Measuring How University Students Form and Value Instagram Connections

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Abstract

The value that an individual gets from a social network is driven by who they are connected to on that network, and how much they value different types of connections. Therefore, understanding who individuals are connected to and how they value those connections is essential to platform launch strategy, pricing, and ultimately, policy. To better understand this heterogeneity, we conducted a study of 316 Instagram users at a US University. Study participants shared their main Instagram accounts' list of connections and indicated their relative and absolute valuations for a selection of connections and the platform as a whole. Approximately one-third of participants were then paid to disconnect from the platform or particular connections for a full semester, based on their stated valuations. We focus here on three sets of results. First, we find the network formed by study participants on Instagram displays strong homophily by academic cohort and race, but not on other dimensions, such as political views or value from the platform. Second, we show that connections from study participants to third parties were more highly valued when those connections were of high degree – i.e. were more strongly connected to other lab study participants. Finally, subjects' reported minimum costs for blocking randomly selected sets of contacts suggests that there are increasing returns to connections on Instagram. Each of these findings has implications for monetization strategy on Instagram and other similar platforms.

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1 Background

The theory of multi-sided platforms was formalized and popularized in seminal papers by Rochet and Tirole in 2003 [Rochet and Tirole, 2003] and Parker and Van Alstyne in 2005 [Parker and Van Alstyne, 2005]. Since then, there has been an explosion of empirical work on measuring network effects on platforms using natural and field experiments. For example, Tucker (2008) [Tucker, 2008] uses an exogenous shock to video messaging platform adoption in an organization to quantify network effects. Boudreau (2021) conducts a field experiment on a new platform where he exogenously varies the size of future expected installed user base that is displayed to a potential adopter, finding people prefer to use platforms that are anticipated to be popular [Boudreau, 2021].

Our study contributes to this literature by empirically measuring the monetary value of network effects on a major social media platform (Instagram) and digging deeper into heterogeneity in valuations across different user groups, by conducting incentive-compatible choice experiments in a university setting. While in some cases it may be straightforward to estimate a network effect, especially when collaborating with a platform, often platforms are uninterested in external studies of their most fraught aspects. We provide a method to perform these measurements through online surveys without directly collaborating with the platforms, hence offering a scalable tool for market researchers, policymakers and regulators. Why is understanding the nature of these network effects so important? Previous empirical [Sundararajan, 2008] and theoretical [Benzell and Collis, 2020] shows that platforms fail to take off when they do not consider heterogeneity in network effects across different user groups.

2 Experiment

We conducted an experiment with undergraduate students at a university in the US during the academic year 2022-23. We selected Instagram as the platform for this study because it is the most widely used social media platform among this population. Subjects were recruited to take part in the experiment during Fall 2022. They are required to have an Instagram account. We ask them to connect with our research Instagram account to take part in the study. At the end of Fall 2022 and the beginning of Spring 2023 (before the semester started), we conducted the main survey. Subjects were required to share the full list of their contacts from their primary Instagram account. We solicited incentive-compatible valuations for either completely deactivating Instagram for the entire Spring semester or blocking a random subset of their connections on Instagram for the entire Spring semester (January 30th, 2023 to May 20th, 2023). Valuations are obtained through the Becker–DeGroot–Marschak (BDM) method and are therefore incentive compatible. We randomly select subjects and randomly select one of their valuations and draw a random number from a distribution. If their valuation is

less than the number we draw, they get the number we draw as cash reward if and only if they follow up with their choice (for e.g. if someone agrees to block 5 of their follower connections for $10 and we draw $15 as the random number, then they get paid $15 at the end of the Spring semester if and only if they blocked those connections for the entire semester). We monitor subjects' compliance with their choices by periodically checking their Instagram accounts. In addition to these valuations, we also solicit information about their demographics, cohort, academic performance, additional Instagram accounts ("Finstas"), membership in on-campus organizations and fraternities/ sororities. Finally, we also solicit information about their three closest contacts on the platform, and for their relative valuations of their 10 randomly selected followers and followings. Of the 316 study participants, 119 were made follow up offers. Of these 80 remained in compliance with the restrictions for the entire semester and were made compliance payments averaging $87.17. Before and after incentive compatability offers were made, we conducted additional brief surveys on users' mental health and attitudes toward Instagram.

3 Results

The data collected in this study contain many interesting patterns. For the sake of brevity, we focus on three here.

3.1 Homophily on the University Student Instagram Network

Figures 1 and 2 are representations of the social network of our study participants. The complete graph of the social network ascertained, including individuals who did not participate in the study, but followed or were followed by a study participant has 250,026 nodes, and 571,971 edges. The graphs in this paper only display as nodes study participants, so only 283 nodes (less singletons) and 448 edges are displayed.[1]

Figure 1 shows that our study participants showed strong homophily along the dimensions of class (i.e. student cohort). The youngest class - set to graduate in 2026 - is clearly separated from the other classes, with the sophmores located between the freshmen and upperclassmen. The right figure splits study participants by self-reported race. There is a less clear, but still detectable delineation between a clusters of participants reporting their race as 'Asian/Pacific Islander' and 'White' which cuts across the class-based clustering visualized in the left panel.

Study participants did not display homophily on all dimensions. Two dimensions where this is the case for are displayed in figure 2: self-reported political orientation and how much they requested to

[1]This total is less than the 316 participants due to some study participants not providing full information.

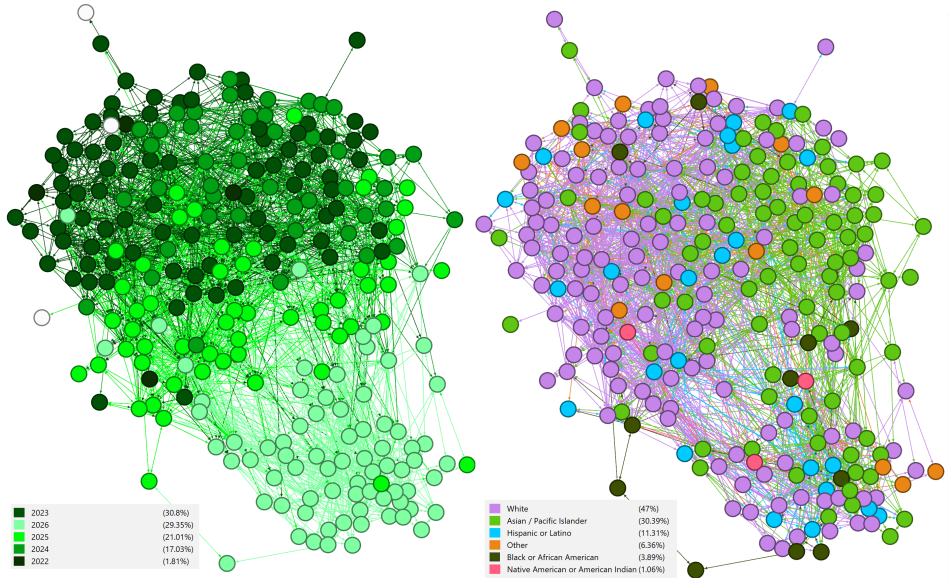


Figure 1: Two visualizations of the graph of the University students' connections on Instagram. Nodes in the directed graph represent University students. Edges represent a follower or following relationship on Instagram between their primary accounts. Nodes in the left figure are colored by the graduating class of the students. Nodes in the right figure are colored by the self-reported ethnicity of the students. Edges are colored by the color of the originating (following) node.

be paid to deactivate Instagram for a semester.

3.2 The Role of Network Structure in Connection Value

One of our study questions asks participants to rank 10 randomly selected contacts by their importance to the participants' value from the platform. These rankings are done twice: on a list of randomly selected followers (i.e. people who follow the participant) and followings (i.e. people followed by the participant).[2]

Table 1 reports the result of an OLS regression of this ranking on the log of the degree of the contact in the observed network. It finds that, for followers who were not part of the study, a doubling of the number of contacts would increase their rank (out of 10) by .391, in other words – increasing their ranking percentile by 3.9%. Similarly, but more weakly, people followed by the study participant who were of higher degree were also more valued as connections. [3]

3.3 Non-linear Marginal Friend Value

Most models of network effects imagine these network effects to be linear in the number of connections. A constant value for additional edges is the assumption that underlies Metcalfe's Law: the calculation

[2]If a contact was both a follower and a following, they could appear in either random list.

[3]In these regressions we control also for the follower/following being a study participant themselves. There were only 38 observations like this, and the coeficients associeted with it in the regression are large and imprecise.

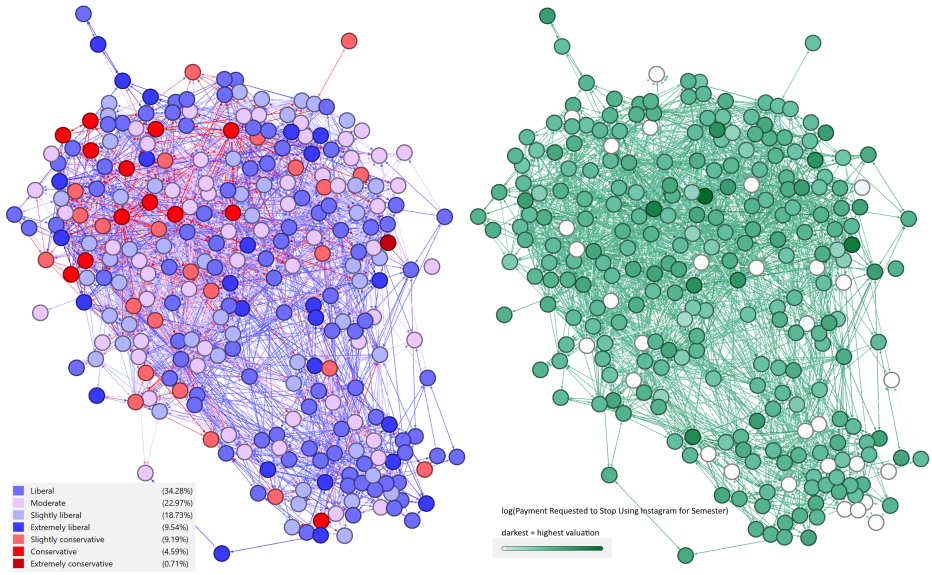
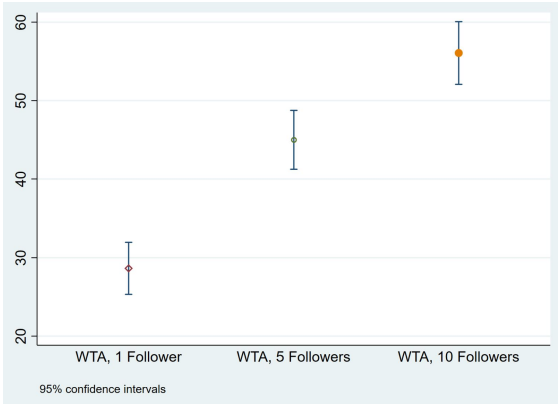


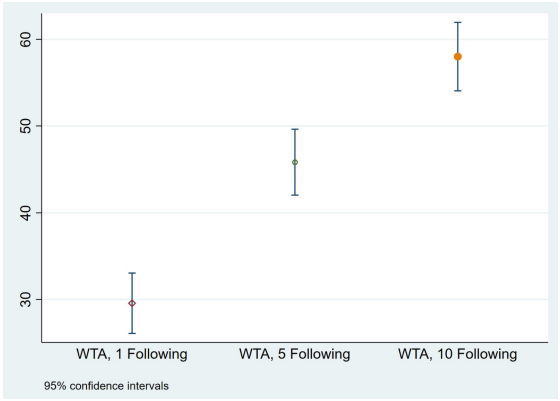
Figure 2: Two visualizations of the graph of University students' connections on Instagram. Nodes in the directed graph represent University students. Edges represent a follower or following relationship on Instagram between their primary accounts. Nodes in the left figure are colored by self-reported political orientation. Nodes in the right figure are colored by the logarithm of student's required payment for deactivating the Instagram for the Spring 2023 semester. Edges are colored by the color of the originating (following) node.

	(1) Follower Value Ranking	(2) Following Value Ranking
log(Follower Degree)	-0.391***	
	(-8.75)	
Follower is Study Participant	-10.086	
	(-1.17)	
Study Participant*log(Degree)	1.556	
	(1.36)	
log(Following Degree)		-0.105*
		(-2.33)
Following is Study Participant		1.291
		(0.24)
Study Participant*log(Degree)		-0.121
		(-0.17)
_cons	5.943***	5.657***
	(77.01)	(65.44)
N	2609	2600

Table 1: Study participants were asked to rank 10 randomly selected followers and followings by their importance to the study particiant's value from the platform.



(a) Followers



(b) Following

Figure 3: Average and 95% confidence intervals of study participants' miniumum required payments (i.e. WTA or Willingness to Accept) to block 1, 5, or 10 randomly selected Instagram contacts. In the left panel, the random names selected were followers of the study participant. In the right panel, the random names selected were followings of the study participant.

that the total value of a platform grows with the square of the number of users.

Here we present novel evidence that, at least on the dimensions considered, that there are increasing returns to connections, at least on Instagram. Figure 3 displays point estimates and 95% confidence intervals for the average amount requested to block 1, 5, and 10 followers (left) or following (right). As can be seen, the valuation of a disconnection on a per-friend basis is decreasing in the number of connections. In other words, the first friend disconnected is more painful than the 5th friend disconnected, which is more painful than the 10th. This result cannot be wholely related to the endowment effect, as the decreasing value of a marginal friend continues from the 5th to 10th connection.

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