



Disrupting Bipartite Trading Networks: Matching for Revenue Maximization

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We model the role of an online platform disrupting a market with unit-demand buyers and unit-supply sellers. Each seller can transact with a subset of the buyers whom she already knows, as well as with any additional buyers to whom she is introduced by the platform. Given these constraints on trade, prices and transactions are induced by a competitive equilibrium. The platform's revenue is proportional to the total price of all trades between platform-introduced buyers and sellers.

In general, we show that the platform's revenue-maximization problem is computationally intractable. We provide structural results for revenue-optimal matchings and isolate special cases in which the platform can efficiently compute them. Furthermore, in a market where the maximum increase in social welfare that the platform can create is ΔW , we prove that the platform can attain revenue $\Omega(\Delta W / \log(\min\{n, m\}))$, where n and m are the numbers of buyers and sellers, respectively. When ΔW is large compared to welfare without the platform, this gives a polynomial-time algorithm that guarantees a logarithmic approximation of the optimal welfare as revenue. We also show that even when the platform optimizes for revenue, the social welfare is at least an $O(\log(\min\{n, m\}))$ -approximation to the optimal welfare. Finally, we prove significantly stronger bounds for revenue and social welfare in homogeneous-goods markets.

A full version of this paper can be found at <https://arxiv.org/abs/2406.07385>.

CCS Concepts: • **Theory of computation** → **Market equilibria; Network formation; Representations of games and their complexity.**

Additional Key Words and Phrases: Online Platforms, Competitive Equilibria, Bipartite Graphs, Revenue-Optimal Matchings

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