Endogenous Candidacy in Electoral Competition: A Survey

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Abstract: We survey the literature on electoral competition under plurality rule where candidacy decisions are endogenous. We organize the differentcontributions into three families based on the paradigm to which they belong and on the part of the set of candidates they endogenize. We argue that endoegenous candidacy offers both theoretical and empirical advantages over the standard Hotelling-Downs model. On the theoretical front, these models can provide a more satisfactory microfoundation for the emergence and/or stability of the two party system under plurality rule. On the empirical front these models offer a better account of the stylized facts about elections, particularly regarding Duverger's law and policy polarization. We also point to shortcomings of these models and propose some directions for future research.

1. INTRODUCTION

Regularly held, and contested, elections are considered to be an essential characteristic of a well functioning democratic system. It is therefore unsurprising that electoral competition is an extensively studied aspect of the political process. In the political economy literature, which seeks to understand the effect of political processes on economic policies, electoral competition is often used as a shorthand

for politics; policies are assumed to emerge from elections rather than being chosen by a social planner. The most commonly used model of electoral competition, the Hotelling-Downs model, has become a standard feature of many microeconomics textbooks.[1]

This article provides an overview of some of the advances in modeling electoral competition that go beyond this standard textbook model. In particular, we will survey a class of models that can be termed "endogenous candidacy models" of electoral competition. We argue that these models provide a better account of the stylized facts of electoral competition and are also based on more satisfactory theoretical underpinnings. We will limit our analysis to plurality rule elections. In another survey, Dellis and Oak (2015 (b)), looks at the literature on comparative analysis of different electoral rules with endogenous candidacy.

This article is organized as follows: the remainder of this section will review and critique the canonical Hotelling-Downs model of electoral competition; in Section 2 we will present some stylized facts regarding the number and positions of political parties in elections across different countries; in Section 3 we will introduce a three-way classification of the endogenous candidacy models and discuss them in turn; finally, in Section 4, we will compare the insights offered by three families of models and conclude by pointing out directions for future research in the field.

1.1. A Brief Overview of the Hotelling-Downs Model

In the canonical Hotelling-Downs model (see Duggan (2006) for a modern treatment) the set of feasible policies is represented as points on the left-to-right spectrum of a line. Two office-seeking candidates compete by choosing points on the line which represent the policies they commit to implementing if elected. Voters have ideal policy positions along different points on the line and are assumed to have distance preferences, i.e., a voter's utility decreases in the distance between her ideal policy and the implemented policy. An election is held under the plurality rule, and the candidate winning the biggest share of votes is elected. The celebrated median voter theorem states that the equilibrium policy positions of the two candidates will be identical to the median voters' ideal policy. The simplicity

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[1]While there are several variants of the Hotelling-Downs model in the literature over time, the original model can be attributed to Downs (1957) which took as a starting point the spatial competition model proposed by Hotelling (1929).

and intuitive appeal of this result makes it one of the most popular concepts in political economy. As pointed out in Callander (2005; 1116): "This powerful result has provided the foundation for insight into many areas of political economy, including influential models on the size of government, the nature of redistributive policies, and the rate of economic growth."

However, there are some shortcomings of the Hotelling-Downs model and its prediction, the median voter theorem, which we shall briefly discuss.

1. **Mixed Empirical Evidence.** The median voter theorem makes two sharp predictions, viz. that the two candidates will adopt the same policy position and this policy position will coincide with the median voter's ideal point. However, the empirical evidence does not support these predictions. For example, Ansolabehere, Snyder and Stewart (2001) provides evidence that in any given electoral district, the Democratic and Republican candidates to the U.S. House adopt polarized positions. Gerber and Lewis (2004), using individual ballot data from the 1992 general election in Los Angeles County, finds that the state legislators regularly adopt positions that differ from the preferred positions of the median voters in their respective districts.

   Not only is there a divergence in the policy platforms via-à-vis the median voter's position, the degree of divergence also varies across space and time (e.g., Ansolabehere, Snyder and Stewart (2001) and the evidence presented in Section 2). This finding suggests the need for a richer model that incorporates factors left out of the canonical model. We will discuss some further empirical evidence related to this point in the next section.

2. **Non-robustness of Equilibrium Existence.** The existence of equilibrium in the canonical Hotelling-Downs model depends crucially on there being two candidates and one policy dimension. With more than two candidates the existence of a pure strategy equilibrium itself is not guaranteed. Furthermore, when the policy space is multi-dimensional, equilibrium generically does not exist. This makes the Hotelling-Downs model a poor representation of elections that have more than two candidates or which are contested on more than one dimension.

   A well known result, Duverger's law, which we discuss in the next section in detail, states that the polities using the plurality rule tend to lead to a two-

party system. It might be tempting to argue, in light of Duverger's law, that the assumption of two parties is without much loss of generality in plurality rule elections.[2] We will take up this issue in the next subsection.

3. **Lack of Satisfactory Micro-foundations.** The Hotelling-Downs model takes the number of candidates as exogenously given, restricting them to two in the canonical case. But the decision to contest an election is obviously strategic and a more satisfactory approach needs to take into account the incentives for candidates to enter/exit the electoral race. Dutta, Jackson and Le Breton (2001) explores the implications of strategic candidacy for a broad class of voting procedures. In that paper the authors show that the outcomes of standard voting procedures will be affected by the incentives of non-contending candidates (i.e., candidates who cannot win the election) to influence the outcome by entering or exiting the election. This suggests that even when there are only two candidates in an electoral race, there may be other candidates that might potentially run and the threat of their entry could affect the equilibrium policies of the running candidates. In other words, it needs to be verified if the median voter outcome of a two party electoral competition is consistent with the sub-game perfect equilibrium of a bigger game involving candidate entry decisions.

1.2. Beyond the Hotelling-Downs Model

In light of the shortcomings discussed above of the Hotelling-Downs model researchers have developed alternative formulations of electoral competition that depart from the canonical model in one or more aspects. Osborne (1995) provides a comprehensive survey of spatial models of political competition under plurality rule till date. In that paper, the author considers different variants of spatial models which differ in assumptions about candidate motivation, voter preferences, voter sophistication (strategic vs. sincere voting) and information available to participants. He concludes (Osborne (1995); page 283,284): "the basic insight afforded by Hotelling's model—that there is an incentive for candidates in two candidate

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[2]For much of our discussion, we will be using the terms candidate synonymously with the term political party. As such, much of the literature we discuss can be thought of as adopting a unitary actor model of political parties. In our conluding section we discuss the relevance of distinguishing between candidates and political parties.

competitions to adopt similar positions—is rather robust." He goes on to further argue that the presence of more than two *potential* candidates significantly dilutes the convergent tendencies inherent in the Hotelling-Downs model. The survey concludes by noting that "most of the ideas designed to explain the stylized facts of political competition rely on features that are absent from [the Hotelling-Downs] model ..." (Osborne (1995); page 289).

Among these features the author mentions the role of potential entry and endogenous formation of political parties to be important for future research. In this survey we will review the literature that follows this line of research. Some papers in this literature predate the Osborne (1995) paper, and have been mentioned in it, while others post-date it.

2. STYLIZED FACTS ABOUT ELECTORAL COMPETITION UNDER PLURALITY RULE

In reviewing the models of electoral competition with endogenous candidacy we will emphasize on the ability of these models to account for the following two stylized facts. 1) Duverger's law: plurality rule elections tend to favor a two party system; 2) Polarization: the political parties/candidates, not just the fringe players but also the serious contenders, do not always adopt convergent policy platforms. The canonical Hotelling-Downs model sidesteps the first stylized fact by exogenously assuming two parties whereas its prediction of convergence to the median voter policy is not supported in the data.

Below we discuss in some detail each of these stylized facts and present some empirical evidence pertaining to each.

2.1. Duverger's Law

In his seminal contribution (see Duverger (1954)), Maurice Duverger identified an empirical regularity of elections, namely, that the plurality rule tends to favor a two-party system. Riker (1982) has dubbed this empirical regularity.

A standard measure of the number of parties that is used in the political science literature is the Effective Number of Parties. Table 1 below presents the average Effective Number of Parties (ENP) across all national parliamentary elections held between 1946-2013 in four democracies that have been using the plurality rule:

Canada, New Zealand (before the electoral reform of 1993), the United Kingdom, and the United States. The ENP is an adjusted measure of the number of parties that accounts for the relative strength of each party. It is the most commonly used indicator of party system fragmentation (Laakso and Taagepera (1979)). The ENP in a given election is obtained by taking the inverse of the sum of squared vote shares of the participating parties (v_is). The precise formula is given by:

$$ENP = \frac{1}{\Sigma_{i=1}^{I} v_i^2}.$$

Thus, the ENP measure varies from 1 (when one party obtains all the votes) to I where I is the number of parties participating in the election.

Country	# of Elections	ENP (s.d.)
Canada	21	3.07 (0.44)
New Zealand	17	2.64 (0.34)
UK	17	2.37 (0.33)
US	17	1.99 (0.02)

The numbers obtained are arguably consistent with Duverger's law (except for Canada which is, and with India, a well-known exception to Duverger's law). Duverger explained the tendency of the plurality rule to favor a two-party system by the strategic behavior of voters. Under the plurality rule, a voter who anticipates that her most-preferred candidate has no chance of winning the election would be wasting her vote if she cast it sincerely and would therefore have an incentive to vote for another candidate whom she may like less but whose electoral prospects are better. This incentive is known as the wasting-the-vote effect. This effect induces voters to concentrate their votes on only two candidates.

Defenders of the canonical Hotelling-Downs model of electoral competition might argue that in light of Duverger's law assuming two party competition is not too bad an assumption to make for studying plurality rule elections. This would then vindicate the use of the median voter theorem, at least for the case of one-dimensional competition. However, Duverger's law is explained in terms of strategic behavior on part of the voters whereas most of the models assume sincere voting, in particular, since most models treat the set of voters as a continuum. This being the case, we need to seek explanation for Duverger's Law elsewhere, one obvious candidate

being strategic behavior of the political parties. Hence, the endogenous candidacy models have the potential to provide another channel for Duverger's Law, one that does not rely on voter's strategic behavior.

2.2.   Polarization in Plurality Rule elections

The median voter result, while being a sharp prediction of much convenience for tractable models of political economy, is not always supported by data. In Table 2 we present, for the same set of countries and time period as above, the average degree of polarization across elections. Polarization is a measure of how different the platforms of the competing parties are, along the left-right dimension. A party system is said to be heavily polarized if all the parties are located at the extremes. Polarization is said to be absent if all the parties are located at the center (Sartori (1976)). Formally, polarization is calculated as the weighted sum of squared distances between each party's position on a left-right scale and the center of gravity of the party system, which is itself the weighted average of all the parties' positions on the left-right scale (e.g., see Lupu (2015)). Thus we have,

$$Polarization = \sum_{i=1}^{I} v_i \cdot (p_i - \bar{p})^2$$

where v_i is party i's vote share and p_i is the policy position of party i on the left-right policy spectrum with the center of gravity, denoted by $\bar{p}$, which is obtained by the formula

$$\bar{p} = \sum_{i=1}^{I} v_i \cdot p_i.$$

Country	# of Elections	Polarization (s.d.)
Canada	21	0.10 (0.05)
New Zealand	17	0.12 (0.08)
UK	17	0.15 (0.10)
US	17	0.08 (0.06)

The above table shows that, on average, it is usual to see between 10% to 20% polarization (100% being complete polarization). Across different elections that number can vary as well. The next section discusses various models of endogenous candidacy and their success (or lack thereof) in explaining the stylized facts discussed above.

3. MODELS WITH ENDOGENOUS CANDIDACY

A key assumption of the Hotelling-Downs model is the pure office motivation of candidates. In fact, candidates that are purely office motivated are referred to as Downsian candidates and the models assuming pure office motivation of the candidates are said to belong to the *Downsian paradigm*. Empirical evidence as well as common sense suggests that there is more than rents from office that motivates individuals to pursue a career in politics. An alternative paradigm, the *partisan paradigm*, assumes that candidates are policy-motivated, i.e., they intrinsically care about the policy outcome (see, for instance, Wittman (1983) and Calvert (1985)).[3] Whether candidates are office or policy motivated has important implications for the credibility of their policy positions, at least in one-shot election games. Purely office motivated parties do not care intrinsically care about the policies they implement; rather, policies are instruments towards gaining political office. This allows the Downsian candidates to announce any feasible policy, and to credibly implement it if elected. For policy motivated candidates, on the other hand, there is an ex-post incentive to deviate from the announced policy and instead implement their most favored policy. Absent any commitment device (such as repetitional concerns), this limits the candidates ability to credibly implement *any* feasible policy (see Alesina (1988)). Lee, Moretti and Butler (2004) provides empirical evidence supporting the premise that candidates cannot credibly commit to moderating their policies, voters essentially electing policies rather than influencing candidates' choices of policy positions (as in the Downsian paradigm).

We classify the models with endogenous candidacy into three families. The different families are classified along two dimensions: 1) whether the candidates are Downsian or Partisan, and 2) whether the entire set of candidates or only a part of it is endogenized. Models in the first two families belong to the Downsian paradigm while those in the third family belong to the partisan paradigm. The first family of models treats some parties as already established in the political arena while other parties are potential entrants. The focus is on the strategic entry decision of this latter group and its implications for policy polarization. The second

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[3]This is not to deny the existence of rents from office. The defining characteristic of models in the partisan paradigm is the presence of policy motivation of the candidates, not the absence of rents from office.

family of models does not privilege any group with an incumbency advantage and treats all parties as capable of entering or staying out. The third family of models, known as the citizen-candidate models, departs from the first two families in the office motivation assumption. Instead in these models candidates, just like citizens, are endowed with policy preferences. In the canonical citizen-candidate models it is further assumed that the only credible policy for a candidate to implement is his ideal policy. As in the second family of models, the entire set of candidates is endogenous.

The following simple diagram will help clarify the three-family classification used by us.

	Downsian paradigm	Partisan paradigm
Established candidates face threat of entry	Models with a threat of entry (family 1)	
Entire set of candidates is endogenous	Hotelling-Downs model with endogenous entry (family 2)	Citizen-candidate model (family 3)

In our discussion of these models we will highlight the predictions they make on both the degree of polarization and the number of parties running for election, and compare the models in terms of the intuition driving the results.

3.1. Models with Threat of Entry (and Entry Deterrence)

The canonical model in this family considers an election with two established candidates who face (the threat of) entry by a third candidate. The seminal papers in this area are Palfrey (1984) and Weber (1992)[4,5] which extend the standard Hotelling-Downs model with two incumbent candidates by adding a third player,

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[4] Weber (1992) generalizes Palfrey (1984) in two aspects. First, it allows for any quasi-concave or single-peaked density function of voters' ideal points, whereas Palfrey (1984) restricted the analysis to symmetric distributions. Secondly, Weber (1992) proposes a different solution concept for which existence is guaranteed for a broader class of voters' preference distributions and which coincides with Palfrey (1984)'s equilibrium concept when the preference distribution is symmetric.

[5] Also see Brams and Straffin (1982) for an earlier attempt. In that paper the authors take the established candidates' locations as exogenous and determine how much these positions can be polarized and still prevent an entrant from winning the election.

the new entrant. Electoral competition is modeled as a hierarchical game: the two established candidates play a Cournot game vis-à-vis each other, simultaneously choosing policy platforms, while acting as Stackelberg leaders vis-à-vis the entrant who chooses his policy position after the established candidates. All candidates are assumed to maximize their respective vote shares.[6] Voters are assumed to vote sincerely, for the candidate whose position is closest to their respective ideal policies.

The substantively different (to Hotelling-Downs) conclusion reached by these papers is that the threat of entry induces the established parties to assume divergent positions, on either side of the median voter. Thus, these models are better able to capture policy divergence observed in political races in the real world. Owing to the vote maximization assumption, these models also have the feature that the third candidate enters the race even when he is sure to lose the election.

Weber (1997) extends Palfrey-Weber line of work further by considering established candidates confronted with a threat of entry by a potential candidate facing a cost of entry. The cost of entry is modeled as a threshold q such that the potential entrant enters the race if and only if he obtain can at least a share $q \in [0, 1]$ of the votes. By varying q one can vary the cost of entry. Depending on the entry cost, the model generates equilibria in which the established candidates converge/do not converge and deter/do not deter the potential entrant from entering. In particular, Weber (1997) shows the following:

First, when the entrant wants to enter only if he can get a majority of votes (i.e., $q > 1/2$), the two established candidates converge to the median voter's ideal policy without attracting entry. This is the Hotelling-Downs outcome. At the polar opposite case of $q = 0$, the equilibrium outcome coincides with that of the Palfrey-Weber models, since, as in the Palfrey-Weber model, the potential entrant always enters, independently of the established candidates' platform choices.

Second, for cases in-between the two polar cases of systematic entry ($q = 0$) and of entry occurring only when it guarantees a majority ($q > 1/2$), i.e., $q \in (0, 1/2]$,

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there will be entry by the potential entrant if the two established candidates converged to the median voter's ideal policy. In this case, the threat of entry generates a centrifugal force which counterbalances the centripetal force of the Hotelling-Downs model and induces the two established candidates to adopt polarized positions. In this range, even when there is no entry in equilibrium, the threat of entry generates divergence in the equilibrium policies of the two parties, i.e., the median voter theorem no longer holds even though there are two parties. Moreover, the extent of divergence increases as the cost of entry decreases.

Thus, models with potential entry are capable of simultaneously producing polarization and a stable two party equilibrium. However, in any entry-accommodating equilibrium, the potential entrant enters in-between the positions of the two established candidates and does not win the election. This prediction raises two questions. First, as noted in Shepsle and Cohen (1990; p.30), empirically we often observe third parties standing at extreme positions, not at centrist ones. Second, one may question the potential entrant's decision to enter the race even though he anticipates that he will come last in the election. The question of why the entrant does enter although he (correctly) anticipates that he will be defeated is a key question. Indeed, equilibrium would not exist if the entrant were restricted to enter only if he can be elected with a positive probability. This follows from a discontinuity in the entrant's probability of election at the point where the two established candidates stand at the median voter's ideal policy. As long as the two established candidates stand at symmetric and not-too-polarized positions around the median voter's ideal policy, the entrant cannot be elected. Indeed, the largest support he could obtain is by locating on the left (resp. right) flank of the established candidate positioned on the left (resp. right) of the median. But then the other established candidate would receive a majority of votes and would be elected outright. The two established candidates have thus an incentive to converge towards the median. But as soon as the two established candidates stand at the median, the entrant would win if he were to enter just on the left or just on the right of the median. The two established candidates would thus have an incentive to deviate and slightly polarize. Hence there is no pair of positions for the established candidates that would constitute an equilibrium.

To obtain equilibria which exhibit polarization and have the incentives for the

third candidate to enter on the flanks, one needs to deviate from the standard assumptions about voter and/or candidate objective functions or information. For instance, Callander and Wilson (2007) allows for voter abstention due to alienation,[7] which reinstates the centrifugal force that induces established candidates to polarize. Moreover, the potential entrant is shown to enter (when he chooses to do so) at the extremes, which is consistent with empirical observations. Another justification for the potential entrant's decision to enter the race could be that the entrant's candidacy is expressively motivated, e.g. the entrant seeking publicity in the media. Alternatively, Palfrey (1984) conjectures that the introduction of candidates' uncertainty about the distribution of voters' ideal policies might permit the entrant to be elected with a positive probability in equilibrium.

Callander (2005) departs from the Palfrey-Weber model by considering a multi-district election (instead of a single-district) election. In his model, multiple national parties (the analogs to the two established candidates of the Palfrey-Weber model) choose simultaneously and independently whether to stand for election and at which positions. The position of a national party is identical in all districts. National parties seek to maximize their share of districts won. After national parties have made their candidacy decisions, district-specific potential entrants, one per district, choose whether to enter in their respective district and at which position. National parties and potential entrants enter if and only if they anticipate winning seat(s). Each district election is held under the plurality rule. Consistent with Duverger's Law, Steven Callander shows that a two-party system can prove stable. Specifically, for intermediate levels of heterogeneity across districts, equilibrium exists in which two national parties adopt polarized positions and all potential entrants are deterred from entering. Consistent with the exceptions to Duverger's law, an equilibrium with multiple national parties can exist when there is sufficient, but not too much, heterogeneity across districts. Thus, Callander's model has the appealing property of being able to explain both Duverger's law as well as its exceptions. Key to explain polarization is that when districts are heterogeneous in the position of their respective median voter, the national parties being positioned symmetrically in one district implies they are asymmetrically positioned

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[7]A citizen abstains from voting due to alienation if she abstains when neither candidate is located sufficiently close to her ideal policy.

in another district. If the national parties are not sufficiently polarized, the latter district-specific potential entrant can then enter on a flank and win the seat.

3.2. Hotelling-Downs Model with Endogenous Candidacy

One criticism of the models discussed above, at least in their canonical form, is that they are stacked in favor of the Duvergerian prediction by assuming two pre-established candidates. In other words, these models can explain the stability of the two-party system but not its emergence. The second family of models seeks to break this asymmetry of treatment between established and potential candidates.

A natural way to extend the Hotelling-Downs model to incorporate endogenous entry would be to have N potential candidates simultaneously deciding whether, and at which position, to enter in the electoral race. Osborne (1993) does precisely this while maintaining the sincere voting assumption of the canonical Hotelling-Downs model with exogenous candidacy as well as the Palfrey-Weber models. It finds that when there are more than two potential parties ($N \geq 3$), then generically there is no pure strategy Nash equilibrium. This result confirms the findings of Cox (1987) which studies multi-candidate elections in the Hotelling-Downs model with exogenous candidacy. It is clear, therefore, that some additional structure is required for equilibrium existence.

To this end, Osborne (1993) subsequently alters the original model by considering a setting with an infinite sequence of periods. At each period, every potential candidate who has not yet chosen a position can decide to enter this period or wait one more period. Osborne shows that in this setting, an equilibrium exists for cases where $N = 3, 4$ or 5. In these cases the equilibrium outcome involves entry of one ($N = 3$) or two candidates ($N = 4, 5$) occurring at the median position.[8] Hence, while the model succeeds in getting an equilibrium to exist, we get back the median voter outcome, the lack of empirical validity of which we have already discussed earlier. Osborne (2000) remedies this shortcoming by adding uncertainty over the position of the median voter's ideal policy to the mix. Considering only the specific case where $N = 3$ and assuming candidates maximize the probability of winning, Martin Osborne shows that a divergent equilibrium (possibly with only two candidates) can exist. As in the Palfrey-Weber model, candidate polarization

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[8] The cases where $N \geq 6$ remain an open question.

occurs as a way to deter or limit the impact of further entry.

Sengupta and Sengupta (2008) shows that the threat of *exit* (as opposed to the threat of *entry* as in the Palfrey-Weber models) can also produce equilibria with divergent policy positions. The authors add a second candidacy stage before the election, at which each candidate can decide whether to withdraw from the race and save some fraction of the entry cost. They show that the option of withdrawing from the race can generate a centrifugal force that leads candidates to polarize. Interestingly, it is the possibility of exit that can serve to deter potential candidates from deviating from their policy platforms at the entry stage.

Feddersen, Sened and Wright (1990) studies a Downsian model of endogenous candidacy but, in contrast to all the papers previously discussed, assumes the voting behavior to be strategic rather than sincere. The authors show that an equilibrium always exists and has the entrants locating at the median voter's ideal policy. Thus we get, once again, the median voter result. Moreover, as was noted by the authors themselves, the result relies crucially on a potential candidate being deterred from entering at a non-median position by the (correct) anticipation that all the voters who prefer the median to the deviator's position will coordinate on one of the candidates standing at the median, thereby defeating the deviator. Thus, the result relies on an implausible assumption of a rather fine degree of voter coordination.

To sum up, the Hotelling-Downs models of endogenous candidacy can, under suitable assumptions to ensure equilibrium existence, explain the emergence as well as stability of a two party system *à la* Duverger. This marks an improvement over the first family of models. However, these models get a mixed grade for explaining policy divergence. In particular, Duvergerian equilibria tend to be convergent and non-convergent equilibria tend to be non-Duvergerian, (Osborne (2000), and Sengupta and Sengupta (2008) being the notable exceptions.) The family of models we consider next has the potential simultaneously to explain both stylized facts simultaneously. In considering this family we will be moving away from the Downsian paradigm to the partisan paradigm.

3.3. The Citizen-candidate Models

In citizen-candidate models every potential candidate is a citizen who, just like any other citizen, has preferences over policies. The canonical model in this family

considers a set of citizens who must elect a representative to choose policy. Each citizen can decide whether to become a candidate, after which citizens vote over the set of self-declared candidates and the candidate who gets elected chooses policy. The models in this family have been used for investigating several issues. These include the issues we focus on in this review, viz. the number of candidates and the extent of polarization, but also other issues such as equilibrium (non) genericity, comparison of electoral systems, the efficiency of policy outcomes, the effects of lobbying or the identity of politicians (e.g., their policy preferences, their quality).

A canonical citizen-candidate model has three stages: in the first stage, each citizen decides whether to become a candidate by incurring an entry cost; in the second stage, an election is held over the set of candidates to decide the winner; in stage three, the winner implements a policy. The solution concept used is sub-game perfect Nash equilibrium in sincere or undominated voting strategies.[9] Since this is a one-shot game, and the winning candidate has a preferred policy, sub-game perfection requires that he chooses his ideal policy. This makes the third stage decision trivial, and it reduces the stage one decision to one about whether to run, but not which platform on which to run.

The two seminal contributions in this literature are Osborne and Slivinski (1996), and Besley and Coate (1997). These contributions differ in two important ways. Osborne and Slivinski consider a unidimensional policy space and assume voting behavior to be sincere. Besley and Coate, on the other hand, allow the policy space to be multidimensional and assume voting behavior to be strategic. In order to facilitate a comparison with the earlier models we will focus on the Osborne-Slivinski version of the citizen-candidate model. For now we will consider the polar opposite case of purely policy motivated candidates. Note however, that the results we present below are robust to adding small rents from office.

The authors classify possible equilibria into three classes, those involving one, two and multiple candidates. In one-candidate equilibria, the candidate must be located at a position sufficiently close to the median so that no other potential candidate wants to enter the race. A candidate whose ideal policy lies further away from the median voter's ideal policy would be defeated and would not want to

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[9]Moreover, when voting is assumed to be sincere, the game is an entry stage game and the solution concept used is that of a pure strategy Nash equilibrium.

enter the race. A candidate whose ideal policy lies closer to the median would be preferred by the median voter, and thus a majority of voters, and would be elected outright. A candidate whose ideal policy is as far away from the median would leave the median voter indifferent and would tie for first place. In the latter two cases, a second potential candidate is deterred from entering the race if his expected utility gain from implementing his ideal policy is smaller than the candidacy cost.

In two-candidate equilibria, each candidate must tie for first place, otherwise, the losing candidate would be better off not running since he would save the candidacy cost without changing the policy outcome. By the same logic, the two candidates must be standing at two different positions, otherwise, one of them would be better off not running; he would save the candidacy cost without changing the policy outcome. Given that the two candidates must be tying for first place while standing at two different positions, their ideal policies must be located symmetrically around the median so that they split equally the votes and tie for first place. In a two-candidate equilibrium neither of the two candidates should be better off not running and no other potential candidate should want to enter the race. The former happens when the two candidates are sufficiently polarized, so that their expected utility gain from adopting their ideal policy exceeds the candidacy cost. The latter happens when the two candidates are close enough to each other so that a potential candidate entering in-between would be defeated or would face a candidacy cost that exceeds his expected utility gain from being elected and adopting his ideal policy. Observe that potential candidates with more extreme ideal policies are necessarily deterred from entering the race since they would split votes with the candidate on their side of the median, thereby triggering the outright election of the other, less preferred, candidate.

Equilibria with more than two candidates do not exist.[10] If a multi-candidate equilibrium were to exist, the leftmost candidate or the rightmost candidate (or both) would be better off not running since his votes would be transferred to his closest neighbor. This vote transfer would improve the electoral prospects of this neighboring candidate and worsen the electoral prospects of the other candidates. This rules out the existence of equilibria with three or more candidates running for election.

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[10] This result holds as long as the rents from office are not too large.

To sum up, the canonical citizen-candidate model is capable of simultaneously explaining the emergence of a Duvergerian two candidate outcome as well as policy divergence away from the median voter's position. Moreover, an equilibrium always exists, even beyond the one-dimensional policy space. Another strength of the citizen-candidate models is their ability to explain a well known exception to Duverger's law, namely, the existence of *spoiler candidates*.[11] These are candidates who run to spoil the election prospects of another candidate even though they do not stand a chance to win.[12]

While citizen-candidate models avoid the problem of equilibrium non-genericity, they typically suffer from the opposite problem, one of equilibrium multiplicity. The existence of multiple equilibria raises the tricky question of which equilibrium will eventually emerge. Different approaches have been taken to tackle this issue. For example, Grosser and Palfrey (2014) obtains a unique (symmetric) equilibrium by assuming that potential candidates' ideal policies are private information. Messner and Polborn (2004) gets a unique equilibrium as well, but by introducing a privately known individual cost of being elected. Alternatively, Eguia (2007) introduces aggregate uncertainty on the vote count, with each vote being recorded with probability less than one. Yet another approach consists in refining the solution concept for citizen-candidate models *à la* Besley and Coate, i.e., models which allow strategic voting behavior. For example, De Sinopoli and Turrini (2002) and Dhillon and Lockwood (2002) consider iterated elimination of weakly dominated voting strategies, while De Sinopoli (2004) considers Mertens stability.

4. DISCUSSION AND CONCLUDING REMARKS

In the previous section we discussed three families of endogenous candidacy models of elections under plurality rule. We argued that the need for these models arose due to both theoretical and empirical shortcomings of the Hotelling-Downs model. In particular, we discussed the need to explain two stylized facts: 1) the emergence and stability of the two party system under plurality rule (and its exceptions), 2) the existence of polarization (sometimes substantial) in the policy

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[11] However, for this result we need the candidates to be sufficiently office-motivated.

[12] The other variant of the citizen-candidate model, studied in Besley and Coate (1997), is also capable of generating two-candidate equilibria with positions divergence from the median as well as equilibria with spoiler candidates.

positions of the contending parties. We found that there exist models in each family that could explain the above stylized facts, but different models generate these results through different channels. We will now provide a comparative perspective on these differences across models.

4.1.   A Comparative Analysis of the Three Families

Let's first look at the issue of polarization. In the Palfrey-Weber model, the established candidates face two conflicting forces. With the established candidates located on the two sides of the median, each can gain by moving closer to the median—this is the centripetal force. However, if one candidate, say the leftist, were to move *too close* to the median, he will invite the new entrant to enter at a position slightly left of him. This threat generates the centrifugal force. The equilibrium is obtained at locations where the two forces, the centripetal force and the centrifugal force, are in balance; such a point has both candidates locating at positions that are divergent from the median. By contrast, the citizen-candidate model does not have the centripetal or centrifugal forces, since the candidates are immobile. In this family of models, the polarized positions occur because of the mutually reinforcing presence of a pair of candidates—the presence of, say, the leftist candidate on the opposite side makes the rightist candidate not want to quit the race because doing so will mean a loss in utility due to a distant policy being implemented. This insight also sheds light on why the citizen-candidate models suffer from the multiplicity of equilibria, each created by mutually reinforcing incentives for each candidate generated by the presence of the opposite side's candidate. On the other hand, the second family of models are not particularly successful in generating polarized equilibria.

Contrasting the Downsian paradigm of the first two families with the partisan paradigm of the third, we can see the role played by policy commitment in driving the convergence result. Polarization arises in citizen-candidate models because of the inability of candidates to commit to policies, which eliminates the centripetal force that would induce two candidates on either side of the median to converge. The role of policy commitment in generating polarization is confirmed in Dellis and Oak (2007) and Brusco and Roy (2011). These two contributions allow each candidate to commit to policies, specifically any policy in Dellis and Oak (2007) and

only policies that are $\varepsilon-$close to their ideal policies in Brusco and Roy (2011). In this context, all equilibria are one-candidate equilibria which, for a low candidacy cost, involve a candidate at the median running unopposed.

Secondly, all three types of models can generate Duvergerian outcomes. However on this front, the first family, i.e., the Palfrey-Weber models, are not particularly satisfactory because, in their canonical form, they assume the presence of two established candidates. Thus, while these models can succeed in showing the stability of a two party system, they do not show its emergence. However, there also exist entry-accommodating equilibria, i.e., equilibria with more than two candidates. These equilibria are a mixed news. On the one hand they could be bought as shown the presence of spoiler candidates, an empirically documented phenomenon. However, on the other hand, this result is driven by the vote share maximization assumption. Moreover, with a few exceptions discussed earlier, the third candidate enters at the center, rather than at the flanks of the established candidates, which does not match the stylized facts since sometimes new parties enter on the extremes as well. In the second family of models, with the exception of Osborne (2000) and Sengupta and Sengupta (2008), Duvergerian equilibria are also convergent. The existence of polarized, Duvergerian equilibria arises rather naturally in the citizen-candidate models. Moreover, unlike the first family, the emergence of this outcome is entirely endogenous. One important insight provided by these models is that Duverger's law does need not arise due to the wasting-the-vote effect as argued by Maurice Duverger but it can also arise due to strategic behavior of endogenous candidates.

4.2.   Other Avenues of Research: Current and Future

The endogenous candidacy models open up avenues for addressing other questions that naturally arise once we treat candidates as endogenous. We could not cover some of these in our survey while others are in their nascent stage and are worthy of future research.

One issue analyzed in a related paper (see Dellis and Oak (2015 (b))) is that of comparative properties of alternative voting rules. In particular, the citizen-candidate model, has been used to compare the extent of policy polarization occurs across different electoral rules. For instance, different voting rules can be shown to

affect the identity of candidates and have an effect on the policy outcome *even when* the equilibrium has only two candidates running in the election. This illustrates the strength of the endogenous candidacy approach, since a model with two exogenously given candidates will not be able to distinguish between most electoral rules in this situations, as they will be equivalent; see for instance, Dellis and Oak (2006, 2007, 2015 (a)), Dellis (2009), Dellis, Gauthier-Belzile and Oak (2015). The importance of endogenizing candidacy when comparing the properties of electoral systems was forcefully raised in Dutta, Jackson and Le Breton (2001).

Another interesting question that endogenous candidacy approach is naturally amenable to is regarding the attributes of the candidates. For instance, what attracts people into politics – rents from office or policy considerations? With endogenous candidacy we can study endogenous emergence of Downsian or partisan candidates rather than assuming candidates to be of one type or another. (See for instance, Callander (2008), Dziubinski and Roy (2013). One can also look at other attributes such as honesty, ability that get selected into political office. See for instance, Caselli and Morelli (2004), Messner and Polborn (2004), and Mattozzi and Merlo (2008) which investigate these questions using citizen-candidate models. One can also use these endogenous candidacy models as a foundation to empirically study policy choices. See for example Chattopadhyay and Duflo (2004), and Beath, Christia, Egorov and Enikolopov (2015).

Finally, one issue deserving further attention is one of the formation of political parties. In the literature reviewed in this paper, there was essentially no distinction between a party and a candidate. However, much of the political science literature, including the work of Maurice Duverger, takes the formation and evolution of political parties and issues surrounding them seriously. These issues include how parties are formed, how their internal functioning affects selection of policies and candidates. Also, the existence of political parties creates reputational concerns both across time and constituencies. Hence, a more satisfactory treatment of political parties is required for building more satisfactory models of political competition. The need to articulate the relationship between candidates and political parties is particularly significant in the citizen-candidate models, where candidates are endowed with policy preferences, than in models of the other two families, where candidates are concerned only by their electoral performance. Morelli (2004) and

Levy (2004) are attempts at introducing parties in the citizen-candidate approach, where parties act as commitment device for implementing announced policies. We believe that further research is required in this area.

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