Dutch politics, A platform game with excessive spawn rates

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Abstract

This paper will describe the effect of media (and other perceived values) on the strategic positioning of parties in a spatial model for proportional representation. A sequential game with incumbents and entrants will be used to show that the existence of perceived values, such as the media, effects the locations of the platforms of parties, and the success and number of entrants. In addition, these insights will be compared with the election outcomes from some of the Dutch election outcomes.

1 Introduction.

In virtually all political models, voters are presumed to only use their policy preferences as a bases for deciding which party or politician to vote for. In this model, however, voters have a second value they take into account when making that decision. Not only the bliss points of voters, and platforms of parties matter in this paper, but also an additional perceived value will be used as a strategic value upon which the agents base their decision. This additional perceived value is presumed to be given, and forms a representation of all non bliss point based characteristics that voters take into account when making a decision. For example, when two politicians are running to become the leader of a country, one of them may be perceived as more trustworthy, honest, likable, or superior in any other way, regardless of its platform. This additional perceived value will directly effect people who used to be indifferent based upon their bliss point, as they will now vote for the better perceived politician. The additional perceived value will will not only effect voters, but it will also, or perhaps even mainly, change the positioning strategy of the parties.

Another difference with most currently existing literature is that this model concerns itself with proportional representation, instead of the winner-takes-all setting. This means that whereas in the winner-takes-all setting entry may be deterred by simply preventing an entrant from capturing at least as much votes as the incumbents, in proportional representation an entrant will enter as long as the share of votes it can capture is at least equal to its costs of entry.

The differences in the setup described above, will result in new findings, which give a new insight in how parties use this advantage or disadvantage in their strategic positioning. This positioning will in turn lead to a certain share of votes, and a share of power. However, to prevent the model from becoming needlessly complicated, the focus will lie upon the election outcomes only, thus disregarding any strategic behavior with regard to the coalition formation.

Once the assumptions and outlines of the model have been tested with simple models, the findings and intuitions will be tested against some actual election outcomes in the Dutch political system. This comparison will show to what extend the simplifications work-out in (the Dutch) reality. However, as this is somewhat uncommon to do in a theoretical research paper, this will be done in chapter six, after the conclusion and discussion.

2 Related Literature

The research that is most related to the research that will be conducted is from Prescott and Visscher (1977). They used a spatial model to investigate the effect of price strategies and profit maximization on the differentiation of products. Though this may seem quite different from Politics, parties and platforms, there is actually quite some overlap. By replacing the firms with parties, the differentiations of the goods with the different locations of the platforms, and the difference in price with the difference in perceived values, the resemblance becomes clearer. Now, a party presenting its platform is comparable to a firm introducing a certain product. The difference is however that parties are only allowed to have one platform, whereas firms may produce several products. Furthermore, firms are allowed to set their own prices, whereas the additional perceived value is presumed to be exogenous. Therefore, where Prescott and Visscher (1977) found that firms will position their products strategically in combination with a certain price that maximizes profits, this paper provides insight for strategies when prices (or additional perceived values) are fixed.

Other related literature is provided by Weber (1996), who used a spatial model with homogeneous goods, but with different locations and prices. The prices are once again exchangeable with the additional perceived values, but here the locations are the equivalents of the platforms. Weber (1996) found that, in order for firms to maximize profit, they will use multiple sales locations, and multiple pricing strategies to maximize profits, and to prevent entry, and thereby limit competition. In this paper on the other hand, parties are not allowed to use multiple locations (platforms), and also cannot influence additional perceived value.

Even though the most resembling research has been conducted with consumers rather than voters, there is also some previous research in the political area that is related. The most common researches in the political area, for instance that of Palfrey (1984) or Hotelling (1929), concern themselves with equally valued goods or parties. This means that if a consumer (or voter) is somewhere between two goods or parties, the individual will always choose that which is closest to his preferences. The equilibria that are found in these models will be reconsidered and discussed in this paper, but the Perceived value and the concept of proportional representation will change the circumstances considerably.

This paper will look at the impact of additional perceived value, which can (partly) overrule the prior preferences of voters (or consumers), on that of party positioning and election outcomes in proportional representation. A close approximation of this is performed by Adams et al. (2011) who looked at the effects of perceived value (in the form of character) on a battle between an incumbents and a challenger, where both are granted a value for their characteristics. They conclude that based on the difference in this value, challengers will position themselves either closer to (if positive) or further from (if negative) the incumbent. In the model of this model however, challengers (or new entrants) will not have this additional value, whereas the incumbents will. Furthermore, there will be multiple incumbents, and multiple entrants (or challengers).

Two models which consider proportional representation, rather than winner takes all, are that of Ortuño-Ortín (1997), and De Sinopoli and Iannantuoni (2008). The first model takes the preferences of voters as given, and tries to determine how parties behave in order to create a coalition that will have a work point as close to their bliss point as possible. The latter does the opposite and takes party platforms as given, and analysis the behavior of voters that try to get the work point of the coalition as close to their bliss point as possible. In both cases the examined factor behaves radical and votes (or positions) extreme, in order for the coalition to be more balanced towards their bliss points. This paper,on the other hand, will not take the coalition into account, and will assume that voters and parties are only concerned with the direct election outcomes.

3 Model

The model that is described in this chapter, will be used to examine and explain the positional behavior of parties, and the (potential) success of entrants. To do so, several assumptions are made to simplify and clarify the situation under which the agents (parties and voters) act.

Assumption 1: Voters are uniformly distributed over a linear interval $[0, 100]$

Where zero is presumed to be extremely left orientated (social/communistic), and 100 to be extremely right orientated (liberal, capitalistic). Whereas a normal distribution or a multidimensional distribution might give a more precise approximation of the real distribution of voter bliss points, a linear distribution suffices to explain the general idea behind the effects of additional perceived value. Furthermore, a linear model prevents calculations from becoming needlessly complicated.

Assumption 2: Voters vote with a utility function of

$$U_{vi} = -|x_{vi} - x_j| + M_j.$$

Where x_{vi} represents the bliss point of the voter, x_j the platform of the party it votes for and M_j the additional perceived value of the party with j ranging from $j = 1$ to $j = m$. The first part of the equation $-|x_{vi} - x_j|$ represents a voters wish to vote for a party that represents its own preferences, or bliss point as closely as possible. The second part, M_j, is the additional perceived value a party might have to convince a voter to vote for that particular party. The magnitude of this value can be explained by the strength, success or appeal of a politician or even the attention it is given by the media. For example, when a voters bliss point is equally close to the platforms of two parties, but one has a running politician that is perceived as more trustworthy, stronger, or in any other way superior to its competitor, the voter will not be indifferent between the parties, but choose for the party with the better politician. This value will be captured in M_j, and is presumed to be exogenous, and known by all agents. For incumbent parties the value of $M_j$will be positive, whereas entrants will have an M_j value of zero.

Another approach to this M_j value is that it represents the incumbency advantage[1] that is enjoyed by incumbent parties. This incumbency advantage may be due to voter commitment (or laziness), search costs, prior successes, or the build up experience with the system. Entrants, on the other hand, are new to this all and cannot exploit such advantages. furthermore, their leaders also tend to be unknown, which suggests that is might be harder to exploit any perceived values such as trustworthiness, or strength of character.

Another implication of this utility function is that voters only look at the election outcomes, and disregard any direct potential influence on the coalition formation that takes place afterward. On the one hand this is a potential shortcoming as voters should only care about the policy that will eventually be implemented, but on the other hand there tends to be great uncertainty about the formation of coalition, meaning that strategic voting might work aversive, and due to this ambiguity, and for simplicities sake, it is presumed to be irrelevant in this model. However, note that if a potential coalition formation would effect the perceived value of a party, then it is accounted for in this model, and it will effect voter behavior and party positioning.

Assumption 3: Parties present themselves through a platform, and are committed to this platform.

In itself this assumption only states that voters can trust the presented policy from a party, and that they there is no uncertainty or asymmetry of information regarding the platform of a party. This allows parties to choose any platform they want.

Assumption 4: Parties only care about maximizing their share of votes, and their utility function is therefore

$$U_{p_j} = s_j - c_e$$

With s_j being the share of votes for party j, and c_e being the cost of entry, which is zero for incumbents. This assumption implies that parties are free

[1] For example as confirmed and described by Gordon and Landa (2009)

to move, but it disregards their interior motivations for a certain policy. This simplifies the model a lot, while still leaving room for a lot of explanatory power for the effect of the additional perceived value. However, it does have the drawback of losing some credibility as parties tend to be created out of interior beliefs. This assumption discards that.

Assumption 5: Parties position their platforms sequentially, with the incumbents first, in a descending order of the height of M_j, and entrants follow one by one thereafter, until there is no longer an incentive to enter.

The reasons why incumbents with high perceived values have to move first is because their voters not only have high evaluations, but they might also have high expectations of these parties. Postponing the presentation of the platform may therefore do more harm to the incumbents with high additional perceived value than to those of with a lower additional perceived value. Furthermore, this assumption helps to keep the focus on the effect of the additional perceived value on the positioning of incumbents and entrants.

4 Implications and equilibria

This chapter will combine the assumptions described in chapter three, and analyze their effects upon several different situations. It will start with simple examples with very few parties, where some intuitions will be founded. Those intuitions will then be used in the larger and somewhat more complicated examples later on.

4.1 Example 1

In this start-up example, the old Hotelling (1929) spatial problem will be altered and revised. The example consists of two incumbents parties (P_1, P_2), and no (potential) entrants. The additional perceived values of P_1 and P_2 are respectively M_1 and M_2, with $M_1 > M_2 > 0$. As mentioned in assumption five, P_1 moves first, after which P_2 will try to maximize its share of votes. This means that P_1 can, and will use backward induction to anticipate the reaction of P_2 on its own actions, and use this to determine its own best strategy. In the Hotelling (1929) spatial problem, both parties would locate themselves at the median voter, in order to catch half the votes. In this scenario however, that does not work. If P_2 positions itself to close to P_1, it will not have any votes at all, as the difference in perceived value between P_1 and P_2 will overrule the voters value of being slightly closer to P_2 in comparison to P_1. The minimum distance P_2 should keep in order to have any votes at all is the exact difference in perceived value, or $M_1 - M_2$ plus and infinitely small distance. If P_2 positions itself here, it can capture all the votes that lay on the other side of P_2 from where P_1 is positioned.

This will be **intuition 1:** A party locates itself at least the difference in additional perceived value away from another party.

This means that in the two party setup, P_2 will position itself $M_1 - M_2$ away from P_1 on the side with the most voters. P_1 can thus position itself with the following pay-off function:

$$U_{P_1} = min(x_1 + M_1 - M_2, 100 - x_1 + M_1 - M_2).$$

The optimum here lies where both are equal, or where $x_1 = 50$, which is exactly in the middle. P_2 will now position itself either $M_1 - M_2$ to the left of P_1, or to the right of P_1. This situation is a sub-game perfect Nash equilibrium, as neither party can improve its pay-off.

4.2 Example 2

The second example consists of two incumbents and one (potential) entrant (P_1, P_2 and E_1). As before, the additional perceived values of P_1 and P_2 are respectively M_1 and M_2, with $M_1 > M_2 > 0$. This situation already becomes a bit more tricky to analyze, as there are now potentially two parties that P_1 has to take into account when deciding upon its location. Due to this second competitor, and the knowledge from intuition one, it becomes rather simple to explain why it is most likely not optimal for P_1 to position itself in the middle. This is due to the fact that if it should, P_2 will realize that by positioning itself the same way as in example one ($x_2 = 50 + M_1 - M_2$), E_1 will be best off by positioning itself on the other side of P_1, at $50 - M_1$. This is due to the fact that E_1 will always want to position itself at the largest remaining share of votes (not dominated by additional perceived values from P_1 or P_2), and due to the symmetry caused by P_1 being in the middle, P_2 can easily make the side where it positions itself smaller than the other. This means that it has no fear of direct competition from E_1, and it maximizes by positioning as close to P_1 as possible, which is at a distance of $M_1 - M_2$. Note that is has to position an infinitely small distance away from this point, in order to make E_1 strictly prefer positioning on the other side of P_1.

Now that it is clear that P_1 will not position itself in the middle, but rather somewhere on one of the two sides, which for simplicities sake, and without loss of generality will be assumed to be the left side, it is time to apply the same reasoning on P_2. If, for arguments sake, P_1 positions itself at the most extreme position of 0, P_2 will not choose to locate itself at $M_1 - M_2$. Even though this is the closest to P_1 and may seem to capture a lot of votes (anything between $M_1 - M_2$ and 100), E_1 will simply position itself at M_1 ($M_1 - M_2 + M_2$), and capture almost all the votes. P_2 therefore has to position itself more to the right, and create two possible areas for E_1 to enter, namely between P_1 and P_2, or to the right of P_2. This information suggests that P_2 should locate somewhere just beyond two third, which makes these conquerable area's equally large[2], and which makes E_1 indifferent between the sides. However, for P_2 it does matter which side E_1 takes. If E_1 takes the right side of P_2, it will position itself at

[2]Note that even though the area to the left is slightly more than twice as large, it is also divided between P_1 and P_2 (or potentially E_1).

$x_2 + M_2$, capturing all the votes from that point to 100, which would otherwise have gone to P_2. If E_1 however chooses to position itself between P_1 and P_2, it is indifferent between any position from $x_1 + M_1$ (Which is equal to M_1, as $x_1 = 0$) and $x_2 - M_2$. The expected value of this will mean that it captures half its votes from P_2, but the other half now comes at the expense of P_1. This means that even though E_1 is indifferent, it is expected to save P_2 half of what is captured by E_1. This means that P_2 will position itself in such a way that the (expected) optimal location for E_1 will bother both P_1 and P_2. Note that this can be achieved when P_2 positions an infinitely small distance further away from P_1. For the sake of simplicity, this will be zero, making E_1 technically indifferent, but it will choose the location between the parties.

Let's say that the share of votes that E_1 will ultimately get is equal to α. That means that the expected sub-game perfect Nash distribution will look as shown in figure 1.[3]:

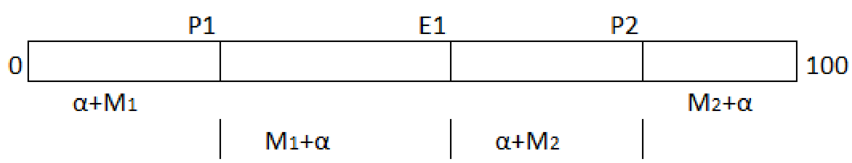

Figure 1

Locations:[4]

$$x_1 = 25 + \tfrac{1}{2}M_1 - \tfrac{1}{2}M_2,$$

$$x_2 = 75 + \tfrac{1}{2}M_1 - \tfrac{1}{2}M_2,$$

and the expected position of E_1 is equal to:

$$50 + M_1 - M_2$$

By taking a closer look to both example one and two, it is possible to give shape to **intuition 2:** Parties secure the largest possible range of votes without giving incentives to latter parties to position within this area.

In the first example this is expressed by P_1 with its fifty-fifty distribution to either secure the left flank, or the right. As these are equally large, P_1 is content with saving either, which is guaranteed by the fact that P_2 may only position

[3]It is called expected because E_1 is indifferent between location ranging from $x_1 + M_1$ to $x_2 - M_2$, but the shown location results in the expected share of votes for P_1 and P_2.

[4]**Elaboration 1.** The distribution from 0 to 100 is now divided into four parts, with a total length of $4\alpha + 2M_1 + 2M_2$. As this is equal to 100, it is possible to calculate the value of α.

$\alpha = 25 - \frac{1}{2}M_1 - \frac{1}{2}M_2$Using this value of α it is possible to determine the locations of the parties more precisely.

$\alpha + M_1 = 25 + \frac{1}{2}M_1 - \frac{1}{2}M_2$

$2\alpha + 2M_1 = 50 + M_1 - M_2$and

$100 - \alpha - M_2 = 75 + \frac{1}{2}M_1 - \frac{1}{2}M_2$.

itself on one side. In the second example, P_1 and P_2 secure their outer flanks by giving the latter partie(s) greater incentives to position elsewhere.

The (expected) **pay-offs** in this scenario are:

$$U_{P_1} = \alpha + 2M_1 + \tfrac{1}{2}\alpha = 37,5 + 1\tfrac{1}{4}M_1 - \tfrac{3}{4}M_2$$

$$U_{P_2} = \alpha + 2M_2 + \tfrac{1}{2}\alpha = 37,5 - \tfrac{3}{4}M_1 + 1\tfrac{1}{4}M_2$$

$$U_{E_1} = \alpha - c_e = 25 - \tfrac{1}{2}M1 - \tfrac{1}{2}M_2 - c_e$$

The entry constraint for E_1 is

$$25 - \tfrac{1}{2}M_1 - \tfrac{1}{2}M_2 - c_e > 0$$

If the entry constraint is not met, than P_1 and P_2 may position themselves closer to the middle, in order to secure more votes, whilst still preventing entry on their outer flank.

4.3 Example 3

4.3.1 Part 1

The third example is somewhat similar to the second, in the sense that only a second (potential) entrant is added. The additional perceived values of the incumbents (P_1, P_2) are unchanged (M_1,M_2, with $M_1 > M_2 > 0$). The entrants (E_1, E_2), have no additional perceived value and will enter in numerical order. With consideration of the two intuitions, this may lead to roughly the same type of sub-game perfect Nash equilibrium as in example 2, where P_1 and P_2 secure their outer flanks, and E_1 and E_2 will share the middle. For simplicities sake, it is once again assumed that P_1 positions on the left side, and P_2 positions on the right side. However, as there are more parties now, the size of the outer flanks will decrease. This is due to the fact that not only E_1 should be in favor of positioning itself between P_1 and P_2, but also E_2 still needs to have an incentive to do so. Just as in example 2, the final decision that E_2 faces should be between three positions that make him technically indifferent. The positions that are referred to are left of P_1 (at $x_1 - M_1$), right of P_2 (at $x_2 + M_2$), or in between P_1 and P_2. For the sake of argument the share of votes it can capture will be defined as α', which is a different α compared to that of example 2. Note however that the concept behind α (or α') remains the same, as it still represents the share of votes the final entrant will or can receive. Another difference with the second example will be that E_1 is no longer indifferent between all the positions from $x_1 + M_1$ to $x_2 - M_2$, but now has to consider a second entrant that will position himself between P_1 and P_2. The options it will have here are to position between P_1 and E_1, between E_1 and P_2, or to copy E_2. As E_1 wants to secure the largest share of votes for itself, it will make both conquerable sides of votes equally large. The consequence is that E_2 is now best of by copying this behavior, and positioning itself at the same spot as E_2. This is due to the fact that it may choose between a pay-off of slightly less thatα' to the left of P_1

(or to the right of P_2), slightly less than α' if it positions between P_1 and E_1 or P_2 and E_1, or half of $2\alpha'$ if it copies E_1. This makes E_2 prefer copying E_1, as it yields the highest pay-off. As E_1 does not have the luxury of moving in such a manner that this copying behaviour is prevented without losing any votes for itself, the result is the sub-game perfect Nash equilibrium shown in figure 2.

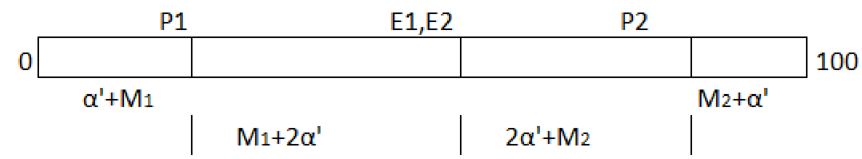

Figure 2

Note that there are now two α''s (and one M_j) between eitherP_j and the entrants, and that the α' has a different value in comparison to the α from example 2.

This results in the following **positions:**[5]

$$x_1 = 16\tfrac{2}{3} + \tfrac{2}{3}M_1 - \tfrac{1}{3}M_2$$

$$x2 = 83\tfrac{1}{3} + \tfrac{1}{3}M_1 - \tfrac{2}{3}M_2$$

and the position of E_1 and E_2 is equal to:

$$50 + M_1 - M_2$$

Note that this is equal to the expected position of the entrant in example 2.

The **pay-offs** are now:

$$U_{P_1} = 2M_1 + 2\alpha' = 33\tfrac{1}{3} + \tfrac{4}{3}M_1 - \tfrac{2}{3}M_2$$

$$U_{P_2} = 2M_2 + 2\alpha' = 33\tfrac{1}{3} - \tfrac{2}{3}M_1 + \tfrac{4}{3}M_2$$

$$U_{E_1} = U_{E_2} = \alpha' - c_e = 16\tfrac{2}{3} - \tfrac{1}{3}M_1 - \tfrac{1}{3}M_2 - c_e$$

Note that the entry constraint will now differ per entrant. For E_1 this is

$$3\alpha' - 2c_e > 0\text{, or } 50 - M_1 - M_2 - 2c_e > 0$$

and the entry constraint for E_2 this is equal to

$$\alpha' - c_e > 0\text{, or } 16\tfrac{2}{3} - \tfrac{1}{3}M_1 - \tfrac{1}{3}M_2 - c_e > 0.$$

[5]**Elaboration 2.** As with the first elaboration, the distribution is divided into four parts, which sum op to 100. therefore, $6\alpha' + 2M_1 + 2M_2 = 100$. This equation can be used to determine α' more precisely.

$\alpha' = 16\frac{2}{3} - \frac{1}{3}M_1 - \frac{1}{3}M_2$The knowledge regarding α'may now be used to determine the positions:

$\alpha' + M_1 = 16\frac{2}{3} + \frac{2}{3}M_1 - \frac{1}{3}M_2$

$100 - \alpha' - M_2 = 83\frac{1}{3} + \frac{1}{3}M_1 - \frac{2}{3}M_2$

$3\alpha' + 2M_1 = 50 + M_1 - M_2$

If neither entry constraint is met, than P_1 and P_2 may position themselves closer to the middle, to secure a larger outer flank (up to $c_e + M_j$, or $100 - c_e - M_j$), whilst still preventing entry.

If only the entry constraint for E_2 is met, then P_1 and P_2 will increase their outer flanks from $\alpha' + M_j$ to $c_e + M_j$. This decreases the area between P_1 and P_2 from $M_1 + M_2 + 4\alpha'$ to $M_1 + M_2 + 6\alpha' - 2c_e$. As E_1 can capture only half of the non M_j part of this, or $\frac{1}{2}(6\alpha' - 2c_e)$, its entry constraint is now $3\alpha' - c_e - c_e > 0$, or $3\alpha' - 2c_e > 0$.

In this example, not only the location of the entrants is equal to the expected location of the entrant in example 2, there is another interesting comparison that can be made. The pay-offs for P_1 and P_2 seem to be somewhat equal, even though a whole new entrant has entered the field. In fact, the difference in pay-offs between example two and example three, for P_1 and P_2 is equal to $4\frac{1}{6} - \frac{1}{12}M_1 - \frac{1}{12}M_2$. As the sign for both M_1 and M_2 is negative, this means that the difference between the two examples will be even smaller than $4\frac{1}{6}$. On a spectrum with a size of 100, and pay-offs for P_1 and P_2 of roughly 30 to 40 per party, this difference is rather small. In fact, if M_1 and M_2 become sufficiently large, the difference in pay-offs might even disappear completely. This is the case for $M_1 + M_2 = 50$. A sum of both M_j's of 50 however does not seem very likely, as this total additional perceived value for two parties on a distribution with a length of 100, is rather severe. In fact, if this should be the case, then neither E_1, nor E_2 will enter, as α (and α') will become equal to zero in both examples. For E_1 on the other hand, the difference in the share of votes between example two and example three is equal to $8\frac{1}{3} - \frac{1}{6}M_1 - \frac{1}{6}M_2$, on a total share of votes of roughly 10 to 20. In cases with relatively low value for M_1 and M_2, this difference can be quite substantial. The reason for the potentially dramatic decrease in the share of votes is due to the second entrant, with which E_1 now has to share its location.

4.3.2 Part 2

The sub-game perfect Nash equilibrium described above holds, but is not the only possible outcome. After P_1 has positioned itself at $\alpha' + M_1$, P_2 may choose another location that results in the same pay-offs. With consideration of the two intuitions, P_2 is able to secure an equally large flank as in the equilibrium described above, but at a different location. P_2 can also secure a flank of $\alpha' + M_2$ by positioning itself at a distance of $M_1 + 2\alpha' + M_2$ from P_1. The maximum share of votes an entrant can capture in between is now one α', or slightly less if P_2 positions itself an infinitely small distance closer to P_1. Note that P_1 can not do the same towards P_2, as this would increase its outer flank, giving an incentive for E_2 to position here. To the right of P_2, on the other hand, there is still an area of $M_2 + 3\alpha'$ left to conquer, which therefore has the greatest potential. E_1 will now have to choose a location, but with consideration of the location that E_2 will choose after E_1 has chosen. If E_1 for instance decides to locate just right of P_2 (at $x_2 + M_2$), it may seem as if it can capture a lot of votes, but then E_2 will simply position itself slightly to the right of that, and it will capture almost $3\alpha'$, leaving E_1 with virtually nothing. Therefore, with the same reasoning as in the equilibrium in part 1, E_1 will position itself $M_2 + 2\alpha'$ to the right of x_2 (or α' away from 100), and E_2 will copy him there to get the largest share of votes. The Sub-game perfect Nash equilibrium thus looks as shown in figure 3.

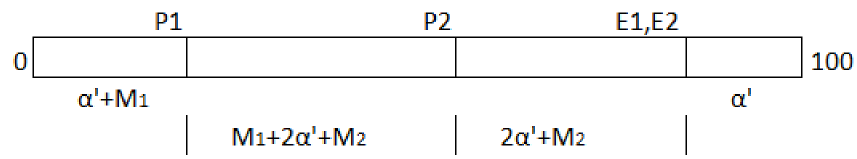

Figure 3

Using elaboration 2 (see footnote under positions example 3 part 1), the **positions** are:

$$x_1 = 16\tfrac{2}{3} + \tfrac{2}{3}M_1 - \tfrac{1}{3}M_2$$

$$x_2 = 50 + M_1$$

and the position of E_1 and E_2 is equal to:

$$83\tfrac{1}{3} + \tfrac{1}{3}M_1 + \tfrac{1}{3}M_2$$

The **pay-offs**, being equal to Example 3 part 1 are:

$$U_{P_1} = 2M_1 + 2\alpha' = 33\tfrac{1}{3} + \tfrac{4}{3}M_1 - \tfrac{2}{3}M_2$$

$$U_{P_2} = 2M_2 + 2\alpha' = 33\tfrac{1}{3} - \tfrac{2}{3}M_1 + \tfrac{4}{3}M_2$$

$$U_{E_1} = U_{E_2} = \alpha' - c_e = 16\tfrac{2}{3} - \tfrac{1}{3}M_1 - \tfrac{1}{3}M_2 - c_e$$

However, there is a difference in the entry 'constraints'. Though the pay-offs may be the same as in part 1, this sub-game perfect Nash equilibrium only holds when there are two entrants. If E_1 knows that the entry constraint for E_2 will not hold, then it may move closer to P_2, 'stealing' a part of its share of votes, while still deterring entry on what has now become his outer flank. Therefore, if E_2 will not enter under the conditions described in the equilibrium, P_2 is better of in the equilibrium given in part 1, and will thus choose for that approach, rather than this alternative.

4.3.3 Part 3

Interestingly, there is a third unique possible sub-game perfect Nash equilibrium, given the outline of this model. P_1 may also choose a vastly different approach in comparison to that of part 1 or part 2. The approach that is being referred is that of figure 4:

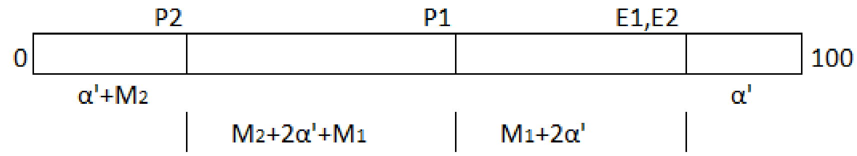

Figure 4

The **positions** here are (using elaboration 2 (see footnote under the positions of example 3 part 1)):

$$x_1 = 50 + M_2$$
$$x_2 = 16\tfrac{2}{3} - \tfrac{1}{3}M_1 + \tfrac{2}{3}M_2$$

and E_1 and E_2 are positioned at:

$$83 + \tfrac{1}{3}M_1 + \tfrac{1}{3}M_2$$

In this approach, P_1 does not directly secure any flank, and the strategy to position itself close to the median voter seems strange at first. However, It can deduce that it is optimal for P_2 to locate on the largest flank, at a distance of $M_1+2\alpha'+M_2$ [6]. This secures both P_2's flanks, each with a size of $M_2+\alpha'$, while it simultaneously secures P_1's left flank with a size of $M_1+\alpha'$. The reason that P_2 wants to position itself on this flank at this distance, is due to the fact that now E_1 and E_2 are best off by positioning themselves at a distance of $M_1+2\alpha'$ from M_1. The reasons for copying and choosing this location are the same as in part 1 and part 2, namely, E_1 cant locate closer or further away from P_1 as E_2 will then steal votes out of its largest flank. Next, E_2 is once again technically indifferent between locating left of P_2, between P_2 and P_1, or copying E_2, but P_1 and P_2 have the luxury of moving an infinitely small distance to the left, and they thereby make E_2 no longer indifferent, but best off by copying E_1. Note that this optimal location for E_1 and E_2 not only gives them the largest share of votes possible, but also gives P_1a fairly large share of votes to its right, namely $M_1+\alpha'$.

the **pay-offs** of this strategy are equal to that of part 1 and part 2, and are:

$$U_{P_1} = 2M_1 + 2\alpha' = 33\tfrac{1}{3} + \tfrac{4}{3}M_1 - \tfrac{2}{3}M_2$$
$$U_{P_2} = 2M_2 + 2\alpha' = 33\tfrac{1}{3} - \tfrac{2}{3}M_1 + \tfrac{4}{3}M_2$$
$$U_{E_1} = U_{E_2} = \alpha' - c_e = 16\tfrac{2}{3} - \tfrac{1}{3}M_1 - \tfrac{1}{3}M_2 - c_e$$

The entry constraints on the other hand, are once again different. If E_2 has no incentive to enter under the sub-game perfect Nash equilibrium ($16\tfrac{2}{3} - \tfrac{1}{3}M_1 - \tfrac{1}{3}M_2 - c_e < 0$), then E_1 and P_2 have the luxury to position closer to P_1, whilst still deterring entry. This means that if the entry constraint for E_2 is not met, P_1 will not choose this strategy, but rather that of part 1 and 2.

[6] Note that positioning on the smaller flank is inferior for P_2, as it still has to deter entry on its outer flank, but competes with P_1 on a smaller area, resulting in a smaller share of votes.

4.4 Example 4.

In this fourth example, there are again once again two incumbents (P_1, P_2), with additional perceived values of M_1 and M_2, with $M_1 > M_2 > 0$. But now, there will be an 'unlimited' amount of entrants. This means that, as long as it is profitable for an entrant to enter, there will be new entry. These incentives for the entrants will therefore determine the number of entrants (n). The implication of this is that backward induction becomes somewhat difficult to use. Fortunately however, the intuitions still hold, and provide sufficient insight as in how to solve this problem. For example, just like example 3 part 1, the incumbents may choose the safe strategy, and locate at such a distance from the edges of the spatial model, that they secure an outer flank that is as large as possible, without encouraging entry within these outer flanks (intuition 2). In this case, this means that the distance they position themselves from the edges is equal to $M_j + c_e$. At this distance, the best a potential entrant can do to capture any votes in this outer flank, is to position itself at a distance of M_j from P_j (intuition 1), thus capturing c_e votes. However, as his costs of entry are also c_e, he is indifferent between entering here, and not entering at all. In fact, the entrant would have to position M_j plus an infinitely small amount of votes away from P_j, in order to make the voters strictly prefer voting for the entrant, thus resulting in an infinitely small loss by positioning there. Once P_1 and P_2 have chosen to position themselves at a distance of $M_j + c_e$ from the edges, the first entrant (E_1) also wants to secure as much as possible. This can be achieved by positioning $M_j + 2c_e$ towards the middle from either of the incumbents. Positioning at this distance secures a flank for both the entrant and the incumbent it 'attaches' itself to. The best a following entrant could do to capture votes between P_j and E_1, is to position between the two, with at least a distance of M_j away from P_j. By doing so, the potential following entrant would capture half of the non-M_j part between the two already located parties, or $\frac{1}{2} * 2c_e$, which is equal to c_e. This makes the potential following entrant indifferent between positioning there, and not entering at all. This indifference can be turned into a strict preference of not entering if E_1 locates an infinitely small distance closer to P_j. This process of strategic locating of entrants will continue until the entire spatial model is filled with parties, each at a distance of $2c_e(+M_j)$ from each other, with of course one exception. As it is unlikely that the combined values for M_j and c_e will lead to a distribution that perfectly fills up the spectrum from 0 to 100, there will be (at least) one distance between parties that is smaller than $2c_e(+M_j)$. This will occur at the location(s) of the last entering entrant(s), as these entrants no longer have the luxury to properly secure flanks, but are limited to inferior 'left-overs'. Note that even though these location may be inferior in comparison to the location of their earlier entered fellow entrants, as long as the benefits of it are larger than c_e, these positions will be taken. As the strategies for locating continue to be the same, it is possible to calculate the amount of entrants that will arise, based on the values for M_j and c_e. This equation will be equal to:

$$n = \frac{100 - 2\Sigma M_j - 2mc_e}{2c_e}$$

Where m is the number of incumbent parties, and n the number of entrants. If n is a non-integer, it is to be rounded up to the closest integer. What the equation therefore actually says is: the number of entrants is equal to the size of the total spectrum (100) minus the area that will be secured by the incumbents (leaving an area that can be conquered by entrants), divided by the size of the area that entrants will (try to) capture. This equation shows that n negatively depends upon the sum of the perceived values and the costs of entry. This negative relationship between costs of entry, the power of the incumbents and the number of entrants seems intuitively correct. For example, when the voters love the incumbent, a potential opponent will think twice before combating against him.

Also note that, just like in example three part two and three, the incumbents may choose strategies that position them more towards the middle, which anticipates that the parties that position after them will secure their flanks for them. This means that, if one would expand this model over multiple rounds, or multiple elections, that successful incumbents can credibly reposition themselves at a similar position to that of the previous election. Furthermore, these locations be roughly anywhere along the spectrum. As long as a stronger incumbent does not radically change its platform over time, the location of the previous election should most likely still be feasible. This consistency over time tends to feel more intuitive than parties that would constantly leapfrog every election in order to get a few more votes. Note however, that if a party presents an extreme platform (relatively close to the edges of the model), and is increasingly successful over time (with an increasing value forM_j), that it is then optimal for that party to become less and less extreme as it grows, as the location of $M_j + c_e$, or $100 - M_j - c_e$ starts to lie more and more towards the middle. This implies that (very) successful extreme parties will have to face the choice between becoming less extreme in order to capture a larger share of votes, or remaining extreme, but missing up on votes, as this strategy is theoretically not optimal.

5 Conclusions and discussion.

5.1 General conclusions and discussion

Adding an additional perceived value to the old spatial problem has provided some interesting results and insights. For a start, the old Hotelling (1929) spatial problem with two parties has changed from a symmetric solution, where both parties locate at the median voter, to a solution where the strongest party takes the middle, and the weaker party is left with a smaller part of a flank. It also shows that inferior parties have to position themselves at a distance equal to at least the difference in additional perceived value, in order to get any votes at all (**intuition 1**).

In the second example, where a (potential) entrant shows up, the incumbents behave different from example one, in the sense that they no longer prefer the center, but they position on the flanks. This behavior is somewhat similar to that of the parties of a model from Prescott and Visscher (1977). In their scenario, there is no additional perceived value, and the two incumbents position themselves at one quarter and three quarters (25 and 75), and they argue that the expected position of the entrant is at 50. In this paper, P_1 uses its dominance in additional perceived value to position closer to the middle, whilst still preventing entry on its left flank. P_2 on the other hand is forced to position slightly to the right of three quarters, in order to prevent entry on its outer flank. The entrants expected point of entry also differs from 50, as it is here $50 + M_1 - M_2$. Furthermore, in the scenario from Prescott and Visscher (1977), the entrant is indifferent between any location that goes from copying the left party (P_1) at one quarter, to copying the right party (P_2) at three quarters. In the model in this paper, the entrant cannot copy any incumbent, due to the presence of additional perceived values. Aside from the differences to previously existing models, example two also reveals the second intuition, namely that parties essentially try to secure a flank that is as large as possible, without creating an incentive for a following party to position itself upon that flank (**intuition 2**).

The third example, having two entrants, shows that the threat of additional entry makes way for multiple strategies, and gives multiple sub-game perfect Nash equilibria. These different strategies all lead to the same pay-offs for all parties involved, as long as all entrants have an incentive to enter. If the entry constraint for the final entrant (E_2) is not met, then the positions of the remaining participants change, though they are still influenced in the sense that incumbents still deter entry in their secure flanks. Furthermore, if only one entrant has an incentive to enter, the incumbents are best off by choosing the 'simple and safe' approach described in part 1, rather than that of part two or three. Another interesting effect of the additional entrant is that the pay-offs for the two incumbents remain roughly the same, whereas E_1 loses the most under non-extreme values of M_1 and M_2 ($M_1 + M_2 < 50$). .Example three also shows that when backward induction becomes rather difficult to apply, that the intuitions give rather solid handholds to reason with (partial) forward induction. The early parties can anticipate the optimal responses of the latter parties, by simply securing certain flanks, and leaving a sufficiently large share of votes for the latter parties to fight over. This means that even though the locations in the equilibria in example three are different, the reasoning behind it stays the same.

In the fourth example, the dynamics change even further. As entrants will enter as long as it is feasible, it becomes rather difficult to use backward induction in the determination of a strategy and a location. However, the intuitions now fully take over, and they make it in fact even simpler to pick a location that will result in the optimal share of votes. This is done by positioning at a distance of $2c_e$ $(+M_j)$ from an already positioned party, or $c_e + M_j$ from the edges. This secures a flank that is as large as possible, while preventing later entrants to position within these flanks (**intuition 2**). The size of these outer most flanks therefore change from $M_j + \alpha$ (in examples two and three) to $M_j + c_e$ (in example four). Another finding is that the number of entrants can be calculated with the values for M_j and c_e. From that equation follows that the number of entrants (n), depends negatively on the sum of additional perceived values, and also negatively on the costs of entry. Both these findings tend to feel intuitive, as a predominant position of the incumbents would scare of entrants, and an increase in entrycosts always makes entry less attractive.

The combination of the examples furthermore shows that the party with the highest additional perceived value always gets the highest pay-off, even though it does not have the benefit of being able to see what other parties did before.

5.2 Revised Assumptions

The model has provided some interesting knowledge and intuitions, but this is based upon assumptions that have simplified reality. The question now is to what extend these simplifications altered reality, and to what extend this model still has explanatory power.

The first assumption states that voters are uniformly distributed over the linear interval of $[0, 100]$. This linear interval goes from extremely left orientated (social/communistic) policies, to extremely right orientated (liberal/capitalistic) policies. However, there may be more aspects in which the platforms of parties might differ. There may for example be differences in preferences regarding Progressive versus conservative, religions, or urban versus the countryside. Adding these, and other factors to the model would lead to a multidimensional model, which might be more realistic, but will also be more complicated. It would allow for more diversified strategies, but as long as voters depend their choices upon the distance between their bliss point and the platforms of parties, and their additional perceived value's, the essence of the model would remain the same, and therefore also the intuitions and implications. The same goes for uniform versus normal, or any other distribution. Whereas normal or another distribution might be more in line with reality, the essence would remain equal, and parties would still pick the location that would maximize their share of votes. the intuitions will therefore remain the same, though the indifference along the uniform line may change into a preference for the more dense parts of the distribution.

Assumption two brings in the additional perceived value. It seems reasonable to believe that there is indeed some other motive for people to vote for parties, other than the locations of the platforms and bliss points. Furthermore, as people have a tendency not to be perfectly rational, nor perfectly informed, they are bound to add some gut-feeling or other biases into their decision making during the elections. This should therefore justify the existence of the additional perceived value M_j. However, it also states that M_j is given and can not be influenced by parties. This is something that is mainly added to simplify the model, as it may be clear that parties do have means to influence this value. Parties may launch more or less expensive (and successful) campaigns, or present stronger or better liked leaders. It could therefore be rather interesting to change this parameter into a variable that can be influenced, in future research.

This research does however provide interesting insights into the incentives for parties to change this variable, and perhaps in combination with the strategy for locating themselves. Another aspect of this second assumption is that the value of M_j is always positive, and that entrants have no additional perceived value. the reasoning behind the positive value is that if a party should have a negative value, and it would locate itself (anywhere), that then an entrant may choose to locate itself on top of this party, thus stealing all the votes from this party. Therefore, such parties are most likely to exit, and are then, and thus, no longer relevant, nor interesting for the model. In reality, if a party is faced (for example) with a lot of scandals or other negative publicity (outweighing any positive publicity), then it is also likely that that party will sooner or later be forced to exit, which means that they also become irrelevant in reality.

The third assumption mentions that parties are committed to their platform. Whereas politicians may indeed have incentives to lie and change their policies after the elections, the parties might also have a reputation to consider if the game is repeated over time. In fact, by deviating to much from the propagated platform in a coalition, voters may lose trust in the party, and this may effect the additional perceived value (M_j) for the next elections. Therefore, the assumption is perhaps ungrounded for a single shot version of the game, but as real politics tend to have multiple elections over time, the assumption tends to be rather solid.

Assumption number four states that parties only care about maximizing their share of votes. In itself this is quite an extreme assumption, as it disregards any interior motivations or beliefs of the politicians. Furthermore, focusing only on the share of votes may give incentives to parties to position at completely different locations along the spectrum in a repeated version of the model. In reality however, parties tend to remain rather steady over time, which is not immediately a logical strategy in this model. However, example four shows that when there is no limit in the number of (potential) entrants, parties can justify a strategy that allows them to be similarly located over time. As this is similar to what may be observed in reality, the assumption therefore does not seem to make the model lose that much explanatory power after all.

The fifth assumption regards the sequential positioning of the parties. This assumption is essential for all the equilibria that are reached, as it effects parties in their strategies, by allowing the use of backward induction. It does however seem logical that incumbent parties locate first, as they already exist, and also have a tendency to keep a rather steady location for their platforms. As all the entrants are assumed to be equal, in the sense that they have no additional perceived value and no platform restrictions, the numerical order goes without loss of generality. The most debatable implication is therefore that incumbent parties locate in descending order of the magnitude of their additional perceived value. However, as mentioned in chapter three, it is arguable that parties with higher additional perceived values have higher expectations from their voters to meet, and are therefore more or less forced to choose between publishing their platform in an early stage, or losing (part of) that additional perceived value. The question could then arise whether or not this trade-off is something worth considering. The model however shows that parties with the highest additional perceived value also always gets the highest pay-offs, suggesting that the higher additional perceived value outweighs the lack of strategic advantages of waiting.

6 Dutch Political Examples

In this bonus chapter, the intuitions that have been formed throughout the paper will be tested against some election outcomes of the Dutch second chamber. To keep things simple and clear, there will only be a few election outcomes[7], rather than all election outcomes. This is because not all election outcomes are interesting enough to discuss, as they sometimes barely differ from previous outcomes. Furthermore, there also will be only limited, though sufficient background information regarding the parties, or the conditions under which they acted. This is to prevent this chapter from becoming a history book about the Dutch politics, but keeping it to the point about locations and perceived value's. Keep in mind, however, that most of what is written here is simplified, and is therefore not as exact as the previous chapters. It does however provide some interesting insights, and is therefore added as an additional chapter.

6.1 Dutch elections second chamber of 1986

The first election outcome that will be discussed it that from 1986, and is displayed in figure 5. This figures main purpose is to set a base value, so the next election outcomes that will be discussed can be compared to this example.

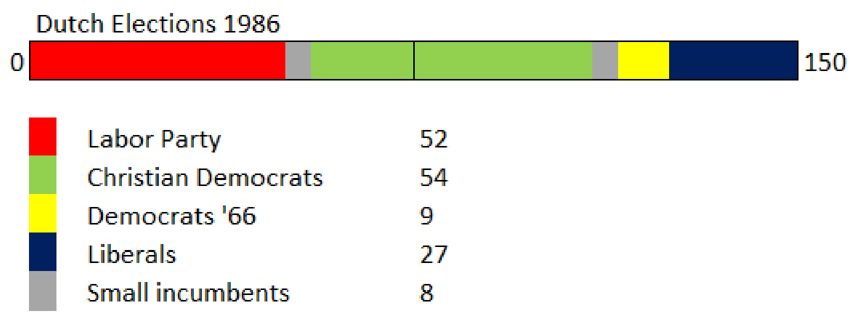

Figure 5

There are several things that may be noticed with regard to figure 5. First of all, as the second chamber consists of 150 seats, the spectrum has been enlarged from 100 to 150. Secondly, to keep things simple, this spectrum is linear, rather then multidimensional. This is due to the fact that this keeps things much easier to compare, and a second argument is that this left versus right comparison tends to suffice for the largest parties, which matters most. Another point worth noticing is that there are relatively few parties that were successful in this election outcome. Despite the fact that there were 27 parties in total that competed in this election. The fact that only four parties managed

[7]Source of election outcomes (and number of entrants): www.nlverkiezingen.com

to get a substantial share of votes, but a lot of parties tried to get any at all, suggests that the additional perceived values of these incumbents were rather substantial in comparison to the costs of entry. A possible explanation for the low costs of entry is that the law dictates that a party has to pay a fee in order to enter the elections, but this fee is returned when that party manages to get at least one seat in the elections. In addition, the people starting these new parties might overestimate their chances at getting a least one seat.

Another noteworthy point was the substantial share of votes for the Labor party and the Christian Democrats. A possible explanation for this is the following. The Labor Party was closely tied to the labor unions at the time[8], and therefore also to the labor class of society, which was closely connected to its labor unions. This was encouraged to vote for the labor party. This close connection gave these people an additional value for voting for the labor party, even when their bliss point was not directly close to that of the platform of the party. For the Christian Democrats, a similar phenomenon occurred, but in this case it was through religion. The Christian Democrats were closely tied to the churches, and a quite substantial amount of the Dutch population was closely tied to their church(es). The priests and the Christian communities encouraged these religious people to vote for the Christian Democrats. Regardless of whether this group pressure is morally correct or not, it did give these people an additional motivation to vote for the Christian Democrats, even when their bliss point was not entirely in line with the platform of the party. Finally, the Liberals consisted mainly of three groups of people. Those who had a lot of money and were seeking for a party that fought for lower taxes upon the rich. Those who had enterprises and sought for a party that promised less government intervention and legislation, and those whose main concern it was to reduce immigration. As the liberals had quite a name in fighting for these causes, they had built up some goodwill and trust among their voters, which allowed them to have a somewhat substantial additional perceived value.

6.2 Dutch elections second chamber of 2002

As time passed on, people changed from being faithful, obedient mobs, towards more free thinking individuals. This meant that mainly the power of the Labor party and Christian democrats was put under pressure, and as a result they started to lose parts of their massive share of votes. The Liberals, on the other hand, experienced a growth up to nearly 40 seats, but were then torn apart by the different incentives of their voters to vote for this party. The group that was mainly against immigrants had separated itself, and in 2002, this allowed for the election outcomes to be as depicted in figure 6.

[8] Abstract from: Geschiedenis van de Partijd van de Arbeid

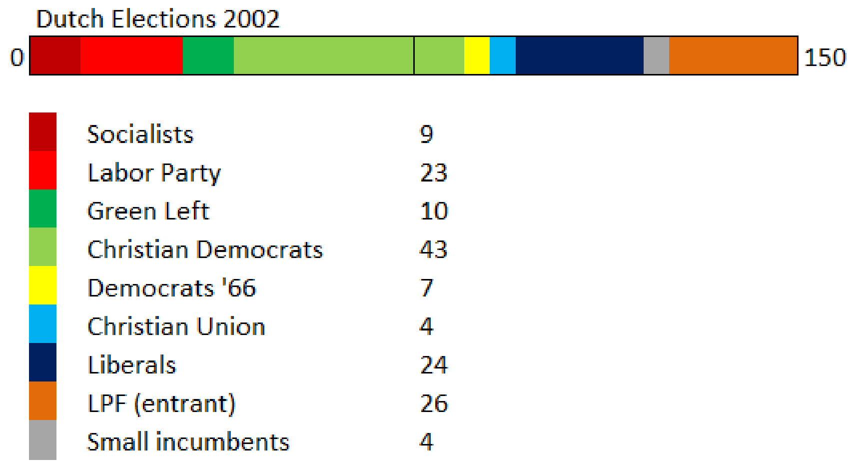

Figure 6

The most obvious difference between figure 5 and figure 6 is that there are a lot more successful parties in figure 6 than in figure 5. The labor party has lost most of its votes, and seems to have fallen apart into a Socialistic party, which has a more communistic orientated than the Labor party, and the Green Left party, which has a larger focus on environmental issues, but is still socially orientated on other issues. The Christian Democrats have declined in comparison with 1986, but not as much as the election before this one. In fact, in 1998, they were reduced to a mere 29 seats, but they recovered in 2002 due to the presence of a mediagenic leader. The charms of that leader allowed the party to recover from a steep decline, but this decline would be continued at the end of that leaders political career. Another noteworthy point is that the location of the center of the Christian Democrats has shifted towards the left. Whereas the average of the votes was roughly at 50 in the previous example, here it is to the left of it. This could either be due to the imperfection of the simplifications of the model, or the party truly became more socially orientated. One more explicit explanation of the imperfections may be that the positioning of parties is determined a few months before the elections, whereas the additional perceived value is more flexible and changeable than what is presumed in the model. In this specific case, there also was an event that may have had incluences on this outcome, which was the rise of the new party LPF (List Pim Fortuyn). This party was founded by Pim Fortuyn, who was murdered a little over a week before the elections. As this political murder shocked the nation, a lot of people felt sympathy for the party, and voted for the LPF for that reason. This means that the anticipated ideal locations for the Liberal party and the Christian democrats were no longer valid, and this could have influenced the balance of the model and the election outcomes.

Whereas the discussion of the election outcome started with the increase in the number of successful parties, there was also a change in the total number of participating parties. This number decreased from 27 in 1986, to 16 in 2002. As there were now also more incumbents, it suggests that either the sum of the additional perceived values has increased, or the entry costs have increased.

6.3 Dutch elections second chamber of 2012

After the elections of 2002, the LPF disappeared rather quickly due to internal disputes, but the gap that was left behind in the extreme right spectrum, was not left unexploited for long. In fact, four years later, in 2006, a new party called the Freedom Party, took its place and was quite successful in doing so. The Christian Democrats, on the other hand, who also faced internal problems, continued. But the internal struggle seemed to continuously damage their reputation, and their share of votes dropped dramatically. In fact, the only true victors of the 2012 elections were the Labor party and the Liberals. Whereas the polls did not give them a lot of hope for many votes, they managed to get into a final stand-off, where the question "who becomes the biggest?" seemed to generate additional perceived value for the both of them. The results of this may be seen in figure 7.

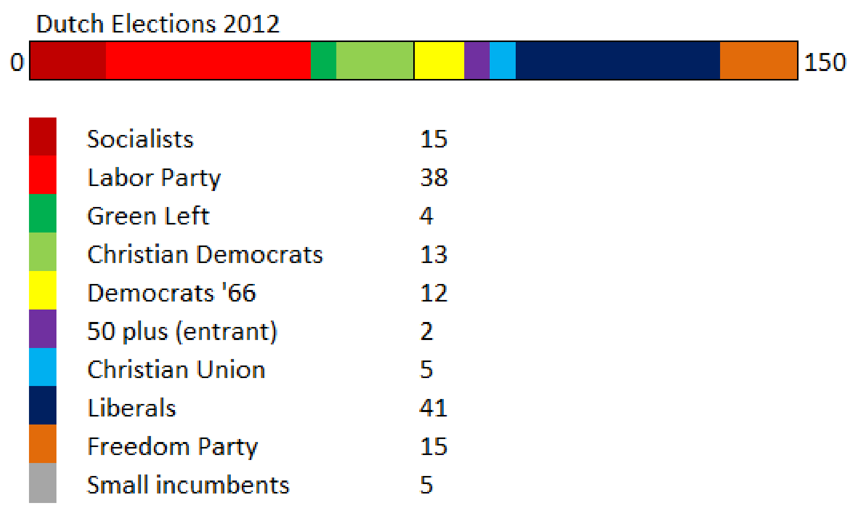

Figure 7

One may notice the rather severe increase of votes for the Labor and Liberal party. As described earlier, this seems to be due to the additional perceived value that was generated with the stand-off that was built op just a few weeks before the elections. This suggests that the additional perceived value is not (entirely) known before the platform location is determined. This means that such variations can influence outcomes, and strategies. It might therefore be interesting for future research, to make this factor more changeable, to see what happens to the equilibrium. Another interesting appearance in figure 7 is the entrant 50 plus. This party is mainly focused on the welfare (and well being) of the elderly of society. As this has not primarily anything to do with the simplified left to right spectrum, it might be the case that a multidimensional model would allow for these kind of niches in a better way. Furthermore, among the small incumbents, there is a party that focuses mainly on the well-being of animals, which also has little to do with the capitalistic versus communistic view on life.

With regard to the number of running parties, the total number was 20 in 2012. An increase in comparison to 2002, but still lower than 1986. The interesting thing however, is that in 2002, with the fewest entrants, the success of the successful entrant was much larger than that in 2012, when there were more. Furthermore, in 1986, when the most entrants were trying to enter, none succeeded. This suggest that there may be a negative relationship between the number of entrants, and the success of the entrants that actually succeed. The model also seems to suggest such a thing, in the sense that a higher entry cost barrier not only decreases the number of entrants, but also increases the pay-off to the parties that still participate.

6.4 Concluding remarks on the Dutch Politics

Chapter six has compared the intuitions from the model with reality, in an attempt to understand to which extend they hold. It seemed that the general outline of the model was indeed in line with reality, but that there were some exceptions that may require more research to explain. For example, the additional perceived value does tend to explain most behavior, but the factor itself seems changeable until the final moment before the elections. Also, the linear model gives a proper indication for the largest parties, but some small parties with specific targets do not seem to fit properly. Finally, the examples suggest that there might be a negative relationship between the number of entrants, and the success of these entrants. The model can explain this with high entry costs, as this both deters entry and allows for higher pay-offs to the parties that still participate.

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