Market Thickness and Matching (In)efficiency: Evidence from a Quasi-Experiment

Do thicker markets deliver more efficient matching outcomes? Intuitively, they should. Size is critical to the survival and success of many matching markets. A larger number of participants on each side offers more opportunities for participants to meet and better chances that a match exists. In the recent rise of peer-to-peer marketplaces, platform owners have expended significant effort fueling growth. For instance, ride-sharing platforms, such as Uber, Lyft, and DiDi, spend billions of dollars a year on marketing campaigns and incentives towards drivers and passengers, whereas other marketplaces, such as the holiday rental platform HomeAway, expand through aggressive acquisitions.

A key difference between these peer-to-peer marketplaces and many traditional two-sided markets (such as the credit card market, the newspaper, and the mobile phone network) is the existence of a high degree of heterogeneity—among market participants, and among the goods or services they offer or desire. In such markets, search is essential to finding the right match. However, a market with heterogeneity is vulnerable to various forms of search frictions. Heterogeneity also increases as the market grows, as does search friction. The presence of abundant options makes it more likely a potential match exists, but it can be more difficult to find.

More often than not, a need for matching comes with a time constraint. Some matching markets have implicit deadlines, such as most labor markets, marriage markets, and organ transplants. Others have more explicit deadlines. For example, a traveler needs to find an accommodation before the intended day of travel. A household needs to find a cleaning service before holding a party. A student needs to find a seat before the school year starts. With limited time to complete a match, the impact of search frictions becomes even more prominent.

It is therefore unclear whether thicker markets will necessarily lead to more efficient outcomes, especially in matching markets with heterogeneity and time constraints.

Existing theoretical literature typically assumes matching markets exhibit increasing returns to scale or constant returns to scale. Empirically, the majority of studies, almost all in labor markets, find evidence consistent with constant returns to scale. However, Petrongolo and Pissarides (2001, p.409) referred to these findings as “tentative,” as most studies rely on aggregate time-series or cross-sectional observations, and “no study conducts a careful test of increasing returns to scale by testing, for example, whether the matching rate improves when the total number of participants increases.”

This paper does exactly that. It studies the effect of market thickness on matching efficiency, exploiting an exogenous shock to market size. The fact that in our data some markets are impacted while others are not gives rise to a quasi-experimental design that allows us to make causal inferences. In particular, we use data from a leading peer-to-peer online holiday rental marketplace operating in Australia, with over 40,000 listings located in 3200 areas and 77 regions. These data offer several advantages for studying the research question at hand. They
cover a large number of relatively isolated markets, which allows us to associate market characteristics, especially market thickness, with matching outcomes. They include information on inquiries and bookings for individual travelers, which allows us to study the property of the matching function at a micro level. Last and most important, the company’s business strategy offered us a unique opportunity to exploit an exogenous shock to market size, due to migrations of listings from two previously acquired platforms expanding some of the markets significantly over a very short period of time.

The context also offers several appealing features that ensure the validity of our identification strategy: (1) all new listings migrated without selections either by the platform manager or by listing owners; (2) the timing of the event was idiosyncratic in nature---it was not publicly announced nor anticipated by market participants; and (3) careful examinations of both control and treatment groups demonstrate parallel trends before the event took place.

Unlike previous literature, we do not find evidence of increasing or constant returns to scale. Rather, we find evidence of diminishing returns to scale. With the size of the marketplace under study, further increases in the number of market participants lead to lower matching efficiency. Specifically, keeping search technology and other factors constant, when market size doubles, traveler confirmation rate goes down by 15.4% and host occupancy rate goes down by 15.9%. In total, the platform lost 5.6% of potential matches on each day due to the increased market size.

What drives the difference between our findings and those in prior research? Is it caused by differences in context? Or data disaggregation? Or identification strategy? To investigate this question, we conduct additional analyses at the market level exploiting cross-sectional variations alone, as in previous studies, but not the exogenous shock. Without the use of the exogenous shock, we find constant returns to scale as previous studies do. But when using the exogenous shock as an instrument to market size, we again find decreasing returns to scale at market level. In other words, the difference in our results is most likely driven by a better identification strategy, rather than a unique setting or simply using disaggregated data.

The decrease in matching efficiency can be attributed to increasing search frictions in markets with more participants. We find that when market size doubles, the number of inquiries sent by travelers increases by 18.3% and the number of inquiries received by hosts increases by 19.6% keeping search technology and other factors constant. The travelers also end up paying higher transaction prices and hosts end up receiving lower revenues. The impact of search friction becomes more severe when the deadline for matching is more imminent. When there is plenty of time left, an increase in search intensity does not lead to a lower matching probability. However, when the deadline is close in time, increasing search intensity leads to lower matching rates and higher transaction prices.

Our findings offer several implications for future research in matching. It emphasizes the need for more carefully done empirical research to look into the causal effect of market thickness on matching efficiency as well as careful evaluations of the properties of the matching functions used in modeling. They also highlight the need for theorizing the sources of market frictions, especially how deadlines affect matching efficiency.
Our findings also offer practical implications for rising peer-to-peer marketplaces. While many marketplace operators attempt to expand their platforms through aggressive marketing campaigns or acquisitions, it may not be an effective strategy if not accompanied by better search. As a market grows, search friction also becomes more prominent. Those once thick markets could become thin due to such frictions. It is therefore crucial for platform operators to invest in technologies such as search engines, recommendation systems, feedback and reputation systems while expanding in size. Sometimes, less obvious choices such as limiting the number of options may achieve better outcomes. Moreover, it is especially important to facilitate efficient search processes when the need for matching is more imminent.