# Depending on the web: discussing the technological support for parties' survival

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## Abstract

**Purpose** – In this article, the author discusses the influence of technological development on the survival of European parties since the Second World War.
**Design/methodology/approach** – The database comprises more than 200 parties and the political forces observed in 20 countries.
**Findings** – The author find that Internet users as a proportion of the population and a higher value of secure servers in an economy tend to strengthen the duration of parties since their first electoral participation.
**Originality/value** – This is the first paper discussing parties' survival in democratic regimens as depending on the technological development.

**Keywords** Political message, Political parties, Survival analysis

**Paper type** Research paper

## 1. Introduction

The aggregation of the interests of individuals in favor of more effective participation in society is the genesis of the creation of political parties. From the classic experiences of Greece and Rome to the present days that distribute parties' messages through digital media, "political parties" have persisted in diverse political organizations – i.e. from modern democracies to dictatorial regimes. As authors such as Duverger (1958), Goguel (1958), Amundsen (2007) and Lancelot (1974) argued in their influential works, a party survives as long as it has the following three structural resources:

(1) voters who support parties in an expressive manner (either at election time or in other political expressions, such as street demonstrations);

(2) financial resources for the development of political activities by the party's members; and

(3) a political-legislative framework of the surrounding structure that allows its continuity (here, we must recognize there is a differentiation between political parties and other political, intellectual or citizenship movements not covered by the aforementioned political-legislative framework, although they can exist through informal groups of citizens).

In contrast, literature such as Michels (1910), Touchard (1959) and Bianco *et al.* (2014) states that a political party tends to disappear for the following four reasons:



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(1) Internal divisions and/or intention to widen the electoral base through a "re-branding" strategy;

(2) Leadership dependence;

(3) Ideological changes/death of supporting Ideologies; and

(4) The end of the party-political system itself.

However, authors like Lochocki (2018) and Graham *et al.* (2013) have emphasized the driving role of historical channels for disseminating political messages – from the graffiti on the walls of Ancient Rome and the invention of the Gutenberg press in the 15th century to the radio and television channels of the 20th century. In spite of this literature, we have observed a significant shortage of studies on the current role of digital channels in the political survival of parties.

This study thus assesses how technological development has influenced the political-party landscape in Europe. Therefore, through proper estimation methods – regressions with instrumental variables, proportional risk regressions and parametric regressions of survival models – we tested how dimensions such as a larger population with Internet access or a greater import of digitally-based services lead to greater or less survival of the observed political forces. We accordingly analyze more than two hundred political parties in the European space.

The structure of the remaining parts of this paper is as follows. Section 2 reviews the literature on the complex relationship between technological development and parties' survival. Section 3 describes the full database of our work. Section 4 shows the main empirical outputs from two-stage least squares regressions to parametric and non-parametric survival regressions. Finally, Section 5 concludes the work.

## 2. Literature review

### *2.1 Technological advances and harnessing political awareness*

When we collect works by classic authors in the literature on the political market, there is a recognition that printed books were undeniably a source of the spread of Protestantism and the counter-Reformation in the 16th century. After this, the generalization of the mass reading of newspapers increased the political and partisan debate in 18th- and 19th-century Europe and America. Later on, several studies showed the relevance of radio and TV for deciding elections.

Authors such as McDougall and Pollard (2019) also identified strong links between the institutional structures of political systems and the competition profile in the media. Thus, dictatorial political systems became the cause and consequence of social communication structures dominated by the oligopolies or monopolies of media groups; in contrast, democratic systems tended to be associated more with liberalized communication markets. Runciman (2018) additionally showed how technological development has also brought changes in political profiles, in political practices and in the very concept of politics or political participation.

On the one hand, access to the Internet for most citizens of countries such as OECD countries has allowed access to a cheap information channel, with a vast diversity of data, indicators, analyses and online libraries. Even before the appearance of the phenomenon of "fake news," the Internet was understood between 1990 and 2010 to be a complimentary source of projection for the traditional media (the press, radio and television). The public, in the comfort and privacy of home, could consult sources and data with the freedom of access that was difficult in alternative channels (Soete, 1991). If until 1990 the voter who usually voted for the center-right wing felt a certain coldness or even disgust in reading the newspapers of the extreme left or extreme right, with the Internet, it became much more accessible to consult and to critically analyze all political manifestos (De Simone and Reis Mourao, 2016). Similarly, facilitating this contact with the most diverse ideas has enabled

voters to perceive through their own reading (beyond the directed readings left by party leaders or by public opinion leaders) the ideas of movements traditionally connoted with more extreme or innovative positions (Short, 2016). As Smolik (2011) warned, this contact not only facilitates the criticism of traditional movements and parties but also leads to a greater likelihood of the communion of the ideals of new movements and parties, which has contributed to the growth and survival of these new movements and parties.

Political participation ceased to have electoral scrutiny as a lonely moment of special relevance in electoral processes and began to have to rely on movements triggered in the virtual and digital space. Environmental movements have become an example of this capacity. Humanitarian aid movements have also taken advantages of these potentialities. Moreover, digital networks have also intensified the pressure to renew governments affected by scandals of their members (Choudhary, 2018).

*2.2 Technological development and party evolution – do the best survive?*

Considering the various authors who argue that technological development, as a disruptive change, also structurally transforms existing parties, we can postulate that technological development leads to the survival of more agile parties (Singh, 1989; Choudhary, 2018). As Singh (1989) pointed out, technological development entails a reduction in the costs of communication channels. This makes offering political messages more desirable for the "small groups" that were previously blocked by institutional and economic barriers from accessing the main platforms of political debate. However, the growth of this competitive offer can lead to a significant loss of the electorate by the "conventional parties," which previously received most of the votes.

From this perspective, technological development can motivate the acceleration of the appearance of new small parties at the cost of the disappearance and/or disintegration of the great conventional political forces. As Kauffmann (2019) observed for France, "The two pillars of French political life, the Socialist Party and the center-right party now called Les Républicains, which provided presidents and parliamentary majorities for nearly 6 decades, have collapsed; at the last elections to the European Parliament, in May, their candidates, put together, totaled barely 14% of the vote. This descent into political hell has not been limited to traditional mainstream parties: the left-wing populist politician Jean-Luc Mélenchon, whose movement La France Insoumise (Unbowed France) emerged as the new hope of the radical opposition two years ago, ended up bowing himself to a 6% score in May."

*2.3 Does technology increase or decrease party survival?*

Therefore, it is fair to ask, does technological development increase or decrease party survival? Wintrobe (2000) warned that by reducing the costs associated with the transmission of messages, technological development leads to an increase in the aggregate supply of political messages. Similarly, following Erdmann and Kneuer (2003), this same technological development can lead to the disappearance of more conventional political forces due the attractiveness of the message of newer parties. According to Perazzoli (2020), technological changes involve significant differences in the way that politics is lived. Therefore, with sharp technological changes – the so-called technological revolutions – we must expect significant political and party changes.

However, to study this complex relationship, we must include in the equation the differences found in economic, political and social structures of national institutions. As Marchetti (2017) noted, the scope of the political message presupposes the public's maturation. Interested voters will be more affected by a message that circulates on new channels. In contrast, those characterized by absenteeism or by a significant lack of interest in political participation will

hardly get interest to receive the parties' message. This dichotomy will necessarily have implications on the duration of the parties and the survival of their structures. Therefore, we considered pertinent to assess the influence of technological development on the political survival of European parties. Next section details such effort.

## 3. The data

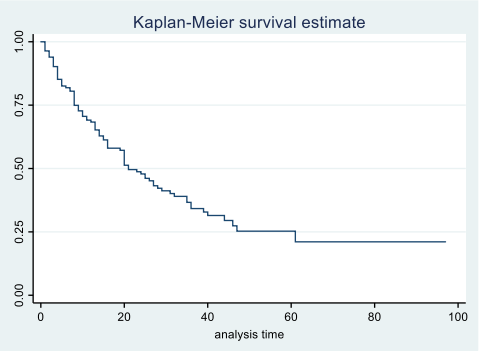
To analyze the determinants of the duration of European political parties and their hazard rates, we constructed a longitudinal data set. This data set covers yearly information for a large sample of European political parties. At this stage, we refer to Emanuele (2016) as the most relevant source of information for an organized list of European political parties since 1945. By following the official information, this dataset "identifies and lists all the new parties that have emerged in Western Europe since 1945 and provides data about party system innovation, defined as the aggregate level of 'newness' recorded in a party system at a given election. Data are based on parliamentary elections (lower house) in 20 Western European countries since 1945. This dataset covers the entire universe of Western European elections held after Second World War under democratic regimes. Data for Greece, Portugal and Spain have been collected after their democratizations in the 1970s" Although this database is updated continuously, we use the list of identified parties available as of September 14, 2019 (see the Appendix). Let us also notice this data source does not identify parties without seats in national parliaments. Therefore, regional parties on local political forces are not here considered. Lastly, we can consider our sample is composed by the most expressive national parties at each one of the observed countries which have had seats at the national parliaments.

### *3.1 The duration of a political party*

For assessing the variety of "durations" of political parties, we follow Olsen (1998), Nooruddin and Chhibber (2008) and Nishikawa (2012). Accordingly, we construct a duration variable that considers the number of years between the first and the last election that a political party participated in. For elections, we independently consider any poll organized by the official authorities, regardless of whether it was legislative, presidential or federal/regional elections. Considering the entire sample, the most durable parties are the Swiss Evangelical People's Party (which was founded in 1919 and is still active in polls, and the most recent poll that this party participated in was the 2015 Swiss federal election), the Communist Party of Luxemburg (which was founded in 1922), and the Scottish National Party (which was founded in 1945). The vast majority of observed parties in our sample were founded after 1945.

For this study, we use the data related to European parties in competing polls from the following countries: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Considering these data, we generated a dummy variable identified as "Failure", with either a value of 1 when the political party failed to participate in two consecutive electoral moments (regardless of whether it was a legislative, European or federal/regional election) or a value of zero otherwise. Our duration variable therefore counts the years between the first and last electoral polls that the political party participated in.

Below we present the structure of our data on political duration for European parties. As seen at Figure 1, the total number of observed European parties is 216. Approximately 50% of the observed political parties did not last 26 years (which follows Kapf, 2017). The average probability of a party not participating in two consecutive polls is 75% after 50 years following its first poll.




**Source(s):** Own work upon Emanuele (2016)

**Figure 1.**
Kaplan–Meier survival function (216 European political parties; unit time: year)

Consistent with Montigny (2015), the appearance of new technologies and the widespread access to the Internet help to explain the high number of new parties that have appeared in the European space, especially in the last 30 years. As seen, this concentration of the birth of new parties has increased the presence of a greater number of parties with duration of less than 40 years, which we must explore in greater detail through the use of a censored/censored data analysis.

*3.2 The importance of electronic platforms to disseminate political messages*

After realizing through the observations in Figure 1 the heterogeneity that characterizes the survival of political parties in the European space, we launch the central hypothesis that we will test in the remaining sections. Thus, we test the hypothesis that technological changes in recent decades, namely, a greater access to digital communication networks, have accelerated the complexity of the political market and, among other consequences, have promoted the survival of a greater number of parties, especially in the European economies characterized by more significant digital access.

Parolin's (2010) work shows how the historical liberalization of the media combined with the reduction of the costs of spreading the message support (may it be through books, pamphlets, newspapers, radio, television or social networks) tend to contribute not only to an accelerated circulation of political messages but also to the emergence and renewal of political parties and their political survival. Although alternative studies have found this evidence for realities linked to public and social support campaigns or even to generalized actions related to public and social marketing (Gangopadhyay, 2015), a notable scarcity of research has persisted in verifying the importance of these mechanisms in the emergence of political parties and their support.

It is therefore essential to question the role of technological development in political parties' dynamics. On the one hand, technological development has made the dissemination of political messages much cheaper, and on the other hand, it has facilitated the diffusion of messages that are often false, contributing to the need for a regulatory role for the competent authorities (Gross and Shumacher, 2019). Thus, parties with parliamentary representation tend to be associated with more significant resources – which enhance the possibility of issuing political messages more effectively. However, the embarrassment that technological development has caused in the circulation of messages about policies may have also unlocked important "market share" opportunities for less-gifted political parties.

Thus, the next sections test the importance of technological development in the survival of political parties while considering the traditional dimensions of socioeconomic development

and the profile of the political market to be important determinants of the survival of political parties.

*3.3 Main variables*

Our main explanatory variables are variables regarding the Internet accessibility of the population. We realize that such a dimension is complex. Therefore, we use the demand for web accessibility and the supply of accessibility for each country as variables, which tend to detail both sides of web accessibility according to Thatcher *et al.* (2006).

To measure the demand of web accessibility, we study the percentage of the population that uses the Internet and the percentage of service imports related to communication through electronic devices (which is assessed in the country's balance of payments). To measure the supply of web accessibility, we study two other variables, namely, the number of secure Internet servers per 1 million people and the percentage of service exports related to communication through electronic devices (which is also assessed in the country's balance of payments). As Mattoni (2017) observed, countries characterized by a high percentage of individuals who use the Internet are associated to a high human development but also to a certain preference of the population to use web connections for various procedures. In corroborating such a direction, the imports of electronic devices are an economic expression of the population's desire to acquire such devices to fulfill their needs (Khrustalev and Slavyanov, 2019). To proxy the supply of web accessibility, we follow Camara and Tuesta (2016) and analyze the secure Internet servers per 1 million people; a secure Internet server uses security protocols, such as transport layer security, so that personal information (e.g. credit card information or other sensitive information) sent out from the server is expected to be encrypted. Countries affected by the lack of secured Internet servers may compromise a population's data; therefore, this tends to reduce the preference for this communication channel (Dentinho, 2016). The exports of electronic devices are another way of measuring the competitive ability of a country to provide a response to the worldwide need for digital communication (Krugman, 2008).

*3.4 Control variables: economic development and the electoral profile of the country*

Authors such as Spoon (2011) and Mesquita *et al.* (2003) have shown the need for studies of political survival to consider two dimensions that the literature has recognized as significant – economic development and the profile of the electoral system.

The relationship between economic reality and the profile of the political regime is a relationship that is even found in the writings of Xenophon and Aristotle. Clearly, different economic realities also lead to different political realities, namely, systems of tyranny, dictatorship or democracy. However, following authors such as Acemoglu and Robinson (2012) and Banerjee *et al.* (2011), when we discuss economic development, we have to embrace a great diversity of realities that are simultaneously distinct and correlated with one another. From the relevance of GDP per capita and respective growth rates to the quality of the infrastructures and institutions involved, several dimensions have to be listed (Rodrik *et al.*, 2004). Other studies mention the need to also include the level of unemployment, the inflation rate, the profile of urban concentration, the family structure, the degree of openness to the outside and the weight of specific sectors (such as agriculture and services).

To assess the degree of economic development, we refer to several variables after considering the literature (Acemoglu and Robinson, 2012; Rodrik *et al.*, 2004; Banerjee *et al.*, 2011). Therefore, we use the following observations for the period of time that each party has lasted.

(1) Yearly Mean of per capita GDP
(2) Yearly Mean of the growth rate of per capita GDP
(3) Standard Deviation of the yearly rate of growth of per capita GDP
(4) Yearly Mean of the Unemployment rate of the country
(5) Standard Deviation of the Unemployment rate of the country
(6) Yearly Mean of the Inflation rate of the country
(7) Standard Deviation of the Inflation rate of the country
(8) Yearly Mean of the urban population in the country
(9) Mean value of the Average Number of Members per Household
(10) Land area
(11) Yearly Mean of Agricultural land (sq. km)
(12) Yearly Mean of Population growth (annual %)
(13) Yearly Mean of Net migration
(14) Yearly Mean of Trade (% of GDP)
(15) Yearly Mean of Agriculture, forestry, and fishing, value added (% of GDP)
(16) Yearly Mean of public debt (% GDP)
(17) Yearly Mean of Public expenditures (% GDP)
(18) Yearly Mean of Tax revenue (% of GDP)
(19) Yearly Mean of education expenditure (% GDP)

In addition, authors such as Johnston (2005) show how the dynamics of electoral processes have important effects on the sustainability of political projects. Thus, in addition to the elements inherent in inter-party competition in democratic regimes, it is important to analyze the evolution of the profile of political projects in electoral environments. Authors such as Wills-Otero (2009) report that many parties tend to disappear after poor electoral results in elections where they traditionally performed better. Specifically, many small parties with a strong expression in European parliamentary and or in regional elections tend to disappear from the political map more quickly after scant votes (especially in terms of percentage) in these elections.

To study the electoral profile of a country, we refer to several variables already tested in literature (Tanaka, 2006; Peters, 2001; Powell and Whitten, 1993). Therefore, we use the following observations for the period of time that each party has lasted.

(1) Average votes of each party in the legislative elections in which they participated
(2) Standard deviation of the votes of each party in the legislative elections in which they participated
(3) Maximum number of votes in legislative elections
(4) Minimum number of votes in legislative elections
(5) Number of elections in which they participated

(6) Percentage of the Average vote obtained in legislative elections
(7) Standard deviation of the Percentage of Voting in legislative elections
(8) Maximum percentage of votes in legislative elections
(9) Minimum percentage of votes in legislative elections
(10) Percentage of the Average Vote in elections to the European Parliament
(11) Standard deviation of the voting percentage in elections to the European Parliament
(12) Maximum percentage of votes in elections to the European Parliament
(13) Minimum percentage of votes in elections to the European Parliament
(14) Existence of one/two chambers of representatives/deputies
(15) And Number of deputy seats.

*3.5 Data sources*

We previously introduced technological progress as our focused dimension to explain the heterogeneous survival of political parties since 1945. Therefore, we extracted our related data from the World Bank (2019), which provides us data for the percentage of the population that uses the Internet, the percentage of service imports related to communication through electronic devices (which is assessed in the country's balance of payments), the number of secure Internet servers per 1 million people and the percentage of service exports related to communication through electronic devices (which is also assessed in the country's balance of payments). The data on the assessed dimensions for socioeconomic development also come from the World Bank (2019), which is a well-detailed, currently used dataset. Therefore, we extract from the World Bank the original data related to each country's set of the following variables: GDP per capita; the growth rate of per capita GDP; the unemployment rate of the country; the inflation rate; the urban population; the average number of members per household; the land area; agricultural land; population growth; net migration; trade; value added from primary activities (agriculture, forestry, and fishing); public debt; public expenditures; tax revenues; and education expenditures.

The major source for the political variables was Emanuele (2016). For the electoral variables, we also refer to Caramani (2000), the European Election Database (2019) and the Party Government Data Set (PGDS). Caramani (2000) is a well-established and discussed source of data and has provided enlarged insight into elections, electoral results by constituencies and other dimensions since 1815. The European Election Database (2019), following its own presentation paragraph, has provided information on several electoral dimensions "including election-related special Eurobarometer surveys since 1979." The European Election Database covers participation and voting behavior in European Parliament elections and include topics such as "the evolution of a political community and public sphere in the European Union, citizens' perceptions of and preferences about the EU political regime, and the evaluation of its political performance." Another well-defined database is PGDS, which has covered 39 parliamentary democracies since 1945, or the year that these countries became a parliamentary democracy (again), through 2008 (Woldendorp *et al.*, 2000). These data sources (Caramani, 2000; EED, 2019; Woldendorp *et al.*, 2000) provide the data for the following variables:

(1) Year of the democratic life of the country in which they appeared
(2) Year of the democratic life of the country in which they last participated
(3) Average votes from the legislative elections in which they participated

(4) Number of elections in which they participated

(5) % of the Average vote obtained in legislative elections

(6) Percentage of the Average Vote in elections to the European Parliament

(7) Existence of one/two chambers of representatives/deputies

(8) Number of deputy seats

The descriptive statistics for these variables are shown in Table 1.

## 4. Empirical section

### *4.1 A two-stage least squares model of parties' duration*

We start our empirical set of steps by enunciating our first empirical model. We intend to study the party duration for each party $i$.

$$\text{PartyDuration}_i = \alpha + \beta_i, \text{jTech}_{i,j} + \beta_{i,k}\text{X}_{i,k} + \varepsilon_i, \quad (1)$$

$\beta_{i,j}$ is a column-vector of coefficients to be estimated for the $j$ variables regarding technological development. In our case, $j = 4$ because we are studying the following 4 variables to assess the technological development that surrounds the development of each party: the percentage of the population that uses the percentage of service imports related to communication through electronic devices (which is assessed in the country's balance of payments); the value of secure Internet servers per 1 million people; and the exports of electronic devices. $\beta_{i,k}$ is another column-vector of coefficients to be estimated for the $k$ control variables that characterize the surrounding socioeconomic and political contexts in which each party developed its activity (which is represented by row-vector $X_{i,k}$). The next table shows the two-stage least squares estimations for the duration of a European party.

Let us also notice that we refer to the two-stage least squares estimators to correct the possible endogeneity biases due to the large number of controls that we intend to use (Holcombe and Boudreaux, 2013). To save space, we omit the list of estimates regarding the controls associated with the socioeconomic level of development in each party's country. The electoral dimensions are also included in the estimations, being the full results available upon request. We use robust-standard errors, and we did not reject the null hypothesis of the endogeneity test following the Durbin–Wu–Hausman test (Davidson and Mackinnon, 1993). Therefore, the exhibited estimations do not suffer from endogeneity problems, and the instruments used revealed to be exogenous (the full details are available upon request).

In Table 2, we observe that two variables related to the demand of new technologies – the percentage of the population identified as Internet users and the imports of electronic services (% of the balance of payments) – support the hypothesis claiming that technological advances have enhanced the political survival of parties. Parties therefore tend to increase their duration in competitive elections if they develop their action in economies with a higher technological development, especially coming from a higher preference revealed by the population able to use electronic devices. Interestingly, the two variables associated with a country's capacity of technological supply are not characterized by significant coefficients.

### *4.2 Survival analysis*

In addition to the preliminary two-stage least squares regressions, we also used survival analysis. We know that at any point in time, political parties face serious periods of having their survival in risk. To analyze these moments, survival analysis is used to estimate the impact of the changes in technological development on the survival rate of political parties.

As is standard, we begin our survival analysis with semi-parametric estimations through Cox regressions that assume proportional hazards; therefore, this empirical procedure means

| | # Observations | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Internet users (% pop.) | 217 | 48.804 | 28.862 | 0.232 | 98.25 |
| Electronic services imported (% Bal. Payments) | 217 | 91.717 | 10.053 | 15.97 | 99.17 |
| Secure Internet servers per 1 million people | 217 | 279,209 | 1,094,178 | 742 | 11,268,818 |
| Electronic services exported (% Bal. Payments) | 217 | 35.746 | 14.203 | 6.89 | 67.08 |
| Yearly mean of per capita GDP (USD) | 217 | 28,640.92 | 19,144.34 | 4,624.1 | 117,724.1 |
| Yearly mean of growth rate of per capita GDP | 217 | 5.570 | 7.322 | −27.4 | 38.2 |
| Standard deviation of the yearly rate of growth of per capita GDP | 217 | 5.272 | 6.231 | 1.762 | 17.772 |
| Yearly mean of unemployment rate of the country | 217 | 7.324 | 5.702 | 0.11 | 24.901 |
| Standard deviation of the unemployment rate of the country | 217 | 1.277 | 1.488 | 0.013 | 7.428 |
| Yearly mean of inflation rate of the country | 217 | 0.212 | 1.307 | −1.4 | 10.8 |
| Standard deviation of the inflation rate of the country | 217 | 0.071 | 0.222 | 0.001 | 1.952 |
| Yearly mean of urban population in the country | 217 | 6.31 | 9.272 | 5.080 | 58.36 |
| Mean value of the average number of members per household | 217 | 1.733 | 1.092 | 0.401 | 3.672 |
| Land area (sq km) | 217 | 196,296 | 184809.1 | 320.621 | 357598.3 |
| Yearly mean of agricultural land (sq. km) | 217 | 2.33 | 1.92 | 4.67 | 10.52 |
| Yearly mean of population growth (annual %) | 217 | 0.584 | 0.507 | −0.659 | 2.538 |
| Yearly mean of net migration | 217 | 242290.3 | 418,865 | −573,292 | 2,659,698 |
| Yearly mean of trade (% of GDP) | 217 | 88.423 | 53.441 | 1.56 | 396.96 |
| Yearly mean of agriculture, forestry, and fishing, value added (% of GDP) | 217 | 2.33 | 1.92 | 1.62 | 10.53 |
| Yearly mean of public debt (% gdp) | 217 | 55.06 | 44.78 | 2.09 | 177.07 |
| Yearly mean of Public expenditures (% gdp) | 217 | 20.93 | 19.91 | 1.76 | 107.6 |
| Yearly mean of Tax revenue (% of GDP) | 217 | 21.06 | 6.33 | 1.87 | 41.02 |
| Yearly mean of education expenditure (% gdp) | 217 | 4.92 | 1.47 | 1.87 | 7.98 |
| Average votes of each party in the legislative elections in which they participated | 217 | 460572.9 | 11807.76 | 103.65 | 9,711,736 |
| Standard deviation of the votes of each party in the legislative elections in which they participated | 217 | 167,219 | 433,313 | 76.1 | 3,094,517 |
| Maximum number of votes in legislative elections | 217 | 676,452 | 1,595,042 | 162 | 13,672,891 |
| Minimum number of votes in legislative elections | 217 | 279189.4 | 893900.9 | 76.2 | 8,691,406 |
| Number of elections in which they participated | 217 | 6.471 | 6.542 | 1 | 31 |

**Table 1.**
Descriptive statistics

(*continued*)

| | # Observations | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Vote obtained in legislative elections (mean, %) | 217 | 3.24 | 4.06 | 0.2 | 29.15 |
| Standard deviation of % vote in legislative elections | 217 | 1.291 | 1.573 | 0.34 | 14.17 |
| Maximum percentage of votes in legislative elections | 217 | 5.033 | 6.027 | 0.56 | 38.77 |
| Minimal percentage of votes in legislative elections | 217 | 1.833 | 3.153 | 0.39 | 28.21 |
| Percentage of vote in elections to the European Parliament (mean) | 217 | 2.56 | 3.90 | 0.41 | 22.933 |
| Standard deviation of the percentage of votes in elections to the European Parliament (mean) | 217 | 0.982 | 0.76 | 0.21 | 3.66 |
| Maximum percentage of votes in elections to the European Parliament | 217 | 3.779 | 5.868 | 0.052 | 35.21 |
| Minimum percentage of votes in elections to the European Parliament | 217 | 1.582 | 2.817 | 0.051 | 22.42 |
| Existence of one/two chambers of representatives/deputies | 217 | 1.585 | 0.493 | 1 | 2 |
| Number of deputy seats | 217 | 404.88 | 354.26 | 56 | 1,434 |

**Table 1.**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Internet users (% pop.) | 0.372*** (0.059) | | | |
| Electronic services imported (% Bal. Payments) | | 0.584*** (0.205) | | |
| Secure Internet servers per 1 million people | | | −9e−4 (e−3) | |
| Electronic Services exported (% Bal. payments) | | | | 0.023 (0.129) |
| Socio-economic controls | Yes | Yes | Yes | Yes |
| Political-electoral controls | Yes | Yes | Yes | Yes |
| Country (dummies) | Yes | Yes | Yes | Yes |
| $N$ | 216 | 216 | 216 | 216 |
| $R^2$ | 0.530 | 0.357 | 0.838 | 0.331 |

**Note(s):** *** Significance level, 1%

**Table 2.**
TSLS estimations – dependent variable: duration of a European party

that all parties face the same hazard function but with stable proportions. A widely recognized advantage of a Cox analysis leaves the shape of the hazard function undefined (Buis, 2006). The estimates of the parameters in the hazard function generate a function that is interpreted as a likelihood that a party disappears from the political map if the risk of being overthrown remains constant over time. Table 3 exhibits the Cox regression estimates.

Table 3 adds new insights to Table 2. In Table 3, we observe that higher values for the proportion of people who use the Internet increase the expected survival of political parties, which follows the value found in the estimation of the coefficient for this variable in Table 2. Contributing to a higher expected period of political survival, we now have the estimated coefficient for "Secure Internet servers per 1 million people," which can actually be interpreted as an additional insight which relates a higher Internet security with a higher political and sustainable duration of parties.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Internet users (% pop.) | −0.071*** (0.015) | | | |
| Electronic services imported (% Bal. Payments) | | 0.174** (0.085) | | |
| Secure Internet servers per 1 million people | | | −0.001*** (4e−4) | |
| Electronic services exported (% Bal. payments) | | | | −0.047 (0.042) |
| Socio-economic controls | Yes | Yes | Yes | Yes |
| Political-electoral controls | Yes | Yes | Yes | Yes |
| Country (dummies) | Yes | Yes | Yes | Yes |
| *N* | 216 | 216 | 216 | 216 |
| Log pseudo-likelihood | −250.42 | −290.89 | −54.63 | −230.63 |

**Source(s):** ***: Significance level, 1%; **: Significance level, 5%

**Table 3.**
Cox estimations

However, two new insights emerge from observing Table 3. The first new insight relates to the estimated coefficient for the variable "Electronic services exported (% Bal. Payments),"; we concluded this coefficient does not have statistical significance. The second insight relates to the estimated coefficient for the variable "Electronic services imported (% Bal. Payments)," which goes against the suggested interpretation for the estimated coefficient for this variable in Table 2. The rationale for this differentiation is in addition to the methodological reasons explored by George *et al.* (2014), who reminds us that while linear-square models consider the linear association among the variables (as in Table 2), Cox models leave the shape of the hazard function undefined. Given that the explicative variables appear in the exponentiated part of the empirical model [1], they may have different signals and statistical significance from the linear-regression coefficients (for instance, when data have a large range of observed values).

According to Sanhueza (1997), "The proportional hazard model has two shortcomings: (. . .) it assumes that the baseline hazard rate is independent of the covariates (. . .) and the partial likelihood estimation technique does not consider the baseline hazard (. . .)." Therefore, for robustness purposes and given that Cox regression estimates tend to be identified as less precise than parametric analyses (Sanhueza, 1997; Bright *et al.*, 2015), we also referred to a parametric analysis that can be used instead. For this purpose, we have to assume the shape of the hazard function. We tested different functional forms (exponential, Weibull, Gompertz, log-normal, log-logistic, and generalized gamma), although Table 4 shows only the three preferred forms due to likelihood ratio tests (exponential, Weibull, and Gompertz).

The coefficients from the various Parametric regressions appear in Table 4. Only for illustrative purposes, we suggest an interpretation for the estimated coefficient for the variable "Internet users" in the regression considering an exponential form for the survival distribution. As can be observed, the estimated coefficient is −0.055. There is a 0.055-unit decrease in the expected log of the relative hazard for each one percent-point increase in the population that uses the Internet when holding the other variables constant. For interpretability, we have to compute the hazard ratios by exponentiating the parameter estimates. For Internet users and again importing the estimates considering an exponential form for the survival distribution, $\exp(-0.055) = 0.946$, there is a 5.5%-decrease in the expected hazard relative to a country with one percent-point higher Internet users.

Across all the estimates for Internet users (regardless of the form of the survival distribution), we found converging and significant results. Therefore, we can assure that countries with a higher percentage of Internet users can offer better conditions of survival for the parties. A similar direction has been found for the relevance of electronic imports – they

| | Exponential | | | | Weibull | | | | Gompertz | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| Internet users (% pop.) | −0.055*** | | | | −0.072*** | | | | −0.075*** | | | |
| | (0.008) | | | | (0.015) | | | | (0.015) | | | |
| Electronic services imported (% Bal. Payments) | | −0.098*** | | | | −0.117*** | | | | −0.118*** | | |
| | | (0.036) | | | | (0.041) | | | | (0.043) | | |
| Secure Internet servers per 1 million people | | | −9e−5*** | | | | −e−4*** | | | | −2e−4*** | |
| | | | (e−5) | | | | (3e−5) | | | | (7e−5) | |
| Electronic services exported (% Bal. payments) | | | | −0.043 | | | | −0.051 | | | | −0.049 |
| | | | | (0.037) | | | | (0.045) | | | | (0.041) |
| Socio-economic controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Political-electoral controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country (dummies) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $N$ | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| Log pseudo-likelihood | −122.95 | −141.79 | −43.48 | −145.75 | −116.86 | −139.25 | −22.76 | −143.56 | −118.09 | −140.6 | −15.44 | −144.81 |
| Weibull param (p) | | | | | 1.458*** | 1.258*** | 3.601*** | 1.197*** | | | | |
| | | | | | (0.175) | (0.118) | (1.268) | (0.112) | | | | |
| Gamma param | | | | | | | | | 0.017*** | 0.015*** | 0.252*** | 0.008 |
| | | | | | | | | | (0.005) | (0.009) | (0.083) | (0.008) |

**Note(s):** ***: Significance level, 1%; **: Significance level, 5%

**Table 4.**
Parametric estimations

also tend to reduce the hazard that a party disappears from the national political spectrum. These two pieces of evidence reinforce the claim that the countries characterized by a population with a revealed preference for the use of new technologies tend to ensure better conditions of survival for a heterogeneous set of political parties. Moreover, a higher number of secure servers in the country is (again) associated with lower hazards of the political disappearance of the observed parties. However, and following the Cox regressions (Table 4), the percentage of electronic exports is not associated with significant influences in parties' survival.

### *4.3 Competing risks*

The weight of the most recent electoral results can be fatal to the survival of a party. Thus, the latest election results are a factor that generates competitive risks that can accelerate the disappearance of certain parties from the political map or instead reduce this risk if there are surprisingly positive results. We consider these different types of elections as competing risks. Following Warnock (2016), "A competing risk is an event that either hinders the observation of the event of interest or modifies the chance that this event occurs." For our study focused on parties' survival, participating in a disastrous regional election can be an event that competes with the event of interest (the disappearance of a party). Competing risk analysis enables the use of survival analysis to explore the differentiated results expected for the last election that each political party participates in.

Table 5 exhibits the findings from the competing risk analysis and separately assesses the risk of disappearing from the national political spectrum due to a negative electoral outcome in legislative elections, in regional/federal elections or in elections for the European Parliament.

For an overall insight, we observe again that higher levels of technological development tend to reduce the risk of a party disappearing after negative electoral outcomes, regardless of whether these outcomes are observed in the legislative or federal, European or municipal regional elections. The different values observed for $N$ in Table 5 are related to the different moments in which we identified the political disappearance of each party. For instance, in the first column, we observe that out of the 216 political parties being observed, 37 disappeared after a negative outcome in a federal/national election, 72 disappeared after a non-federal/national election, and the remaining cases were lost to follow-up before any disappearance.

## 5. Conclusion, implications and further challenges

Authors such as Runciman (2018) have emphasized how the technological development of recent decades, along with transversal phenomena such as the popularity of so-called social networks (Facebook, Instagram, etc.), have changed political life. They mainly focus on changes in how people live in a democracy, with implications for the way in which parties address these changes. This work contributes to this debate by testing the profound changes that the technological development of the last decades has contributed to an increase in the percentage of the population that uses the Internet and that consumes more products with an advanced technological base. If this type of change has caused major changes in the way that parties interact with electorates and with the political message itself, the way in which these advances interact in political parties' survival has thus far been little explored.

By using an appropriate empirical analysis, we observed that technological development – more than encouraging the emergence of new movements and parties – has led to greater survival for political parties in general. Thus, political parties are more likely to survive in the face of a positive evolution of technological externalities accessed by the population.

**Table 5.** Competing risks analysis: the role of the last observed election's outcomes

| | Legislative/ Federal Parl. | Legislative/ Federal Parl. | Legislative/ Federal Parl. | Legislative/ Federal Parl. | European Parl. | European Parl. | European Parl. | European Parl. | Municipal/ Regional Parl. |
|---|---|---|---|---|---|---|---|---|---|
| Internet users (% pop.) | −0.063*** (0.024) | | | | −0.041*** (0.011) | | | | |
| Electronic services imported (% Bal. Payments) | | −0.004 (0.099) | | | | 0.096 (0.133) | | | |
| Secure Internet servers per 1 million people | | | −e−4 (e−4) | | | | −9e−7 (2e−6) | | |
| Electronic Services exported (% Bal. Payments) | | | | −0.199*** (0.050) | | | | 0.024 (0.038) | |
| Socio-Economic Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Political-Electoral Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| Country (dummies) | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| *N* (Fail/Compet/ Censored) | 216 (37/72/107) | 216 (37/72/107) | 216 (37/72/107) | 216 (37/72/107) | 216 (71/38/107) | 216 (71/38/107) | 216 (71/38/107) | 216 (71/38/107)) | |
| Log pseudo-likelihood | −83.49 | −79.58 | −43.48 | −78.31 | | | −51.75 | −210.02 | |

**Note(s):** Significance level, ***: 1%

| | Municipal/Regional Parl. | Municipal/Regional Parl. | Municipal/Regional Parl. | Municipal/Regional Parl. |
|---|---|---|---|---|
| Internet users (% pop.) | −0.073*** (0.014) | | | |
| Electronic services imported (% Bal. payments) | | −0.154* (0.085) | | |
| Secure Internet servers per 1 million people | | | −8e−6*** (3e−6) | |
| Electronic services exported (% Bal. Payments) | | | | −0.049 (0.043) |
| Socio-economic controls | Yes | Yes | Yes | Yes |
| Political-electoral controls | Yes | Yes | Yes | Yes |
| Country (dummies) | Yes | Yes | Yes | Yes |
| *N* (Fail/Compet/Censored) | 216 (69/1/140) | 216 (69/1/140) | 216 (69/1/140) | 216 (69/1/140) |
| Log pseudo-likelihood | −285.35 | −244.6 | −67.91 | −286.39 |

**Note(s):** Significance level, ***: 1%

This evidence poses relevant political implications. First, there is a concern with party heterogeneity in economies with lesser penetration of technological development. Just as technological development is seen not only as an incentive for an increasingly broader political spectrum but also as a stimulating mechanism that leads to a greater survival of this generality of party forces, it is also reasonable to expect that parties will, in general, suffer greater impacts, such as a difficulty of survival in operating in more difficult economic realities with less accessibility to electronic development.

Second, another implication relates to the challenges posed to the democratic participation structures themselves. Citizens are currently more demonstrating their own political participation on the streets but mostly on social media. Such behavior implies changes in the way that political movements organize themselves to capture the electorate's attention and to increase the voice of their voters.

Third, the joint management of the various platforms for the dissemination of the political message requires challenges that have been successfully achieved. For example, the support of paper, radio or TV can continue to be extremely effective with certain groups of the electorate (particularly older populations or a population with specific preferences for these channels).

This work also poses significant challenges for research teams. First, we are aware of the importance of differentiating the observed sample, exploring its own weaknesses through the introduction of 'frailties' models associated with each case, and seeking to see how political survival is affected by the traditional size of each party (for example, verifying whether technological development has increased the survival of small or large parties). Second, extending the database to other countries with the respective parties will be a natural extension to verify the robustness of the results achieved here. Third, we also consider the possibility of extending this database to regional/local parties as well as to other European countries besides those here analyzed. Finally, we intend to test the role of technological development in the survival of the "popular movements" that are rapidly developing in the space of social networks focused on very specific purposes to understand the assumed survival profile due to the multiplication in platforms, social networks and applications.

It would also be very interesting to focus on a bottom up methodology (from regional analysis to more global/continental one) instead of a top-down approach like the one developed in this paper. Regional/local analysis of the same variables and their connections to political parties survival can shed a clarifying light in the political behavior of parties at supralocal levels. As people do not vote the same party at each level (this is a known peculiarity of the European voting behavior) and parties could survive at a local/regional level and disappear at national/federal and European ones, this challenge can also be considered in further researches. Additionally, dividing the analysis considering the different longevity of each democratic regimen can lead to complimentary insights (the multipartisan system in Europe has different times and chronologies since 1945 – e.g. Greece, Portugal and Spain regained democracy as we understand it, in the standard sense, only in the 1970s).

## Note

1. Equation 2 exhibits the general form of the Cox proportional hazards regression (Berlinski *et al.*, 2007; Bright *et al.*, 2015):

$$\lambda_i(t) = e^{x_i'\beta} * \lambda_0(t),\ i = 1, 2, \ldots, n \tag{2}$$

Equation 2 shows that with $n$ parties being studied, the hazard rate (the probability of the presence in polls after $t$ years, i.e. $\lambda_i(t)$), depends on the vector of the considered variables ($x$), the vector of the regression coefficients ($\beta = (\beta_1, \beta_2, \ldots, \beta_k)$), and the baseline hazard ($\lambda_0(t)$ (i.e. the probability of existing when all of the explanatory variables are equal to 0).

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## Further reading

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## Appendix

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|---|
| *Austria* (Communist Party of Austria; United Greens; Alternative List; No – Civic Action Group against the Sale of Austria; The Independents – Ligner's List; Dr. Martin's List; Liberal Forum; Citizens Forum of Austria; Team Stronach) |
| *Belgium* (Christian Flemish People's Union; Democratic Front of the Francophones; Walloon Rally; Ecolo; Agalev; Democratic Union for the Respect of Labour; Rossem; National Front; Vivant; List Dedecker; Workers' Party; People's Party) |
| *Cyprus* (PAME; Union of the Centre; New Democratic Front; United Democrats; New Horizons; Movement of Ecologists; Free Citizens Movement; National Popular Front; Citizens'Alliance; Animal Party) |
| *Denmark* (The Independent Party; Socialist People's Party; Liberal Centre; Christian People's Party; Progress Party; Common Course; The Greens; New Alliance; The Alternative) |
| (*continued*) |

**Table A1.**
List of studied political parties and countries

*Finland* (Smallholders' Party of Finland; Finnish Christian League; Constitutional People's Party; Green League; Pensioners' Party; Young Finns; Alliance for Free Finland; Reform Group; True Finns)
*France* (Gaullist Union; Poujade List; Extreme Right; Unified Socialist Party; Reformist Movement; Republican Radicals; Ecologists; Workers' Struggle; National Front; Other Right; Other Left; Greens; Ecology Generation; Other Greens; Extreme Left; Hunting-Fishing-Nature-Tradition; Revolutionary Communist League; Republican Pole; National Republican Movement; Mouvement pour la France; En Marche; Debout La France)
*Germany* (German Peace Union; National Democratic Party of Germany; The Greens; Party of Democratic Socialism; The Republicans; Alliance '90; German People's Union; Pirate Party; Alternative for Germany; Free Voters; Die Partei)
*Greece* (Progressive Party; Popular Orthodox Rally; Ecologist Greens; Independent Greeks; Golden Dawn; Democratic Alliance; Recreate Greece; Action Liberal Alliance; Front of the Greek Anticapitalist Left; The River; Union of Centrists; Teleia)
*Iceland* (National Preservation Party; Independent Democratic Party; Candidature Party; Independents from the South; Women's Union; National Party; Humanist Party; Liberals; Liberal Party; New Force; Icelandic Movement – Living Country; Citizens' Movement; Bright Future; Pirate Party; Household Party; Iceland Democratic Party; Right-Green People's Party; Rainbow; People's Party)
*Ireland* (Sinn Féin; National Progressive Democrats; Workers' Party; Anti H-Block; Progressive Democrats; Green Party; National Party; Socialist Party; People Before Profit; Social Democrats; Renua Ireland; Independents for Change; Independent Alliance)
*Italy* (Proletarian Democracy; Radical Party; Pensioners' Party; Green List; Lombard League; The Network; Forza Italia; Democratic Alliance; Italian Renewal; Italy of Values; European Democracy; New PSI; The Right; Five Star Movement; Civic Choice; Act to Stop the Decline; +Europe)
*Luxembourg* (Independent Party of the Middle Class; Popular Independent Movement; Enrôlés de Force; Independent Socialist Party; Green Alternative Party; Alternative Democratic Reform Party; National Movement; Green and Liberal Alliance; Communist Party Luxembourg; Pirate Party Luxembourg; Party for Full Democracy)
*Malta* (Democratic Alternative)
*The Netherlands* (Pacifist Socialist Party; Farmers' Party; Democrats 1966; Reformed Political League; New Middle Party; Reformed Political Federation; General Elederly Alliance; Socialist Party; Centre Democrats; List Pim Fortuyn; Liveable Netherlands; Party of Freedom; Party for the Animals; 50Plus; Forum for Democracy)
*Norway* (Progress Party; Red Electoral Alliance; Pensioners' Party; Coastal Party; Green Party)
*Portugal* (Christian Democratic Party; Workers' Party for Socialist Unity; Revolutionary Socialist Party; Democratic Renewal Party; National Solidarity Party; Left Bloc; Workers' Communist Party; People-Animals-Nature; Democratic Republican Party)
*Spain* (Democratic and Socialist Centre; Communist Unity Board; Democratic Reformist Party; Ruiz Mateos' Group; Galician Nationalist Bloc; Canarian Coalition; Republican Left of Catalonia; Union for Progress and Democracy; Amaiur; Podemos; Citizens; Animalist Party)
*Sweden* (Christian Democrats; Green Party; New Democracy; Sweden Democrats; Feminist Initiative)
*Switzerland* (Evangelical People's Party; Republican Movement; National Action; Progressive Organizations of Switzerland; Federation of Swiss Green Party; Feminist and Green Alternative Group; Swiss Motorists' Party; Ticino League; Green Liberal Party; Alternative Left)
*United Kingdom* (Scottish National Party; Ulster Unionist Coalition; Referendum Party; United Kingdom Independence Party; Green Party; British National Party)

**Table A1.** **Source(s):** Emanuele (2016)

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Paulo Mourao was born in Vila Real (Portugal). He is the author of several scientific articles indexed by ISI Thompson and of some books. His works are focused on Economics, Public Finance, Social Economics and Sports Economics. He appears often in national and international media for commenting social and economic issues. Paulo Mourao has been awarded several times for his scientific works. Paulo Mourao can be contacted at: paulom@eeg.uminho.pt