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Income Inequality and Political Survival in Countries Around the World

Sahan Shrestha
Eastern Illinois University

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ABSTRACT

There are many factors that influence whether a political leader exits out of office or remains in power. In this thesis, we evaluate the impact of one important factor, income inequality, on the survival prospects of the leader using data for 152 countries for the period 1962 – 2015. We use a linear probability model, a logit model, and a Cox Proportional Hazard Model, all of which indicate that higher income inequality increases the probability of leader survival. To address the potential endogeneity of income inequality, I use a simultaneous equations model and the results hold. The results are also robust to controlling for a host of leader-, party-, and country-level variables, as well as the bimodal nature of income inequality. Evidence is also given for polity type, which is the degree to which a country is democratic, as an important factor in simultaneously determining income inequality and political survival.

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CHAPTER ONE

INTRODUCTION

Does an equitable economy increase the likelihood that national leaders will remain in office? The impact of the state of the economy on political survival is a question of fundamental importance, but there have been relatively few research topics addressing this issue. One measure of an equitable economy is income inequality which, usually measured by the Gini coefficient, refers to the extent to which income is distributed in an uneven manner among a population. This thesis attempts to answer the question of whether this unequal distribution has any impact on whether a leader retains her position.

By income, we mean the revenue streams from wages, salaries, interests on a savings account, dividends from shares of stock, rent, and profits from selling something for more than you paid for it. Unlike wealth statistics, income figures do not include the values of home, stock, or other possessions. However, income inequality does follow the principle of unequal distribution. It's winner-take-all, where the top 1 percent have as much loot as the bottom 50 percent – and where the richest eighty-five people have as much as the bottom three and a half billion (Global Wealth Report, 2015). This same brutal principle of unequal distribution applies outside the financial domain – anywhere that creative production is required. The majority of scientific papers are published by a very small group of scientists. Just a handful of authors sell all the books. A million and a half separately titled books sell each year in the US. However, only five hundred of these sell more than a hundred thousand copies (Fenner et al., 2010). A tiny proportion of musicians produces almost all the recorded commercial music. In 2016, the most popular artist, Drake, was streamed 6.1 billion times, followed by Rihanna (3.3 billion streams),

Twenty One Pilots (2.7 billion streams) and The Weeknd (2.6 billion streams). Moving down a hundred places from Drake, the 101st ranked group was the California band Los Tigres de Norte, which was streamed 0.5 billion times, or less than 10 percent as much as Drake.

Technology has certainly widened inequality in the music industry, but unequal distribution prevailed even in the 15th century. Just four classical composers (Bach, Beethoven, Mozart, and Tchaikovsky) wrote almost all the music played by modern orchestras. Bach, for his part, composed so prolifically that it would take decades of work merely to hand-copy his scores, yet only a small fraction of his work is commonly performed, thus demonstrating the law of unequal distribution again.

This principle is sometimes known as Price's law, after Derek J. de Solla Price, the researcher who discovered its application in science in 1963. However, the basic principle had been discovered much earlier by Vilfredo Pareto (1848 – 1923), who noticed its applicability to wealth distribution in the early twentieth century, and it appears true for every society ever studied, regardless of governmental form. It also applies to the population of cities (a very small number have almost all the people), the mass of heavenly bodies (a very small number hoard all the matter), and the frequency of words in a language (90 percent of communication occurs using just 500 words).

Given this natural tendency for unequal distribution to occur, why do we study inequality? Numerous literatures in this field have pointed out that inequality in terms of income and wealth, is a self-feeding beast. Corruption and inequality feed off each other, creating a vicious cycle between corruption, unequal distribution of power in society, and unequal distribution of income and wealth. As the Panama papers showed, it is still far

too easy for the rich and powerful to exploit the opaqueness of the global financial system to enrich themselves at the expense of the public good. Grand corruption cases, from Petrobras and Odebrecht in Brazil to Ukranian ex-president Viktor Yanukovych, show how collusion between businesses and politicians denies national economies of billions of dollars of revenues that were siphoned off to benefit the few at the expense of the many. This kind of systemic grand corruption violates human rights, prevents sustainable development and fuels social exclusion.

A society with relatively high income inequality might be an equitable society, and wouldn't be a problem, if the observed inequality were the outcome of an entirely fair process – in which some worked harder or took more economic risks with resultant greater economic gains than others However, in many countries, the operation of legal, political and regulatory institutions is undermined by the wealthy and the powerful for their own benefits (Glaeser et al., 2002). If one person is sufficiently richer than another, and courts are corruptible, then the legal system will favor the rich, not the just. Likewise, if political and regulatory institutions can be moved by wealth or influence, they will favor the established, and not the efficient.

Whether the income inequality of a country systematically affects the abilities of leaders to succeed in their positions is of considerable consequence, and of great interest to policy makers, domestic participants in the political process, outsiders who wish to encourage or discourage leadership transitions, and others. Even Kuznets in his famous paper about economic growth and income inequality followed his conclusions with the question, 'Can the political framework of the underdeveloped societies withstand the strain which further widening of income inequality is likely to generate?'

In this thesis, we hypothesize that higher income inequality leads to higher survival prospects of political leaders. We measure income inequality with the widely used Gini Index. In societies infected with crony capitalism, a widening gap between the high income and the low-income people incentivizes the rich to maintain the status quo. Political leaders, who most of the times themselves are on the upper end of the income distribution, employ rent seeking behavior through lobbying and appeal to the rich. In return, they provide benefits to their supporters, whether in the form of tax breaks, leniency in the courts, and even outright cronyism.

We might be inclined to put the blame on those political and regulatory institutions, for being fallible to corruption and not doing what they were designed for. We're also often appalled by how sly and dishonest most politicians are. However, politicians, who are also human, do respond to certain incentives, and in this, lies a potential endogeneity problem in our thesis.

In fact, the self-interested calculations and actions of rulers are the driving force behind all of politics. In 2014, Brazilian President Dilma Rousseff's party had funneled some funds to pay off politicians, buy their votes and help with political campaigns, which later led to the Petrobras scandal. Even excluding corruption cases, politicians act on their own interest. Amidst all the debate about national interest, what did President Obama worry about in formulating his Afghan Policy? If he did not announce a timetable for withdrawal from Afghanistan, he would lose support from his Democratic electoral base (Simon and Schuster, 2010). Similarly, President Kennedy was concerned that if he took no action in what became the Cuban missile crisis, he would be impeached, and the Democrats would pay a heavy price in the 1962 midterm elections (Norton, 1969).

National interest might have been on each of their minds, but their personal political welfare was front and center.

To understand why politicians do what politicians do, we need to read and remember the words of Niccolo Machiavelli, a late 15th century political advisor and political theorist who argued that we shouldn't think that politicians are immoral and simply bad for lying and dissembling and maneuvering. In his view, 'A good politician isn't one who is friendly, honest or kind. It's someone who knows how to defend, enrich and bring honor to the state."

Machiavelli in his books, the Prince and the Discourses, addressed the central problem of politics: it is almost impossible to be both a good politician and a good person in a traditional Christian sense. The overwhelming responsibility of a good prince is to defend the state from external and internal threats: to stable governance. While it will be theoretically be wonderful for a leader to be both loved and obeyed, a Prince should always aim to inspire terror, for this is what ultimately keeps people in check. Machiavelli's Christian contemporaries had suggested that leaders should be merciful, peaceful, generous, and tolerant. They thought that being a good politician was the same as being a good Christian. But Machiavelli argued that there is an incompatibility between good Christian ethics and good governance.

Girolamo Savanorola was a Dominican friar, who'd briefly come to be the ruler of Florence in 1494. He'd come to power promising to build the city of God on Earth. He preached against the excesses and tyranny of Medici government, and even managed to rule Florence as a peaceful, democratic, and relatively honest state. However, his tenure couldn't last. Because in Machiavelli's view, it was based on the weakness of being

'good' in a Christian sense. Once his regime became a threat to the corrupt Pope Alexander, he was captured and tortured, then hanged and burned before the public. This, Machiavelli argued, is what tends to happen to the nice guys in politics.

The first and foremost priority of a leader is to survive in office. Mesquita and Smith (2011) argue that "Ruling is about staying in power, not about good governance." To this end, leaders buy support by rewarding their essential backers relative to others. Through taxation, leaders have the resources to enrich their most essential supporters. Taxation, usually in autocratic settings, redistributes from those outside the coalition (the poor) to those inside the coalition (the rich). Autocratic systems demonstrate this principle, for here, people are rich solely because they are in the winning coalition, and others are poor because they are not. Philip Chiyangwa, a protégé of Robert Mugabe in Zimbabwe had stated it bluntly, "I am rich because I belong to Zanu-PF [Mugabe's ruling party]." When the coalition changes, so does who is rich and who is poor.

In addition to examining the significance of income inequality on affecting the ability of a national leader to retain his or her position, this thesis will also examine their simultaneous relationship. Leaders do seem to have an incentive to influence the economic system. Income inequality might be a part of that system, or it might even be directly influenced by the leader in power.

Using a lagged income inequality variable might help remove the problem of endogeneity since political leaders cannot influence the income inequality of the years before they were in a position of power. However, using a lagged version of a very slow moving variable such as income inequality might not make much difference at all. Furthermore,

endogeneity may persist since it may be the entire political system (or other variables for that matter) due to which political survival and income inequality may be linked.

Methods to address potential endogeneity with the full detail of the model will be presented in later sections. The next section, Section 2, will discuss the theory and existing evidence on income inequality and leadership change.

CHAPTER TWO

LITERATURE REVIEW

2.1 Income Inequality and short term political survival prospects

There may be a number of reasons why greater income inequality may decrease the probability of political survival. First, greater income inequality may make the majority of the population, who are likely to be on the lower end of the income distribution graph, unhappy with the incumbent leaders. This unhappiness may decrease public ratings of the leaders, strengthen the opposition party, or even cause a revolution.

Secondly, higher income inequality generates a highly skewed income distribution graph, with a small fraction of population at the top income earning tier, while leaving a large number of population at the bottom. In a true democracy, this majority of the population are likely to blame the incumbent leaders for this great divide, instead of capitalism itself. Naturally, the incumbent leaders may be excommunicated, or to be less dramatic, voted out of office. Olson (1963) and Huntington (1968, 1991) have argued that income inequality, caused by rapid economic growth, could strain the social fabric, potentially leading to political instability.

However, we should refrain from wishful thinking. It might not be so easy to remove a political leader. Mere unhappiness might not be enough. Greater income inequality is often a symptom of corruption. If everyone in the political sphere is corrupt, leading to or benefitting from large income inequality, the incumbent leaders' political survival may not be influenced by the public. Further, a communist country (or even a socialist one)

may not be entirely democratic. A country like North Korea, would have no facility to change their political leaders.

Or perhaps, there is no systematic relationship between income inequality and leadership change. If members of the electorate believe that national leaders have little impact on the income inequality, or if they are able to directly judge the leader's performance, their support for the leader may be unrelated to the income inequality.

However, there are more complications in formulating a model that could provide an answer. There is evidence that political factors affect the economy, (since leadership does matter) meaning that the direction of causality is unlikely to be one-way. Barro (1991), Alesina et al. (1996), Brunetti (1997), and Przeworski et al. (2000), find that political instability is harmful to the economy. Political instability may follow protests, uncertainty, and low investment, thus hurting the economic growth rate. This decrease in the economic growth rate might lower income inequality, thus potentially giving the illusion that lower income inequality leads to a decrease in the probability of political survival.

Income inequality is also shown to be correlated with economic growth. Berg et al. (2018) show that lower net inequality is robustly correlated with faster and more durable growth, after controlling for the level of redistribution. They use two econometrics approach: first, the effect on medium term growth, and second, the duration of growth spells. For the former, they find higher inequality lowers growth, and that redistribution has a tiny and statistically insignificant effect. For the latter, they find higher inequality has a statistically significant relationship with the duration of growth spells. Furthermore, inequality has shown to intensify the financial cycle that leads to crisis risk (Rajan, 2010).

In an unequal society, through the influence of the rich, political and economic factors allow financial excess to increase out of control (Stiglitz, 2010). The crisis risk will eventually lead to economic shocks, and in an unequal society, there is less social consensus required to adjust in the face of these shocks (Easterly, 2007; Berg et al, 2012).

Further still, there may be other variables that may affect both political survival and income inequality in the country. These variables could take the form of institutions, government policies, global events such as the end of the Cold War or the recession of 2008, and expectations concerning political stability. Five centuries and a half earlier, Niccolo Machiavelli (1532) observed that an autocratic ruler lasts longer in office than a democratic ruler, and advised in his famous book, the Prince, that a ruler is better off feared than loved. Indeed, the regime type of a country may also be one of those variables in influencing political survival.

In Machiavelli's view, whoever desires to establish a kingdom or principally where liberty and equality prevail, will equally fail, unless he withdraws from that general equality a number of the boldest and most ambitious spirits, and makes gentlemen of them, not merely in name but in fact, by giving them castles and possessions, as well as money and subjects; so that surrounded by these he may be able to retain his power. In this way, inequality may cause higher chances of political survival.

Echoing Machiavelli, in "The Dictator's Handbook", Mesquita and Smith (2011) state five rules that leaders should use to stay in power: (1) The smaller the winning coalition, the fewer people to satisfy to remain in control. (2) Having a large nominal selectorate gives a pool of potential people to replace dissenters in coalition. (3) Maintain control of revenue flows to redistribute to your friends. (4) But only pay friends enough that they

will not consider overthrowing you and at the same time little enough so that they depend on you. (5) Don't take your friends' money and redistribute it to the masses.

The fifth rule seems extremely pertinent to our research. Mesquita and Smith (2011) have argued that redistribution efforts by a leader might be their own undoing. Although they did not study income inequality, one can infer that high inequality might aid in political survival. In a podcast they did with EconTalk host Russ Roberts (2016), they present a fascinating yet depressing positive correlation between the reputation of an American president and the number of people dying in wars while that president is in office. They argue that the decision of how and when to go to war is made in self-interested ways rather than in consideration of what is best for the nation. In parallel ways, redistribution efforts to decrease inequality are also made in self-interested ways rather than the nation's best interest.

Even in democracies, the notion that inequality should be at least partially self-correcting has not found empirical support. Meltzer and Richard (1981) present a model where increased inequality leads the median voter to demand more redistribution. Redistribution is limited, however, because higher rates of taxation reduce the labor supply. Furthermore, in any economy, unequal turnout or unequal political power can create a situation where the pivotal voter under majority rule may have greater income than the median. When a society has large numbers of relatively poor residents without voting rights, as arises with substantial immigration, redistribution will be limited even when all those enfranchised people participate fully (McCarty, Poole, and Rosenthal, 2006).

The impact of the type of polity on inequality and political survival is clear, even though the direction of the effect is debated. Bonica et al. (2013) present possible reasons why

the US political system has during the last few decades failed to counterbalance rising inequality. One reason is that both Republican and Democratic parties have experienced an ideological shift towards acceptance of a form of a free market capitalism, which offers less support for government provision of redistribution. Another reason is that the rich have been able to use their resources to influence electoral, legislative, and regulatory process through campaign contributions, lobbying and revolving door employment of politicians and bureaucrats. This suggests a simultaneous relation between political leaders, income inequality and the type of polity itself.

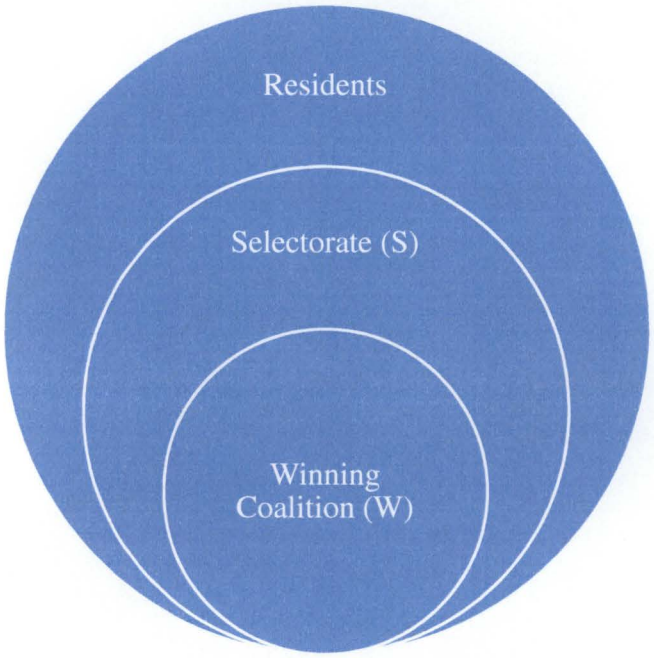
Only a modicum of research has addressed the potential endogeneity of political survival. Burke (2012) used commodity prices, export partner growth, precipitation and rainfall as instruments to address the possibility of two way causation between political survival and economic growth. As we would expect, precipitation and rainfall were shown to be weak instruments. The selectorate theory discussed below also outlines the endogeneity problem caused by simultaneity.

2.2 The Selectorate Theory

Mesquita et al. (2003) present the selectorate theory in order to analyze political survival, and one can see from their argument how income inequality and political survival are endogenous. The selectorate theory is founded upon two main terms: the selectorate and the winning coalition. The selectorate is defined as the set of people whose endowments include the qualities or characteristics institutionally required to choose the government's leadership and necessary for gaining access to private benefits given out by the government's leadership. In general, the selectorate is the set of people who can 'select' their leader.

The winning coalition is defined as a subset of the selectorate of sufficient size such that the subset's support endows the leadership with political power over the remainder of the selectorate as well as over the disenfranchise members of the society. In exchange for their support, members of the winning coalition receive a share of whatever private benefits the incumbent leader give out to her supporters.

Figure 1: Diagram illustrating the relationship between Winning Coalition and the Selectorate



In a hereditary monarchy, the lineage required for selectorate membership occurs among a definite subset of the population: the aristocracy or nobility. Anyone in that subset, by definition, is adequately endowed with the quality of lineage. The winning coalition must include approximately a simple majority of those with the necessary lineage. Therefore, in a strictly hereditary system, a majority of the relevant aristocracy's support is sufficient to ensure that an individual becomes or remains a monarch. Here, both the selectorate and

the winning coalition are small, with the ratio of the winning coalition to the selectorate being approximately one-half.

In a true democracy, the selectorate is the entire population of citizens who have the right to vote, while the winning coalition is that majority subset of the selectorate whose votes enable the leader to be elected. Here, both the selectorate and the winning coalition are large, with the ratio of the winning coalition to the selectorate also being approximately one-half.

However, a winning coalition can be considerably less than half of the selectorate in a rigged electoral system, like the systems that have operated in Iraq, Kenya, and many other places, including the Soviet Union. In the Soviet Union for instance, the selectorate consisted of as many as all adult citizens, while the winning coalition consisted of the subset of the selectorate and in addition, who possessed a defined special proficiency, including a membership in the Communist Party.

The fundamental premise in selectorate theory is that the primary goal of a leader is to remain in power. To remain in power, leaders must maintain their winning coalition. When the winning coalition is small, as in autocracies, the leader will tend to use private goods to satisfy the coalition. When the winning coalition is large, as in democracies, the leader will tend to use public goods to satisfy the coalition.

In the Soviet Union, the small winning coalition was given access to special privileges not granted to the rest of the selectorate. George Arbatov (1993) observed:

"The number of people who received various perks grew constantly under Khruschchev and Brezhnev, keeping up with the growth in sheer numbers of the party's administrative

system. People abused these privileges shamelessly, even flaunted them. They lived with an incredible extravagance and a luxury that bordered on the absurd."

Mesquita et al. (2003) have argued that leaders survive longest when they depend on a small coalition and a large selectorate, because it is easier to satisfy a small coalition. They also do least under these conditions to promote the well-being of most people living under their control. It follows from these private benefits doled out to the winning coalition that inequality is an obvious byproduct. Those people in the winning coalition who are given private benefits are a lot more well off than those not in the winning coalition. Hence, there is a simultaneous relationship between the inequality, political survival and the type of polity.

CHAPTER THREE

METHODOLOGY

3.1 The Model

Based on literature and real world events, our empirical model can be set up as follows:

$$D_{c,t} = \alpha G_{c,t-1} + x'_{c,t-j}\beta + I_c + I_t + \varepsilon_{c,t} \quad (1)$$

where the dependent variable $D_{c,t}$ is equal to 1 if there is an exit of the effective primary national leader during year *t* (excluding exits due to natural death or deposition by another state), and 0 otherwise. This dependent variable covers exits of leaders brought about by election loss, resignation, loss of cabinet support, loss of the support of the legislature, sickness, coup, popular revolt, assassination, domestic armed rebellion, and other means. $G_{c,\,t-1}$ is the Gini coefficient for income distribution in year t-1. We could use a longer lag of Gini since Gini coefficients do not show much variation in one year). $X'_{c,\,t-j}$ is a vector of time-varying control variables. I_c is a vector of country fixed effects, I_t is a vector of year fixed effects, and $\varepsilon_{c,\,t}$ is an error term, with $E(\varepsilon_{c,\,t}) = 0$.

The binary dependent variable in equation (1) will be estimated using Linear Probability Model (LPM). For this model, the relationship between dependent and independent variables is a particularly simple one, and allows the model to be fitted by simple linear regression. However, the estimated coefficients can imply probabilities outside the unit interval [0,1] which is why we also estimate the above equation using a logit model. A probit model, however might not be suited to a fixed effects treatment (Greene 2000).

The logit function or the log-odds is the logarithm of the odds $p/(1-p)$ where p is the probability that the leader will exit. This gives the odds ratio, which we later back-transform the estimated regression coefficients off of the log scale so that we can interpret the conditional effects of each variable.

Survival analysis is also a particularly suitable method for analysis, given that it is a collection of statistical procedures for data analysis for which the outcome variable of interest is time until an event occurs (Kleinbaum and Klein, 1996). This method is generally used in epidemiology and health related research, as outcome variable of interests are usually death, disease incidence, or some other individual experience. The event of interest in this thesis is the exit of the political leader, and the outcome variable of interest is time until the leader exits.

Survival analysis is very well suited to handle the analytical problem of censored data. In essence, censoring occurs when we have some information about individual survival time, but we don't know the survival time exactly. A type of censored data is when a leader does not experience an exit before the end of the dataset, i.e. the year 2016. President Barack Obama's incumbency is an example of censored data, since his exit from office was after 2016. Similar to the odds ratio given by the logit model, the cox proportional hazard model gives an estimate of the hazard rate. The hazard rate can be interpreted as the instantaneous potential per unit time for the event to occur, given that the individual has survived. It is calculated as:

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t \mid T \geq t)}{\Delta t}$$

In mathematical terms, the 'given' part of the formula for the hazard function is found in the probability statement in the numerator to the right of the limit sign. This statement is a conditional probability because it is of the form, "P of A, given B," where the P denotes probability and where the long vertical line separating A from B denotes "given." In the hazard formula, the conditional probability gives the probability that a person's survival time, T, will lie in the time interval between t and $t + \Delta t$, given that the survival time is greater than or equal to t. Because of the given sign here, the hazard function is sometimes called a conditional failure rate.

In Kleinbaum's (1996) own words, "To get an idea of what we mean by instantaneous potential, consider the concept of velocity. If, for example, you are driving in your car and you see that your speedometer is registering 60 mph, what does this reading mean? It means that if in the next hour, you continue to drive this way, with the speedometer exactly on 60, you would cover 60 miles. This reading gives the potential, at the moment you have looked at your speedometer, for how many miles you will travel in the next hour. However, because you may slow down or speed up or even stop during the next hour, the 60-mph speedometer reading does not tell you the number of miles you really will cover in the next hour. The speedometer tells you only how fast you are going at a given moment; that is, the instrument gives your instantaneous potential or velocity."

Given the Δt in the denominator, the hazard is a rate rather than a probability. Similar to the idea of velocity, a hazard function h(t) gives the instantaneous potential at time t for getting an event, in this case, exit from office, given survival up to time t. This will hopefully be elucidated after we interpret results from the Cox model in the following chapter.

We control for time-varying factors such as the growth rate per capita, as measured by the GDP growth per capita (Burke, 2012). We lag the growth per capita by one year in hopes of circumventing the endogeneity problem here. By lagging it by one year, we are assuming that the political leader in power does not influence the GDP growth rate of a year ago. The log of GDP per capita is also used to control for the level of development attained by the country. This is not considered endogenous since GDP moves relatively slowly and by the time the leaders come in power, relatively equivalent level of development would already have been achieved. Secondary school enrollment is also included as a control variable since it could be a latent but important variable determining political survival. Many autocratic regimes, including the Rana regime of Nepal (1846 to 1951 AD), had it in their interest to suppress education in hopes that the public might not awaken to their tyranny. Highly educated people are a potential threat to autocrats, and so autocrats make sure to limit educational opportunity. They want workers to have basic labor skills like literacy, but they want their own children to be well educated, and so send them off to schools in places like Switzerland, the United States and the United Kingdom. In fact, one might say that Oxford University is a breeding ground for authoritarians. It is the alma mater of many, including Zimbabwe's Robert Mugabe, the Bhutto family of Pakistan, kings of Jordan, Bhutan, Malaysia, and even little Tonga.

It is important to include urban concentration as a control variable. In "Cities and Stability", Jeremy L. Wallace (2014) provides an in-depth analysis of how cities function and how they provide a strong base for revolutions to ignite and overthrow the current regime. Historically speaking, most downfall of dictators, autocrats, and monarchs has been the effect of uprisings and revolutions in cities.

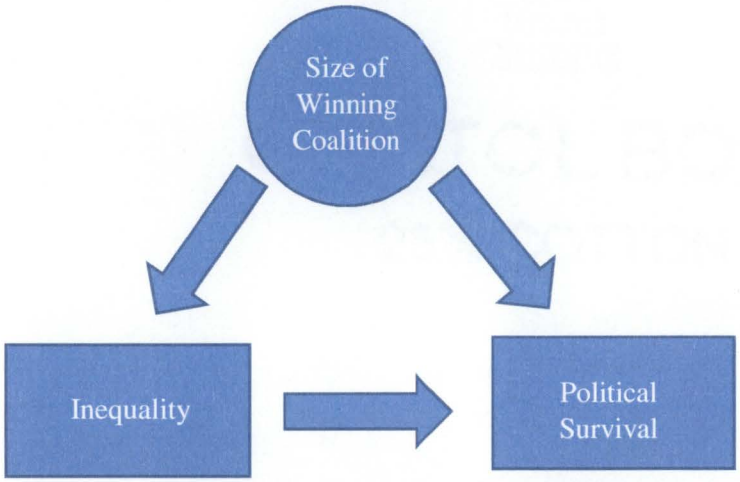
We follow Burke (2012) and we add leader specific control variables such as tenure, age and sex. Tenure is included to see how the probability of exit in the following year changes given that a leader has survived up to the current year. Burke (2012) showed that a strong ageing effect exists in that old leaders are generally voted out of office than young ones. A dummy variable for female is included to see whether male leaders or female leaders have higher probabilities for survival.

A few other dummy variables are included to control for other exogenous factors. A dummy equal to 1 for the years 1989 – 1992 (or another time period) for countries classified as transition economies by the Development Research Institute (DRI 2009) and 0 otherwise is included as a control variable since there are quicker exits during transitions (Burke, 2012). Dummies for elections that affect the effective primary national leader, a dummy for exit due to sickness, a dummy for exit due to death, and a dummy for the year of a legal term limit are also included to control for exits other than a regular exit.

3.2 Simultaneous Equations Modelling

The selectorate theory illustrates the problem of simultaneity bias. Inequality and political survival are simultaneously determined from the size of the winning coalition. The size of the winning coalition affects both inequality and the survival of political leaders. The figure below shows the relationship between the size of the winning coalition, income inequality and political survival.

Figure 2: Theoretical framework derived from the selectorate theory



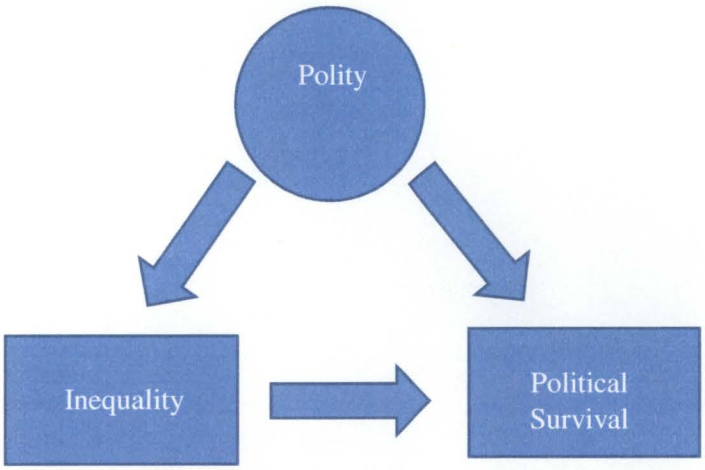
Mesquita et al. use an extremely crude method of estimating the size of the winning coalition and the selectorate. In their own words, "Their objective is to evaluate the general tendency for the predictions of the selectorate model to be a significant component of broad array of phenomena, and not to maximize the variance explained for any dependent variable." The way they estimate the sizes of the winning coalition and the selectorate is through a combination of institutional variables collected from POLITY IV and Arthur Banks' cross-national time-series data. An institutional variable called Legislative Selection (LEGSELEC) is used as an indicator of the size of the selectorate. This is a categorical variable that takes a value of 0 if there is no legislature, 1 if the legislature is chosen by heredity, and 2 if the members of the legislature are directly or indirectly selected by popular election. Similarly, the authors estimate the size of the winning coalition by using a composite of variables from the POLITY database.

We do not use the method used by Mesquita et al. for two main reasons. First, the authors have treated the coding convention (0, 1, or 2) as if it were a scale. They seem to have arbitrarily constrained the coefficient of the size of the selectorate, such that one value

would be twice the value of another. In other words, a LEGSELEC value of 2 would have double the selectorate size than a LEGSELEC value of 1. Secondly, the size of the winning coalition is almost perfectly correlated with the Polity variable, which measures the degree of democracy. Including the size of the winning coalition and the Polity variable will lead to a multicollinearity problem.

The Polity variable itself is therefore, used in place of the size of the winning coalition. There are three reasons why using the polity variable instead of the size of the winning coalition is justified. First, the use of polity variable, which could be thought of as the degree of democracy, is much more intuitive and simpler than winning coalition size. Second, it is readily available from the POLITY IV database, and does not require arbitrarily selecting institutional variables as done by Mesquita et al. Finally, the highly significant correlation coefficient of 0.89 between the size of the winning coalition and the polity variable suggesting that autocracies usually have small winning coalitions, while democracies have a large winning coalition, ensures that we are basically measuring the same thing.

Figure 3: Theoretical framework for the Structural Equations Model



In order to separate the effects of income inequality on political survival, we construct a Structural Equations Model (SEM) with two separate equations. The structural equation is given as:

$$G_{c,t} = \gamma_1 Polity_{c,t} + \gamma_2 lnGDP + \varepsilon_{c,t} \quad (2)$$

$$D_{c,t} = \theta_1 Polity_{c,t} + \theta_2 G_{c,t} + x'_{c,t-j}\theta + \varepsilon_{c,t} \quad (3)$$

Where,

G = Gini Coefficient

Polity = Type of polity, tends to 1 if country is democratic and tends to 0 if autocratic

D = Dummy variable, =1 if there was exit of one or more leaders

X' = Vector of time-varying control variables

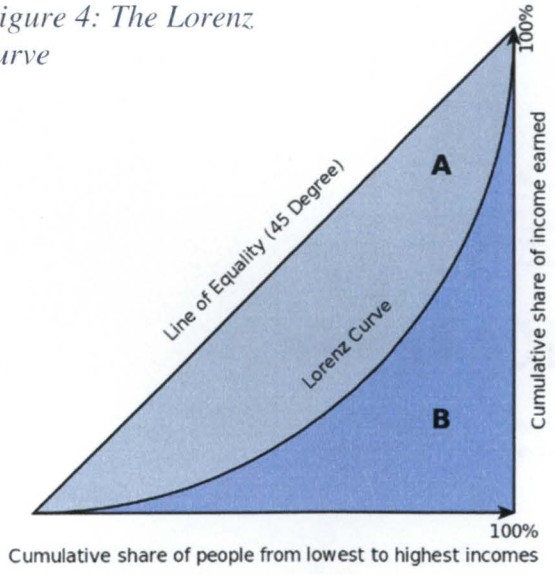
ε = Error term

CHAPTER FOUR

DATA

Data was collected from a variety of sources and includes 152 countries for the period 1962 - 2015. The data for political leaders was collected from a dataset called Archigos, which detailed the entry date and exit date of politicians from the 1800s to 2015. Inequality data was collected from the World Inequality Database (WID) maintained by an international academic consortium. Data was filtered to produce consistent estimates of the Gini coefficient of inequality. The Gini index or the Gini coefficient is a statistical measure of distribution which was developed by the Italian statistician Corrado Gini in 1912. After arranging all households from the poorest to the richest, a Lorenz curve can be drawn by plotting cumulative percentages of the households against the corresponding cumulative percentages of income they receive. Gini coefficient can then be calculated as a ratio of the area between the Lorenz curve and the line of perfect equality (the 45° line) to the entire area below the 45° line. Another way of thinking about the Gini coefficient is as a measure of deviation from perfect equality. The further a Lorenz curve deviates

Figure 4: The Lorenz curve



from the perfectly equal straight line (which represents a Gini coefficient of 0), the higher the Gini coefficient and the less equal the society.

Another important database was the Polity IV data, which detailed the various aspects of democracy in a country. Other covariates like percentage of population with secondary education, GDP growth per capita, demographic data, and others were collected from the World Bank database, World Development Indicators.

A quick glance at the data shows that there was a total of 1247 exits of leaders and out of that 809 were 'regular' exits (after discounting for leaders who left office due to death, sickness or by reaching the end of their term limit). Only 51 of these politicians were female, while the mean age of the politician at the time of their exit is 58 years. 229 leaders were deposed in their first year in office, while only 69 leaders lasted more than 10 years. The leader, Hassanal Bolkiah from Brunei has the longest tenure of 52 years, while also being the incumbent today.

The data also shows that autocrats seem to survive longer than their democratic counterparts, as the former's average tenure in is 8.7 years, while the latter enjoys an average of 3.6 years in office. Income inequality, however, is only slightly higher in autocracies, with a mean Gini coefficient of 0.42 than in democracies, with a mean score of 0.38. This inequality variable is almost bimodal, as the Gini score ranging between 0.25 to 0.27 and between 0.46 to 0.5 have the highest frequencies.

The summary statistics are given in the table below.

Table 1: Summary Statistics

Variable	Obs	Mean	Std.	Min	Max
Dummy	7839	0.159332	0.366357	0	1
Gini Coefficient	2969	38.81891	11.44815	15.55	78.6
Growth Per Capita (Lagged)	8209	0.043724	0.149365	-3.12912	0.799368
Log of GDP per capita	8592	22.82338	2.550038	15.99304	30.5555
Urban Concentration	8284	33.66557	17.15468	2.867021	100
Secondary Enrollment	7360	61.55373	34.68608	0	166.154
Tenure	7672	5.749739	7.129686	0	48
Age	7672	56.29262	11.09032	17	99
Transition Period	10716	0.011385	0.106096	0	1
Polity	8036	0.548637	0.370435	0	1
Female	7672	0.035454	0.184935	0	1
Term Limit	7120	0.036236	0.18689	0	1
Sick dummy	7839	0.002551	0.05045	0	1
Death dummy	7839	0.007909	0.088587	0	1
Elections	8364	0.18221	0.38604	0	1

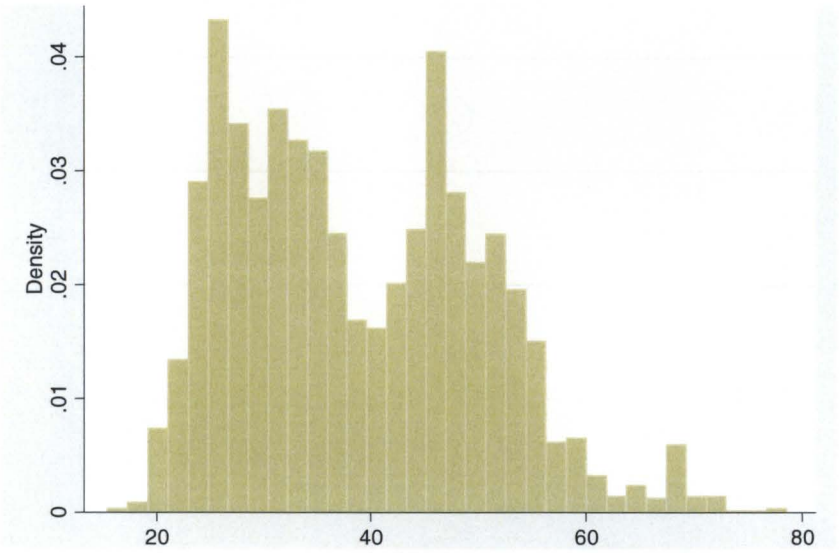
A list of countries and their Gini coefficients for the year 2015 are given in Table 2.

Table 2: Countries and their Ginis as of 2015

Gini≤35		35<Gini≤45		Gini>45	
Canada	31.6	United States	44.685	Honduras	49.59
United Kingdom	34.2	Dominican Republic	44.695	Costa Rica	48.34
Ireland	29.8	El Salvador	40.575	Ecuador	45.925
Netherlands	28.5	Argentina	40.5	Brazil	51.315
Belgium	26.5	Uruguay	40.18	Bolivia	46.715
Luxembourg	28.5	Lithuania	37.55	Paraguay	51.10833
France	29.35	Israel	36	Chile	48.5
Switzerland	29.6	Malaysia	41.14333	South Africa	65.5
Spain	34.55			China	46.2
Portugal	33.8			Sri Lanka	46
Germany	29.85				
Poland	32.6				
Austria	27.4				
Hungary	27.5				
Slovak Republic	24.4				
Italy	32.4				
Malta	28.1				
Croatia	30.755				
Slovenia	24.75				
Greece	34.1				
Cyprus	33.6				
Estonia	33.9				
Latvia	35				
Finland	25.6				
Sweden	27.25				
Norway	25.55				
Denmark	27.4				
Iceland	24.7				

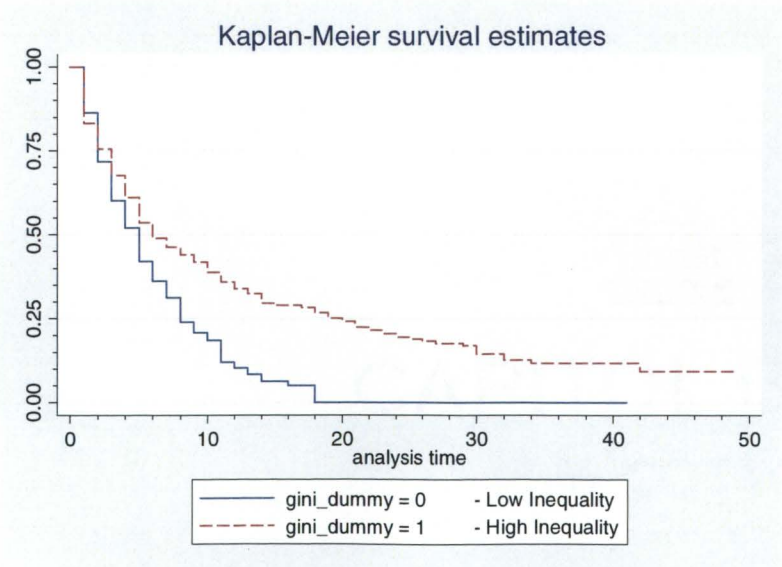
The bimodal nature of income inequality is shown in figure 1.

Figure 5: Histogram for Gini Coefficient



Given this bimodal nature, we can divide all observations into two major groups: one with low inequality and one with high inequality. The low inequality group include those observations that have a Gini coefficient less than the mean of 38.82, while the high inequality group includes observations whose Gini coefficient is higher than the mean.

Figure 6: Survival curves for countries with high inequality and low inequality



A preliminary survival function graph shows that leaders tend to survive a lot more in highly unequal societies after they stay in office for a couple years. In both groups, around 80% of leaders survive their first year in office. Both groups have a similar survival rate up until around the 5 year mark, after which the difference is drastic. By simply eyeballing the graph, it can be seen that 37% of the leaders in the group with high income inequality survive 10 years in office, while only around 20% of the leaders in the group with low income inequality survive the same number of years. The survival function graph also illustrates that no leaders in the group with low income inequality survive more than 18 years while there are still 25% of the leaders in the unequal societies surviving more than the same number of years.

Table 3: Log rank test for equality of survival functions

Gini_dummy	Events observed	Events expected
0	215	156.16
1	593	651.84
Total	808	808
	chi2(1)	31.82
	Pr>chi2	0.000

A log-rank test that tests for the null hypothesis of equal survival functions is rejected at the 1% significance level and thus shows that the two survival curves are statistically different from one another.

CHAPTER FIVE

RESULTS

5.1 Preliminary Results

We use three models to estimate the effects of income inequality on political survival. The results from a linear probability model, a logit model and a cox proportional hazard model is given below.

Table 4: Regression Results

	LPM	Logit	Cox Proportional
Gini	-0.00391***	-0.0406***	-0.0235***
	(0.00105)	(0.0101)	(0.00633)
Growth per capita (lagged)	-0.0441	-1.199*	-0.229
	(0.0711)	(0.621)	(0.322)
Urban concentration	-0.000234	-0.00143	-0.00192
	(0.000892)	(0.00579)	(0.00388)
Secondary Enrollment	-0.00103**	-0.00876**	-0.00597**
	(0.000404)	(0.00425)	(0.00264)
Tenure	0.000807	0.0104	0.061
	(0.0025)	(0.0200)	0
Age	0.00212**	0.0190**	0.0147***
	(0.000975)	(0.00799)	(0.00552)
Transition period	0.301**	1.934***	1.236***
	(0.126)	(0.595)	(0.417)
Polity	0.104**	1.244***	0.827**
	(0.043)	(0.396)	(0.326)
Female	-0.0641***	-0.760**	-0.410*
	(0.0193)	(0.359)	(0.215)
Term limit	0.782***	7.070***	1.756***

	(0.0277)	(1.019)	(0.129)
Sick Dummy	0.795***	-	1.635***
	(0.065)		(0.466)
Death Dummy	0.705***	-	1.399***
	(0.05)		(0.376)
Election (constructed)	0.233***	1.855***	1.028***
	(0.0295)	(0.153)	(0.107)
Constant	0.126*	-1.516	
	(0.0688)	(1.512)	
Year FE	YES	YES	YES
Observations	2,019	2,005	2,019
Number of countries	93	93	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

All three models show a negative relationship between income inequality and the probability of exit. These results are consistent with the Kaplan-Meier survival graph which showed that leaders tend to survive more in highly unequal societies. The LPM model shows that a one-point increase in the Gini coefficient decreases the probability of the incumbent leader exiting office the following year by 0.03%, ceteris paribus. Similarly, the logit model shows a 4% decrease in the odds of exiting office holding all other factors constant, since $e^{-0.0415} = 0.96$. The marginal effects that show the change in probability when the independent variables increase by one unit, are shown in Table 5 below.

Table 5: Marginal Effects

VARIABLES	(1) Dummy
Gini	-0.00499***
	(0.00123)
Growth per capita (lagged)	-0.148*
	(0.0766)
Urban concentration	-0.000176
	(0.000712)
Secondary Enrollment	-0.00108**
	(0.000522)
Tenure	0.00127
	(0.00246)
Age	0.00234**
	(0.000980)
Transition period	0.238***
	(0.0739)
Polity	0.153***
	(0.0488)
Female	-0.0936**
	(0.0442)
Term limit	0.870***
	(0.162)
Sick Dummy (omitted)	-
Death Dummy (omitted)	-
Election (constructed)	0.228***
	(0.0207)
Observations	2,005

Table 5 above shows that at the mean values, the change in probability of leader exit given a one unit change in the Gini Coefficient is a decrease by 0.499 percentage points.

The leader specific control variables sick dummy and death dummy are omitted because they predict exit perfectly. The classification statistics for this logistic regression is given in Table 6.

Table 6: Classification Statistics

Classified	D	~D	Total
+	181	28	209
-	215	1581	1796
Total	396	1609	2005

Classified + if predicted Pr(D)	>=	0.5
TRUE D defined as Dummy	<>	0

Sensitivity	Pr(+| D)	45.71%
Specificity	Pr(-|~ D)	98.26%
Positive predicted value	Pr(D | +)	86.60%
Negative predicted value	Pr(~D | -)	88.03%
FALSE + for true ~D	Pr(+| ~D)	1.74%
FALSE - for true D	Pr(-| D)	54.29%
FALSE + rate for classified +	Pr(~D | +)	13.40%
FALSE - rate for classified -	Pr(D | -)	11.97%
Correctly classified		87.88%

The overall rate of correct classification is estimated to be 87.88, with 98.26% of the leaders remaining in power correctly classified (specificity), and 45.71% of the leader exits correctly classified (sensitivity).

In the Cox Model, the negative coefficient of 0.0235 translates to a decreased risk of exiting office of 2.32% (calculated as $1 - e^{-0.0235}$) when the Gini coefficient increases by 1 point, controlling for all other covariates. In other words, a unit increase in the Gini coefficient increases the hazard rate, or the instantaneous potential for exiting office by 2.32%.

Results on the control variables indicate that a strong ageing effect exists: older leaders are statistically more likely to lose their jobs, even after controlling for tenure. All else equal, higher secondary enrollment is associated with lower probability of exit. This could be because the public might assign this improvement in their country to their respective leaders and believe that the leader helped achieve this improvement. Leaders of transition economies were more likely to lose office. Unsurprisingly, leaders are more likely to lose office subsequent to elections, upon reaching their term limit, and upon leaving due to sickness and death. Female leaders tend to last more in office than their male counterparts, and autocratic leaders tend to last more in office given the positive coefficient on the polity variable.

5.2 Robustness Check

Given the bimodal nature of the Gini Coefficient, a robustness analysis is conducted to see whether the results change when the assumptions change. There may be uncertainty regarding the model specification but a robustness test can improve the validity of inferences (Plumper and Neumayer, 2017).

An additional dummy variable is created, which takes a value of 1 if the Gini Coefficient is greater than 40, and 0 if otherwise. The number 40 is selected since it separates

observations into roughly two normal distributions with separates modes as shown in Figure 1. Another form of robustness check is conducted by excluding all observations between 36 and 39, and redoing the estimation.

The regression results in table 4 show that the dummy variable for high Gini Coefficients are statistically significant at the 5% significance level. Column 1 is a re-estimation of the first column from Table 3 with the additional dummy variable for high Gini coefficients. Column 2 is also the same as Column 1 with only one difference: the estimation in the second column excludes all observations with Gini Coefficients between 36 and 39. Similarly, columns 3 and 4 is a re-estimation of the Logit model from table 3, and column 5 and 6 is a re-estimation of the Cox Proportional model.

In all six models, highly unequal societies have a significantly lower probability of leader exit than societies with low Gini Coefficients. The LPM estimate for the Gini dummy in column 1, for instance, is -0.0936 which means that highly unequal countries have a lower probability of leader exit than that in countries with low inequality by 0.0936. The results hold for all six models.

Table 7: Robustness Check

	1	2	3	4	5	6
VARIABLES	LPM	LPM2	Logit	Logit2	Stcox	Stcox2
Gini	-0.0005	-0.00053	-0.00194	-0.00642	-0.00322	-0.00388
	(0.00162)	(0.0017)	(0.017)	(0.0185)	(0.0102)	(0.0108)
High Gini dummy	-0.0936**	-0.0847**	-1.195***	-1.024**	-0.552**	-0.495**
	(0.0384)	(0.0383)	(0.38)	(0.43)	(0.223)	(0.245)
Growth PC	-0.0474	-0.0808	-0.603	-0.915	-0.265	-0.365
	(0.0708)	(0.0581)	(0.553)	(0.6)	(0.325)	(0.327)

Urban	-0.00013	2.72E-05	-0.00167	0.000977	-0.00144	-0.00094
	(0.00088)	(0.00085)	(0.00897)	(0.00951)	(0.00386)	(0.00404)
Secondary Enroll	-0.00113***	-0.000985**	-0.0118***	-0.0119**	-0.00663**	-0.00685**
	(0.00041)	(0.00041)	(0.00434)	(0.00482)	(0.00263)	(0.00291)
Tenure	0.000954	0.00540**	0.0529**	0.0653***	0.137	0.448
	(0.00243)	(0.00247)	(0.023)	(0.0245)	(0.000)	(0.000)
Age	0.00217**	0.00218**	0.0221**	0.0215**	0.0144***	0.0155***
	(0.00097)	(0.00086)	(0.00935)	(0.00985)	(0.00551)	(0.00574)
Transition Period	0.304**	0.319**	1.969***	2.277***	1.253***	1.369***
	(0.13)	(0.127)	(0.607)	(0.641)	(0.417)	(0.425)
Polity	0.104**	0.136***	1.206***	1.679***	0.823**	1.147***
	(0.0409)	(0.0443)	(0.465)	(0.542)	(0.324)	(0.374)
Female	-0.0587***	-0.0648***	-0.830**	-0.885**	-0.373*	-0.394*
	(0.0192)	(0.0184)	(0.384)	(0.404)	(0.215)	(0.221)
Term Limit	0.787***	0.798***	6.967***	6.996***	1.789***	1.775***
	(0.0275)	(0.0313)	(0.779)	(0.792)	(0.13)	(0.134)
Sick dummy	0.781***	0.777***	20.15	21.51	1.563***	1.747***
	(0.065)	(0.0747)	(3,909)	(7,916)	(0.468)	(0.512)
Death dummy	0.705***	0.692***	19.23	20.29	1.367***	1.318***
	(0.0498)	(0.0473)	(2,683)	(4,318)	(0.376)	(0.381)
Election	0.232***	0.230***	1.836***	1.902***	1.021***	1.050***
	(0.0296)	(0.0296)	(0.156)	(0.164)	(0.107)	(0.111)
Constant	0.0368	-0.0274	-3.554***	-3.990***		
	(0.000)	(0.0842)	(0.905)	(0.99)		
Observations	2,019	1,897	2,019	1,897	2,019	1,897
Number of c_id	93	92	93	92		

The results of all models as well as the Kaplan Meier survival graph support the hypothesis that high inequality is associated with longer political survival. Income

inequality and political survival could very well be endogenous, as suggested by the selectorate theory. Using lagged income inequality gives out similar results to that of table 3. It could very well be that highly unequal societies are the by-product of a political system where the exit of a leader is unlikely. This possibly explains the significant negative sign on the Gini Coefficient in the three regression models.

Table 8: A correlation matrix shows that as polities move towards democracies, inequality falls

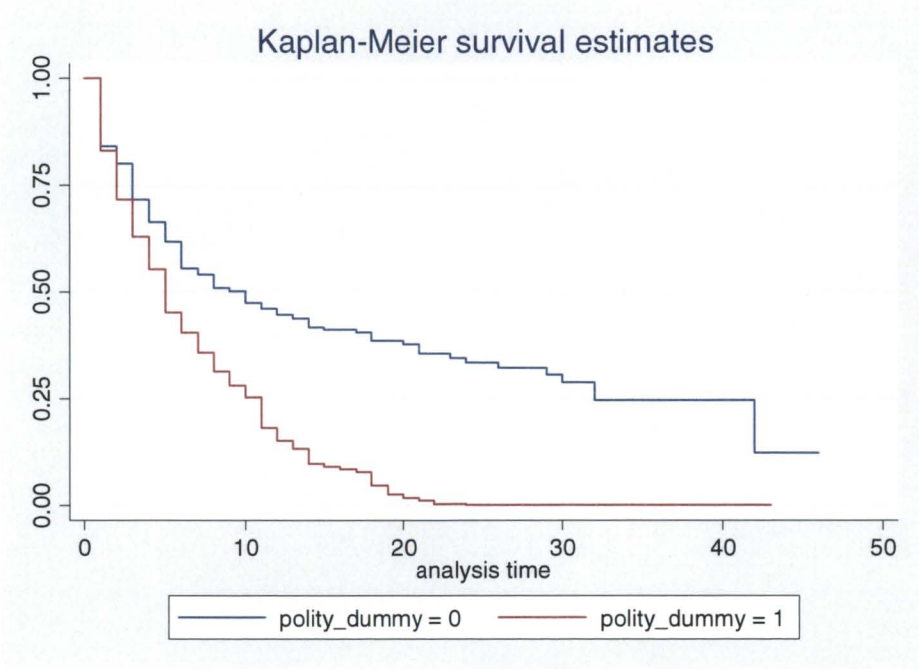
	Gini	Polity
Gini	1	
Polity	-0.2129	1

We move ahead with the simultaneous equations model. The log of GDP is also used as an independent variable to satisfy the order condition for parameter identification.

We then construct another Kaplan Meier survival function based on Polity_dummy. This polity dummy takes the value of 1 if the country is relatively democratic, i.e., its polity score is greater than 0.5, and 0 if otherwise.

The survival graphs show what was predicted from the selectorate theory. Autocrats tend to survive a lot more in office than do democrats. Even more interestingly, it is very difficult for autocrats to survive their early years in office, even harder than for democrats if we look at just the first year. For autocrats, it is hard to find sources of revenues to satisfy their winning coalition in their first year. It comes of no surprise that we often see looting, confiscations, and extractions during political transitions.

Figure 7: Survival curve for leaders in autocracies and democracies



5.3 Simultaneous Equations Model Results

The regression results from the SEM model is shown below.

Table 9: Simultaneous Equations Model Results

VARIABLES	Gini Coefficient	dummy
Gini coefficient		-0.00391***
		(0.00079)
Transition Period		0.301***
		(0.107)
Growth per capita (lagged)		-0.0441
		(0.0607)
Secondary Enrollment		-0.00103***
		(0.00033)
Tenure		0.000807
		(0.00216)
Age		0.00212***
		(0.00074)
Female		-0.0641***

		(0.0213)
Urban Concentration	0.108***	-0.00023
	(0.0176)	(0.00049)
Polity	-5.769***	0.104***
	(0.849)	(0.0326)
Term Limit		0.782***
		(0.0186)
Election		0.233***
		(0.0214)
Sick dummy		0.795***
		(0.0595)
Death dummy		0.705***
		(0.0402)
GDP per capita (Logged)	-1.781***	
	(0.143)	
Constant	85.70***	0.126*
	(3.628)	(0.066)
Observations	2,019	2,019

The results shown above in table 4 provide estimates of how the type of polity simultaneously influence income inequality as well as the survival of leaders. Looking at the first column in table 4, the type of polity negatively affects income inequality. Autocratic countries are associated with higher income inequality, while democratic countries have lower income inequality. Similarly, the log of GDP per capita is also seen to be negatively related with Gini coefficients. Rich countries and countries that have attained a certain level of development generally have lower Gini coefficients, and thus lower income inequality. Finally, the urban concentration variable has a positive coefficient which implies that countries with higher urban concentration generally have higher income inequality. This is consistent with prior literatures and intuitive thinking.

The results of the second equation are identical with results from the LPM, Logit and the Cox Proportional Hazard Model. Income inequality is still negatively correlated with the probability that a leader is going to exit office. A high level of inequality could be a sign that the winning coalition is deriving private benefits from the incumbent leader while citizens not in the winning coalition are not gaining or gaining very few benefits (mostly public) from the policies set by the incumbent leader. This could be one reason why higher inequality induces the winning coalition to keep the incumbent leader in power.

The effect on other covariates have also not changed. Secondary enrollment are significant at the 1% significance level, and are negatively associated with the probability that a leader exits office. The ageing effect still exists as old leaders have more of a tendency to exit out of office, even after we control for tenure. Females last longer in office than their male counterparts. However, this could be because out of our sample of 1981 observation, there were only 61 female leaders. Finally, leaders have a higher probability of exit during periods of transition. Like before, it is not surprising that leaders tend to exit a lot more during elections, and at the end of their term limits.

CONCLUSION

This paper explores whether a nation's level of income inequality affects the short-run political survival prospects of that nation's leader. The simultaneous equations model controls for the simultaneity bias between the size of the winning coalition, income inequality and probability of leader exit. The results provide evidence that higher income inequality increases the likelihood that national leaders will retain their position.

There have been no studies that have typically examined the effect of income inequality on democratic election results. This paper provides causal evidence of a relationship between income inequality and political survival that extends beyond the ballot box. The magnitude of the estimated impact of income inequality on political survival is quite small. The SEM estimate in column 2 of Table 5 indicates that a one point increase in the Gini Coefficient reduces the probability of leader change by 0.4%.

The results provide important lessons for the rich who want to stay rich, for autocrats, or even budding dictators. For the rich, it is easier to protect their fortunes simply by maintaining their political support to leaders in order to protect their wealth, or income. Autocrats and dictators can use these results as evidence to back up one of Mesquita and Smith's (2011) rules for successful dictatorship: Don't take your friends' money and redistribute it to the masses.

The findings of this paper have important implications. We can understand why some believe that stable leadership is good for economic well-being. But autocrats do not grow more efficient at improving their society over time. The uncertainty provoked by

instability might be thought to scare investors, but those effects – if they exist at all – are offset by the advantages inherent in political competition.

Policy changes need to address the political incentives for greedy, corrupt and rent-seeking governance. The mechanism with which political leaders stay in power by appealing to the rich, or how the rich enable the political leaders they support to stay in power need to be addressed. The political transition from a society ruled by an exclusive group to one with a broad, inclusive coalition structure, i.e. a more democratic polity, appears to be fundamental for sustained improvement in the quality of life for the world's economically, socially, or politically oppressed people.

Further research could be done to refine the effect of inequality on political survival. We could see if the results improve or worsen when we use wealth inequality, instead of using income inequality. Introducing taxation and/or spending on public goods might help shed some light on how attempts to reduce inequality (if they exist at all) may impact prospects of survival.

Appendix: Variable Definitions

Exit of leader in year: Binary variable=1 if there are one or more exits of the effective primary national leader during the year for reasons other than natural death or foreign deposition; 0 otherwise. Goemans et al. (2009).

Gini Coefficient: Measure of income inequality. Higher Gini coefficients indicate higher income inequality. World Inequality Database (2015)

GDP per capita growth: Annual percentage growth rate of GDP per capita based on constant local currency. World Bank (2015).

Urban concentration: The share of the urban population in a country that lives in its largest city. Calculated by dividing population estimate for the largest city by the total urban population of the country. United Nation's Population Division's World Urbanization Prospects (2009).

Secondary enrollment rate (% gross): Number of pupils enrolled in secondary education, regardless of age, expressed as a percentage of the population in the theoretical age group for secondary education. Data from the World Bank (2016b) and DRI (2009). Data are interpolated (linear).

Tenure of leader in power at start of year (years): Sum of 31 Decembers that the leader has been in office during current tenure. Calculated for leader in office on 1 January using Goemans et al. (2009).

Age of leader in power at start of year (years): Calendar year minus birth year of leader in office on 1 January, calculated using Goemans et al. (2009).

Transition dummy: Binary variable, =1 for the years 1989-1992 for transition economies; 0 otherwise. DRI (2009).

POLITY2 (rescaled): Revised Combined Polity Score of the Polity IV Project. Marshall et al. (2010). Rescaled so it ranges from 0 (full autocracy) to 1 (full democracy).

Female dummy: Binary variable, =1 if effective national leader is female; 0 otherwise. Goemans et al. (2009).

Term limit dummy: Binary variable, =1 if national leader left office due to legal requirement during year; 0 otherwise. Self-constructed. Does not include cases in which a national leader avoided a requirement to leave office.

Sick dummy: Binary variable, =1 if national leader left office due to sickness during year; 0 otherwise. Self-construction.

Death dummy: Binary variable, =1 if national leader died while in office; 0 otherwise. Self-construction.

Election dummy: Binary variable, =1 if an election affecting the effective national leader occurred during the year; 0 otherwise. Constructed with election data from Goemans (2009) using the following operation on six binary variables: Presidential election (0,1)*Leader subject to presidential elections (0,1) + Parliamentary election (0,1)*Leader subject to parliamentary elections (0,1) + Presidential or parliamentary election (0,1)*Assemblyelected president (0,1). Beck et al. (2001) and other sources used to allocate leaders to elections.

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ANNEX

Figure 9: Survival curve for leaders in high growth countries vs low growth countries

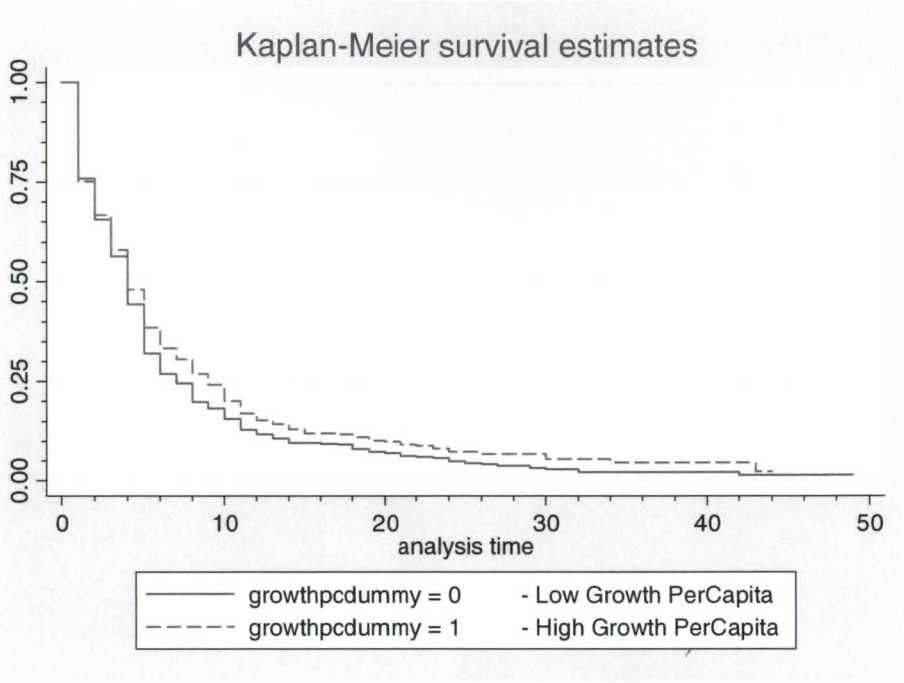

Figure 10: Survival curve for leaders in high GDP countries vs low GDP countries

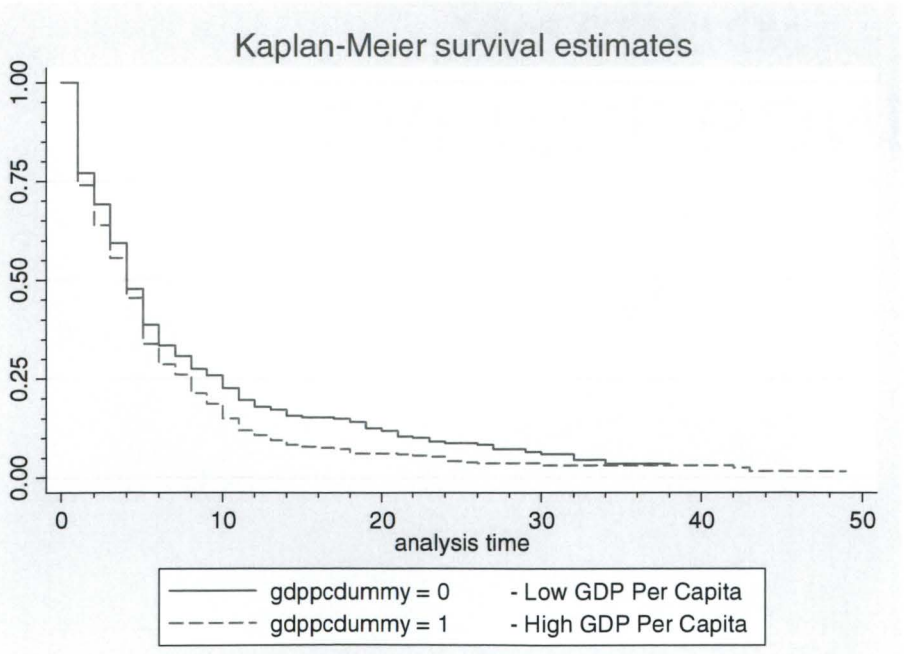

Figure 11: Survival Curves for Low Urban Concentration countries vs High Urban Concentration countries

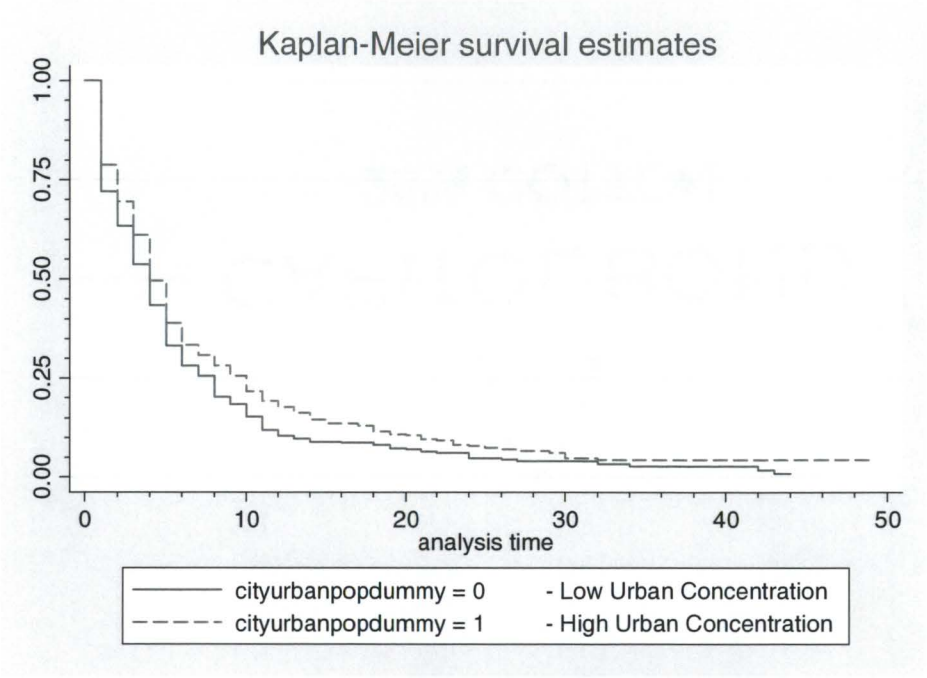

Figure 12: Survival curve for leaders in high secondary enrollment countries vs low secondary enrollment countries

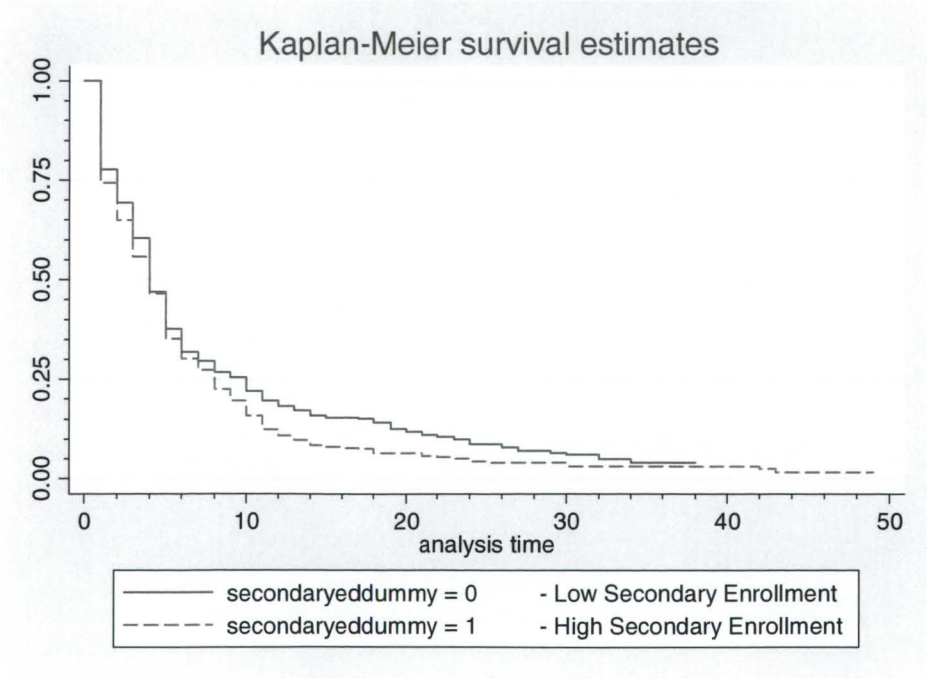

Figure 13: Survival curve for young vs old leaders

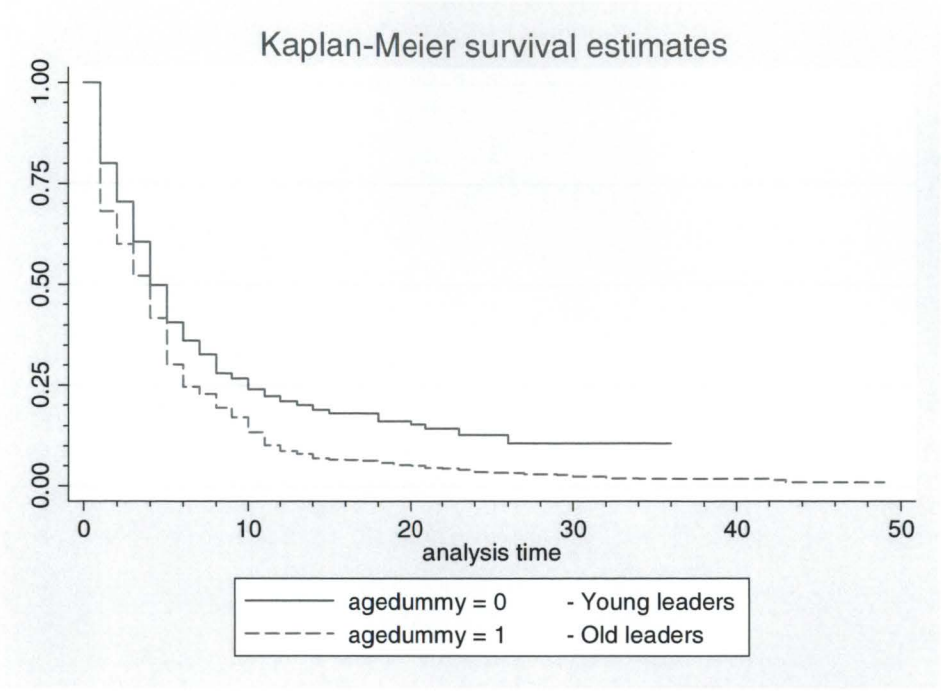

Figure 14: Survival curves for male leaders vs female leaders

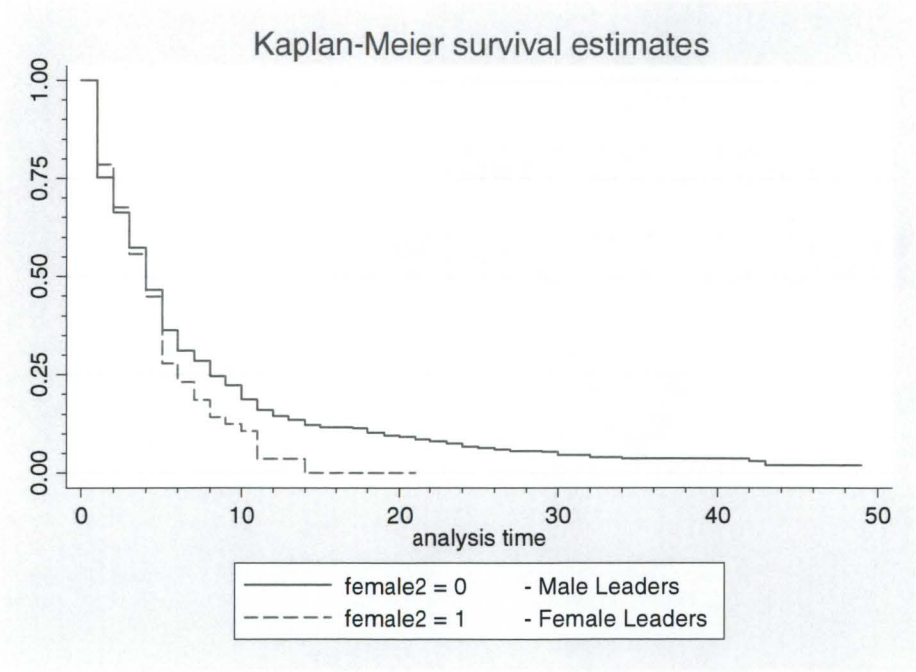

Table 10: Correlation Matrix

	Gini	Growth PC	Urban Conc	Sec. Edu	Tenure	Age	Transition	Polity	Female	Term Limit	Sick Dummy	Death Dummy	Election
Gini	1												
Growth PC	-0.0089	1											
Urban Conc	0.3008	-0.0234	1										
Sec. Edu	-0.5404	0.0094	-0.317	1									
Tenure	0.0909	-0.0035	0.0649	-0.1675	1								
Age	0.1063	0.0039	-0.0888	0.1021	0.2879	1							
Transition	0.0536	-0.0254	0.047	-0.0822	-0.0097	-0.0372	1						
Polity	-0.2129	0.0305	-0.1771	0.5115	-0.3834	0.0929	-0.018	1					
Female	-0.0535	-0.0006	-0.0604	0.1279	-0.0813	0.0153	-0.0235	0.1695	1				
Term Limit	0.0925	0.0074	-0.0425	0.0459	-0.0645	0.0494	-0.0171	0.1279	0.0233	1			
Sick Dummy	0.0064	0.0066	-0.0095	0.009	-0.009	0.0395	-0.0063	0.0113	0.004	-0.0097	1		
Death Dummy	-0.0201	0.017	-0.0046	-0.0093	0.0556	0.0772	0.0122	-0.0281	-0.0173	-0.018	-0.0045	1	
Election	-0.012	-0.0006	-0.0323	0.0925	-0.0257	0.0443	-0.0119	0.1763	0.0161	0.1488	0.0157	0.0234	1