

Strategic Behaviors in Primary elections

Chun-Fang Chiang, Hsin-Yi Lin, Joseph Tao-yi Wang¹

Abstract

We study strategic behavior in a primary election in which acting sincerely is the same as casting a vote with zero pivotal probability. The 2012 Taiwan Democratic Progressive Party (DPP) presidential primary election was conducted in the form of “contrast style polling,” asking respondents which candidate they would vote for in hypothetical situations in which the DPP proposed different candidates as the 2012 presidential candidates. Under the electoral rule, the candidate who beat the incumbent president, Ma, with the largest margins would be the 2012 DPP nominee. Therefore, for a party supporter, acting sincerely is the same as casting a vote with zero pivotal probability. By conducting a survey during DPP primary, we calculate the proportion of strategic voters. We analyze survey data conducted during DPP primary and find that 18.7 percent Pan-Green supporters acted strategically, which was enough to influence the primary election outcome in this competitive election. We also offer a rational voter model to illustrate how the electability of candidates affect voters’ decisions, and apply the model to the 2008 US primary and 2012 DPP primary in Taiwan. Empirical results suggest that voters’ voting behavior in the primary election is affected by their perceptions of candidate’s electability in both US and Taiwan.

¹ Chiang: chunfang@ntu.edu.tw

1. Introduction

Voting decision in a primary election may not be simple for a rational voter. On the one hand, one would like to vote for the candidate with one's preferred ideology and characteristics. On the other hand, the candidate who is more likely to beat candidates from the other parties should be a better choice. Designing a good electoral rule in primary election is also not easy for a political party. Under the current US primary election electoral rule, if everyone acts sincerely, the elected candidate may not be the one who are most likely to win in the presidential elections, and thus not the best choice for the political party. The 2012 DPP electoral rule aimed to maximize the party interests but failed to take voters' strategic behavior into consideration.

In 2012, the DPP implemented surveys with contrast style questions, asking respondents three hypothetical questions regarding the candidate for whom they intend to vote as a newly elected president in three hypothetical campaigns, given the pairings Tseng-chang Su and Ying-jeou Ma, Ing-wen Tsai and Ying-jeou Ma, or Hsin-liang Hsu and Ying-jeou Ma. The electoral rule stated that the candidate who beat Ma with the largest margin would be the 2012 DPP nominee. While the spirit of the survey design is to let the independents select the candidate most likely to win the presidential election, respondents other than independents have incentives to respond strategically.

Before the polling, the Tsai campaign group developed the slogan "support only one", which urged her supporters to choose Tsai when facing the Tsai-Ma question and abstain in the other hypothetical questions. The campaign strategy was controversial because a DPP supporter who prefers Tsai to Su to Ma then had to lie when facing the Su-Ma question. While the strategy was controversial, it revealed the fact that under this electoral rule, two candidates would obtain an equal vote if a respondent choose both Su and Tsai in the polling. Thus, if a respondent wanted to make a difference in the primary election outcome, she should give her favorite candidate her full support by voting only for that candidate in order to widen the gap between the candidates.

By conducting a survey at the same time when DPP was conducting their official polls, we are able to calculate the proportion of strategic voters, investigate the influence of the strategic behavior on election results. We conducted survey that contained the same

contrast style questions as those in the DPP polling to investigate the exclusive-support behavior in the DPP primary election. In addition to the contrast style questions, the survey includes information regarding the favorability of candidates, the voter's perception of a candidate's electability, and other background information. In this study, we refer the behavior of only voting for one DPP candidate in all contrast style questions as "exclusive-support" behavior. Among people who disliked Ma as a president, the exclusive-support behavior can be seen as strategic voting behavior in the primary election. In the survey data, 18.7 percent of the Pan-Green supporters² demonstrated "exclusive-support" behavior. Although this is not a very large proportion, it did have a significant influence on the outcome of the primary election.

In this study, we also offer a model in which a voter would consider the favorability of candidates, the probability of being pivotal in the primary and the electability of candidates in the presidential election and study voter behavior by analyzing data from survey conducted during 2012 DPP primary election, and data from Annerburg survey implemented during 2008 primary election in the US.

Strategic voting behavior has been studied extensively, and most studies focus on strategic voting behavior in a three-candidate election (Cox 1994, Alvarez and Nagler 2000, Myatt 2007). Because the supporters of a third party or third candidate are in general a minority group and not everyone acts strategically, there may be few instances of strategic voting.³ The strategic behavior in the DPP primary election differs from the strategic voting behavior in a three-candidate election in two aspects. First, many people who have incentives to act strategically. In fact, all people who least prefer Ma had incentives to act strategically, and they made up more than one-third of the population. Second, in a three-candidate election, when voting for the third candidate, the probability of pivotal was small but still positive. However, under the DPP primary electoral rule, the probability of being

² Pan-Green supporters refer to voters who favor Tsai over Ma and also favor Su over Ma.

³ In regard to a multiparty election, McKelvey and Ordeshook (1972) and Alvarez and Nagler (2000) defined strategic voting as the voter's voting for her second-most preferred party instead of the most preferred one if her most preferred party has less chance of winning the election and if there was intense competition between her second- and third-ranked parties. Under this definition, 5.1 percent to 17 percent of voting has been defined as strategic voting in past research (Cain 1978, Galbratith and Rae 1989, Heath *et al.* 1991, Johnson and Pattie 1991, Abramson *et al.* 1992, Lanoue and Bowler 1992, Evans and Heath, 1993, Niemi *et al.* 1993, Blais and Nadeau 1996).

pivotal is zero if respondents choose DPP candidates in all survey questions.

Kawai and Watanabe (2010) proposed that a distinction should be drawn between *strategic voting* and *misaligned voting*. They defined strategic voting as “conditioned on the event that their votes are pivotal”; a strategic voter may vote for her most preferred candidate or she may not, depending on the probability of being pivotal. Misaligned voting is “voting for a candidate other than the one the voter most preferred,” and it was only a subset of strategic voting. They built a model of voting behavior to estimate both strategic voting and misaligned voting. Their results suggested that approximately 75.3 percent to 80.3 percent of the voters are strategic, and the estimation of misaligned voting was approximately 2.4 percent to 5.5 percent, which was comparable to the amounts of strategic voting reported in previous literature (between 3 percent and 17 percent). Under the DPP primary, unlike most elections, *strategic voting* implies *misaligned voting* for people other than independents.

We construct a rational voter model in which voters consider not only the favorability of the candidates but also their perceptions of the candidate’s electability. The model predicts that, in the case of the U.S., a voter is more likely to act strategically and vote for the less preferred candidate when the less preferred candidate would be more likely to beat candidates from other parties in the presidential elections. In the case of DPP primary, the model has two predictions: 1) all rational party supporter and Pan-Green supporter should act strategically rather than sincerely. 2) candidates’ electability would affect voters decision, as in the US case.

We analyze voter behavior in 2008 US primary election. Empirical results based on Annernberg survey suggests that, for a typical voter, if her perceptions of Obama’s electability increased by one standard deviation, then the probability that the same voter who is also a Clinton’s supporter voted for Obama rather than Clinton decreased by 0.13 percent, and the probability that an Obama supporter voted for Clinton rather than Obama decreased by 1.70 percent.

Analyzing our survey data conducted during the DPP primary, we find that, for a typical Pan-Green supporter in Taiwan who initially believed that only Tsai will win but changed her mind to believe that both Su and Tsai could win, the probability of an exclusive-support for Su increased by 5.78 percent, and the probability of exclusive-support for Tsai

decreased by 14.17 percent. For a typical Pan-Green supporter who believes that both Su and Tsai could win, when the favorability difference between Tsai and Ma increased by one standard deviation, the probability of a exclusive-support for Tsai increased by 7.99 percent, and the probability of exclusive-support for Su decreased by 3.26 percent.

When studying strategic voting behavior in primary elections, many researchers have focused on *viability*, the candidate's chance of winning their party's nomination, rather than *electability* (Bartels 1985, Abramson *et al.* 1992, Sher 2011). Rickershauser and Adrich (2007) suggested that *electability* was a key consideration in candidate choice in presidential primaries. They conducted an experiment and found that electability has a significant effect on the evaluation of candidates for one's party's nomination. Our results suggest that, in both Taiwan and the U.S., voters' subjective beliefs of candidates' electability in presidential elections affect their voting decisions in primary elections.

2. Background

In Taiwan, it is not easy for the political parties to design a good primary election system due to the lack of party registry mechanism. The number official members of DPP is small and therefore the DPP has relied on polling from the general public to decide their candidate for legislative/presidential elections in recent years.

In the 2012 presidential election, three candidates competing for the DPP presidential nominee: Tseng-chang Su (蘇貞昌), Ing-wen Tsai (蔡英文) and Hsin-liang Hsu (許信良), while Ying-jeou Ma (馬英九) was confirmed as the Kuomintang (KMT) presidential nominee. The 2012 DPP presidential primary election was held through a series of nationwide opinion polls. Five polling companies were hired to conduct the surveys⁴, and each one was required to complete 3000 valid samples. The final result of the primary election would be the average results of the five polls.

The 2012 DPP presidential primary drew a great deal of attention because it significantly differed from previous ones. The DPP has included opinion polls in the process of nominations since 1996.⁵ In 2000, the nomination was decided by 30% of votes

⁴ Five companies were selected from seven by drawing lots: DPP (黨中央民調中心), Spotting (觀察家), MSRC (精湛), ADSRC (全方位), and ERA (年代).

⁵ The main reason is that the number of official DPP members is small and the DPP could not exclude the possibility that some candidates would bribe their supporters to register as party members.

from party members, and 70% from polls. The issue with polls from the general public is that some KMT supporters acted strategically by choosing the weaker DPP candidate in the polls. In 2008, while the votes from party members still accounted for 30%, the DPP used opinion polls which excluded the non-DPP supporters. In 2011, votes from party members were dropped in the DPP primaries, and the nomination was completely decided by the polls from the general public, regardless of party preference. In the previous polls in primaries before 2011, all DPP candidates were listed in a single question for respondents to choose. In the new version, multiple questions were asked and in each question, one DPP candidate was paired with the opponent from KMT. According to contrast style polling, “if only one DPP candidate defeats Ma in the poll, he or she will be declared the winner. If multiple candidates beat Ma, the one with the highest score wins. In case of a tie, the candidate with the highest winning margin or the smallest losing margin will win.”⁶

Because of the unconventional polling style, two controversies arose among DPP supporters about the primary polls results. First, because there was intense competition between Su and Tsai, Tsai’s campaign advocated an “exclusive-support” strategy. The strategy suggested that the respondents should vote for Tsai if the 2012 Taiwan presidential candidates were Tsai and Ma, but not vote for Su/Hsu if the presidential candidate were Su/Hsu and Ma regardless of personal preferences. This strategy attempted to widen the vote gap between Tsai and the other two candidates and therefore increase Tsai’s chances of winning the DPP presidential primary election. Because of this, some argued that the “exclusive-support” strategy would induce an unjust primary election, and the primary outcome would not deliver the real voter-preferred candidate. Some DPP supporters also worried that Ma’s supporters might back a DPP candidate who was less likely to beat Ma in the presidential election in their response to the poll.

In the end, both Tsai and Su beat Ma in the potential contests; Tsai obtained 0.425 vote share, while Su obtained 0.4115. According to the primary rule, Tsai defeated Su by 1.35 percentage points and became the 2012 DPP presidential nominee. Table 1 reports poll results from five companies hired by the DPP.

⁶ Central News Agency (CNA), April 24 2011.

3 Survey Design and Results

Our survey was conducted using telephone polling from April 25 to 27, 2011, during the scheduled time for the official primary.⁷ The survey contained the same contrast-style questions as those in the 2012 DPP official primary opinion poll. In addition, the survey asked for background information, including the favorability of candidates and the candidate's electability. A total of 1521 respondents were interviewed. Compared with Su and Tsai, Hsu had few supporters. In our survey, only 2.9 percent of the respondents favor Hsu the most among the four candidates. Therefore, we exclude respondents who favor Hsu most from the sample, and focus on the respondents' answers when Su or Tsai was listed as a candidate against the incumbent candidate Ma.

The survey included "contrast style" questions that were the same as the official DPP primary opinion polls. Respondents were asked for which candidate they vote would on election day when facing different DPP candidates. In these questions, each DPP candidate was compared with the contender, Ma. The survey questions are as follows: "*If the 2012 Taiwan presidential candidate were DPP candidate and Ying-jeou Ma, which candidate would you be most likely to vote for?*" (*DPP candidate* refers to Tseng-chang Su, Ing-wen Tsai, and Hsin-liang Hsu.) Table 2 shows the results of the contrast style questions in our sample. It appears that both Tsai and Su defeat Ma; Tsai defeats Ma by 4.87 percent, while Su defeats Ma by 3.28 percent. Therefore, according to the rules, Tsai would be elected as the DPP nominee.

We classify respondents into Pan-Green supporters, Ma supporters, and Independents based on their support of the DPP candidates and the incumbent Ma. The favorability questions are as follows: "*We want to know your opinion about the overall feeling and support for following candidate. 0 means very unfavorable, and 10 means very favorable. On a scale from 0 to 10, how would you rate candidate k?*" [*candidate k* refers to Tseng-chang Su, Ing-wen Tsai, Hsin-liang Hsu, and Ying-jeou Ma.] We define those who favor Su over Ma and also favor Tsai over Ma as Pan-Green supporters and define those who favor Ma over Su and also favor Ma over Tsai as Ma's supporters. The rest of the respondents are described as independents. Thus independents refer to those who either 1. favor Su, Tsai, and Ma equally or 2. prefer either Su or Tsai most but least prefer the other,

⁷ The results of the official DPP primary opinion polls were released on April 27. But the survey continued and interviewed 169 respondents on April 27.

i.e., do not strictly favor Su and Tsai over Ma. For example, a voter who favors Su over Ma and favors Ma over Tsai, or favors Su over Ma and favors Ma and Tsai equally would be an independent.

While high favorability does not necessary imply high electability, respondents were asked to answer which candidate is most likely to win the presidential election when each DPP candidate competing with the incumbent, Ma. The electability questions are as follows: “*If the 2012 Taiwan presidential candidate were DPP candidate and Ying-jeou Ma, in your opinion, which candidate had greater chance of winning the election?*” [DPP candidate refers to Tseng-chang Su, Ing-wen Tsai, and Hsin-liang Hsu.]

Summary statistics regarding favorability and electability are presented in Table 3 and Table 4. Comparing Su and Tsai, the electability of Tsai is higher than Su while the favorability of Su is higher than Tsai.

A. Strategic behaviors in DPP primary

We define “Exclusive-support” behavior as the behavior in which a voter only votes for one of the two competitive candidates. For example, Su and Tsai were equally competitive candidates in the DPP primary election; in this situation, an exclusive-support for Tsai is referred to as behavior where a voter answered that she would vote for Tsai if the presidential candidates were Tsai and Ma, but she would not vote for Su if the presidential candidate were Su and Ma.

The exclusive-support behavior of Pan-Green supporters can be defined as strategic voting behavior. By definition, a Pan-Green supporters will not have exclusive-support behavior if answering the survey questions sincerely. The statistics of exclusive-support behavior of the Pan-Green supporters are presented in Table 5, column (1). Among Pan-Green supporters, although there is an explicit incentive for strategic voting behavior, yet 73.1 percent of supporters (414) sincerely voted for both Su and Tsai. Only 18.7 percent Pan-Green supporters exhibited exclusive-support behavior. As reported, there were more than three times as many exclusive-support respondents for Tsai (81) than exclusive-support for Su (25).

For a Ma supporter, an exclusive-support for Tsai/Su means she did not sincerely vote

for her most preferred candidate in one of the voting intention questions. Ma's supporters also have an incentive to exclusive-support for DPP candidates. Because the DPP primary election outcome would determine Ma's rival, Ma's supporters would like to support a weaker DPP candidate in order to ensure Ma's victory in the presidential election. As presented in column (2) of Table 5, 86.3 percent of Ma's supporters sincerely voted for Ma in both hypothetical questions. Only 2.1 percent of Ma's supporters exclusively-supported for Tsai or Su.

We do not expect independents to act strategically. First, if an independent favors each candidate equally, then she has no incentive to influence the election outcome by applying any voting strategy. Second, if an independent favors Su or Tsai over the other, then only voting for the candidate who she most favorite is sincere voting. The statistics on exclusive-support behavior of independents are presented in Table 5, column (3). Most of them have no definitive answer of for whom they will vote (35.4%). Fifty-six independents who exclusively-supported for Tsai and 64 independents who exclusively-supported for Su voted according to their preferences.⁸

B. The influence of strategic voting

Based on the favorability of candidates in Table 3, we can infer the outcome of the primary election if all voters answered the poll sincerely. Forty-four percent voters favor Su over Ma (676), but only 42 percent of voters favor Tsai over Ma (649). However, Tsai obtained more votes than Su and won the primary election (Table 2).

The key factor in Tsai's victory is the "exclusive-support" behavior of those who supported both Su and Tsai. Eighty-one supporters exclusively-supported for Tsai and 25 supporters exclusively-supported for Su. If those supporters all voted according to their preferences, i.e., voted for both Su and Tsai, then Su should have obtained 675 votes and Tsai should have obtained 660 votes. The results imply that Tsai's victory in the primary election was mainly due to "exclusive-support" behavior among Pan-Green supporters.

⁸ If a voter favors two candidates equally, then whether she votes for either candidate or has no definitive answer was taken as voting according to preference.

4 A Model of rational (strategic) voting

We constructed a voting behavior model that followed that of KW but introduced the presidential primary election system into our model. While KW's model only set a one-round election, our model discussed strategic voting in a two-stage election process, including the primary election as well as the presidential election. Our model is based on the rational voter approach in which voters are rational and always act to maximize their expected utility. The expected utility is composed of voters' candidate preference and their perceptions of each candidate's electability.

There are two candidates in the primary election: candidate 1, and candidate 2. Another party only has one incumbent candidate R . Voter i 's utility from candidate k being president is $u_{i,k}$. A sincere voter is defined as a voter who always votes for her most preferred candidate; i.e., a sincere voter would vote for candidate k if and only if $u_k \geq u_l, \forall l$. In contrast, a strategic voter would rationally cast a vote to maximize her expected utility, considering the probability of being pivotal. In the model below, all voters are assumed to be strategic.

Denote voter i 's utilities that candidate k wins the primary election as $u_{i,k}^*$. Let p_k is the probability in voter i 's opinion that candidate k would be elected president. We have

$$u_{i,1}^* = p_1 * u_{i,1} + (1 - p_1) * u_{i,R} \quad (1)$$

$$u_{i,2}^* = p_2 * u_{i,2} + (1 - p_2) * u_{i,R} \quad (2)$$

Let PV denote the probability of being pivotal. The utility of voting for candidate 1 in the primary election is given by $PV(u_{n,1}^* - u_{n,2}^*)$ divided by 2 because the pivotal vote only has a 50 percent probability of changing the election outcome.⁹ Thus, the expected utility from voting for those two candidates is given by

⁹ More specifically, a pivotal vote makes a difference in two cases. First, if the two candidates have equal votes, then candidate k will win the election only if she gets one more vote. In this case, the probability that candidate k wins the election increases from 50 percent (tied) to 100 percent because of one vote. Second, if candidate k is one vote behind the other, one more vote will result in a tie vote. In this case, the probability that candidate k wins increase from 0 percent (lose by one vote) to 50 percent (tied).

$$\bar{u}_{n,1} = \frac{1}{2}PV(u_{n,1}^* - u_{n,2}^*) = \frac{1}{2}PV(p_1 * (u_{n,1} - u_{n,R}) - p_2 * (u_{n,2} - u_{n,R})) \quad (3)$$

$$\bar{u}_{n,2} = \frac{1}{2}PV(u_{n,2}^* - u_{n,1}^*) = \frac{1}{2}PV(p_2 * (u_{n,2} - u_{n,R}) - p_1 * (u_{n,1} - u_{n,R})) \quad (4)$$

The difference of above expected utilities can be expressed as the following:

$$\text{Gain in EU} = PV(p_1 * (u_{n,1} - u_{n,R}) - p_2 * (u_{n,2} - u_{n,R})).$$

The difference is the gain in expected utility when voting for candidate 1 rather than candidate 2.

A. Applying the setting to the US primary election

A rational voter would vote for the candidate with the highest expected utility. Thus, we define variable *Difference* as $\bar{u}_{n,Obama} - \bar{u}_{n,Clinton} = PV(p_{Obama} * (u_{n,Obama} - u_{n,Rep}) - p_{Clinton} * (u_{n,Clinton} - u_{n,Rep}))$. The model predicts that when the difference is larger, the voter would be more likely to vote for Obama rather than Clinton. The model also predicts that both the candidate's favorability and electability in the presidential election matter in the primary elections.

When acting rationally, a voter would vote for the less preferred candidate only when the less preferred one has larger probability to win. In other cases, a voter would vote for the most preferred candidate. In terms of empirical predictions, the model predicts that we are more likely to observe misaligned voting, as defined by KW, when more voters believe that their less preferred candidates would be more likely to beat candidates from other parties in the presidential elections. However, when they voted for their preferred candidate, we cannot distinguish the voter was acting sincerely or rationally in a direct way.

B. Applying the setting to the DPP primary election

A rational voter gains positive utility only when the probability of being pivotal is positive. The probability of being pivotal is zero if a voter chooses Tsai and Su in two survey questions respectively. So the model predicts that as long as the expected utility of voting for Su, $\bar{u}_{n,Su}$, is different from the expected utility of voting for Tsai, $\bar{u}_{n,Tsai}$, the voter should either exclusive-support Tsai, or exclusive-support Su.

We denote the difference in expected utilities, $(p_{Tsai} * (u_{n,Tsai} - u_{n,Ma}) - p_{Su} * (u_{n,Su} - u_{n,Ma}))$ as X. Based on the model, when X is greater than 0, the voter should exclusively support for Tsai, otherwise the voter should exclusively support for Su.

Because the survey asked which candidate would win the presidential election rather than a probability of candidate's electability, we do not observe p_{Tsai} and p_{Su} directly¹⁰. Therefore, we classify respondents into four groups, denoted as Gk, where k=1, 2, 3, 4. The voters in group G1 believe that both Su and Tsai would win the presidential election. Assuming that $p_{Tsai} = p_{Su} = 1$ for voters in group G1, the proxy for the difference in expected utility, X, can be simplified as $(u_{n,Tsai} - u_{n,Su})$. Voters who believe that only Su would win are classified into group G2, and their proxy for the difference in expected utility, X, can be simplified as $(u_{n,Ma} - u_{n,Su})$, based on the assumption that $p_{Su} = 1$ and $p_{Tsai} = 0$. Similarly, voters who think that only Tsai would win are in group G3, and X can be simplified as $(u_{n,Tsai} - u_{n,Ma})$. The voters in G4 group think that both Su and Tsai would lose the election, and their utility gain from exclusively-supporting Tsai is zero, assuming that $p_{Tsai} = p_{Su} = 0$ ¹¹. Let Di be the indicator variable that indicates which group the voter is in. We can then express X as follows:

$$X = D1 * (u_{n,Tsai} - u_{n,Su}) + D2(u_{n,Ma} - u_{n,Su}) + D3 * (u_{n,Tsai} - u_{n,Ma}) + D4 * 0 \quad (5)$$

This specification describes how people react when they have different beliefs in the candidate's electability. When a voter believes that both Su and Tsai could win, she would be more likely to exclusively-support for Tsai, if she favors Tsai over Su. If a voter believes

¹⁰ The electability questions asked respondents which candidate most likely win the presidential election in their opinions. Therefore, the respondents' perceptions of the candidates' electability would be either $1 > p > \frac{1}{2}$ or $\frac{1}{2} > p > 0$.

¹¹ 306 voters in the D1 group; 136 voters in the D2 group; 110 voters in the D3 group; 513 voters in the D4 group.

that only Su could win, she would be more likely to exclusively-support for Su if she favors Su over Ma. Similarly, when a voter thinks that only Tsai could win, she would be more likely to exclusively-support for Tsai if she favors Tsai over Ma.

When a voter believes that both Su and Tsai would lose, voting for either would not change the election outcome. It is worth noting that, when a voter in the D4 group believes her vote makes no effect on the election, she might choose to vote according to her true preference, thus making her appear to be a sincere voter in spite of her rational thinking.

5 Testing Model Predictions

A. Favorability and Electability of candidates in DPP primary

We first use a probit model to estimate the effects of a candidate's favorability and electability on exclusive-support behavior among Pan-Green supporters. The sample is restricted to Pan-Green supporters and voters who favor Hsu most are excluded. As shown in Table 6, the marginal effects of Su and Tsai's favorability and electability all are significant for exclusively-supporting behavior for Tsai, and they are also significant for exclusively-supporting behavior for Su except Su's electability.

We then use the probit model to estimate the model derived from Section 4. The dependent variable is whether a Pan-Green supporter exclusively-votes for Tsai/Su. The estimation results are presented in Table 7. The first and third columns in Table 7 report the effects of the difference in expected utilities ($X = p_{Tsai} * (u_{n,Tsai} - u_{n,Ma}) - p_{Su} * (u_{n,Su} - u_{n,Ma})$). As shown, the difference in expected utilities has a positive significant effect on exclusively-supporting for Tsai and a negative significant effect on exclusively-supporting for Su, which is consistent with the model.

The second and the fourth columns report the effects of $D1 * (u_{n,Tsai} - u_{n,Su})$, $D2 * (u_{n,Ma} - u_{n,Su})$, and $D3 * (u_{n,Tsai} - u_{n,Ma})$. The estimations tell us how favorability affects exclusive-support behavior when voters have different perceptions of candidates' electability. The results show that voters who think either Su or Tsai would win and the voters who think only Tsai will win significantly have more intent to exclusively-support for Tsai but have no significant effect on exclusively-supporting for Su. In contrast, the

voters who think that only Su will win have more intent to exclusively-support for Su, but this has no significant effect on exclusively-supporting for Tsai.

Based on our estimation, we can calculate the magnitude of the effects of favorability and electability. First, we calculate the effects of a candidate's electability for a typical Pan-Green supporter who originally thought Tsai would win the presidential election but Su would not. If the typical Pan-Green supporter change her perceptions to believe that both Tsai and Su could win, then the probability of exclusively-supporting for Su will increase by 4.86 percent, and the probability of exclusively-supporting for Tsai will decrease by 13.90 percent.¹²

Second, we calculate the effects of the favorability of candidates for a typical Pan-Green supporter who thought that both Su and Tsai would win. When $u_{n,Tsai} - u_{n,Ma}$ increased by one standard deviation, i.e., from 5.72 to 8.77 while $u_{n,Su} - u_{n,Ma}$ remained unchanged, the probability of exclusively-supporting for Tsai increased by 7.83 percent, and the probability of exclusively-supporting for Su decreased by 2.74 percent.

Third, based on the estimations results from column 2 and 4 in Table 7, we calculate the effects of candidates' favorability on the probability of voters' exclusive-support behavior given their perceptions of a candidate's electability: (1) For a typical Pan-Green supporter who believes that either Su or Tsai would win, if her favorability of Tsai increased by one standard deviation, then the probability of exclusively-supporting for Tsai increased by 8.46 percent, and the probability of exclusively-supporting for Su decreased by 1.74 percent. (2) For a typical Pan-Green supporter who believes that only Su would win, if her favorability of Su increased by one standard deviation, then the probability of exclusively-supporting for Su increased by 2.20 percent, and the probability of exclusively-supporting for Tsai decreased by 1.62 percent. (3) For a typical Pan-Green supporter who believes that only Tsai would win, if her favorability of Tsai increased by one standard deviation, then the probability of exclusively-supporting for Tsai increased by 4.84 percent, and the probability of exclusively-supporting for Su decreased by 0.92 percent.

¹² For all typical Pan-Green supporters, the mean value of $u_{n,Tsai} - u_{n,Ma}$ is 5.72 and the Std. Dev. is 3.05, the mean value of $u_{n,Su} - u_{n,Ma}$ is 5.41 and the Std. Dev. is 2.83, the mean value of $u_{n,Tsai}$ is 7.90 and the Std. Dev. is 1.84, the mean value of $u_{n,Su}$ is 7.61 and the Std. Dev. is 1.79, the mean value of $u_{n,Ma}$ is 2.19.

These results demonstrate that favorability and electability do indeed affect exclusive-support behavior among the Pan-Green supporters. The estimations and simple examples also show that for a Pan-Green supporter, except for voters who think that only Su would win, the intention to exclusively-support for Tsai is stronger than that to exclusively-support for Su, whether it is influenced by favorability or electability.

Using results from Table 7, we predict the probability of exclusive-support behavior of the Pan-Green supporters under different perceptions of each candidate's electability. The results are presented in Table 8. When Pan-Green supporters believe either Su or Tsai would win, they are more likely to exclusively-support for Tsai (12.17%) than exclusively-support for Su (4.45%). If they think only Su would win, the probability of exclusively-supporting for Su is 14.72 percent; and if they think only Tsai would win, the probability of exclusively-supporting for Tsai is 30.49 percent. The results show that Pan-Green supporters do indeed have stronger intentions to exclusively-support for Tsai.

We also use an ordered probit model for robustness checks, and the estimation results are reported in Table 9. The dependent variable in the ordered probit model is ranked by the following list: exclusive-support for Tsai, responding sincerely, exclusive-support for Su. The results show that the effects of $D1 * (u_{n,Tsai} - u_{n,Su})$, $D2 * (u_{n,Ma} - u_{n,Su})$, and $D3 * (u_{n,Tsai} - u_{n,Ma})$ are stronger and remain consistent with the model predictions..

Based on our results, contrast style polling is not an appropriate primary electoral method because it creates incentives for strategic voting, and thus the election result would be sensitive to campaign strategies. Therefore, DPP should design another electoral rule to achieve their objective.

4.2. Strategic Voting Behavior in 2008 US primaries

In the 2008 Democratic presidential primary election, Barack Obama and Hillary Clinton were largely tied and made the contest much more competitive and longer than expected, which provide a good opportunity to study whether Obama and Clinton's supporters had strategic voting intentions in Democratic primaries. We estimated the effect of the expected utility on vote intention using our model, which presumed that the candidate's electability and favorability will affect the primary vote decision.

The data came from the 2008 National Annenberg Election Survey (NAES), which was a project of the Annenberg Public Policy Center of the University of Pennsylvania. This telephone opinion survey focuses on the voting behavior and political stance of the public through the 2008 US primary and general presidential election campaigns. It was conducted daily from 17 December 2007 through 3 November 2008. We only use the data obtained from 17 December 2007 through the day the Democrat nominee was determined, 8 June 2008. The survey covered a range of topics related to the presidential campaign and politics generally. The questions about voting intention in Democratic primaries, favorability of candidates, and the candidates' electability are used to study strategic voting behavior in the U.S. primary election.

The survey asked the respondents for which candidate they intended to vote in the Democrat primary election as follows: If you voted today in the Democratic presidential primary election or caucus in your state, which candidate would you vote for?¹³

The survey also investigated the candidate's favorability and electability. The questions used to inquire the favorability of candidates are as follows: *For the following person, please tell me if your opinion is favorable or unfavorable using a scale from zero to 10. Zero means very unfavorable, and 10 means very favorable. Five means you do not feel favorable or unfavorable toward that person. Of course you can use any number between zero and 10. On a scale of zero to 10, how would you rate Candidate?*¹⁴ [Candidate refers to Hillary Clinton, Barack Obama, John McCain, Mike Huckabee, and Mitt Romney.]

The questions used to investigate a candidate's electability are as follows: *Thinking about the general election in November and using a scale from zero to 100, where zero means no chance, 50 a 50-50 chance, and 100 a certain win, what do you think the chances are Candidate will beat the Republican candidate for president? You can name any number from zero to 100. [Candidate refers to Hillary Clinton and Barack Obama.]*

¹³ In the early campaign, 8 major candidates competed for the Democrat nomination — Joe Biden, Hillary Clinton, Chris Dodd, John Edwards, Dennis Kucinich, Barack Obama, Bill Richardson, and Tom Vilsack (joining Mike Gravel). However, Obama and Clinton's frontrunner status remained all the way through the primaries and caucuses. This question was addressed to 21,275 respondents between 17 December 2007 – 8 June 2008.

¹⁴ The question of the favorability of Clinton was not asked in the week of 6 October 2008; the favorability of Huckabee was only asked from 17 December 2007 - 4 March 2008; the favorability of Romney was only asked from 17 December 2007 - 6 February 2008.

We define those who favor Clinton over Obama as Clinton supporters and those who favor Obama over Clinton as Obama supporters. We then examine the voting intention of Clinton supporters and Obama supporters in a Democratic primary (Table 9). The results show that there were 273 voters who favored Clinton over Obama who would vote for Obama rather than Clinton, accounting for 4.25 percent of Clinton’s supporters; 778 voters would vote for Clinton rather than Obama even though they favor Obama over Clinton, accounting for 8.94 percent of Obama’s supporters. One natural reason for the inconsistency between the preference and voting behavior among Clinton and Obama’s supporters could be due to the subjective perception about candidates’ electability.

We estimate the effects of the favorability and electability on voting intentions, and we report the marginal effects of the candidate’s favorability and electability in Table 11. From the table, the marginal effects of Obama and Clinton’s favorability and electability all are significant based on inconsistent voting intentions.

We used a probit model to perform our estimations. The first estimation is used to study the case of whether and how the favorability of the candidates and the candidate’s electability affected whether an Obama supporter did not vote for Obama but voted for Clinton in the Democratic primary election. The dependent variable is whether an Obama supporter votes for Clinton rather than Obama, and the sample is restricted to Obama’s supporters. The second estimation is used to study the similar case of Clinton’s supporters. The dependent variable in the second estimation is whether a Clinton supporter votes for Obama rather than Clinton, and the sample is restricted to Clinton’s supporters. The independent variable X is the expected utility from voting for Obama minus that for Clinton, $\bar{u}_{n,Obama} - \bar{u}_{n,Clinton} = T(p_{Obama} * (u_{n,Obama} - u_{n,Rep}) - p_{Clinton} * (u_{n,Clinton} - u_{n,Rep}))$. The estimation results are presented in Table 12.

From the Table 12, the signs of X are as expected. For the purpose of understanding the magnitude of the marginal effects of changes in favorability and electability, we calculate the probability changes when the favorability changed and electability changed. According to the estimation results of X , for example, (1) for a typical voter¹⁵, if the

¹⁵ For a typical Obama’s supporter, the mean value of p_{Obama} is 0.68 and the Std. Dev. is 0.21, $p_{Clinton}$ is 0.48 and the Std. Dev. is 0.25, $u_{n,Obama} - u_{n,Rep}$ is 2.91 and the Std. Dev. is 3.39, $u_{n,Clinton} - u_{n,Rep}$ is -0.63 and the Std. Dev. is 3.68. For a typical Clinton’s supporter, the mean value of p_{Obama} is 0.54 and the Std. Dev. is 0.26, $p_{Clinton}$ is 0.69 and the Std. Dev. is 0.23, $u_{n,Obama} - u_{n,Rep}$ is -0.33 and the Std. Dev.

difference of the favorability of Obama and the favorability of Republican, $u_{n,Obama} - u_{n,Rep}$, increased by one standard deviation, then the probability that a Clinton supporter voted for Obama rather than Clinton increased by 3.09 percent, and the probability that an Obama supporter voted for Clinton rather than Obama decreased by 13.95 percent. (2) For a typical voter, if her perception of Obama's electability increased by one standard deviation, then the probability that a Clinton supporter voted for Obama rather than Clinton decreased by 0.13 percent, and the probability that an Obama supporter voted for Clinton rather than Obama decreased by 1.70 percent.¹⁶

4.3 Previous DPP electoral rule

While respondents' strategic behavior of the Pan-Green supporters may affect the electoral outcome under the new electoral rule, people have concerns with the influence of Pan-Blue supporters' strategic behavior we also examine the influence of strategic

Our survey also included "competing style" questions that were implemented in the previous DPP primary opinion polls. Respondents were asked a single question to choose one candidate from all DPP candidates. The survey questions are as follows:

If the 2012 Taiwan presidential candidate were DPP candidate and Ying-jeou Ma, which candidate would you be most likely to vote for?

[DPP candidate refers to Tseng-chang Su, Ing-wen Tsai, and Hsin-liang Hsu.]

3. Conclusion

This study investigates strategic voting behavior in the presidential primary elections. We find that in the 2012 DPP presidential primary election, 18.7 percent of Pan-Green supporters act strategically. Although this is not a very large proportion, it still influenced the primary election outcome in this competitive election. The behavior was affected by their favorability of the candidates as well as their perceptions of the candidate's electability. We constructed a simple rational voter model that considered both the

is 3.65, $u_{n,Clinton} - u_{n,Rep}$ is 3.20 and the Std. Dev. is 3.43.

¹⁶ In these examples, each particular change in favorability or electability occurred while the other variables remained unchanged.

candidate's favorability and electability to study exclusive-support behavior in the 2012 Taiwan DPP presidential primary election and 2008 Democrat presidential primary election.

The results show that strategic voting behavior in the primary election could be explained by a rational voter model. Our results show that the exclusive-support behavior of Pan-Green supporters in the 2012 DPP primary election was affected by favorability and electability. We also find that voters had stronger intentions to exclusively-support for Tsai than exclusively-support for Su, suggesting that the advocacy of exclusively-supporting by Tsai's campaign was effective. Our results suggest that contrast style polling is not an appropriate primary electoral method because it can create incentives for strategic voting, and thus the election result would be sensitive to campaign strategies.

Finally, we find that the voting intentions of American voters were also affected by both the favorability and electability of the candidates, which are consistent with the predictions of the rational voter model.

Reference

- [1] Alvarez, R. M. and Nagler, J. (2000). "A New Approach for Modeling Strategic Voting in Multiparty Elections." *British Journal of Political Science* 30: pp. 57 – 75.
- [2] Bartels, Larry M. (1985). "Expectations and Preferences in Presidential Nominating Campaigns." *American Political Science Review* 79: pp. 804 – 15.
- [3] Bartels, Larry M. (1988). "Presidential Primaries and the Dynamics of Public Choice." Princeton: Princeton University Press.
- [4] Bouton, Laurent (2012). "A Theory of Strategic Voting in Runoff Elections." Boston University.
- [5] Bouton, Laurent and Castanheira, Micael (2012). "One Person, Many Votes: Divided Majority and Information Aggregation." *Econometrica* 80 (1): pp. 43 – 87.
- [6] Chen, Kong-Pin and Yang Sheng-Zhang (2002). "Strategic Voting in Open Primary."

Public Choice 112: pp. 1 – 30.

[7] Duverger, Maurice (1954). "Political Parties." New York: John Wiley & Sons.

[8] Farquharson, Robin. (1969). "Theory of Voting." Blackwell (Yale U.P. in the U.S.).

[9] Kawai, Kei & Watanabe, Yasutora. (2010). "Inferring Strategic Voting." APSA 2010 Annual Meeting Paper.

[10] McKelvey, R.D. and Ordeshook, P.C. (1972). "A General Theory of the Calculus of Voting." in J. F. Herdon and J. L. Bernd, (eds.), *Mathematical Applications in Political Science VI*, The University of Virginia Press, pp. 32 – 78.

[11] Myatt, David (2007). "On the Theory of Strategic Voting," *Review of Economic Studies* 74 (1): pp. 255 – 281.

[12] Rickershauser, Jill, and John Aldrich (2007). "'It is the electability, stupid" - or maybe not? Electability, Substance, and Strategic Voting in Presidential Primaries." *Electoral Studies* 26: pp. 371 – 380.

[13] Sher, Chien-Yuan (2011). "Distinguishing Strategic Voting from Bandwagon Effects – How did Voters' Subjective Expectations Affect Result." Boston University.