Momentum and Social Learning in Presidential Primaries

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Sequential election in presidential primaries.
In 2008, schedule became increasingly front-loaded.

Does the order of states voting matters?
Do sequential and simultaneous systems lead to differences in outcomes?

Key: late voters learn about desirability of candidates from early voters.
   ⇒ Momentum effects
Introduction

Definition (*Momentum effects*)

*Positive effect of candidate performance in early states on candidate performance in later states.*

Problems:

- Challenging econometric attempt to identify and measure momentum effects.
- What is the informational content of voting returns from early states?
- Do absolute returns matters or should results be measured relative to voter expectations? How can these expectations be measured?
- How to account for candidate characteristics? How do voters weigh the voting returns from different states?
Formal analysis of social learning:
- Banerjee (1992), Bikhchandani et al. (1992) and Welch (1992)

Equilibrium of simultaneous vs sequential game:
- Dekel and Piccione (2000): eq. of simultaneous also of sequential, regardless of sequence.

Momentum in presidencial primaries:
Setup

- Sequential election: Order of voting taken as given.
- \( \Omega_t \): set of \( s \) voting \( c = 0, 1, \ldots, C \) at \( t \). Size: \( N_t \geq 1 \)
- Payoff of voter \( i \) residing in \( s \) from \( c \) winning:
  
  \[
  u_{cis} = q_c + \eta_{cs} + \nu_{cis}
  \]

  (1)

- Prior: at \( t = 1 \), \( q_c \sim N(\mu_1, \sigma_1^2) \)
- normalize \( u_{0is} = 0 \)
- \( \eta_{cs} \sim (0, \sigma_\eta^2) \). Known own \( s \) pref.
- \( \nu_{cis} \) i.i.d. across \( c \) and \( i \).
Voters in $s$ receive a signal over $q_c$:

$$\theta_{cs} = q_c + \varepsilon_{cs}$$ (2)

where $\varepsilon_{cs} \sim N(0, \sigma^2_{\varepsilon})$ i.i.d.

Given $\theta_{cs}$,

$$E(u_{cis}|\theta_{cs}, \eta_{cs}, \nu_{cis}) = E(q_c|\theta_{cs}) + \eta_{cs} + \nu_{cis}$$ (3)

- $i$ in $s$ at $t$ supports $c$ s.t. $\max E(u_{cis}|\theta_{cs}, \eta_{cs}, \nu_{cis})$
- Voters do not account for their influence in late voters.
Voting Behaviour

Private updating over quality:

\[ E(q_c|\theta_{cs}) = \alpha_t \theta_{cs} + (1 - \alpha_t) \mu_{ct} \]  \hfill (4)

\[ \alpha_t = \frac{\sigma_t^2}{\sigma_t^2 + \sigma_\varepsilon^2} \]  \hfill (5)

Plug (4) into (3):

\[ E(u_{cis}|\theta_{cs}, \eta_{cs}, \nu_{cis}) = \alpha_t \theta_{cs} + (1 - \alpha_t) \mu_{ct} + \eta_{cs} + \nu_{cis} \]  \hfill (6)

Since \( \nu_{cis} \sim \) type I extreme value:

\[ Pr(E(u_{cis}|\theta_{cs}, \eta_{cs}, \nu_{cis}) > E(u_{dis}|\theta_{ds}, \eta_{ds}, \nu_{dis}; \forall d \neq c)) = \]

\[ \frac{\exp[\alpha_t \theta_{cs} + (1 - \alpha_t) \mu_{ct} + \eta_{cs}]}{\sum_{d=0}^C \exp[\alpha_t \theta_{ds} + (1 - \alpha_t) \mu_{dt} + \eta_{ds}]} \]  \hfill (7)
Assume continuum of voters ⇒ state-level vote shares = voting prob.

\[
\frac{\nu_{cst}}{\nu_{0st}} = \frac{\exp[\alpha_t \theta_{cs} + (1 - \alpha_t) \mu_{ct} + \eta_{cs}]}{\exp[\alpha_t \theta_{0s} + (1 - \alpha_t) \mu_{0t} + \eta_{0s}]}
\]

(8)

Since \( u_{0is} = 0 \), taking logs:

\[
\ln(\nu_{cst}/\nu_{0st}) = \eta_{cs} + \alpha_t \theta_{cs} + (1 - \alpha_t) \mu_{ct}
\]

(9)

Aggregate voting returns key link between individual voting and aggregate returns.
How voters in late states update their beliefs over quality? From (9) and (2):

$$\frac{ln(\nu_{cst}/\nu_{0st}) - (1-\alpha_t)\mu_{ct}}{\alpha_t} = q_c + \frac{\eta_{cs}}{\alpha_t} + \varepsilon_{cs}$$  \hspace{1cm} (10)

Posterior distrib. is normal and characterized by:

$$\mu_{ct+1} = \beta_t \left[ \frac{1}{N_t} \sum_{s \in \Omega_t} \frac{ln(\nu_{cst}/\nu_{0st}) - (1-\alpha_t)\mu_{ct}}{\alpha_t} \right] + (1 - \beta_t)\mu_{ct}$$  \hspace{1cm} (11)

$$\frac{1}{\sigma^2_{t+1}} = \frac{1}{\sigma^2_t} + \frac{N_t}{(\sigma^2_{\eta}/\alpha^2_t) + \sigma^2_{\varepsilon}}$$  \hspace{1cm} (12)
Weight on voting signals given by:

\[ \beta_t = \frac{N_t \sigma_t^2}{N_t \sigma_t^2 + (\sigma^2_{\eta}/\alpha_t^2) + \sigma^2_{\epsilon}} \]  

(13)

Rewrite (11) as:

\[ \mu_{ct+1} - \mu_{ct} = \frac{\beta_t / N_t}{\alpha_t} \sum_{s \in \Omega_t} [ln(v_{cst}/v_{0st}) - \mu_{ct}] \]  

(14)

where \( \mu_{ct+1} - \mu_{ct} \) is social learning, and depends on surprises in voting returns: deviations in vote shares from expectations over candidate performance.
Data

- 2004 Democratic primary: Dean, Kerry (baseline) and Edwards.
- Reactions of voters in daily opinion polls.
  - National Annenberg Election Survey (NAES).
  - 4,084 respondents (s with primaries not held yet).
- Estimate $\eta_{cs}$. Delete Washington DC and seven small states.
- Aggregate vote shares from 2004 primary season.

- Compare support for $c$ among late voters, before and after releasing voting returns.
- Assume respondents have not yet observed private signals ($\theta_{cs} = 0$).
Data

Fig. 2.—Dean before and after the Iowa primary
Data

**Fig. 4.**—Edwards before and after the Iowa primary
## Results

### First-Stage Multinomial Logit

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<th>Base Specification</th>
<th>Includes Distance</th>
<th>Includes Time Trend</th>
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| Distance Trend     | -.062**           | -.062**             |

Note: Bootstrap 95 percent confidence intervals are in brackets.

*Significant at 10 percent.

**Significant at 5 percent.
Results

Fig. 5.—A, Mean of prior (Kerry = 0); B, variance of prior

Fig. 6.—Weights on private and public voting signals
Alternative Explanations

1. Departures from Sincere Voting
   - Examine dynamics of measures of $q_c$: Strategic vs sincere voting.
   - Positive relation between $\mu_{ct}$ and $quality_{itc} \Rightarrow$ Sincere voting.

2. National Information
   - Social learning due to national information?
   - Most likely date for a break in support: Jan., 19 (Iowa)-Jan., 20.

3. Campaign Finance and Persuasion
   - Increase in contributions from influence-motivated contributor after surprising win.
   - Discrepancy in shift in expenditures and candidate support $\Rightarrow$ campaign expenditure cannot fully explain baseline results.
Weights and Campaign Resources

**Fig. 10.** Advertising coverage versus implied voting weights

**Implied voting weights**

- Weight
- Period (t)

**Advertising coverage**

- Minutes of exposure per capita (000's)
- Period (t)

Advertising from 2/18/2003–3/2/2004 for 3 candidates; data not available for ND, RI, and UT.
Conclusion

- Model of voter behaviour under sequential elections.
- Late voters infer private information held by early voters from voting returns.
- Candidates experience momentum effects in 2004: performance exceed expectations.
  - Kerry benefited from surprising wins in early states.
  - Took votes away from Dean.
- Early states have up to five times the influence of late states.
- Candidates respond by funneling campaign expenditures in early states.
- Counterfactual: race tighter under simultaneous system.