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# Statistically measuring 2016 presidential candidate electability: Evidence from prediction markets

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**Statistically Measuring 2016 Presidential Candidate Electability: Evidence From  
Prediction Markets**

**This Draft: February 2016**

By

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# **Statistically Measuring 2016 Presidential Candidate Electability: Evidence From Prediction Markets**

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## **Abstract**

We use prediction market data from Betfair, the world's largest Internet betting exchange, to measure the electability of 2016 Presidential candidates using regressions that compare the general election contest and party nomination win probabilities for each candidate. A candidate who is more electable should see a higher response of the odds of becoming president to a given change in the odds of receiving a party's nomination. Our regressions estimate this response for each major candidate, and these estimates constitute our measures of electability. The data indicate that there is a high degree of variability in the electability of candidates. We present a number of different model estimates, in order to explore the sensitivity of results to specific assumptions. Across specifications, we find that Jeb Bush and Marco Rubio are the most electable, while Chris Christie and John Kasich also have high electability scores. We also find that Hillary Clinton has the highest electability score in the Democratic field and that Bernie Sanders' electability is sensitive to specification changes. We interpret Mrs. Clinton's very high electability scores as suggesting that markets are pricing in a significant probability that Republicans will nominate a candidate who has little chance in the general election.

**JEL Classifications: C53, D72, G14**

**Keywords: Forecasting and Prediction Methods, Economic Models of Political Processes, Information and Market Efficiency**

## **I. Introduction**

As we enter the 2016 year of election with narrowing fields in both the Democratic and Republican nominating contests, many primary voters may wish to factor into their reasoning an assessment of which candidates have the best shot of winning the general election, should they win their party's nomination. To date, however, there has not been a direct measure of electability. In this paper, we take advantage of the fact that betting markets allow wagers on both the primary and the general election to develop a regression based (and market-based) estimate of each major candidate's electability.

Prediction markets remain controversial in both their ability to accurately measure actual beliefs and their ability to accurately predict outcomes. And the literature in the area is rapidly evolving. While some have previously raised doubt about whether prediction markets provide an unbiased measure of aggregate beliefs (e.g., Manski, 2006), a number of analyses have found them to be effective and reasonably accurate in this regard (e.g., Wolfers and Zitzewitz (2006), Sunstein (2006) and Surowiecki (2004)).

There is further debate concerning the accuracy of prediction markets in predicting actual outcomes. Research by Servan-Schreiber, Wolfers, Pennock, and Galebach (2004) using prediction market data from TradeSports.com finds that prediction markets exhibited significant predictive powers in predicting the outcomes of NFL Football games. Moreover, Hubbard (2007) conducted an analysis over 400 retired prediction markets which showed that the probability of an event actually occurring is close to its market-implied probability which, more importantly, was significantly better at predicting outcomes than the average forecaster estimate.

With respect to forecasting the outcomes of elections, Snowberg, Wolfers and Zitzewitz (2012) survey evidence that prediction markets can accurately forecast political and economic

outcomes. They find that prediction markets generally exhibit lower statistical errors than professional forecasters and political polls.

With respect to U.S. presidential elections, Rhode and Strumpf (2004) finds that well-organized historical betting markets predicted the outcomes of presidential contests with a strong degree of accuracy. While there is still controversy over the overall predictability of online prediction markets in Presidential election nominating contests<sup>1</sup>, we think that the evidence tends to support the conclusion that election-related prediction markets clearly provide a reasonable estimate of the odds of a candidate being victorious. In this brief paper, we show how publicly available data can be used to provide an estimate of the electability of a primary candidate in the pending general election. We leave to future work the analysis of whether this measure of electability proves to be empirically useful predicting election outcomes.

## **II. Data and Empirical Strategy**

As a result of federal laws and many state laws banning online gambling in the United States, most prediction markets based in the U.S., such as the Iowa Electronic Markets, operated by the University of Iowa, and PredictIt, operated by Victoria University of Wellington, legally operate in the U.S. based on no-action relief granted by the Commodity Futures Trading Commission, which guarantees no risk of prosecution for online gambling under several conditions.<sup>2</sup> In the case of PredictIt, the CFTC no-action conditions require that on any given contract, PredictIt imposes a limit of 5,000 total traders and a cap of \$850 on the investment made by any single participant.

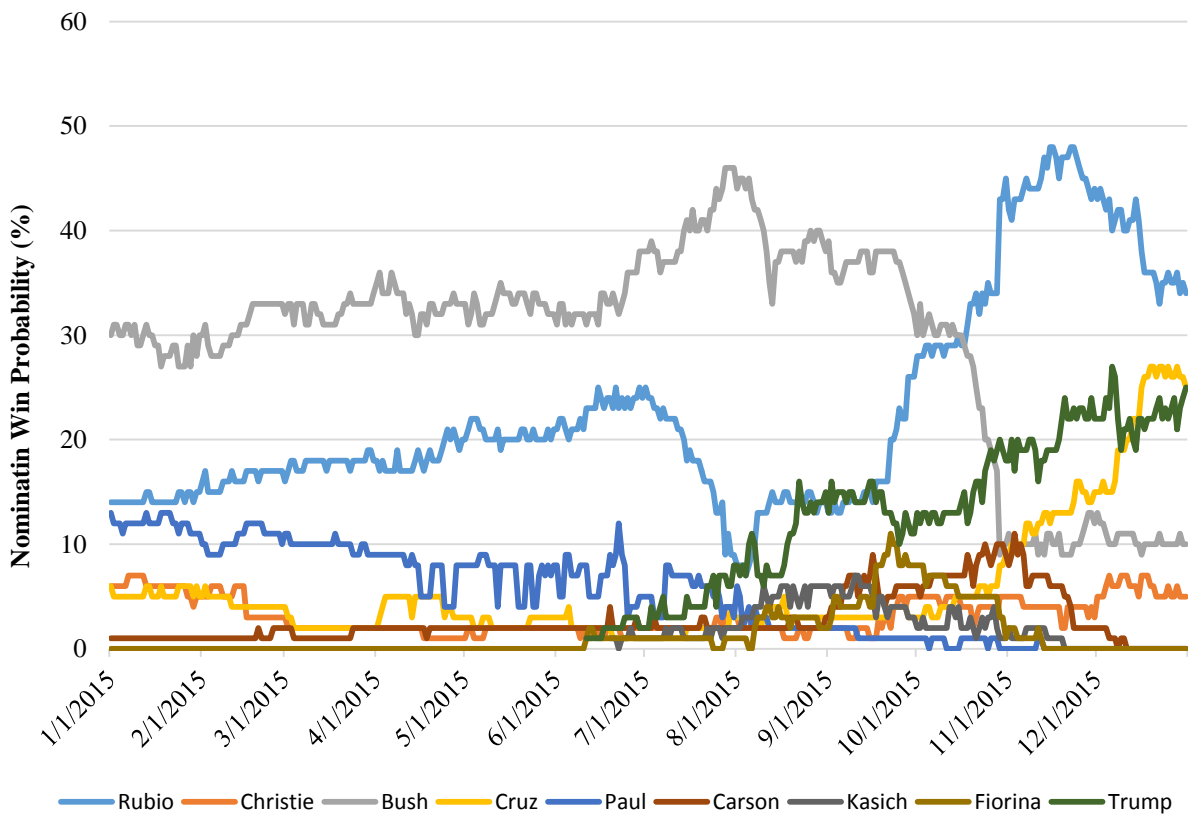
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<sup>1</sup> Leonhardt, David. "[Prediction Markets and Elections](#)", *The New York Times*, March 9, 2012

<sup>2</sup> "[CFTC Staff Provides No-Action Relief for Victoria University of Wellington, New Zealand, To Operate a Not-For-Profit Market for Event Contracts and to Offer Event Contracts to U.S. Persons](#)". *U.S. Commodities Futures Trading Commission*, October 29, 2014.

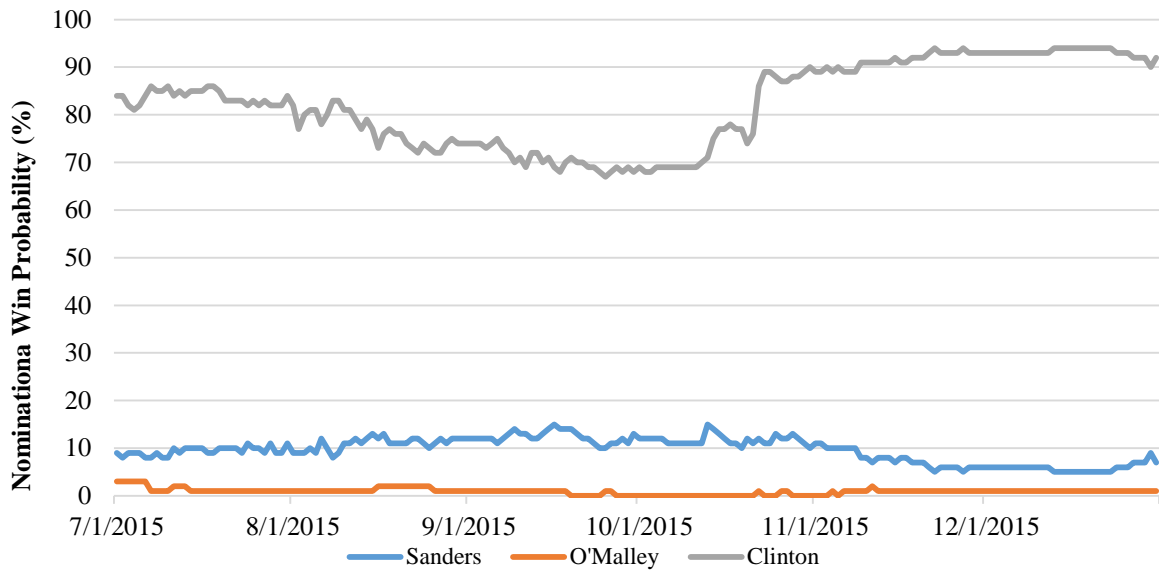
Meanwhile, U.K.-based Betfair has become the world's largest online betting exchange, and has prediction markets for nearly every 2016 Presidential candidate's probability of winning both their party's nominating contest and the general election. These markets fluctuate in almost continuous time, and have, as suggested by the Figures 1A and 1B, varied enormously over the past year, giving the econometrician ample variation to investigate.

**Figure 1A. Betfair Prediction Markets Republican Nomination Win Probability (%)**



Notes: Based on daily Betfair prediction market contract prices. Source: Betfair/PredictWise

**Figure 1B. Betfair Prediction Markets Democratic Nomination Win Probability (%)**



Notes: Based on daily Betfair prediction market contract prices. Source: Betfair/PredictWise

In this paper, we use these data from Betfair provided by PredictWise for the fourth quarter of 2015 to develop a statistical measure of “electability” for each 2016 candidate for whom data exists.

The intuition for our approach is straightforward. For each candidate, we can observe one betting contract for winning the party’s nomination, and a separate betting contract for winning the general election. If a candidate experiences a positive shock to his electability, the odds of winning the nomination go up by a given amount. At the same time, the odds of winning the general election will likely increase as well.

If a candidate is viewed by betting market participants as highly electable, for a given increase in the odds of winning the nomination, that candidate will experience a larger increase in the odds of winning the general election than would a less electable candidate. Suppose, for example, that the odds of being the party’s nominee increase by 10 percentage points for two different candidates. But one candidate’s concurrent increase in the odds of winning the general election is 9 percent, whereas the other candidate’s concurrent increase in



general election odds is only 2 percent. The candidate who experienced the 9 percent increase in general election odds in response to the 10 percent shock to the candidate’s nomination odds would, in this framework, be considered more electable than the candidate who experienced only a 2 percent increase in response to the same 10 percent shock to the candidate’s nomination odds. Broadly speaking, a candidate who is viewed as relatively unelectable would see their odds of winning the general election respond little to changes in the odds of being the nominee.<sup>3</sup>

To measure any given candidate’s electability, in statistical terms, we want to find the conditional probability of the candidate winning the general election if they won the nomination [P(Win General Election | Win Nomination)].

From elementary statistics, the definition of a conditional probability P(Win General Election | Win Nomination) is defined as:

$$(1) P(\text{Win General Election}) = P(\text{Win General Election} | \text{Win Nomination}) * P(\text{Win Nomination})$$

Statistically, given a time series of each candidate’s odds of winning the general election and their respective primary, we can estimate their “electability” (their conditional probability of winning the general election given a primary win) from the  $\beta$  of a simple ordinary least squares (OLS) regression of a candidate’s general election probability on their nomination win probability:

$$(2) P(\text{Win General Election})_t = \alpha + \beta * P(\text{Win Nomination})_t + \varepsilon_t$$

where  $P(\text{Win General Election})_t$  and  $P(\text{Win Nomination})_t$  are the prediction market probabilities of a given candidate winning the general election and nomination respectively. This estimate of  $\beta$  provides a direct estimate of electability.

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<sup>3</sup> Malhotra and Snowberg (2009) also use prediction markets to assess the probability of winning the general election conditional on winning the 2008 nomination, however they only examine point estimates of conditional probabilities over the course of the primaries as opposed to running regressions over a longer period of time as we do in this paper.

In our analysis, we use data from Betfair, host of the world's most liquid prediction markets, to provide us with general election and nomination probability data on the 2016 presidential candidates.

### **III. Results**

Table 1 provides our baseline estimates of the electability of the candidates in the Republican field. For all of the candidates, the regressions are extremely precisely estimated, and a very high share of the variation in the odds of winning the presidency is explainable by variation in odds of receiving the nomination. The results are highly statistically significant.

In the Republican field, we find that the statistically more “electable” candidates, candidates whose conditional probabilities of winning fall in the 36-52% range according to prediction markets, are Chris Christie (52.5%), Marco Rubio (41.6%), Jeb Bush (38.7%), and John Kasich (36.1%).

The statistically less “electable” candidates, whose conditional probabilities of winning fall in the 25-35% range according to prediction markets, are Ted Cruz (35.0%), Ben Carson (29.4%), Carly Fiorina (26.9%) and Donald Trump (25.7%). Rand Paul's statistical electability, according to the OLS specification, falls far behind the rest of the group at 8.7%.

To put these base case estimates in perspective: a 10 percentage point increase in the odds of winning the Republican nomination would, on average, increase the odds of Chris Christie being president by 5.25 percentage points. That same 10 percentage point increase in the odds of winning the Republican nomination, by contrast, would on average only increase the odds of Rand Paul being president by 0.87 percentage points.

In the Democratic field, as can be seen in Table 2, the regression results are again precisely estimated and highly statistically significant. We find that the order of the statistically “electable” candidates from highest to least are Bernie Sanders (80.3%), Hillary Clinton (65.7%), and Martin O’Malley (23.9%).

Consistent with standard economics conventions, \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level.

All data span October 1, 2015 through December 31, 2015.

Table 1. Republican Field Electability OLS Regression Estimates

<i>Candidate</i>	<i>Party</i>	<i>Alpha (α)</i>		<i>Electability Beta (β)</i>		<i>N</i>	<i>R</i> <sup>2</sup>
Chris Christie	GOP	-0.005 (0.236)	*	0.525 (0.049)	***	92	0.564
Marco Rubio	GOP	-0.013 (0.598)	**	0.416 (0.015)	***	92	0.891
Jeb Bush	GOP	-0.004 (0.150)	**	0.387 (0.009)	***	92	0.958
John Kasich	GOP	0.009 (0.038)	***	0.361 (0.024)	***	92	0.718
Ted Cruz	GOP	-0.003 (0.105)	***	0.350 (0.007)	***	92	0.967
Ben Carson	GOP	0.001 (0.058)		0.294 (0.010)	***	92	0.904
Carly Fiorina	GOP	0.000 (0.035)		0.269 (0.010)	***	92	0.883
Donald Trump	GOP	0.030 (0.404)	***	0.257 (0.021)	***	92	0.632
Rand Paul	GOP	0.000 (0.017)		0.087 (0.034)	**	92	0.067

Notes: The most simple specification estimates a standard OLS model regressing the time series of Betfair prediction market probabilities for the 2016 Republican candidates where  $P(\text{Win General Election})_t = \alpha + \beta * P(\text{Win Nomination})_t + \varepsilon_t$ . \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

Table 2. Democratic Field Electability OLS Regression Estimates

<i>Candidate</i>	<i>Party</i>	<i>Alpha (α)</i>		<i>Electability Beta (β)</i>		<i>N</i>	<i>R</i> <sup>2</sup>
Bernie Sanders	DEM	0.0192 (0.328)	***	0.803 (0.037)	***	92	0.893
Hillary Clinton	DEM	-0.0296 (1.285)	**	0.658 (0.015)	***	92	0.957
Martin O’Malley	DEM	0.000 (0.058)		0.239 (0.070)	***	92	0.115

Notes: The most simple specification estimates a standard OLS model regressing the time series of Betfair prediction market probabilities for the 2016 Democratic candidates where  $P(\text{Win General Election})_t = \alpha + \beta * P(\text{Win Nomination})_t + \varepsilon_t$ . \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

For many of the candidates in our sample, the odds of winning the nomination or the presidency hover near zero for most of the sample period. Accordingly, in those cases it may be possible that most of the variation is simply noise until the probability rises to a certain level, and that the residuals would be highly serially correlated since a candidate might experience “before near zero” and “after near zero” periods in which the statistical relationship is fundamentally different. Tables 3 and 4 explore the importance of this factor. In these tables we also report censored regressions, which restrict the data to those for which the candidate’s nomination win probability on Betfair is equal to or greater than 3 percentage points. For some of the candidates, this reduces the sample size significantly.

Table 3. Republican Electability Estimates, Censored

<i>Candidate</i>	<i>Party</i>	<i>Alpha (<math>\alpha</math>)</i>		<i>Electability Beta (<math>\beta</math>)</i>		<i>N</i>	<i>R<sup>2</sup></i>
Chris Christie	GOP	-0.006 (0.271)	**	0.565 (0.055)	***	89	0.548
Marco Rubio	GOP	-0.013 (0.598)	**	0.416 (0.015)	***	92	0.891
Jeb Bush	GOP	-0.004 (0.150)	**	0.387 (0.009)	***	92	0.958
John Kasich	GOP	-		-		0	-
Ted Cruz	GOP	-0.003 (0.105)	***	0.350 (0.007)	***	92	0.967
Ben Carson	GOP	0.002 (0.260)		0.268 (0.034)	***	53	0.542
Carly Fiorina	GOP	-0.009 (0.293)	***	0.412 (0.050)	***	30	0.710
Donald Trump	GOP	0.030 (0.404)	***	0.257 (0.021)	***	92	0.632
Rand Paul	GOP	-		-		0	-

Notes: Censored OLS regressions are limited to data points where each candidate’s nomination win probability,  $P(\text{Win Nomination})_t$ , is equal to or greater than 3 percentage points. \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

Censoring observations to those in which the nomination win probability is equal to or greater than 3% removes Paul and Kasich altogether, due to their permanently low levels of winning the nomination. It also removes some observations from Christie, Fiorina and Carson. Interestingly, Fiorina’s electability score substantially increases to 41.2% in this censored specification—her electability score is 26.9% in the uncensored specification. Granted, this may reflect the fact that the variation at probabilities close to zero is simply noise. Christie’s electability estimate increases slightly, while Carson’s decreases slightly. Rubio, Bush, Cruz, and Trump are unaffected by censoring at 3%, as they have had nomination odds above the threshold during the entire sample period between October 1 and December 31 2015.

Likewise, on the Democratic side, restricting observations to those for which the odds of the candidate winning the nomination was 3% or more had no effect on the estimates for Clinton or Sanders. The same restriction, however, eliminated too many of O’Malley’s observations for a regression to be performed.

Table 4. Democratic Electability Estimates, Censored

<i>Candidate</i>	<i>Party</i>	<i>Alpha (<math>\alpha</math>)</i>		<i>Electability Beta (<math>\beta</math>)</i>		<i>N</i>	<i>R<sup>2</sup></i>
Bernie Sanders	DEM	0.0192 (0.328)	***	0.803 (0.037)	***	92	0.839
Hillary Clinton	DEM	-0.0296 (1.285)	**	0.658 (0.015)	***	92	0.957
Martin O’Malley	DEM	-		-		0	-

Notes: Censored OLS regressions are limited to data points where each candidate’s nomination win probability,  $P(\text{Win Nomination})_i$ , is equal to or greater than 3 percentage points. \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

In addition to signal-to-noise ratios declining close to zero, the data also contain significant upward and downward trends. This suggests that even for candidates who have been far from zero for most of the season, the residuals may well still be highly serially correlated. Tables 5

and 6 report Durbin Watson statistics to test for serial correlation, which is, for the most part, present.

Table 5. Republican Field Serial Correlation

<i>Candidate</i>	<i>Party</i>	<i>DW Statistic (OLS)</i>		<i>DW Statistic (Censored OLS)</i>	
Chris Christie	GOP	1.065	***	0.992	***
Marco Rubio	GOP	0.818	***	0.818	***
Jeb Bush	GOP	1.303	***	1.303	***
John Kasich	GOP	1.067	***	-	
Ted Cruz	GOP	1.635	**	1.635	**
Ben Carson	GOP	1.625	**	1.485	**
Carly Fiorina	GOP	0.762	***	0.667	***
Donald Trump	GOP	0.792	***	0.792	***
Rand Paul	GOP	2.037		-	

Notes: The Durbin-Watson (DW) Statistic is calculated as  $d = \frac{\sum_{t=2}^T (\varepsilon_t - \varepsilon_{t-1})}{\sum_{t=1}^T \varepsilon_t^2}$  where  $\varepsilon_t$  is the residual from the OLS regression. A DW statistic is significantly less than 2 is evidence of positive serial correlation. Censored OLS regressions are limited to data points where each candidate's nomination win probability,  $P(\text{Win Nomination})_t$  is equal to or greater than 3 percentage points. \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

Table 6. Democratic Field Serial Correlation

<i>Candidate</i>	<i>Party</i>	<i>DW Statistic (OLS)</i>		<i>DW Statistic (Censored OLS)</i>	
Bernie Sanders	DEM	0.580	***	0.580	***
Hillary Clinton	DEM	0.870	***	0.870	***
Martin O'Malley	DEM	1.016	***	-	

Notes: The Durbin-Watson (DW) statistic is calculated as  $d = \frac{\sum_{t=2}^T (\varepsilon_t - \varepsilon_{t-1})}{\sum_{t=1}^T \varepsilon_t^2}$  where  $\varepsilon_t$  is the residual from the OLS regression. A DW statistic is significantly less than 2 is evidence of positive serial correlation. Censored OLS regressions are limited to data points where each candidate's nomination win probability,  $P(\text{Win Nomination})_t$  is equal to or greater than 3 percentage points. \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

Tables 7 and 8 report the output of regressions that use the Cochrane-Orcutt technique to correct for serial correlation.

Table 7. Republican Field Estimates, Corrected For Serial Correlation

<i>Candidate</i>	<i>Party</i>	<i>Alpha (α)</i>		<i>Electability Beta (β)</i>		<i>Rho (ρ)</i>	<i>N</i>	<i>R<sup>2</sup></i>
Jeb Bush	GOP	-0.003 (0.214)		0.383 (0.012)	***	0.341	91	0.916
Marco Rubio	GOP	0.004 (1.213)		0.374 (0.031)	***	0.634	91	0.623
Ted Cruz	GOP	-0.004 (0.128)	***	0.350 (0.008)	***	0.178	91	0.953
Ben Carson	GOP	0.005 (0.070)		0.290 (0.012)	***	0.191	91	0.864
Donald Trump	GOP	0.004 (0.703)	***	0.219 (0.035)	***	0.631	91	0.304
Rand Paul	GOP	0.000 (0.017)		0.090 (0.034)	**	-0.019	91	0.070
Chris Christie	GOP	0.002 (0.380)	***	0.073 (0.059)		0.845	91	0.017
Carly Fiorina	GOP	0.002 (0.310)		0.058 (0.047)		0.930	91	0.017
John Kasich	GOP	0.003 (0.276)		0.007 (0.034)		0.931	91	0.001

Notes: A Cochrane-Orcutt AR (1) regression is used to correct for serial correlation, which takes the OLS residuals  $\varepsilon_t$  and models them as a stationary first-order autoregressive structure where  $\varepsilon_t = \rho\varepsilon_{t-1} + e_t$ , to estimate the quasi-difference between variables such that  $[P(\text{Win General Election})_t - \rho * P(\text{Win General Election})_{t-1}] = \alpha(1 - \rho) + \beta * [P(\text{Win Nomination})_t - \rho * P(\text{Win Nomination})_{t-1}] + e_t$ . \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

Controlling for serial correlation has a fairly large impact on the results. For the most part, it reduces the estimated electability of both the Republican and Democratic candidates. But the rank-order sorting of the Republican candidates is fairly similar to that found in the uncorrected runs. The electability scores from highest to lowest in this regression specification become: Jeb Bush (38.3%), Marco Rubio (37.4%), Ted Cruz (35.0%), Ben Carson (29.1%), Donald Trump (19.5%) and Rand Paul (11.7%).

We could not find statistically significant estimates for Carly Fiorina, Chris Christie, and John Kasich.

Table 8. Democratic Field Estimates, Corrected For Serial Correlation

<i>Candidate</i>	<i>Party</i>	<i>Alpha (α)</i>		<i>Electability Beta (β)</i>		<i>Rho (ρ)</i>	<i>N</i>	<i>R<sup>2</sup></i>
Hillary Clinton	DEM	-0.018		0.644	***	0.576	91	0.844

		(2.582)		(0.029)				
Martin O'Malley	DEM	0.000 (0.087)		0.179 (0.092)	*	0.975	91	0.041
Bernie Sanders	DEM	0.027 (2.125)		0.141 (0.062)	**	0.975	91	0.055

Notes: A Cochrane-Orcutt AR (1) regression is used to correct for serial correlation, which takes the OLS residuals  $\varepsilon_t$  and models them as a stationary first-order autoregressive structure where  $\varepsilon_t = \rho\varepsilon_{t-1} + e_t$ , to estimate the quasi-difference between variables such that  $[P(\text{Win General Election})_t - \rho * P(\text{Win General Election})_{t-1}] = \alpha(1 - \rho) + \beta * [P(\text{Win Nomination})_t - \rho * P(\text{Win Nomination})_{t-1}] + e_t$ . \* indicates significance at the 10% level, \*\* indicates significance at the 5% level, and \*\*\* indicates significance at the 1% level. All data span October 1, 2015 through December 31, 2015.

When controlling for serial correlation using Cochrane-Orcutt AR(1) regressions in the Democratic field, the most significant finding is that Bernie Sanders electability falls significantly to 14.1% from 80.3% in the OLS estimates. Hillary Clinton's score, meanwhile, falls only slightly to 64.4% from 65.7% and Martin O'Malley's score falls to 17.9% from 23.9% in the OLS estimates. The sharp uptrend in Sanders' odds of winning seems likely to have led to highly serially correlated errors in the first-pass runs.

It should be noted that, overall, Betfair prediction markets give Clinton a higher conditional probability of winning the general election contingent on her winning the Democratic contest compared to the conditional probabilities across the entire Republican field. This assessment may reflect the fact that the market currently expects that there is a high probability that the Republicans will nominate someone who is relatively unelectable to run against her in the general election, along with the widespread perception that the electoral college map favors Democrats, which likely plays a factor as well.

Hotelling (1929) observed that differentiation in competition between businesses and political candidates was similar. He postulated that just as there is often not much difference between the products of different competing companies, there is often not much difference between the platforms of elected candidates of different parties. Largely, this is hypothesized to



be a result of politicians and consumers seeking to capture the majority of voters and consumers. respectively.

This reasoning would suggest that the most electable candidates are the ones that hold the more moderate positions in each party, something which arguably fits our prediction market regression results finding that Chris Christie , Marco Rubio, Jeb Bush , and John Kasich are most electable among Republicans and that Hillary Clinton is most electable among Democrats.

Our results further support the rational choice theory conclusions of Downs (1957), which argues that in democracies, the aggregate distribution of political opinion forms a bell curve, with most voters possessing moderate opinions, which then in turn encourages candidates to adopt centrist positions to become elected.

#### **IV. Conclusion**

Prediction markets are arguably the best data resource available to measure the probability that a given candidate wins the nomination or the general election. In this paper, we show how the presence of both markets allows us to estimate electability.

We find that there is a very high level of variation in estimates of the electability of candidates in both parties, and that the point estimates are sensitive to whether or not we control for serial correlation in the residuals.

Our results indicate that candidates like Christie, Rubio, Bush and Kasich have the highest electability scores in the Republican field. We also find that when controlling for serial correlation, Hillary Clinton has the highest electability score in the Democratic field. The market has a very low assessment of the electability of several of the candidates, including Donald Trump, Rand Paul, Bernie Sanders and Ted Cruz.

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