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Who will win the Nobel Prize?

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Abstract

This paper identifies the determinants of the Nobel Prize Award. The analysis is analogous in spirit to Hamermesh and Schmidt (Econometrica, 2003) on the election of Econometric Society fellows. It is found that the number of citations, age and nationality have significant impacts on the odds of winning the Nobel. We provide the first statistical evidence that John Bates Clark medalists and individuals affiliated with the University of Chicago have a higher chance of winning the Prize.

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1. Introduction

The study of the economics profession has been of increasing interest since the 1990s. Garfield (1992) investigates the relationship between citations and the Nobel Prize. Van Dalen (1999) finds that the most important and creative contributions of the economics laureates are written between the ages of 29 and 38, which are slightly below that of laureates in physics but much younger than that of laureates in chemistry and medicine/biology. Coupé (2003) provides a list of top 100 economists worldwide. It is found that most of the top 100 are affiliated with Chicago, Harvard, MIT, Penn, Stanford, Berkeley and Northwestern. Only 14 are affiliated with non-US institutions. Hamermesh and Schmidt (2003) examine the determinants of election as fellow of the Econometric Society via a probit model.

In this paper, we estimate a logit model to identify the determinants of the Nobel Prize award. The logit model is used because of its mathematical convenience.[2] The analysis is analogous in spirit to Hamermesh and Schmidt (2003) on the election of Econometric Society fellows. Similar to the election of fellows of the Econometric Society, the selecting process of Nobel laureates is also a Hall-of-Fame voting. The Bank of Sweden Prize for Economic Sciences in Memory of Alfred Nobel was established in 1968 by the Bank of Sweden. The award is given based on the originality of the contribution, its practical importance, its ability to withstand scrutiny and criticism, as well as its impact on future scholarly publications (Lindbeck, 2001). As of 2007, sixty-one economists have received the Prize.

The distribution of nationalities of the laureates is uneven. Over two-third of the laureates are American, 25% are European economists. Only two Asian economists have been awarded the Prize. Such a distribution can be attributed to the fact that 74% of the doctorate recipients in Economics and Econometrics in the 1960s are U.S. citizens (Scott and Siegfried, 2002). The American dominance has lessened in recent years. In the year 2000, the percentage drops to about 42%. The distribution of affiliations of the laureates is also uneven. Table 1 shows the distribution of schools where the laureates obtained their most advanced degree and Table 2 lists the institutions where these laureates have spent most of their time. The University of Chicago has been a breeding ground for Nobel Prize winners. A large percentage of the laureates receive their PhD degrees from or spend most of their academic life at the University of Chicago. The paper is structured as follows: Section 2 describes the data and the methodology used. Section 3 predicts the future winners of the Nobel Prize. Section 4 is the conclusion.

[2] The main motivation for logit regression was that the logistic distribution function can be computed faster than the normal distribution function. With the advent of modern computers, this distinction has become less important.

Table 1: Universities where laureates received their highest degrees (1969-2003)

School	No. of laureates	%
Chicago	8	13.8%
MIT	6	10.3%
Harvard	5	8.6%
Columbia	4	6.9%
Oxford	3	5.2%
Oslo	2	3.4%
Leiden	2	3.4%
Leningrad	2	3.4%
Stockholm	2	3.4%
LSE	2	3.4%
John Hopkins	2	3.4%
UC Berkeley	2	3.4%
Princeton	2	3.4%
Cambridge	2	3.4%
Carnegie Mellon	2	3.4%
Yale	1	1.7%
Vienna	1	1.7%
Wisconsin	1	1.7%
Budapest	1	1.7%
Paris	1	1.7%
New School for Social Research	1	1.7%
Ecole Polytechnique	1	1.7%
UCLA	1	1.7%
Minnesota	1	1.7%
Cornell	1	1.7%
Nottingham	1	1.7%
Frankfurt	1	1.7%
Total	58	100%

Table 2: Schools where the laureates have spent most of their time at (1969-2003)

School	**No. of laureates**	**%**
Chicago	10	17.2%
MIT	6	10.3%
UC Berkeley	5	8.6%
Harvard	5	8.6%
Columbia	4	6.9%
UCSD	2	3.4%
Oslo	2	3.4%
Stockholm	2	3.4%
LSE	2	3.4%
Cambridge	2	3.4%
Oxford	2	3.4%
Stanford	2	3.4%
Yale	2	3.4%
Carnegie-Mellon	2	3.4%
University of Bielefeld	1	1.7%
Leningrad	1	1.7%
University of Arizona	1	1.7%
University of Washington	1	1.7%
UBC	1	1.7%
U Penn	1	1.7%
Princeton	1	1.7%
U of Jerusalem	1	1.7%
The Netherlands School of Economics	1	1.7%
University of Minnesota	1	1.7%
Total	58	100%

2. The Data and Model

Our sample is based on the 300 most commonly cited researchers in the field of Economists/Business from the ISI Highly Cited.com. Among these 300 individuals, non-economists and those who are deceased are removed from the sample. Nobel laureates and John Bates Clarke medalists[3] who are not included among the 300 are added to the list. The final sample contains 237 individuals. The variables of interest include the number of citations of the economists[4], their nationality, the school where they earn their PhD degrees, their current affiliation, age, gender and whether they have received the John Bates Clark Medal. The following logit regression model is estimated:

$$P = 1/(1+ \exp(-\mathbf{X'}\,ß)) , \qquad (1)$$

where

$$\mathbf{X'}\,ß = ß_0 + ß_1\,\text{CITATION} + ß_2\,\text{N500} + ß_3\,\text{N1000} + ß_4\,\text{GENDER} + ß_5\,\text{AGE} + ß_6\,\text{CHICAGO\_WORK} + ß_7\,\text{CHICAGO\_PHD} + ß_8\,\text{JBC} + ß_9\,\text{AMERICAN};$$

P is the probability that an individual is awarded the Nobel Prize;

CITATION: the number of citations of the individual between 1981 and 2004;[5]

N500 = 1 if the individual has a single paper with more than 500 citations, and = 0 otherwise;

N1000 = 1 if the individual has a single paper with more than 1000 citations, and = 0 otherwise;

GENDER = 1 if the individual is a female, and = 0 otherwise;

AGE: the current age of the non-winner or the age of the laureate at the time of the award;

CHICAGO_WORK = 1 if the individual works for the University of Chicago longer than any other schools, and = 0 otherwise;

CHICAGO_PHD = 1 if the individual is a PhD of the University of Chicago, and = 0 otherwise;

JBC = 1 if the individual has won the John Bates Clark Medal, and = 0 otherwise;[6]

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3 The John Bates Clark Medal Award was instituted in 1947 by the American Economic Association and is awarded every two years to a promising economist under the age of forty who has made a significant contribution to economic science.

[4] The number of citations can be obtained from http://www.isihighlycited.com.

[5] For coauthored papers, we divide the number of these citations equally among all the authors.

[6] The John Bates Clark Medal Award is only for young American economists, other important awards, such as the Erwin Plein Nemmers Prize in Economics awarded by Northwestern University, the Yrjö Jahnsson Prize awarded by the European Economic Association, the Royal Economics Society Prize, and the Frisch Medal Award given by the Econometric Society should also be considered. However, these

AMERICAN = 1 if the individual is an American, and = 0 otherwise.

Table 3: Estimation Results

	Coefficient (t-statistic)		
	Model 1	**Model 2**	**Model 3**
CONSTANT	-9.67	-9.61	-9.50
	(-6.37)	(-6.37)	(-6.42)
CITATION	9.32E-05	0.0001	0.0002
	(1.07)	(1.50)	(2.54)*
N500	0.48	0.50	
	(0.97)	(1.04)	
N1000	0.22		
	(0.36)		
GENDER	-34.38		
	(-7.65E-07)		
AGE	0.13	0.13	0.13
	(5.57)*	(5.54)*	(5.57)*
CHICAGO_WORK	0.79	0.92	0.84
	(1.28)	(1.55)	(1.43)
CHICAGO_PHD	0.51		
	(0.76)		
JBC	1.35	1.24	1.20
	(2.29)**	(2.18)**	(2.09)**
AMERICAN	-1.08	-1.03	-1.02
	(-2.44)*	(-2.38)**	(-2.37)**

** significant at the 5% level
* significant at the 1% level

The results are reported in Table 3. For the first model, both the variables GENDER and CHICAGO_PHD are insignificant, and they are dropped in Model 2. Since N500 and N1000 are highly correlated, we remove N1000 from the model. The result is more satisfactory in the second model. Since N500 is still not significant, it is dropped in the third model. Note from Model 3 that age and the number of citations are the most significant factors. The average age of the laureates upon receiving the award is 66.7. As it takes time for an economic theory to be scrutinized empirically, AGE should be

Prizes (established in 1994, 1993, 1988 and 1978 respectively) have a rather short history compared to the John Bates Clark Medal and the correlation between these awards and the Nobel Prize is subject to further observation. Thus, they are not included in our model.

positively related to the chance of being awarded the Prize. Our calculations show that the winning chance increases by 2.29% as AGE increases by one year, and by 2.85% for every 1000 additional citations.

Table 4: The relationship between awardees of the John Bates Clark Medal and the Nobel Prize

John Bates Clark Medal	Awardees	Nobel	Lag time (years)
1947	Paul Samuelson	1970	23
1949	Kenneth Boulding	Deceased	Deceased
1951	Milton Friedman	1976	25
1953	**Not Awarded**		
1955	James Tobin	1981	26
1957	Kenneth Arrow	1972	15
1959	Lawrence Klein	1980	21
1961	Robert Solow	1987	26
1963	Hendrik Houthakker		
1965	Zvi Griliches	Deceased	Deceased
1967	Gary Becker	1992	25
1969	Marc Nerlove		
1971	Dale Jorgenson		
1973	Franklin Fisher		
1975	Daniel McFadden	2000	25
1977	Martin Feldstein		
1979	Joseph Stiglitz	2001	22
1981	Michael Spence	2001	20
1983	James Heckman	2000	17
1985	Jerry Hausman		
1987	Sanford Grossman		
1989	David Kreps		
1991	Paul Krugman	2008	17
1993	Lawrence Summers		
1995	David Card		
1997	Kevin Murphy		
1999	Andrei Shleifer		
2001	Matthew Rabin		
2003	Steven Levitt		
2005	Daron Acemoglu		
2007	Susan Athey		
2009	Emmanuel Saez		

We observe a strong relationship between the awarding of the John Bates Clark Medal and the awarding of the Nobel Prize. Table 4 shows the awardees of the John Bates Clark Medal and the Nobel Prize. The correlation is obvious. From 1947-1991, 12 out of 22 medalists have already received the Nobel Prize. The average lag between receiving these two awards is 21.8 years. Our estimation result shows that John Bates Clark medalists are 19.57% more likely to win the Nobel Prize than non-medalists.

As our sample of highly cited economists consists mostly of American, the relative proportion of winning the Prize is smaller for American in our sample. Note that the coefficient of the gender variable is not significant. Thus far, all the Economics laureates are male. There is one female (Karen Lewis) among the top 100 in Coupé (2003). In our sample, there are only two female economists (Nancy Stokey and Barbara Spencer) and there is only one female recipient of the John Bates Clark Medal (Susan Athey)[7]. Under our model, Barbara Spencer and Nancy Stokey have a chance of 13.9% and 7.4% of winning the Nobel Prize respectively. Due to the lack of female laureates, we cannot conclude that gender is related to the odds of receiving the award. The University of Chicago is shown to be a breeding ground for Nobel laureates. As of 2008, 22 out of 62 recipients of the Prize are affiliated with this school. Under our model, economists who spend most of their career at the University of Chicago have an additional chance of 12.5% of winning the Nobel.

3. Prediction

To test the explanatory power of our model, we construct a prediction table with a cutoff probability of 0.5. Table 5 shows that among the 184 economists who have not yet been awarded the Nobel Prize, our model correctly predicts that 93% of them having a chance lower than 0.5 of winning the Prize. Among those who have been awarded the Prize (53 economists), 24 of them have a chance higher than 0.5 for being awarded the Prize.

Table 5: Prediction Evaluation (success cutoff C = 0.5)

	Estimated Equation		
	Dep=0	Dep=1	Total
P(Dep=1)<=C	172	29	201
P(Dep=1)>C	12	24	36
Total	184	53	237
Correct	172	24	196
% Correct	93	45	83
% Incorrect	7.1	54.7	17.7

[7] The asymmetry can be explained by the demographic profile of doctorate recipients reported in Scott and Siegfried (2002). In the 1960s, only 4.5% of the PhD recipients in Economics and Econometrics were women. There were only about 260 female PhD recipients in the whole decade. In the 1970s, the ratio increased to 8.7% and continued to increase over time. In 2000, the percentage of female PhD recipients was 26.9%.

The chance of winning the Nobel Prize can be computed by our model. For the 184 economists in the pool who have not yet been awarded with the Nobel Prize, 12 of them have a winning probability higher than 0.5. The winning probabilities of these 12 economists are reported in Table 6.

Table 6: Economists who have a high chance of winning the Nobel Prize

Name	**Winning Probability**
Hendrik Houthakker	0.94
William Baumol	0.86
Martin Feldstein**	0.85
Edmond Malinvaud	0.84
Eugene Fama**	0.84
Thomas Schelling*	**0.80**
Oliver Williamson	0.73
Dale Jorgenson**	0.71
Harold Demsetz**	0.69
Marc Nerlove	0.66
Fisher Franklin	0.59
Jerry Hausman	0.58

*Thomas Schelling was awarded the Nobel Prize in 2005.

**Martin Feldstein, Eugene Fama, Dale Jorgenson and Harold Demsetz are also listed in Thomson Nobel Prize predictions (http://scientific.thomsonreuters.com/nobel/nominees/#economics). Other economists in the Thomson's list include Lars Hansen, Thomas Sargent, Christopher Sims, Armen Alchian, Robert Barro, Kenneth French, Paul Romer, Richard Thaler, Jagdish Bhagwati, Avinash Dixit, Paul Krugman, Oliver Hart, Bengt Holmstrom, Oliver Williamson, Elhanan Helpman, Gene Grossman, Jean Tirole, Robert Wilson and Paul Milgrom.

4. Conclusion

In this paper, we estimate a logit model to identify the common features of Nobel laureates. Factors that are found to be significant include the number of citations, age, the nationality and the affiliation of an economist, and whether he/she has been awarded the John Bates Clark Medal. We provide statistical evidence that the Chicago school economists have a better chance of winning the Nobel Prize. We also identify a handful of economists who are likely to be awarded the Prize. As recent laureates received their PhD in the 1960s, American males will still dominate the award in the coming decade. However, with the increase in the number of female doctorate recipients, it is likely that there will be a first female laureate within 20 years.

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