Media Aspects in Political Coverage: Theoretical Model under an Incumbent-Challenger Framework

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Table of Contents

Table of Figures

Table of Propositions

1. Introduction

Democracy is based on the principle of self-governance, whereby citizens elect representatives to govern them as they wish to be governed (Merriam-Webster, 2019). While the expectation is that citizens discipline and direct their leaders through voting in elections (Berganza, 2000), a number of factors in reality complicate the electorate's decision-making and access to accurate information on the activity and performance of governing bodies. Most often, individual voting is influenced by news media and its coverage of the politics of the State (Johnson, 2016). Voters rely on journalists and mass media to convey data and bridge the information gap between them and their representatives (Asp, 2007). It is perhaps unsurprisingly then that voters find themselves highly dependent on how the media covers the news, and the incentives behind the methods through which said coverage is conducted. Possibly more concerning is that politicians seem to be acutely aware of this fact, and often either use it to their advantage, or react to it prior to even conducting their election campaigns, to the potential detriment of the voters (Gehlbach and Sonin, 2014; Schiffrin, 2017).

In this paper, three modelling methods are developed, which integrate three different aspects of media coverage of political contests in democratic countries, with the aim of better understanding how different aspects affect the incentives and the electoral equilibria of candidates. These are: news coverage as a source of information, as political propaganda, and as a source of entertainment (Mazzoleni, 1987). Throughout these models, a distinction is made between incumbent and challenger. This allows for a more realistic representation of the most common form of political contest: the re-election.

Numerous papers have poured over the context behind incumbent advantages and on why incumbents tend to win re-election the overwhelming majority of the time (Open Secrets, 2019; Erikson, 1971). Some point towards incumbent quality (Ashworth and Mesquita, 2008; Green and Krasno, 1988), some the challenger pool (Lazarus, 2008; Adams and Squire, 1997), and a few others point to the media (Prior, 2006; Green-Pedersen et al., 2015; Hopmann et al., 2011). Even within the media factor, several papers already cover significant ground, breaking down the different categories of media versus party logic (Goidel and Langley, 1995; Altheide and Snow, 1979; van Aelst et al., 2008; Takens et al., 2013), party media agenda-setting (Hopmann et al., 2011), media capture (Gehlbach and Sonin, 2014; Schiffrin, 2017) and the media spectacle (Mazzoleni, 1987, 2008; Soesilo and Wasburn, 1994; Boumans et al., 2013; Street, 2004). There is however a

distinct lack of integration between the theoretical models of the media, the categorisation of media aspects, and the empirical evidence, both qualitative and quantitative. This paper aims to solve this concern, and more clearly highlight the effective contribution of the media to electoral success, using as standpoint the differences in coverage between challenger and incumbent.

Electoral disputes are modelled as first-past-the-post contests between two parties for a single indivisible prize, over multiple districts. As defined by Tullock (1980), the probability of either candidate winning depends on his exertion of effort, as a ratio over the aggregate effort made by all competing parties in that district. This paper extends this understanding to include functions of voter perception, which code the effort exerted by the candidates through the prisms of media coverage, type of effort (licit or illicit) exerted, and voter reaction to the consequent actions. The type of coverage conducted determines both the structure of this function and that of the effort constraint equation to it associated. The type of effort exerted determines both winning probability and the candidate's character. Voter reactions qualify the allocation of said effort.

As a baseline to compare our results to, we start by analysing the case of an open-seat election, whereby no distinction is made between candidates - both are put in the same situation, that of the dispute for a political role. We show that, while winning probabilities are split equally between candidates as one might expect, the effort allocation between different types of activities, licit and illicit, depends heavily on the society's own biases towards suspect political activity. While the relevance of social perceptions and contest organisation bias in electoral disputes is not doubted by specialised literature going back decades (Collier, 2002, Meyer, 1991; Bass and Dunteman, 1963), our baseline has the benefit of conveying such information in a more tractable way.

The first model developed is that where the news media's presumed primary role is that of transmitting information on governance and the status quo. This constitutes an incumbent vulnerability, as the critical and tendentially negative views espoused by the media (Prior, 2006) and the watchdog attitude towards the status quo (Green-Pedersen et al., 2015) create incentives for a much more inquisitive atmosphere of the incumbent's activities relative to the usual media coverage of a challenger. Our results show how this type of news broadcasting tends to marginally decrease the winning prospects for the incumbent, while forcing the candidate to exert less illicit effort and conduct less dubious activities than the challenger. Given the nubilous nature of backstage politics, there is

little research from which to base this finding. Nonetheless, there is broad empirical evidence that freedom of the press leads to shorter-lasting government tenures for corrupt incumbents (Brunetti and Weder, 2003; Chowdhury, 2004), and that authoritarian governments are more likely to censor mass media as a way to diffuse threats to their incumbency (George, 2007; Moore 2000). Both of these examples show a tendency for the news media to induce incumbent discomfort, modelled here.

The second model concerns media capture by governments – a situation where the media are not fully autonomous in their coverage, and are instead dependent on third-parties with vested interests who use them for other purposes (Mungiu-Pippidi and Ghinea, 2012). It can be seen as an advantage for the incumbent, and therefore it is here modelled as hampering the diffusion of the challenger's own electoral efforts. We show how this has the opposite effect to that documented in the prior model; in this case, the incumbent now has a much higher likelihood of winning the election, and is also the candidate who performs the most illicit actions. The relevant literature, broadly related to the alternative concept of "media agenda-setting", largely agrees with these findings (Weaver et al., 2004; Dearing and Rogers, 1996), which follow expectations of political influence on communication media carried out by relevant parties, and laid out in Hopmann et al. (2012) and Sartori (2005).

The third model, and perhaps the one which contributes the most to the academic literature, is that on the media spectacle and the commercialisation of political news broadcast. A relatively recent phenomenon which has been getting some traction in communication studies (Kellner, 2002, 2010, 2015), these studies are largely qualitative and empirical. This paper offers one of the first theoretical models on the impact of the media spectacle on political contests, and connects this phenomenon to the emergence of populism in the past few decades, a relationship documented in Mudde (2007) and De Jonge (2018). Considering situations both where only one of the candidates (incumbent or challenger) has celebrity status, and where both do, this paper finds highly volatile results, with the incumbent either producing identical levels of illicit effort or marginal more than the challenger. Winning probabilities are also highly dependent on the relative celebrity standing of the two candidates, with a slight advantage to the incumbent.

Model comparisons substantiate two general predictions. In a circumstance where only one of the candidates enjoy the benefits of a mediatic campaign, the biggest impact the news media has on the electoral contest is through that media spectacle, followed by its

role in the diffusion of propaganda, and finally of information. When both candidates benefit from similar levels of celebrity, the media spectacle becomes significantly less relevant, behind the stronger effects of propaganda and information. This has two implications: mass media's power as a political agent is closely tied to its commercialisation or dependence on the powerful; and the systemic failure of mass media's incentives in motivating the industry's aspiring goal, regularly seen as its raison d'être: criticise "what is" and find "what ought to be".

We consider two tests for robustness of the models' predictions, as well as a regression analysis. A nationwide party corruption mark-up on the cost of illicit effort is temporarily considered, and the models are for a moment generalised to include n parties. In both cases, equilibrium effort allocation does not change, and the adjustment in winning probabilities of the candidates only reduces the effects earlier described in a predictable, proportional manner as to not alter the main findings of this paper. The regression analysis performed, while it is itself fairly non-robust, serves as a first indication of the potentialities of the models detailed in the paper. A database was produced from scratch, including information on duration of government tenure (from the Party Government Data Set), legal and political pressures exerted on press freedom (from the Press Freedom Index), and details regarding the emergence of populism (from the Timbro Authoritarian Populism Index) and its connection to media sensationalism, as well as interacting variables. The simple regression found coefficients tendentially coinciding to those predicted by our models for media impact through both information and propaganda, albeit perhaps not as strong or significant as the models anticipated. The empirical findings with regards to the relevance and impact of media commercialisation implied both candidates benefitted similarly from the media spectacle, with the challenger coming out slightly ahead. While this does not correspond to one of the main predictions of the paper, comparisons of special cases of our models provide an explanation of this result dependent on the more democratic profile of the countries sampled (EU27). Less mature democracies are on the other hand expected to have the incumbent coming out ahead in media spectacularization effects.

This paper is structured as follows. Section 2 offers an overview of the literature consulted to develop the framework of the study conducted. In section 3, the models attempting to frame media coverage within election contest functions are introduced. Section 4 summarises our results. Section 5 offers a detailed discussion of the particularities of such

models. Section 6 provides the robustness tests to the main models. Section 7 establishes our indicative empirical analysis. Section 8 concludes.

2. Theoretical Framework

This paper contributes to the body of work on contest theory (from a methodological point of view) and media studies.

Contest theory is a well-defined branch of economics, with a broad base of topics and issues considered using its framework over innumerable papers (surveys in Corchon, 2008, Nitzan, 1994, and Konrad, 2006). One of the fundamental uses of contest theory is to study political competition, the Tullock (1980) contest success function being the most common method (check Baik, 1998, and Che and Gale, 2003, for alternatives). This function models the winning probability of a certain candidate as the ratio of its expenditure of a certain input over the total spent by all candidates. Such input is often related to either advertisement costs (Tullock, 1967; Pastine and Pastine, 2012) or effort (Crutzen and Sahuguet, forthcoming; Chowdhury and Sheremeta, 2011), and modelled either as a part of a constant function equal to it (Crutzen and Sahuguet, forthcoming), with an exponent (Chung, 1996; Nti, 2004), or integrated in the exponent of a mathematical constant (Hirshleifer, 1989). A less commonly used form of coding the input is by means of a Cobb-Douglas production function, whereby two inputs are considered instead, and both mediated by weights in their exponents (Cornes and Hartley, 2005; Gradstein, 1995, 1998; Corchón and Dahm, 2010). This paper adds to the literature on that particular form of the contest function, by considering both licit and illicit effort as part of what determines the voters' perception of the candidates' campaign platform.

Furthermore, this paper extends the literature on asymmetric contests (Sieger, 2010; Kirkegaard, 2012, for a theoretical study; Fonseca, 2009, for empirics). We combine asymmetric information of the media (modelled otherwise in Einy et al., 2014) with a candidate distinction between incumbents and candidates. This reflects the empirical literature, which has long distinguished candidates by political power when analysing general media effects (Goidel and Shields, 1994, Prior, 2006, Hopmann et al, 2011, Gree-Pedersen et al, 2015). In this paper, we widen the study of this divide by including differences in the impact and coverage of corruption charges (Peters and Welsh, 1980; De Vries and Solaz, 2017; Kolstad and Wiig, 2018, Chong et al. 2016), the use of mass media for political propaganda (Gehlbach and Sonin, 2014; Mungiu-Pippidi and Ghinea, 2012), and the emergence of twenty-first century populism politics (Mazzoleni, 2008; Street, 2004).

To the best of our knowledge, this paper is also the first to combine contest success functions with voter perceptions mediated by media diffusion of imperfect information on candidates. Most literature on the topic of media influence of political contests is limited to empirical analysis, including but not limited to Hopmann et al., (2011), and Green-Pedersen et al. (2015). The few theoretical models in the topic focus on the psychological methods of media coverage which may influence viewers in their political decision-making: framing, agenda-setting, and priming (Scheufele and Tewsbury, 2007; Scheufele, 1999, 2000; Iyengar and Simon, 1993; Entman, 2007). This paper looks instead at the aspects of media coverage in terms of their objectives and incentives, an approach more characteristic of economics literature (Mazzoleni, 1987). Our results contribute also to the comparative media studies literature by hierarchising these different objectives in terms of their effects on electoral winning probabilities. While these results are limited by the models used and assumptions made by the author, they are as far as one can see the first attempt at making such an effect comparison along these lines.

We also open a lead for new studies, particularly on the different types of effort and actions conducted by candidates while on the campaign trail, in their licit and illicit forms. Modern literature on this topic has focused on neutral reporting of candidate actions, particularly online and tendentially over strategy rather than actual activity (Foot and Schneider, 2002; Kreiss, 2014). This paper hopes to highlight the importance of the distinction between the two types, particularly in the context of media coverage. Illicit effort constitutes a risky move which the media may or may not identify, with practical effects for voter perception, while licit effort is always positive, though possibly less effective. Such a distinction has yet to be mirrored in the literature, which focuses more on consequences and effects rather than nature (Long, 2019; Sole-Olle and Sorribas-Navarro, 2018). The wider problem is discussed in Peters and Welch, 1980 and not yet solved as of Welch and Hibbing, 1997. Hazama (2018), and Cordero and Blais (2017) ask similar questions, though they still focus on the "why they do it" rather than the "what they do". Galeotti and Zizzo (2018), which conducts an experiment of voters' preferences for honesty and competence, is a remarkable exception, as it provides insight into voter attitudes towards different types of actions conducted by political candidates.

3. Models

Society consists of a continuum mass K of voters, K being an odd natural number. It is segmented into K electoral districts of identical size, each with a unit mass of those voters. One representative is elected to the legislature for each district, as per the characteristic first-past-the-post electoral system.

The electoral process constitutes the period prior and up to the day of the general election, when candidates are observed to be actively campaigning for votes. Campaign work is split in two measures of effort, licit (e) and illicit effort (h), which together produce the voters' perception of each candidate's platform.

Consider the voter's perception function of candidate i's political platform:

$$v_i = e^{\alpha} \cdot h^{1-\alpha}$$

Licit effort constitutes all effort which may be deemed legal and desirable by voters under complete information: character improvement, capacity to adapt to the wishes of the voters, good policy ideas - in general, "frontstage campaigning". Illicit effort on the other hand can be summarised as "backstage campaigning". It is the illegal effort or the actions most objectionable by the voters under complete information: the networking, the exchange of political favours, and/or questionable financial accounting tricks. Troublesome or not, both types of effort can and do contribute to a more positive perception of the candidates under incomplete information.

In the production function above, α represents the elasticity of a candidate's perceived political production to licit effort. In other words, it reflects the return in positive perceptions of the candidate's investment in licit actions, as a share of total candidate perception. One can also see α as representative of how much illicit actions are frowned upon in a particular country. The lower the α, the more positively viewed the consequences resulting from illicit acts are under imperfect information. This does not necessarily mean that the electorate is more or less favourable to corruption, only that it views its consequences more positively. While it is expected that this parameter will be relatively fixed over time in each country, it likely varies over different countries. We thus assume a uniform distribution.

Total effort $(e + h)$ is a finite resource. When each effort type is multiplied by its cost and summed, they amount to the candidates' effort constraint Y, the structure of which we may discuss in due time. The total available effort Y is identical for all candidates.

Politicians endogenously set these two types of effort to improve the perceived quality of their platform, increase their chances of (re)election, and thus maximise their expected utility. If elected, the winning candidate earns a payoff normalised to 1. The losing candidate earns 0. The objective functions of the candidates form the following pattern:

$$\Pr(winning\ the\ election\ |\ v_p, p = i\ or\ j\ )\ subject\ to\ the\ effort\ constraint$$

In each district, parties select a candidate to stand up for the election. Consider district d. In district d, voters observe the perceived efforts of 2 candidates, v_i, and v_j. It is assumed the probability that candidate i wins the seat in district d is given by the Tullock (1980) contest success function:

$$P_d^i \left(v_d^i, v_d^j \right) = \frac{v_d^i}{v_d^i + v_d^j}$$

The present model studies four particular cases:

1. The election is disputed by 2 identical challengers - "open seat" challenge
2. The election is disputed by an incumbent and a challenger (a "re-election" challenge), where media coverage is predominantly based on the role of watchdog
3. A re-election challenge, where communication media is subordinate to incumbent influence
4. A re-election challenge, where communication media is driven particularly by political star-making

We may now discuss these in succession.

3.1 Open-Seat Challenge

The open-seat election is the most simplistic form of election contest, where all candidates are virtually identical. It will serve as a comparative baseline of the effects the other cases have on the winning probabilities of the different candidates. In an open-seat election under a first-past-the-post electoral system, two candidates from different parties compete to be the political representative of a district, for all K districts in a country. The electoral

period corresponds to the candidates' process of setting their personal levels of licit and illicit effort, attempting to maximise the likelihood of getting elected. Consider challenger i's probability of getting elected in district d:

$$P_d^i(v_d^i, v_d^j) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{e_i^\alpha \cdot h_i^{1-\alpha}}{e_i^\alpha \cdot h_i^{1-\alpha} + e_j^\alpha \cdot h_j^{1-\alpha}}$$

Note how the perceived quality function of the political platform of all candidates is virtually identical. This reflects their similar standing in the election. All challengers are equally visible in the eyes of the voters and the media. The perception of their platforms depends on the same variables and elasticities. Furthermore, there is no reason to expect any candidate to have an advantage over the other in equilibrium. For technic simplification, the effort budget Y is identical for all, and the cost of both licit and illicit effort are the same (hereby normalised to one). These assumptions allow for the definition of a simple effort constraint:

$$e + h = Y$$

Consider thus the detailed objective function of candidate i from district d, identical to that of candidate j (here portrayed is only the version to optimise licit effort e):

$$P_d^i(v_d^i, v_d^j) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{e_i^\alpha(Y - e_i)^{1-\alpha}}{e_i^\alpha(Y - e_i)^{1-\alpha} + v_d^j}$$

This function will later allow us to identify the optimal share of the effort budget each candidate allocates to both licit and illicit effort.

3.2 Re-Election Challenge 1 – Information Role of the Media

The re-election challenge model allows for the introduction of candidate asymmetries into our computations, thereby favouring a deeper understanding of how these impact the allocation of the different types of effort and the winning probability of the different candidates.

As already mentioned above, we study one such asymmetry in depth: media coverage. Discussed briefly in section 2 (Brunetti and Weder, 2003; Prior, 2006; Green-Pedersen et al., 2015), one of the most empirically observed phenomena behind the so-called "incumbent advantage" is that of the role of the media in shaping the electoral process.

Prior to and during the official election campaigning period, one of the roles the communication media tends towards is that of a "watch dog" for the democratic process (Green-Pedersen et al., 2015; Mazzoleni, 1987). Society at large expects this, as well as an exposition of the daily troubles afflicting the country on which they are based. While this role shifts as the election comes close and the challengers to the incumbent become increasingly "newsworthy", it is safe to say incumbents tend to be the main target of the electorate's attention and criticism throughout one's term. While this has positives (e.g. visibility and voter recognition, as described in Prior, 2006) and negatives to the incumbent, we may focus on a particular negative side to increased media focus: the increase in the incumbent's corruption costs.

Corruption is doubtlessly a significant issue for all candidates in an election, though it is more often damaging for incumbents given the above (Peters and Welsh, 1980; Slomczynski and Shabad, 2011; Winters and Weltz-Shapiro, 2013, De Vries and Solaz, 2017). While it heavily relies on the strength of the corruption accusation (Vries and Solaz, 2017) among other conditions (Sikorski, 2018), when deemed relevant by the voters it has devastating effects (Ferraz and Finan, 2008; Kolstad and Wiig, 2018).

Consequently, the model is adapted to include different illicit effort costs for two distinct types of candidate:

$$Effort\ constraint: \begin{cases} e_i + h_i = Y & if\ i\ is\ a\ challenger \\ e_i + (1 + \delta)h_i = Y & if\ i\ is\ an\ incumbent \end{cases}$$

with $0 < \delta < 1$ being a mark-up on the cost of the illicit effort incurred by the incumbent. To define the exact mark-up, we consider the empirical findings of Chong et al. (2015). The paper finds that while neutral corruption campaigns against incumbents are highly effective (particularly in close contests), the impact depends heavily on the quality of the challenger too: if the challenger is predicted to be as corrupt, the voters tend to withdraw from the political process entirely rather than changing their votes.

Thus, consider mark-up δ for incumbent candidate i:

$$\delta = \sum_{j=1}^{n} \frac{Y - \hat{h}_j}{nY} = \sum_{j=1}^{n} \frac{\hat{e}_j}{nY}$$

for challengers from n parties of identical size.

The higher the predicted average licit effort $\hat{e}$ exerted by challengers to the incumbent as a share of their total effort, the higher the cost for the incumbent to incur on illicit effort. Note that this implies that, while voters are unable to verify an individual challenger's licit effort, they are able to gauge the average licit effort among the opposition candidates, akin to general awareness of the level of corruption existent among the opposition's political leaders.

Given all challengers are identical:

$$\delta = \sum_{j=1}^{n} \frac{\hat{e}_j}{nY} = \frac{\hat{e}_j}{Y}$$

Given candidate incumbent i for district d, consider thus the objective function of the incumbent (here portrayed is only the version to optimise illicit effort h):

$$P_d^i\left(v_d^i, v_d^j\right) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{(Y - (1+\delta)h_i)^\alpha h_i^{1-\alpha}}{(Y - (1+\delta)h_i)^\alpha h_i^{1-\alpha} + v_d^j}$$

Given candidate challenger j for district d, consider thus the objective function of the challenger (here portrayed is only the version to optimise licit effort e):

$$P_d^j\left(v_d^i, v_d^j\right) = \frac{v_d^j}{v_d^i + v_d^j} = \frac{e_j^\alpha\left(Y - e_j\right)^{1-\alpha}}{e_j^\alpha\left(Y - e_j\right)^{1-\alpha} + v_d^i}$$

This mark-up is assumed to be exogenously defined – as in that the challenger does not consciously define it. Despite using a modified single-challenger mark-up function (which could threaten this assumption), we maintain the expectation that because the mark-up is derived from the predicted (not actual) mean licit effort of all challengers, a single challenger's equilibrium effort is by itself inconsequential to the definition of the mark-up (as $n \to \infty$). To simulate this equilibrium condition, the general assumption is applied to this specific case by holding v_d^i as a constant when maximising e_j and h_j.

3.3 Re-Election Challenge 2 – Propaganda Role of the Media

An alternative role the communication media tends towards is that of the party propagandist, particularly for the party in power/most relevant party (Mazzoleni, 1987; Hopmann et al., 2012; Van Aelst et al., 2008 Beumers, Hutchings, and Ruylova, 2009;

Akser and Baybars-Hawks, 2012). Under this case, the incumbent's party controls to a significant extent what is highlighted as news, and can use such ability to complicate the challenger's efforts.

In the specialised literature, this type of media influence is identified as the result of "media capture". As defined in Mungiu-Pippidi and Ghinea (2012), media capture reflects a situation where the main media companies in a certain region or country are controlled by the government either directly or through third parties with vested interests in politics. It can be found in all types of democracies, from Spain (Schiffrin, 2018) to Czechia (Vojtechovska, 2017), to Latin America (Marquez-Ramirez and Guerrero, 2017). We may thus consider the Propaganda Model as indissociable (Gehlbach and Sonin, 2014) from this common occurrence (CIMA, 2017).

Viewing media coverage's effect in elections as only increasing the costs of illicit effort incurred by the incumbent is admittedly a one-sided consideration. We take the opportunity here to consider a situation where media access is an incumbency's advantage rather than a vulnerability. As before, a Tullock contest function is used:

$$P_d^i\left(e_d^i, h_d^i, v_d^j\right) = \frac{e_i^\alpha \cdot h_i^{1-\alpha}}{e_i^\alpha \cdot h_i^{1-\alpha} + v_d^j}$$

The incumbent's illicit effort h_i is interpreted as being representative of the incumbent effort allocation to media manipulation. It is assumed that the larger the share of total effort allocated by the incumbent to illicit effort, the more expensive it is for the challenger to exert that kind of effort. Consider thus a new mark-up, ε:

$$\varepsilon_j = \frac{h_i}{Y}$$

In full, the new effort constraint face by the challenger is

$$Y = e + (1 + \varepsilon)h$$

while the incumbent's remains unaltered.

A major difference between the mark-up δ of the earlier model, and the new mark-up ε is that while δ represents an average which we presume cannot be intentionally affected by the challenger, ε is fully determined by the incumbent, which as a single entity is

empowered to maximise his returns having in mind that relationship and how it affects the challenger.

Combining the previous equations, we obtain the objective function of the incumbent:

$$P_d^i(h_i, h_j) = \frac{(Y - h_i)^\alpha \cdot h_i^{1-\alpha}}{(Y - h_i)^\alpha \cdot h_i^{1-\alpha} + \left(Y - \left(1 + \frac{h_i}{Y}\right)h_j\right)^\alpha \cdot h_j^{1-\alpha}}$$

and that of the challenger:

$$P_d^j(h_i, h_j) = \frac{\left(Y - (1 + \varepsilon)h_j\right)^\alpha \cdot h_j^{1-\alpha}}{\left(Y - (1 + \varepsilon)h_j\right)^\alpha \cdot h_j^{1-\alpha} + v_d^i}$$

The equilibrium is akin to that of a Stackelberg model, where a leader (hereby the incumbent) defines his utility-maximising strategy through backwards induction of the equilibrium strategy of the follower (hereby the challenger). This adds an additional layer of differentiation between the two competitive roles.

3.4 Re-Election Challenge 3 – Spectacularisation Role of the Media

A third role media usually takes towards political elections is that of spectacularising the contestants, often from a commercial optic (Stromback and Esser, 2014) and from a framing of politics as a game rather than a dispute over issues (Stromback, and Van Aelst, 2010, Mazzoleni, 1987). This implies personalising political campaigns, making stars and celebrities out of the candidates (Kriesi, 2011; Porath, Suzuki, and Ramdohr, 2014), and thus constitutes a way by which the media impacts the political contest.

However, unlike the two previous effects we modelled, it is hard to assess which candidate, the incumbent or the challenger, most often gains from this commercialisation; there is virtually no empirical evidence supporting either possibility. In favour of the incumbent as the star, we may argue it is more likely due to the already mentioned extra exposure incumbents get in the communication media. Yet, it sounds more plausible that the challenger stands to benefit the most from such a status, as it may be able to embody (and thus galvanise) the opposition to the incumbent.

A prime example of this issue is Silvio Berlusconi, a media tycoon who revolutionised Italian politics in the mid-90s (Schlesinger, 1990). Mr. Berlusconi enjoyed enduring

popularity as Prime Minister of Italy for 9 years (longest serving post-WW2), born out of media personalisation and charisma, both as a candidate and as an incumbent.

Importantly, challengers, structurally holding the most precarious position, often do not have the access or the ability to heighten their own stardom, being more dependent on the whims of the media. All a challenger can really do to attract the interest of the media is to exert effort which, when under the spotlight of the watch dog, is perceived as highly positive by the electorate. Thus, one may argue that challenger stardom relies on the value attributed to positive effort by the electorate, as the more recognised positive actions are structurally, the more a hard-working candidate tends to stand out. On the other hand, incumbents may be able to influence the sustainability of their position through the delegation of political influence and even rent distribution. The incumbent influences his own stardom in a much more direct way, a way which is much less dependent on the value attributed by the electorate to any kind of effort.

A way through which one may thus model these considerations is by doing the following. The spectacularisation of the incumbent is assumed to be heightened/dependent on the illicit effort assigned to it (h), while the challenger's stardom is created through a fixed mark-up equal to the elasticity of licit effort (α) on the challenger's production function.

In mathematical terms (with effort constraints set to $e + h = Y$):

$$Voter\ perception\ function: \begin{cases} v_d^j = (1+a)e^a h^{1-a} & if\ challenger \\ v_d^i = (1+h)e^a h^{1-a} & if\ incumbent \end{cases}$$

This implies the following for the objective functions of the two candidates. For incumbent candidate i for district d, consider thus the objective function:

$$P_d^i\left(v_d^i, v_d^j\right) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{(1+h)e^a h^{1-a}}{(1+h)e^a h^{1-a} + v_d^j} = \frac{(1+h)(Y-h)^a h^{1-a}}{(1+h)(Y-h)^a h^{1-a} + v_d^j}$$

The objective function of challenger candidate j from district d is:

$$P_d^j\left(v_d^i, v_d^j\right) = \frac{v_d^j}{v_d^i + v_d^j} = \frac{(1+a)e^a h^{1-a}}{(1+a)e^a h^{1-a} + v_d^i} = \frac{(1+a)(Y-h)^a h^{1-a}}{(1+a)(Y-h)^a h^{1-a} + v_d^i}$$

By separating the three concepts of information, propaganda, and spectacularization, one may study the singular effects behind each, and thus come closer to a full-fledged model of media influence.

4. Results

4.1 Open-Seat Election

Candidate i district d chooses e_d^i to maximise the following equation:

$$P_d^i(v_d^i, v_d^j) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{e_i^\alpha (Y - e_i)^{1-\alpha}}{e_i^\alpha (Y - e_i)^{1-\alpha} + v_d^j}$$

The first-order condition is:

$$\frac{v_d^j (Y - e_i)^\alpha e_i^{\alpha-1} (e_i - \alpha Y)}{\left(e_i^\alpha (e_i - Y) - v_d^j (Y - e_i)^\alpha\right)^2} = 0$$

At the equilibrium, we have that, given the denominator is $\neq 0$:

$$e_d^{i*} = e_d^{j*} = \alpha Y$$

By the effort constraint, all remaining equilibrium values are identified:

$$h_d^{i*} = h_d^{j*} = Y - e_d^* = Y - \alpha Y = (1 - \alpha)Y$$

Formally:

Proposition 1: In open-seat elections with two identical candidates, candidates exert licit effort $e^* = \alpha Y$ and illicit effort $h^* = (1 - \alpha)Y$.

The winning probabilities can be calculated by applying the maximising inputs to the objective functions of each candidate. Because the two candidates are identical both in their objective functions and effort constraints, it is possible to directly conclude that the probability of wining is 50% each. In mathematical terms:

$$P_d^i(v_d^i, v_d^j) = P_d^j(v_d^i, v_d^j) = \frac{(\alpha Y)^\alpha \left((1 - \alpha)Y\right)^{1-\alpha}}{(\alpha Y)^\alpha \left((1 - \alpha)Y\right)^{1-\alpha} + (\alpha Y)^\alpha \left((1 - \alpha)Y\right)^{1-\alpha}} = 0.5$$

Formally:

Proposition 2: In open-seat elections with two identical candidates, the likelihood of either one winning is 50% (or $\frac{100}{n}$% for n candidates).

While these results do not deliver anything unexpected, they are hereby established as a baseline, against which we are to compare and contextualise the effects created by the re-election models framed earlier.

4.2 Re-Election Challenge – Information

In a re-election challenge, the existence of two types of candidates with different effort cost profiles implies two likely different equilibrium effort levels. We find them each at a time, starting with the challenger, and then proceeding to the incumbent.

4.2.1 Challenger

Challenger candidate j in district d chooses e_d^j to maximise the following equation:

$$P_d^j\left(e_d^j, v_d^i\right) = \frac{e_j^\alpha\left(Y - e_j\right)^{1-\alpha}}{e_j^\alpha\left(Y - e_j\right)^{1-\alpha} + v_d^i}$$

The first-order condition associated is identical to the one in the open-seat challenge. We thus go directly to the results:

$$e_d^{j*} = \alpha Y$$

$$h_d^{j*} = Y - e_d^{j*} = Y - \alpha Y = (1 - \alpha)Y$$

As of this point, we are not yet able to calculate the probability of victory of the challenger, given the exogenous variable v yet to be settled.

4.2.2 Incumbent

Incumbent candidate i in district d chooses h_d^i to maximise the following equation:

$$P_d^i\left(h_d^i, v_d^j\right) = \frac{(Y - (1 + \delta)h_i)^\alpha h_i^{1-\alpha}}{(Y - (1 + \delta)h_i)^\alpha h_i^{1-\alpha} + v_d^j}$$

The first-order condition for this problem is[1]:

$$\frac{v_d^j(Y - (1+\delta)h_i)^\alpha\big((1+\delta)h_i + (\alpha - 1)Y\big)}{\big((1+\delta)h_i - Y\big)\big(h_i(Y - (1+\delta)h_i)^\alpha + v_d^j h_i^\alpha\big)^2} = 0$$

At the equilibrium, we have that:

$$h_i^* = \frac{(1-\alpha)Y}{1+\delta} = \frac{(1-\alpha)Y}{1+\frac{\hat{e}_j}{Y}}$$

Note here how the equilibrium equation integrates a predicted, rather an actual value of licit challenger effort ($\hat{e}_j$). This marks the crucial distinction between the short and the long term in our model. In the short term, voters are uninformed about the equilibrium level of corruption/illicit activities carried out by any of the candidates. They are only aware of these actions in terms of the (positive) effects on their perception of the candidates' political platforms. In the long term however, voters can sense the overall levels of corruption in society and in each of the parties in regular political contention. In other words, $\hat{e}_j = e_j^*$. It is this sixth sense (regularly included in indexes of perceptions of corruption) that is contained in the mark-up of the incumbent's effort constraint.

To realise this, we substitute the equilibrium licit effort input of the challenger into the denominator, like so:

$$h_i^* = \frac{(1-\alpha)Y}{1+\frac{\hat{e}_j}{Y}} = \frac{(1-\alpha)Y}{1+\frac{e_j^*}{Y}} = \frac{(1-\alpha)Y}{1+\frac{\alpha Y}{Y}} = \frac{1-\alpha}{1+\alpha}Y$$

Note how h_i^* is equal to h_j^* divided over the cost mark-up. This sort of "discount effect" will leave a mark on the incumbent winning probabilities over the relevant values of α.

Finally, we apply the previous method to find the equilibrium licit effort e^i:

$$\delta = \frac{e_d^{j*}}{Y} = \frac{\alpha Y}{Y} = \alpha$$

$$e_i^* = Y - (1+\delta)h_i^* = Y - (1+\alpha)\frac{1-\alpha}{1+\alpha}Y = \alpha Y$$

Proposition 3: In re-election challenges with two candidates where the primary role of the media is that of information, challengers exert licit effort $e^* = \alpha Y$ and illicit effort $h^* = (1 - \alpha)Y$. These results are identical to those found in open-seat elections.

Proposition 4: In re-election challenges with two candidates where the primary role of the media is that of information, incumbents exert licit $e^* = \alpha Y$ and illicit $h^* = \frac{1-\alpha}{1+\alpha}Y$.
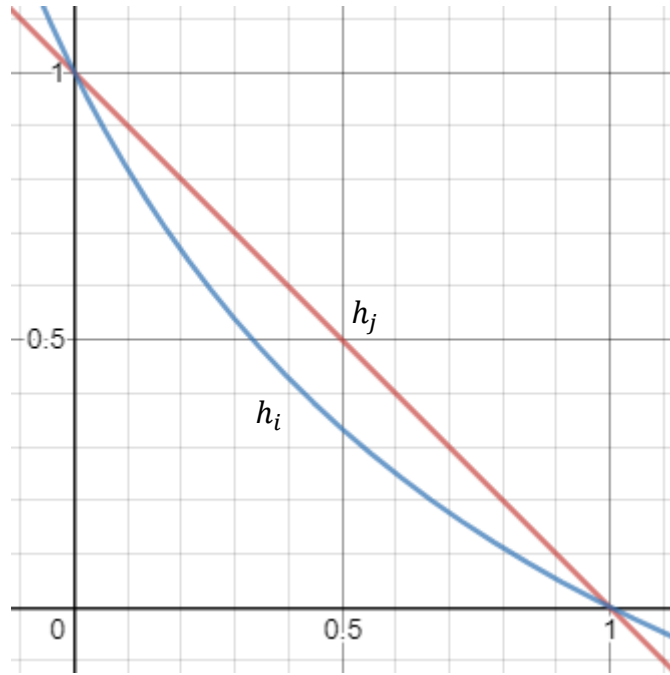
Graph 1: h_i and h_j over the relevant values of α.

With a more expensive illicit effort h, the incumbent has to expend more of his total effort to attain his maximising equilibrium. He is therefore unable to attain the same equilibrium as the challenger, who is not affected by the same concern. How much the incumbent's winning probability changes can be gauged by integrating the objective function of either of these intervenients in terms of α, an extra step as a result of the dynamics of the probability over the possible values of α. Given the presumed uniform distribution of this parameter, the integral should offer the average winning probability over all of its values.

Here, as in the rest of the section, Y is normalised to 1 for probability calculations:

$$\int_0^1 \frac{(\alpha Y)^\alpha \left(\frac{1-\alpha}{1+\alpha}Y\right)^{1-\alpha}}{(\alpha Y)^\alpha \left(\frac{1-\alpha}{1+\alpha}Y\right)^{1-\alpha} + (\alpha Y)^\alpha((1-\alpha)Y)^{1-\alpha}} \, d\alpha = 0.466$$

24

Formally:

Proposition 5: In re-election challenges with two identical candidates where the primary role of the media is that of information, the likelihood of the incumbent winning is 46.6%.
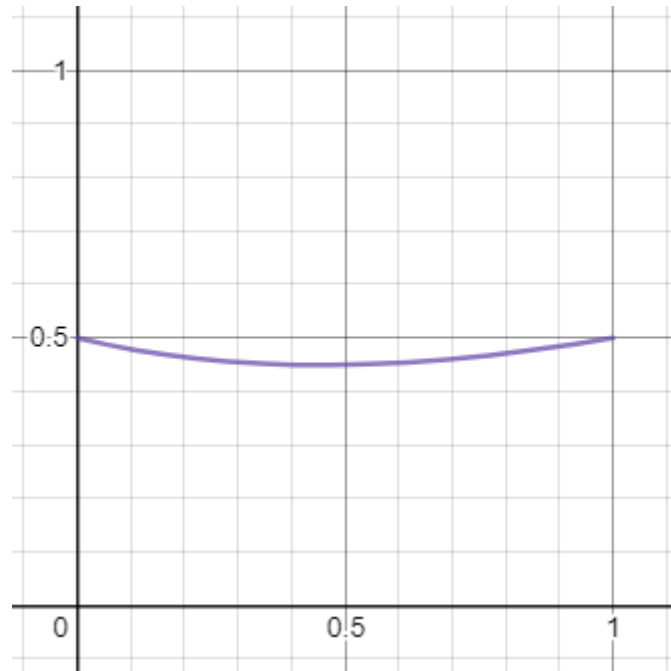
Graph 2: The incumbent's winning probability over the relevant values of α.

The non-monotonic function we find is convex over α as a result of the discount factor on the illicit effort of the incumbent. The lowest point on the curve, where $\alpha = \alpha^l = 0.455$, is the value for which the extra cost for the incumbent affects him the most. Below the lowest value of α, h is valued at a high enough level for the cost to be offset; above this lowest value, the high worth of e shift effort allocation away from h, thereby reducing any negative effects that plague the cost of h_i.

The higher costs to the incumbent reduce his chances of victory by 3.4%. While the reduction is highly intuitive, this result is quite striking when put into context. In the role of the watchdog, the media regularly works as a negative force for the incumbent's political platform (Berganza, 2000; Liu, Horsley, and Yang, 2012; Goidel and Langley, 1995). This is due to, as described before, the reformist outlook of the industry (Green-Pedersen et al., 2015). However, the impact found by the model is comparatively small relatively to what one would expect from such an important role. As described before, it is quite clear the impact of the communication media on politics. That this particular

effect is so small is thus more telling of the little impact this particular role has on the general media landscape.

That being said, it is also important to point out the fact the incumbent ends up allocating less effort to illicit activities than the challenger in this model. That is the case particularly where the elasticities of the two types of effort are most similar (where $\alpha \approx 0.5$). This implies that, for two identical candidates, the Information Model predicts the incumbent will be less "corrupt" than the challenger during the election. The information conveyed to the electorate by this fact is that, in a situation where the voters perceive the incumbent to be as corrupt as its challenger, and where voters still want to support lower corruption, it is preferred to vote for the status quo rather than for change, for the simple fact the incumbent is the incumbent. This implication also highlights elections as a way by which the electorate disciplines (but not necessarily punishes) the incumbent (Berganza, 2000).

4.3 Re-Election Challenge – Propaganda

Challenger candidate j from district d chooses h_d^j to maximise the following equation:

$$P_d^j(h_i, h_j) = \frac{\left(Y - (1 + \varepsilon)h_j\right)^\alpha \cdot h_j^{1-\alpha}}{\left(Y - (1 + \varepsilon)h_j\right)^\alpha \cdot h_j^{1-\alpha} + v_d^i}$$

The utility-maximising level of (il)licit effort is found by solving the equation for one of the inputs (first-order condition), and then using the effort constraint to find the other:

$$h_j^* = \frac{(1-\alpha)Y}{1+\varepsilon} = \frac{(1-\alpha)Y}{1 + \frac{h_i}{Y}}$$

$$e_j^* = Y - (1 + \varepsilon)\frac{(1-\alpha)Y}{1+\varepsilon} = \alpha Y$$

Note how both inputs depend on whichever value is defined by the incumbent as its level of illicit effort. Knowing this, the incumbent maximises the following objective function:

$$P_d^i(h_i, h_j) = \frac{(Y - h_i)^\alpha \cdot h_i^{1-\alpha}}{(Y - h_i)^\alpha \cdot h_i^{1-\alpha} + (\alpha Y)^\alpha \cdot \left(\frac{(1-\alpha)Y}{1 + \frac{h_i}{Y}}\right)^{1-\alpha}}$$

26

The first order condition of the problem above is:

$$\frac{(\alpha-1)Y^2(Y-(1-\alpha)Y)^\alpha(Y-h_i)^\alpha h_i^\alpha\left((\alpha-2)h_i^2+(1-2\alpha)Yh_i+(1-\alpha)Y^2\right)\left(\dfrac{(1-\alpha)Y}{1+\frac{h_i}{Y}}\right)^\alpha}{(h_i-Y)\left(\left((Y-h_i)^\alpha h_i^2+Y(Y-h_i)^\alpha h_i\right)\left(\dfrac{(1-\alpha)Y}{1+\frac{h_i}{Y}}\right)^\alpha+(1+\alpha)Y^2(Y-(1-\alpha)Y)^\alpha h_i^\alpha\right)^2}=0$$

The root of the problem, and thus our utility-maximising value for h_i, is

$$h_i^*=\frac{-Y\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)Y}{2(\alpha-2)}\vee\frac{Y\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)Y}{2(\alpha-2)}$$

Considering $0<\alpha<1$ and $Y,e^*,h^*>0$, only the left-hand-side (LHS) holds as both a root and a possible solution to the constrained optimisation problem, as the right-hand-side (RHS) is negative for all relevant values of α. Thus, for all the following calculations, only the LHS is used.

By the effort constraint, the above implies:

$$e_i^*=Y-h_i^*=\frac{Y\sqrt{8\alpha^2-16\alpha+9}-3Y}{2(a-2)}$$

$$h_j^*=\frac{(1-\alpha)Y}{1+\frac{h_i}{Y}}=\frac{(1-\alpha)Y}{1+\frac{-\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)}{2(a-2)}}$$

Formally:

Proposition 6: In re-election challenges with two candidates where the primary role of the media is that of propaganda, challengers exert licit effort $e^*=\alpha Y$ and illicit effort $h^*=\frac{(1-\alpha)Y}{1+\frac{\sqrt{8\alpha^2-16\alpha+9}-3}{2(\alpha-2)}}$.

Proposition 7: In re-election challenges with two candidates where the primary role of the media is that of propaganda, incumbents exert licit $e^*=\frac{Y\sqrt{8\alpha^2-16\alpha+9}-3Y}{2(\alpha-2)}$ and illicit effort $h^*=\frac{-Y\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)Y}{2(\alpha-2)}$.

By graphing the functions of illicit effort of both candidates, the intuition behind these results becomes clear.
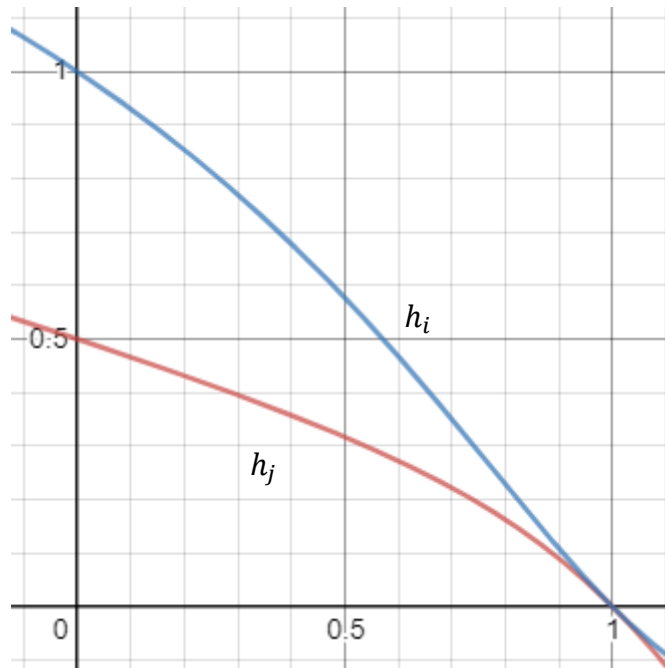
Graph 3: h_i and h_j over the relevant values of α.

Over all relevant values of α, the illicit effort incurred by the incumbent is larger than that incurred by the challenger, with the difference diminishing for increasing values of the parameter. The incumbent incurs more illicit effort than the challenger as doing so increases the cost mark-up of the challenger, thereby reducing the challenger's winning probability.

It is also interesting to note once again the dependency on α. As seen before, for increasing values of licit effort elasticity, licit effort becomes more attractive than illicit effort. For values of α just below 1, illicit effort is essentially non-significant - the challenger will not have any interest in spending effort on it independently of how much the incumbent increases the cost mark-up. It is thus unsurprising that the differences in effort allocation of the two candidates at this point are so residual.

Finally, special mention of the y-axis at $\alpha = 0$. When only illicit effort obtains a response from the electorate, the extra costs brought up on the challenger by the mark-up dependent on the incumbent become quite relevant. It should also be at this point that the incumbent will have the highest winning probability advantage.

The average incumbent's winning probability can be best understood by again integrating the objective function of either of these intervenients in terms of α.

$$\int_0^1 \frac{\left(\frac{Y\sqrt{8\alpha^2-16\alpha+9}-3Y}{2(\alpha-2)}\right)^{\alpha}\left(\frac{-Y\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)Y}{2(\alpha-2)}\right)^{1-\alpha}}{\left(\frac{Y\sqrt{8\alpha^2-16\alpha+9}-3Y}{2(\alpha-2)}\right)^{\alpha}\left(\frac{-Y\sqrt{8\alpha^2-16\alpha+9}-(1-2\alpha)Y}{2(\alpha-2)}\right)^{1-\alpha}+(\alpha Y)^{\alpha}\left(\frac{(1-\alpha)Y}{1+\frac{-\sqrt{8\alpha^2-16\alpha+9}-1-2\alpha}{2(\alpha-2)}}\right)^{1-\alpha}} \, d\alpha$$

$= 0.563$

Formally:

Proposition 8: In re-election challenger with two identical candidates where the primary role of the media is that of propaganda, the likelihood of the incumbent winning is 56.3%.

Graph 4: The incumbent's winning probability over the relevant values of α.

This satisfies the previous comments on the interaction between the levels of illicit effort of challenger and incumbent. The incumbent is most influent on the challenger's winning probability where illicit effort is highly relevant, and loses such influence as licit effort becomes more important. In the cases where the media's primary role is that of propaganda for the incumbent party, it is found that the incumbent's chances of victory increase by 56.3% on average. If this result were to be translated in vote percentages, it would imply a 12.6% difference in voting between the two candidates, only as a result of

the media's actions. This largely matches Hopmann et al. (2012) expectations of political influence on communication media carried out by relevant parties (Sartori, 2005) of a political system. If we take a moment to consider more of the literature on parties' "media agenda-setting" (Weaver et al., 2004; Dearing and Rogers, 1996), and connect to that the higher news-worthiness characteristic of incumbents (Green-Pedersen, Mortensen, and Thesen, 2015), those in power generally are in the prime spot to control the media agenda, as suggested by an increasing body of literature (Gehlbach and Sonin, 2014, and Besley and Prat, 2006, for a theoretical foray; Schiffrin, 2017; Enikolopov, Petrova, and Zhuravskaya, 2011, and Vojtechovska, 2017, for empirics). Our results are thus in the same nature of those found elsewhere.

4.4 Re-Election Challenge – Spectacle

Incumbent candidate i from district d chooses h_d^i to maximise the following equation

$$P_d^i(v_d^i, v_d^j) = \frac{v_d^i}{v_d^i + v_d^j} = \frac{(1+h)e^\alpha h^{1-\alpha}}{(1+h)e^\alpha h^{1-\alpha} + v_d^j} = \frac{(1+h)(Y-h)^\alpha h^{1-\alpha}}{(1+h)(Y-h)^\alpha h^{1-\alpha} + v_d^j}$$

where $Y = 1$.

The root of the problem, and thus our utility-maximising value for h_i, is

$$h_i^* = \frac{\sqrt{\alpha^2 - 10\alpha + 9} - \alpha + 1}{4} \vee h_i^* = -\frac{\sqrt{\alpha^2 - 10\alpha + 9} + \alpha - 1}{4}$$

As earlier, only the LHS holds as both a root and a possible solution to the constrained optimisation problem, as the RHS is negative for all relevant values of α. Once again, only the LHS is used.

Through the effort constraint (for $Y = 1$):

$$e_i^* = Y - h_i^* = Y - \frac{\sqrt{\alpha^2 - 10\alpha + 9} - \alpha + 1}{4} = \frac{-\sqrt{\alpha^2 - 10\alpha + 9} + \alpha + 3}{4}$$

Independently, the challenger maximises the following objective function in terms of h_d^j:

$$P_d^j(v_d^i, v_d^j) = \frac{v_d^j}{v_d^i + v_d^j} = \frac{(1+\alpha)e^\alpha h^{1-\alpha}}{(1+\alpha)e^\alpha h^{1-\alpha} + v_d^i} = \frac{(1+\alpha)(Y-h)^\alpha h^{1-\alpha}}{(1+\alpha)(Y-h)^\alpha h^{1-\alpha} + v_d^i}$$

The first-order condition of this maximisation problem is:

$$\frac{v_d^i(\alpha+1)(1-h)^\alpha h^\alpha(h+\alpha-1)}{(h-1)\left(v_d^i h^\alpha+(\alpha+1)(1-h)^\alpha h\right)^2}=0$$

The utility-maximising values for h_j and e_j are then:

$$h_j^* = 1-\alpha \quad\text{and}\quad e_j^* = \alpha$$

Formally, for both the incumbent and challenger:

Proposition 9: In re-election challenges with two candidates where the primary role of the media is that of spectacularisation, challengers exert licit effort $e^* = \alpha$ and illicit effort $h^* = 1-\alpha$.

Proposition 10: In re-election challenges with two candidates where the primary role of the media is that of spectacularisation, incumbents exert licit $e^* = \frac{-\sqrt{\alpha^2-10\alpha+9}+\alpha+3}{4}$ and illicit effort $h^* = \frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+1}{4}$.
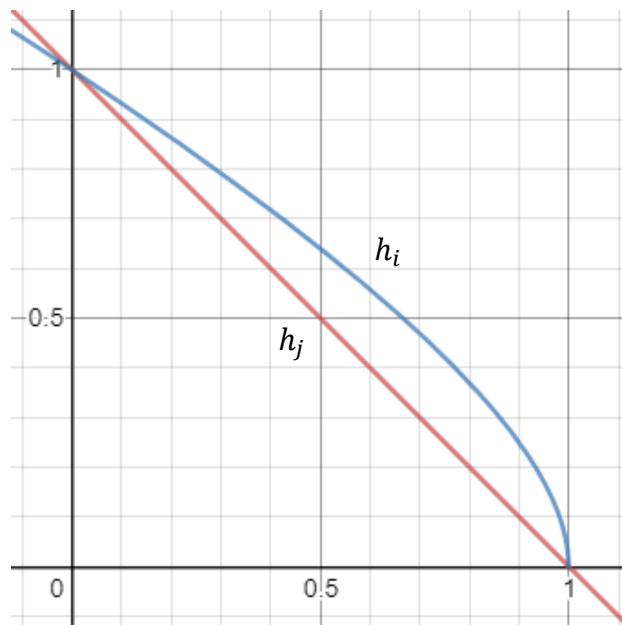
Graph 5: h_i and h_j over the relevant values of α.

There are two main conclusions to draw from these results. First, is the finding that using the elasticity of licit effort as a mark-up has no influence in changing the equilibrium allocation of effort of the challenger. Comparing the two candidate objective functions,

31

this result seems to be a consequence of the inability of the challenger to determine the value of the parameter directly. This inability, together with the multiplicative nature of the mark-up, means the conditions have not fundamentally changed for this type of candidate to alter his effort allocation. However, this does not mean the new mark-up is irrelevant, something that will soon become clear. Second, is the finding that as a consequence of the two different types of spectacularization, the incumbent is the one which allocates the most illicit effort. Directly tied to our first finding, this is the result of the ability of the incumbent to determine his own mark-up, which provides an incentive for him to change effort allocation significantly in the direction of illicit effort.

The average incumbent's winning probability can be best understood by again integrating the incumbent's objective function with all maximising inputs included. However, we now take a moment to consider three different instances: one where both incumbent and challenger enjoy stardom; one where only the incumbent does; and one where only the challenger does.

In that order:

$$\int_0^1 \frac{\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+5}{4}\right)\left(\frac{-\sqrt{\alpha^2-10\alpha+9}+\alpha+3}{4}\right)^{\alpha}\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+1}{4}.\right)^{1-\alpha}}{\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+5}{4}\right)\left(\frac{-\sqrt{\alpha^2-10\alpha+9}+\alpha+3}{4}\right)^{\alpha}\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+1}{4}\right)^{1-\alpha}+(1+\alpha)(\alpha)^{\alpha}(1-\alpha)^{1-\alpha}}\,d\alpha$$

$$= 0.509$$

$$\int_0^1 \frac{\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+5}{4}\right)\left(\frac{-\sqrt{\alpha^2-10\alpha+9}+\alpha+3}{4}\right)^{\alpha}\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+1}{4}.\right)^{1-\alpha}}{\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+5}{4}\right)\left(\frac{-\sqrt{\alpha^2-10\alpha+9}+\alpha+3}{4}\right)^{\alpha}\left(\frac{\sqrt{\alpha^2-10\alpha+9}-\alpha+1}{4}\right)^{1-\alpha}+(\alpha)^{\alpha}(1-\alpha)^{1-\alpha}}\,d\alpha$$

$$= 0.604$$

$$\int_0^1 \frac{(\alpha)^{\alpha}(1-\alpha)^{1-\alpha}}{(\alpha)^{\alpha}(1-\alpha)^{1-\alpha}+(1+\alpha)(\alpha)^{\alpha}(1-\alpha)^{1-\alpha}}\,d\alpha$$

$$= 0.405$$

Formally:

Proposition 11: In re-election challenger with two identical candidates where the primary role of the media is that of spectacularization, the likelihood of the incumbent winning is

50.9% where both the incumbent and the challenger are "stars", 60.4% where only the incumbent is, and 40.6% where only the challenger is.
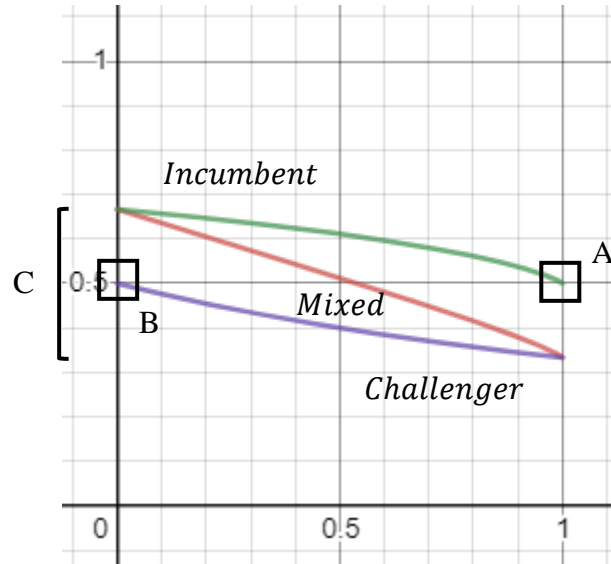
Graph 6: The incumbent's winning probability over the relevant values of α. Top line for the incumbent as a "star", bottom line for the challenger as a "star", middle line for both as "stars".

The resulting values are striking. First, it is found that, under mixed spectacularization (both candidates are celebrities), the winning probability of the incumbent is largest the smaller the elasticity of licit effort, but on average barely compensates for the star power of his opposition (50.9% vs 49.1%). This marginal difference seems to reflect once again the difference in mark-up control between the two candidates. Second, as α increases, illicit effort, essential part of the incumbent's mark-up, is found to decreases in importance, while the opposite happens to the challenger (whose mark-up dependents on α directly). This means that a general decreasing (increasing) trend in the incumbent's (challenger's) winning probability over increasing values of α can be observed for all three instances of the model. The third interesting result found is how impactful the media can be on election results in a situation where only one of the candidates enjoys the personalisation of his platform. If the incumbent is the only mediatic figure, then it stands to enjoy a likelihood of being re-elected 20.8% higher than the challenger (60.4% to 40.6%). On the other hand, if the challenger is the most relevant figure, then the incumbent has a 19% lower winning chance (40.5% to 59.5%). If the incumbent is the only mediatic figure, then it stands to enjoy a likelihood of being re-elected 20.8% higher

than the challenger (60.4% to 40.6%). On the other hand, if the challenger is the most relevant figure, then the incumbent has a 19% lower winning chance (40.5% to 59.5%).

Perhaps the most important consequence of the commercialisation and spectacularisation of politics in the rise of populism (De Jonge, 2018; Mudde, 2007). A re-emerging literature recently is that of populism studies, or the study of the causes, nature, and consequences of populist politics. While the term itself has contentious connotations (Stanley, 2008; Aslanidis, 2015; Canovan, 2004), it generally is associated to candidates who gauge the "will of the people" as their own, and conduct campaigns focused on bringing down the "entrenched and corrupt elites" (Allcock, 1971; Mudde, and Kaltwasser, 2017). One other thing populist often have in common is media attention. Be it Thierry Baudet in the Netherlands, Rodrigo Duterte in the Philippines, or Jair Bolsonaro in Brazil, populists everywhere are often on the (international) news (thought regional coverage varies drastically, e.g. Belgium (CSA, 2012)). Mass media can today be said to be the main mechanism by which candidates, challengers in particular, obtain coverage and celebrity status, and become an integral part of the spectacularisation of national politics. Most infamously in France with Marine Le Pen's National Front/National Rally party in 2017, and in the UK with Nigel Farage's UKIP in 2016, populist parties have been able to translate the spotlight into votes, often with overwhelming results. Such overwhelming results are in line with this paper's predictions. While there are multiple circumstances under which politicians may become celebrities (Denton, 1988; Salgado, 2018; Street, 2004), populist politics are indeed perhaps the best example of the predictions set in our model. The model also distinguishes the organic pull of celebrity challengers from the more managed status of incumbents, equally found in the literature (Albertazzi, 2015; Mansfield, 1995).

4.5 Model Comparison

4.5.1 With Average Probability

Up to this point, we have modelled and made predictions with regards to how likely it is that a candidate wins an election, having in mind both capacity (incumbent or challenger), and media role. For technical reasons, it is not possible to obtain results for a more complex model including all three types of role. Consequently, interaction effects are not captured by this paper's method. However, it is still of interest to consider a composite

form of the results obtained above. This composition is achieved by simply overlapping the different models we have looked at thus far, and as a consequence may not be completely identical to a situation where all effects are integrated into a single model.

Of the three role types, that of media as a watchdog and as a challenger star-maker are the only two where the incumbent's winning probability is lower than that of the challenger. This limited occurrence matches known empirical findings on the generally overwhelming nature of incumbent advantage (Open Secrets, 2018). However, these two situations imply very different electoral results. In our watchdog model, mass media's political intervention creates a 6.8% unfavourable gap between the incumbent and the challenger, while in the spectacle model a celebrity challenger has a 19% advantage over his competitor. While we may not take these numbers as fact given the simplifications of our model, comparatively, the support a challenger may inadvertently obtain from the media through its pursuit of truth and fact appears to be less relevant than support deriving from status.

On the other hand, incumbent stardom and propaganda are the most significant positive indicators for incumbent victory probability, in that order (60.4% and 56.3% respectively). This is of reasonable sense, as both are dependent on incumbent decision-making, which allows the candidate to pursue a maximisation path from both of these model's identifying characteristics.

While the propaganda model yields more impactful results than the watchdog model, a comparison with the spectacle model requires a more qualified analysis. When the primary role of the media is that of disseminating political propaganda, our model finds the incumbent to have a 12.6% lead over the challenger. This is lower than that identified for single-star political elections (19% for a celebrity challenger, 20.8% for celebrity incumbents) yet much higher than in the mixed Spectacle Model (12.6% vs 1.8%). In fact, even the watchdog model yields higher effects (6.8% vs 1.8%), and the baseline open-seat election model only slightly less (0% vs 1.8%).

With both of the above considerations in mind, we are then capable of making two significant claims:

Proposition 12: Where political celebrity status is due to a single candidate, mass media's primary political impact is through spectacularization, followed by propaganda, and finally that as a watchdog.

Proposition 13: Where the political spectacle involves all candidates, mass media's primary political impact is through propaganda, followed by that as a watchdog, and finally through spectacularization.

As discussed earlier, the Propaganda and the Spectacle models both point towards the incumbent as the candidate with the largest allocation of effort towards illicit activities, while the challenger takes the upper hand in the Information model. While this may be too demanding a task for this non-general model, these results seem to point a tendency for the incumbent to perform the most illicit acts overall on the campaign trail, as Propaganda and Spectacle are either the two most important effects, or the most important and a close third respectively. Further research on this possibility is needed and advised.

The American Press Institute defines journalism as "the activity of gathering, assessing, creating and presenting news and information" (API, 2019). The findings of our model challenge this definition directly. API's definition is most associable to our watchdog model of the media, where mass media is perceived as a social-reformist source of information on the status quo. In comparing this seemingly primary role of journalism with the alternative models, the official definition comes up short. While not entirely contentious in modern literature on communication, this fact is nonetheless notable.

Also worthy of note is the dependency of mass media's primary journalistic role on the characteristics of the "political spectacle". In a highly mediatic environment, where both candidates benefit from their own celebritization, the difference-maker rests on whichever one is better able to disseminate their political propaganda. In such a circumstance, the work conducted on the nature of media capture by incumbents in communication literature is ever so relevant. In the case where only one of the candidates attains celebrity status, the hierarchy changes somewhat, with media spectacularization becoming the most importance characteristic (though propaganda remains more relevant than information). This seems to explain elections where the incumbent faces little opposition in campaigning for re-election, and the resulting overwhelming voting disparities.

Let us consider for a moment a coupling of all these characteristics into a single model. While any results will lack robustness for our modelled dismissal of other sources of incumbent-challenger distinction, and the exclusion of interaction effects and alternative

36

model weightings, it is nonetheless of interest, in particular for within-paper comparisons. Note how we are not integrating the different models into a single solvable model, but rather identifying the net combined effect of these over all relevant values of α.
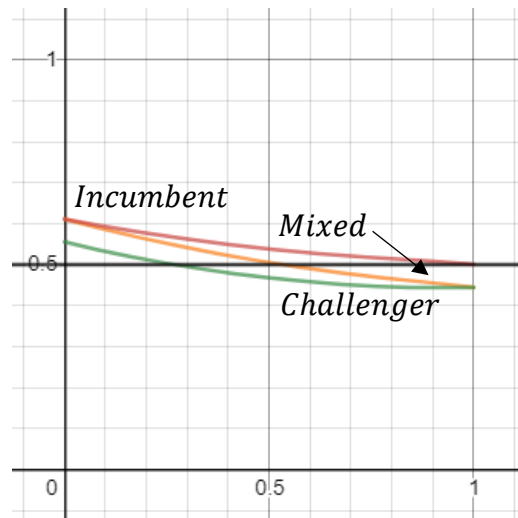
Graph 7: The incumbent's model-combined winning probability over relevant values of α. Top line for incumbent as a "star", bottom line for challenger as a "star", middle line for both as "stars". Line at y=0.5 is the 50/50 baseline.

Performing the integral of each of the combinations yields the following results. When combining the information and propaganda effects with that of the star incumbent, we obtain an expected winning probability for such candidate of 54.5%; considering a star challenger instead yields 47.8% victory likelihood for the incumbent; and having a mix of the two yields 51.3%. We may also consider a situation where neither candidate attains celebrity status, which automatically yields a 50% chance of victory to either candidate (akin to the baseline model). In this situation, the winning probability for the challenger is of 51%.

Formally:

Proposition 14: The incumbent's winning probability when combining the individual effects of media as source of information, propaganda, and spectacularization for the incumbent is of 54.5%.

Proposition 15: The incumbent's winning probability when combining the individual effects of media as source of information, propaganda, and spectacularization for the challenger is of 47.8%.

Proposition 16: The incumbent's winning probability when combining the individual effects of media as source of information, propaganda, and spectacularization for both candidates is of 51.3%.

Proposition 17: The incumbent's winning probability when combining the individual effects of media as source of information, propaganda, and non-spectacularization is of 51%.

Most striking is the fact that such numbers are much lower than those usually attained by encroached incumbents, and are more similar to those incumbents participating in heavily contested elections. Certain results in particular, such as the composite model where the incumbent is the single beneficiary of media spectacularisation, fit empirical predictions worse than others, like for example the composite model where there is wider media spectacularisation (Aalberg, Stromback, and de Vreese, 2011). Nonetheless, the model hierarchy of incumbent returns seems to fit unusually well with the expected (Takeshita and Mikami, 1995; Porath, Suzuki, and Ramdohr, 2014; Mazzoleni, 2008).

4.5.2 Special Cases

Thus far we have shied away from model comparisons using specific values of α, instead using its presumed uniform distribution to compare models on their mean in this parameter. Consider now some special cases, where the α selected yields significantly different predictions. While we have touched briefly in each part of section 4 on how the models behave over all relevant numbers of α, we hereby take the time to show some of the stark contrasts one may obtain depending on how an electorate perceives the consequences of political activities carried out by candidates.

In our Information Model, graph 1 highlights a particularity which can be observed in most other models. More extreme values of α (tending towards 0 or 1) tend to create less distinctions between challenger and incumbent results. Graph 2 shows the consequences of this particularity in terms of the incumbent's winning probability. This has the interesting implication that countries whose electorate values the consequences of illicit activities very little (in terms of their impact on winning probabilities) will see a watchdog media impact of similar proportions to a country which values these consequences highly.

Voters who have little interest in such distinction (α towards 1/2) on the other hand benefit from the maximum impact of this aspect. The reasoning for this appears to be the following. In countries where illegal activities have consequences of little value for the electorate, politicians of all types will have no interest in spending effort on those, in the pursuit of probability maximisation under resource constraints. Since the model places higher costs for the incumbent only on the allocation of illicit effort, the loss of importance of this type of effort will offset the relevance of that cost. On the other hand, in countries where illegal activities have consequences of high value for the electorate, both incumbent and challenger will want to focus particularly on that type of effort. This means that, tending towards $\alpha = 1$, the mark-up on the incumbent's effort constraint will become meaningless. Here's how: the challenger, spending more on illicit effort, devalues the mark-up by raising voter predictions over the opposition party's level of corruption. The middle value of parameter α is the point at which the two effects are most limited – illicit effort is relevant without being overwhelming, and the mark-up effect is maximised.

In the Propaganda Model, the case is significantly different. This time, both graphs 3 and 4 point to a decreasing incumbent winning percentage trend over the relevant values of α. This implies a significant difference between electorates that value "illicit consequences" and those who do not. For countries at the beginning of the spectrum, which only value illicit consequences ($\alpha = 0$), propaganda is highly effective in increasing the likelihood of the incumbent winning. On the other end, with α towards 1, the difference in winning probabilities between challenger and incumbent is essentially null. This implies that fairer and more moral societies, more averse to illicit consequences, are less impacted by attempts on the part of the incumbent to shut down the diffusion of the challenger's party platform. This seems to be linked to the investment of the incumbent on illicit activities. As α increases, the value of illicit effort decreases in terms of its impact on winning probabilities. As a consequence, it is less interesting for the incumbent to invest on increasing the cost of illicit effort of the challenger, as by doing so he risks deviating from his own optimal allocation. The challenger himself is also less likely to spend effort on illicit activities under these conditions, reducing the importance of the mark-up further.

The Spectacle Model appears to combine both of these trends. The curves are smoother for moderate values of α, like in the first model, but there is clear winning probability trend downwards that marginally benefits the incumbent in all three instances of the

Spectacle Model, akin to the second model. In graph 6, we see how a society which does not care for illicit consequences presents a winning likelihood to a celebrity incumbent which matches that of a non-celebrity challenger under identical circumstances [A]. This results from the increasing irrelevance of illicit effort for higher values of α. We also see how this result is quite similar to that of the celebrity challenger when the electorate cares quite a lot for illicit consequences [B]. Since the effect from being a celebrity challenger is inadvertent, and comes from the care of the voters for licit effort, an $\alpha = 0$ nullifies such effect. The mixed instance of the model generalises these similarities into an almost straight decreasing line with a slight positive "bias" to the incumbent's winning chances. In the case of this mixed instance, the α of the country is crucial to define which candidate stand to benefit the most: the two extremes of this curve are separated by a winning probability of 1/3 [C].

Given the above, it is perhaps unsurprising that graph 7 shows α impacting the winning probability of the incumbent quite significantly, adding a layer of volatility. For lower values of α, all instances of model combination point to the incumbent having a higher likelihood of winning. This can be connected to the generally found incumbent advantage in re-elections in first-past-the-post systems, if one can prove the high interest for illicit consequences in those societies. The possibility that more politically corrupt countries (particularly those found in developing countries) tend to see dictatorships and longer tenures in power for incumbents is a hypothesis this paper to this extent supports. On the other hand, highly moral electorates are hereby expected to lead to a probabilistic advantage for challengers, particularly under the mixed and pro-challenger instances, while the pro-incumbent challenger leaves the winning probabilities balanced. This idea is tested (and eventually supported) in section 7.

5. Discussion of the Models

Some of properties shared by all the models deserve deeper consideration.

An assumption of the voter perception function used is that, if any type of effort is carried out, the voter perception function must be positive. This is assumed to fit the model as much as possible to reality, where any effort made necessarily creates an impact (unless it is ineffective, though there is little reason to think effectiveness depends on performing both types of effort). This implies that if a candidate incurs effort e, it necessarily also expends a minimum h, as if the latter were to be zero the licit effort would have no impact on the perception function. This is a consequence of the structure of the Cobb-Douglas function, which determines that the two inputs included in it are complements. One may excuse this issue by highlighting the practical inability to perfectly satisfy a large mass of people, meaning any action incurred by politicians which may be systemically disagreeable by a large portion of the electorate is liable to be considered "illicit effort". Illicit effort itself may benefit from having a clearer definition. By this definition, the abovementioned disagreeableness must (1) be the result of a moral rather than political issue, and (2) bring positive results to a campaign's perception under imperfect information but negative results in the event of perfect information. Under this wider definition, it is highly unlikely a candidate does not incur in some level of illicit effort.

Given the way electoral inputs are modelled in this paper, one may have difficulty to code specific actions such as bribes, misappropriation of state funds, and nepotism. These illicit actions taken by candidates arguably have both an expenditure and an effort component. For all of these cases, it is important to identify what is most meaningful for the voters when such cases are reported: how much money was spent on these actions, or the fact that they at all occurred? The literature on media coverage of political scandals falls short of distinguishing the two effects. Consequently, this paper takes the liberty to assume the latter, and codes the effort made by the candidates to perform these acts as part of its measure of illicit effort.

The models developed in this paper consider only licit and illicit actions liable to change the voter perception of a given political campaign. A particular case worth mentioning is that of spending and exerting effort with the purpose of directly manipulating the results of an election. This type of intervention under imperfect information is unlikely to change the perception of the electorate with regard to a particular party platform yet it increases

the chances of one's election, arguably enough to guarantee a win to whoever practices it (e.g. the incumbent giving himself extra percentage points in the election by coercing officials). This paper's stated intention is to shed light on the role of the media in political contests. Therefore, all actions not directly associable with the way the media portrays elections are not considered. This is one of them, as election results manipulation does not make use of media channels.

Finally, a point is due on the use of identical effort budgets for all candidates, both incumbents and challengers. In the case of an open-seat election, any difference in effort budget size between the otherwise identical candidates would immediately imply that those with the larger budget are more likely to win the election. The additional budget would either allow the benefitted candidates to attain higher equilibrium levels, or leaves all equilibrium inputs unchanged. The same can be applied to re-election campaigns. Those with higher budgets are now more likely to win the election that they would otherwise be, though this does not necessarily imply they are now the candidates most likely to win. Given the analytical simplicity of this alternative, this paper takes a candidate similarity approach.

6. Robustness Check

In this section, two model robustness checks are performed, which may strengthen the conviction of the results obtained from the main models. More precisely, we consider the relevance of (1) nationwide opposition party corruption and (2) a different number of parties.

6.1 Nationwide Party Corruption

In its Information Model, this paper analyses the role of the media as a political watchdog by including a mark-up on the effort constraint of the incumbent, symbolising the additional scrutiny under which political incumbents are. Importantly, this mark-up is dependent on the average level of illicit effort exerted by district challengers to the incumbent. While illicit does not mean illegal (section 5 for this clarification), the two are arguably correlated. Consequently, the more illicit actions conducted by district challengers, the more corrupted and untrustworthy these candidates will be presumed to be in the long run (where predicted corruption matches actual corruption). According to Chong et al. (2015), this implies that the incumbent's illicit activities and corruption scandals, once discovered, provoke costs with not-as-high an impact on the incumbent's winning chances. Voters will not change their allegiance from the incumbent to the challenger as much as they otherwise would, if the challengers were more trustworthy.

While such assumption is rooted in theory and fits properly within district-level design, extra considerations must be made with regards to what such mark-up function means at the country level. While at the district level incumbent and challenger are neatly divided across party lines, at the country level each of the two parties should have both incumbents and challengers in its ranks across districts. This could create a problem to our model.

Here is how. At the district level, we observe the levels of illicit level conducted by the challengers to verify how much more it will cost the incumbent to allocate effort to illicit actions. At the country level, there is no single party which combines all the different districts' challengers against a different party combining all the different districts' incumbents. This implies that our mark-up is unable to properly aggregate all different instances of corruption in the country. Left missing are the effects from national partywide corruption scandals, and spill-over effects from adjacent district corruption.

For a model based on incorporating all effects from incumbent corruption being found and highlighted by the media, this leaves our work incomplete.

To answer this, we start by highlighting the regionality principle of this function. As it pertains to district elections in a plurality rule election system, the electorate's perception of corruption is limited to the area where each voter votes. The parties are seen as loosely aggregated bodies, so that a political scandal within a district does not affect another. This fits with general expectations in the literature on party structure under first-past-the-post electoral systems (as evidenced namely in Polodny, 1994, with the example of the US).

This nevertheless still leaves open the possibility of nationwide corruption as a result of a national, party-specific scandal, which would doubtless affect both the incumbents and challengers of the party. Consider thus an additional cost mark-up, to be added to the effort constraint of both the incumbent and the challenger:

$$\varphi = \sum_{d=1}^{k} \frac{h_d}{kY}$$

For clarification purposes, our discussion of corruption is indissociable from the concept of illicit effort. Nonetheless, the two are not equivalent, as stated prior. Mark-up φ represents the perceived average relative amount of effort allocated to illicit activities by the candidate of each party throughout the k districts. It can be seen as an indicator of the average within-party illicitness: the higher the distrust of the electorate towards a particular party (the higher the φ), the higher the costs for that party to practice such illicit acts.

Given one of the stated goals of this paper is to establish the distinguishing factors between incumbents and challengers under the pressure of the media, the inclusion of the above-mentioned mark-up depends on two considerations: (1) that the media indeed influences candidates by facilitating the perception the electorate has of these; (2) that the media does this in distinctive ways for the incumbent's party and challengers' party. While the first of these is easily accepted, the second requires a slightly deeper analysis.

Consider, in succession, the mark-up φ as it is to be applied to the effort constrains of the incumbent and the challenger:

$$\varphi_i = \sum_{d=1}^{k} \frac{h_d^i}{kY} \qquad\qquad \varphi_j = \sum_{d=1}^{k} \frac{h_d^j}{kY}$$

As we have already established, in each district there are two opponents, each of which coming from a different party. Depending on their status as either an incumbent or a challenger, candidates are identical across districts. Any given incumbent or candidate has an equal likelihood of being part of either party (as suggested by the baseline model), and incumbents and challengers are identical across districts. We may thus conclude that, over time and on average, the mark-up φ is identical for both opposing parties, as the two will have an identical number of challengers and incumbents, the only factor distinguishing the levels of illicit effort exerted by different candidates. This in essence implies that the inclusion of this mark-up in the model as a distinct entity is unnecessary, as it fails consideration (2); we may normalise it and focus instead on what makes illicit costs distinct between a district's challenger and incumbent.

6.2 *N* parties

Finally, we check the robustness of the models when observing n parties competing per district. In practice this implies, in each of the k districts, a single incumbent now competes with n-1 challengers.

Because each model differs in its approach, we consider the impact of n parties on each in succession.

6.2.1 Information Model

We spare only a few moments on this model, as much of its discussion in section 3 already implicitly includes a solution. Consider the objective function for the incumbent:

$$P_d^i\left(e_d^i, h_d^i, v_d^j\right) = \frac{e_i^\alpha \cdot h_i^{1-\alpha}}{e_i^\alpha \cdot h_i^{1-\alpha} + \sum_{j=1}^{n-1} v_d^j}$$

Similarly, for a challenger j:

$$P_d^j\left(e_d^i, h_d^i, v_d^i\right) = \frac{e_j^\alpha \cdot h_j^{1-\alpha}}{v_d^i + \sum_{j=1}^{n-1} e_j^\alpha \cdot h_j^{1-\alpha}}$$

The mark-up reverts back to the general case laid out in section 3[2]

$$\delta = \sum_{j=1}^{n-1} \frac{\hat{e}_j}{(n-1)Y}$$

for challengers from n-1 parties of identical size.

In equilibrium, the predicted effort exerted by each candidate is equal to the actual effort. Furthermore, all challengers are presumed to be equal in their objective function and effort constraint. Consequently, we have that:

$$\delta = \sum_{j=1}^{n-1} \frac{\hat{e}_j}{(n-1)Y} = \frac{\hat{e}_j}{Y} = \frac{e_j}{Y}$$

While the larger number of challengers necessarily dilutes the winning probability of all candidates, it does not actually change the equilibrium allocation of effort pursued by incumbent and challengers. Any composite effects (such as those compared in section 4) will only be proportionally reduced. Consequently, for our purposes, it adds little to the analysis, and may be dismissed, a sign of the model's robustness.

6.2.2 Propaganda Model

The Propaganda Model follows a similar path, for it also includes a unique mark-up on one of the candidates' effort constraints.

$$\varepsilon_j = \frac{h_i}{Y}$$

Note how the mark-up remains unchanged whether we have 1 challenger or n-1, as the number of incumbents remains fixed at one. Consider the new objective function of the challenger under the new circumstances:

$$P_d^j\left(e_d^i, h_d^i, v_d^i\right) = \frac{\left(Y - \left(1 + \varepsilon_j\right)h_j\right)^\alpha \cdot h_j^{1-\alpha}}{\sum_{j=1}^{n-1}\left(Y - \left(1 + \varepsilon_j\right)h_j\right)^\alpha \cdot h_j^{1-\alpha} + v_d^i}$$

---

[2] In part 3 we consider *n* challengers, yet we may use *n - 1* without loss of generality.

Maximising this function in the same way we did in section 4 yields:

$$h_j^* = \frac{(1-\alpha)Y}{1 + \dfrac{h_i}{Y}}$$

$$e_j^* = \alpha Y$$

These are the exact same equilibrium values found for 2 candidates, meaning that any change, if existent, will necessarily come from a new allocation of effort on the part of the incumbent. Consider the incumbent's new objective function:

$$P_d^i\left(e_d^i, h_d^i,\right) = \frac{(Y - h_i)^\alpha \cdot h_i^{1-\alpha}}{(Y - h_i)^\alpha \cdot h_i^{1-\alpha} + \sum_{j=1}^{n-1}\left((\alpha Y)^\alpha \cdot \left(\dfrac{(1-\alpha)Y}{1 + \dfrac{h_i}{Y}}\right)^{1-\alpha}\right)}$$

Maximising this function yields:

$$h_i^* = \frac{Y\sqrt{8\alpha^2 - 16\alpha + 9} + (2\alpha - 1)Y}{2(a-2)} \lor -\frac{Y\sqrt{8\alpha^2 - 16\alpha + 9} + (2\alpha - 1)Y}{2(a-2)}$$

Both of these results are identical to those found for a more limited number of candidates. Therefore, we may conclude the same we did for the prior model: while the larger number of challengers alters the winning probabilities of all candidates, it does not alter their equilibrium distribution of effort. Thus, they add very little to our analysis, and our model stands robust.

The reasoning behind the ineffectiveness of the change in the number of challengers is as follows. A larger number of candidates affects the combining of all the voter perceptions of all candidates, but crucially does not change in any way the actual function of voter perception of any candidate, nor their effort constraints. Naturally, this implies that the winning probabilities of challengers and incumbent are diluted by the larger number of parties, without changing the incentives that created the original effort allocation in the first place.

6.2.3 Spectacle Model

Under the Spectacle Model, not all challengers are necessarily alike: we may have celebrity challengers and relatively more "obscure" challengers. This means we are not

able to use some of the tricks used so far. We may focus on a particular case, where a single challenger is the only celebrity, and attempt to draw conclusions about the model at large.

Consider the new objective function of the incumbent:

$$P_d^i(h, v_d^c, v_d^o) = \frac{(Y-h)^a h^{1-a}}{(Y-h)^a h^{1-a} + v_d^c + (n-2)v_d^o}$$

Since both v_d^c and v_d^o are constants in the function (challengers and incumbent act independently), we may equate them to a constant v like so: $v_d^c + (n-2)v_d^o = v$. This allows us to recreate the original objective function of section 3, meaning that the effort allocation will be identical as to that with only two candidates.

This also opens up interpretation for the two other instances of this model. As in this case, with a celebrity incumbent or with both a celebrity incumbent and celebrity challenger the objective function of the incumbent does not change meaningfully once we add more challengers. All these additional challengers can easily be integrated into a single constant v as we have done here, which does not change the output from what it used to be with only one challenger. Thus, we can conclude the equilibrium effort allocation identified earlier is robust against a changing number of parties.

Consider the new objective function of the celebrity challenger c:

$$P_d^c(h, v_d^i, v_d^o) = \frac{(1+a)(Y-h)^a h^{1-a}}{(1+a)(Y-h)^a h^{1-a} + v_d^i + (n-2)v_d^o}$$

The same thing applies here: all voter perception functions which are not the celebrity challenger's are perceived as constants, meaning that the function is virtually identical to the original one.

This also has the same implication as earlier: if we are able to turn all additional constants into a single, more complex constant, then the real impact on effort allocation is inexistent. For all instances of this model, one can thus conclude that the distribution of effort remains unaltered.

Finally, consider the objective function of the obscure challenger o:

$$P_d^o(h, v_d^i, v_d^c) = \frac{(Y-h)^a h^{1-a}}{v_d^c + v_d^i + (n-2)(Y-h)^a h^{1-a}}$$

Maximising this function yields the following:

$$h_o^* = (1 - \alpha)Y$$

$$e_o^* = \alpha Y$$

These equilibrium values for licit and illicit effort are identical to those found when maximising the objective function of the celebrity challenger. This in turn implies that the number of challengers is essentially irrelevant for the determination of the equilibrium effort allocation of either challenger or incumbent.

Furthermore, because one can once again combine the constant voter perception functions of the other candidates into a single constant, this third candidate is unaffected by whether the other challengers or the incumbent are or not celebrities.

This concludes this robustness test, as we find all three models to be unaffected in their equilibrium effort allocations by changes in candidate pool size. Note however how the number of candidates does affect winning probabilities, though it only dilutes the media effects previously discussed, adding little to this paper's analysis. Also, important to have in mind is that we assume throughout this section that the effort constraint (Y) of the different candidates is both identical and unchanged, independent from number of candidates. Since a higher number of candidates (themselves with different levels of political relevance) reduces every candidate's chances of victory *ceteris paribus*, one may expect their respective political campaigns to reconsider their "effort budget", in case there is an alternative to which one may allocate the "leftover" effort for higher marginal gains.

7. Empirical Testing

Across this study, several papers have been cited which establish the principles behind the models presented. While the models themselves are of a complexity hard to replicate empirically, there is still the possibility to test our conclusions instead. In this section, a regression analysis is conducted as a first indicative foray, to verify whether the hierarchy of effects hereby found (**Propositions 12** and **13**) are satisfied in any way by the evidence.

7.1 Data Gathering

To test the results obtained in the previous sections, a database was constructed with data on the following concepts: average incumbent duration in power; levels of media capture (meant to retain the propaganda effect); freedom of the press (information effect); and media commercialisation (spectacle effect). A simple regression analysis follows, using the first variable as the dependent variable, and all others as independent variables. Summary statistics of all the relevant variables can be found in the Appendix of this paper.

To cover the average incumbent duration in power, the Party Government Data Set is used, and completed with more recent data by this paper's author. The PGDS files, developed by the Free University of Amsterdam, cover 39 parliamentary democracies since 1945, and include variables on duration of government, reasons for termination of government, incumbent party, type of government, elected seats and ideology of government and parliament (EUI, 2019). From this data set, all 27 members of the European Union are selected, a criterion related to the presumed maturity of such democracies.

To gauge the effect of the media as a conveyor of information and propaganda, Freedom House's Press Freedom Index is used, with data on the same number of countries. This index considers external pressures on the mass media industry through 3 channels: legal, economic, and political pressures. Given the lack of better alternatives, we consider political pressures a proxy for the propaganda effect (as it highlights media capture), and legal pressures a proxy for the information effect. The reasoning is as follows. The higher the political pressures on the part of the incumbent over media outlets (in other words, the higher the media capture by the government), the stronger the pressure to produce more positive content on the status quo may be. Meanwhile, the heavier regulatory and legal constraints there are for the development of the press in the first place, the harder it

will be to conduct basic journalistic investigations and fulfil the media's role as political watchdog. This reasoning follows the original index's methodology and argumentation on the integration of these two components in the overarching concept of Freedom of the Press (Freedom House, 2019). Lastly, note how both variables are normalised by country. While this decision is made directly by the index, it can be explained away by its usefulness when comparing results between countries.

To assess media sensationalism and commercialisation, there is a noticeable lack of indexes, analytical methods and quantitative data on media strategy with regards to political news coverage. Consequently, we make use of the score achieved by EU countries in the Timbro Authoritarian Populism Index. The TAPI documents the emergence of populist parties in several European democracies (Timbro, 2019). For our purposes, the results achieved by populist parties in parliamentary elections in the past 20 years are used. The use of this index, while not immediately intuitive, is related to the link (documented in section 4) between media coverage of regional politics and the rise of populism in Europe. If the evidence found in the empirical literature holds (rundown of such literature also in section 4), media strategies defined by sensationalism and emotional coverage of trivial topics are highly correlated to the emergence and ascendance of populist politics, who seem to benefit from the attention received for their controversial policies to convey their ideas to a wider part of the electorate.

For all four measures, the period studied is that between 2002 and 2017. Descriptive statistics can be found in the Appendix.

7.2 Data Transformations

The following variables are included in the regression model (by their names): "Duration", "LnLegal", "LnPolit", "PopulBeg", "IncPop", as well as interactions between the latter variable and "PopulBeg".

To create the dependent variable "Duration", which compiles the number of days in office of a certain incumbent, only uninterrupted legislatures and permanent heads of government were taken into account. Interim and acting roles were dismissed entirely. Heads of government who won multiple elections were perceived as holding office uninterruptedly, even if minister shuffles occurred. Governments that only lasted for a single calendar year (not to be confused with year length) were also not considered, as

this would prevent us from conducting analyses on multi-year trends with annually-released indexes.

To develop the variable "LnLegal", much like the variable "LnPolit", the score attributed by the Press Freedom Index in the last year of incumbency was transformed into its logarithm, and subtracted from the score in the first year of incumbency. The transformation was performed due to the expectation that improving one's score in press freedom is easier to accomplish for those at a lower rank than for those with the top marks. The higher and positive the value of these variables, the worse the change in the level of press freedom. Negative values imply an increase in press freedom.

Variable "PopulBeg" considers the percentage of the vote populist parties gained or lost in an election at the beginning of the incumbent mandate. We consider this percentage at the beginning of a certain tenure rather than at the end for a reason: only populist gains/losses at the beginning of a legislature reflect the impact media spectacularisation had on that particular election (and over that entire mandate).

Finally, a dummy variable was created, "IncPop", detailing whether a particular government is or is not led by a populist party/agenda. The variable is included in our regression analysis both individually and interacted with the populism variables.

The data collected for each country is too small to draw meaningful conclusions regarding country fixed effects, even in a case where we are merely looking for indicative results. To keep the internal invalidity of those effects from limiting further the relevance of our regression, we elect to disregard these.

No controls were included in this regression. Although such additions could and should be carried out in future extensions of this paper, in their current form the models presented do not directly shed light on potential conditions and controls. Therefore, the regression is kept to its absolute form, only including the elemental concepts exposed in previous sections.

7.3 Regression Results

The simple analysis performed makes use of the following regression equation, for legislature i:

$$Duration_i = \beta_0 + \beta_1 * LnLegal_i + \beta_2 * LnPolit_i + \beta_3 * PopulBeg_i + \beta_4 * IncPop_i$$
$$+ \beta_5 * (PopulBeg_i * IncPop_i) + \varepsilon_i$$

The following tables summarise the results:

$Observations$	100
$Prob > F$	0.08
$R\text{\textasciicircum}2$	0.09

	$Coefficient$	$Std.Error$	$P > |t|$
LnLegal	2493	1501	0.10*
LnPolit	3297	2327	0.16
PopulBeg	-4.20	11.53	0.72
IncPop	-506	1.90	0.01***
PopulBeg* IncPop	8.65	27.06	0.75
Constant	1296	107	0.00***

Table 1: Regression results; Significance: =<0.01***, =<0.05**, =<0.10*

These results admittedly do not attain the robustness or significance demanded to imply causation. Nonetheless, they may be useful as a small first step in testing the predictions of this paper. For this reason, more thought is put on the coefficients found, followed by a slight mediation of the results by the associated standard errors and significance.

To start, it is found that for a 1% worsening of the legal pressures on a country's freedom of press the incumbent remains in power for an extra 25 days. In other words, more legal freedom for mass media development implies a shorter incumbent term. This matches the Information Model's predictions quite well, since that model expects a negative media effect on incumbency winning probability in electoral contests (here associated with duration in power). The fact that the effect is only about 2% of the constant (which is the total predicted number of days in power a non-populist incumbent who provokes no

changes in any of the independent indicators gets, 1296 days), further highlights the second prediction of our model: that this effect is quite minimal.

Secondly, it is found that, for a 1% worsening of the political pressure on a country's freedom of press, the incumbent remains in power a further 33 days, which is 2.5% of the constant. This result coincidentally agrees in full with all the propositions resulting from our Propaganda Model: (1) that increasing media capture benefits the incumbent, as the regression results foresee the incumbent lasting longer in power as a result; and (2) that such an effect is more impactful than that of the Information model, 33 versus 25 days.

Finally, we find results for our populism metric which require a deeper interpretation. For a 1% increase in the populist electorate, the incumbent stands to lose 4 days by the beginning of his mandate. This result implies that populist forces are a threat to a newly elected incumbent. Nonetheless, the coefficient is quite weak, especially when comparing to the two previous effects. This could be due to both the incumbent and the challenger(s) being part of the media spectacle, meaning the benefits of celebrity given to both end up cancelling each other out (though the challenger's effect slightly wins out). To test the power of the incumbent effect in particular, we take a look at the interaction coefficients. When a populist is in power, for each extra percentage point the populist party in government attained before reaching power, their mandate lasts almost 8 days more. This result implies a positive isolated effect for an incumbent being a celebrity (which fits our model's prediction), but the fact the general result is negative (-4.20) tends to imply the challenger's effect wins out when both candidates are celebrities (which does not fit the predictions). Generally, these results highlight the importance of being a populist candidate in an election. As far as that result concerns us, it confirms the relevance of the Spectacle Model's effect. On comparing this effect with that of the other models (Information and Propaganda), we find that it is much smaller, approaching fulfilment of **Proposition 13** more so than **Proposition 12**. This may indicate, as briefly touched on before, that the spectacularization effect is mixed rather than one-sided to either candidate. The tendency for the challenger to be affected the most by media celebritization, while not a direct proposition arising from the data, matches our expectations regarding countries with a high α – that is, countries where, when candidates carry out illicit activities to improve their party platform, their effect on the candidates' winning probability is minimal (see section 4.5.2). Given our sample is constituted by the

EU27 countries, which are (generally) mature democracies and/or economically developed nations, a high α is by all means likely.

The regression itself has a limited amount of observations and is collectively insignificant, though it has an R squared of 0.09. In addition, "LnLegal" and "IncPop" have significant coefficients, but they both share high standard error. Measurement error, selection bias (only EU countries selected), outliers (populist results particularly swayed by Italy, Greece, and Latvia), and reverse causality (populism and duration in power) are all potential problems, as is independent variable endogeneity. Thus, this regression analysis is, at most, useful only as an indication of the potential of the paper's model.

Further research is recommended. An improvement could be the use of more regional data (particularly US and UK, with first-past-the-post systems), where candidates either number two, or only two have a clear shot at victory. However, though the best data is regional, corruption and freedom press indicators are generally national, hence why parliamentary elections are used here. Better variables and indexes could also be identified; the ones used were only the ones immediately available. Finally, a suggestion for improvement could be to consider a regression equation on the probability of re-election victory as the dependent variable. This would be more faithful to the theoretical models developed. Duration of mandate was used here as it facilitated the coding of by-elections and early contests, as well as government changes where the party in power remained the same but there was a shuffle in the government leadership role.

8. Conclusions

This paper develops three modelling methods to integrate three different aspects of media coverage of political contests in democratic countries with a first-past-the-post electoral system, under an incumbent-challenger framework. These three aspects are: media as a source of information, as a source of political propaganda by the incumbent, and as a source of entertainment. All three are modelled by adapting the Tullock (1980) contest success function using a candidate type-dependent voter perception function (itself an adaptation from the original Cobb-Douglas production function) with licit and illicit effort integrated as inputs, as well as a fixed effort constraint.

The main results of the paper are as follows. For all three media models, the elasticity of voter perceptions in terms of the type of effort carried out is found to have a significant position in determining the overall allocation of total effort, as well as the winning probabilities of the candidates. While the exact effort allocation depends on this elasticity, the symbioses between the effort constraints and the models at large are crucial in defining the differences between the candidates: both the spectacle and the propaganda models imply the incumbent allocates more effort than the challenger to illicit activities, with the latter only overtaking the former in the information model.

Model comparisons also yield important predictions. The media celebritization of a single political candidate is found to on average be the most important characteristic of the news coverage in determining whether one becomes the contest winner, followed by propaganda and information. However, this spectacularisation is heavily dependent on whether only one or both candidates benefit from such spectacle. If both candidates' political campaigns are mediatic, this effect becomes somewhat less relevant, the propaganda and information aspects of the broadcast overtaking it instead (in that order). This weighting also seems to imply a tendency for the incumbent to carry out more illicit activities than the challenger, when combining the effects of all three models.

The models and results proposed in this paper may be of interest to researchers from the areas of contest theory, journalism, and comparative media studies. It adds much needed quantitative analytics to the study of factors guiding news coverage, as well as the incentives motivating politicians under the spotlight. This study further highlights the lack of attention currently being given to the quantification of media phenomena with regards their political role. In particular, the phenomenon of the "media political spectacle" is

overreported but undermeasured. There is also little either theoretical or empirical data to draw from when determining the kind of options politicians are faced with during electoral contests, and what reaction these draw from the electorate under imperfect and perfect information. Both of these criticisms constitute areas for further research, but also pieces of a puzzle which, once identified and expanded on, may yield different results from those exposed here.

This paper itself is only a foray into understanding these concepts, a starting point from which to develop a more robust, general model for media influence in democratic processes. Further research built on this paper may include, but not be limited to, interaction effects between the different aspects of media coverage, variable effort constraints, and more robust empirical testing including control variables, better data, and more objective indicators.

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Appendix – Summary Statistics

Variable	Observations	Mean	Standard dev.	Minimum	Maximum
Duration	102	1291	872	151	4495
LnLegal	102	0.012	0.061	-0.167	0.172
LnPolitic	102	0.020	0.051	-0.083	0.223
PopulBeg	102	1.922	7.949	-14.1	38.1
IncPop	102	0.186	0.391	0	1

Table A 1: Descriptive statistics of all relevant variables of the regression performed in section 7 of this paper.

All variables have 102 observations, owing to a complete data set.

The dependent variable, "Duration", has a mean value of 1291, implying an average tenure for governments of almost thirteen hundred days, or 3½ years. There is however a wide deviation from this mean across countries and years, with the shortest government recorded lasting only 151 days, and the longest almost forty-five hundred, about 12 years.

Independent variable "LnLegal" has mean 0.012, implying that on average, changes in legal freedom of the press reduce said freedom by 1.01 points, with a standard deviation of 1.06 points (0.061). The mean combined with the similar absolute values of the minimum and maximum points to a variable distribution slightly skewed to the left, a clear tendency for a reduction of legal press freedom over time.

Independent variable "LnPolitic" is quite similar, with changes in political freedom of the press on average reducing said freedom by 1.02 points with a standard deviation of 1.05 points. The variable's distribution as determined by the mean, maximum, and minimum, implies a skewness to the left that is more pronounced than the previous variable.

Independent variable "PopulBeg" has a mean of 1.922, implying an average vote gain for populist parties over each new election of almost two percent. Standard deviation however almost reaches eight percent, implying a relative volatility in populist results and likely dependence on the country considered. The minimum and maximum values of this variable also point to either incredible rises or complete collapses of these type of parties.

The dummy variable "IncPop" has a mean of 0.186. This implies that over all different government tenures contained in the data, almost nineteen percent are attributable to populist governments. The standard deviation is however quite large (twice the size of

the mean, almost forty percentage points), which may imply an instable tenure of these type of parties in power.
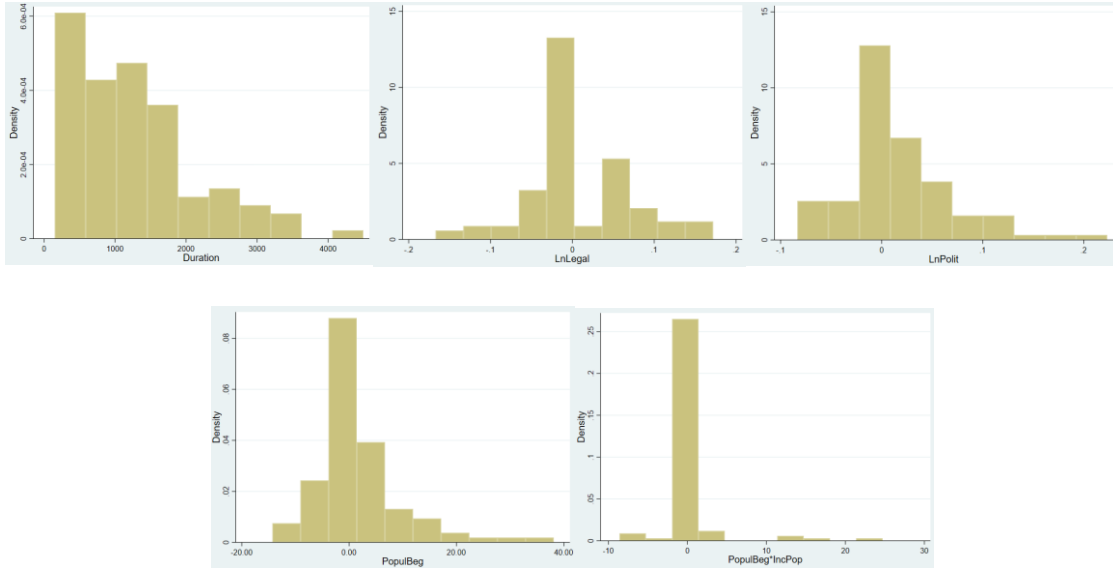
Graph A 1: Density distribution of Duration, LnLegal, LnPolit, PopulBeg, and the interaction of PopulBeg with IncPop.

Variable correlations are not impactful, generally fulfilling assumptions over multicollinearity. The only exceptions are the correlations between variables LnLegal and PopulBeg and IncPop. The results indicate that strong electoral performances by populists (either by doing well in an election or winning it outright) are vaguely connected to the worsening of the legal pressures on press freedom. Nonetheless, this correlation is weak enough that our overall regression results still stand.

	Duration	*LnLegal*	*LnPolit*	*PopulBeg*	*IncPop*
Duration		0.12	0.17	0.04	-0.14
LnLegal	0.12		0.09	**0.25**	**0.30**
LnPolit	0.17	0.09		0.16	0.13
PopulBeg	0.04	**0.25**	0.16		0.03
IncPop	-0.14	**0.30**	0.13	0.03	

Table A 2: Correlations between all relevant variables of the regression performed in section 7 of this paper.