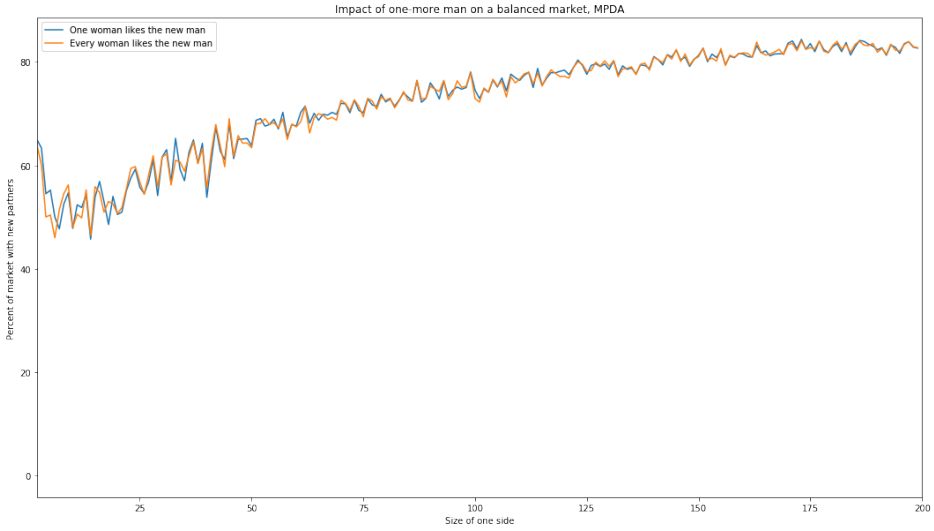
The Value of Competition: Simulations

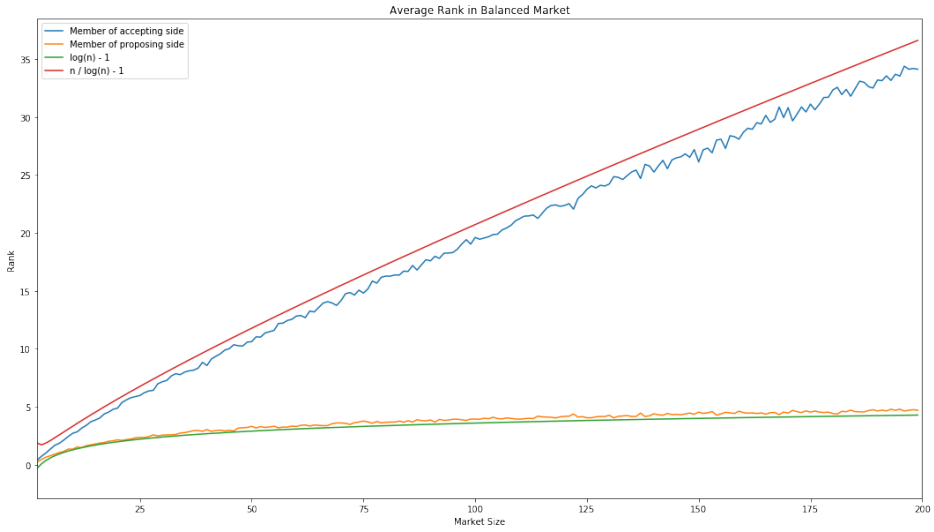
February 23, 2022

Introducing another member on the proposing side (a "man") into a balanced one-to-one matching market with uncorrelated preferences significantly changes the man-optimal stable match. It makes no difference if one person on the accepting side (a "woman") prefers the man to her own stable match or if all women prefer the man to their own stable match; the market shakes up if he is accepted by just one woman, and with equal probability the highest ranked woman on his preference ordering that accepts him is generally high on men's preference orderings, and also generally low. The man who is displaced then seeks a new match, who is preferred to the current match of the next woman on his preference ordering with some positive probability, and if he is accepted then a new man is displaced, and so on. The percentage of matches that are new (where a woman is matched to a new man after a man is added to the market) is depicted in the following figure.

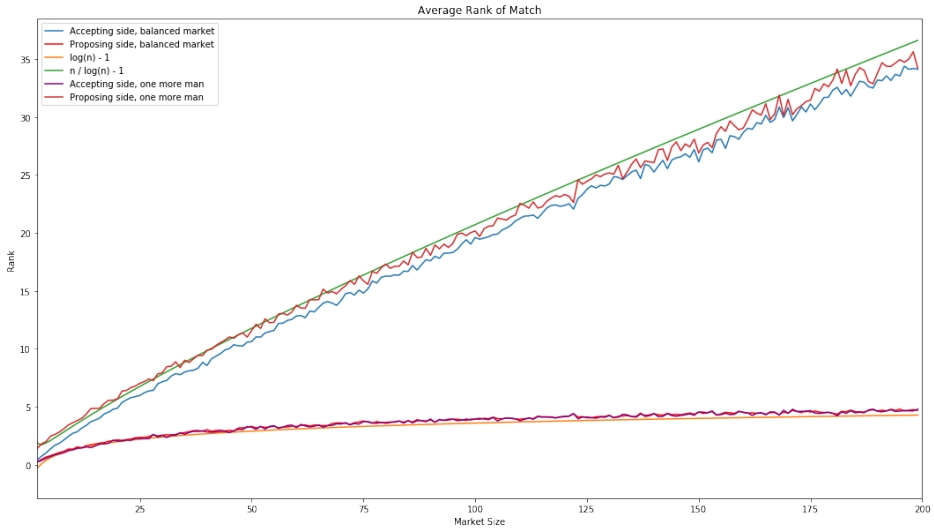


While the number of matches significantly changes, it is unclear how the quality of matches changes. Intuitively men suffer and women benefit from increased competition on the proposing side. But just how much?

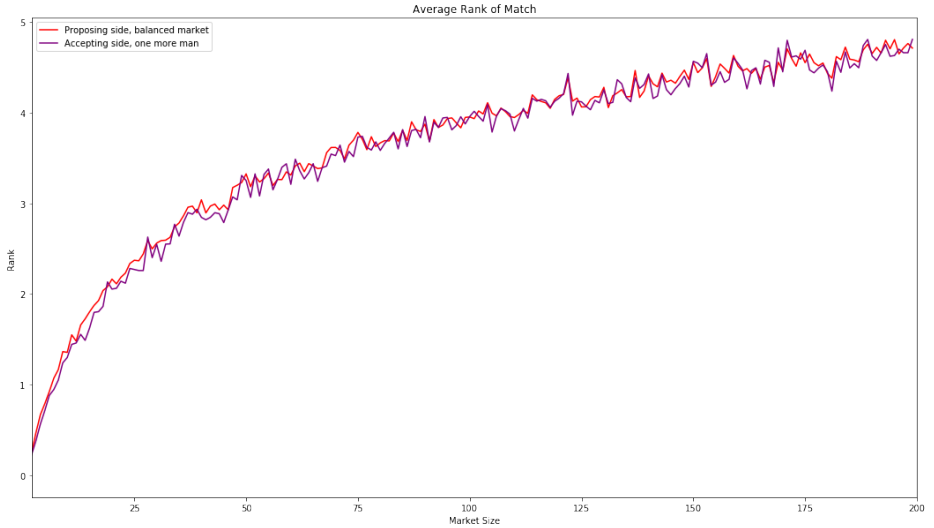
Define the person ranked highest for a given preference profile as being of rank "0", the second highest ranked person as rank "1", and so on. Each market member seeks to minimize the rank of their match. To see how introducing another man changes outcomes, we should first analyze outcomes in balanced markets without adding a man. From Pittel (1989a) in a balanced market of n men and n women, men's average matches approach woman $[log(n) - 1]$, and women's approach man $[\frac{n}{log(n)} - 1]$. Consider the following graph that shows the average rank of matched partners in a balanced market.



In a balanced market the difference in rank of match between the proposing side and the accepting side is $[log(n) - \frac{n}{log(n)}]$ on average; in a market with an extra member on the proposing side the difference is comparable (as described in Ashlagi et al. (2017)) but slightly different. Consider the following graph which now includes the average rank of a match for members on the proposing side and the accepting side in a market with one more proposer.



A set of sellers in a market of equal number sellers and buyers may have the following choice: recruit one more buyer or choose a matching mechanism which brings about a seller-optimal match. The results below—exclusively comparing the proposing side's outcomes in a balanced market and the accepting side's outcomes with one-more proposer—suggest that further analysis can be useful.



Lastly, I provide a visual that shows the difference between the men-optimal match and men-pessimal match in a balanced market, and the difference between the optimal match for the larger side and pessimal match for the larger side in a market with one more person added to it.