



Moneychangers and the Local Credit Market in Late Renaissance Florence. A Social Network Analysis

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1 INTRODUCTION

In late medieval and early modern Europe, local money lenders played a critical role in the everyday life of people. On the one side, they sustained the lower strata, supporting poor households in their daily struggles; on the other, they supplied funds to the well-off, fostering both local and international commerce, and promoting economic development. Credit markets included several professional and non-professional lenders who worked alongside each other. Public authorities frequently regulated their activities, sometimes imposing strict conditions, as was often the case

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for Jewish moneylenders.¹ The structure of local credit markets was shaped by many variables linked to the political, economic, and social environment.

This paper studies the dense interpersonal network that linked borrowers and lenders in late Renaissance Florence. Previous research indicates that this network constituted the main access to credit available in the city at the time.² Various professional lenders, among which were private Christian pawnbrokers, were active in the city. However, their market share appears to have been quite limited.³ The allocation and deployment of financial funds took place mostly via transactions that involved private individuals.

In late Renaissance Florence, lenders and borrowers were part of networks that included family members, friends, or neighbors, based on geographical, professional, and social homophily.⁴ Repeated exchanges forged familiarity among individuals, creating quasi-kin relationships.⁵ However, intermediaries were also active in the city and solved informational problems linking demand and offer. They matched borrowers worthy of a loan with lenders who wanted to invest their money. They were sometimes directly responsible for the repayment of the loans and were asked to settle the debt in case of default. This was the case with

¹ There are several examples that could be mentioned, see for instance B. Pullan about the Venetian Jewish community Brian S. Pullan, *La politica sociale della Repubblica di Venezia 1500- 1620*, vol. II, ‘Gli ebrei veneziani e i Monti di piet ’ (Rome, 1982); on the Tuscan area, see Maristella Botticini, ‘A tale of ‘benevolent’ governments: private credit markets, public finance, and the role of Jewish money-lenders in medieval and Renaissance Italy’, in: *The journal of economic history*, 60–1 (2000): 168–189.

² John F. Padgett and Paul D. McLean, ‘Economic Credit in Renaissance Florence’, in: *The Journal of Modern History* 83.1 (2011), 1–47.

³ Elise Dermineur, and Matteo Pompermaier (forthcoming), ‘Credit networks in renaissance Florence: revisiting the *catasto* of 1427’, in: *Ricerche di storia economica e sociale*, VIII (2022): 89–110, <https://doi.org/10.17426/R08C08>, there 159.

⁴ Paul D. McLean and Neha Gondal, ‘The Circulation of Interpersonal Credit in Renaissance Florence’, in: *European Journal of Sociology / Archives Europ ennes de Sociologie / Europ isches Archiv f r Soziologie* 55–2 (2014): 135–176, there 157. On the topic, see Laurence Fontaine, *The Moral Economy: Poverty, Credit, and Trust in Early Modern Europe* (New York, 2014).

⁵ Elise Dermineur, ‘The evolution of credit networks in pre-industrial Finland’, in: *Scandinavian Economic History Review* 70–1 (2022): 57–86, there 68.

guarantors (or *mallevadori*), who helped spread trust and encouraged credit transactions.⁶

This chapter delves deeper into the functioning of the interpersonal credit market in fifteenth-century Florence by investigating the roles of a specific professional category, that of moneychangers. The literature offers several examples of moneychangers who lent to family members, neighbors, or even peasants living in the Florentine countryside. It is not surprising that they were particularly active in the credit market: they were trained accountants and were among the few individuals in the city with ready cash—both gold and silver coins. The sources show that they were not only lenders, but also intermediaries and guarantors. As we will see, the moneychangers contributed to the efficiency of the market—identified as the capacity of the market to match debtors and creditors.

The paper relies on the analytical tools offered by social network analysis (SNA). By focusing on the intermediary activity of moneychangers we gain useful insights into the mechanisms of credit and intermediation in fifteenth-century Florence. The findings do not only highlight their role in matching borrowers and lenders in credit markets, but also their relevance in keeping different clusters within the network connected. Overall, this research contributes to the discussion about the structure and functioning of credit networks in preindustrial societies.

The main source for this study is the Florentine *catasto* of 1427, one of the oldest tax assessments still existing in Italy.⁷ The *catasto* listed the wealth, profession, age, and marital status of almost 10,000 Florentine households. Claims and liabilities were utilized to determine the taxable net wealth, therefore each declaration also includes extensive lists of borrowers and lenders. The *catasto* is a massive source of information about the economic conditions of Florentine households. For that

⁶ The literature on intermediaries is extensive. In this book, several papers focus on notarial credit and intermediation (Giuseppe De Luca and Marcella Lorenzini, ‘Notary lending networks in northern Italy in the eighteenth and nineteenth centuries’; Ruben Peeters and Rogier van Kooten, ‘Looking for dark matter credit: exploring notarial credit markets in Antwerp and its surroundings ca. 1835’), dialoguing particularly with existing research on France, see Philip T. Hoffman, Gilles Postel-Vinay and Jean-Laurent Rosenthal, *Dark matter credit: the development of peer-to-peer lending and banking in France* (Princeton, 2019).

⁷ Archivio di Stato di Firenze (henceforth ASFi), *Catasto, Campioni dei cittadini*, bb. 64–85, and ASFi, *Catasto, Portate dei cittadini*, bb. 15–63; this research focuses on the Nicchio Gonfalone, ASFi, *Catasto, Portate*, bb. 17, 18_I and 18_II.

reason, the analysis limits itself to a specific part of the city of Florence, the *gonfalone* called Nicchio.⁸ The chapter also relies on a judicial record produced by the *Arte del Cambio*, the guild that reunited all of money-changers and regulated their business. This proves to be very useful in retracing qualitatively the various ways through which people lent and borrowed money in fifteenth-century Florence.

The research intersects with the literature focused on the activities of moneychangers and credit networks in preindustrial societies. This chapter aims to highlight the role of intermediaries in the local credit network from a more systematic point of view. It broadens the scope of the analysis and includes all the population residing in a specific area of the city, regardless of their social status or the value of transactions.

Previous literature focusing on credit networks in Florence mainly focused on the elites and included loans/debts of more than 10 florins.⁹ Considering that the yearly average wage of an unskilled worker at the beginning of the fifteenth century was about 14 florins, ignoring all loans of less than 10 florins excludes a large part of so-called consumer credit.¹⁰ In *gonfalone* Nicchio, about 62% of transactions were of less than 10 florins. The overall volume of these credit exchanges is surely limited if compared to the exchanges mobilized by merchant banks, but this does not reduce the significance of these transactions for a large part of the urban population.

In the next section, the paper reviews the literature on the Florentine credit market and analyses existing research on the roles of money-changers in it. The following part introduces the data used and retraces the structure of the overall credit network investigating its main features. The fourth section focuses more closely on the moneychangers: it investigates their position in the network (i.e., their functions) and uses a multilevel algorithm to identify and study the communities that compose it. The detection and analysis of the communities in the network confirm

⁸ The dataset and some of the preliminary results are drawn from a previous paper I wrote in collaboration with Elise Dermineur, which focuses on the overall structure of the local credit market in 1427 Florence; see Dermineur and Pompermaier, 'Credit networks in Renaissance Florence'.

⁹ Padgett and McLean, 'Economic Credit', there 5; McLean and Gondal, 'The Circulation of Interpersonal Credit', there 144.

¹⁰ David Herlihy and Christiane Klapisch-Zuber, *Tuscans and their Families: A Study of the Florentine Catasto of 1427* (New Haven, 1985), there 95.

the strength of professional and geographical homophily in network formation. However, it seems there is no cluster of moneychangers, who are instead an “open group”, spread across the network. This particular characteristic reflects the important bridging role that moneychangers had in the Florentine credit market and the ways through which they linked various communities of the network together. The qualitative and quantitative analysis suggests the important contribution of moneychangers to the efficiency of the local credit market. They helped to overcome asymmetries of information, spreading trust, and lowering transaction costs.

2 CREDIT AND INTERMEDIATION IN LATE RENAISSANCE FLORENCE

Preindustrial credit markets were usually much more varied than those existing in modern societies where the pre-eminence of banks over other credit institutions appears to be almost indisputable. In Renaissance Europe, several lenders operated simultaneously in the context of fragmented markets. This was the case in fifteenth-century Florence, where different kinds of lenders were supplying money to the local population.

Christian pawnbrokers were operating in the city, practicing what was perceived as a clearly usurious activity. Their activity was tolerated and regulated by the Commune, who in 1351 introduced a licensing system and imposed on them the payment of an annual fee for lending money on pledges.¹¹ Pawnbrokers traditionally played a significant role in preindustrial cities, especially for the lower classes. They allowed those who owned small objects of everyday use to access credit and stabilize their income.¹² However, the *catasto* disclose only limited traces of their activity, suggesting that they might have held only a marginal share of the market.

¹¹ Marvin B. Becker, ‘Three Cases Concerning the Restitution of Usury in Florence’, in: *The Journal of Economic History*, 17–3 (1957): 445–450, 446; Note that the Monte di Pietà (Municipal Pawnshop) of Florence was established only in 1495; see Carol Bresnahan Menning, *Charity and State in Late Renaissance Italy: The Monte di Pietà of Florence*, Ithaca and London, 1993.

¹² See Daniel L. Smail, ‘The materiality of credit: debt collection as pawnbroking in late medieval mediterranean Europe’, in: *Histoire Urbaine*, 51 (2018): 95–110; Matteo Pompermaier, ‘Credit and poverty in early modern Venice’, in: *Journal of Interdisciplinary History*, 52–4 (2022): 513–536.

In a previous paper, Dermineur and Pompermaier show that in the Nicchio *gonfalone*—one of the sixteen that made up Renaissance Florence—there were only a few individuals who declared to have pledges explicitly pawned at a Christian *presto* (a dozen out of about 12,000 transactions).¹³ The authors point out at least two reasons that could explain why the real number of loans supplied by pawnbrokers is underestimated. First, the *catasto* could not be well-suited to record short-term loans—and pawnbroking is usually very short-term credit. Second, individuals were maybe hesitant to declare such transactions because of the social stigma connected to it. In any case, the low number of transactions suggests that pawnbrokers were not the main providers of credit for the local population.¹⁴

The Florentine urban credit market seems to have primarily relied on a dense network of interpersonal transactions. Indeed, credit circulated in the context of peer-to-peer relations that involved private individuals. This was true at all levels of society, and the network included both the upper and lower strata of the population. Previous research highlights that commercial credit networks among Florentine companies were indeed based on a wide range of non-economic, social relationships among the partners of these companies.¹⁵ Padgett and Mclean stress the importance of family, friendship, geographical homophily, and *onore* (linked to public charges) as the main variables that affect the creation and development of credit networks in such a context.

Before the arrival of the Jewish moneylenders (1430s) and the establishment of the Monte di Pietà (1495), Florentines in need of funds for their own survival turned to their family and their *parentela*, to their friends and neighbors, or to the local elite and foreign lenders.¹⁶ The

¹³ See for instance Biagio di Agnolo and Cambio di Piero had a debt with the *presto* – lender – called Lioni (or Leoni) for 2.15 and 8 florins respectively. ASFi, *Catasto, Portate*, b. 17, f.º 331; ASFi, b17, f.º 438.

¹⁴ Dermineur and Pompermaier, ‘Credit networks in renaissance Florence’, there 158–159.

¹⁵ Padgett and McLean, ‘Economic Credit in Renaissance Florence’.

¹⁶ We do not know how the arrival of the Jewish moneylenders or the establishment of the municipal pawnshop affected the credit network. Jewish moneylenders were barred from living and working in Florence *intra muros* at the time of the first *catasto*, they were admitted into the city only in the 1430 s. They were nonetheless present and active throughout Tuscany. There, according to the *catasto*, Jewish moneylenders accounted for about 10% of household debts.; Botticini, ‘A tale of ‘benevolent’ governments’, there

contracting parties often knew each other: they either worked together, frequented the same places of sociability, lived in the same neighborhood, and so forth. The familiarity between individuals forged through prolonged relationships and repeated exchanges contributed to lowering asymmetries of information and promoted trust. In such a context, where endogamy and homophily were relevant in the building of credit networks, it is unclear what was the role of intermediaries.

A broad body of literature stresses the relevance of intermediaries in the economy. In particular, D. C. North highlighted the role they had in solving asymmetries of information, spreading trust, and increasing the efficiency of the market.¹⁷ In fifteenth-century Florence, the moneychangers were among those categories who seemed to have played a relevant role in this sense. Moneychangers appear in the sources as *tavolieri*, *banchieri*, and *cambiavalute*, testifying about the multiple functions they were responsible for.¹⁸ Unlike pawnbrokers, they were members of the *Arte del Cambio*, the guild that represented and coordinated all of them and regulated their business. The *Arte* was one of the most important guilds in the city: it was established at the beginning of the thirteenth century as a separate branch of the *Arte di Calimala*—the guild of the biggest merchants of the city. Its premises were not by chance located in one of the most central areas of Florence, in the *Signoria* square, under the *loggia dei Pisani*.

Defining the main functions of moneychangers is not an easy task. They were a sort of “mixed bag”—to use Richard Goldthwaite’s words—“ranging from small shops to large international companies”. The smaller moneychangers had little to do with banking: they usually did not accept deposits and they did not offer transfer operations to their customers. They lived off the commissions they charged for simple change operations between different currencies or between gold and silver coins. The most important moneychangers were instead involved in transfers in markets

167–174. Peer-to-peer lending markets traditionally functioned in concentric circles; see Fontaine, *The Moral Economy*, there 38.

¹⁷ Douglass C. North, ‘Transactions Cost in History’, in: *The Journal of European Economic History*, 14–3 (1985): 557–576.

¹⁸ In this paper the term banker—the literal translation of *banchiere*—is used as a synonym of moneychanger.

abroad and supplied large loans financing commerce and trade, being at the core of international networks.¹⁹

Many studies describe the role of the moneychangers in the credit market and the variety of forms through which they participated in it. In his research on medieval Bruges, Raymond De Roover claimed that moneychangers granted a line of credit to their customers, who were thus allowed to overdraw their accounts up to a stated limit.²⁰ Big international banks traded in bills of exchange, which, even if useful in extending a line of credit, were technically not loans and escaped any charge of usury (it was technically *cambium* and not *mutuum*). In both cases, it was not direct lending, and it did not imply cash transactions. However, there are also traces of more direct participation of moneychangers in the market, especially as lenders.

Richard Goldthwaite describes the activity of the banker Bindaccio di Michele de' Cerchi in the middle of the fifteenth century, highlighting his role as a lender. The ledgers of the bank record many *cose pegnate*, pawned things, in particular jewelry, that he accepted as collateral. Lending on security was, according to Goldthwaite, one of the most important activities in the early years of the bank. Cerchi also acted as guarantor and, on several occasions, promised his customers to pay the debts they had with other individuals in case of default. The amounts were as low as two florins and rarely exceeded 50 florins. His clients came from every social *milieu*, among which were artisans, bakers, notaries, weavers, etc.²¹

Charles De La Roncière retraced instead the economic activity of Lippo di Fede del Sega through the analysis of his ledgers. He had a *banco di mercato* devoted to local change, and his main activity was to convert foreign currencies and change gold and silver coins. The *banco* provided him with the liquidity he partly re-invested in his money-lending activity. In fact, he supplied small amounts, usually interest-free, to his neighbors and relatives who were part of his social network. At the same time, he lent to peasants living in the Florentine countryside. While urban loans seemed to be a means for social integration at neighborhood level,

¹⁹ Goldthwaite, 'Local banking in renaissance Florence', there 6.

²⁰ Raymond De Roover, *Money, Banking and Credit in Mediaeval Bruges. Italian Merchant-Bankers, Lombards and Moneychangers. A Study in the Origin of Banking*, (Cambridge (MA), 1948,), there 294.

²¹ Goldthwaite, 'Local banking in renaissance Florence', there 28.

rural loans were clearly an instrument of land expropriation aimed at broadening Lippo's real properties.²²

The paper moves forward from these studies and analyses the intermediary roles of moneychanger from a more systemic perspective. To this end, the next section retraces and analyses the credit network in a specific area of Florence called *gonfalone* Nicchio, which will serve as case study for the analysis. It focuses on the kinds of credit relationships that linked individuals, highlighting how intermediation took place in early fifteenth-century Florence. We will then turn to graph theory to assess more in detail the positions that moneychangers occupied in the network.

3 CHARACTERISTICS OF THE CREDIT NETWORK IN THE GONFALONE NICCHIO

On May 24, 1427, the commune of Florence established the first *catasto* to deal with two pressing issues: first, the city needed a tax reform to increase revenues and pay for ordinary and extraordinary expenses, especially the armed conflicts in which the city was involved. Second, the local population perceived the complicated web of forced loans (which flew into the *monte*, the public debt), *gabelle*, and other direct taxes that existed before the *catasto* as an excessive and unfair burden.²³ There was a general need for a more rational tax assessment based on the real value of assets and not on very questionable estimations, as was the case with forced loans.

The *catasto* introduced a novel way of assessing wealth. Every household provided a detailed declaration (a *portata*) outlining their real estate, livestock, cash, merchandise, and shares in the public debt. These declarations also accounted for claims and liabilities, which were utilized to

²² 64% of loans that had real estate as collateral defaulted; see Charles M. de La Roncière, *Un Changeur Florentin du Trecento: Lippo di Fede del Sega (1285 env. – 1363 env.)* (Paris, 1973); this is something that happened also in the Venetian mainland in the fifteenth century; see Gigi Corazzol, *Fitti e livelli a grano. Un aspetto del credito rurale nel Veneto del '500* (Milan, 1979).

²³ Molho, *Florentine public finances*, there 82–83; see also Hérlihy and Klapisich-Zuber, *Tuscans and their Families*, there 5.

determine the taxable net wealth.²⁴ The *catasto* contains interesting information about 10,000 households and more than 37,000 individuals living in Florence, and many more residing in the Florentine territories (both the *contado*, its hinterland, and the *distretto*, the other territories under the Florentine authority).²⁵

This paper does not study the entire city of Florence, but only the *gonfalone* called Nicchio, one of the sixteen areas into which it was divided (in yellow in Fig. 1).²⁶ Nicchio was chosen for several reasons: first, it was part of the wealthy inner circle of the city but was also linked to the poor ghettos in the south. Second, the aggregate value of both deductions and private investments (which contain debts and loans, respectively) are among the highest in the city: this suggests that the volume of credit exchanges recorded in the declarations is quite high.²⁷

The analysis of the credit network is based on the lists of names of borrowers and lenders that are attached to the tax declaration of each householder living in the Nicchio *gonfalone* in 1427. In some cases, these lists can be very long, with hundreds of names of borrowers and lenders, while in others they just include a few names or even none. The number of transactions is generally correlated with several variables, like wealth, profession, and age of the householders.²⁸ On average, each declaration

²⁴ Herlihy and Klapisch-Zuber, *Tuscans and their Families*, there 93. Each family could subtract 200 florins from their total assessment for every member of the family (except for servants, apprentices, and employees), but only households who lived in Florence, see Guido Alfani and Francesco Ammannati, 'Long-term trends in economic inequality: the case of the Florentine state, c. 1300–1800', in: *Economic History Review* 70–4 (2017): 1072–1102, there 1094. A *catasto* amounted to 0.5% of an individual's net capitalization: for instance, 2 *catasti* corresponded to 1% of the total amount of net taxable assets. Between 1428 and 1433, the citizens of Florence were asked to pay 153 5/6 *catasti*, see Molho, *Florentine public finances*, there 92.

²⁵ Herlihy and Klapisch-Zuber, *Tuscans and Their Families*, there 56.

²⁶ ASFi, *Catasto*, Portate, bb. 17, 18I, 18II.

²⁷ The preliminary analysis of the *gonfalone* was based on the database developed by David Herlihy and Christiane Klapish-Zuber available at <https://cds.library.brown.edu/projects/catasto/overview.html> (June 2023).

²⁸ There is a positive but not very strong correlation between the number of transactions (both debts and credits) and the overall value of assets declared by householders (correlation = 0.44, 0.5 if we consider the number of loans, and 0.37 the number of debts).

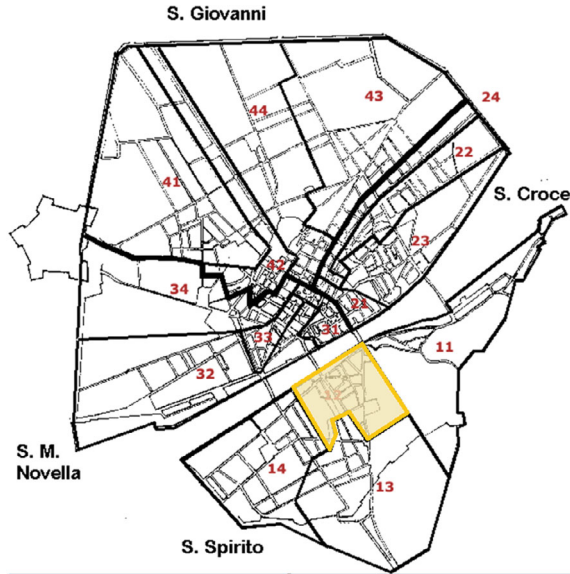


Fig. 1 Map of Florence in 1427 (based on Bonsignori 1584); S.Spirito: 11: Scala, 12: Nicchio (in yellow), 13: Sferza, 14: Drago; S.Croce: 21: Carro, 22: Bue, 23: Lion Nero, 24: Ruote; S.Maria Novella: 31: Vipera, 32: Unicorno, 33: Lion Rosso, 34:Lion Bianco; S.Giovanni: 41: Lion d'Oro, 42: Drago, 43: Chiavi, 44: Vaio; (Source: https://cds.library.brown.edu/projects/catasto/newsearch/1420-50_map.html)

contains about 30.44 transactions or—from the perspective of the householder—28.04 claims and 10.44 debts. The average value of transactions is about 49.29 Florins, while the median value is 5.25 Florins.²⁹

Individuals are listed by name, patronymic, and, in some cases, surname. Sometimes it is possible to find other pieces of information useful to identify the individuals mentioned, like for instance where they lived, their professions, nicknames, and so forth. This is extremely important for SNA, and the first step in the analysis is to identify with a certain degree of confidence all individuals in the network. This is usually

²⁹ Average and median values are very different because the standard deviation is high; the average and median values of loans and liabilities are 80 and 10 Florins, and 37 and 4 Florins, respectively.

not a problem with more recent datasets, but it can be problematic for historians. At that time, people tended to have the same names—and, therefore, patronymics. In the database, there are about 1,500 different first names and more than 9,500 individuals: 672 of them are called Antonio, 611 Giovanni, 355 Francesco, and so forth. In many cases, the patronymic is, in its turn, a very common name, which sometimes makes identification a hard task. The profession and their place of residence are useful information in this regard. However, when I could not establish that two names belong to the same individual, they have been considered as two different persons. This means that the number of nodes is possibly overestimated rather than underestimated.³⁰

Figure 2 gives us a visual representation of the credit network. It includes about 9,500 nodes and 12,000 edges (see Table 1). Even though the structure is quite complicated to read, the visualization is very helpful and highlights at least two main features. First, there is a unique interconnected unit, called giant component, that includes almost all nodes and edges—respectively about 97% and 98% of the total. Credit was widespread and almost everyone had at least one claim or one liability; moreover, almost all households were part of a unique and interconnected ecosystem. The private credit market was the main access to credit for part of the urban population. There were just a few households that were excluded from, or that did not participate in, the credit market at all.³¹

Between 2,000 to 2,500 individuals lived in Nicchio, divided into approximately 450 households (about 5% of the city). Many of them were artisans and shopkeepers (18.44% and 11.27% respectively), but there were also noble families and individuals involved in highly qualified professions (such as notaries).³² Wealth inequality was important,

³⁰ We compared my data with the database created by David Herlihy and Christiane Klapish-Zuber in order to identify even more individuals and track their declarations in the *catasto*. This reduced the problem linked to the overestimation of the number of nodes.

³¹ Dermineur and Pompermaier (forthcoming), ‘Credit Networks in Renaissance Florence’; widows were especially numerous among householders with few or completely without credit/debit relations.

³² 1.4% of householders were nobles, 3.2% were employed as judges, notaries, medical doctors, and brokers; in total, 488 households lived in the Nicchio gonfalone, at least according to the 1427 *catasto*; the average number of individuals per household—estimated by Klapish-Zuber and Herlihy was 4.42, which means an average population of 2,200 individuals; See Herlihy and Klapish-Zuber, *Tuscans and their Families*, there X.

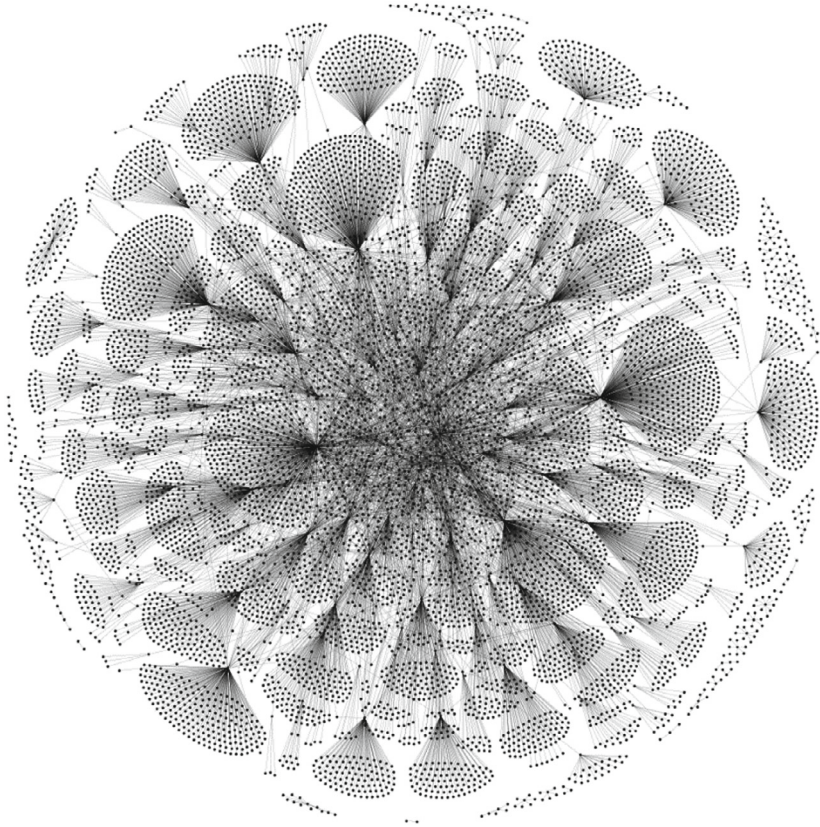


Fig. 2 Visualization of the network, Nicchio gonfalone

but still below the average of the city: 10% of the richest families in the city lived there, while 38 households (8.38% of the total) declared no assets at all.³³ Research suggests that significant inequalities usually exert a negative influence on the creation of social networks since inegalitarian

³³ Gini index in Nicchio is 0.75, and in the entire city is 0.79; the highest inequalities are in Drago (in the quarter of Santo Spirito), equal to 0.85, and the lowest in Drago (San Giovanni), 0.38. However, the value and number of deductions were so high that it is difficult to run such an analysis. For instance, the primary residence was not included in the declarations, as well as movables of everyday use (the so-called *masserizie*).

Table 1 Main characteristics of the network, Nicchio gonfalone

<i>Measure</i>	<i>Value</i>
Nodes	9,502
Edges	11,529
Diameter	13
Average Degree	1.213
Average path length	5.224
Size of the giant component	Nodes: 9,183 (96.64%) Edges: 11,269 (97.74%)

The database does not include any transactions that involve public institutions such as the commune of Florence and other municipalities, but only those between private individuals and private institutions (churches, monasteries, etc.). The number of nodes and edges slightly differs from Dermineur and Pompermaier (forthcoming), ‘Credit Networks in Renaissance Florence’ because the database is always updated as soon as new individuals are identified

societies tend to be less socially cohesive.³⁴ This seems not to be true in 1427 Nicchio. In the *gonfalone*, strong inequalities did not lead to the fragmentation of the social fabric. It is not among the aims of this chapter to discuss social and economic inequalities in medieval societies, but it is interesting to note that people seemed to live in different social spheres that were not mutually exclusive.

Besides visualization, there are specific measurements that can help us to identify the main characteristics of the overall credit network. The density, the number of edges in the network divided by the number of edges that could potentially exist, is very low. Compared to other social relations such as friendship, credit supply is bound to the availability of cash or to the existence of commercial transactions and, therefore, is limited. Many nodes had only a few connections, as confirmed by the relatively low average degree, the average number of links each individual had (1.213); on the other hand, there is a small group of individuals at the top of the hierarchy of the *gonfalone* featuring many connections. The network has a hierarchical structure with very few reciprocal transactions. This contributes to “provid[ing] a way to avoid self-interest and

³⁴ Cattell, Vicky, ‘Poor people, poor places, and poor health: the mediating role of social networks and social capital’, in: *Social science & medicine* 52–10 (2001): 1501–1516, there 1502.

defection or cheating”, increasing the efficiency of the whole network.³⁵ It was a reputation-based system in which gossip spread information, and ostracism was the punishment for not adhering to a set of basic rules and social norms.

In general, the low average path length (5.224) compared to the number of nodes suggests that we are dealing with a so-called small-world network.³⁶ In such a structure, which characterizes many human networks, most nodes are not directly linked but can be reached from every other node with just a limited number of “steps”. This means that nodes are embedded in socially close relationships. In other words, strangers are linked by a short chain of acquaintances: intermediaries were therefore important for the efficiency of the system.

4 MONEYCHANGERS IN THE FLORENTINE CREDIT MARKET

4.1 *A Qualitative Analysis*

Figure 2 describes the high volume of transactions that involved people living in the *gonfalone* Nicchio in 1427. Despite all edges looking the same, they can represent very different credit transactions, dissimilar relationships between individuals, and various ways through which people lent and borrow money. The *catasto* usually lacks this information, and I decided to integrate it with a register produced by the *Arte del Cambio* that includes a series of 373 trials related to the period between September 3, 1409 and April 15, 1414.³⁷ The litigations concern various topics, and the *Arte* appears as the judiciary to which individuals turned when they had problems with moneychangers, regardless of the cause. However, most of them are linked to credit transactions.

³⁵ Ana S. Ribeiro, ‘The Evolution of Norms in Trade and Financial Networks in the First Global Age: The Case of the Simon Ruis’z Network’, in: Cátia AP Antunes and Amélia Polónia (eds.), *Beyond Empires: Global self-organizing, cross-imperial networks, 1500-1800* (Leiden and Boston, 2016), 12-41, there 31.

³⁶ Duncan J. Watts and Steven H. Strogatz, ‘Collective dynamics of ‘small-world’ networks’, in: *Nature* 393 (1998), 440-442.

³⁷ ASFi, *Arte del Cambio*, b. 65; the register covers the period between the 3rd of September 1409 and the 15th of April 1414.

The analysis shows that there are four main categories of credit exchange that involved the moneychangers. First, purchases on credit or deferred payments. They were of critical importance in preindustrial societies. James Shaw and Evelyn Welch’s analysis of the ledgers of a Florentine apothecary describes the daily activity of the shop between 1464 and 1568. They highlight the importance of credit in such a cashless economy. Claims and liabilities seemed to last over time, and sometimes it took many years before debts were repaid.³⁸ Shopkeepers’ declarations in the *catasto* are filled with small debt, some of them labeled as “bad debts” or belonging to “bad borrowers”. Sometimes, they can be found years later, still waiting to be closed.³⁹ Many of the edges we see in Fig. 2 are probably linked to the purchase of goods for personal reasons and involved small amounts, while others were maybe more substantial and were part of larger commercial transactions.

Second, individuals lent money to each other. The above-mentioned register testifies that loans were often supplied in cash, using golden and silver coins. The ease with which gold and silver coins circulate in the city and the impressive volume of transactions that emerged from the analysis of the *catasto*, suggests that this was a very dynamic credit market.⁴⁰ The third category includes the payments on behalf of others. These were direct cash payments or *giro* payments that involved at least three individuals: the banker acted usually as an agent and paid one or more creditors on behalf of one of his customers. If a client’s deposit did not cover the expenses, the account balance turned negative, and the banker became a

³⁸ James Shaw and Evelyn Welch, *Making and Marketing of Medicine in Renaissance Florence* (Amsterdam and New York, 2011), there 84.

³⁹ Matteo Pompermaier, ‘Dynamic Networks? Credit and Trust in Late Renaissance Florence (1427–1430)’, in: Mauro Carboni, Pietro Delcorno (eds), *Mobilizing Money for the Common Good. The Social Dimension of Credit (14th–19th Century)* (Bologna, 2024), 149–178.

⁴⁰ It also contradicts the idea of the *strettezza del credito* (lit. Tightness of credit) and *mancomento del danaio* (lit. shortage of cash) mentioned in some documents of the 1420 s and 1430 s; A. Molho, *Florentine Public Finances in the early renaissance 1400–1433*, Cambridge (MA), 1971, pp. 155–156. However, it has not been taken for granted that what declared really happened. In a paper devoted to early modern Venice, James Shaw describes the characteristics of what he defined a baroque economy, in which there was a “discrepancy between the documentary record and the underlying practices of the informal economy”, individuals describe transactions in cash that never took place in reality. See Shaw, James, ‘The informal economy of credit in early modern Venice’, in: *The Historical Journal* 61–3 (2018), 623–642, there 631.

creditor of his customer. According to the register, it was usually a very short-term credit, considering that four months were sufficient to proceed with legal action.

Fourth, the promises to pay. It is not always easy to clarify how promises to pay worked, nor what was the relationship between the parties involved. An example could help: Iacopo di Tommaso sued Andrea di Pierozzo Ghetti for a debt of 65 florins that he “promised us for Antonio di Bonino *pizzicagnolo*” (street food seller).⁴¹ It is likely that Antonio di Pierozzo Ghetti acted as guarantor (the so-called *malleatore*) of Antonio di Bonino—the street food seller—and, once clear that the latter was unable to repay his debt, he was sued by Iacopo di Tommaso, the lender. In the *catasto*, there are many cases in which guarantors (*malleadori*) are enlisted among the debtors. This practice seemed to be quite widespread: we can imagine that creditors would turn to the courts to sue both the debtor and its guarantor in order to have more chances of getting back their money.

Florence was a rather small city, and we can suppose that information circulated easily among individuals who have repeated interactions with each other, something which reduced asymmetries in information. However, guarantors and intermediaries seemed to be important for the correct functioning of the overall credit network, supporting everyday transactions. They spread trust and gave (access to) credit to individuals who lacked it. They help to reduce transaction costs and make local exchanges more fluid. As we will see in the next section, SNA allows us to track some characteristics of the network that reflect the role of moneychangers as intermediaries.

4.2 *A Social Network Analysis*

As stated earlier, this paper relies on a sample of about 450 tax declarations of households residing in the *gonfalone* Nicchio in 1427. The network resulting is the sum of about 450 ego networks linked to each other through individuals who are mentioned as borrowers or/and lenders in more than one declaration. This explains the structure that the network assumes when we look at it in Fig. 2. The center of this network is highly interconnected, while the periphery looks more

⁴¹ ASFi, *Arte del Cambio*, b. 65, f.o 4v, 10 September 1409.

modular, made by several interconnected stars, and small groups of nodes revolving around a central node, the declaration holder.

In such a network, where are the moneychangers? It is very easy to track moneychangers when they were the ones declaring taxes, simply because they stated what their job is. It is much less so when they are listed as borrowers or lenders because the profession is not always specified. To overcome this problem, we collected the names of all the members of the *Arte del Cambio* between 1400 and 1427.⁴² We considered this time frame to be long enough to include all the moneychangers still alive and operating in 1427. Then, we compared this list of names with the database of borrowers and lenders in the Nicchio *gonfalone*.⁴³ At the end of this process, we were able to track 164 moneychangers, about 1.7% of the total sample, who were involved in about 2,000 transactions.

Moneychangers were more active than the rest of the sample, being involved on average in about 106 transactions against slightly more than 30. Also, the average and median values of loans and debts are higher, respectively 148.78 and 22.17 Florins (against 49.29 and 5.25). This is due to the fact that many moneychangers in the sample belonged to the upper classes, who are on average more active and involved in commercial transactions of a higher amount. Therefore, these numbers alone tell little about the actual involvement of moneychangers in the credit market.

Figure 3 depicts exactly the same network we see in Fig. 2, but it highlights moneychangers (larger dots) and divides the edges into two different colors according to their value (light gray and black respectively less and more than 10 Florins). This is interesting for several reasons: first, it gives us an idea of the part of the network that has been completely ignored in previous research, which did not include transactions of less than 10 florins (all the light gray area). Second, it confirms the hierarchical structure of the network, with limited reciprocity in the transactions.⁴⁴

⁴² The author thanks Claudia Tripodi for her support in the data collection.

⁴³ *Arte del Cambio*, b. 12, “Quaderno membranaceo contenente giuramenti per matricole e società”. To identify all moneychangers living in 1427 Florence, we compared the names of all those registered at the *Arte del Cambio* with the index of the entire *catasto*, about 10,000 names. We do not know if they had a *banco* or if they were just part of the *Arte del Cambio* without running an activity, but this is the only way to identify and track all of them.

⁴⁴ The reciprocity of a directed graph can be expressed as the proportion of bidirectional edges to the overall number of edges present in the graph.

Finally, it shows the position of the moneychangers in it. Many of them are in the center where most interconnected individuals are located, and the volume and number of exchanges are higher. Others are in the peripheries, among less interconnected individuals, and are involved in smaller transactions.

Moneychangers were differently positioned in the network because they probably had different roles in the credit market. In his study on Cerchi's bank, Goldthwaite claimed that the amounts of loans provided

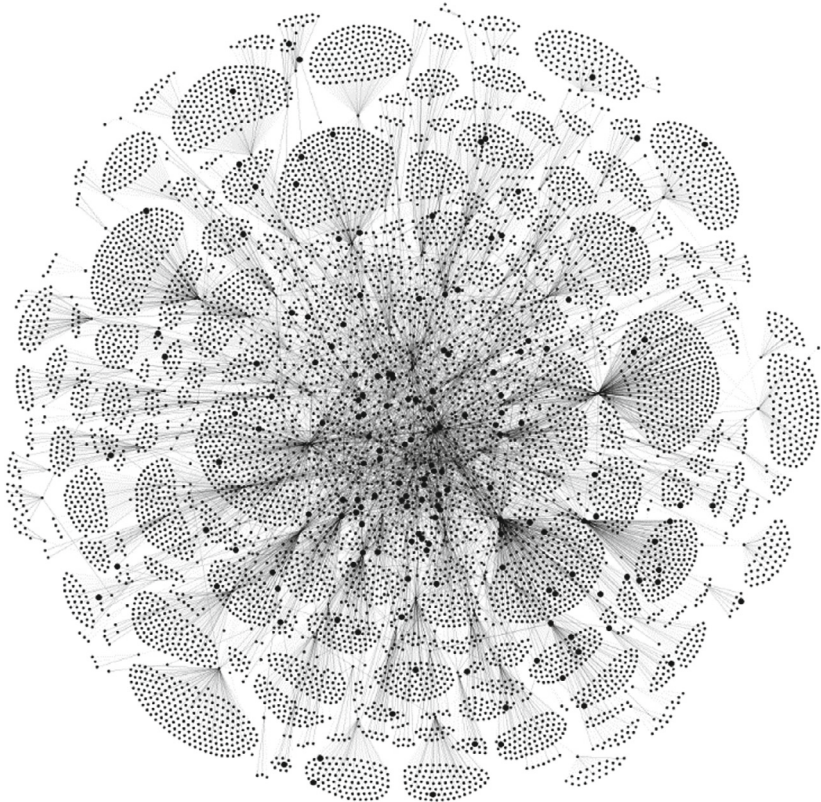


Fig. 3 Moneychangers in the network (Nicchio gonfalone); larger dots = moneychangers; the darker the color of the edge, the higher the amount

by moneychangers were directly related to the size of their banks.⁴⁵ The segmentation of the credit offer seems to be confirmed also by the fact that the personal wealth of lenders is directly proportional to the median value of the loans they supplied.⁴⁶

Once retraced, the entire structure of the network and the position of moneychangers in it, we can move forward and focus on the analysis of the communities in the network. The visualization of the network, as powerful as it is, fails to highlight the different communities that compose it. To that end, we need to turn to the mathematical approach offered by graph theory. A community is defined as a group of actors who interact with each other more intensively than with anyone outside of the group, “to such an extent that they could be considered to be a separated entity”.⁴⁷ The goal of identifying all different communities is to understand how many closed groups of lenders and borrowers are in the network and test the role of homophily in the formation of such groups. By so doing we will be able to reach two main goals: first, assess if there are communities of moneychangers; second, deepen our understanding of the structure and the functioning of the credit network.

There are several ways to identify communities, and the literature often disagrees on which one is the most appropriate.⁴⁸ In this case, we used a multilevel algorithm developed by Blondel et al. and available on the SNA software Gephi.⁴⁹ In community detection, we consider both

⁴⁵ Goldthwaite, ‘Local banking in renaissance Florence’, there 30.

⁴⁶ Not the average one; tested considering the declarations of 5 moneychangers with the highest degree.

⁴⁷ See Albert-László Barabasi, *Network Science*, chapter 9, available at <http://networksciencebook.com/> (June 2023); for the quote, see Stephen P. Borgatti, Martin G. Everett and Jeffrey C. Johnson, *Analyzing social networks* (London, 2018), there 181; cited in Daniela Stoltenberg, Daniel Maier and Annie Waldherr, ‘Community detection in civil society online networks: Theoretical guide and empirical assessment’, in: *Social Networks* 59 (2019): 120–133, there 121.

⁴⁸ It depends on many variables, like data, characteristics of the network, etc. In this regard see Stoltenberg, Maier, Waldherr, ‘Community detection in civil society online networks’; see also Vincent A. Traag, Ludo Waltman and Nees Jan Van Eck, ‘From Louvain to Leiden: guaranteeing well-connected communities’, in: *Scientific reports* 9.1 (2019): 1–12.

⁴⁹ Algorithm: Vincent D. Blondel, Jean-Loup Guillaume, Renaud Lambiotte, Etienne Lefebvre, ‘Fast unfolding of communities in large networks’, in: *Journal of Statistical Mechanics: Theory and Experiment* 10 (2008), P1008; find out more about Gephi here <https://gephi.org/> (May 2023).

the weight of ties, as it is proportional to the quality of the relationships (i.e., the quality of credit), and the direction of the edges—even though sometimes it creates some problems such as leaving some nodes and dyads unassigned.⁵⁰

The algorithm identifies 127 communities that include all 9,502 nodes. The average number of members per community is 74.82 and the median is 8: the smallest community includes only 2 members and the largest one 637. The first issue to solve is to unveil what are the main features that characterize these communities. At first sight, they are quite mixed, and they include individuals with different professions, coming from diverse geographical areas, and characterized by dissimilar wealth levels. However, if we deeply observe their characteristics we can notice some clear patterns. I look first for professional homophily, which suggests that individuals tend to have credit relationships with others who are employed in the same professional sector. This is usually one of the strongest patterns, and the above-mentioned literature on fifteenth-century Florence already highlighted the relevance of this phenomenon for the creation of credit networks.

The sample includes information about the professions of only a part of the nodes, around 30%. The biggest group (10.19% of the total sample) includes the manufacture and commerce of wool, silk, and linen, that we gathered in a single broad category that includes those employed in the production, retailing, and commerce of textile products. Those were the most important manufactures in late Renaissance Florence. Other categories gather artisans (crafters, 6,16%) and retailers (both food and non-food related, 2.4% and 2.7% respectively). As we saw previously, the moneychangers are only about 1,7% of the sample. The large part of nodes for which the profession is unknown invites us to be careful in interpreting the results. However, it is quite clear that certain professional groups are more represented in some communities than in others, suggesting that homophily could have a role in linking borrowers and lenders. This is far from being unexpected.

As an example, in cluster 54, in which we have 577 nodes and 651 edges, 25% of nodes are employed in textile manufacturing and commerce, especially wool. In Fig. 4, we can see the visual representation of this community. The network is composed of several small groups

⁵⁰ Stoltenberg, Maier, Waldherr, ‘Community detection in civil society online networks’, there 128.

of nodes, which represent the declaration holders—many of whom are employed in the textile industry—with several borrowers and lenders around them. At the center, inside the circle called “A”, we notice the most central individuals in this community. Those are almost all involved in the commerce of wool or silk and have an important bridging role, connecting the different parts of the community together. There are several important individuals in this circle, like for instance Cosimo di Giovanni de’ Medici, and members of families Salviati, Rondinelli, Bindi, etc. The community also includes a few moneychangers (larger dots). They contribute to connecting different parts of the network together, but their bridging role, in this case, is less important and is often redundant, since other nodes already do the same function. Therefore, professional homophily in this cluster is relevant and moneychangers have a less relevant role in such a system.

This is not the only cluster in which professional homophily is significant. Many clusters revolve around wool or silk merchants and manufacturers, which was not by chance the most relevant sector in the urban economy. In other cases, there are high percentages of nodes involved with food production and retailing, and artisans. At the same time, it is interesting to note that there are no clusters with a high percentage of moneychangers (in relative terms). Indeed, they are never more than 3–4% of nodes in each community. I can draw one interesting conclusion from this analysis: in a context in which professional homophily was relevant in community formation, no structure links all moneychangers with each other.⁵¹ Moneychangers seem to be a sort of “open group”. They are spread across the network and greatly contribute to its connectedness.

If we test the importance of homophily using the geographical origins we find similar results. The analysis suffers from a greater uncertainty, but there are communities clearly characterized by creditors and debtors residing in the same area.⁵² The test is carried out with locations outside the territory that then constituted the municipality of Florence; we expect to find similar results also within Florence, but we need data from all

⁵¹ De Roover proved that moneychangers in Bruges had accounts with each other to make transfers available in the absence of a real clearing system; see De Roover, *Money Banking and Credit in Medieval Bruges*.

⁵² We selected 15 different cities and villages: Arezzo, Bologna, Brozzi, Castello Fiorentino, Certaldo, Colla, Gambassi, Pieve di Settimo, Pisa, Pistoia, Prato, Quarantola, San Casciano, San Gimignano, San Miniato.

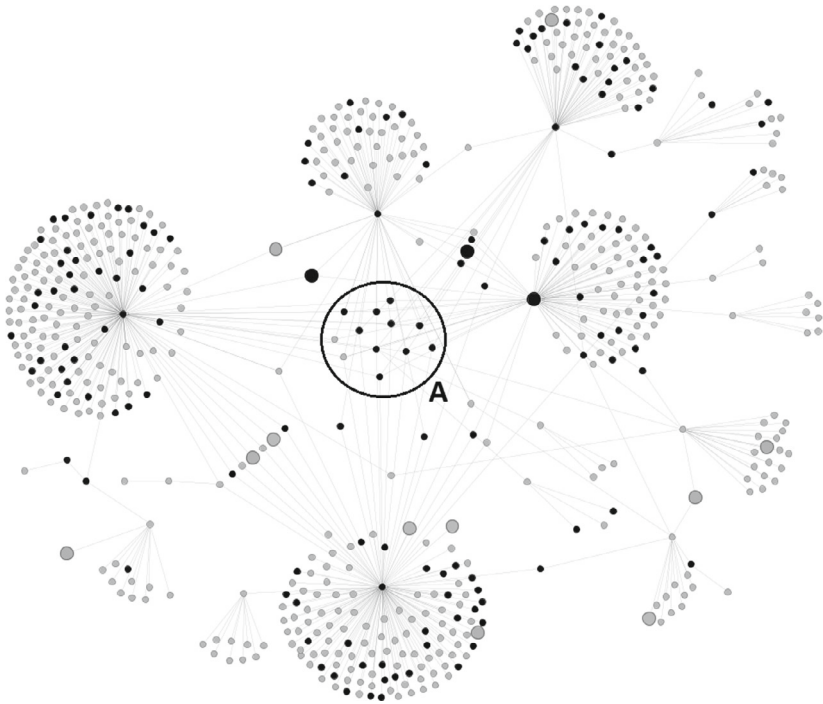


Fig. 4 Cluster 54, larger dots: moneychangers, black dots: textile, gray dots: other professions

gonfalonni to run this test thoroughly.⁵³ The same test based on the wealth of individuals suffers from the lack of data since we know the gross and net wealth of a limited number of nodes (10% to 20% in each community). The analysis seems to confirm the vertical structure of the network, a context characterized by mixed modules in which the well-off lent to the poor. However, these are only basic speculations.

So far, I have highlighted the structure of the network, the composition of the different clusters that compose it, and the strength of homophily in network formation. Is it possible to say something about the role of moneychangers as intermediaries? The answer is affirmative.

⁵³ Among others, see Padgett and McLean, 'Economic Credit in Renaissance Florence'.

To this end, I rely on centrality measures. They are the “oldest and best-known descriptive indices within network analysis ... designed to capture the extent to which one vertex occupies a more central position than another”.⁵⁴

The degree of nodes is one of the most commonly used measures. It counts the number of connections that each node has, and it is considered an index of popularity. In a directed network based on credit relations, the degree describes the number of operations each node was involved in. We can distinguish in-degree, incoming money (liabilities), from out-degree, money that an individual is lending (claims). The betweenness centrality quantifies instead the extent to which a node lies on “a large number of shortest paths between various third parties”.⁵⁵ It is a measure of the bridging role of nodes in the network. Closeness centrality evaluates instead how central nodes are in the network and how quickly they can reach out to all other nodes—which means how close a specific node is to any other node in the network. Finally, eigenvector centrality is probably the most interesting one, as it calculates the centrality of a node by summing the centrality of its neighbors. It is a measure of influence, which is based on the idea that central nodes are those connected to other central nodes.⁵⁶

What do these measures tell us about the role of moneychangers in the credit market? First of all, they are on average 5.5 times more active than the rest of the nodes in the network. This is not unexpected, since it was clear from the simple comparison of the number of nodes and edges. It is more interesting to note that the betweenness centrality is on average 14 times higher in the group of moneychangers than in the rest of the sample, highlighting their importance as intermediaries. They were critical in linking different parts of the network together: they are in between different clusters, having credit relationships with individuals belonging to many of them. This is coherent with the results of the analysis of the different communities in the network. Moneychangers’ closeness centrality is two times higher than that of the rest of the group, meaning that they occupy a central position in the credit network. Finally,

⁵⁴ Carter T. Butts, ‘Social network analysis: A methodological introduction’, in: *Asian Journal of Social Psychology*, 11–1 (2008): 13–41, there 22.

⁵⁵ Butts, ‘Social network analysis’, there 23.

⁵⁶ Eigenvector centrality “is a core-periphery measure, it is an index of diffusion and influence”. All of that from Butts, ‘Social network analysis’, there 24.

the most interesting measure is eigenvector centrality, which is on average two times higher for moneychangers than for the rest of the network. This confirms their centrality in the network, and the fact that they were linked to other individuals very active in the credit market in the area.

If we compare the moneychangers to other different professional groups, the results do not change. The comparison is especially interesting with the textile manufacture and commerce, which includes many of the most wealthy and relevant individuals in fifteenth-century Florence. Again, moneychangers are at the top of the hierarchy in all centrality measures, while textile manufacturers and merchants are second in the ranking. The quantitative analysis therefore confirms what is suggested by the qualitative one.

5 CONCLUDING REMARKS

SNA “provides a powerful set of tools for describing and modelling the relational context in which behavior takes place, as well as the relational dimensions of that behavior”.⁵⁷ Through SNA it was possible to retrace the main characteristics of the credit network and to delve deeper and study the communities that composed it and the nodes inside each community. The credit network in the Nicchio area includes almost all nodes and edges, meaning that credit was widespread and that almost every household living in the area was part of a unique and interconnected ecosystem. Money did not seem to be concentrated, and the credit market seemed to be quite dynamic: credit circulated widely (paper or real money) and in different ways, such as deferred payments, direct loans, book transfers, and payments on behalf of others.⁵⁸ The network has the feature of a small-world network, in which all individuals are embedded in socially close relationships and strangers are linked by short chains of acquaintances. It has low reciprocity and a hierarchical structure, which contributes to increasing its efficiency.

The identification and analysis of the communities that made up the credit network suggest the strength of professional and geographical homophily. It means that the local credit market was constituted of several

⁵⁷ Butts, ‘Social network analysis’, there 13.

⁵⁸ McLean and Gondal claimed that the supply of credit was rather concentrated and that there were relatively few alternatives, see McLean and Gondal, ‘The circulation of interpersonal credit’, there 161.

small communities characterized by common traits, more likely of professional and geographical nature. Credit flew among those individuals. Moreover, the analysis also shows the importance of intermediaries in keeping the network connected. Moneychangers played a critical bridging role, linking all the different communities together. Deals were more likely to be successful when people turned to them. Several centrality measures confirmed this hypothesis and their relevance in the credit network, especially in terms of betweenness, closeness, and eigenvector centralities. They occupied the most central positions in the network, they were the most important intermediaries, and they were connected to the most influential nodes. We tend to consider the increase in the number of intermediaries as one of the results of the progressive financialization of the credit market, but this might not be completely true. Moneychangers seemed to have contributed to the dynamism of the local credit market.

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