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expect any advantage in their dealings with them":
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**“A knavish people ...
so dextrous in bargaining that it is impossible for Christians to expect any
advantage in their dealings with them”:¹
London Jewry and the Stockmarket during the South Sea Bubble**

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Their unremitting diligence and constant attention to the main object of all their undertakings; their unquenchable thirst for wealth. (Quoted in Endelman, *Georgian England*:97)

Introduction

Expelled from England in 1290, Jews openly returned to London in 1656 under the protection of Oliver Cromwell. The initial population numbering 160 grew to 450 by 1680 and 850 by 1695 (Pollins: 42 and 242). In 1720 there were probably no more than 2,500 Jews living in London, of whom roughly 1,000 were Sephardic and 1,500 were Ashkenazi, relative to a London population of at least 600,000 (Endelman:41). Historians agree that Jews in London focused on overseas trade and brokering (Yogev: 15; Pollins: 43). Their connections with the trading world of Amsterdam, Portugal and Brazil are understandable; their role as brokers is less clear.²

Over the course of the seventeenth century, a secondary market in financial stocks emerged in both Amsterdam and London. While this market was stronger in Amsterdam early on, London was the pre-eminent market by the eighteenth century. Thus Jewish brokers in Amsterdam might have wanted to be part of this growing London market. Brokering requires that an individual stand ready to buy or sell a share and that he or she be able to put one party in touch with another party. The role of a broker is one of intermediary and intermediation requires information and connections. Although the early eighteenth century witnessed the beginnings of the shift from personal to impersonal finance, this was still a world in which significant personal and business relationships were determined by family and kinship links, and shared religious and political beliefs.³ Not only were Jews outside extant political, religious and kin circles,

but they were also a relatively new immigrant group. Indeed, the quotations opening this paper are evocative of the long-standing prejudice towards international Jewry in the financial arena. Therefore we have to ask in what sense could a member of this relatively new and Jewish community, one whose rights were circumscribed, act as an intermediary beyond its own immediate group?

This paper, thus, explores the role of Jewish players in the secondary market for shares and, more particularly, the role of brokering activities by individual members of London Jewry. It specifically examines the network of relationships created by the buying and selling of shares in the market for Bank of England shares. Based on the transfer books of the Bank of England, we have information on each of the almost 7,000 transfers of Bank stock over the course of 1720, the year of the South Sea Bubble. Focusing on these transfers, we use social network analysis to measure the strength of brokering activity by Jews or the strength of ties between the Jewish and non-Jewish communities (Granovetter, 1983, 2005). Beyond measuring the size of Jewish participation in the market, this analysis allows us to trace the actual lines of connection between any one trader and another; in other words through whose hands did a share pass into or out of the Jewish community. Specifically, we focus on the role played by Francis (Aaron) Pereira, a Sephardic Jew, and Moses Hart, an Ashkenazi, both of whom were important financiers of the period, as well as important figures in their respective communities.⁴

Religion separated Jews from Gentiles, just as religion separated Catholic from Church of England, and Protestants from Dissenters. Despite the fact that religion separated many groups in England, the Jewish community certainly appears more

disconnected. Although the primary purpose of this paper is to understand how members of London Jewry were embedded in the secondary market for Bank of England stock, a more over arching ambition is to understand the reality of Jewish segregation in London at the beginning of the 18th century. We use these business dealings in Bank stock as a case study of the extent of Jewish penetration of the market, while raising, by implication, questions concerning connectivity between financial and other spheres in society.

We begin with a very brief history of the London Jewish Community from the mid seventeenth to the mid eighteenth century and then of the structure of the London stock market prior and during the South Sea Bubble of 1720. This is followed by an overview of the structure of networks and the role played by social capital. We then provide a short description of the transfer books of the Bank of England. Using the information provided by the Bank ledgers, we find that there were relatively few members of the Jewish community buying or selling stock. However, the percentage of Bank stock involved was larger than their numerical share of the market. We find that members of the community were selling to and buying from the larger community and not merely within their own group. We also find that Francis Pereira and some other Jews acted as brokers and were tightly networked with the other large brokers in Bank of England stock. Overall, despite the prevailing stereotypes and fears about doing business with London's Jews, they were heavily involved in market transactions for Bank stock. Furthermore, the timing of Pereira and Hart's involvement with the market raise important questions concerning the role played by Jewish financiers in sustaining the development of the early London stock market.

1. Brief Historical Background

Jews were expelled from England in 1290.⁵ In 1492, Ferdinand and Isabella of Spain expelled Spanish Jews ostensibly to prevent contact between professing Jews and those, known as New Christians or *Conversos*, who had been baptized (forcibly or otherwise) at the end of the fourteenth century. Many went initially to Portugal but, in 1497, they too were expelled. As a result, Jews and New Christians, whether crypto Jews or not, moved into communities in Europe, North Africa, and the Ottoman Empire. As nominal Catholics, *Conversos* could settle in places where Jews were excluded, such as London, Hamburg or the South of France. Others settled in existing Jewish communities such as Venice and Livorno and yet others in cities with no policies regarding Jewish settlement (Goldish:235). Thus by the end of the sixteenth century, a Sephardic community linked by family and commercial ties existed across Europe.

Encouraged by the growth in the international economy and the long-distance trades, and protected by the treaty of 1630 with Spain, New Christian merchants settled in London.⁶ As Spanish merchants this group, whether crypto-Jews or not, had to appear as Roman Catholic, attending Mass at the various Catholic embassies in London. In late 1655, when war with Spain threatened Spanish merchants in London with confiscation of their goods and ships, some *Conversos* claimed refugee status as Spanish Jews (Edelman: 26). Two forces building over the previous decades made it feasible for Jews to think that they might live openly in London. The first was theological or eschatological and stemmed from the growth of millarianism, especially among radical Puritans. They

believed that the end of the current age was nigh but that the coming millennium was linked to the conversion of the Jews, which required that Jews live in England.⁷ These beliefs were mirrored among some in the Jewish community in Amsterdam, who believed that for a Messiah to come, Jews had to live everywhere. Publication of *The Hope of Israel* in England marked the start of a campaign to obtain government approval for Jewish resettlement in England. (Endelman:22)⁸

Involvement in long distance trade and wars, whether domestic or foreign, increased connections between the English state and the international financial community. Wars needed to be financed and armies supplied and here Jewish financiers, such as Machado and Pereira, were among the leading companies in this area. Cromwell, thus, had both personal theological motives and pragmatic political economy reasons for the readmission of Jews to England. In favor of readmission, Cromwell, however, sought wider support, by convening what has become known as the Whitehall Conference in December 1655. Although that support was not forthcoming, he tacitly allowed Jews to live openly in London. However, the expulsion order of 1290 was not rescinded. Over the next four decades, especially at times of regime change, the merchant community in London pushed to have the Jews expelled; while the Crown continued to suppress these attempts. In each case, the self-interest of the Crown lay with being able to procure the financial resources it needed and perhaps also to have a bargaining position. Yet despite the protection afforded this community by the Crown, the protection was personal and potentially precarious. The Jewish community lived in London on sufferance. Their protection came from the Crown but existed only as long as the group was potentially useful to the Crown.⁹

Along with Dissenters, Catholics and others who could not take the Christological oaths, Jews could not be Freemen of the City of London, nor members of the livery guilds, nor hold public office, nor get degrees from Oxford or Cambridge. They could not open retail businesses within the City limits. Foreigners could not own property. And foreigners could be expelled from the country (Endelman:36). So in this sense Jews were not more restricted than English Catholics. Jews born in London were English, but as Jews, they were aliens and could be expelled.¹⁰ Thus, by the first decades of the eighteenth century, although London's Jewish community was probably less threatened than in other parts of Europe, it was still relatively new and foreign. As such, it would not be connected into the existing social fabric created by circles of family, religion or politics. Jews were outsiders.

2. The Stock Market and the South Sea Bubble

Joint-stock trading companies emerged as a unique business form around the beginning of the seventeenth century. These were limited liability firms in which a person owned a share in the company which itself was a legal entity. The company acquired its capital by selling shares to the public. Initially stock was closely held but over time a secondary market for shares emerged. Such a secondary market for shares is a stock market in which people buy and/or sell shares for their own individual personal financial reasons. By the first two decades of the eighteenth century, a well-developed secondary market had developed in London.¹¹ The market was not one physical site; rather transactions took place in several different locations. A buyer or seller could go to the head offices of the individual companies, such as the East India company house or the

Bank of England building, and match up there with someone who wanted to sell or buy. Another venue operated in the coffee houses in Exchange Alley, such as Jonathan's and Garraway's.¹² Or if one was uncomfortable frequenting a coffee house or standing in front of a company house, one could use a known jobber/broker who bought and sold shares. In this respect, the market in 1720 was more subject to personal interactions or less anonymous than is the stock market today. The actual transfer of ownership took place when the sale was registered with the relevant company. Ownership was legally defined within the charter of the respective company and entitled an individual potentially to vote at the General Court and to elect or be elected to the Board of Directors.¹³ Share ownership also entitled a person to a stream of dividends and to potential capital gains or losses, both of which depended on the economic fortunes of the particular company.

Thanks to the general freedom allowed to printers after the accession of William III to the throne of England in 1688, a number of print sources informed current and potential investors on developments in the emerging securities market. Newspapers began inserting regular paragraphs to report on the latest prices. Perhaps even more useful, a specialized publication, John Castaing's *Course of the Exchange*, began regular appearance by at least 1698.¹⁴ Castaing's publication appeared twice-weekly, on Tuesdays and Fridays, coinciding with the days that mail packet boats left from Harwich to the Dutch port at Hook of Holland. Each issue contained the prices of the major securities over the previous three days, as well as the latest exchange rates for bills of exchange on major European cities.¹⁵ As a result, those living outside London, in Amsterdam or further afield, had information about the general state of the markets in

London. One important result of the financial press was that shares were now more transparently priced. A person buying or selling had knowledge of the most recent market price and thus would have to spend less time searching for price information. Because ownership of a share was well defined and easily transferable, and prices transparent, shares were a liquid financial asset. It was, in fact, the very liquidity of shares that helped to generate the South Sea Bubble of 1720.

In the years following the Treaty of Utrecht in 1713, the English government grew increasingly concerned about the size of its outstanding debt. The monied companies - Bank of England (1694), New East India Company (1698) and the South Sea Company (1710) - had already shown that a swap of government debt for company equity could reduce the government's debt service.¹⁶ The initial proposal to undertake a further debt-for-equity swap came from the directors of the South Sea Company, but the directors of the Bank of England quickly entered into competition for this business. The impact of this competition was to increase the size of the loan or the price that each company offered the government for the privilege of undertaking this swap. Ultimately, the South Sea Company offer was chosen. The bare outlines of the agreement were that the government would receive a £7.5 million loan from the South Sea Company, while the Company would issue roughly £31 million shares of new capital with roughly half to be exchanged with existing government debt-holders and the remainder as a new share issue.¹⁷ The main implication of this debt for equity exchange for our purposes is that it brought the existing holders of government debt in the form of annuities into the already flourishing market for equities and the potential for capital gains attracted new purchasers.

The bubble began in February 1720 with Parliamentary approval of the South Sea Company's plan to redeem outstanding government debt not already held by that company, the Bank of England or the East India Company. The higher the market price of South Sea stock the more attractive would be the inducement for debt holders to exchange government debt for company stock and also the more attractive for the South Sea Company which would need less stock per unit of debt redeemed.¹⁸ Thus, the incentives were set for the directors of the company to focus on the market value of the existing stock. Rather than place all the stock issue on the market at once, the company decided to do so in a number of stages or subscriptions. Such was the enthusiastic response by debt holders that, with each successive subscription of new stock, the price of South Sea shares rose spectacularly, and with it the share prices of other companies also rose.¹⁹

Such was the demand for this debt-for-equity swap that the books of the South Sea Company had to close from June 23 to August 22, 1720 to allow the clerks to catch up on recording all of the subscriptions received.²⁰ When transfer books reopened in August, the opening price was essentially as in mid-June. Immediately, however, the price of its stock began to fall, resulting in a general scramble for liquidity. In September 1720, the South Sea Company attempted to enlist the aid of the Bank of England in completing the debt conversion but this failed and prices continued to fall ending the year essentially where they had begun.²¹ Thus in the period during and immediately after the Bubble, the Bank of England was an important player in the market. The rise and fall of share prices in 1720 is called the South Sea Bubble. Bank of England shares started the

year at 150, rose to 180 in May and 250 in June, falling back to 147 on the last day of the year as shown in Figure 1.

3. Networks and Social Capital

The secondary market for shares that had developed by 1720 was anonymous as to social status, class, occupation, gender or religion, in that a person from any social class, gender, occupation, location (including foreign) or religion could buy or sell a share.²² Yet at the same time, the buying or selling of a share was often a face-to-face transaction and it is in this aspect that outsiders might have had a more difficult time than insiders connected by family, religions, or politics. The act of buying a share or stock on the secondary market also requires some level of information. The desire to buy a share presupposes that the person already has some information about what share purchase means and what benefits might accrue.²³ But it also requires knowledge on where to go, what to ask for, and what forms to file. Information of this type is a public good. One shareholder's knowledge does not impinge on what another shareholder can know. There are two potential and certainly not mutually exclusive sources of information and knowledge: the print media and networks.

The print media clearly diffused the information necessary for the effective operation of securities markets and such sources were widely available by 1720. Networks provide more informal links between people allowing them to reduce the costs of gathering information or providing easier access information, though access to such information did not always mean that the information was accurate.²⁴ Networks link individuals to information through other individuals. The importance of networks has been well

established in many different areas. Sociologists are particularly interested in how networks operate (Granovetter, 1974, 1985; Burt, 1987, Montgomery, 1990). Political scientists are interested in the ways in which networks affect the transmission of political information (Huckfeldt and Sprague 1995; Wasserman and Galaskiewicz, 1994). Economists examine the ways in which networks determine the propagation of crisis through contagion (Kelly and Ó Gráda, 2000; Schiller and Pound, 1989; Calomiris and Mason, 1997). In each case the authors seek to understand how the network operates and the ways in which individuals within the network are connected to one another.

By linking people together, networks provide their participants with benefits. At the same time, networks reflect both choice on the part of the individuals within the network and the social structures in which the individual is embedded. While an individual can choose with whom to spend time and share information, networks are partly determined by geography, occupation, social customs, religion and mores which in turn constrain the set of choices facing any single individual. Nonetheless, belonging to a network provides a short cut for acquiring information and evaluating the information. Networks, thus, are one mechanism through which the social capital of a society operates.²⁵ Networks change the costs of information and as a result of repeated interactions they also build trust and reciprocity between members of the network as they learn about one another.

The extent of the benefits and costs from any given network will vary by network. Obviously, networks are not all going to have the same characteristics. For instance, networks can be different sizes. Burt has argued that bigger networks are better than smaller ones because “more contacts can mean more exposure to valuable information,

more likely early exposure, and more referrals” (Burt, 1992: 16). Granovetter examining the question of frequency of interaction - where more frequent interaction means stronger ties - has focused on the strength of those ties. Interestingly, he argues that networks built on strong ties will quickly exhaust the information in the network, thus pointing to the ‘weakness of strong ties’ (Granovetter, 1973 and 1983). In contrast, networks based on weak ties can contain more new information because weak networks expose people to more information as they tend to tie diverse groups together. As a result of these loose links, individuals can move beyond what might otherwise be considered a tightly knit environment determined by geography or social structures.

The Jewish community in London in the early eighteenth century must have appeared to outsiders as a strong network defined by ties of kin, business, language and dress. But in reality there were not one but two quite separate communities; comprising the quite distinct Sephardic and Ashkenazi groups. Indeed, by 1700, both groups had their own Synagogues. The Sephardim worshiped at the Bevis Marks Synagogue originally located in Creechurch Lane but in 1694 a new synagogue in Plough Yard was built “on the condition that it was built away from the highway so as not to arouse any offence among the surrounding populations” (Rubens:117).²⁶ The Ashkenazi Synagogue was close by in Duke’s Place in the East End of the City. Members of both communities tended to live in the City of London just beyond the City wall within walking distance of the synagogues. The proximity enhanced by geography would have created stronger ties further reinforced by language with the Sephardim speaking Ladino, Portuguese or Dutch and German or Yiddish for the Ashkenazi community. At the same time, these Sephardic and Ashkenazi communities were not monolithic. There were splits and divisions within

each.²⁷

The ties that bound the Sephardic and Ashkenazi communities were of course the very ties that separated them from one another and from the larger London communities. Language, religion, dress and the use of one's own shops and shopkeepers reduced the number of interactions between Jews and everyone else and more readily defined Jews as outsiders. Clearly, the non-Jewish community was not homogeneous either being comprised of separate but interlocking groups. These groups did however speak a common language defined more broadly by kin, business, politics and religion. These overlapping circles created social capital generating bonds of trust and reciprocity between and across these different circles. These overlapping circles, therefore, created *bonding* and *bridging* social capital, to use the terminology of Woolcock, encompassing these ties between family, neighbors and work (2001:13-14). The majority of London Jews would not at this time have had access to these two particular forms of social capital, although there are instances of marriage between Jew and Gentile. Woolcock, however, also defines *linking* social capital as that which allows connections between groups who are dissimilar and thus creating the weak networks of Granovetter.

By 1720, coffee shops had become a focal point of activity for the burgeoning stock market and so a location for the emergence of bridging social capital. As focal points, Jonathan's and Garraway's coffee houses in Exchange Alley (shown in Figure 2) reduced the cost of information gathering and made it more convenient for buyers and sellers to locate counterparties and also to find a broker. But for the more observant members of the Jewish community, these coffee houses themselves were problematic. It was not that observant Jews did not drink coffee. We know there were coffee houses in

the Jewish ghettos of Venice and Verona. Indeed, in response to a question in the sixteenth century about coffee and coffee houses, Rabbi David ibn Abi Zimra (d. 1573) wrote that he saw no problem with the beverage being prepared by a non-Jew, both because separate utensils were used for coffee and because it was too insubstantial an item to fall under the prohibition of *bushulei nokhrim*. Coffeehouses were another matter entirely, prompting him to state:

..., I do not consent to its being drunk at a meeting place of non-Jews, for this has some undesirable consequences and the Jews are holy ... (Horowitz:22)

Not all Jews in London were observant. But an inability to access information and counterparties at a coffee house would further reduce ties between the minority and majority groups.

Language, religious observance, diet, dress and language or an overall lack of bonding, bridging and linking social capital all suggest that Jews should not be heavily involved in the secondary market for shares in London. They were very clearly outsiders. Yet historical and contemporary descriptions of London Jewry state that members of this community were major players in the capital market as stock jobbers and brokers. This is made most clear in the anti-Semitic rhetoric that followed the Jewish Naturalization Bill of 1753:

They deal largely in the Mysteries and Iniquities of Stock-jobbing, and get vast Estates by plundering the Publick They are all griping UsurersIt can never be to our temporal Interest to see such Persons made Englishmen, and I am certain it can never be the Interest of our Religion. (Cranfield:21)

According to 'Britannicus', a pen name for one of the more forceful writers for

London Evening-Post, rich Jews did not engage in trade which was so vital for England's survival, but rather made their money in "Stock Jobs, Lotteries, and other iniquitous Arts of Exchange Alley" (Cranfield:21). The London Evening-Post was more concerned with inflammatory rhetoric than facts.²⁸ Yet if the local population believed that the Jews were a "knavish people, who will over-reach and cheat you if they can" ... "so dextrous in bargaining that it is impossible for Christians to expect any advantage in their dealings with them" (Endelman, *Georgian England*:98), it is difficult to see how any member of either the Sephardic or Ashkenazi community could act as brokers for the larger non-Jewish community. How networked and how integrated the Jewish community was in the 1720 London capital market is fundamentally a question of measurement, to which we now turn.

4. Bank of England stock and its Jewish Shareholders

Joint-stock companies kept exceptionally good records of who owned their stock. They did so for two important reasons. The first was that they had to know to whom to pay dividends. The second was that the boards of directors were elected. Eligibility to vote or to sit on the board of directors (Court of Assistants) required ownership of different numbers of shares. Because these companies had to know how many shares an individual owned, transfers of shares were recorded. Here we focus on transactions in the Bank of England shares which by 1720 were the blue-chip stock in the market.²⁹ The transfer ledgers (AC28/1545-1554) note the name, address, occupation or social status, date, and book value of the transfer, for every seller and buyer of Bank of England stock. These records, thus, give us an accurate picture of the spot market for Bank stock. The

records do not tell us about the forward market nor do they tell us the exact price at which the transaction took place. However, from the financial press we know the daily listed price.

We use name as the leading indicator for whether someone was Jewish. Given the recency of their arrival in London, members of the Sephardic community are relatively straightforward to determine - Pereira, da Costa, Nunes, Fernandez, Peixota, Macado, for example. Members of the Ashkenazim from Eastern Europe such as Moses Hart and Isaac Levy are perhaps less readily identifiable. We have therefore coded all male individuals with biblical first names - Moses, Abraham, Isaac, Solomon - as Jewish. This, of course, is going to be an upper bound estimate in that some individuals were baptized Catholics or Anglicans or were Dissenters.³⁰ But this very broad brush provides us with an outside estimate of the Jewish market network.

Over 1720, the book value of transfers of the Bank of England stock was £6.2 million.³¹ With a book value of capital stock at £5.5 million and recognizing that not all who owned stock sold during the 1720, the volume of activity in the market for Bank of England stock is very large. There were 7,275 transactions of Bank stock 3,872 individuals: either as buyer, as seller, or as buyer and seller.³² The vast majority of these individuals were in the market only once, as either a buyer or seller. Of these almost 4,000 unique individuals, we have only 166 persons whom we can define as Jewish.³³ This is 4.3% of all unique individuals. In contrast, there were 594 unique women who were active in the market, only 4 of whom were Jewish.³⁴ Of these, 166 individuals, 93 both bought and sold shares; the other 73 were either only buyers or only sellers. Thus in terms of just the number of investors, London's Jews were a small fraction of the market

in Bank stock.

Of course, the number of unique individuals is only one measure of market penetration because a single individual could have many different transactions. By our estimate, Jews were involved in 656 sale transactions and 824 purchase transactions for a total of 1480 transactions of which only 166 were between two Jews. So the majority of transactions were between the Jewish and Gentile stockholders. Jews were the sellers in 9% of sale transactions, and purchaser in 11% of all purchase transactions, meaning that Jews were involved in roughly 20% of total transactions in Bank. Despite the prevailing stereotypes and fears, a Jew was on one side of one fifth of all transactions in Bank of England stock across 1720.

Jews, thus, comprised only 4% of the individuals in the market for Bank stock but were involved in 20 % of transfers with most being involved in only one or two transactions as with the population at large. When we consider the value of this activity, we find that the book value of sales was £512,949 or 8% of the total book value of transfers; book value of stock purchases was £669,882 or 11% of the value of purchases. Jews were, therefore, net purchasers of Bank stock which we discuss further below. The average book value of transfers by Jews, whether buying or selling, was significantly larger than the average sale or purchase for the market as a whole: £3,090 for sales and £4,035 for purchases relative to £871 per capita for the whole market (Carlos and Neal: 507).³⁵

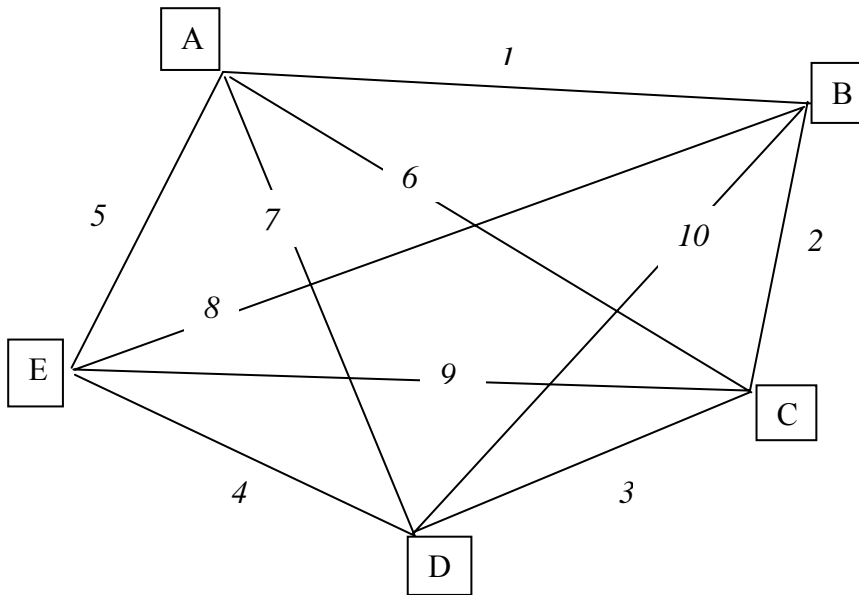
As shown in Figure 1, price changes in Bank stock were not uniformly spread across 1720. Prices start to rise in April and May reaching their zenith in July. August and September see falling prices and by the end of the year, prices were where they were

in January. The monthly pattern of sales and purchases by Jews is shown in Tables 1a and 1b. Given our concern that Abraham Craiesteyn might not be Jewish, we show monthly sales and purchases including and excluding Craiesteyn. While the numbers change slightly, the main results carry through in all cases. In the first six months of the year, Jewish shareholders were involved in less than 10% of sale transactions by month. Their sale activity rose in the next six months reaching 18% and 15% of all transactions in November and December, respectively. As buyers, Jews again comprised less than 10% of purchasers in the first six months of 1720. However, they became especially important as a group after the down turn of the Bubble. Jews were involved in 12% of purchases in July but as much as 29% in August and 21% in September. Purchases then fell back to roughly 11% to 14% of monthly activity for the last three months of the year. The distribution of activity by book value shows the same pattern. In August, London Jewry purchased £146,714 book value of stock or 26.5% of the total book value of stock purchased in that month. Thus, just as the price of South Sea stock was plummeting in August and September and the resulting scramble for liquidity was driving down the price of Bank of England stock, Jewish purchases helped stabilize the price of Bank stock and slow its decline, while as net purchasers they increased their representation among the stockholders eligible to vote in the annual general meetings.

This increased representation of Jews in the market for Bank of England stock is striking. The book value of Bank shares purchased in August 1720 was almost three times the book value in the previous month. Non-Jews in the market were clearly willing to sell to members of the Jewish community whatever their own personal perception of that community might have been. Social network analysis allows us to look at the pattern

of activity more spatially and to better understand how people were related to one another within the market for Bank stock.³⁶ Each transfer links an individual seller with an individual buyer. Each such pair of agents and the tie between them is called a dyad in network analysis. For any two separate individuals in the market for Bank stock this dyad can take one of four different forms: no connection between two given traders (0,0); trader 1 buys from trader 2 but not the reverse (1,0); trader 1 sells to trader 2 but not reverse (0,1); and trader 1 buys from and sells to trader 2 (1,1). While the relationship between individuals in Bank stock is not necessarily symmetric, it is directed in that someone who wants to buy has to find someone who wants to sell.

In this framework, we can measure the links between individuals via a set of network metrics. *Density* refers to the number of *actual* links in the network compared with the number of *possible* links. For example, if g defines the number of nodes or actual agents, then $g(g-1)/2$ represents the maximum number of lines in the network graph. For example if $g=5$, then the maximum number of possible connections between these five agents is 10 as shown:



Of course, the actual number of links between these five agents could be zero. So if L represents the number of actual links between agents, density is measured as $2L/g(g-1)$ or the number of actual links relative to all possible links. As the number of possible ties increases exponentially with the number of agents, the density measure decreases with the size of the network and so it will be very small when there are a very large number of possible linkages. *Distance* measures the shortest path between any two agents, n_i and n_j , such that $d(i,j) = d(j,i)$. Essentially, these two measures give us a summary of the how agents are related within the market. In the schematic given above the distance is one link from any agent to another. Reflecting the large size of our network, the density measure for the whole market for Bank of England shares is very low at 0.0005.³⁷ Even with the

low density coefficient, all pairs of traders are loosely connected in this market through the movement of stock, in that A sells to B who then sells to C.³⁸ For Bank of England shares in 1720, the average distance between agents was 4.593. One can think of this as the degree of separation between traders and implies that on average any two traders in the network were connected through only three to four other traders

As we noted above, London Jewry comprise a very small part of this very loosely connected market. But they are part of this market. If we only consider all transactions that involve a Jew and calculate density and average distance on this reduced network, density increases to 0.0011 as expected. The average distance between reachable pairs is now 3.16. However, not all actors were equally involved in the market. Indeed, as we noted earlier nearly 80% of all, Jew or non-Jew, who bought or sold Bank of England stock had at most two transactions (Carlos and Neal: 511). Although this pattern also held for the Jewish community, proportionally more Jews were involved in more than two transactions. For instance, roughly 9% of all Jewish traders were involved in ten or more transactions, whereas for all involved in Bank stock, the proportion is roughly 4%.

The most important Jewish traders in Bank stock were Francis (Aaron) Pereira who had 62 sales and 109 purchases and Moses Hart with 31 sales and 41 purchases. Francis Pereira was Sephardic, while Hart was Ashkenazi. Both were central players in the market for Bank stock. The centrality of an individual describes how an individual actor is situated within the larger market. *Degree Centrality*, for instance, is measured along two directions: *out degree*, which in our case relates to the number of sales, and *in degree* which measures number of purchases.³⁹ As is evident from the number and size of his transactions in the Bank transfer ledgers, Francis Pereira has the highest level of

centrality, followed by Moses Hart.⁴⁰ More importantly, however, measured across all agents and transactions, Pereira ranks eleventh and Hart twelfth in terms of out degree (sales), and fifth and thirteenth, respectively, in terms of in degree (purchases). Both men were broker/jobbers standing ready to buy and sell from any wishing to sell or buy, which argues for a degree of connectedness with the market as a whole and for a willingness by non-Jews to interact with both Pereira and Hart.

If *degree centrality* refers to the number of transfers carried out by an agent, *betweenness centrality* describes who was most central within the flow of transfers such that the agent acted as a node for transfers between others. By this measure, Francis Pereira ranks fourth in the whole market behind Sir George Caswall, Robert Westley (a merchant tailor) and James Martin (goldsmith). Moses Hart lies seventh. It does not appear that the Sephardic and Ashkenazi communities in London were closely connected even in terms of their common interest in the active securities trade that had arisen in 1720. Of his 62 sales, Francis Pereira, the wealthiest Sephardi in terms of Bank stock, had only one sale to Moses Hart, a member of the dominant Ashkenazi congregation, and Hart had only one sale to Pereira. This possibly more than any other number points to the separation within London Jewry even if they were seen by outsiders as one. Indeed, in the ranking of the top fifteen agents in terms of *betweenness centrality* measures, there are two other members of the Sephardic community: Anthony da Costa and Solomon Pereira, and also Abraham Craiesteyn who perhaps was not Jewish but was tightly connected with the community in Amsterdam.

This *betweenness centrality* is measured across all of 1720. However, the centrality of Pereira and Hart changed quite dramatically over the course of the Bubble.

In January, Francis Pereira had only two sales: to Anne Saville and Joseph da Costa, while Moses Hart had no transactions. Schematically for Pereira, these are the equivalent of two rays from a node (such as lines 1 and 5 from node A in prior schematic). In March, Pereira again had only two transactions: buying from Sarah Maria Trip (wife of a leading Amsterdam merchant) and selling to John Furly. By June, Pereira was buying from and selling to more people. A diagrammatic representation of his June activity is given in Figure 3 with the arrows showing the direction of flow of shares. Despite the larger number of transactions, only one took place with another Jew, Ferdinand Mendes. However, four of his seven purchases were from sellers living in Amsterdam. Pereira had one transaction of £3,000 with Michael Court of Amsterdam. One of his other transactions was from a fellow broker, Johanna Cock, who was also connected with the Dutch community.⁴¹ His mercantile and family connections to the Amsterdam community would have been strong and in his will, he left money to the Synagogue in Amsterdam.⁴² In addition his daughter married and lived in that city.

By August, Pereira had become a major player in the market, with ten sale transactions and 43 purchases. Indeed, he may have been the most important figure in the market in this month. Figure 4 shows a much more complex and dynamic situation than any month earlier. Relative to the hub and spoke pattern of July, August is much more complex with interactions between sets of individuals revolving around Pereira. Even though Pereira has only ten sales in August, seven were to other members of the Sephardic community and with an extremely large sale of £6,000 to Peter Delmé, another major broker of Bank stock.⁴³ His purchase pattern is much more diffuse: six came from Amsterdam and four from other Jews, including one from Moses Hart, but most of his

other purchases were from individuals who themselves involved in large numbers of transactions and so might be considered in the middle levels of those active in Bank stock. Unlike Westley, whom we discuss below, Pereira is not buying from the small seller. By October, the number of his transactions has fallen to only eight for the month and he ends the year as a net purchaser of Bank of England of over £50,000 book value of stock. Francis Pereira ended the year holding £93,105 book value of stock and continued to be a major shareholder in Bank stock during the 1720s.

Our centrality measures have Moses Hart as a central player in the market. However, he is important in only a few months. Whereas Pereira was involved in 171 transactions, Hart was involved in only 72. And while Pereira was in the market in January, Hart did not have his first transaction in Bank stock in 1720 until May when he sold £500 book value of stock to John Fermor, an Army Colonel. In June seen in Figure 5, Hart was involved in a larger number of transactions, but as with Pereira, six of his nine purchases are from sellers living in Amsterdam and three of his sales are to Jews and, three sales on different dates to George Caswall, one of the top two brokers in Bank stock. So again in the London market, Hart interacted at the top levels of the financial community. But even this level of activity did not continue. In contrast to Pereira, his August transactions were less complex (Figure 7) and he ended the year with a zero net position in Bank of England stock over 1720, confirming his official role as a broker, not a jobber.

5. Analysis

Francis Pereira and Moses Hart were important players in the market for Bank of

England stock in 1720, but they are not the largest players. The two most important broker/jobbers in Bank of England stock were Sir George Caswall and Robert Westley, who had the highest centrality measures. During 1720, Sir George Caswall had 214 purchases and 240 sales of Bank stock; Robert Westley had 199 and 254. Caswall and Westley came from very different strata of London society. Caswall was a knight and a member of the elite, while Westley was a merchant tailor. By and large Westley bought and sold from those further down the social ladder: shopkeepers, textile workers and smaller merchants. The difference in their clientele can be seen in the book value of transactions. Despite having roughly the same number of purchases, the book value of Westley's purchases for 1720 was £105,556 while for Pereira it was three times larger at £336,197.

Caswall and Westley operated in different parts of the market. Where Caswall had six sales over £10,000 book value with the largest being a sale of £30,000 to Samuel Strode who is listed as a stationer and his smallest book value sale at £200, Westley had 26 sales with a book value less than £100 with one at £3; his largest was £4,800 to an army colonel, Charles Matthew. The segmentation of the market by income or social class is also visible in that none of Westley's 254 sales were to members of London's Jewry, even to Pereira, Hart, da Costa, Levy or Medina. He did have one purchase of £700 from Solomon Medina on 3rd November 1720. In contrast, Pereira both bought from and sold to Hart and Pereira. Figures 7 and 8 describe the June transactions for both men. Another feature of Westley's transactions in June's 41 sales was that few were outside of London and none with shareholders in Amsterdam. Pereira, by contrast, was clearly engaged with Amsterdam's merchant community, both Jewish and non-Jewish.

Despite the overall importance of Caswall and Westley for dealing in Bank stock during 1720, Francis Pereira and other members of the Jewish community were the critical players in August, when the Bubble began to break. In 43 purchases, Pereira bought £39,000 of Bank stock. He laid off £20,000 in the ten separate transactions described above; six of which were to other members of the Sephardic community: Jacob, Abraham, and John da Costa; Jacob Henriques, Lewis Mendes and Francisco Duarte in Amsterdam. He also had a £6000 sale to Peter Delmé another top broker/jobber in Bank stock who was also dealing regularly with the Amsterdam merchant elite.

August was a critical month for the financial sector. It saw the downturn in share prices and the beginning of the end of the Bubble. In essence, the Sephardic community stepped in to act in the role of modern central bankers helping to slow down the fall in prices and perhaps to provide a much softer landing for this Bubble, at least for Bank stock. Without the actions of Jewish shareholders in the market in August and September, prices for Bank stock would have fallen far faster than they did. Pereira's role in August is evident in the pattern of his sales and purchases and in the network graph of his position in the market. But hidden within these data and graphs is the fact that Pereira may also have been stepping into the market to replace Sir George Caswall, who as a director of the South Sea Company, was spending some months in the Tower of London. From being the most important broker for Bank of England stock, Caswall had just two transactions in August. And Robert Westley had only 12 purchases. Indeed, Westley probably did not have the financial resources to buy £39,000 book value in one month as did Pereira. A counterfactual world where there had been no change other than

Caswall's removal might have been one in which the market responded with a much faster decrease in price. In such an event it is not impossible to conceive that there might have been significantly more disruption within the financial and mercantile communities as prices fell more precipitously and with that the value of collateral with the financial community also plummeting.

There were Jews, mainly Sephardic but some Ashkenazi, embedded in the secondary market for Bank stock. If we think of the market as a pyramid from large brokers at the top down to the incidental or small traders at the bottom, or as sets of concentric circles with the large broker/jobbers in the center, and smaller broker/jobbers farther out, Jews entered into contact with the market both at the top or in the center, and from a periphery. Patterns of purchases show a much closer connection to Amsterdam than to London. Jews were using their social capital to link friends and family and community in Amsterdam to the burgeoning market in London. Pereira and Hart are very much part of an elite financial community connected in London to the other large brokers where their financial assets rather than their religion would have been important, rather than as part of a more broadly diffused London market. Hart, for example, was an agent for William Law in Paris who was buying South Sea stock.⁴⁴

The pamphlet literature and the public press in mid century played on the idea that Jews were a 'knaveish people'; dishonest and unscrupulous, ready to cheat others in order to make money. Their activities across the South Sea Bubble allows us to look more closely at this ascertain. Bubble periods are ones in which people have the opportunity to make speculative gains or losses. Our previous work estimated aggregate gains or losses

for all involved in the market for Bank of England stock across 1720. It showed that, on aggregate, the almost 4000 individuals had a net loss of -£7 per head (Carlos and Neal:516-517). However, the gains and losses were unevenly distributed. Men on average lost -£14 per head, while women made £25 per head.⁴⁵ When we consider how the Jewish community fared, we find that as a group they experienced serious financial losses as a result of their activities in the market for Bank of England stock. As a result of their transactions, Jews in the market ended the year as overall net purchasers of Bank of England shares. These shares cost them £360,000 or £2,169 per head. Valuing the shares at 147, the price on December 30 1720, Jews in the market had speculative losses of -£780 per person. They had purchased shares when the market price was high and by the end of the year the price had fallen. Thus far from being a knavish people who were “so dextrous in bargaining that it is impossible for Christians to expect any advantage in their dealings with them”, London’s Jewish investors in Bank of England stock lost heavily during the Bubble.

There is no question that the Sephardic community used its financial capital to smooth the downturn in the market for Bank of England stock. Whether this was done deliberately or accidentally is something that we currently do not know. On the one hand, it is perhaps easy to think that perhaps this was a ‘price of admission’ for greater access and acceptance. Endelman (2002:66) has argued that intensive social interaction between Jews and non-Jews took place at top and bottom of the social ladder. For instance, he gives the example of Samson Gideon who married a Protestant, baptized his children and whose daughter married the second Viscount Gage with a dowry of £40,000 and obtained a baronetcy for his son. Certainly, the da Costas and the Pereiras along with

other Sephardic families bought country estates in Surrey and Stanmore.⁴⁶ Yet assimilation probably took place on a family by family basis. When Anthony da Costa applied for admission to the Russia Company seven years after the South Sea Bubble, he was refused. Even when the Attorney General took his part, he still was not admitted. (Endelman, 1979:23)

Perhaps more compelling is to argue that the memory of financial panics in Amsterdam in the 1680s and earlier in the century in Vienna made London's Sephardic community especially aware of the consequences of a collapse of the financial system which would have brought bankruptcies and panic not just within the financial sector but also to other closely connected sectors. Bankruptcies or collapse in the financial market would have quickly spread to the mercantile and international trading sectors. It is perhaps not unreasonable to think that London's Jews were protecting their own large trading and mercantile networks.

Table 1A - Number of Transactions by Sale and Purchase

	Number of Transactions by Month	Sale Transactions Jews Only ¹	Sale Transactions by Jews (%)	Buy Transactions Jews Only	Buy transactions by Jews (%)
January	325	12 (8)	3.69 (2.46)	19 (18)	5.85 (5.54)
February	821	50 (46)	6.09 (5.60)	48 (43)	5.85 (5.24)
March ²	289	14 (11)	4.84 (3.80)	25 (20)	8.65 (6.92)
April	775	26 (22)	3.35 (2.84)	44 (38)	5.68 (4.90)
May	1131	90 (73)	7.76 (6.45)	96 (96)	8.45 (8.45)
June	937	93 (80)	9.93 (8.54)	76 (75)	8.11 (8.00)
July	507	59 (55)	11.63 (10.85)	62 (57)	12.22 (11.24)
August	698	55 (45)	7.88 (6.45)	203 (195)	29.08 (27.94)
September	416	53 (49)	12.74 (11.79)	88 (85)	21.15 (20.43)
October	411	47 (46)	11.44 (11.19)	45 (40)	10.95 (9.73)
November	536	94 (92)	17.54 (17.16)	58 (46)	10.82 (8.58)
December	429	63 (58)	14.68 (13.52)	60 (55)	13.99 (12.82)
Totals	7275	656 (585)		824 (768)	

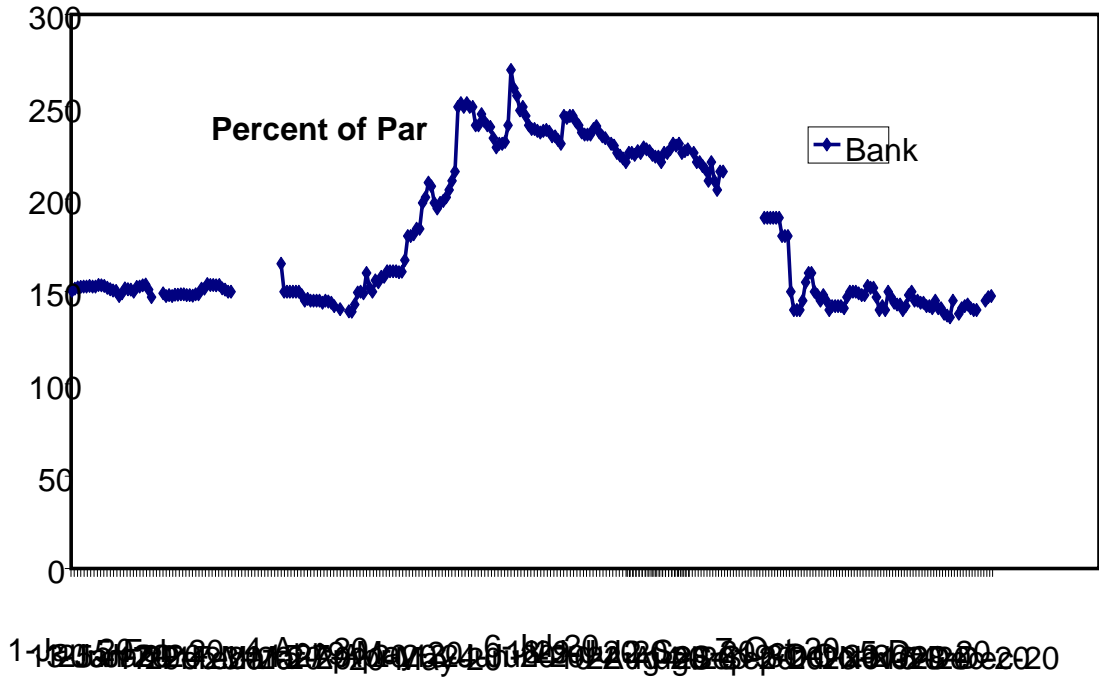
Table 1B - Book Value of Transfers by Sale and Purchase

	Book Value of Shares Sold by Jews	Book Value of Shares Sold by Jews (%)	Total Book Value of Transfers	Book Value of Shares Purchased by Jews	Book Value of Shares Purchased by Jews(%)
January	10,750 (5,750)	2.81 (1.50)	382,007	14,650 (14,150)	3.84 (3.70)
February	78,400 (73,900)	7.99 (7.52)	981,533	68,700 (64,700)	7.00 (6.82)
March	13,500 (10,500)	4.48 (3.48)	301,632	23,800 (18,800)	7.89 (6.23)
April	21,600 (18,600)	3.15 (2.72)	685,122	36,750 (32,050)	5.36 (4.68)
May	80,109 (60,609)	8.34 (6.31)	961,023	78,590 (78,590)	8.18 (8.18)
June	68,806 (61,206)	10.21(9.08)	673,948	62,347 (61,347)	9.25 (9.10)
July	31,429 (28,429)	8.17 (7.39)	384,547	57,000 (53,200)	14.82 (13.83)
August	30,994 (25,494)	5.59 (4.60)	554,227	146,714 (138,514)	26.47 (25.00)
September	33,979 (29,479)	10.43 (9.05)	325,672	65,129 (63,129)	20.00 (19.38)
October	36,100 (35,100)	9.94 (9.67)	363,051	34,200 (30,300)	9.42 (8.35)
November	65,432 (63,932)	18.56 (18.13)	352,524	42,277 (35,027)	11.99 (9.94)
December	41,850 (35,850)	14.63 (12.53)	286,083	39,725 (36,725)	13.89 (12.84)
Totals	512,949(448,849)	8.21 (7.18)	6,251,369	669,882 (626,538)	10.72 (10.02)

¹ The number in brackets refers to the total without Abraham Craiesteyn throughout the tables.

² The transfer books were closed for two weeks in March for the semi-annual dividends.

Figure 1. Bank of England Stock, 1720



Source: Neal, Rise of FC.

Figure 2. Coffee Shops in Exchange Alley.

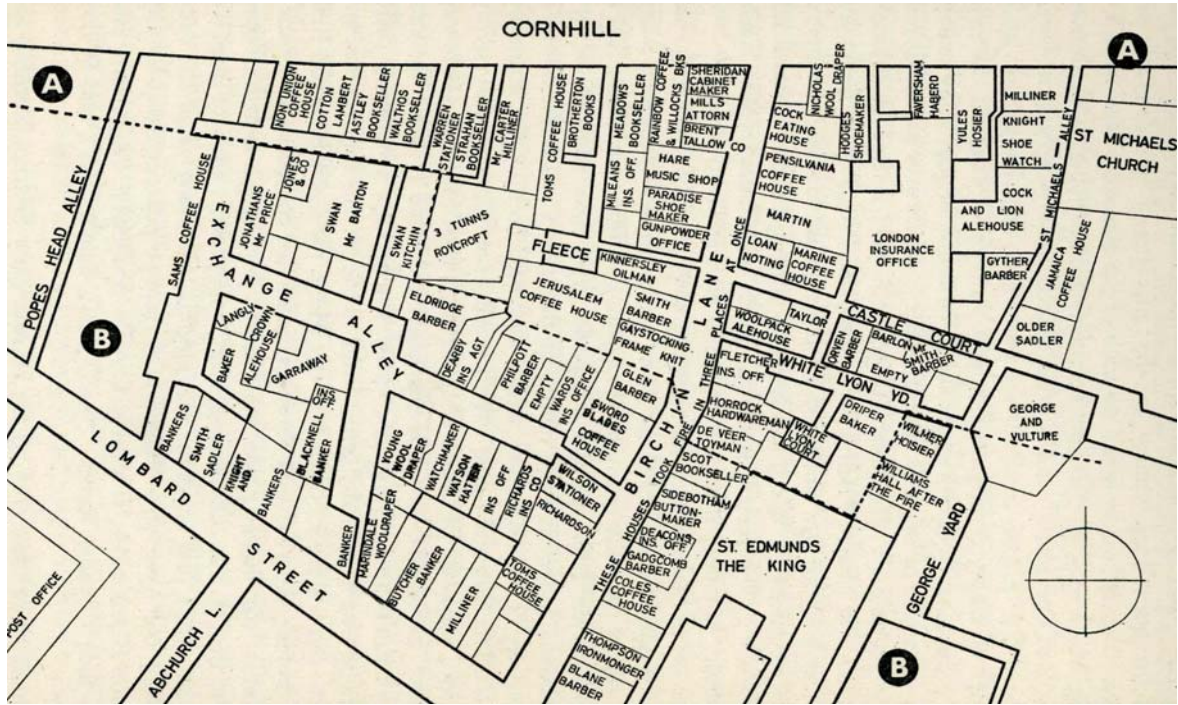


Figure 3: June Transactions of Francis Pereira

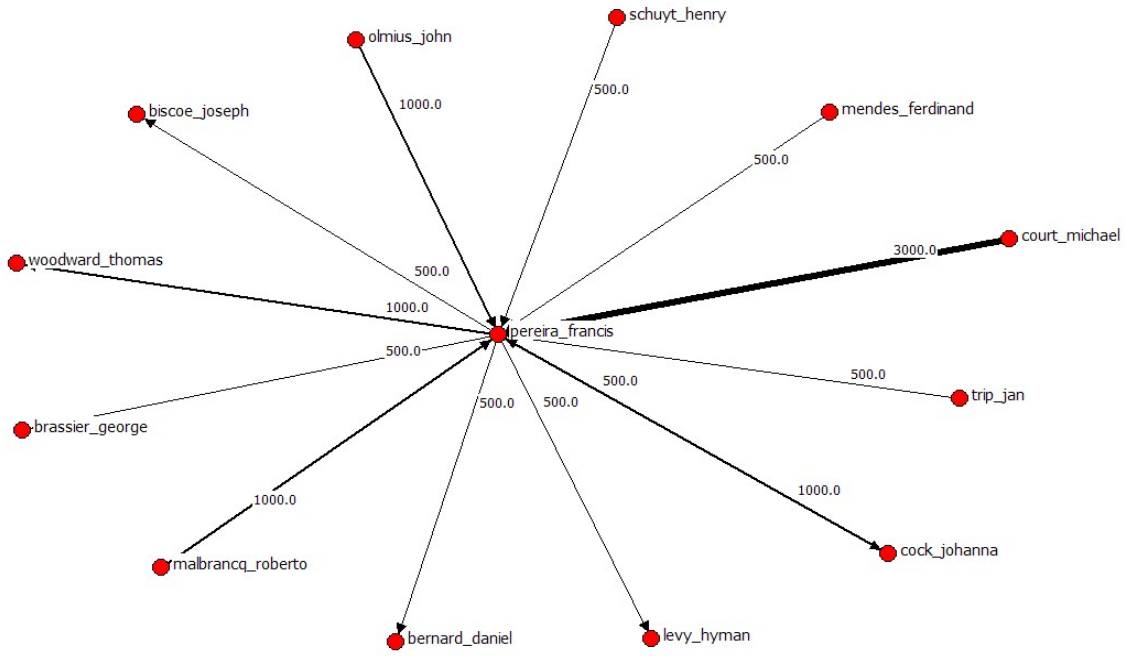


Figure 4: August Transactions of Francis Pereira

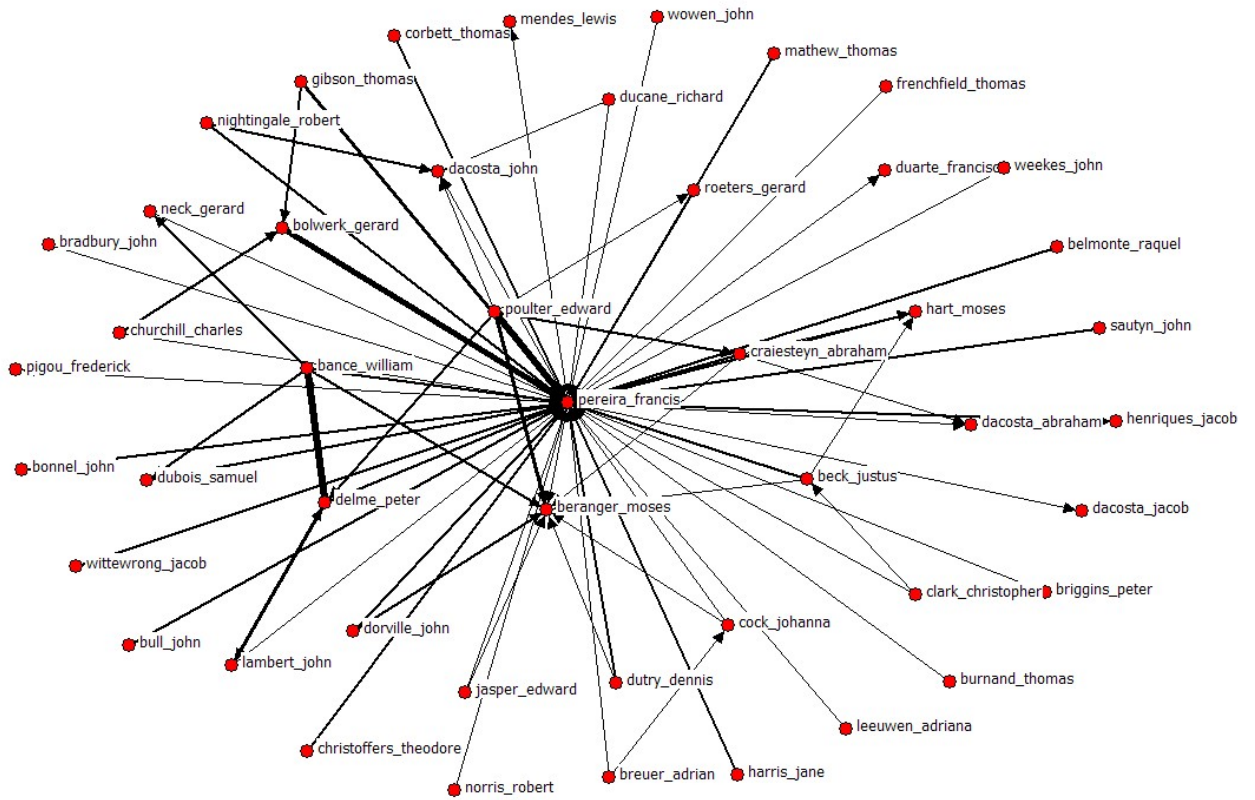


Figure 5: June Transactions of Moses Hart

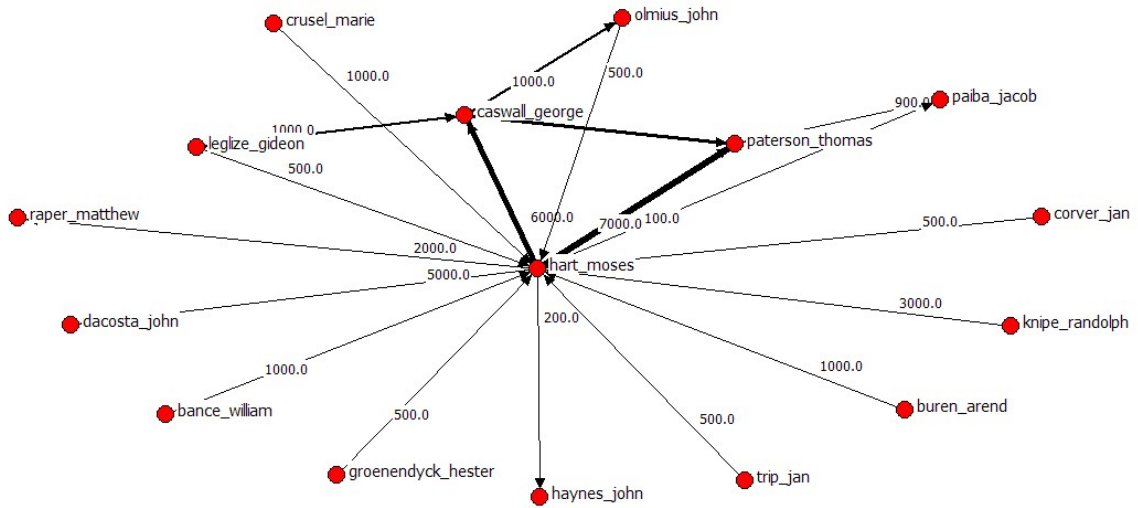


Figure 6: August Transactions of Moses Hart

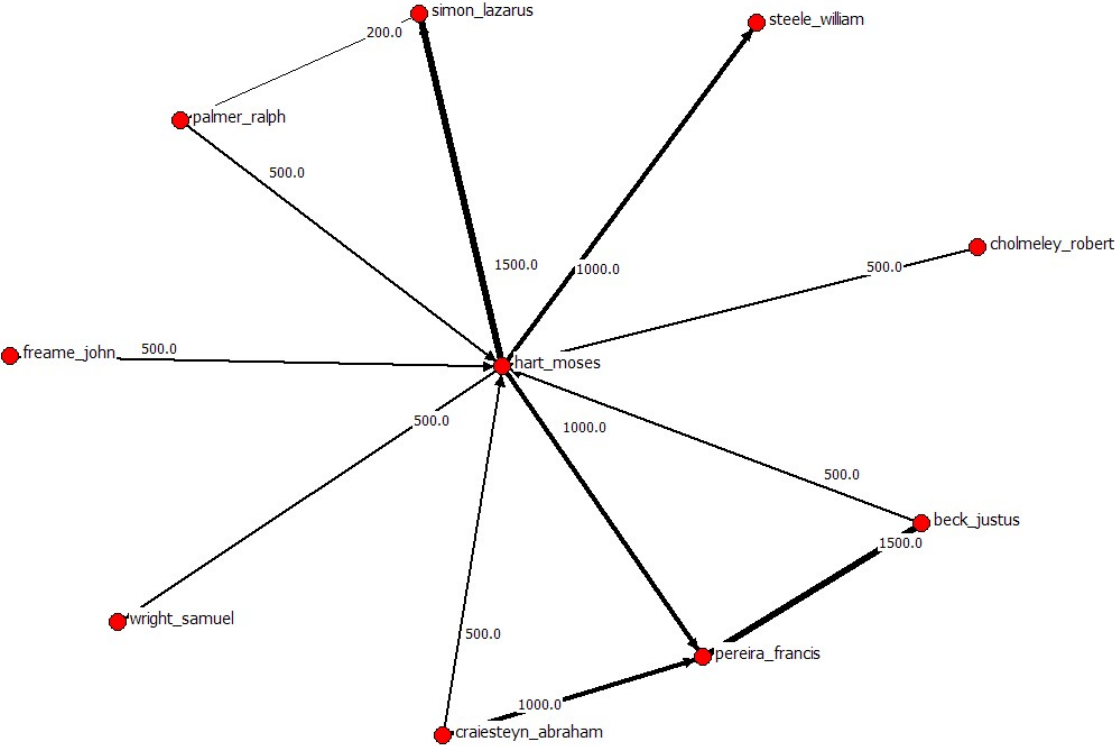


Figure 7: June Transactions of Sir George Caswall

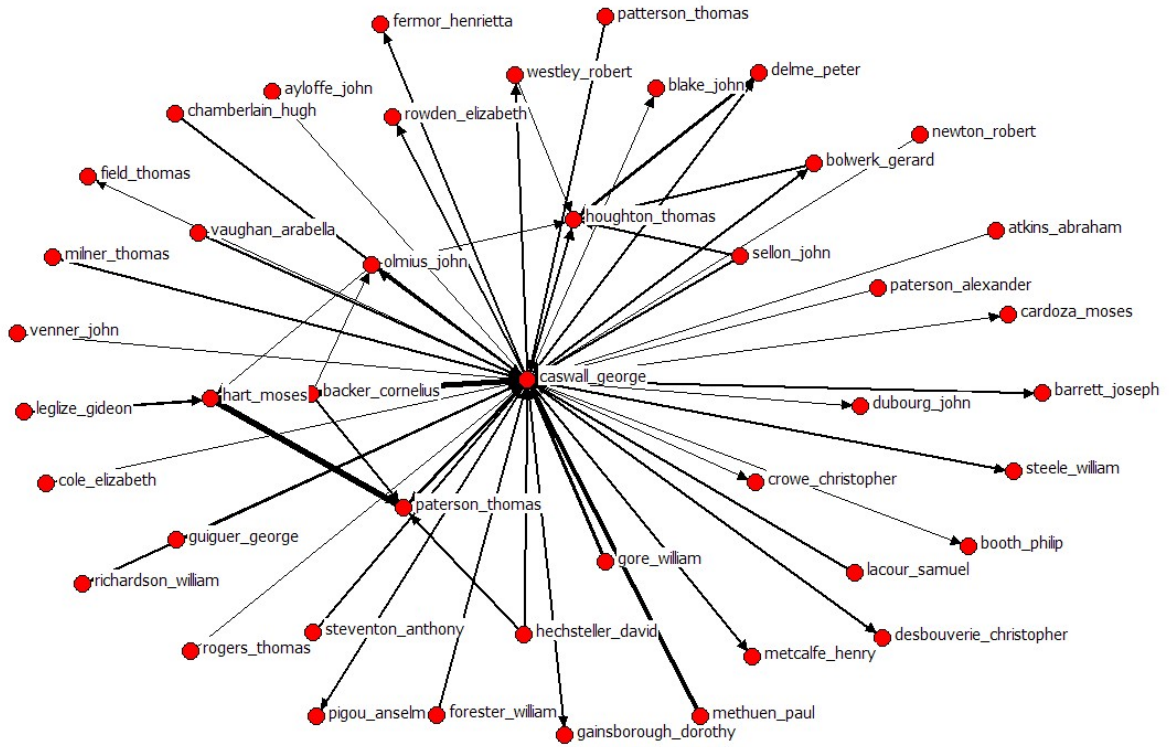
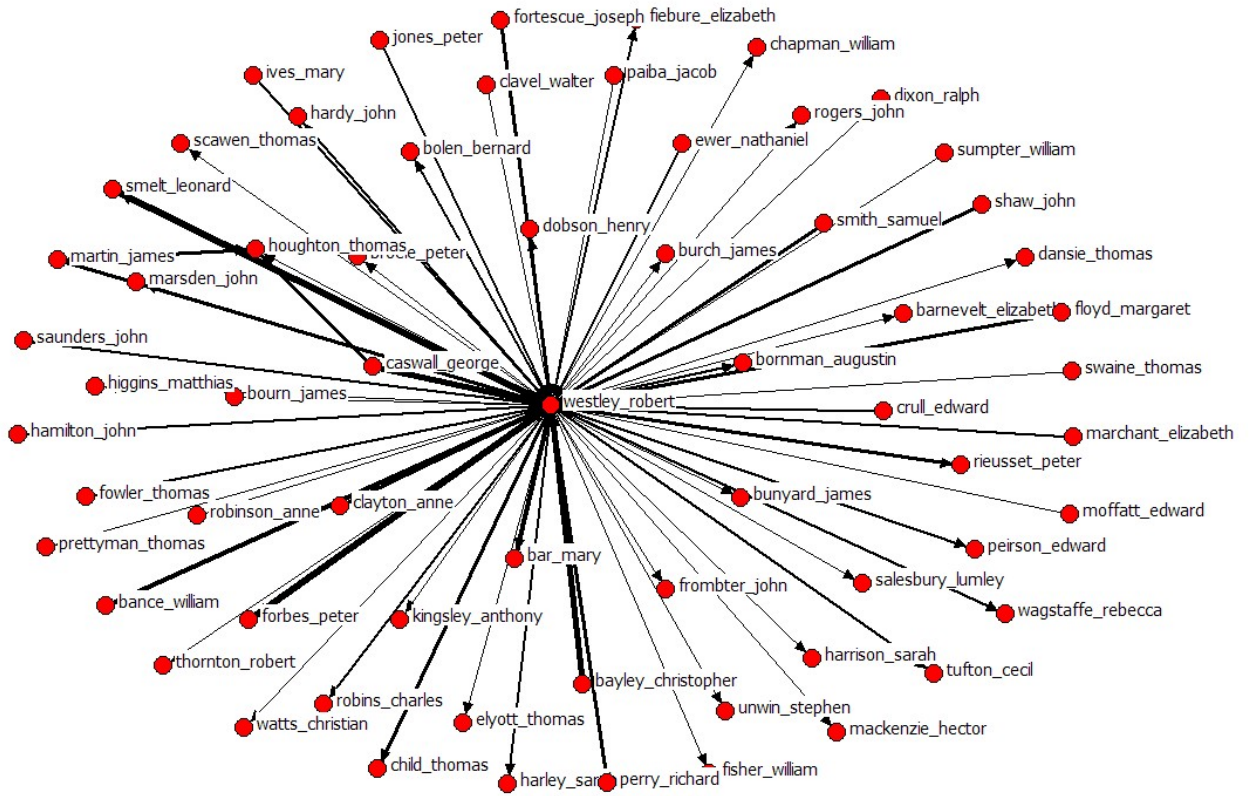


Figure 8: June Transactions of Robert Westley



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¹ Quoted in Endelman, *Georgian England*: 98.

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- ² We are using the term broker to mean someone who stands ready to buy or sell. We are not using it to mean a legal broker which was defined by law and limited in number.
- ³ There is both an extensive literature in history on networks generated by kinship, religion and politics and a correspondingly large, albeit separate, literature on the impact of kinship, religion and politics on social capital.
- ⁴ For a broader discussion of the role of brokers in the Bank of England stock, see Carlos, Neal and Wandschneider, working paper, 2007.
- ⁵ Much of the discussion that follows comes from Endelman, *The Jews of Britain*.
- ⁶ Some had settled in London in the sixteenth century but all Portuguese had been expelled at the end of the century, some having been accused of being Judaizers.
- ⁷ Based on rabbinic theory derived from Ezekiel 4:6 (Healey:75) taking a day to represent a year, the mathematically inclined estimated that the millennium would occur in 1655 or 1656.
- ⁸ In addition there were petitions such as Manuel Marinez Dormido, a Spanish merchant, who asked Cromwell to allow Jews to be “dwellers here [England] with the same equalness and conveniences which your island born subjects do enjoy.” He also asked that Cromwell petition the Portuguese crown to restore his fortune (Endelman 2002:23).
- ⁹ See Endelman (2002) for a more complete description of these attempts at expulsion.
- ¹⁰ But by the end of the seventeenth century not all Jews were foreigners. Anyone borne in England was English. Thus by birth, members of the Sephardic and Ashkenazi communities were English and thus were able to buy and own property, although as Jews they could be expelled. In 1667, the Court of the King’s Bench ruled that Jews could give evidence in court allowing them to swear on the Hebrew Bible and in 1684, Jews were allowed to sue for recovery of debts owed to them (Endelman 2002:36).
- ¹¹ Historians have argued that Jews were excluded from chartered trading companies, see Endelman 2002:36, such as the Russia or Levant companies. Both of these companies were organized in the mid-sixteenth century. Indeed, the Levant was not a joint-stock trading company but rather regulated company. Regulated companies are more akin to clubs which admit members selectively than to companies whose stock trades independently on a secondary market.
- ¹² Jonathan’s became the physical site of the London stock exchange.
- ¹³ The book value of a single share was £100. Most companies required ownership of some number of shares to vote and even more to be elected to higher office. The actual value of a share was determined by the market and could be above or below par. A share could be subdivided and so a person could own one-tenth of a share, for example. See Scott *Constitution and Finance* for a discussion of individual charters and voting rules.
- ¹⁴ In competition to Castaing was Freke’s *The Price of the Several Stocks* which ran from March 1714 to June 1722.
- ¹⁵ It also included notes on the days of dividend payment for the major government stocks and the numbers on tallies that were currently being paid off by the Exchequer.
- ¹⁶ See Neal, *Rise of Financial Capital*, ch. 2 for a more extensive discussion of the development of this information network.
- ¹⁷ Dickson, *Financial Revolution*, ch. 5. These amounts are all in 1720 pounds. See www.eh.net, How much is that? for the current equivalent.
- ¹⁸ The contract drawn up between the Government and the South Sea company did not specify the actual price at which government debt would be exchanged for SSC shares which created the incentive to increase the market price.
- ¹⁹ Those companies competing for investors’ favor against the booming South Sea Company started to take defensive measures. A standard response was to mortgage back a portion of outstanding capital stock, reducing the number of shares available for trade on the stock market, while at the same time providing relatively cheap credit to their stockholders. This credit could be used to purchase stock in any company or for financial settlement purposes. Starting May 10, 1720, the Bank of England, most threatened by the probable success of the South Sea Company, mortgaged 29% of its capital stock. The East India Company and the Royal African Company followed suit.
- ²⁰ The price quoted for South Sea Company stock during this period was, therefore, a forward price, adding a forward premium of the current market rate of interest to the expected future spot price at the end of

August. The transfer books for the other companies remained open. This means that the actions of these stockholders during this period of intense reassessment of the market can be observed.

²¹ This occurred when it became evident that the Company's banking affiliate, the Sword Blade Company, was out of cash. Resolution of the South Sea affair began with the Bank treaty in 1722, whereby the Bank of England took on some outstanding South Sea stock, adding nearly £3.5 million to its own capital stock

²² See Carlos and Neal, 2006.

²³ This does not always mean that the information is correct. Some less well informed persons might believe that prices can only rise.

²⁴ See Laurence, "The Emergence of a Private Clientele for Banks" Open University, working paper, 2008.

²⁵ There is a very large body of literature dealing with social capital. A brief but good overview of the topic is to be found in Smith "Social Capital".

²⁶ Rubens notes in footnote (117:fn. 4) that the same restriction had also been placed on a Catholic church even as late as the mid-twentieth century.

²⁷ See for instance, Goldish, "Jews, Christians and Conversos: Rabbi Solomon Aailion's Stuggles in the Portuguese Community of London".

²⁸ Indeed, all of the slanders refuted in Menasseh ben Israel's *The Humble Address* of 1655 were once again asserted as fact. These included usury, cheating, and ritual murder. Cranfield, "The 'London Evening-Post'".

²⁹ Looking at women as a separate subgroup, Carlos, Maguire and Neal, analyzed share ownership for women in Bank of England (a blue-chip stock) and Royal African (junk status) stocks over 1720.

³⁰ The majority of those so identified as Jewish are very small participants in the market. There is one exception, Abraham Craiesteyn. Craiesteyn was one of the top ten buyers and sellers of Bank of England stock. To the extent that he was not Jewish, and we think he probably was not, we will be misattributing his activities. In all following tables, we provide estimates with and without Craiesteyn. There is little change in the results.

³¹ £1 in 1720 is roughly equivalent to £123 in 2005. [www.eh.net/ How Much is That?](http://www.eh.net/How_Much_is_That?)

³² The aggregate data for the Bank of England come from Carlos and Neal, "The Microfoundations of the Early London Capital Market".

³³ Without Craiesteyn we have 165 individuals.

³⁴ While women made up nearly 15% of all individuals in the market, Jewish women made up only 2% of the Jews in the market. These were Rachael Henriques, Arabella Mendes, Deborah Mendes, Ribca Nunes. For Jewish women, language would have limited access to the market.

³⁵ Of course, the variation across individual was very large both within the Jewish community and the whole population of those in the market for Bank stock.

³⁶ Wasserman and Galaskiewicz, eds, *Advances in Social Network Analysis*.

³⁷ The standard deviation is high at 0.0218.

³⁸ There were 328 pairs for whom this was their only transaction. Each of these 328 pairs only trades within the pair and neither side has any further links with the rest of the market. We do not include these agents in the distance analysis.

³⁹ This analysis was conducted using Borgatti, Everett and Freeman *Ucinet 6 for Window*.

⁴⁰ Craiesteyn also has a high centrality measure. He ranked five in our *betweenness* centrality measure.

⁴¹ See Carlos and Neal, 2004, for a more complete discussion of Joanna Cock's activities.

⁴² Pereira did also leave money to the Bevis Mark Synagogue in London and to the Jewish community there.

⁴³ See Carlos, Neal and Wandschneider, 2008 for a discussion of brokers in Bank stock.

⁴⁴ Neal, 1994.

⁴⁵ The relative losses and gains by gender were found also in the tech bubble of the 1990s.

⁴⁶ See Sutcliffe, "Identity and Space", pp.101-104.