

A Bargaining Theory of the “Edwards’ Effect” in the 2007-8 Democratic Presidential Primary

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Honors Thesis

*Submitted in partial fulfillment of the requirements for Graduation with Distinction in
Economics in Trinity College of Duke University*

Duke University
Durham, North Carolina
2009

Acknowledgement

The author is currently completing a Bachelor of Science in Economics and a Bachelor of Science in Engineering in Biomedical Engineering. The author can be reached at alex.li@duke.edu. He would especially like to thank Professor Huseyin Yildirim for the immense amount of support, advice, and feedback he provided as the project progressed. Without Professor Yildirim's help, a workable theoretical model would have never been established. The author is also grateful for Paul Dudenhefer's constructive criticisms and critique of the paper and his Economics 201S and 202S classmates' encouragement and advice throughout the course of this project.

Abstract

2008's Democratic Presidential Primary will go down as one of the most competitive races in recent history. Two candidates, Senators Barack Obama (Illinois) and Hillary Clinton (New York), fought a see-saw battle to obtain enough delegates/vote-shares for the Democratic nomination. Although the race eventually dwelled down to these two players, for a while it was a dynamic three-player-race with Senator John Edwards (North Carolina) in the fold. During that time, many people were puzzled by Edwards' insisting on staying in the race even when he had no foreseeable chance of becoming the party's eventual nominee. In this honors thesis, I construct a theoretical model to explain Edwards' reason for staying in the race. My model found that if Edwards attains a certain amount of vote-shares, depending on the external circumstances, he could have pushed the election into a backroom negotiation phase. In this phase, he would have become the most pivotal player as his relatively low amount of vote-shares would ironically turn him into the player with the greatest negotiating power. This could have allowed him to come out of the backroom negotiation with a final prize value that would have exceeded the efforts he inputted. My paper coins this as "The Edwards Effect" and explores the ramifications and conditions for its existence.

I. Introduction

In the latest United States Presidential Election cycle, the competitive Democratic primary imparted on the road to the White House an extra layer of intrigue. The norm in past elections had been for both the Democratic and Republican parties to settle on a de-facto nominee to the General Election four to five months before the party's National Convention. In this past election cycle, however, only the Republican primary was resolved well in advance of the National Convention as Senator John McCain (Arizona) emerged as the official nominee of the GOP. Meanwhile, the Democratic nominee was effectively selected just two months shy of the National Convention when Senator Hillary Clinton (New York) finally conceded the contest to Senator Barack Obama (Illinois).

Given the current national political landscape, the Democrats had a lot riding on this particular presidential primary. With an economy in recession and an unpopular war in Iraq, public opinion of President George Bush had reached historic lows. Some of these negative opinions had trickled down to his party, and public sentiment was in favor of a major ideological/party change in leadership. It was widely believed that whoever won the Democratic Presidential Primary had an exceedingly great chance of winning the General Election (this was validated on Election Night as Obama cruised to victory to become the first African-American President of the United States). This made the stakes extremely high for all of the candidates involved.

From the very beginning of the Democratic primary, only three candidates had a viable chance of winning the eventual nomination - Hillary Clinton, Barack Obama, and John Edwards. Each of the three had some major backing but no one had the majority of the Democratic Party behind him/her. A back-and-forth battle ensued. No certain

nominee emerged from the early primaries and caucuses; yet one thing became certain: John Edwards, while having a nontrivial amount of support, did not have enough to capture him the party's nomination.

The public and media soon wrote Edwards off and saw the primary essentially as a two-person race. Yet Edwards himself refused to quit early, and it was not until late January, after more than a year on the campaign trail, that he finally withdrew his candidacy (TimesOnline, 2006). This brings up an interesting and perplexing question: why did John Edwards stay in the race even when he knew he could not win the nomination? The presidential nomination race is already time-consuming and strenuous, and this is even tougher for less viable candidates like Edwards as they have to actively engage in special issues to bring the public and media attention back from the front runners. Why, then, did John Edwards persist, when he clearly did not have the votes nor the momentum?

One main motivator of behind Edwards' decision to stay in the race is the way the Democratic primary process works—in order to become the official party's nominee, a candidate must obtain a majority of the voting delegates at the National Convention. The Democratic party has two types of delegates, pledged delegates and unpledged/super delegates. The super delegates are high ranking party officials, governors, and congressmen who can vote for any of the candidates at the National Convention; they represent a little less than 20 percent of the total delegate pool. The rest of the delegates, the pledged delegates, are selected to the National Convention to vote for a specific candidate. Each candidate receives a percentage of a state's total delegates that is directly proportional to the percentage of votes the candidate received in the state primary

election/caucus. This means that a candidate does not have to win every state to win the final nomination (Kathleen, 2000).

In previous election cycles, the front runner usually obtains enough delegates to make it impossible for his/her competitors to win the party nomination, so this policy of super delegates has been relatively unimportant. However, for this past election cycle, the two top candidates, Obama and Clinton, had about the same number of delegates until the very end. As late as the beginning of June 2008, with 2,026 delegates needed to clinch the Democratic nomination, Obama had 1,887 delegates while Clinton had 1,718 (Chozick, 2008). With the results from Michigan and Florida still to be determined in a rules committee hearing (the Democratic National Committee disqualified all of the delegates from those states as punishment for pushing up their primary dates), no one knew just how much longer the race would last.

This lack of an obvious leader made each delegate matter that much more, and this is where the “Edwards Effect” came into play. Although Edwards did not have enough delegates to win the party’s nomination, he could have potentially gained enough delegates to push the nomination process into a backroom negotiation phase, forcing the eventual nominee to promise him a “reward” in exchange for dropping out of the race. Such a reward, a “final prize value,” might have been a cabinet position, the vice president post, or even a seat on the Supreme Court.

In this paper, I propose to model such a two-stage game that can occur in a close primary race with three candidates: Edwards, Clinton, and Obama. The first stage describes the primary election process in which each of the three candidates expends effort to gain some proportion of the total vote-shares. Assuming that no one player gains

more than fifty percent of the total vote-share, a second negotiation stage will occur in my model. In this paper, I solve for each candidate's effort equation in the different cases that can occur when no one wins a majority of the vote-shares/delegates. Then, I explore the most important case of the four, when all three candidates come out of the backroom negotiation with the same percentage of the final prize value, and see if it can occur in equilibrium.

The results of this specific case show that Edwards could have obtained a prize value that, in the end, would more than make up for the cost of his efforts to continue in the race. I argue that this is the reason why Edwards decided to remain in the race for as long as he did even when he realized that he had no chance of winning the nomination. This paper concludes that given a specific set of external circumstances, by reaching a particular percentage of total vote-shares/delegates in the general primary race, Senator John Edwards could have stimulated an "Edwards Effect" that would have pushed the primary process into a rare backroom negotiation phase. It is from this phase that he can change the nomination process from a winner-take-all contest to a competition with different prize values for all participants.

This paper has eight additional sections. Section II focuses on various existing theoretical and empirical studies that form the basis for my model. Section III provides an in-depth construction of my theoretical model, a three-player, two stage game. Sections IV and V then solve the effort equations for all three candidates under the different cases of my model. Section VI then explores the constraints that are necessary to make one particular case the equilibrium solution, and Section VII provides a numerical illustration of the theoretical model. Section VIII provides additional in-depth analyses and ties the

theory to its practical applications. Finally, Section IX concludes with a summary of results and points out instances for further investigation.

II. Literature Review

Most of the existing literature on the United States' Presidential election process focuses directly on the actual election. The few available studies on the U.S. presidential nomination process focus primarily on specific state primaries and voting patterns. There are a few others, such as Aldrich's model (1980) and Stone, Rapoport, and Atkeson's model (1995), which explored the dynamics of the weeding-out process within a party's nomination race. These studies tend to focus on the public perception of the candidates, specifically on their viability in the nomination process and their electability in the General Election. The primary reason for the dearth of literature in my specific topic area is the lack of close nomination races in recent history. With the shortage of data, there are also very few empirical analyses on the topic.

The first stage of my theoretical model relies on that political competition can be modeled as a contest, which is a generally accepted and proven relationship. Konrad (2007) provided a broad survey of the contest literature available today, and the first stage of my model is based largely upon the Tullock contest model that Konrad described. This model, applied by Tullock in 1980, based the probability of a player winning on a ratio of his/her own effort over the total of all players' efforts in the game. Although my model uses this same underlying assumption in the first stage, it builds on Tullock's model by allowing the proportion of vote-shares a player wins for each specific state election to depend on both the player's effort for the current state election, and the vote-shares that same player had won previously. Specifically, the proportion of vote-

shares a player wins in a certain state is a ratio of the sum of the effort that player spends and the vote-shares he/she won previously, over the sum of all the players' efforts and the total vote-shares from previous contests. This way, my model links all of the state elections and will more realistically model the state-by-state election process of the presidential primary race. For example, a decent showing in a big state with many delegates up for grabs at the beginning of the primary season can dramatically help a candidate's overall position in the model, while a blown-out victory at a small state at the end of the primary season will not matter so much for that same candidate.

The backroom negotiation/bargaining process that is described in the second stage of my model is very similar to the government formation process that exists in many Western European countries, and in this field, many analyses have been conducted. Most of the existing coalition/government formation literature focus on elections such as those of Belgium, Denmark, and France where the government is formed by a group of parties. For example, Merlo (1997) portrayed a theoretical model that describes the government formation process in post-war Italy along with an empirical analysis of his model. Merlo arrived at the conclusion that although delays in forming a government resulting from the bargaining process can be extremely costly to society, they could be optimal to the players involved due to the stochastic environment. This conclusion used the assumption that each player's prize value coming out of the negotiation process might not always be decreasing with respect to time. However, this is different from my model where the primary process has a very definitive timeline and usually will last shorter than a country's government formation process. This will cause the prize value to decrease as time goes on because the party needs to have a nominee by the end of the National

Convention and any delays in this process will play to the advantage of the other party's nominee as he/she will have more time to prepare for the General Election.

Today's government-formation model is largely based on the work of Baron and Ferejohn. Baron and Ferejohn (1989) presented a theoretical model that focuses on the bargaining process in legislatures and the formation of agendas. They were able to relate their model in the context of government formation in parliamentary systems by looking at the expected number of seats each party will receive in the final parliamentary government. This model was adapted in my theoretical model as the basis for the second stage, the negotiation phase, of the game. As my model is working within the context of the U.S. primary nomination system, the final expected value symbolizes how much influence/power each of the candidates will have in the President's cabinet if the party's nominee is elected President of the United States. However, my model is different from Baron and Ferejohn as it looks at the amount of vote-shares that is needed to reach the bargaining phase with different external circumstances; each set of circumstances can create different relationships among the three final expected values coming out of the backroom negotiation process. Meanwhile, Baron and Ferejohn's model looks at the strategies employed by the different players in the negotiation phase by fixing each player's offering probability to a certain amount (in effect, in my model, they are fixing the amount of vote-shares each player comes into the bargaining phase with).

Austen-Smith and Banks (1988) also came up with a similar model dealing with party behavior in a legislature. They developed a multi-stage game with three parties competing with one another to get their own legislature agendas across. They found that the result of the game is created by a noncooperative bargaining game among the three

different parties. Similar to my model, the negotiating power that each party comes in with is dependent on the amount of vote-shares that party captured in the general election. However, Austen-Smith and Banks' model also takes into consideration each party's policy positions in the election process, whereas my model does not, thus simplifying the negotiation stage of the game.

Diermeier and Merlo (2004) tested the validity of both Baron and Ferejohn's model and Austen-Smith and Banks' model with empirical data. Diermeier and Merlo concluded that Baron and Ferejohn's model best fit the empirical data collected from over 313 government formations in 11 multi-party democracies in the period of 1945 to 1997. However, they also realized that an alternative model that combines the underlying assumptions of both models made an even better fit with the empirical data. As my model is trying to portray a nomination process which has less complexity than a government formation process, primary considerations were given to Baron and Ferejohn's assumptions. And for this purpose, Diermeier and Merlo's study was able to confirm the underlying assumptions in, and the validity of, my second stage.

III. Theoretical Framework

The current model contains the three main players in the 2008 democratic presidential primary: John Edwards, Hillary Clinton, and Barack Obama. It contains two stages: an election stage and a negotiation stage. To win the game, a candidate or a group of candidates must obtain a majority of the vote shares available. In the first stage, the nomination process, candidates expend effort in a series of state elections to obtain some proportion of the total vote-share. Then in the second stage, candidates go through a negotiation process so that in the end, a team of candidates wins the competition. Unlike

most models, a minimum of three candidates is needed to guarantee the possibility that no one has a majority of the vote-shares at the end of the first stage, so that the second stage can occur.

Part A – The Parameters

There are three players: Edwards (e), Clinton (c), and Obama (o)

Each player, i , has a certain amount of votes gained from previous state elections, X_i

X_i = the amount of vote share person i comes into the current state election with

Each of the players put in a certain amount of effort (expenditure): x_i

x_i = the amount of effort player i exerts in the current state election

Part B – Stage One

In the first stage, each player puts in his/her effort, x_i , which will, at the end of stage one, generate a certain proportion of the total vote-share.

Player i 's proportion of the total vote-shares at the end of stage one is determined by the following equation:

$$p_i = \frac{X_i + x_i}{\sum_{j=1}^3 (X_j + x_j)} \quad (1)$$

Where:

$$1 = \sum_{j=1}^3 p_j \quad (2)$$

(1) shows that the amount of effort player i puts in relative to the total effort of all the players determines the percentage of the vote-shares player i comes out of the first stage with.

In this stage, each player tries to maximize his/her payoff with respect to his/her effort.

For example, Edward's equation would be:

$$\max_{x_e} \pi_e = v_e^*(p_e, p_c^*, p_o^*) - c(x_e) \quad (3)$$

Subject to (1).

In (3), the v_e^* represents the expected value of the final prize at the end of negotiation (the Democratic National Convention), normalized to 1, that Edwards would expect to receive under equilibrium conditions at the completion of stage two, the backroom negotiations.

Part C – Stage Two

In Stage two, each player enters with a certain proportion of the vote-shares, p_i , gained from stage one. There are two cases under stage two.

- *Case 1: $p_i > 0.5$ for some i .*

This is the trivial case. If any of the p_i is greater than 0.5, then that person would automatically win 100 percent of the final prize. None of the other two players will receive any consolidation prize, power of influence, in this case.

- *Case 2: $p_i < 0.5$ for all i .*

If none of the players has a majority of the vote-shares, then they would enter a bargaining phase as the game would only end when a group of players can capture a majority of the vote-shares. Note that if $p_i < 0.5$ for all i , then $p_k + p_l > .5$ for $i = k, l$.

This is the case that is examined in the paper.

Solving Case 2:

Parameters of interest

1. p_i = the probability of player i offering to form an alliance to win the game

(Note: This is the same variable as the amount of vote-shares player i comes into stage two with. The higher the proportion of vote-share i has, the greater the chance i will offer to form an alliance as he/she is in more dominant position, the power player position)

2. r_{ij} = the probability of player i offering to form an alliance with player j
3. δ = discounting factor

This number is contained within $[0, 1)$. The discounting factor shows the attrition effects associated with a long negotiation process. As stage two drags on, each player's expected value of the prize will go down as each player is expending additional energy, effort, time, and other intangibles that cannot be recovered. The discount factor is important to this model as it represents the critical time loss for the eventual nominee to prepare for the General Election Race.

Calculation of expected value, v , coming out of negotiation

The expected value for each player coming out of negotiation is solved in the same way.

Edwards' expected value is solved as an example below:

Part A.

Edwards can make an offer (p_e) to Clinton which will be represented by: $r_{e,c}$ which results in a final expected value of:

$$\text{Edwards}' = 1 - \delta v_c \text{ (as the total value is equal to 1)}$$

$$\text{Clinton}'s = \delta v_c$$

$$\text{Obama}'s = 0 \text{ (as he was not offered to be part of the winning team)}$$

Part B.

Edwards can make an offer (p_e) to Obama which will be represented by: $r_{e,o}$ which results in a final expected value of:

$$\text{Edwards}' = 1 - \delta v_o$$

$$\text{Clinton}'s = 0$$

$$\text{Obama}'s = \delta v_o$$

Part C.

Edwards can receive an offer from Clinton (p_c) with a probability of $r_{c,e}$ with an expected value of:

$$\text{Edwards}' = \delta v_e$$

$$\text{Clinton}'s = 1 - \delta v_e$$

$$\text{Obama}'s = 0$$

Part D.

Edwards can receive an offer from Obama (p_o) with a probability of $r_{o,e}$ with an expected value of:

$$\text{Edwards}' = \delta v_e$$

$$\text{Clinton}'s = 0$$

$$\text{Obama}'s = 1 - \delta v_e$$

Part E.

The total prize value for Edwards will be

$$v_e = p_e(1 - r_{e,c}\delta v_c - r_{e,o}\delta v_o) + p_c r_{c,e}\delta v_e + p_o r_{o,e}\delta v_e \quad (4)$$

Equation 4 can be simplified: Edwards will make an offer to Obama with the probability:

$(1 - r_{e,c})$. This is because Edwards has to make an offer to win the game. If Edwards does

not offer to form a team with Clinton, then he will have to do it with Obama.

Now the equation becomes:

$$v_e = p_e[1 - r_{e,c}\delta v_c - (1 - r_{e,c})\delta v_o] + p_c r_{c,e}\delta v_e + p_o r_{o,e}\delta v_e \quad (5)$$

The same logic can be used to find the expected value for Clinton and Obama, as they are

all symmetrical. The following will result:

$$v_c = p_c[1 - r_{c,e}\delta v_e - (1 - r_{c,e})\delta v_o] + p_e r_{e,c}\delta v_c + p_o(1 - r_{o,e})\delta v_c \quad (6)$$

$$v_o = p_o[1 - r_{o,e}\delta v_e - (1 - r_{o,e})\delta v_c] + p_e(1 - r_{e,c})\delta v_o + p_c(1 - r_{c,e})\delta v_o \quad (7)$$

Solving for p_i 's

The expected values can be differentiated into four different cases by knowing the fact that: Without loss of generality, let $p_e \leq p_c \leq p_o$, as Edwards is the weakest candidate and Obama is the strongest. From Eraslan (2002), we then know that: $v_e^* \leq v_c^* \leq v_o^*$. Hence, there are 4 possible cases to consider. Below, for each of the 4 cases, the P_i 's are solved in terms of v 's, r 's and δ 's.

Case One: $v_e^* = v_c^* = v_o^* = 1/3$.

This means that equations (5-7) can be written:

$$\frac{1}{3} = p_e \left[1 - \frac{\delta}{3}\right] + \frac{p_c r_{c,e} \delta}{3} + \frac{p_o r_{o,e} \delta}{3} \quad (8)$$

$$\frac{1}{3} = p_c \left[1 - \frac{\delta}{3}\right] + \frac{p_e r_{e,c} \delta}{3} + \frac{p_o (1 - r_{o,c}) \delta}{3} \quad (9)$$

$$\frac{1}{3} = p_o \left[1 - \frac{\delta}{3}\right] + \frac{p_e (1 - r_{e,c}) \delta}{3} + \frac{p_c (1 - r_{c,e}) \delta}{3} \quad (10)$$

Solving for these equations leads to:

$$p_e = \frac{3 - r_{o,e} \delta - 2\delta - r_{c,e} \delta + r_{o,e} \delta^2 + \delta^2 r_{c,e} - \delta^2 r_{c,e} r_{o,e}}{r_{e,c} \delta^2 r_{o,e} - r_{e,c} \delta^2 r_{c,e} - r_{o,e} \delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9} \quad (11)$$

$$p_c = \frac{3 - r_{o,e} \delta^2 + \delta^2 + r_{e,c} \delta^2 r_{o,e} - r_{e,c} \delta + r_{o,e} \delta - 3\delta}{r_{e,c} \delta^2 r_{o,e} - r_{e,c} \delta^2 r_{c,e} - r_{o,e} \delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9} \quad (12)$$

$$p_o = \frac{r_{e,c} \delta - 4\delta - r_{e,c} \delta^2 r_{c,e} + \delta^2 + 3 + r_{c,e} \delta}{r_{e,c} \delta^2 r_{o,e} - r_{e,c} \delta^2 r_{c,e} - r_{o,e} \delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9} \quad (13)$$

Case Two: $v_e^* < v_c^* = v_o^*$

This means that:

$$r_{c,e} = 1, r_{o,e} = 1 \text{ and } v_c^* = v_o^* = v$$

This means that equations (5-7) can be written:

$$v_e = p_e[1 - \delta v] + p_c \delta v_e + p_o \delta v_e \quad (14)$$

$$v = p_c[1 - \delta v_e] + p_e r_{e,c} \delta v \quad (15)$$

$$v = p_o[1 - \delta v_e] + p_e(1 - r_{e,c}) \delta v \quad (16)$$

Solving for these equations leads to:

$$p_e = \frac{v_e(\delta v_e - 1 + 2\delta v)}{\delta v - 1 + \delta v_e} \quad (17)$$

$$p_c = \frac{v(1 - \delta v_e r_{e,c} + 2r_{e,c} \delta^2 v v_e + \delta^2 v_e^2 r_{e,c} - \delta v - \delta v_e)}{(\delta v - 1 + \delta v_e)(\delta v_e - 1)} \quad (18)$$

$$p_o = \frac{v(1 + \delta^2 v_e^2 - \delta^2 v_e^2 r_{e,c} + 2\delta^2 v v_e - 2r_{e,c} \delta^2 v v_e - 2\delta v_e + r_{e,c} \delta v_e - \delta v)}{(\delta v - 1 + \delta v_e)(\delta v_e - 1)} \quad (19)$$

Case Three: $v_e^* = v_c^* < v_o^*$

This means that:

$$r_{e,c} = 1, r_{c,e} = 1, r_{o,e} = r_{o,c} = \frac{1}{2} \text{ and } v_c^* = v_e^* = v$$

This means that equations (5-7) can be written:

$$v = p_e[1 - \delta v] + p_c \delta v + p_o r_{o,e} \delta v \quad (20)$$

$$v = p_c[1 - \delta v] + p_e \delta v + p_o(1 - r_{o,e}) \delta v \quad (21)$$

$$v_o = p_o[1 - \delta v] \quad (22)$$

Solving for these equations leads to:

$$p_e = \frac{v(1 - v_o r_{o,e} \delta - 3\delta v + 2\delta^2 v^2 + \delta^2 v v_o)}{(\delta v - 1)(2\delta v - 1)} \quad (23)$$

$$p_c = \frac{v(1 - v_o r_{o,e} \delta - 3\delta v + 2\delta^2 v^2 + \delta^2 v v_o)}{(\delta v - 1)(2\delta v - 1)} - \frac{\delta v v_o}{(\delta v - 1)(2\delta v - 1)} \quad (24)$$

$$p_o = \frac{v_o}{1 - \delta v} \quad (25)$$

Case Four: $v_e^* < v_c^* < v_o^*$

This means that:

$$r_{o,e} = 1, r_{e,c} = 1 \text{ and } r_{c,e} = 1$$

This means that equations (5-7) can be written:

$$v_e = p_e[1 - \delta v_c] + p_c \delta v_e + p_o \delta v_e \quad (26)$$

$$v_c = p_c[1 - \delta v_e] + p_e \delta v_c \quad (27)$$

$$v_o = p_o[1 - \delta v_e] \quad (28)$$

Solving for this equation leads to:

$$p_e = \frac{(1 - \delta)v_e}{1 - \delta(1 - v_o)} \quad (29)$$

$$p_c = 1 - \frac{(1 - \delta)v_e}{1 - \delta(1 - v_o)} - \frac{v_o}{1 - \delta v_e} \quad (30)$$

$$p_o = \frac{v_o}{1 - \delta v_e} \quad (31)$$

IV. Equilibrium Effort Solutions for Case One

Within these four cases, this paper will find the conditions that are necessary for case one, when $v_e^* = v_c^* = v_o^*$, to be established as the equilibrium. This would give validity for the underdog, John Edwards, to stay in the race.

As mentioned previously: $p_e \leq p_c \leq p_o$

Substituting the P_i 's with the solutions gathered for case one from equations 11-13:

$$\frac{3 - r_{o,e}\delta - 2\delta - r_{c,e}\delta + r_{o,e}\delta^2 + \delta^2 r_{c,e} - \delta^2 r_{c,e} r_{o,e}}{r_{e,c}\delta^2 r_{o,e} - r_{e,c}\delta^2 r_{c,e} - r_{o,e}\delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9} \leq \frac{3 - r_{o,e}\delta^2 + \delta^2 + r_{e,c}\delta^2 r_{o,e} - r_{e,c}\delta + r_{o,e}\delta - 3\delta}{r_{e,c}\delta^2 r_{o,e} - r_{e,c}\delta^2 r_{c,e} - r_{o,e}\delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9} \leq \frac{r_{e,c}\delta - 4\delta - r_{e,c}\delta^2 r_{c,e} + \delta^2 + 3 + r_{c,e}\delta}{r_{e,c}\delta^2 r_{o,e} - r_{e,c}\delta^2 r_{c,e} - r_{o,e}\delta^2 r_{c,e} - 9\delta + \delta^2 r_{c,e} + 2\delta^2 + 9}$$

Validation of Case One

To check the validity of the inequalities, assume all of the candidates came into the final stage with equal proportion of vote-shares: $p_e = p_c = p_o = p$

Which will lead to the results: $r_{o,e} = 0.5$, $r_{c,e} = 0.5$, and $r_{e,c} = 0.5$

This will transform the equations into the following:

$$\frac{3 - 0.5\delta - 2\delta - 0.5\delta + 0.5\delta^2 + 0.5\delta^2 - 0.25\delta^2}{0.25\delta^2 - 0.25\delta^2 - 0.25\delta^2 - 9\delta + \delta^2 0.5 + 2\delta^2 + 9} = \frac{3 - 0.5\delta^2 + \delta^2 + 0.25\delta^2 - 0.5\delta + 0.5\delta - 3\delta}{0.25\delta^2 - 0.25\delta^2 - 0.25\delta^2 - 9\delta + 0.5\delta^2 + 2\delta^2 + 9} = \frac{0.5\delta - 4\delta - 0.25\delta^2 + \delta^2 + 3 + 0.5\delta}{0.25\delta^2 - 0.25\delta^2 - 0.25\delta^2 - 9\delta + 0.5\delta^2 + 2\delta^2 + 9}$$

And simplify to:

$$\frac{0.75\delta^2 - 3\delta + 3}{2.25\delta^2 - 9\delta + 9} = \frac{0.75\delta^2 - 3\delta + 3}{2.25\delta^2 - 9\delta + 9} = \frac{0.75\delta^2 - 3\delta + 3}{2.25\delta^2 - 9\delta + 9}$$

They become the same equation as expected.

Now moving on to the first stage of the game:

Assume: $X_e, X_c = X_o = X$

For Edwards:

$$p_e = \frac{X_e + x_e}{2X + X_e + x_e + 2x} \quad (32)$$

In order for the candidates to expend positive effort in the bargaining phase, the following individual rationality must be true:

$$\frac{1}{3} - c(x_e^*) \geq 0 \Rightarrow x_e^* \leq \frac{1}{3c} \quad (33)$$

(Edwards will only exert effort when the cost of his effort is less than or equal to the expected value he receives after the bargaining phase)

As

$$p_e = \frac{X_e + x_e}{2X + X_e + x_e + 2x} \text{ and } p = \frac{0.75\delta^2 - 3\delta + 3}{2.25\delta^2 - 9\delta + 9} \quad (34)$$

Thus:

$$\frac{0.75\delta^2 - 3\delta + 3}{2.25\delta^2 - 9\delta + 9} = \frac{x_e + X_e}{2X + x_e + X_e + 2x}$$

Solving for x_e^* :

$$x_e^* = X + x - X_e \quad (35)$$

$$(X, x \uparrow \Rightarrow x_e^* \uparrow \text{ and } X_e \uparrow \Rightarrow x_e^* \downarrow)$$

Also means:

$$x_e^* = X + x - X_e \leq \frac{1}{3c} \quad (36)$$

$$(c \uparrow \Rightarrow x_e^*, x^* \downarrow)$$

Solving for Obama's and Clinton's efforts will lead to the following:

$$x^* = X_e + x_e - X \quad (37)$$

$$(X_e, x_e \uparrow \Rightarrow x^* \uparrow \text{ and } X \uparrow \Rightarrow x^* \downarrow)$$

Also means:

$$x^* = X_e + x_e - X \leq \frac{1}{3c} \quad (38)$$

$$(c \uparrow \Rightarrow x_e^*, x^* \downarrow)$$

The above results show that each candidate's effort will increase as the other candidates' efforts and vote-shares from previous elections go up. This makes intuitive sense as each player will have to try harder in order to reach the bargaining phase if the other players were to expend more efforts and/or their vote-shares from previous elections were to increase. On the other hand, if a player's vote-shares from previous elections were to increase, that player could exert less effort and still reach the same old total vote-share proportion and hence his/her effort would go down in equilibrium. As the cost of the effort increases, the amount of effort exerted by all players would decrease, which is demonstrated in (36) and (38). This is also in line with intuition as higher costs of effort will cut more deeply into a player's final expected value and would lower the incentive for the player to expend the same amount of effort as before.

Next, the following values are used to confirm the results:

Let: $X_e = X = 0.1$, then $x_e^* = x^*$

Let: $X_e = 0.1$, $X = 0.2$, then $x_e^* = x + 0.1$

Edwards would need to make up the difference in the second equation to ensure everyone arrives at the bargaining table with the same proportion of vote-shares. These results validate the equations gathered for case one.

Effort functions for the largest vote-shares proportion range in Case One

Below, effort functions are solved for the largest possible vote-shares proportion range that can induce case one's equilibrium. This is the range that Edwards is most interested in as it shows him the lowest vote-share percentage that is needed to obtain the same prize value as Obama or Clinton.

In order to get the largest range for $p_e \leq p_c \leq p_o$, the inequalities would be turned into $p_e < p_c \leq p_o$ which would mean: $r_{c,e} = 1$ and $r_{o,e} = 1$.

The economical interpretation of $r_{c,e}$ and $r_{o,e}$ means that Obama and Clinton would always offer to Edwards in the bargaining phase. This makes perfect sense as Edwards' vote-share is the smallest of all the players and should command the least amount of value in equilibrium as $v_e^* \leq v_c^* \leq v_o^*$ will hold. (As will be explained later, this is also the reason why Edwards could come out of the negotiation phase with a significant portion of the overall prize value.)

With the above information, the inequalities would turn into:

$$\frac{\delta^2 - 4\delta + 3}{2\delta^2 - 9\delta + 9} \leq \frac{3 + r_{e,c}\delta^2 - r_{e,c}\delta - 2\delta}{2\delta^2 - 9\delta + 9} \leq \frac{r_{e,c}\delta - 3\delta - r_{e,c}\delta^2 + \delta^2 + 3}{2\delta^2 - 9\delta + 9} \quad (39)$$

To put the model more in line with the real-life political situation, the vote-shares entering the bargaining phase for both Obama and Clinton are equal and larger than that of Edwards'.

Therefore: $p_e < p_c = p_o$

This also means that: $r_{e,c} = 0.5$ (The person that Edwards offers an alliance to would be truly random as they both have the same bargaining power).

Thus the relationship changes to:

$$\frac{\delta^2 - 4\delta + 3}{2\delta^2 - 9\delta + 9} \leq \frac{0.5\delta^2 - 2.5\delta + 3}{2\delta^2 - 9\delta + 9} \text{ where } p_e = \frac{\delta^2 - 4\delta + 3}{2\delta^2 - 9\delta + 9} \text{ and } p_c = p_o = p = \frac{0.5\delta^2 - 2.5\delta + 3}{2\delta^2 - 9\delta + 9}$$

This set of inequalities also shows that as the discounting factor decreases, the range for p_i 's will also decrease.

Now moving on to the first stage of the game:

Assume: X_e and $X_c = X_o = X$, where $X_e < X$

That is, Edwards comes into the last state election with a certain amount of vote-shares that is less than Obama's and Clinton's, who have the same amount of vote-shares.

Then

$$p_e = \frac{X_e + x_e}{2X + X_e + x_e + 2x} \quad (40)$$

$$p = \frac{X + x}{2X + X_e + x_e + 2x} \quad (41)$$

Edwards' individual rationality is the same as (33).

As

$$p_e = \frac{X_e + x_e}{2X + X_e + x_e + 2x} \text{ and } p_e = \frac{\delta^2 - 4\delta + 3}{2\delta^2 - 9\delta + 9} \quad (42)$$

Solving for x_e^* :

$$x_e^* = \frac{(2X + 2x^*)}{\frac{2 - \delta}{1 - \delta}} - X_e \quad (43)$$

$$(X, x \uparrow \Rightarrow x_e^* \uparrow \text{ and } \delta \uparrow, X_e \uparrow \Rightarrow x_e^* \downarrow)$$

Also means:

$$x_e^* = \frac{(2X + 2x^*)}{\frac{2-\delta}{1-\delta}} - X_e \leq \frac{1}{3c} \quad (44)$$

$$(c \uparrow \Rightarrow x_e^*, x^* \downarrow)$$

Solving for Obama's and Clinton's efforts could give the following:

$$x^* = \frac{x_e^* + X_e}{\left(\frac{2-2\delta}{2-\delta}\right)} - X \quad (45)$$

$$(\delta, x_e, X_e \uparrow \Rightarrow x^* \uparrow \text{ and } X \uparrow \Rightarrow x^* \downarrow)$$

Also means:

$$x^* = \frac{x_e^* + X_e}{\left(\frac{2\delta-2}{\delta-2}\right)} - X \leq \frac{1}{3c} \quad (46)$$

$$(c \uparrow \Rightarrow x_e^*, x^* \downarrow)$$

The intuition behind these results is the same as explained after (38). The only new variable here is the discount factor. For Edwards, as the discount factor goes up, his effort would go down in equilibrium. This is because a higher discount factor increases the range among the p_i 's that can induce the equilibrium: $v_e^* = v_c^* = v_o^* = 1/3$. Therefore, Edwards would only need to reach a smaller overall proportion of vote-shares as the discount factor increases and can thereby lower the amount of effort he puts in. The reverse is true for Obama and Clinton as they would need to expend extra effort to get the higher vote-shares required to bypass the negotiation phase and win the final prize value without any bargaining.

V. Effort solutions for Case 2-4

Using the same analysis that was performed in Section IV to solve for the equilibrium efforts for Case One, the effort solutions for each of the cases 2-4 are shown below.

Case Two: $v_e < v_c = v_o = v$

For Edwards:

$$x_e = \frac{(2X + 2x)}{\left(\frac{(4-\delta)v}{(1-2v)(1-\delta)} \right)} - X_e \quad (47)$$

$(X, x \uparrow \Rightarrow x_e \uparrow \text{ and } v \uparrow, \delta \uparrow, X_e \uparrow \Rightarrow x_e \downarrow)$

For Clinton and Obama:

$$x = \frac{x_e + X_e}{\left(\frac{(1-2v)(\delta-1)}{v(0.5\delta-1)} \right)} - X \quad (48)$$

$(\delta, x_e, v \uparrow \Rightarrow x \uparrow \text{ and } X \uparrow \Rightarrow x \downarrow)$

Case Three: $v_e = v_c = v < v_o$

For Edwards and Clinton:

$$x = \frac{(X_o + x_o)}{\left(\frac{1-2v}{1-\delta v} \right)} - X \quad (49)$$

$(X_o, x_o, v \uparrow \Rightarrow x \uparrow \text{ and } X, \delta \uparrow \Rightarrow x \downarrow)$

For Obama:

$$x_o = \frac{2x + 2X}{\left(\frac{v(2-\delta)}{(1-2v)} \right)} - X_o \quad (50)$$

$(x, X, \delta \uparrow \Rightarrow x_o \uparrow \text{ and } X_o, v \uparrow \Rightarrow x_o \downarrow)$

Case Four: $v_e < v_c < v_o$

For Edwards:

$$x_e = \frac{(X_c + X_o + x_c + x_o)}{\left(\frac{1 - \delta v_c - v_e}{v_e(1 - \delta)}\right)} - X_e \quad (51)$$

$$(X_o, x_o, X_c, v_c, v_e, x_c \uparrow \Rightarrow x_e \uparrow \text{ and } X_e, \delta \uparrow \Rightarrow x_e \downarrow)$$

For Clinton:

$$x_c = \frac{(X_e + X_o + x_e + x_o)}{\left(\frac{1 - 2\delta v_e - \delta v_c + \delta^2 v_e^2 - v_c + 2\delta v_e v_c + \delta v_c^2}{v_c(1 - 2\delta v_e + \delta^2 v_e - \delta v_c)}\right)} - X_c \quad (52)$$

$$(X_e, X_o, x_e, x_o \uparrow \Rightarrow x_c \downarrow, v_c, X_c \uparrow \Rightarrow x_c \uparrow)$$

For Obama:

$$x_o = \frac{x_e + X_e + x_c + X_c - X_o}{\left(\frac{1 - \delta v_e - v_o}{v_o}\right)} \quad (53)$$

$$(X_c, x_c, X_e, x_e, v_o, v_e, \delta \uparrow \Rightarrow x_o \uparrow \text{ and } X_o \uparrow \Rightarrow x_o \downarrow)$$

VI. Equilibrium Constraints for Case One

In order for case one to be the equilibrium case, all of the candidates must not have any incentives to deviate to any other cases. The following constraints must be satisfied for this to be true.

For Edwards:

$$\frac{1}{3} - c(x_e^*) \geq \max\{v_e - c(x_e), 0\} \quad (54)$$

(V_e = Edward's Expected Value from Case 2)

This constraint is set to ensure that Edwards does not deviate to case 2, in which, although the expected value he derives from it would be less than that he would have received under case one, he would be expending so much less effort to achieve it that it would make sense for him to operate under that strategy instead.

For Clinton:

$$\frac{1}{3} - c(x_c^*) \geq \max\{v_c - c(x_c), 0\} \quad (55)$$

(V_c = Clinton's Expected Value from Case 3)

Similar to Edwards, this constraint is set to make sure that Clinton does not deviate to Case 3, in which she is spending a lot less effort than she would have under Case One, and although she would receive less expected value, the sheer decrease in effort would make sense for her to follow Case 3's effort function.

For Obama:

$$\frac{1}{3} - c(x_o^*) \geq \max\{1 - c(\bar{x}_o), 0\} \quad (56)$$

(1 = Obama's Expected Value from Case 4)

For Obama, this constraint is set to see if Obama has an incentive to bypass the negotiation phase all together by expending so much effort that he would be able to capture a majority of the vote-shares.

VII. One Example Solution for the Theoretical Framework

The following example provides a numerical application of the theoretical framework. Given a set of external circumstances, it finds the range of vote-shares percentage that would lead Edwards to stay in the race.

Parameters:

Let $\delta = \{0.1, 0.2, 0.9, 0.95\}$ and $c = 0.05$

Solving for x_e and x through the following Matrix equations:

$$\text{Case One: } \begin{bmatrix} \frac{2-\delta}{1-\delta} & -2 \\ -1 & \frac{2-2\delta}{2-\delta} \end{bmatrix} \begin{bmatrix} x_e^* \\ x^* \end{bmatrix} = \begin{bmatrix} 2X - \left(\frac{2-\delta}{1-\delta}\right)X_e \\ X_e - \left(\frac{2-2\delta}{2-\delta}\right)X \end{bmatrix}$$

$$\text{Case Two: } \begin{bmatrix} \frac{(4-\delta)v}{(1-2v)(1-\delta)} & -2 \\ -1 & \frac{(1-2v)(1-\delta)}{v(1-0.5\delta)} \end{bmatrix} \begin{bmatrix} x_e \\ x \end{bmatrix} = \begin{bmatrix} 2X - \left(\frac{(4-\delta)v}{(1-2v)(1-\delta)}\right)X_e \\ X_e - \left(\frac{(1-2v)(1-\delta)}{v(1-0.5\delta)}\right)X \end{bmatrix}$$

$$\text{Case Three: } \begin{bmatrix} \frac{1-2v}{1-\delta v} & -1 \\ -2 & \frac{v(2-\delta)}{1-2v} \end{bmatrix} \begin{bmatrix} x \\ x_o \end{bmatrix} = \begin{bmatrix} X_o - \left(\frac{1-2v}{1-\delta v}\right)X \\ 2X - \left(\frac{v(2-\delta)}{1-2v}\right)X_o \end{bmatrix}$$

$$\text{Case Four: } x_o = \frac{x_e + X_e + x_c + X_c}{\left(\frac{1-\delta v_e - v_o}{v_o}\right)} - X_o \text{ plug in values (} V_o = 1 \text{ and } V_e \text{ and } V_c = 0)$$

The following tables contain the equilibrium results found for a set of X_e and X values:

When Delta = 0.9 c = 0.05

X	X_e	x	x_e
0.205	0.195	1.5	0.115
0.21	0.19	1	0.03
0.211	0.189	2.002	0.213
0.212	0.188	-2.5	-0.604

Table 1: Case One Results when $\delta = 0.9$

When Delta = 0.95 c = 0.05

X	X_e	x	x_e
0.204	0.196	4.5	0.252
0.205	0.195	2	0.015
0.206	0.194	-0.5	0.194

Table 2: Case One Results when $\delta = 0.95$

Because when $X = 0.205$ and $X_e = 0.195$ exists as a valid solution in both of the δ s tested above, this specific set of numbers was explored with other delta values. Table 3 below lists the x and x_e that were obtained when those specific values were used with delta values of 0.2 and 0.1.

delta	X	X_e	x	x_e
0.1	0.205	0.195	4.358912	4.128705
0.2	0.205	0.195	2	1.765

Table 3: Case One Results when $X = 0.205$ $X_e = 0.195$

Constraints

The above results are checked against constraints (54), (55), and (56) to ensure that they are the equilibrium results so that no player would have any incentive to deviate from these results to results from any other cases.

For the Edwards' Constraint (54):

As Edwards could have incentive to deviate to the strategy given under case two, case two was solved and the following values were gathered. One assumption was made regarding the value v (the expected value coming out of backroom negotiation for Clinton and Obama) and v_e (the expected value for Edwards).

As $2v + v_e = 1$ and $v_e < v$, therefore the range for v is: $\frac{1}{3} < v < \frac{1}{2}$

Using this information, the following values were gathered:

When Delta = 0.95	
When $X_e = 0.195$ and $X = 0.205$	
	x_e
$v = 0.33$	-0.195
$v = 0.4$	-0.195
$v = 0.49$	-0.195

Table 4: Results for Edwards' efforts under Case Two when Delta = 0.95

When Delta = 0.90	
When Xe = 0.195 and X = 0.205	
	x e
v = 0.33	-0.195
v = 0.4	-0.195
v = 0.49	-0.195

Table 5: Results for Edwards' efforts under Case Two when Delta = 0.90

When Delta = 0.2	
When Xe = 0.195 and X = 0.205	
	x e
v = 0.33	-0.195
v = 0.4	-0.195
v = 0.49	-0.195

Table 6: Results for Edwards' efforts under Case Two when Delta = 0.20

When Delta = 0.1	
When Xe = 0.195 and X = 0.205	
	x e
v = 0.33	-0.195
v = 0.4	-0.195
v = 0.49	-0.195

Table 7: Results for Edwards' efforts under Case Two when Delta = 0.10

All of the resulting effort values are negative for Edwards, which suggests that Edwards should not be expending any effort in case 2. The overall results suggest that Edwards would be following the strategy laid out in Case One.

For Clinton's Constraint (55):

Similar to Edwards' constraint, case three was solved for Clinton and the following values were gathered. The assumption here is that:

$$\text{As } 2v + v_o = 1 \text{ and } v < v_o, \text{ therefore the range for } v \text{ is: } 0 < v < \frac{1}{3}$$

Where v is the expected value for Clinton and Edwards, and v_o is the expected value for Obama.

When Delta = 0.95

When X = 0.195 and X _o = 0.205	
	x _c
v = 0.1	-0.195
v = 0.2	-0.195
v = 0.3	-0.195

Table 8: Results for Clinton's efforts under Case Three when Delta = 0.95

When Delta = 0.90

When X = 0.195 and X _o = 0.205	
	x _c
v = 0.1	-0.195
v = 0.2	-0.195
v = 0.3	-0.195

Table 9: Results for Clinton's efforts under Case Three when Delta = 0.90

When Delta = 0.2

When X = 0.195 and X _o = 0.205	
	x _c
v = 0.1	-0.195
v = 0.2	-0.195
v = 0.3	-0.195

Table 10: Results for Clinton's efforts under Case Three when Delta = 0.2

When Delta = 0.1

When X = 0.195 and X _o = 0.205	
	x _c
v = 0.1	-0.195
v = 0.2	-0.195
v = 0.3	-0.195

Table 11: Results for Clinton's efforts under Case Three when Delta = 0.1

All of the resulting effort values are negative for Clinton, which suggests that Clinton should not be expending any effort in case 3. The overall results suggest that Clinton would be following the strategy laid out in Case One.

For Obama's Constraint (56):

Case four was solved to prove that Obama does not have any incentives to deviate from case one. As Obama would only expend extra efforts to win the race outright, this suggests: $V_o = 1$ while $V_c = V_e = 0$.

Using these values, Case 4's results for Obama would arrive at an effort value of infinity which suggests that Obama should only be following the strategy laid out in Case 1, as the cost of this effort would overwhelm his accompanying prize value.

Vote-shares Range

Now that all of case one's results are proven to be the equilibrium results, stage one is solved using those values and the vote-shares that are needed to arrive at those equilibrium values under each delta value are solved and shown in Table 12 below.

Delta	X	X _e	x	x _e	p _e	p
0.1	0.205	0.195	4.3589	4.1287	32.14%	33.93%
0.2	0.205	0.195	2.0000	1.7650	30.77%	34.62%
0.9	0.205	0.195	1.5000	0.1150	8.33%	45.83%
0.95	0.205	0.195	2.0000	0.0150	4.55%	47.73%

Table 12: Vote-shares Percentages for different values of Delta

Table 12 shows that when the discount value is high (delta is greater than 0.8), Edwards could push the game into a negotiation phase with as little as 8.3% of the total vote-shares, if Obama and Clinton are tied up at 45.83%. These values would change depending on the X_e and X coming into the final stage, but it shows that there is a set of values in which he could push the election into a negotiation stage in which he would get a prize value that would make up for his efforts.

Table 12 also shows, that as the discount factor goes down, the percentage of vote-share that Edwards would need to push the game into a negotiation phase would go up, hurting Edwards as it would increase the amount of effort he needs to input. The reason behind this is explained in the next section. However, this example clearly shows that there are cases in real life in which it will be worthwhile for Edwards to stay in the race even if his proportion of the vote-shares is nowhere near the 50 percent mark.

VIII. In-depth Analysis

As the example in the previous section clearly shows, my theoretical model does have important real life implications. One significant detail regarding the discount factor does have to be pointed out here. The set of inequalities given in (39) shows that as the discount factor goes down, the range of p_i 's does get narrower. This suggests that it would actually hurt Edwards if the backroom negotiation process were to be dragged out during the National Convention, which, at first glance, might seem to be counterintuitive. However, this result does make sense when looked at from a different perspective. The Democratic National Convention is set for late August; if the negotiation drags on to late September or even early October, the time loss for the General Election campaigning would decrease the final expected value for all three Democratic candidates heavily—their probability of winning the Presidency would decrease relative to the time loss. The discount factor models this loss in expected value due to a long, dragged out negotiation process. As the expected value in equilibrium goes down, Edwards would have had less and less incentive to remain in the race given the effort he would have needed to put in and the discount factor portrays this in the theoretical model.

The 2008 Democratic Presidential Primary clearly demonstrates the practical application of the theoretical model. The external circumstances surrounding the race can transform a weak but efficient candidate such as John Edwards into an influential player. Not only was the race intensively fought between two juggernaut candidates in Obama and Clinton, but furthermore, the shroud over the primary race was further thickened by the long-running dispute about the seating of the Michigan and Florida delegates. If these two states had been even partly seated in the National Convention, more than 2,026 delegates would have been needed to win the nomination and Clinton could very well

have turned her small delegate difference into a virtual tie with Obama. As my theoretical model demonstrates, this would have only benefited Edwards more as he would have tried to push the election into a backroom negotiation/compromise during the Democratic National Convention.

This apparent confusion in the Democratic Primary was watched closely by the Republicans as well. Amy Chozick, a *Wall Street Journal* reporter, interviewed Republican pollster Glen Bolger, who stated, “There are not a whole lot of recent models to look at where a severely wounded candidate stays in it.” (Chozick, 2008). Although Bolger’s comment was directed at Clinton’s campaign, it can apply to Edwards’ campaign as well. Edwards’ less-than-stellar performances in some of the early primaries and caucuses severely compromised his shot at winning the nomination race outright. Yet, people in his own campaign still knew he had a shot. The following are excerpts from an essay written for *Politics Magazine* by Joe Trippi, Edwards’ senior advisor, who describes some of his own regrets at the time:

I had this feeling that if he stayed in the race he would win 300 or so delegates by Super Tuesday and have maybe a one-in-five chance of forcing a brokered convention. That there was a path ahead that would be extremely painful I should have told him emphatically that he should stay in. My regret that I did not do so—that I let John Edwards down—grows every day that the fight between Hillary Clinton and Barack Obama continues...

That would mean Edwards, Obama, and Clinton would go into the convention without any of them close to sealing the nomination. You would have had months of Obama and Clinton banging away at each other, with Edwards able to come across to weary Democrats as a welcome, fresh face. You’d have the electability argument begin to play to Edwards’ advantage, since he always did well against McCain in polling... (Trippi, 2008)

This is the clearest indication that Edwards’ campaign did consider the possibility of forcing the election into a negotiation phase. The reason why Edwards decided not to do

so is because of the tremendous effort involved, what Trippi described in his essay as “the extremely painful path”.

Trippi believes Edwards commands a strong position in the backroom negotiation phase because of both direct and indirect circumstances playing out in the primary. As Edwards’ proportion of the vote-shares would have been the lowest, both Obama and Clinton would have expected that winning his endorsement would be the cheapest option in the backroom negotiation phase, that it would have cut into their own expected value the least. But since both Obama and Clinton would have approach Edwards, Edwards’ negotiation power, along with his expected value in equilibrium, would have gone up. The indirect circumstance that is contributing to Edwards’ powerful position in negotiation is because both Obama and Clinton are in such a strong position that they would not have dropped out of the race and endorsed Edwards; so these two candidates would only receive something if they, themselves, is nominated, and therefore it means they have had to be willing to pay out a significant portion of their own expected values to Edwards to get his support.

For practical considerations, even if Edwards dropped out ahead of the National Convention, he would have still laid claim to some of the final prize value through the value of his own endorsement. As my model shows, Edwards could have swung his own vote-shares to either Obama or Clinton and propelled one of them to the final nomination by letting them bypass the negotiation stage. This is also verified in reality, as his endorsement was heavily sought after by both Obama and Clinton after Edwards dropped out of the race. When Edwards endorsed Obama in the middle of May, it played a significant role in Clinton’s eventual defeat. As BBC News describes it:

Correspondents say the timing of the announcement is significant, on a day when Hillary Clinton has been celebrating a big win in West Virginia which was largely down to her support among poorer white voters – a constituency with which John Edwards is most closely identified. (BBCNews, 2008)

And even if Edwards' proportion of delegates alone does not end the primary race for Clinton, his endorsement could have also affected the direction Edwards' supporters will lean toward. For example, United Steelerworkers, which had endorsed Edwards originally, quickly followed Edwards' endorsement and endorsed Obama the day after. This could have led to additional vote-shares in several of the next state primaries at little to no cost to Obama (United Steelworkers [USW], 2008). These endorsements could have not only help Obama win the Democratic nomination but could have also served to united the party as well as capture additional Independent votes for the General Election, increasing Obama's probability of winning the road to the White House.

In the backroom negotiation phase for this endorsement, Obama must have given Edward some sort of promise or guarantee. For example, many analysts believe that Obama will make Edwards' poverty policies a key component of his domestic agenda. Some even believed that Edwards was going to be in line for a cabinet-level position in an Obama administration. There was even evidence suggesting that Edwards was on Obama's shortlist as a Vice President nominee (Associated Press [AP], 2008). However, due to the ensuing extramarital scandal that erupted in late July, Edwards' prize value out of this backroom negotiation will, unfortunately, never be known publicly.

Yet, from Clinton's nomination as the Secretary of State to Joe Biden and Bill Richardson (two other Democratic Presidential candidates) appointments as the Vice Presidential Nominee and Secretary of Commerce respectively, there is evidence in the

public that supports the hypothesis that Obama's victory in the Democratic Presidential Primary did come at a heavy cost. Many analysts were already casting doubt on Obama's ability to act independently as President, apart from his former rivals. All of these current events show that my theoretical model does have important real-life implications for Edwards, as well as other underdog candidates, in the 2008 Presidential Primary.

Aside from U.S. politics, my theoretical model also has ramifications for elections worldwide. One recent example is the 2008 Cypriot Presidential Election. There were three main candidates, Christofias of AKEL, Kasoulidis of DISY, and the incumbent Papadopoulos of the DIKO. These three candidates entered Election Day in a virtual tie and the final tally was 33.51 percent for Kasoulidis, 33.29 percent for Christofias, and 31.79 percent for Papadopoulos. According to Cypriot bylaws, a run-off election was called between the two top finishers. Although Papadopoulos was officially out of the race, his endorsement and supporters were widely coveted by both candidates in their run-off campaign. Major positions in the government were offered by both candidates, including the Minister of Foreign Affairs as well as the President of the House of Representatives, to the DIKO (AP, 2008). In subsequent campaign speeches, both of the candidates' positions moved closer to that of Papadopoulos which suggested that he still had a significant amount of bargaining power even though he was out of the race. Eventually, with DIKO's endorsement, Christofias won the Presidency of Cyprus. However, analysts are already waiting for the campaign promises made to Papadopoulos to trickle out (Reuters, 2008). This is another real-life example that would follow the expected value/ negotiation power framework proposed in my theoretical model.

IX. Conclusion

I started this paper looking at the reasons underlying Senator John Edwards' decision to stay in the race even when he had no chance of winning the Democratic Presidential Nomination. My hypothesis responded to the situation in which none of the three major Democratic candidates obtains a majority of the delegates/vote-shares by the National Convention. I argue that this will force a backroom negotiation process in which all three of the candidates will try to form an alliance with one of the two other candidates in order to obtain the delegates/vote-shares that are needed. Through this negotiation stage, although Edwards would have come in as the weakest player (as defined by his vote-shares in comparison with Obama and Clinton), he would have become the most valuable player as both Clinton and Obama would have tried to negotiate with Edwards to receive the best deal that would minimize the losses to their own expected values. Through this deal, Edwards could have obtained a prize value that could overcome any costs that he would have to endure in the state election processes. This prize value coming out of the backroom negotiation could have meant having his own policies on the agenda of the next President of the United States or even a cabinet position in the next Presidential administration.

My theoretical model is based on a combination of a Tullock contest model and Baron and Ferejohn's model of government formation. My model differs from the Tullock contest model in that it connects all of the state elections together in the first stage through additional variables that describe the candidate's own past performances. It also differs from Baron and Ferejohn's model in that it does not fix the proportion of vote-shares/delegates each candidate would come into the negotiation stage with. My model connects the two stages by portraying the probability of a player's decision to offer

to form an alliance as dependent on the proportion of vote-shares that same player came into the negotiation with. As my model demonstrates, depending on the external circumstances, Edwards could have come into the final stage with what would seem like, at first glance, an insignificant proportion of the overall vote-shares, but been able to use it to come out of the negotiation phase with some significant percentage of the final prize-value. My model further tests these circumstances to ensure that they could be achieved under equilibrium conditions.

One limitation of my model is that it does not address the existence of the “super delegates” in the Democratic Presidential Primary. These delegates include high-ranking party officials and current and former elected officeholders. The crucial difference between these delegates and the pledged delegates is that the super delegates are free to support any candidate of their choice: the only way for a candidate to win over these delegates is to court each one of them individually. Although the proportion of super delegates pledged to each candidate is usually approximately proportional to the percentage of vote-shares that that candidate gains in the state elections, a candidate could potentially win a nomination by having the support of many super delegates and a less-than-usual amount of pledged delegates. This measure was put in place by the Democrats to prevent the nomination of any radical/unrealistic candidates to the General Election due to popular fervor. As such, these super delegates wield a significant amount of power and can change a nomination race at any time and should be addressed in any subsequent theoretical model.

However, given its limitation, my theoretical model still exposes a critical result in the 2008 Democratic Primary that future campaign strategists should consider. And

perhaps, just perhaps, if John Edwards had stayed a little bit longer, he could have demonstrated the “Edwards’ Effect” in real life and then, as Trippi writes, “[John Edwards] would hold the key to the convention deadlock. And maybe, just maybe, a brokered convention would have stunned the political world and led to an Edwards nomination.”

X. Bibliography

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