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Strength in numbers: how a mathematical tool can detect financial misreporting by charities

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Dr Canh Dang is an LSE Fellow in the Department of Economics at LSE. His current research focuses on the economics of nonprofit organisations, the effectiveness of aid, and the accuracy of financial data.

The charitable sector has been hurt by a series of scandals, and with often poor reporting, allegations of financial mismanagement can be hard to spot. A mathematical law already in use to spot electoral fraud could help bring potential issues to light, research by **Canh Dang** suggests.

Recent high-profile scandals related to the misuse of charitable funding and donations have highlighted the importance of financial transparency when it comes to the work of non-profit organisations. But with charity financial records often lacking clarity, it can be hard to identify potential instances of fraud or financial mismanagement.

Economist Dr Canh Dang has been exploring how a mathematical mechanism often used to spot election fraud can be utilised to flag irregularities in charities' financial reports. The instrument has been used to test for election fraud in Iran and data irregularities in scientific journals. Now, he is proposing that the tool - known as Benford's Law - is also used to detect financial misreporting by charities.

> In both Uganda and the UK, 25 per cent of charities were found to be potentially misreporting their financial accounts.

Dr Dang has been interested in the motivations behind prosocial and charitable behaviour since his time as an undergraduate student. However when the UK charity sector was hit by a **series of scandals** during the first year of his PhD in 2015/16, raising urgent questions around financial mismanagement and the ethics of some fundraising activities, he decided to explore the behaviour of charities and non-profit organisations.

This is something he has continued to investigate, now including how financial misreporting by charities can be detected and why charities are motivated to misreport. "Data on charities is often very limited and incomplete, as they are not subject to legal requirements to make their finances fully public, especially in developing countries" he explains.

Back to square one: identifying Benford's Law as a tool to highlight potential financial issues

In recent work, Dr Dang and colleagues studied the financial data for a large sample of charities based separately in the **UK** and **Uganda** for signs of financial irregularities.

To do this, they used the mathematical tool, Benford's Law. Also known as the first-digit law, this rule focuses on the first digit in a set of numbers and works on the observation that in naturally occurring data sets (such as population numbers, river lengths, house prices), the first number of that set will be one (as opposed to numbers two to nine) in around 30 per cent of cases. Findings show the first number will be two in around 17.6 per cent of cases. At the other end of the scale, the number nine will appear as the leading number less than five per cent of the time. Under Benford's Law, the leading digit is likely to be small, and all numbers do not have an equal chance of occurring first.

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The team used this principle to test whether or not the charities' financial data was genuine or manipulated, as people are rarely capable of engineering data that follows Benford's Law. Any financial information falling foul of Benford's Law was flagged as a potential case of misreporting, and something that needed further investigation. Dr Dang found that in both Uganda and the UK, 25 per cent of charities were potentially misreporting their financial accounts.

"These results were really striking as we have two very different countries with very similar levels of financial misreporting," says Dr Dang. "We decided to investigate this further to test whether it was just a coincidence. We found that in both cases the misreporting was primarily due to lack of funding and support from donors in helping charities with their bookkeeping activities." Significantly, the researchers didn't find any evidence of intention to misreport from the charities in their samples.

Catch 22: how to help identify potential misreporting without undermining confidence in the charity sector

With this in mind, the team are cautious on how Benford's Law should be used to regulate charities. They are mindful of walking the fine line between wanting to highlight potential misreporting, so these cases can be further investigated, without undermining confidence in the sector and the benefits of charitable work.

"Our method does not provide definitive evidence of frauds or wrongdoings. To establish this, a full investigation or auditing is still needed. We think of our method as a way to effectively flag up potential candidates for auditing at a very low cost. We want to emphasise that our findings are about misreporting, and this could be due to legitimate reasons," warns Dr Dang, who is calling on donors to do more to support charities.

"Donors could be more active in monitoring and regulating charities with stricter funding conditions that perhaps require more frequent and transparent reports about the charities' activities. Perhaps they could provide more training for the charities, regarding accounting services and bookkeeping techniques."

Going forwards, the team are in contact with the Charity Commission about how Benford's Law can be used to help identity charities for auditing and hope to collaborate with the Commission to improve accountability. "Being transparent is of the utmost importance for the survival of the charity sector in our world today," advises Dr Dang. ■

Dr Canh Dang was speaking to Charlotte Kelloway, Media Relations Manager at LSE.