

Swing voters, swing stocks, swing users

June 2 2020



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In group decision-making, swing voters are crucial...or so we've heard. Whether it's a presidential election, a Supreme Court vote, or a congressional decision —and especially in highly partisan environments, where the votes of the wings are almost guaranteed—the votes of the few individuals who seem to be in the middle could tip the scales.

However, the notion of a swing [voter](#) is limited because people don't always fall neatly onto one side or another. In many cases, the "middle" shifts over time; others may watch the swing voter to determine their own votes; or voters may make compromises, reflecting complex and overlapping networks of influence. To account for such complexity, the authors of a new paper published in the *Journal of the Royal Society Interface* develop a more general approach to identifying "pivotal components," which are akin to swing voters but applicable to a wide range of systems.

"We propose a generalizable approach for identifying pivotal components across a wide variety of systems," says author Edward Lee, who studies collective behavior at the Santa Fe Institute. "These systems go beyond voting, and include [social media](#) (like Twitter), biology (like the statistics of neurons), or finance (like fluctuations of the stock market)."

In the paper, Lee and his co-authors, Daniel Katz (Illinois Tech), Michael Bommarito (CodeX), and Paul Ginsparg (Cornell University) identify a statistical signature of pivotal components that they then trace to communities on Twitter, votes in the Supreme Court and Congress, and stock indices within financial markets. They find wide diversity in how [social systems](#) depend on sensitive points, when such points exist at all

For example, between 1994 and 2005, the US Supreme Court was generally dominated by patterns other than partisan politics, despite partisan votes like Bush v. Gore, which effectively decided the presidential election in 2000. In contrast, the New Jersey State Supreme Court from 2007-2010 was characterized by two pivotal voters. This variation reflects the role of institutional rules and norms.

"This concentration of power may correspond to weakness because

focused pressure, such as intense lobbying, might be used to control outcomes, a kind of tyrannical exploitation of democracy," says Lee. This finding presents the possibility of learning next how institutional mechanisms diffuse power away from swing voters or concentrate them in the hands of a few individuals.

The authors' new framework for identifying pivotal components could also be applied to a variety of other systems to identify individuals or swing coalitions, which consist of multiple components or voters that need to be changed simultaneously, even in opposing ways.

To develop their approach, the interdisciplinary team combined ideas from statistical physics, mathematics, political science, and finance. Their work could help identify prime candidates for changing outcomes, or lead to a better understanding of how institutional and environmental factors shape the emergence of social structure.

More information: Sensitivity of collective outcomes identifies pivotal components, *Journal of the Royal Society Interface*, [rsif.royalsocietypublishing.org1098/rsif.2019.0873](https://royalsocietypublishing.org/doi/10.1098/rsif.2019.0873)

Provided by Santa Fe Institute

Citation: Swing voters, swing stocks, swing users (2020, June 2) retrieved 3 October 2025 from <https://phys.org/news/2020-06-voters-stocks-users.html>

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