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On influence and compromise in two-tier voting systems. (English) [Zbl 1426.91095]


Summary: We examine two aspects of the mathematical basis for two-tier voting systems, such as that of the Council of the European Union. These aspects concern the use of square-root weights and the choice of quota.

Square-root weights originate in the Penrose square-root system, which assumes that votes are cast independently and uniformly at random, and is based around the concept of equality of influence of the voters across the Union. There are (at least) two distinct definitions of influence in current use in probability theory, namely, absolute and conditional influence. These are in agreement when the underlying random variables are independent, but not generally. We review their possible implications for two-tier voting systems, especially in the context of the so-called collective bias model. We show that the two square-root laws invoked by Penrose are unified through the use of conditional influence.

In an elaboration of the square-root system, W. Słomczyński and K. Życzkowski (Penrose voting system and optimal quota" , Acta Phys. Pol. B 37, No. 11, 3133-3143 (2004)] have proposed an exact value for the quota $q = q^*$ to be achieved in a successful vote of a two-tier system, and they have presented numerical and theoretical evidence in its support. We indicate some numerical and mathematical issues arising in the use of a Gaussian (or normal) approximation in this context, and we propose that other values of $q$ may be as good if not better than $q^*$. We discuss certain aspects of the relationship between theoreticians and politicians in the design of a two-tier voting system, and we reach the conclusion that the choice of quota in the square-root system is an issue for politicians informed by theory.

MSC:

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Keywords:
two-tier voting systems; square-root weights; choice of quota

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References:


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