The Impact of Social Connections on Credit Scoring

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Abstract

Motivated by the growing popularity of social data use in credit scoring industry, this study aims to understand the impact of using network data on credit scores and access to financing. We build a model to assess the accuracy of credit scores obtained from individualized data vs. data from an individual’s network. Next we investigate how the accuracy of these scores is influenced if individuals can modify and form their social networks to attain higher credit scores. We find that if individuals are motivated to improve their financial scores, they may form smaller social circles. The impact of this on the accuracy of consumer credit scores, however, is ambiguous. Credit scores can become more accurate in the long term as a result of the modifications in social networks, but this accuracy may come at the cost of more fragmented social relationships.

Keywords: Networks, credit score, credit financing

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Extended Abstract

In many countries, financial institutions keep tabs on consumers’ past borrowing and repayment history. Such information is evoked in future financing occasions (e.g., when a consumer applies for credit, attempts to re-finance a loan, or needs housing) when credit bureaus provide underwriting institutions information about the applicant’s financial background in the form of a credit score. The score can, in turn, influence both the lender’s decision to institute a credit and the terms of the credit. In general, consumers with high scores are more likely to obtain credit, and may obtain it with better terms. A low score, on the other hand, may limit one’s access to financing. Given that people use credit for a range of undertakings that affect social and financial mobility, such as purchasing a house, starting a business, or obtaining higher education, credit scores have a considerable impact on the access to opportunities and hence social inequality among citizens in a society.

Until recently, to assess one’s credit worthiness, credit bureaus relied solely on the financial history of an agent. The financial credit score popularized by Fair, Isaac and Corporation (FICO, in short), for example, relies heavily on three key data to determine access to credit: consumers’ debt level, length of credit history, and regular and on-time payments. The score has become so important that it ‘solely determines annual percentage rate (APR), grace period, and other contractual obligations of a loan’ (Wall Street Journal (WSJ from here on) 2014). Within the past few years, however, the credit scoring industry has been subject to a dramatic change in data sources. In order to assess a consumer’s credit worthiness, an increasing number of firms today rely on network-based data and measures, including the number of followers, background of peers, education and employers, and repayment history of friends (WSJ 2014).

Take, for example, Lenddo, a lending start-up part of “a growing group of entrepreneurs who believe online reputations can tell lenders more about a person’s trustworthiness than the FICO score” (WSJ 2014). The company is reported to assign credit scores based on the information in users’ social networking profiles such as education and career data, who they are friends with, the information available about friends, and how many followers they have. Moreover, the company uses social networks to create peer pressure on individuals to repay loans. If a user defaults on a loan, for example, Lenddo maintains the right to notify her friends, who in turn have an incentive to put pressure on the individual to repay, because their Lenddo scores would be negatively impacted if they didn’t.

Similar to Lenddo, a growing number of new start-ups specialize in using data from social networks. Such firms claim that their social network-based credit scoring and financing practices broaden opportunities for a larger slice of the population and may benefit low-income individuals who would otherwise find it hard to obtain credit. Our study is motivated by the growing success of such credit scoring practices and investigates whether a move to network-based credit scoring affects financing equality. In particular,
we are interested in addressing the following questions. First, from the perspective of lenders, is there an advantage to using network-based measures rather than measures based on an individual’s data? Second, as the use of social network data becomes common practice in financing, how may consumers’ (endogenous) network formation influence the accuracy of credit scores? How may it influence individuals’ access to financing and the inequality in providing access to economic opportunities among members of society? Third, how does the mechanism for peer pressure work in network based credit scoring? Lastly, and more importantly, how do these scores influence inequality in access to financing?

Access to financing, in this study, is assumed to correlate with one’s credit score. By inequality, we embrace a definition suggested by Demirguc-Kunt and Levine (2009), and assume that credit scores can influence access to financing on both the extensive and intensive margins. First, on the extensive margin, reducing inequality for financing access may happen via increasing the number of individuals who are considered eligible for financing. Second, on the intensive margin, network-based measures may allow access to credit at better terms, even for those who have access to it. Although the extensive and intensive margin may improve with network-based financing, it may fall disproportionately on different members of society. It is important, therefore, to study the impact of this new system on individuals who would obtain low and high credit scores based on personal financial history separately.

We develop a model where a credit scoring firm receives signals from a network of individuals and updates beliefs about the trustworthiness of the individuals conditional on the network data. We find that, perhaps confirming the growing trend, using network-based measures provides a more accurate assessment of an individuals’ credit worthiness. Our explanation for the popularity of network-based measures lies at the core of information acquisition: with exogenous networks, network-based data provide more information points about the individual, therefore reducing the uncertainty on the assessment of his credit score. This simple explanation of reduced uncertainty via more data points justifies the use of network-based measures in industry. Moreover, we find that accuracy of network-based scores is mostly dependent on gathering information from the first-order relationships of a borrower’s network. This implies that credit-scoring firms can assess an individual’s credit worthiness relatively efficiently using data from a relatively smaller subset of the overall network.

We extend our model to allow agents in a network to form and modify social networks to improve their credit scores. We do so because the ability of individuals to react to network-based scoring may affect the accuracy of credit scores. For example, if agents could choose their network to improve their access to financing, they might choose to drop friends with lower scores. In other words, use of network-based scores may motivate individuals to form relationships (or, may motivate them to report select network information to credit institutions) to improve financing outcomes. This move could result in social fragmentation within a network: individuals with better access to financing opportunities might choose to segregate themselves from individuals with worse financing opportunities. As a result, individuals will
self-select into highly homogeneous yet tighter sub-networks, but the impact of such social fragmentation on credit scoring accuracy remains ambiguous. On the one hand, network-based credit scores may become more accurate as each agent will be located in a homogeneous network. On the other hand, scores may become less accurate because smaller sub-networks provide fewer data points on each person. We find that conditional on the importance of financial scores relative to social relationships, both improvement and decline of credit score accuracy may be possible. When accuracy declines, use of network-based measures could put individuals with low financing opportunities in further hardship.

To investigate how social pressure works to motivate low credit score individuals, we further extend our model to allow borrowers to exert effort to improve their financial standing and ask: Are low score individuals motivated to improve their credit score via the social pressure of other low score individuals (intra-group connections) or high score individuals (between-group connections)? Using social networks in credit scoring allows social pressure to motivate low-score individuals to exert effort to improve their standing. This possibility may, in small part, explain the claims made by network-based credit scoring firms about why their systems are effective. Lenddo, for example, suggests that it helps low-income individuals because upon joining their network, individuals are motivated to pay more effort to improve their financials. Turns out, both intra-group and between-group connectivity play an important role in motivating a low-score individual to improve his credit standing, but connections to high score individuals have a more direct and significant role.

Our study links to a rich literature on social networks in marketing, economics, and sociology. Social networks have been at the heart of a vast variety of real life phenomena from labor market outcomes (Myers and Shultz (1991); Montgomery (1992); Calvó-Armengol and Zenou (2005); Ioannides and Soetevent (2006)), education (Calvó-Armengol and Zenou (2005)), finance (Allen and Babus (2009), Acemoglu et al. (2013)) to microfinance (Feigenberg et al. (2010), Banerjee et al. (2013)). Given this rich interest, the idea that there is a positive correlation between social interactions and individuals' financial outcomes (Feigenberg et al. (2010)) is not new. In fact, many who study networks of institutions and humans emphasize the value of this exercise.

Perhaps the most relevant stream of research to our study is the one that is studying risk sharing in human networks (Townsend (1994), Ambrus et al. (2010), Bramoullé and Kranton (2007), Bramoullé and Kranton (2007)). Studies on social collateral in human networks find that risk sharing within a network is incomplete, that is, for most individuals financial transactions are contained within their immediate network, such as families and neighbors, but less observed across individuals from non-immediate networks. Using field experiments, Feigenberg et al. (2010) gathered evidence to understand what formation of closer links implies for individuals' financial outcomes. They find that closer social ties had significant implications for economic returns, including a lower likelihood of loan default and increased financial transfers from others outside of one's immediate social circle. Our model predictions are in line with
these observations. We expect that agents with closer in-group ties exert high effort to improve their own credit scores.

Another important finding from human networks and social collateral is the possibility of exclusion for individuals who deviate from the norms of the network (Allen and Babus, 2009; Ambrus et al., 2010). We introduce the possibility of discrimination against low-credit individuals. There are two ways through which such discrimination can come about. First, the initial formation of relationships can be subject to discrimination. As individuals’ awareness of the relationship between social networks and financing access increases, they will be more selective in forming relationships, and may prefer to form relationships with higher-credit individuals to protect their credit score. Formation of networks in order to attain a high credit score can be an indirect way of discrimination because some individuals are systematically excluded from others’ networks. Second, individuals may observe each other’s effort to improve score and discriminate based on personal effort. Any low-score individual who deviates from exerting effort may face discrimination by others who do not. If he cannot meet his network’s expectations to improve his score, rationally, some of his contacts may want to disassociate their credit score from his score.

Finally, the studies focusing on the impact of new technologies on society can be considered as relevant to our paper. Focusing on the impact of new technologies, Rosenblat and Mobius (2004) find that reduction in communication costs allows the level of separation between individuals to reduce, whereas between group separation among sub-networks of the society increases. van Alstyne and Brynjolfsson (2005) investigate the impact of internet on collective knowledge and find that technology can lead to segregation among individuals who have access to it. Unlike these former studies, in this study, without making any assumptions about costs we show that a relatively new technology such as network-based credit scoring may also bring individuals closer while increasing group segregation.

References


