

Measuring the value of network effects from digital platforms

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There is a growing interest in estimating the contribution of the digital economy to overall human activity. Academics, National Statistical Offices (NSOs), and multilateral organizations are engaged in numerous efforts to develop a framework for compilation of a comprehensive Digital Economy Satellite Accounts. These efforts include the valuation of free digital services, measurement of the contribution of platforms to national output, and improving the measurement of intangible assets.

Many of the services offered by the digital economy rely on network effects in the process of service provision. For instance, social networking sites such as Tiktok and Instagram are dependent on having a large user base in order for them to be entertaining to users. One can argue that the value of instant messaging apps like WhatsApp and Telegram relies on the user's contacts also using the same app. This speaks of the profound role networks have on the digital economy.

While the literature in this area is aware that networks play a critical role in creating value in the digital economy, to the best of our knowledge, none have focused on quantifying these network effects and measuring the degree of which networks contribute to the value of the platforms. In this paper, we intend to measure the impact of networks to value derived by households from the consumption of free digital services. We would conduct an online panel survey, which intends to elicit the respondents' individual valuation of certain digital services (Facebook, Instagram, and Whatsapp). The survey would be similar to other studies aimed at measuring the value of free digital services, such as those by Corrigan et al. (2018), Brynjolfsson et al. (2019b), Brynjolfsson et al. (2019a), Nguyen and Coyle (2020), and Jamison and Wang (2021). The key difference between this study and previous research is that we also intend to measure how much an individual's network size affect their valuation. We would achieve this by asking respondents about the size of their network (number of "friends", "followers", and frequent contacts) and measuring the marginal effect of an additional user to the respondents valuation of the digital platform. The survey would have three rounds. The first round would be in April 2023. The second in July 2023. The third would in October 2023. We intend to analyze the result for first and second round of the survey for this conference paper. Since we are conducting a panel survey, we would be able to control for time-invariant confounders by employing either a fixed effect or a first difference estimator.

Schreyer (2021) was the first paper to point out the importance of networks in the valuation of free digital products. In an analytic framework, he describes free digital services as a product of own-account production by households, wherein individuals employ time and

capital to generate leisure services. In his framework, he argues that changes in the network size of a platform user constitutes an exogenous quality change for the digital service provided by the platform. He demonstrates in a series of simulation that the contribution of free digital products to total output varies substantially with the parameter value for network effects.

Belleflamme and Peitz (2021) argues that network effects create value and the goal of businesses that own and operate these platforms is to capture at least part of that value. Platforms can either charge the users themselves for the service or they can charge a another group of individuals and businesses in order to monetize the value created by the network.

This paper would extend three strands of literature. The Schreyer (2021) framework describes network effects as a source of “quality change” for platforms. The System of National Accounts recommends that quality change should be treated as changes in volume. In his framework, Schreyer (2021) characterize network effects as an exogenous parameter with arbitrary values. “We have found no good empirical handle to assess the size of these network effects as their cost elasticity is unknown,” the paper writes. This paper would extend the measurement literature by providing an empirical measure of these network effects that plays an essential role in understanding the contribution of free digital services to overall human activity. As mentioned in the Schreyer (2021) paper, network effects are critical for capturing some volume growth in the digital economy.

This paper also extends the literature on the impact of platforms. While there have been numerous studies on the role of network effects on value creation, most of these studies are theoretical papers (see Belleflamme and Peitz (2018), von Briel and Davidsson (2019), and Li et al. (2010)). Empirical works in this area are mainly focused on value derived by businesses from network effects (see Vakeel et al. (2020) and Bai et al. (2021)). This paper would extend the platform literature by examining the degree of which networks have an impact to users. To the best of our knowledge, no study has been written on how networks affect consumer valuation of digital service providers.

Lastly, the paper would extend the literature on the measurement of intangible assets and data. The platform literature characterizes networks as an important element in value 3 creation. If so, from a measurement perspective, one can think of networks as inputs to production of services offered by platforms. For apps such as Facebook and Youtube, it is the information from the network that improves the quality of these platforms. If information is stored for more than a year and these information still contributes to the service provision of the platform, then we can characterize this information as a form of intangible asset. Once we are able to measure the value contributed by the inclusion of an additional user to the network,

we can use this information to estimate the aggregate value of these networks and account them as intangible assets.

In the next section, we discuss the methodology for estimating the marginal contribution of networks to a user's valuation of free digital platforms. We then discuss the timely for study. Lastly, we discuss some application for the estimates.