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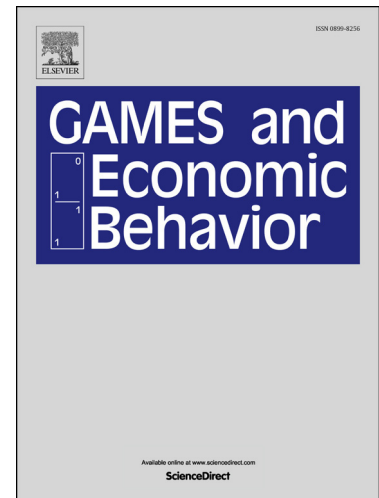
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Money as Minimal Complexity*

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Abstract

We consider mechanisms that provide the *opportunity* to exchange commodity i for commodity j , for certain ordered pairs ij . Given any connected graph G of opportunities, we show that there is a unique “ G -mechanism” that satisfies some natural conditions of “fairness” and “convenience”. Next we define time and price complexity for any G -mechanism as (respectively) the time required to exchange i for j , and the information needed to determine the exchange ratio (each for the worst pair ij). If the number of commodities exceeds three, there are precisely three minimally complex G -mechanisms, where G corresponds to the star, cycle and complete graphs. The star mechanism has a distinguished commodity – the money – that serves as the sole medium of exchange and mediates trade between decentralized markets for the other commodities. Furthermore, for *any* weighted sum of complexities, the star mechanism is the *unique* minimizer of the sum for large enough m .

Theorem 1 *JEL Classification:* C70, C72, C79, D44, D63, D82.

Keywords: exchange mechanism, minimal complexity, money.

*In honor of Lloyd Shapley. (The authors thank David Levine and two anonymous referees for suggestions that have improved the presentation.)

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