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A characterisation of corruption risk in public procurement through social network analysis

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Corruption measurement is challenging due to the complex, latent, and shadow nature of this phenomenon. Recent approaches for its measurement rely on preventative approaches, and the most prominent literature in this field recognizes red flag indicators as very suitable tools for this purpose. These indicators detect situations at risk of corruption by signaling the presence of anomalies/inconsistencies with the aim of soliciting audits by control authorities. Red flags are often considered in public procurement, a sector particularly vulnerable to corruption, because of the economic interests at stake and the complexity of the several relationships being established in the networks of involved actors. In this work, we use data from the Italian database of public contracts, a massive dataset containing detailed information on every public procurement procedure managed in Italy. Using data about 800 thousand tenders published in 2013-2021, we compute a selection of the most relevant red flags for corruption risk in public procurement: single bidding, contract awarded with discretionary criteria, length of advertising and evaluation periods. At the same time, social network analysis indicators can be derived by considering contracting authorities and/or winning companies as nodes, with shared tenders as the edges connecting these nodes. In this context, we use classical centrality measures (such as degree, betweenness and closeness centrality) and more recent and innovative indicators (such as distinctiveness centrality and rotating leadership). This work allows us to characterize corruption risk in public procurement in terms of features of the networks involved in the public procurement process through statistical modeling, such as (multilevel) linear and logistic regression. Preliminary results show that some social network analysis metrics are more effective than others in predicting red flags and have an important impact in explaining their variability, suggesting that specific public procurement risks are associated with specific networks of issuers and winners.

Keywords

Corruption risk, red flag indicators, public procurement, social network analysis indicators

Topics

- Applications of network analysis in multidisciplinary fields

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