Scaling in Japanese Elections for the House of Representatives

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Election is one of the most important processes of social group dynamics. During the last decades, elections are studied by not only political scientists but also statistical physicists. These studies by physicists are called ``Opinion Dynamics". Many mathematical models are suggested and many empirical investigations are carried out.

Many physicists have studied the distribution of the fraction of voters received by candidate as empirical investigations. These studies make it clear that these distributions follow power law in many countries such as Brazil[1][2], Indonesia[3], India[4] and Mexico[5].

There are two factors in obtaining votes. One factor is the influence of the party which candidates belong to. The other factor is the influence of the candidates. By comparing the number of votes of candidates in the same party, only the performance of candidates can be studied. This can be done in proportional elections with open lists. In this system, there are three variables: the number of votes v received by a candidate, the number Q of candidates presented by the party in the list and the total number N of votes received by the party list. Fortunato and Castellano [6] shows that vQ/N follows log-normal in many countries.

Japanese electoral system is the single non-transferable vote (SNTV) up to 1993. In SNTV system, each voter can cast one vote for one candidate and candidates race for multiple seats. SNTV can result in proportional representation if parties have accurate information about the supports of their voters, and nominate candidates in accordance with their supports. Therefore, in Japan, it can be predicted that vQ/N follows log-normal.

In this paper, we show that the data obtained from Japanese elections for the house of representative from 1946 to 1993 display statistical features of a scale-invariant phenomenon.

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