

FUNDAÇÃO GETÚLIO VARGAS
ESCOLA DE ECONOMIA DE EMPRESAS DE SÃO PAULO

JOÃO MENDES

Elections and Stock Market Volatility: Evidence in OECD countries and
Developing countries

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Dissertação apresentada à Escola de
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requisito para obtenção do título de
Mestre Profissional em Economia.

Campo do Conhecimento:
International Master in Finance

Orientador Prof. Dr. João de Mendonça
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Prof. Dr. João de Mendonça Mergulhão
(ADVISOR)

Prof. Dr. Luís Brites Pereira
(DISCUSSANT)

Prof. Dr. Fernando Anjos (DISCUSSANT)

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Resumo

Este trabalho estuda se existe impacto na volatilidade dos mercados de ações em torno das eleições nacionais nos países da OCDE e nos países em Desenvolvimento. Ao mesmo tempo, pretende, através de variáveis explicativas, descobrir os fatores responsáveis por esse impacto. Foi descoberta evidência que o impacto das eleições na volatilidade dos mercados de ações é maior nos países em Desenvolvimento. Enquanto as eleições antecipadas, a mudança na orientação política e o tamanho da população foram os factores que explicaram o aumento da volatilidade nos países da OCDE, o nível democrático, número de partidos da coligação governamental e a idade dos mercados foram os factores explicativos para os países em Desenvolvimento.

Palavras-chave: Volatilidade; Mercado de ações; Eleições

Abstract

This project studies whether there is impact in stock market volatility around national elections in OECD countries and Developing countries. At the same time, it pretends, through a set of explanatory variables, find the factors that are responsible for that impact. It was found evidence that the impact of elections in stock market volatility is bigger in Developing countries. While early elections, the change in political orientation and the size of population were the factors that explained the abnormal volatility in OECD countries, the level of democracy, the number of parties of the governmental coalition and the age of the stock markets were the ones for Developing countries.

Keywords: Volatility; Stock Market; Elections

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Introduction

National elections represent the major moment when population choose the people who represent them in the making of economic, political and social decisions. This choice will strongly influence the path each country will take.

Political events have a big influence in financial markets because markets tend to respond to new information regarding political decisions that can impact on monetary and fiscal policy. The perception that the outcome of the elections influences the movement of stock markets has been an evidence in the social media both in Organisation for Economic Co-operation and Development (OECD) countries and in Developing countries.

An example is the newspaper's "El País" quote regarding Brazilian Presidential elections in October 2014: *"As might be expected, the market reacted badly to the re-election of President Dilma Rousseff ... the stock market rose in fall of 6% ... the dollar advanced 3,46 % ... the Petrobras shares had registered a fall of about 13 %. It was not expected anything different from this.", says Alex Agostini , an analyst at Austin Brokerage.*"¹

In the USA after Obama's reelection in 2012, Infowars published: *"Stock markets responded to Obama's re-election by plunging today. The Dow tumbled below 13,000 as the S&P broke 1,400, beating this year's drop on June 1"*.

The investors revise their expectations taking into account the elections outcome depending on their profit expectations related to the elections results. Basically, the

¹ Original text: *"Como era de se esperar, o mercado reagiu mal à reeleição da presidenta petista Dilma Rousseff...a Bolsa de Valores amanheceu em queda de 6%...o dólar avançava 3,46%...as ações da Petrobras haviam registrado uma queda em torno de 13%. "Não se esperava nada diferente disso", diz Alex Agostini, analista da Austin Corretora."*

price of a stock is related to the profits that the companies will distribute to its shareholders (*fiscal* policy has influence) and the expected interest rate (*monetary* policy has influence).

For example, one may say that historically it can be seen that typically the left-wing governments tend to implement higher taxes in order to distribute more money through social politics. Obviously, if the tax rate of the companies increases, the profit that will be distributed as dividends for shareholders will be lower, in the same conditions. This means that the stock price will decrease as a response to an Election of a Government that has this political agenda as the expected dividend is lower.

All over the world there are different political systems and regimes that differ the way the countries choose their representatives. Although there are several different realities, in this project it will be just considered only two political systems: the Parliamentary and the Presidential. The different political systems in each country will be classified accordingly these two systems, neglecting small and non-significant differences.

The Parliamentary system has the Prime Minister or Premier as the Head of Government and the President being merely a High Representative of the State with no executive power. In the Presidential system the President holds the position of both Head of State and Head of Government (Executive and Representative Powers).

The present study tries to deepen the relationship between Elections and Volatility of the stock markets and prove the perception demonstrated above.

In this project we will complement the results obtained by (Bialkowski, Gottschalk, & Wisniewski, 2008) where 134 elections (from 1982 to 2004) of OECD

countries were used to provide evidence that stock market volatility is substantially raised around national elections.

This work makes the same approach for the elections occurred between 2002 and 2014 in OECD countries covering 105 elections over 32 countries. The same analysis was extended for 13 Developing countries covering 38 elections to understand if there is any significant impact in this group of countries as well. A comparison of the results of these two groups of countries is done in order to understand if the national elections have bigger impact in OECD countries or in Developing countries.

In order to provide further information regarding the factors that can influence the magnitude of election shocks several explanatory variables were used, namely: *Parliamentary*, *Minority Government*, *Margin of Victory*, *Number of Parties*, *Orientation*, *Early Election*, *Age*, *Compulsory Voting*, *Population and GDP* (Gross Domestic Product) *per Capita*. The last two variables are considered in its natural logarithm form.

These variables were used to find results for OECD countries and Developing countries. However, for Developing countries three more variables were implemented in the model: *Democracy*, *Development* and *Globalization* following the argument used by (Macedo, Pereira, & Jalles, 2013).

Literature Review

Stock market volatility has been frequently studied regarding the way it can be measured as well as the drivers responsible for the existence of that volatility.

For instance, (Shiller, 1981) defends that volatility does not follow the predictions of present value models and (Grossman & Shiller, 1981) showed that the intertemporal variation appears to be inexplicably high and cannot be rationalized even in a model of stochastic discount factor. More recently, in his book (Wisniewski, 2009) documented the same results as the authors mentioned before.

Financial economists faced a challenge since the fluctuation of stock markets could not be explained by standard valuation models. Dividends and earnings are drivers of volatility but other drivers needed to be found in order to explain the volatility present in the stock markets. In his work, (Schwert, 1989) examined empirically how stock return variability are linked to macroeconomic variables, financial leverage and trading volume. His analysis indicates that only a small proportion of fluctuations in the stock market can be explained.

The economists understood that political events may be one factor that influences the market movements and because of this, the issue of political events that ties to financial market performance has been the subject of several studies, e. g., in the US, the link between political issues and economic performance was analyzed by (Goodell & Vahamaa, 2013) and the author concluded that the presidential election process engenders market anxiety as investors form their expectations regarding future macroeconomic policy. Still in US, other study (Ejara, Nag, & Upadhyaya, 2012) have

examined the market reactions to election polls. This study concluded that the changes on election polls induced volatility in stock markets.

Furthermore, (Fuss & Bechtel, 2008) studied the effect of the expected partisanship in the 2002 German election and found that the expectations of right or left wings victory make the volatility of the market change. This study reinforces the idea of the impact of political events on stock market volatility.

The studies mentioned before focused their studies in one country however, in the paper by (Pantzalis, Stangeland, & Turtle, 2000) the authors went further realizing that the positive reaction of the stock market to elections is shown to be a function of a country's degree of political, economic and press freedom, and a function of the election timing and the success of the incumbent in being re-elected.

There are several studies with different approaches that confirm the relationship between politics and stock market volatility. In the paper by (Bialkowski, Gottschalk, & Wisniewski, 2008) the authors proceed to show that, in OECD countries, stock markets can become very unsettled during periods of important political changes. In this paper it is demonstrated that National Elections affect the stock market volatility in the days that surround the Election Day. Apart from these results, the authors found that markets with short trading history exhibit stronger reaction.

This project contributes to the existent literature by providing comparative study between Developing countries and OECD countries regarding the impact of National Elections. Finally, using a linear regression methodology, it is given information about which are the variables that explain the impact in both group of countries.

Methodology

As methodology it will be measured the impact of elections on the second moment of return distribution using the volatility event study approach. First, it is isolated the country-specific component of variance within a GARCH (1,1) framework:

$$R_{i,t} = \alpha + \beta R_t^* + \varepsilon_{i,t} \quad , \quad \varepsilon_{i,t} \sim N(0, h_{i,t}) \quad (1)$$

$$h_{i,t} = \gamma_0 + \gamma_1 h_{i,t-1} + \gamma_2 \varepsilon_{i,t-1}^2 \quad (2)$$

where $R_{i,t}$ and R_t^* are the continuously compounded returns on the US dollar denominated stock market index in country i and the global stock market index on day t , respectively. Also $\varepsilon_{i,t}$ denotes the country specific part of index returns, and $h_{i,t}$ stands for its conditional variance. It will be assumed that $\varepsilon_{i,t}$ has a normal distribution with null mean value and variance $h_{i,t}$.

Equations (1) and (2) are estimated jointly using the Maximum Likelihood method over a period immediately preceding the event window. The convention is to use 250 days to estimate the benchmark model. However, in this work it is used 500 days because for GARCH models one year of data may be insufficient.

To measure possible abnormal volatility, one has to consider the variation in $\varepsilon_{i,t}$ around the event date in relation to its regular non-event level. The GARCH model may serve as a benchmark since it can provide an indication of what the volatility would have been, had the election not occurred.

As it stands, (2) is one-step-ahead forecast and will not generate an event independent projection. The immediate impact of an election, as measured by $\varepsilon_{i,0}$ will have a bearing on the values of $h_{i,t}$ for any $t > 0$. This issue is solved by making the

volatility forecast conditional only on the information set available prior to the event. For this reason, the volatility benchmark for k -th day of the event window is defined as k -step-ahead forecast of the conditional variance based on the information set available on the last day of the estimation window t^* , with expectation given by:

$$E[h_{i,t^*+k}|\Omega_{t^*}] = \hat{\gamma}_0 \sum_{j=0}^{k-1} (\hat{\gamma}_1 + \hat{\gamma}_2)^j + (\hat{\gamma}_1 + \hat{\gamma}_2)^{k-1} \gamma_1 h_{i,t^*} + (\hat{\gamma}_1 + \hat{\gamma}_2)^{k-1} \hat{\gamma}_2 \varepsilon_{i,t^*}^2 \quad (3)$$

The distribution of the residuals during the event window can be described as $\varepsilon_{i,t^*} \sim N(\text{AR}_t, M_t \cdot E[h_{i,t}|\Omega_{t^*}])$, where M_t is the multiplicative effect of the event on volatility, AR_t is the event-induced abnormal return, and $t > t^*$. Under the null hypothesis that investors are not surprised by elections outcomes, the value of parameter M_t should equal one. Note that, if the residuals were demeaned using the cross-section average, they would be normally distributed with zero mean. Since the objective of the study is to quantify the effect of elections on stock market volatility, M_t is the parameter of primary interest.

The method of estimating this event induced volatility multiple rests on combining residual standardization with a cross sectional approach in the spirit of (Boehmer, Masumeci, & Poulsen, 1991) and (Hilliard & Savickas, 2002). Note that the estimate of M_t can be calculated as the cross-sectional variance of demeaned residuals, standardized by the event-independent demeaned residual standard deviation, given by

$$\widehat{M}_t = \frac{1}{N-1} \sum_{i=1}^N \frac{(N \cdot \hat{\varepsilon}_{i,t} - \sum_{j=1}^N \hat{\varepsilon}_{j,t})^2}{N \cdot (N-2) \cdot E[h_{i,t}|\Omega_{t^*}] + \sum_{j=1}^N E[h_{j,t}|\Omega_{t^*}]}$$

where $\hat{\varepsilon}_{i,t} = R_{i,t} - (\hat{\alpha} + \hat{\beta} R_t^*)$ and $t > t^*$.

Under the null hypothesis, the demeaned standardized residuals follow a standard normal distribution because M_t equals one. Consequently, the abnormal percentage change in volatility on a given day t of the event window is expressed by $(\hat{M}_t - 1)$. For an event window (n_1, n_2) , the Cumulative Abnormal Volatility (CAV) can be determined by:

$$CAV(n_1, n_2) = \left(\sum_{n_1}^{n_2} \hat{M}_t \right) - (n_1 - n_2 + 1) \quad (5)$$

In the current setting, the null hypothesis of no impact can be rewritten as:

$$H_0: CAV(n_1, n_2) = 0, \quad (6)$$

which is equivalent to

$$H_0: \sum_{n_1}^{n_2} M_t (N - 1) = (n_2 - n_1 + 1) \cdot (N - 1). \quad (7)$$

Since, under the null hypothesis, M_t is a variance of N independent $N(0,1)$ random variables, $\hat{M}_t(N - 1) \sim \chi^2_{(N-1)}$ and $\sum_{t=n_1}^{n_2} \hat{M}_t(N - 1) \sim \chi^2_{(N-1) \cdot (n_2 - n_1 + 1)}$. The test statistic for the hypothesis stated in (6) is therefore given by:

$$\Phi(n_1, n_2) = \sum_{n_1}^{n_2} (N - 1) \cdot \hat{M}_t \sim \chi^2_{(N-1)(n_2 - n_1 + 1)} \quad (8)$$

The inferences based on the theoretical statistic will not be robust if the assumptions of the underlying econometric model are violated. Potential complications may arise from non-normality, cross-sectional dependence, or autocorrelation of the regression residuals $\varepsilon_{i,t}$.

Data

In what follows, several computations had to be made, using a set of software, according to the specific objective at each stage. In the Appendix 2 the functions created for these computations are included.

This work compiled information from 105 elections in 32 industrialized countries and from 38 elections in 13 considered as developing countries. Regarding the industrialized countries, the work includes all OECD countries except Slovakia and South Korea. As of the time of writing this work, Morgan Stanley Capital International Inc. (MSCI) did not provide enough data from these two stock markets.

Table 1 - Sample composition for OECD countries

Country	Election type	MSCI Index	Number of elections
Australia	Parliamentary	MXAU	4
Austria	Parliamentary	MXAT	3
Belgium	Parliamentary	MXBE	3
Canadá	Parliamentary	MXCA	3
Chile	Parliamentary	MXCL	3
Czech Republic	Parliamentary	MXCZ	3
Denmark	Parliamentary	MXDK	3
Estónia	Parliamentary	MXEST	2
Finlândia	Parliamentary	MXFI	3
France	Presidential	MXFR	3
Germany	Parliamentary	MXDE	3
Greece	Parliamentary	MXGR	5
Hungary	Parliamentary	MXHU	3
Iceland	Parliamentary	OMXIGI	3
Ireland	Parliamentary	MXIE	3
Israel	Parliamentary	MXIL	4
Italy	Parliamentary	MXIT	3
Japan	Parliamentary	MXJP	3
Luxembourg	Parliamentary	LuxX	3
Mexico	Presidential	MXMX	3
Netherlands	Parliamentary	MXNL	3
New Zealand	Parliamentary	MXNZ	4
Norway	Parliamentary	MXNO	3
Poland	Parliamentary	MXPL	3
Portugal	Parliamentary	MXPT	3
Slovenia	Parliamentary	MXSL	4
Spain	Parliamentary	MXES	3
Sweden	Parliamentary	MXSE	3
Switzerland	Parliamentary	MXCH	3
Turkey	Parliamentary	MXTR	3
United Kingdom	Parliamentary	MXGB	3
United States	Presidential	MXUS	3

Table 1 and Table 2 show the election type, the MSCI Index and the number of elections analyzed in each country.

Table 2 - Sample composition for Developing countries

Country	Election type	MSCI Index	Number of elections
Argentina	Presidential	MXAR	3
Brazil	Presidential	MXBR	3
Bulgaria	Parliamentary	MXBU	2
Colombia	Presidential	MXCO	4
Egypt	Presidential	MXEG	3
India	Presidential	MXIN	3
Indonesia	Presidential	MXID	3
Malaysia	Parliamentary	MXMY	3
Pakistan	Parliamentary	MXPK	3
Philippines	Presidential	MXPH	2
Russia	Presidential	MXRU	3
South Africa	Presidential	MXZA	3
Thailand	Presidential	MXTH	2

The returns for the remaining countries were computed using US dollar denominated MSCI Country Indices. These are value-weighted and adjusted for dividend payments. It was chosen MSCI World Index, which measures the performance of all developed equity markets, as a proxy for our global portfolio.

Since the objective of this work is to study the volatility around those elections that determine the formation of national governments, we have to focus on presidential elections in presidential systems and parliamentary elections in parliamentary systems.

Elections dates were mostly obtained by searching in each country governmental websites. The double checking of this data was made using alternative websites.

Elections that took place 500 days after 01/01/2000 were excluded in order to be possible to use 500 days as benchmark. This restriction enables us to estimate the volatility benchmark model given in (1) and (2) for all events considered. Because of

this, although the observations start in 2000, in this work, only the elections from 2002 until 2014 were taken into account.

In order to find the determinants of election-induced volatility it was used a comprehensive data set of explanatory variables. These variables are supposed to provide further information regarding political, institutional and socio-economic factors that can influence the magnitude of the impact around Election Day.

The following explanatory variables were used for both OECD countries and Developing countries:

- Parliamentary: dummy variable that signals the difference between parliamentary and presidential systems. It takes the value of 1 when it is parliamentary system and 0 otherwise.
- Minority Government: dummy variable that indicates when a minority government is brought to office, i. e., when in a parliamentary system the majority of seats was not achieved in the election and it was not made a coalition to provide it. In the presidential systems the majority is always obtained. This variable assumes 0 in case of majority and 1 in case of minority.
- Margin of Victory: it is the difference between the election winners and the opposition. In parliamentary systems can be the difference between the government coalition and all the other parties, whereas on Presidential Elections it is the difference between the winner and the runner-up.
- Number of Parties: indicates the number of independent parties involved in the government coalition for parliamentary systems. It takes the value of 1 for Presidential systems.

- Orientation: dummy variable that tends to show shifts in political orientation. This means when there is a shift from left wing to right wing or vice-versa. The classification of left or right wing is not entirely uncontroversial and may be deemed somewhat subjective, therefore it was followed the conventions adopted by (Banks, Muller, & Overstreet, 2004). This variable assumes the value of 1 when there is a change in political orientation.
- Early Election: dummy variable that indicates when an election is called, at least, three months before the official end of the mandate that was in course. It takes the value of 1 when the election is called early and 0 otherwise.
- Age: dummy variable that takes the value of 1 when the stock market of that country was established after 1860 and 0 when established before the same date.
- Compulsory Voting: dummy variable that assumes the value of 1 when a country has mandatory voting laws and 0 otherwise.
- Ln (Population): is the natural logarithm of the total population in a given country-year.
- Ln (GDP per Capita): it is the natural logarithm of GDP per capita of the country in the year of the elections analyzed. This value is measured in constant 2000 US dollars.

While computing these variables, different awareness levels of each of the 45 country reality was needed. For instance, variable *Age*, *Compulsory Voting* and *Parliamentary* were computed with the analysis of each country by itself, while the other considered variables implied an exhaustive search and analysis for each of the 143 elections for all countries. Not only the election by itself but also the change induced by each election, namely, *Minority Government*, *Margin of Victory*, *Number of Parties*,

Orientation, Early Election, Ln (Population) and Ln (GDP per Capita). The information about all variables and their computation is summarized in the Appendix.

Table 3 - Descriptive Statistics for OECD countries

	Mean	Standard deviation	25th Percentile	Median	75th Percentile
Parliamentary	0,9109	0,2863	1,0000	1,0000	1,0000
Minority_Government	0,0737	0,2626	0,0000	0,0000	0,0000
Margin_of_Victory	-0,0025	0,1636	-0,0945	-0,0146	0,0533
Number_of_Parties	2,3579	1,3599	1,0000	2,0000	3,0000
Orientation	0,5102	0,5025	0,0000	1,0000	1,0000
Early_Election	0,2857	0,4541	0,0000	0,0000	1,0000
Compulsory_Voting	0,2059	0,4104	0,0000	0,0000	0,0000
Age	0,5313	0,5070	0,0000	1,0000	1,0000
Ln_Population	16,3426	1,5801	15,5012	16,1703	17,5479
Ln_GDP_per_capita	10,3768	0,6397	10,0474	10,5418	10,7937

Table 4 - Descriptive Statistics for Developing countries

	Mean	Standard deviation	25th Percentile	Median	75th Percentile
Parliamentary	0,2162	0,4173	0,0000	0,0000	0,0000
Minority_Government	0,1351	0,3466	0,0000	0,0000	0,0000
Margin_of_Victory	0,0927	0,2775	-0,1194	0,0715	0,2440
Number_of_Parties	1,2432	0,8630	1,0000	1,0000	1,0000
Orientation	0,4865	0,5067	0,0000	0,0000	1,0000
Early_Election	0,1081	0,3148	0,0000	0,0000	0,0000
Compulsory_Voting	0,3846	0,5064	0,0000	0,0000	1,0000
Age	0,8462	0,3755	1,0000	1,0000	1,0000
Ln_Population	18,3142	1,1358	17,6249	18,2065	19,0127
Ln_GDP_per_capita	8,1823	0,8635	7,6821	8,2229	8,8059

The information for Compulsory Voting (dummy variable) comes from an archive of the International Institute for Democracy and Electoral Assistance (IDEA, 2015).

In the last two variables the log transformation is applied to reduce skewness in the underlying data, as usual used when analyzing these variables under linearity condition. Furthermore, these two variables were obtained from the database compiled by the World Bank (Bank, 2015). All the other political variables were obtained consulting the

European Statistics website (EuroStat, 2015), the governmental website of each country and confirmed with an exhaustive research on the internet.

As mentioned before, this work pretends to compare the impact of national elections on stock markets on OECD countries and Developing countries. For these last group of countries, and following (Macedo, Pereira, & Jalles, 2013) one can see that there are more variables that should be accounted for and might have an impact on stock markets: the three explanatory variables are Democracy, Development and Globalization. The necessary computation of each variable was made comprising the data collection taking into account each election date.

The variables are constructed as follows:

- Democracy: is the average of the two measures of the quality of democracy published by the Freedom House: Political Rights and Civil Liberties (House, 2015), where 7 stands for minimum political rights and 1 stands for maximum Political Rights. This scale is also used for Civil Liberties.
- Globalization: is given by the KOF index (*Konjunkturforschungsstelle* in German) which measures the global connectivity, integration and interdependence in the economic, social, technological, cultural, political, and ecological spheres (KOF, 2015), where 100 stands for maximum globalization and 1 stands for minimum globalization.
- Development: represents the ratio of a given country's GDP per capita over that of the United States (Bank, 2015).

Table 5 - Descriptive Statistics for the new variables included for Developing countries

	Mean	Standard deviation	25th Percentile	Median	75th Percentile
Democracy	3,4474	1,3244	2,1250	3,2500	4,5000
Globalization	59,8844	7,4714	56,3340	59,2237	63,9651
Development	0,1005	0,0697	0,0452	0,0830	0,1380

In Table 3, Table 4 and Table 5 are presented descriptive statistics for the explanatory variables analyzed for OECD countries and Developing countries, respectively. On Table 3 it is shown that parliamentary elections represent 91% of the sample and only in 7% of the cases the government is formed based on a minority of seats in the parliament. A possible explanation for the negative margin of victory in the OECD countries is that most countries incorporated majoritarian elements in their electoral systems. This means that with less than half of the votes it is possible to get a majority in the parliament. An example is Greece that attributes automatically 50 seats (out of 300) to the party or coalition that obtains more votes on the election.

As shown in Table 4, relating to Developing countries, parliamentary elections only represent around one fourth of the elections. This is the reason why the Number of Parties is approximately 1. Therefore, also may explain the margin of victory is positive because usually in Presidential elections it is needed more than 50% of the votes to elect the President.

In OECD countries, in 51% of the cases occurred a change in orientation which is almost the same as in Developing countries. However, when compared with the data from 1980 to 2004 presented in (Bialkowski, Gottschalk, & Wisniewski, 2008), in OECD countries the change in orientation increased. A possible explanation for this may be the fact that, nowadays, these countries are not facing a period of consistent

economic growth and people expect that from changing the political orientation of the government may result in a consistent economic growth.

In developing countries only 10% of the elections are called early. The variable Democracy has a mean of 3,44 which is too far from one which represents the most democratic country. Another important result is that, on average, the GDP per capita of the Developing countries is 10% of that of the US making clear the colossal economic difference between these countries and the US, see Table 5.

When analyzing the question of compulsory voting, seven of the OECD countries (20%) and five of Developing countries (38%) have mandatory voting laws but stringency and enforcement of these laws appear to be country specific.

The German stock is the oldest in the sample (1585) and half of OECD countries established its stock market before 1860. Not surprisingly, in 84% of Developing countries the stock markets were established after 1860.

Regarding population, in OECD countries the range is 311 566 in Iceland in 2007 and 313 873 685 in the USA in 2012 whereas in Developing countries the range is from 7 265 115 in Bulgaria in 2013 to 1 267 401 849 in India in 2014.

Finally, the range of GDP per capita is between 3 576\$ in Turkey in 2002 and 110 664\$ in Luxembourg in 2013 in OECD countries, while in Developing countries the range is from 483\$ in Pakistan in 2002 to 13 693\$ in Argentina in 2011. These data is included in the Appendix.

Results

The investigation starts with the volatility event study described in the methodology section. The Election Day was defined as the event day, except for instances when elections took place during the weekend or on a holiday. In these cases, day zero is defined as the first trading day after the election. There are situations, as in France and Brazil, where can happen a second round of the election and so there are two different dates for the elections. In these situations the event day was considered the day of the second round election.

Table 6 - Cumulative Abnormal Volatility around Election Day (2002-2014): OECD vs Developing countries

OECD COUNTRIES				DEVELOPING COUNTRIES		
Symmetric event window						
Window	CAV (n ₁ ,n ₂)	Implied percentage change	P value	CAV (n ₁ ,n ₂)	Implied percentage change	P value
(-2,2)	1,4598	29,2000	0,0000	5,7495	114,9900	0,0000
(-5,5)	1,7844	16,2200	0,0000	16,2785	147,9900	0,0000
(-10,10)	3,1822	15,1500	0,0000	19,1126	91,0100	0,0000
(-25,25)	109,7048	215,1100	0,0000	22,1369	43,4100	0,0000
Asymmetric event window						
Window	CAV (n ₁ ,n ₂)	Implied percentage change	P value	CAV (n ₁ ,n ₂)	Implied percentage change	P value
(0,2)	1,5280	50,9300	0,0000	4,9428	164,7600	0,0000
(0,5)	1,8821	31,3700	0,0000	10,9438	182,4000	0,0000
(0,10)	2,2565	20,5100	0,0000	13,4688	122,4400	0,0000
(0,25)	120,8219	464,7000	0,0000	13,8723	53,3500	0,0000

It can be seen that in Developing countries, for example, CAV (-25,25) reaches a value of 22,14. It is possible to realize that the ratio of CAV to the total number of days included in the event window is, by construction, equal to the percentage increase of the volatility relative to its benchmark. This means that in 51 days surrounding the

elections, the country-specific component of variance was 43,41% higher than it would have been, had the elections not occurred.

Narrowing the event window tend to larger implied percentage changes, confirming that most of the large stock market moves are concentrated around the Election Day. An important note to consider is that around national elections the country specific return volatility can easily double in the week of elections in Developing countries while in OECD countries it does not happen with the same magnitude.

Is of interest to test if the differences reported in Table 6 are statistically significant, i.e.,

$$H_0: \frac{CAV_{Developing}}{CAV_{OECD}} = 1.$$

In Table 7 the results for the hypothesis testing are displayed, under the assumption of the normal distribution of the test statistics.

Table 7 – Test for CAV differences between Developing and OECD countries

Window	OECD		Developing		<i>F_t</i>	<i>p-value</i>
	CAV(n1,n2)	Variance	CAV(n1,n2)	Variance		
(-2,2)	1,4598	0,3150	5,7495	2,1847	6,9356	0,0000
(-5,5)	1,7844	0,2130	16,2785	3,3838	15,8864	0,0000
(-10,10)	3,1822	0,1001	19,1126	1,4900	14,8851	0,0000

From Table 7 it's possible to see that there are statistically significant differences between CAV in Developing and OECD countries in all the windows considered, allowing us to establish that CAV is higher in Developing countries when comparing with OECD countries. The windows considered do not comprise the window

(-25,25), since as seen in Table 6, the CAV values obtained specially in OECD countries are abnormal.²

Comparing results obtained from 2002-2014 with the results obtained from 1982-2004

Table 8 - Cumulative abnormal volatility around Election Day on OECD countries: 1982-2004 vs 2002-2014

OECD COUNTRIES 1982-2004				OECD COUNTRIES 2002-2014		
Symmetric event window						
Window	CAV (n ₁ ,n ₂)	Implied percentage change	P value	CAV (n ₁ ,n ₂)	Implied percentage change	P value
(-2,2)	5,3675	107,3500	0,0000	1,4598	29,2000	0,0000
(-5,5)	6,8504	62,2764	0,0000	1,7844	16,2200	0,0000
(-10,10)	7,9387	37,8033	0,0000	3,1822	15,1500	0,0000
(-25,25)	11,9437	23,4190	0,0000	109,7048	215,1100	0,0000
Asymmetric event window						
Window	CAV (n ₁ ,n ₂)	Implied percentage change	P value	CAV (n ₁ ,n ₂)	Implied percentage change	P value
(0,2)	5,3655	268,2750	0,0000	1,5280	50,9300	0,0000
(0,5)	6,6115	132,2300	0,0000	1,8821	31,3700	0,0000
(0,10)	7,2652	72,6520	0,0000	2,2565	20,5100	0,0000
(0,25)	8,6725	34,6900	0,0000	120,8219	464,7000	0,0000

As seen in Table 8, the results of CAV, implied percentage change obtained between 1982-2004 and 2002-2014 there are some notorious differences. In the period analyzed in this work (2002-2014), there is still an impact on specific country variance which is given by the p-value, i. e., independently of the window considered, close to

² These unexpected values are possibly due to the fact that the benchmark made while computing CAV(-25,25) do not consider the high volatility recorded in the elections around 2008, during the epicentre of the financial market crisis, therefore producing *abnormal* differences making the hypothesis test not coherent with the other considered windows. For some countries the elections around 2008 were deleted to test the computation of CAV(-25,25) producing values that are comparable. For instance, in Austria the computed CAV(-25,25)=223,3593 against CAV(-25,25)=1,4564 when deleting the 2008 election. But the generalization of this methodology for all countries would reduce largely the sample and consequently other problems would arise. The option followed in this project consisted in maintain the observed values and discard comparisons for the two sets of countries for the window (-25,25).

zero. Since the database of the period 1982-2004 was not available, it was not possible to test the significance of the apparent reported differences.

However, it is important to underline that CAV diminished significantly from one period to another and the implied percentage change diminished as well. This can be interpreted as the OECD countries have matured their democracies. Basically, over the years, the investors started to predict much better the impact of the elections on monetary and fiscal policy. The investors have the impression that the countries will not change significantly their monetary and fiscal policy no matters who the Head of the government is.

Another possible explanation may be that a big part of OECD countries belong to the Eurozone and because of that the monetary policy does not change from country to country independently from the elections results.

Determinants of the volatility around Election Day

In order to find further information that links the magnitude of elections shocks to several explanatory variables a regression analysis was implemented. The dependent variable was defined as the natural logarithm of the volatility ratio following the methodology adopted in prior literature (Clayton, Hartzel, & Rosenberg, 2005). This is the ratio of the return variance computed over the (-25,25) event window by the variance of the returns in a pre-event of equal length (-76,-26).

As part of the data analysis, the existence of outliers was considered, since they produce high variability in the analysis, the estimation is affected and the explanation is reduced. As usual in this type of analysis, the factor considered for identifying an outlier were the observations above 3 standard deviation. There are in the Appendix several

outputs where initial estimation of the model is made, along with some tests to establish that the analysis can be made.

Table 9 - ANOVA for OECD countries after treatment

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Regression	13,675	3	4,558	7,070	0,000
Residual	58,030	90	0,645		
Total	71,705	93			

Table 10 - Coefficients for OECD countries after treatment

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
	B	Std. Error	Beta		
(Constant)	5,332	1,365		3,907	0,000
Orientation	0,396	0,168	0,227	2,358	0,021
Early	-0,401	0,189	-0,203	-2,126	0,036
LN_GDP	-0,399	0,130	-0,293	-3,062	0,003

Considering OECD countries, the regression analysis, as seen in Table 9 and Table 10, shows a statistical significant relation between the dependent variable and a set of explanatory variables. The F^3 test has allowed us to show statistical evidence that an estimation of a model is possible with a near zero *p-value*. When analyzing the *t* test at a 5% significance level, 3 explanatory variables were identified.

As can be seen in the Table 10, in OECD countries the investors tend to react in a more volatile manner when there is a change in political orientation as the investors may anticipate new directions and redistribution policies. The results obtained also tell that the larger the GDP per capita of a country, the less volatile the market is around National Elections.

³ The *F* test, conjointly tests if there is at least one non null coefficient and therefore at least one statistically significant variable that will explain the dependent variable.

In the previous literature (Bialkowski, Gottschalk, & Wisniewski, 2008) it was found that the elections called early had a positive impact on stock market volatility. However, in this sample the result obtained contradicts this result. Finding a reason for this contradiction is a tough task since it is not intuitive that early elections reduce the volatility. Probably this happened because of specificities of the sample studied.

The model for OECD countries is expressed by the following equation, with $\bar{R}^2 = 0,164$:

$$\widehat{Dependent} = 5,332 + 0,396 \times Orientation - 0,401 \times Early - 0,399 \times LN_GDP$$

Reasoning as before, we have made the analysis for Developing countries and as shown in table Table 11 and Table 12. Here again, 3 statistically significant explanatory variables were identified. For this analysis the 3 variables discussed before (Democracy, Globalization and Development) were also included. At this point we make note that the significance of the coefficients estimation is made at a 6,8% significance level, allowing the variable Age to be included in the model, increasing its quality.

Table 11 - ANOVA for Developing countries after treatment

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Regression	4,408	3,000	1,469	3,386	0,030 ^b
Residual	13,887	32,000	0,434		
Total	18,295	35,000			

Table 12 - Coefficients for Developing countries after treatment

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
	B	Std. Error	Beta		
(Constant)	0,617	0,395		1,560	0,129
n_Parties	0,294	0,130	0,356	2,269	0,030
Age	-0,576	0,306	-0,301	-1,887	0,068
Democracy	0,195	0,088	0,353	2,215	0,034

In this case, the number of parties involved in the coalition after the elections seems to contribute positively for the election shocks. This can happen due to the perception of the investors that implementing new policies is a hard task when there are so many parties in the coalition. It is also clear that the stability of a government tends to be fragile as more parties the government has.

The variable Democracy is measured here as being the average of two indicators published by The Freedom House: Political rights and Civil Liberties (House, 2015). As could be expectable, the level of democracy was found as being a variable that is statistically significant to explain the volatility around the Elections in Developing countries. Basically, as the coefficient is positive, the lower the democracy level of a country, in a more volatile manner the markets react.

It is important to note that Political Rights and Civil Liberties published by Freedom House are two indicators that are being used for “Sustainable Governance Indicators” and were already launched in 2015. This note reinforces the importance and credibility of this variable as enriching this project, see (SGI, 2015).

The variable Age appears to be another explanatory variable with significance to be considered. In this case, it is not easy to find an explanation for the coefficient obtained as it indicates that in “younger” stock markets is expected lower volatility. Again, this can be due to some specificities from the sample used.

The model obtained for Developing countries is expressed in the following equation, with $\bar{R}^2 = 0,170$:

$$\widehat{Dependent} = 0,617 + 0,195 \times Democracy + 0,294 \times n_Parties - 0,576 \times Age$$

It can be argued that since all the stock markets are denominated in US dollars, the verified volatility can also be due to the movements of foreign exchange markets. In the paper of (Bialkowski, Gottschalk, & Wisniewski, 2008) it was verified that stock market volatility is substantially larger than foreign exchange markets even in periods of closely contested elections which indicates that the contention that the results stem from fluctuation values of domestic currencies appears to be unsubstantiated.

Conclusions

This study contributes to the analysis of the relationship between finance and politics by focusing on stock market volatility around national elections.

In this study it is quantified the cumulative abnormal volatility obtained in the days that surround elections in OECD countries and in Developing countries between 2002 and 2014. This work extends prior results as seen in the literature that just focused on OECD countries and allows comparing the results with Developing countries.

The first finding that comes from this work is that there is a significant impact in OECD countries around the national Election Day. The magnitude of this impact was reduced when compared with the previous results for OECD countries (1982-2004) volatility but despite lower, the impact is still significant.

In Developing countries, it was found that the investors that operate in these markets react in a way that the country-specific component of volatility can easily double so that there is a big fluctuation on stock markets of these countries.

Another important result that arises from this project is that the shock caused by the elections in the stock market volatility seems to be larger in Developing countries when compared to OECD countries.

The set of explanatory variables used in this work tried to capture economic, political, institutional and social factors. In OECD countries, three variables – *Orientation*, *Early Election* and *Ln GDP* - proved to influence the magnitude of induced-election volatility in a significant way. Stock market investors tend to react in a

more volatile way when the outcome of the election reveals a change in political orientation.

The results shown in this project reinforce prior literature, as seen in (Bialkowski, Gottschalk, & Wisniewski, 2008), where it was found that a change in political orientation is a significant variable that explain the results on the volatility. However, in the update introduced in this project, the formation of minority government has no longer statistical significance. This can be due to the fact, nowadays, the politicians are more capable of finding solutions even in minority governments implying that investors do not see the minority government as a reason to react in a more volatile manner in the stock market.

Another finding in OECD countries was that smaller the GDP per capita bigger the impact on stock market volatility.

Regarding Developing countries, the investors see the number of parties of the coalition as a reason to react. Basically, the investors expect more political problems with the number of parties in the coalition.

The level of democracy, as defined in this work, is another factor that influences the investor behavior meaning that they react in a more volatile way when a country is considered less democratic.

Future Improvements

From the study developed, some questions arose and might lead to other studies in the future.

For these future works, in order to consolidate the results obtained, the database should be increased mainly in Developing countries. This improvement will result in more robust results. It could be also interesting to compare and understand the differences between the values of the Cumulative Abnormal Volatility before the elections and after the elections $[(-25,0) \text{ vs } (0,25)]$.

The problem detected with abnormal values for CAV in the window $(-25,25)$ was reported in this study for OECD countries, concerning elections around 2008. It might be of interest to investigate the reason why such abnormal CAV values were not reported for Developing countries.

Another possible extension in this work may be to understand the opposite causality: if volatility in the stock markets do influence the election results.

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Appendix

Table 13 – Election dates in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	09/10/2004	24/11/2007	21/08/2010	07/09/2013
Austria	01/10/2006	28/09/2008	29/09/2013	
Belgium	10/06/2007	13/06/2010	25/05/2014	
Canada	23/01/2006	14/10/2008	02/05/2011	
Chile	11/12/2005	13/12/2009	15/12/2013	
Czech Republic	03/06/2006	29/05/2010	26/10/2013	
Denmark	08/02/2005	13/11/2007	15/09/2011	
Estonia	04/03/2007	06/03/2011		
Finland	16/03/2003	18/03/2007	17/04/2011	
France	05/05/2002	06/05/2007	06/05/2012	
Germany	18/09/2005	27/09/2009	22/09/2013	
Greece	07/03/2004	16/09/2007	04/10/2009	17/06/2012
Hungary	23/04/2006	25/04/2010	06/04/2014	
Iceland	12/05/2007	25/04/2009	26/04/2013	
Ireland	17/05/2002	24/05/2007	25/02/2011	
Israel	28/01/2003	29/03/2006	10/02/2009	22/01/2013
Italy	10/04/2006	14/04/2008	25/02/2013	
Japan	11/09/2005	30/08/2009	16/12/2012	
Korea	19/12/2002	19/12/2007	19/12/2012	
Luxembourg	13/06/2004	07/06/2009	20/10/2013	
Mexico	01/07/2006	30/06/2012		
Netherlands	22/11/2006	09/06/2010	12/09/2012	
New Zealand	17/09/2005	08/11/2008	26/11/2011	20/09/2014
Norway	12/09/2005	14/09/2009	09/09/2013	
Poland	25/09/2005	21/10/2007	09/10/2011	
Portugal	20/02/2005	27/09/2009	05/06/2011	
Slovak Republic	21/09/2002	17/06/2006	12/06/2010	10/03/2012
Slovenia	03/10/2004	21/09/2008	04/12/2011	13/07/2014
Spain	14/03/2004	09/03/2008	20/11/2011	
Sweden	17/09/2006	19/09/2010	14/09/2014	
Switzerland	19/10/2003	25/11/2007	23/10/2011	
Turkey	03/11/2002	22/07/2007	12/06/2011	
United Kingdom	05/05/2005	06/05/2010		
United States	02/11/2004	04/11/2008	06/11/2012	

Table 14 – Election dates in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	27/04/2003	28/10/2007	23/10/2011	
Brazil	27/10/2002	29/10/2006	31/10/2010	
Bulgaria	04/07/2009	11/05/2013		
Colombia	26/05/2002	28/05/2006	30/05/2010	25/05/2014
Egypt	07/09/2005	17/06/2012	28/05/2014	
India	10/05/2004	13/05/2009	12/05/2014	
Indonesia	20/09/2004	08/07/2009	09/07/2014	
Malaysia	21/03/2004	08/03/2008	05/05/2013	
Pakistan	10/10/2002	18/02/2008	11/05/2013	
Philippines	10/05/2004	10/05/2010		
Russia	07/12/2003	02/12/2007	04/12/2011	
South Africa	14/04/2004	22/04/2009	07/05/2014	
Thailand	23/12/2007	03/07/2011	02/02/2014	

Table 15 – Minority Government in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	0	0	0	0
Austria	0	0	0	
Belgium	0	0	0	
Canada	1	1	0	
Chile	0	1	0	
Czech Republic	0	0	0	
Denmark	0	0	0	
Estonia	0	0		
Finland	0	0	0	
France	0	0	0	
Germany	0	0	0	
Greece	0	0	0	0
Hungary	0	0	0	
Iceland	0	0	0	
Ireland	0	0	0	
Israel	0	0	0	0
Italy	0	0	0	
Japan	0	0	0	
Korea				
Luxembourg	0	0	0	
Mexico	0	0		
Netherlands	0	0	0	
New Zealand	0	0	0	0
Norway	0	0	0	
Poland	0	0	0	
Portugal	0	1	0	
Slovak Republic				
Slovenia	0	0	0	0
Spain	1	1	0	
Sweden	0	0	1	
Switzerland				
Turkey	0	0	0	
United Kingdom	0	0		
United States	0	0	0	

Note: 0 – Majority Government; 1 – Minority Government

Table 16 – Minority Government in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	0	0	0	
Brazil	0	0	0	
Bulgaria	1	0		
Colombia	0	0	0	0
Egypt	0	0	0	
India	1	1	1	
Indonesia	0	0	0	
Malaysia	0	0	0	
Pakistan	0	0	0	
Philippines	0	0		
Russia	1	0	0	
South Africa	0	0	0	
Thailand	0	0		

Note: 0 – Majority Government; 1 – Minority Government

Table 17 – Margin of Victory in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	-0,0660	-0,1324	-0,1898	-0,0990
Austria	0,3934	0,1048	0,0162	
Belgium	-0,0216	0,1446	0,0258	
Canada	-0,2746	-0,2470	-0,2076	
Chile	0,0352	-0,1360	-0,0452	
Czech Republic	-0,0220	-0,0440	-0,1698	
Denmark	0,0520	0,1120	0,0040	
Estonia	0,1260	0,3240		
Finland	0,0760	0,1700	0,2500	
France	0,6440	0,0620	0,0320	
Germany	0,3884	-0,0328	0,3454	
Greece	-0,1020	-0,1634	-0,1216	-0,0362
Hungary	-0,0300	0,0546	-0,1092	
Iceland	0,2680	0,0294	0,0226	
Ireland	-0,0900	-0,0204	0,1120	
Israel	0,3170	0,0506	0,1798	0,0365
Italy	-0,0038	-0,0640	-0,4100	
Japan	-0,0446	-0,0514	-0,1378	
Korea				
Luxembourg	0,1896	0,1920	-0,0268	
Mexico	-0,2822	-0,2162		
Netherlands	0,0350	-0,0090	0,0284	
New Zealand	-0,1014	0,0368	-0,0518	-0,0146
Norway	-0,0400	-0,0440	0,0780	
Poland	-0,0720	0,0080	-0,0492	
Portugal	-0,1000	-0,2680	0,0082	
Slovak Republic				
Slovenia	-0,0194	0,0496	0,0648	0,0130
Spain	-0,1482	-0,1220	-0,0900	
Sweden	-0,0352	-0,0144	-0,2420	
Switzerland				
Turkey	-0,3144	-0,0684	-0,0034	
United Kingdom	-0,1960	0,1820		
United States	0,0240	0,0580	0,0220	

Table 18 – Margin of Victory in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina		-0,0930	0,0820	
Brazil	0,2260	0,2166	0,1210	
Bulgaria	-0,2060	-0,2416		
Colombia	0,0800	0,2470	0,3820	0,0190
Egypt	0,7720	0,0356	0,9382	
India	-0,2920	-0,2556	-0,2200	
Indonesia	0,2124	0,2160	0,0630	
Malaysia	0,2780	0,0278	-0,0524	
Pakistan	0,0944	0,0100	-0,2114	
Philippines	-0,2002	-0,1984		
Russia	-0,2486	0,2860	-0,0140	
South Africa	0,3938	0,3180	0,2430	
Thailand	0,3413	-0,0318		

Table 19 – Number of Parties in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	3	1	1	4
Austria	2	2	2	
Belgium	5	6	4	
Canada	1	1	1	
Chile	1	3	1	
Czech Republic	3	3	3	
Denmark	3	4	4	
Estonia	3	3		
Finland	3	4	6	
France	1	1	1	
Germany	2	2	2	
Greece	1	1	1	2
Hungary	2	1	1	
Iceland	2	2	2	
Ireland	2	3	2	
Israel	5	4	6	4
Italy	1	1	1	
Japan	1	1	1	
Korea				
Luxembourg	2	2	3	
Mexico	1	1		
Netherlands	2	3	2	
New Zealand	3	4	4	4
Norway	3	3	4	
Poland	3	2	2	
Portugal	1	2	2	
Slovak Republic				
Slovenia	4	4	5	3
Spain	1	1	1	
Sweden	4	4	2	
Switzerland				
Turkey	1	1	1	
United Kingdom	1	2		
United States	1	1	1	

Table 20 – Number of Parties in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	1	1	1	
Brazil	1	1	1	
Bulgaria	1	2		
Colombia	1	1	1	1
Egypt	1	1	1	
India	1	1	1	
Indonesia	1	1	1	
Malaysia	1	1	1	
Pakistan	2	2	2	
Philippines	1	1		
Russia	1	1	1	
South Africa	1	1	1	
Thailand	6	1		

Table 21 – Change in Orientation in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	0	1	0	1
Austria	1	0	0	
Belgium	1	1	0	
Canada	1	0	0	
Chile	0	1	1	
Czech Republic	1	1	0	
Denmark	0	0	0	
Estonia	1	0		
Finland	1	0	1	
France	0	1	1	
Germany	1	0	0	
Greece	1	0	1	0
Hungary	0	1	0	
Iceland	0	1	1	
Ireland	0	0	1	
Israel	0	1	1	0
Italy	1	1	1	
Japan	0	1	1	
Korea				
Luxembourg	0	0	1	
Mexico	0	1		
Netherlands	0	1	0	
New Zealand	0	1	0	0
Norway	0	0	1	
Poland	1	1	0	
Portugal	1	0	1	
Slovak Republic				
Slovenia	1	1	1	1
Spain	1	0	1	
Sweden	1	0	1	
Switzerland	1	0	0	
Turkey	1	0	0	
United Kingdom	0	1		
United States	0	1	0	

Note: 0 – No change in orientation; 1 – Change in orientation

Table 22 – Change in Orientation in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	1	0	0	
Brazil	1	0	0	
Bulgaria	1	1		
Colombia	1	0	1	0
Egypt	0	1	1	
India	1	0	1	
Indonesia	1	0	1	
Malaysia	0	0	0	
Pakistan	1	1	1	
Philippines	1	1		
Russia	1	0	0	
South Africa	0	0	0	
Thailand	0	0		

Note: 0 – No change in orientation; 1 – Change in orientation

Table 23 – Early Election in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	0	0	0	0
Austria	0	1	0	
Belgium	0	1	0	
Canada	1	1	1	
Chile	0	0	0	
Czech Republic	0	0	1	
Denmark	0	1	0	
Estonia	0	0		
Finland	0	0	0	
France	0	0	0	
Germany	0	0	0	
Greece	0	1	1	1
Hungary	0	0	0	
Iceland	0	1	0	
Ireland	0	1	0	
Israel	1	1	1	1
Italy	0	1	0	
Japan	1	0	1	
Korea				
Luxembourg	0	0	1	
Mexico	0	0		
Netherlands	1	0	1	
New Zealand	0	0	0	0
Norway	0	0	0	
Poland	0	1	0	
Portugal	1	0	1	
Slovak Republic				
Slovenia	0	0	1	1
Spain	0	0	1	
Sweden	0	0	0	
Switzerland	0	0	0	
Turkey	0	0	0	
United Kingdom	0	0		
United States	0	0	0	

Note: 0 – No early election; 1 – Early election

Table 24 – Early Election in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	0	0	0	
Brazil	0	0	0	
Bulgaria	0	1		
Colombia	0	0	0	0
Egypt	0	0	1	
India	0	0	0	
Indonesia	0	0	0	
Malaysia	0	0	1	
Pakistan	0	0	0	
Philippines	0	0		
Russia	0	0	0	
South Africa	0	0	0	
Thailand	1	0		

Note: 0 – No early election; 1 – Early election

Table 25 – Age in OECD countries

Country	Age
Australia	1
Austria	0
Belgium	0
Canada	1
Chile	1
Czech Republic	1
Denmark	0
Estonia	1
Finland	1
France	0
Germany	0
Greece	1
Hungary	1
Iceland	1
Ireland	0
Israel	1
Italy	0
Japan	1
Korea	
Luxembourg	1
Mexico	1
Netherlands	0
New Zealand	1
Norway	0
Poland	0
Portugal	0
Slovak Republic	
Slovenia	1
Spain	0
Sweden	1
Switzerland	0
Turkey	1
United Kingdom	0
United States	0

Note: 0 – Markets before 1860; 1 – Markets after 1860

Table 26 – Compulsory in OECD countries

Country	Compulsory
Australia	1
Austria	0
Belgium	1
Canada	0
Chile	1
Czech Republic	0
Denmark	0
Estonia	0
Finland	0
France	0
Germany	0
Greece	1
Hungary	0
Iceland	0
Ireland	0
Israel	0
Italy	0
Japan	0
Korea	0
Luxembourg	1
Mexico	1
Netherlands	0
New Zealand	0
Norway	0
Poland	0
Portugal	0
Slovak Republic	0
Slovenia	0
Spain	0
Sweden	0
Switzerland	0
Turkey	1
United Kingdom	0
United States	0

Note: 0 – No compulsory; 1 – Compulsory

Table 27 – Age in Developing countries

Country	Age
Argentina	0
Brazil	1
Bulgaria	1
Colombia	1
Egypt	1
India	0
Indonesia	1
Malaysia	1
Pakistan	1
Philippines	1
Russia	1
South Africa	1
Thailand	1

Note: 0 – Markets before 1860; 1 – Markets after 1860

Table 28 – Compulsory in Developing countries

Country	Compulsory
Argentina	1
Brazil	1
Bulgaria	0
Colombia	0
Egypt	1
India	0
Indonesia	0
Malaysia	1
Pakistan	0
Philippines	0
Russia	0
South Africa	0
Thailand	1

Note: 0 – No compulsory; 1 – Compulsory

Table 29 – Population in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	20 127 400	20 827 600	22 031 800	22 031 800
Austria	8 268 641	8 321 496	8 479 823	
Belgium	10 332 785	10 920 272	11 204 000	
Canada	32 570 505	33 245 773	34 342 780	
Chile	16 337 749	16 991 729	17 619 708	
Czech Republic	10 238 905	10 474 410	10 514 272	
Denmark	5 419 432	5 461 438	5 570 572	
Estonia	1 340 680	1 327 439		
Finland	5 213 014	5 288 720	5 388 272	
France	61 803 229	64 012 572	65 649 570	
Germany	82 469 422	81 902 307	80 651 873	
Greece	11 055 729	11 163 002	11 187 085	11 092 771
Hungary	10 071 370	10 000 023	9 877 000	
Iceland	311 566	318 499	323 764	
Ireland	3 931 947	4 398 942	4 576 794	
Israel	6 689 700	7 053 700	7 485 600	8 059 500
Italy	58 143 979	58 826 731	60 233 948	
Japan	127 773 000	128 047 000	127 561 489	
Korea				
Luxembourg	458 095	497 783	54 336	
Mexico	112 116 694	120 847 477		
Netherlands	16 346 101	16 615 394	16 754 962	
New Zealand	4 133 900	4 259 800	4 384 000	4 500 000
Norway	4 623 291	4 828 726	5 080 166	
Poland	38 165 445	38 165 445	38 534 157	
Portugal	10 503 330	10 568 247	10 557 560	
Slovak Republic				
Slovenia	1 997 012	2 021 316	2 052 843	2 061 000
Spain	42 921 895	45 954 106	46 742 697	
Sweden	9 080 505	9 378 126	9 747 000	
Switzerland	7 339 001	7 551 117	7 912 398	
Turkey	65 022 300	69 496 513	73 058 638	
United Kingdom	60 401 206	62 766 365		
United States	292 805 298	304 093 966	313 873 685	

Table 30 – Population in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	37 970 411	39 331 357	40 728 738	
Brazil	179 393 768	188 134 315	195 210 154	202 033 670
Bulgaria	7 444 443	7 265 115		
Colombia	41 216 304	43 841 370	46 444 798	49 140 523
Egypt	71 777 678	80 721 874	83 386 739	
India	1 110 626 108	1 190 138 069	1 267 401 849	
Indonesia	221 293 797	237 486 894	252 812 245	
Malaysia	25 365 089	27 302 348	29 716 965	
Pakistan	149 693 684	167 008 083	182 142 594	
Philippines	84 231 329	93 444 322		
Russia	144 667 468	142 114 903	142 956 460	
South Africa	46 727 694	50 055 701	54 000 000	
Thailand	66 076 927	66 576 332	67 222 972	

Table 31 – GDP per capita in OECD countries

Country	Election			
	First	Second	Third	Fourth
Australia	30 450	40 977	51 801	67 463
Austria	40 429	51 388	50 511	
Belgium	25 007	44 358	47 722	
Canada	40 245	46 399	51 791	
Chile	7 615	10 142	15 732	
Czech Republic	15 159	19 764	19 858	
Denmark	48 817	58 501	61 304	
Estonia	16 580	17 179		
Finland	32 816	48 286	50 791	
France	24 276	41 601	40 925	
Germany	34 650	41 669	46 251	
Greece	21 677	28 547	29 484	22 594
Hungary	11 343	12 959	13 881	
Iceland	68 835	40 263	47 350	
Ireland	32 354	61 216	51 952	
Israel	27 399	21 582	27 583	36 051
Italy	33 425	40 661	35 686	
Japan	35 781	39 323	46 679	
Korea				
Luxembourg	74 677	100 729	110 665	
Mexico	8 623	9 818		
Netherlands	44 009	50 338	49 128	
New Zealand	27 526	30 626	37 373	41 824
Norway	65 767	78 457	100 898	
Poland	7 976	11 252	13 608	
Portugal	18 785	23 063	23 196	
Slovak Republic				
Slovenia	17 261	27 502	24 965	24 019
Spain	24 920	35 580	31 975	
Sweden	46 256	52 076	58 491	
Switzerland	47 961	63 225	87 998	
Turkey	3 576	9 312	10 605	
United Kingdom	39 935	38 363		
United States	41 922	48 402	51 496	

Table 32 – GDP per capita in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	3 413	8 384	13 694	
Brazil	2 811	5 788	10 978	
Bulgaria	6 738	7 499		
Colombia	2 376	3 713	6 180	8 076
Egypt	1 250	3 256	3 304	
India	650	1 147	1 627	
Indonesia	1 161	2 272	3 534	
Malaysia	4 918	8 460	10 538	
Pakistan	483	1 018	1 275	
Philippines	1 085	2 136		
Russia	2 975	9 146	13 324	
South Africa	4 892	5 912	6 483	
Thailand	3 738	5 192	5 445	

Table 33 – Democracy in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	2	2	2	
Brazil	2,5	2	2	
Bulgaria	2	2		
Colombia	4	3	3,5	3,5
Egypt	5,5	5	5,5	
India	2,5	2,5	2,5	
Indonesia	3,5	2,5	3	
Malaysia	4	4	4	
Pakistan	5,5	4,5	4,5	
Philippines	2,5	3		
Russia	5	5,5	5,5	
South Africa	1,5	2	2	
Thailand	5	4	5,5	

Table 34 – KOF index in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	61,6252	60,2651	57,9894	
Brazil	59,2237	59,4656	59,6279	
Bulgaria	71,6922			
Colombia	52,7606	57,2914	52,6748	
Egypt	57,6596	56,3340		
India	46,4718	49,9481		
Indonesia	53,8357	56,6765		
Malaysia	76,7537	77,3998		
Pakistan	50,2537	50,7406		
Philippines	58,4987	56,6652		
Russia	66,0889	67,2614	65,2807	
South Africa	61,7829	63,9651		
Thailand	62,8044	65,6127		

Table 35 – Development in Developing countries

Country	Election			
	First	Second	Third	Fourth
Argentina	0,0860	0,1744	0,2749	
Brazil	0,0736	0,1246	0,2269	
Bulgaria	0,1434	0,1414		
Colombia	0,0623	0,0799	0,1277	0,1479
Egypt	0,0282	0,0632	0,0605	
India	0,0155	0,0244	0,0298	
Indonesia	0,0277	0,0483	0,0647	
Malaysia	0,1173	0,1748	0,1987	
Pakistan	0,0127	0,0210	0,0240	
Philippines	0,0259	0,0441		
Russia	0,0750	0,1903	0,2675	
South Africa	0,1167	0,1258	0,1187	
Thailand	0,0778	0,1043	0,0997	

Table 36 - Correlation matrix for OECD countries

	Dependent	M_Victory	n_Parties	Orientation	Early	Age	Compuls	LN_Pop	LN_GDP	Minority	Parliamentary
Dependent	1,000	-,083	-,130	,235	-,204	,019	,001	,154	-,318	,037	-,145
M_Victory	-,083	1,000	,321	-,065	-,057	-,136	-,224	-,236	,229	-,321	-,082
n_Parties	-,130	,321	1,000	,041	,115	,136	-,122	-,467	,214	-,140	,315
Orientation	,235	-,065	,041	1,000	,089	,049	-,031	,017	-,104	,074	,017
Early	-,204	-,057	,115	,089	1,000	,049	-,060	-,132	,063	-,064	,191
Age	,019	-,136	,136	,049	,049	1,000	,345	-,361	-,247	-,032	,194
Compuls	,001	-,224	-,122	-,031	-,060	,345	1,000	,000	-,227	-,047	-,006
LN_Pop	,154	-,236	-,467	,017	-,132	-,361	,000	1,000	-,287	,095	-,459
LN_GDP	-,318	,229	,214	-,104	,063	-,247	-,227	-,287	1,000	-,046	,056
Minority	,037	-,321	-,140	,074	-,064	-,032	-,047	,095	-,046	1,000	,082
Parliamentary	-,145	-,082	,315	,017	,191	,194	-,006	-,459	,056	,082	1,000

Table 37 - Correlation matrix for Developing countries

	Dependent	M_Victory	n_Parties	Orientation	Early	Age	Compuls	LN_Pop	LN_GDP	Minority	Parliamentary	Democracy	KOF	Development
Dependent	1,000	-,072	,280	,017	,120	-,184	,124	,119	-,126	,120	,084	,258	,120	-,005
M_Victory	-,072	1,000	,067	-,264	,206	,361	,367	-,153	,118	-,492	-,248	,050	-,011	,200
n_Parties	,280	,067	1,000	-,024	,511	,120	,112	-,070	-,119	-,120	,151	-,120	,113	,027
Orientation	,017	-,264	-,024	1,000	,010	,070	-,392	,144	-,550	,257	,152	,131	-,222	-,505
Early	,120	,206	,511	,010	1,000	,147	,281	-,320	,186	-,147	,232	-,046	,334	,119
Age	-,184	,361	,120	,070	,147	1,000	-,024	-,421	,127	-,533	,222	,163	,268	-,052
Compuls	,124	,367	,112	-,392	,281	-,024	1,000	-,224	,345	-,314	,004	-,086	,184	,294
LN_Pop	,119	-,153	-,070	,144	-,320	-,421	-,224	1,000	-,565	,393	-,410	,156	-,533	-,426
LN_GDP	-,126	,118	-,119	-,550	,186	,127	,345	-,565	1,000	-,288	-,043	-,244	,454	,550
Minority	,120	-,492	-,120	,257	-,147	-,533	-,314	,393	-,288	1,000	-,028	-,099	-,165	-,247
Parliamentary	,084	-,248	,151	,152	,232	,222	,004	-,410	-,043	-,028	1,000	,089	,458	,064
Democracy	,258	,050	-,120	,131	-,046	,163	-,086	,156	-,244	-,099	,089	1,000	,017	-,147
KOF	,120	-,011	,113	-,222	,334	,268	,184	-,533	,454	-,165	,458	,017	1,000	,587
Development	-,005	,200	,027	-,505	,119	-,052	,294	-,426	,550	-,247	,064	-,147	,587	1,000

Table 38 - ANOVA for OECD countries

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Regression	14,227	10	1,423	2,010	0,043 ^b
Residual	56,625	80	0,708		
Total	70,852	90			

Table 39 - Coefficients for OECD countries

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
	B	Std. Error	Beta		
(Constant)	6,200	2,580		2,403	0,019
M_Victory	-0,242	0,648	-0,045	-0,373	0,710
n_Parties	-0,023	0,078	-0,035	-0,293	0,771
Orientation	0,393	0,180	0,222	2,183	0,032
Early	-0,384	0,205	-0,194	-1,872	0,065
Age	-0,046	0,221	-0,026	-0,207	0,837
Compuls	-0,159	0,229	-0,077	-0,696	0,489
LN_Pop	-0,022	0,077	-0,040	-0,287	0,775
LN_GDP	-0,408	0,160	-0,295	-2,553	0,013
Minority	-0,059	0,383	-0,017	-0,155	0,877
Parliamentary	-0,312	0,372	-0,100	-0,837	0,405

Table 40 - ANOVA for Developing countries

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Regression	5,523	13,000	0,425	0,699	0,744
Residual	12,762	21,000	0,608		
Total	18,285	34,000			

Table 41 - Coefficients for Developing countries

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	Sig.
	B	Std. Error	Beta		
(Constant)	-1,390	5,207		-0,267	0,792
M_Victory	0,171	0,706	0,065	0,242	0,811
n_Parties	0,334	0,198	0,403	1,689	0,106
Orientation	0,102	0,383	0,070	0,266	0,793
Early	-0,332	0,588	-0,146	-0,565	0,578
Age	-0,678	0,600	-0,328	-1,129	0,272
Compuls	0,229	0,342	0,153	0,670	0,510
LN_Pop	0,013	0,191	0,022	0,071	0,944
LN_GDP	0,031	0,272	0,037	0,112	0,912
Minority	0,169	0,537	0,082	0,315	0,756
Parliamentary	-0,015	0,448	-0,008	-0,032	0,974
Democracy	0,191	0,114	0,341	1,672	0,109
KOF	0,027	0,028	0,295	0,954	0,351
Development	-1,532	3,064	-0,152	-0,500	0,622