oil prices hinder HDI, there exists an indirect negative effect from oil to democracy. Ross (2001) has also presented this relationship and establishes that oil hindered political institutions.

VECM 2

The second Vector Error Correction Model portrays the endogenous relationship between real GDP growth rate (GDP), Human Development Index (HDI) and a proxy variable for political institutions (Polity), and the lagged change of real oil prices as an exogenous variable. The VECM is defined as follows:

$$\begin{aligned}\Delta LGDP_t = & \alpha_1 + \alpha_{GDP} \theta_{t-1} + \alpha_1 \Delta LGDP_{t-1} + \beta_1 \Delta HDI_{t-1} + \gamma_1 \Delta Polity_{t-1} \\ & + \delta_1 \Delta Oil_{t-1} + \varepsilon_1\end{aligned}$$

$$\begin{aligned}\Delta HDI_t = & \beta_2 + \beta_{HDI} \theta_{t-1} + \alpha_2 \Delta LGDP_{t-1} + \beta_2 \Delta HDI_{t-1} + \gamma_2 \Delta Polity_{t-1} + \delta_2 \Delta Oil_{t-1} \\ & + \varepsilon_2\end{aligned}$$

$$\begin{aligned}\Delta Polity_t = & \gamma_3 + \gamma_{Democ} \theta_{t-1} + \alpha_3 \Delta LGDP_{t-1} + \beta_3 \Delta HDI_{t-1} + \gamma_3 \Delta Polity_{t-1} \\ & + \delta_3 \Delta Oil_{t-1} + \varepsilon_3\end{aligned}$$

Results VECM (2)

The cointegrating equation represents the long run relationship between the Log of the GDP, the Human Development Index and Polity.

$$\begin{aligned}\theta = & LGDP - 8.76 HDI - 0.044 Polity - 12.97 \\ & (0.9328)^{***} (0.0111)^{***}\end{aligned}$$

$$\begin{aligned}LGDP = & \theta + 8.76 HDI + 0.044 Polity + 12.97 \\ & (0.9328)^{***} (0.0111)^{***}\end{aligned}$$

As in the first VECM, this equation demonstrates that Human Development Index and Polity are positive correlated with GDP.

Table 8: VECM 2 estimation results

Variable	Coefficient	(Std. Err.)
Equation 1 : D_LGDP		
L._ce1	0.028	(0.016)*
LD.LGDP	0.096	(0.151)
LD.HDI	0.003	(0.018)
LD.Polity	-0.002	(0.002)
LD.Oil	0.001	(0.000)***
Intercept	0.041	(0.015)
Equation 2 : D_HDI		
L._ce1	0.659	(0.124)***
LD.LGDP	-3.412	(1.179)***
LD.HDI	0.311	(0.141)**
LD.Polity	0.022	(0.014)*
LD.Oil	-0.004	(0.002)*
Intercept	0.741	(0.117)***
Equation 3 : D_Polity		
L._ce1	1.293	(1.533)
LD.LGDP	-7.816	(14.544)
LD.HDI	2.993	(1.741)*
LD.Polity	-0.105	(0.167)
LD.Oil	-0.026	(0.025)
Intercept	-0.378	(1.448)
	* Significance at the 10% confidence level	
	* Significance at the 5% confidence level	
	*** Significance at the 1% confidence level	

The Vector Error Correction Model that uses Polity as a proxy for political institutions quality presents one difference in comparison to the former VECM that included the Democ variable. In this model, there exists a short-run Granger causality from political institutions quality (Polity) to the HDI. Since the polity variable considers the effect of autocracy on the democratic series, it is intuitive that after controlling for the autocracy in dictatorship period, better political institutions have a positive effect on the HDI. Hence, there exists a bivariate causality between political institutions and human development. This result confirms previous studies as

presented in Baum and Lake (2003), Doucouliagos and Ali (2008), and Acemoglu et al (2015).

CONCLUSIONS

The paper examines the endogenous relationship between Ecuador's social progress, democracy and growth. After estimating the dynamics of these variables through a Vector Error Correction Model (VECM) and Granger causality tests, it is clear that the only variable that in the short-run causes economic growth is the lagged change in oil prices. However, in the long-run there exists a positive relationship between human development, democracy and growth. Regarding Human Development, in the short-run this variable is mainly caused by the difference in past levels of human development. Nevertheless, when controlling for autocracy in the political institutions variable, better quality of political institutions Granger causes human development. In the same way, in the long-run economic growth and better political institutions have a positive effect to human development. Likewise, this variable short-run Granger causes democracy. We didn't find a long-run relationship between economic growth and human development to democracy. Finally, we show that although oil has a positive effect on economic growth, it hinders human development directly and political institutions indirectly.

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