Do networks of blockholders have an impact on Mergers and Acquisitions?

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ABSTRACT

The objective of this study is to analyze the impact of corporate network effects on takeover outcomes. The network effect is measured by the strength of a firm's investment in other firms. We find that firms which have more block investments in other firms have a higher probability of being an acquirer. Acquirers which are more well-connected have a higher probability of completing the deal with the target. Firms which are highly connected by the virtue of being the recipient of block investments, have a higher probability of being a target. In addition, the social connections of the targets help them complete the deal with the acquirer eventually.

Keywords: Mergers and Acquisitions, Networks, Blockholders, Centrality, Connections

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1. INTRODUCTION

The objective of this paper is to examine the impact of networks of blockholders on mergers and acquisitions. External blockholders are very prevalent in the financial markets and they are motivated by factors which can be broadly classified into two: shared benefits of control and private benefits of control (Holderness, 2003). Holderness (2003) in his paper explains that the shared benefits of control are that the presence of an external blockholder leads to better management and decision making, which eventually augments the wealth of the shareholders in the long run. He also adds that the private benefits of the control from an external blockholder point of view is that the benefits could be something financial such as executive compensation or synergies in production for it. The private benefits of acquiring a block could also be in view of a long term acquisition. When a firm acquires a block in another firm, it could lead to a partnership between the two firms as it creates a platform for them to share their core competencies. The major advantage of the block-investment for both the firms is that through these blocks they can share their ideas, reduce costs, increase their own efficiency and eventually they could improve their own profitability. The synergies created between the two firms through the partnership could form the basis of the merger between them in the future.

Networks and interconnections of various forms play an important role in finance. Literature points to the fact networks of various forms have a positive impact on firm performance (Dyer and Singh, 1998; Geletkanycz and Boyd, 2011; Larcker et al., 2013). The networks could also help a firm be an acquirer thanks to the CEO's connections (El-Khatib,R et al (2014) or connections between board of directors (Cai and Sevilir (2012); Renneboog and Zhao (2013)) . This paper deals with one such network, which is a network of blockholders. We focus on a network of blockholders because of their ubiquitous presence in the financial markets. In 2010, external blockholders held as much as 66.2 % of the market value of NYSE stocks and 71.2 % of the market value of NASDAQ stocks (Blume and Keim, 2012). With such a presence, they are likely to play an important role in corporate strategy of firms. In our paper we solely focus on the roles played by networks that help the blockholders in takeover activity. To our knowledge, there has been very little prior academic research done on the effect of a network of blockholders in the takeover process. We would like to do that by answering the research question which is "Do a network of block holding positions increase the probability of a takeover of the firm by the blockholder?" We

analyze the network effect through the following three questions: 1.What is the probability of a firm being an acquirer and does the network effect help a firm be one? 2. Does network effect have an impact on the probability of a firm to be a target? 3. Does the network effect have an impact on the probability of deal completion? By answering these three questions, the network effect of block holdings on mergers could be better understood. Also, the role of financial firms in these networks could become clearer through our analysis.

We obtain our panel data of shareholding structure of a firm from Bureau van Dijk (BVD), a Belgian financial data provider. Their database BVD orbis has thorough information on companies worldwide including shareholder information of listed firms. Their main source of information for the database for the American listed firms are the US security exchange commission (SEC) filings (collected using the free online EDGAR database), institutional holdings from the NASDAQ one-line interface and Factset (a financial information provider). The ownership information is collected from the SEC filings Def. 14, 13-G, 13-D and 10-K (items 11 and 12). They also collect additional information through private correspondence, annual reports, stock exchanges, company websites, telephonic calls (in case of conflicting information), press news and other periodical databases like Zephyr M&A database.

From the BVD orbis database, we have a total of 17583 observations of US firm year links, between the blockholders and their targets of investment, between 2007 and 2012. The link between the two firms is that the blockholder holds at least 5% of the outstanding shares in the firms they have invested in. The network effects are measured with the help of two centrality measures – degree and eigenvector. The first measure degree centrality measures the number of links that a block holder or its target of investment has. A well-connected firm will have a higher degree centrality score. The second measure Eigenvector centrality measures the importance of each individual in the network by taking into account the extent to which a firm is connected to other firms which are well-connected (El-Khatib et al, 2014). The choice of these two centrality measures is based on a number of previous contributions. Renneboog and Zhao (2013) show that the probability of deal completion increases when a bidder and target have one or more director in common and they measure the links with the help of degree centrality measures. El-Khatib et al (2014) show that CEOs with bigger networks were able to facilitate deals better and the CEO links were measured by degree centrality and eigenvector. Also the paper by Ahern and Harford (2014)

show that degree and eigenvector are the two centrality measures which are best suited for the input-output network. We use both a weighted and an unweighted networks for our analysis. For a weighted network, the weights are based on the percentage of share held by one firm in another.

The database is split into two sub-samples. We have a sub-sample where only non-financial firms invest in each other. The other sub-sample has financial firms as a blockholder in addition to the links in the previous sub-sample. The rationale for having a financial firms in our network is that institutional ownership between two-firms increases the probability of the two firms merging (Brooks et al, 2016). Brooks et al (2016) also postulate that financial firms which own blocks in either the acquirer or the target or both may have an important governance role in the M&A process, reducing information symmetry and mitigating the bargaining and transaction cost.

The impact of network effects on the merger and acquisition process is analyzed using a logit analysis. The timeframe for all the analysis is between 2007 and 2012. We study the extent to which a position of the firm in the network has an impact on it being a target or an acquirer. We use the same specifications as Karpoff et al (2014) for our analysis. In both the above cases, the analysis is done with industrial fixed effects and annual fixed effects. We also analyze the impact of the extent to which the position of the acquirer or target in the network helps them complete the deal. The specifications of Betton et al (2014) are used for our analysis. This analysis is done with annual fixed effects alone.

From our analysis, we could observe that network effects have a significant impact on a firm being an acquirer if it has many links with its targets of their investments. This indicates that firms which have more block investments in other firms are more likely to be acquirers in the long run because of the social connections they get through such investments. This result is consistent with the results of Renneboog and Zhao (2013), which show that better connected companies are more likely to be acquirers. We also find that firms which are the recipient of block investments have a higher probability of being a target. This is an indicator that the block investments in a firm, makes it more attractive as a target to potential acquirers. One of the reasons for the above phenomenon is that some blockholders could have been instrumental in the firms being better managed which led to better performance in the short run, hence making it more attractive as a target. Another reason could be that the firm which took a block position in the other firm views it as a target in the long run. Our analysis also shows that acquirers which are both well connected and important

in the network are more likely to close the deal with the target. Targets which are important in the network have a higher probability of deal completion with acquirers. Hence, the social connections that the acquirer and the target have through these block investments have a significant impact on takeover outcomes from the perspective of both the acquirer and the target.

The structure of the paper is as follows. We explain the different centrality measures we use and what they signify in the section 2. The hypothesis development, literature review and the regression model are explained in the section 3. The data collection and the corresponding descriptive statistics are explained in the section 4 and the results that we obtained are explained in the section 5. We finally summarize of the results and conclude in the section 6.

2. CENTRALITY MEASURES

This section explains the different centrality scores used in our paper and what are the significance of the measures:

Degree: Degree of a network measures the importance of a particular individual (vertex in centrality parlance) because of the number of connections it has with another individuals in the network (Freeman, 1978; Miura, 2011). In other words, degree is the number of links a particular firm has with other firms in the network by the virtue of investing or being invested in. If a blockholder has more number of links by the virtue of having invested more in other firms, it is likely to have higher out-degree measures. If the firm has more number of links by the virtue of other firms investing in it, it is likely to have a higher in-degree measure. Firms with higher degree measures are likely to be more central in the network of firms. Since a weighted network is also used in our analysis, it should be the noted that the weights assigned to each firm is based on the percentage of the shareholdings that a blockholder has in the firm it has invested in.

We use a directed network in our analysis where the number of links coming in and going out might be different and hence we have out-degree and in-degree. In this network the in-degree is defined as the degree of the target and out-degree as the degree of blockholder.

For a directed network, we define out-degree of a node i as d_i which takes the value:

$$d_i = \frac{1}{|V| - 1} \sum_{j \neq i} Aij \qquad \text{- (1)}$$

where $|V|$ is the number of total number of nodes in the network and A_{ij} is the adjacency matrix which gives the number of the nodes that a particular node is connected to. Adjacency matrix A_{ij} is defined as a $|V| \times |V|$ matrix with all entries equal to one if a node i and j are connected and zero otherwise.

For a directed network, we define in-degree of a network i as d_i:

$$d_i = \frac{1}{|V| - 1} \sum_{j \neq i} A'ij \qquad \text{- (2)}$$

where $A'ij$ is the transpose of the adjacency matrix A_{ij} in equation (1).

Eigen-Vector: Eigen vector awards higher centrality scores to members which have many neighbours, important neighbours (measured by size of the neighbor) or both (Miura, 2011). Bonacich (1972) defines the eigenvector centrality score as the sum (weighted or unweighted) of centrality scores of its neighbours increased by a constant. For a directed network, we define eigen-vector of a node i as c_i which takes the value:

$$ci = \lambda^{-1} \sum_{j=1}^{N} A'ij \; cj \qquad \text{- (3)}$$

where $A'ij$ is the transposed adjacency matrix , λ is a constant and c_j is the eigenvector of other nodes. When written in a form of a matrix notation the equation becomes:

$$\lambda \, c = A'c \qquad \text{- (4)}$$

From equation (4) it could be seen that c is the principal eigenvector of the adjacency matrix. From the equation (3) it could be observed that if a particular node is connected to more number of nodes in the network or connected to larger members (which are connected to more number of nodes in the network) or both, the eigenvector of that particular node is awarded a higher centrality score and therefore measures its importance.

In essence, eigenvector of a particular firm measures the importance of any firm in the network by the virtue of having more number of links with other well-connected firms. We calculate both the weighted and unweighted value of eigenvector of each member in the network. The weights are based on the percentage of the shareholding that a blockholder has in its target of investment.

Hence we define the eigenvector of the target as the eigenvector of the links coming in and eigenvector of the blockholder as the eigenvector of the links going out.

3. LITERATURE REVIEW AND HYPOTHESES

There are also quite a few papers which link the networks of various forms and performance of the firm. The main argument that they provide is that the social connections of the management measured by the network effect lead to better access of information from which the firm can benefit in decision making (Larcker and Tayan, 2010; Omer et al., 2012). Boards with bigger network centrality score have shown a superior risk-adjusted stock returns thanks to the greater information access (Larcker et al, 2013). Also, well connected CEOs have better access to low cost information thanks to their network contacts which aids them in a variety of purposes (Burt, 1997; Nahapiet and Ghoshal, 1998). Networks of directors serving in various companies could help them strengthen their ties, establish a stronger communication channel for soft information and eventually gives them more influence in boardroom discussion (Renneboog and Zhao, 2013). All these studies establish a positive link between networks and firm's performance or aid them indirectly. The key link in all the above studies that the networks of various interconnections (among the management) leads to a wealth of information which could help a firm in the long run. When firms acquire a block in other firms, it gives the management of the two firms an opportunity to interact with each other, which gives the blockholder specific information about the firm it has invested in. This information could be helpful for the blockholder in making a decision about a potential takeover.

Though a relatively new field, there has been a few papers which show that networks have an impact on mergers and acquisitions. A paper by Cai and Sevilir (2012) report in the context of mergers and acquisitions (M&As) that informational asymmetries are lower when the bidder and the target have a common director. Cai et al. (2016) were able to show that firms with a common auditor have a higher probability of merging with each other. Their research also showed that such deals have higher acquisition announcement returns than the non-common auditor deals. Stronger product market connections lead to a greater incidence in cross-industry mergers is one of the main findings of Ahern and Harford (2014). They also add that these mergers propagate in waves through links between customer and suppliers. Another major finding in their paper is that merger activities that are central in their product market network are a precursor to merger waves across the economy. In a network of firms and its suppliers, customers and rivals, Harford et al. (2016) reported that they were able to predict which pairs of firms were more likely to merge. They were

also able to add to their existing results by showing which targets were more likely to attract multiple bidders and which mergers added the maximum value and attracted follow on merger activity. All these papers establish the link between networks of various forms and mergers and acquisitions. In this paper, we analyze the impact of network of block holder links on the merger process.

We formulate our hypotheses on the impact of networks on a firm being an acquirer, a firm being a target and probability of deal completion.

3.1 Probability of being an acquirer: The first question we would like to ask is whether blockholders that are more central and more well connected have a higher probability of being an acquirer or not. Renneboog and Zhao (2013) in their paper suggest that companies with better access to information through their networks are more likely to find targets and initiate takeover talks. The reason for this is that blockholders having many direct links with the firms they have invested in, increases the amount of soft information that they get through their social connections which helps it choose a suitable target. Also, financial firms invests could play the role of deal facilitator if they have block investments in either the blockholder or the target. This leads to our first hypothesis (H1): *Blockholders with a higher centrality scores have a higher probability of it being an acquirer.*

3.2 Probability of being a target: Our next question analyses whether network effects enable some firms to be more attractive as targets or not. When the firm being invested in has more number of links with block holders it will increase its in-degree centrality and eigenvector measure. Some blockholders play an important role in management of firms which could help the firms they have invested in, in their performance in the long run. Their performance could potentially make them more attractive as targets for acquirers in the future. In addition the presence of financial firms as blockholders in a firm makes them attractive as targets because the financial firms could act as the facilitator of a merger in the future. This leads to our second hypothesis (H2): *Firms with higher centrality scores will increase the probability of it being a target.*

3.3 Probability of deal completion: Our final question deals with the impact of network effects on deal completion. Once the intention to acquire the target has been revealed, the target has to decide how to react to this offer. Through its social connections thanks to its position in a network, the target is likely to receive a lot of information which helps it decide whether it should merge with

its acquirer. Also the acquirer has to decide its negotiation strategy based on the information it gets from its social connections. This gives us a notion that the network effects have an impact on the deal completion from both the side of the target and from the side of the acquirer. The financial firms could influence the strategies of both the sides because of their investment in either of the firms or both the firms. *This leads to our third hypothesis (H3) that targets or acquirers with higher centrality scores have a higher probability of merging with the firm it is negotiating with.*

4. DATA

We obtained our network links from the Bureau Van Dijk (BVD). From their BVD orbis database we have a total of 17583 observations between 2007 and 2012. The link between a blockholder and the firm it has invested in is that it has at least 5% of the outstanding shares of the other firm each year. The percentage of outstanding shares are directly held by the blockholder and does not include indirect holdings.

[Insert Table 1]

In the Table 1, we compare what proportion of the firms in the sample are represented in comparison to the firms from the CRSP database. We observe that on an average 41% of the CRSP universe is represented in our sample of BVD orbis across all sectors and in all the years. So it is quite a representative sample of the CRSP database overall.

[Insert Table 2]

In the Table 2, we have tabulated a square matrix to look at the sectors that a firm from a particular sector invests in. It could be observed that the blockholders are mostly interested in the firms of their own sector than from the other sectors with an average of 64% investments in their own sector. Financial sector is the sole exception to the above observation. Firms from the financial sector have an average of 28% investment in other financial firms and invest the remaining in the other sectors. It should also be noted that financial firms have the most investments for any sector every year as a percentage of the total links in the sample. Almost 73% of all links have a financial firm present in it either as a blockholder or as a target or as both. In total, we have 4491 links where non-financial firms invest in each other.

The overall data is split into two subsamples. In the first subsample, there is a network of non-financial firms investing in themselves alone. We have a total of 4491 observations in this sample across 6 years between 2007 and 2012. We calculate the network centrality measures of degree and eigenvector for both the blockholder and the target for this sample. To this we add firms from the CRSP database which don't have any links with other firms in this sample as block holding. Since they don't have any links with other firms in the sample, their network measures are also set to 0. In total there are 42875 observations in this subsample.

Our second subsample is when we add financial firms as a blockholder which invest either in the target or the blockholder or both the firms. There are a total of 14019 observations in this subsample across 6 years between 2007 and 2012. We calculate the network measures just like we did for in the previous subsample. In addition to this, just like the previous subsample, firms from CRSP universe, which don't have links to other firms in this sample are added. Their centrality scores are set to zero since they don't links with other firms in the network. If the firms which don't have links with other firms in the network are excluded we could end up having a biased sample which does not represent the whole universe of firms. In order to avoid this self-selection bias, we choose to set their centrality scores to zero. Overall, we have a total of 62062 observations in the subsample.

[Insert Table 3 and Table 4]

In our Table 3, we have four panels. Table 3 as a whole looks at the centrality measures of the blockholder and its target of investment in the whole CRSP universe on an annual basis between 2007 and 2012. Panel A of the table looks at the centrality measures of the blockholder in a weighted network. Panel B of the table looks at the centrality measures of the blockholder in an unweighted network. Panel C of the table looks at the centrality measures of the target of blockholder's investment in a weighted network. Panel D of the table looks at the centrality measures of the target of blockholder's investment in an unweighted network.

We repeat the same process for the blockholder and its target of investment in table 4 albeit it consists of only firms from the BVD orbis database and not the whole CRSP universe.

In the CRSP universe, where there are only non-financial firms we notice that on an average, a blockholder has 0.2 links with the targets on an annual basis with a standard deviation of 0.84

though Pfizer has as many as 11 outward links in the year 2012. For the same sample (with only non-financial firms), where there are firms from the BVD orbis database alone, we have as many as 1.79 links with a standard deviation of 1.28 links. From a target level perspective of the same subsample (with only non-financial firms) for the CRSP universe we notice that the target has an average of 0.11 links with the blockholder on an annual basis with a standard deviation of 0.31 links. However the number of inward links increases to as many as 1.01 links with a standard deviation of 0.11 links when the sample contains firms only from the BVD orbis database. Overall we could say that blockholders are more central in the network than the targets thanks to the number of outward links they have which gives them an overall higher degree and eigenvector scores as well.

In the other subsample (where the financial firms are a blockholder), the blockholder on an average has 42 links with a target on an annual basis, with a standard deviation of 154 links though Blackrock has had as many as 816 links in 2010 in the CRSP universe. This average increases to an average of 185 links with a standard deviation of 280 links when only firms the BVD orbis database are there. In the CRSP universe, targets have as few as 0.35 links with the blockholders with a standard deviation of 0.75 links, though Cavco industries have had as many as 6 blockholder links invested in it in the year 2012. However this average increases to 1.55 links with a standard deviation of 0.81 links. It is quite clear that even in the setup with financial firms, blockholders are more central in the network than targets because of the number of links they have which gives them better network centrality measures. Also, the financial firms are more central than both these type of firms.

To observe which of these blockholders have been an acquirer or a target in our database, we collect the list of mergers between 2007 and 2012 from the SDC database and there are a total of 1662 observations which includes both deals which were successful and unsuccessful. The sample collection satisfies the following criteria:

- The firm has 100% control after acquisition and the firms acquired at least 50% of the shares of the target in the deal
- The deal was worth a minimum of 1 million US dollars
- The acquirer has the necessary data on the CRSP/Compustat to access the required data for the concerned models

- All the targets are from the United States and are public companies
- All the acquirers are from across the world and they could be a subsidiary , public or a private firm

From this database, the firms that were acquirers or targets between 2007 and 2012 are obtained. This helps us determine the probability of a firm being a target or acquirer.

4.1 Probability of being an acquirer or target: From the M&A sample, two variables "Acquirer" and "Target". We choose our variable specifications from the paper by Karpoff et al (2014). The variables collected from CRSP-Compustat merged database are current assets, total assets, total shares outstanding, long term debt, industry adjusted operating income, net power plant equipment, current liabilities, total sales, closing price and cash assets and short-term investments. From these variables we calculate the control variables for the acquirer and the target respectively. The firm specific characteristics that are controlled for in our analysis are Firm size, Market to book ratio, Return on assets, Property ratio, liquidity ratio, sales growth, cash assets and Leverage.

We control for industrial level characteristics with the industrial concentration. The industrial concentration is defined by the HH index (Herfindahl-Hirschman index) using sales.

There are a total of 40106 observations between 2007 and 2012, when there are financial firms as a blockholder in our analysis. The number of observations decreases to 28931 observations when there are just non-financial firms investing in each other. The ratios in the data are winsorized to ensure that they lie between the 1^{st} and 99^{th} percentile and essentially avoid the problem of outliers. Also, the centrality measures are added to both the sub-samples. Their replace the centrality measures to 0 if the firms do not have links with other firms in their respective samples.

Table 5 describes the summary statistics of the whole sample. In the table 6, we look at the difference in statistics between financial and non-financial firms. This difference is found out using a difference of means between financial firms and non-financial firms. This test is repeated to observe the difference of statistics between acquirers and non-acquirers in the Table 7 and targets and non-targets in the Table 8.

[Insert Table 5]

In the Table 5, it can be observed that only 1.73% of the whole sample has been an acquirer in this period. It also can be observed that 2.19% of the same sample has been a target in this period. Also, 26.44% of this sample are financial firms. Firms from the sample have a leverage of 17% with a standard deviation of 20% (sample from Karpoff et al (2014) have a leverage of 20%). The firms also have an average return on assets of 0.68% with a standard deviation of 22.2 %. They also have a property ratio of 48.27% and a liquidity ratio of 25.48% (Karpoff at al (2014) report a property ratio of 61% and a liquidity ratio of 19%). The average sales growth of the firms in the sample is 11% with a standard deviation of 42.88% (corresponding sales growth from Karpoff et al (2014) is 10%). The firms have an average cash and short term equivalent holdings of 19.66% in this period. They have also have an average market to book ratio of 1.56 with a standard deviation of 2.23 (Karpoff et al (2014) report an average of 1.53 for their sample).

[Insert Table 6]

From the Table 6, it is observed that financial firms are more central in the network than their non-financial counterparts. Financial firms have lesser long term debt (16% for financial firms in comparison to 18% for nonfinancial firms) and have lesser liquidity (23.4% in comparison to 25.6% for non-financial firms) in the sample. The financial firms hold lesser cash (11% financial firms and 22% for non-financial firms), have lesser sales growth (6% vs 12.4%) and yet have a higher return on assets (3.1% versus -0.03%) than the non-financial firms. Financial firms also have a lower market to book ratio (0.86 versus 1.78) when compared to non-financial firms.

[Insert Table 7]

From the Table 7, it could be observed that acquirers have a better return on assets (5.5% versus 0.6%) and sales growth (15.5% versus 10.8%) than firms that weren't acquirers. The acquirers are less liquid (18.1% versus 25%) and have a poorer property ratio (41% versus 48.5%). They also hold lesser cash and short term investments (14.5 % versus 19.8%) and don't have a very high market to book ratio (1.16 versus 1.58) value in comparison to their non-acquiring peers.

[Insert Table 8]

Table 8 shows that targets have lower sales growth in comparison to the firms that are not targets (2.5% versus 11%). In addition, the targets have lower market to book ratio than their non-target peers (1.26 versus 1.58).

With respect to the first hypothesis which deals with the probability of firm being an acquirer, we use a logit regression for our analysis. The dependent variable is "Acquirer" and the independent variables are the centrality measures of the blockholder which measure the network effects. We control for industrial fixed effects and annual fixed effects in our analysis. The logit equation which we use to determine the probability of a firm being an acquirer in our set up is as follows:

$Probability\ of\ being\ an\ acquirer =$ a_0 + a_1*(Network measures) + a_2*ln(Total assets) + a_3*(Market to book ratio) + a_4*leverage + a_5*(Return on assets) + a_6*(sales growth) + a_7*(Property ratio) +a_8*(liquidity ratio) + a_9*(cash asset) + a_{10}*(Industrial concentration) – (5)

For our second hypothesis which deals with the probability of firm being a target, we use a logit regression model. The dependent variable is "Target" and the independent variables are the centrality measures which measure the network effects. We also control for industrial fixed effects and annual fixed effects in our analysis. The logit equation which we use to determine the probability of a firm being a target in our set up is as follows:

$Probability\ of\ being\ target =$$a_0$ + a_1*(Network measures) +a_2*ln(Total assets) +a_3*(Market to book ratio) +a_4*(Return on assets) +a_5*(Property ratio) +a_6*(liquidity ratio) +a_7*Leverage +a_8*(growth in sales) + a_9*(Industrial concentration) - (6)

4.2 Probability of deal completion: Betton et al (2014) in their paper developed a model which predicts the conditional probability of deal success. We use the same variable specifications in our model to measure the probability of deal completion.

Our dependent variable is a dummy variable "Success" which takes a value equal to one if the deal has been completed between 2007 and 2012 and 0 if the deal is a failed bid.

The independent variable is the centrality measures of both the acquirer and the network. They measure the network effects which help in deal completion from the perspective of both the acquirer and the target.

In our control variables we have controlled for the acquirer, target and the deal characteristics. In our acquirer characteristics we control for toehold, bidder being public, horizontal acquisition and four week premium. For the target characteristics we control for Target size, NYSE/AMEX,

Turnover and poison pill. The deal characteristics which we control for are Tender offer, all cash and all stock.

[Insert Table 9]

In our sample of 1662 deals completed and uncompleted a total of 81.17% of the deals were completed (1349 deals). In the sample, 62.7% have gone for an all cash deal and 12.58% have gone for an all stock deal. 2.05% of the targets had a poison pill defense takeover which discourages hostile takeover. 33.15% of the targets were in the same sector as the acquirer. 55.84% of the bidder were public and 7.16% of the targets had a toehold block taken by the bidder in them. 27.08% of the targets were listed in NYSE or AMEX. The sample on an average has a turnover of 0.5 with a standard deviation of 0.54 and the corresponding 4 week premium is 46.68% with a standard deviation of 56.3 %. We also notice that acquirers on average have higher centrality measures than the targets in the sample. Overall, the statistics are in order with the statistics of Betton et al (2014).

We use a logit regression for our analysis to measure the probability of deal success. We also control for annual fixed effects in our analysis. We use the centrality measures of both acquirer and target to see the impact of network measures from both the perspectives to see how they affect the probability of deal completion. The logit equation which we use to determine the probability of a deal success in our set up is as follows:

$$Probability\ of\ deal\ success = a_0 + a_1*(network\ measures) + a_2*(Target\ size) + a_3*(Poison\ Pill) + a_4*(Turnover) + a_5*(Toe\ Hold) + a_6*(Listed\ bidder) + a_7*(4\ week\ premium) + a_8*(Tender\ offer) + a_9*(all\ cash) + a_{10}*(all\ stock) + a_{11}*NYSE\ AMEX - (6)$$

5. RESULTS

We discuss the results in details for the analysis of all our three hypotheses in this section. We also discuss the results and their significance for both the sub-samples separately.

5.1 Probability of being an acquirer: In our logit analysis on the sample where there are only non-financial firms, we observe that degree of acquirer both weighted and unweighted measures have a very high positive significance on the probability of a firm being an acquirer. This shows that blockholders which are more central in the network by the virtue of having more links with other

firms have a higher probability of being an acquirer. We also get a positive significance for unweighted eigenvector of blockholder to be an acquirer. This signifies that firms with higher eigenvector have a higher importance in the network and hence have a higher probability of being an acquirer. We however don't get significant results for weighted eigenvector measurement. For robustness checks, we repeat our analysis with firm fixed effects instead of industrial fixed effects. We get similar results for the robustness checks.

For a similar analysis on a sample where there are financial firms as a blockholder, we obtain the same results. We notice that degree of acquirer (both weighted and unweighted) and unweighted eigenvector of acquirer have a positive and significant impact on a blockholder being an acquirer. They signify that blockholders which have more number of links in the network and are important in the network by being connected to other well-connected firms have a higher probability of being an acquirer. These results gives us sufficient proof to validate our hypothesis that network effects play a significant impact on the probability of a firm being an acquirer. Hence, firms which have more block investments in other firms are more likely to be an acquirer because of the social connections they get through such investments.

When it comes to control variables, we get a positively significant coefficient for bidder size, leverage and sales growth. We also observe a negative coefficient for market to book ratio. These results are consistent with the results of Brooks et al. (2016). We do not have significance for other control variables used in our analysis.

[Insert Table 10]

5.2 Probability of being a target: We repeat our analysis on the two subsamples to see the probability of a firm being target. In our sample where there are non-financial firms investing in each other, we observe that degree of the target, both weighted and unweighted have significant impact on the firm being a target. This signifies that firms which are recipients of more block investments are more likely to be targets. In the sample where there are financial firms as a blockholder, we don't find any of the centrality measures being significant. Therefore we find some evidence that firms which are more central in the network have a higher probability of being a target based on the results we got from the sub-sample with no financial firms.

[Insert Table 11]

When it comes to control variables, we get a negative significance for firm size, market to book ratio and sales growth. These results are consistent with the results obtained in Karpoff et al (2014). The other control variables in our analysis are not significant.

5.3 Probability of deal completion: Finally we move on to our probability of deal completion which we would like to explain both from the version of target's centrality measures and acquirer's centrality measures.

In the sample with only non-financial firms, we observe that all the centrality measures (weighted degree of the acquirer, unweighted degree of the acquirer, weighted eigenvector of the acquirer and the unweighted eigenvector of the acquirer) are highly significant and have a positive impact on the probability of deal completions. We also find that the eigenvector of the target, both weighted and unweighted are highly significant with a positive impact. This indicates that the block investments have a positive impact on the takeover outcomes from the perspective of both the acquirer and the target.

When there are financial firms added to the sample as blockholders, we observe that the degree and eigenvector of acquirer (both weighted and unweighted) are positively and highly significant. We also observe that the weighted measure of eigenvector of the target is significant and the unweighted eigenvector is insignificant. Since the acquirers and the targets in this network have links with financial firms, it could be observed that the financial firms have a significant impact on deal completion. This is in line with the results of Brooks et al. (2016) that financial firms which have block investments in the acquirers or targets increase the probability of the two firms merging. Hence the financial firms play a significant role in helping the acquirers and the target complete the deal. This gives us a validation of our hypothesis that acquirers and targets which are more central in the network are more likely to close the deal.

[Insert Table 12 and Table 13]

From our logit analysis, we notice that the control variables poison pill, all stock deal and toehold have a negatively significant coefficient. We can also observe that public bidders and tender offers have a positively significant coefficient. These results are consistent with the results of Betton et al (2014). The other control variables do not have a significant impact on the probability of deal completion.

It should be noted that when we performed logit regression for the probability of deal completion in the case where there are only non-financial firms in the sample, the iterations did not converge. Hence we find out the probability of deal completion with a linear probabilistic model.

6. CONCLUSION

As we saw previously there is a growing literature on how social networks have an impact on mergers and acquisitions. They had shown that network of board of directors, networks of CEOs, networks of economic links created by customer, supplier and rival links all have an impact on mergers and acquisitions. We are adding something new to this literature by examining if networks of blockholders have an impact on mergers and acquisitions. We have done so by trying to answer three basic questions – 1. Impact of networks on a blockholder being an acquirer 2. Impact of networks on a firm being invested in becoming a target 3. Impact of networks on probability of deal completion if two firms decide to merge from both the measures of the acquirer side and the target side.

Our study shows that firms with many block investments in other firms have a higher probability of being an acquirer. Through the social connections that they got through these investments, the acquirers were also more likely to complete the deal. We also find evidence that firms which are the recipient of such investments were more likely to be a target. We were also able to find evidence that the social connections of these targets helped them complete the deal in the long run. Overall, we find that networks of blockholders have an impact on mergers and acquisitions.

From our paper, we were able to gain a better understanding of the takeover strategies of firms and how networks of blocks in firms help them in it. We were also able to see the impact of financial firms in these networks.

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Table 1: Table 1 represents the sectoral split up of the firms in our database on an annual basis. The table give us a comparison of the number of firms that are there in the CRSP versus the number of firms are there in the sample in each sector on an annual basis. The sample consists of firms from the BVD orbis database.

Year	SIC codes (shareholder)	Firms in CRSP (number)	Firms in sample (number)	Sample representation
2007	01 to 09 (Agriculture , forestry and fishing)	15	6	40.00%
	10 to 14 (mining)	377	156	41.38%
	15 to 17 (construction)	58	16	27.59%
	20 to 39 (Manufacturing)	2422	1005	41.49%
	40 to 49 (Transportation)	599	262	43.74%
	50 to 51(Wholesale trade)	164	62	37.80%
	52 to 59 (Retail trade)	316	94	29.75%
	60 to 67 (Finance)	1984	490	24.70%
	70 to 89 (services)	1066	448	42.03%
	91 to 99 (Public admin)	87	26	29.89%
	Total	7088	2565	36.19%
2008	01 to 09 (Agriculture , forestry and fishing)	15	5	33.33%
	10 to 14 (mining)	377	166	44.03%
	15 to 17 (construction)	57	14	24.56%
	20 to 39 (Manufacturing)	2345	1056	45.03%
	40 to 49 (Transportation)	586	278	47.44%
	50 to 51(Wholesale trade)	160	60	37.50%
	52 to 59 (Retail trade)	307	107	34.85%
	60 to 67 (Finance)	1903	542	28.48%
	70 to 89 (services)	1045	483	46.22%
	91 to 99 (Public admin)	82	30	36.59%
	Total	6877	2741	39.86%
2009	01 to 09 (Agriculture , forestry and fishing)	17	5	29.41%
	10 to 14 (mining)	360	158	43.89%
	15 to 17 (construction)	56	24	42.86%
	20 to 39 (Manufacturing)	2237	1022	45.69%
	40 to 49 (Transportation)	571	278	48.69%
	50 to 51(Wholesale trade)	149	65	43.62%
	52 to 59 (Retail trade)	290	106	36.55%
	60 to 67 (Finance)	1852	543	29.32%
	70 to 89 (services)	1020	474	46.47%
	91 to 99 (Public admin)	42	21	50.00%
	Total	6594	2696	40.89%

Year	SIC codes (shareholder)	Firms in CRSP (number)	Firms in sample (number)	Sample representation
2010	01 to 09 (Agriculture , forestry and fishing)	20	9	45.00%
	10 to 14 (mining)	359	164	45.68%
	15 to 17 (construction)	56	25	44.64%
	20 to 39 (Manufacturing)	2193	1087	49.57%
	40 to 49 (Transportation)	548	290	52.92%
	50 to 51(Wholesale trade)	147	62	42.18%
	52 to 59 (Retail trade)	280	108	38.57%
	60 to 67 (Finance)	1826	543	29.74%
	70 to 89 (services)	1002	508	50.70%
	91 to 99 (Public admin)	29	17	58.62%
	Total	6460	2813	43.54%
2011	01 to 09 (Agriculture , forestry and fishing)	18	8	44.44%
	10 to 14 (mining)	381	184	48.29%
	15 to 17 (construction)	54	26	48.15%
	20 to 39 (Manufacturing)	2167	1097	50.62%
	40 to 49 (Transportation)	552	292	52.90%
	50 to 51(Wholesale trade)	152	64	42.11%
	52 to 59 (Retail trade)	279	118	42.29%
	60 to 67 (Finance)	1831	539	29.44%
	70 to 89 (services)	941	446	47.40%
	91 to 99 (Public admin)	29	17	58.62%
	Total	6404	2791	43.58%
2012	01 to 09 (Agriculture , forestry and fishing)	19	6	31.58%
	10 to 14 (mining)	380	165	43.42%
	15 to 17 (construction)	52	22	42.31%
	20 to 39 (Manufacturing)	2153	1074	49.88%
	40 to 49 (Transportation)	541	277	51.20%
	50 to 51(Wholesale trade)	148	59	39.86%
	52 to 59 (Retail trade)	283	103	36.40%
	60 to 67 (Finance)	1798	558	31.03%
	70 to 89 (services)	955	475	49.74%
	91 to 99 (Public admin)	29	10	34.48%
	Total	6358	2749	43.24%

Table 2: Table 2 represents the sectors in which a blockholder from a particular sector invests in, between 2007 and 2012 based on the data we obtained from BVD orbis.

			Target										
	Year	SIC codes (shareholder)	01 to 09	10 to 14	15 to 17	20 to 39	40 to 49	50 to 51	52 to 59	60 to 67	70 to 89	91 to 99	Total
Blockholder	2007	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	40	2	2	6	1	0	2	0	0	53
		15 to 17 (construction)	0	0	2	1	0	0	0	1	0	0	4
		20 to 39 (Manufacturing)	0	4	0	302	3	7	1	3	40	1	361
		40 to 49 (Transportation)	0	5	0	6	67	0	2	0	5	0	85
		50 to 51(Wholesale trade)	0	0	0	2	2	9	1	0	5	0	19
		52 to 59 (Retail trade)	0	0	0	5	2	2	24	3	4	0	40
		60 to 67 (Finance)	5	106	10	651	191	34	38	452	209	11	1707
		70 to 89 (services)	0	2	0	21	4	2	5	5	128	1	168
		91 to 99 (Public admin)	1	0	1	12	1	0	1	5	7	0	28
	2008	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	40	1	3	4	1	0	1	0	0	50
		15 to 17 (construction)	0	0	2	1	0	0	0	1	0	0	4
		20 to 39 (Manufacturing)	0	3	0	309	3	8	2	3	40	1	369
		40 to 49 (Transportation)	0	5	0	1	67	1	1	1	8	0	84
		50 to 51(Wholesale trade)	0	0	0	3	2	9	2	0	4	0	20
		52 to 59 (Retail trade)	0	0	0	4	2	1	28	2	8	0	45
		60 to 67 (Finance)	1	114	12	731	203	37	59	543	257	24	1981
		70 to 89 (services)	0	1	0	18	3	2	4	8	135	1	172
		91 to 99 (Public admin)	1	0	0	13	2	0	1	5	5	0	27
	2009	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	32	1	3	5	1	0	0	0	0	42
		15 to 17 (construction)	0	0	3	1	0	0	0	1	0	0	5
		20 to 39 (Manufacturing)	0	4	0	297	3	8	2	4	43	0	361
		40 to 49 (Transportation)	0	6	0	1	65	1	0	2	10	1	86
		50 to 51(Wholesale trade)	0	0	0	3	3	7	2	0	3	0	18
		52 to 59 (Retail trade)	0	0	0	2	2	3	25	2	6	0	40
		60 to 67 (Finance)	1	128	21	830	271	57	66	673	270	10	2327
		70 to 89 (services)	0	0	0	16	2	1	5	7	140	0	171
		91 to 99 (Public admin)	1	0	0	10	2	0	1	4	3	0	21

			Target										
	Year	SIC codes (shareholder)	01 to 09	10 to 14	15 to 17	20 to 39	40 to 49	50 to 51	52 to 59	60 to 67	70 to 89	91 to 99	Total
Blockholder	2010	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	28	1	4	5	1	0	0	0	1	40
		15 to 17 (construction)	0	0	3	1	0	0	0	1	0	0	5
		20 to 39 (Manufacturing)	0	6	0	282	3	8	2	5	39	0	345
		40 to 49 (Transportation)	0	4	0	2	53	1	0	2	8	0	70
		50 to 51(Wholesale trade)	0	0	0	3	2	7	1	0	2	0	15
		52 to 59 (Retail trade)	0	0	0	1	2	2	19	2	5	0	31
		60 to 67 (Finance)	6	139	22	995	281	63	94	611	339	7	2557
		70 to 89 (services)	0	0	0	15	2	2	4	5	141	1	170
		91 to 99 (Public admin)	1	0	0	13	2	0	1	5	4	0	26
	2011	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	39	1	6	7	1	1	0	0	1	56
		15 to 17 (construction)	0	0	3	1	0	0	0	1	0	0	5
		20 to 39 (Manufacturing)	0	7	0	313	5	9	1	3	43	1	382
		40 to 49 (Transportation)	0	4	1	4	67	2	0	1	10	0	89
		50 to 51(Wholesale trade)	0	0	0	3	2	8	2	0	3	0	18
		52 to 59 (Retail trade)	0	0	0	2	3	1	20	1	5	0	32
		60 to 67 (Finance)	5	160	23	877	265	52	90	583	245	5	2305
		70 to 89 (services)	0	0	0	15	2	2	5	6	145	1	176
		91 to 99 (Public admin)	1	0	0	12	1	0	1	5	3	0	23
	2012	01 to 09 (Agriculture , forestry and fishing)	2	0	0	0	0	0	0	0	0	0	2
		10 to 14 (mining)	0	43	1	6	7	1	1	0	0	1	60
		15 to 17 (construction)	0	0	2	1	0	0	1	0	0	0	4
		20 to 39 (Manufacturing)	0	7	0	347	6	10	3	3	44	1	421
		40 to 49 (Transportation)	0	6	0	4	74	2	0	1	10	0	97
		50 to 51(Wholesale trade)	0	0	0	4	1	6	2	0	3	0	16
		52 to 59 (Retail trade)	0	0	0	3	2	1	25	1	6	0	38
		60 to 67 (Finance)	3	120	27	794	224	43	56	587	243	3	2100
		70 to 89 (services)	0	0	0	16	1	2	4	8	151	0	182
		91 to 99 (Public admin)	1	0	0	9	2	1	0	4	3	0	20

Table 3: Table 3 represents the summary statistics of the blockholder and its target of investment in the CRSP database which consists of firms from the BVD orbis database and firms that are not in the database, between 2007 and 2012. There are two subsamples of firms – a sample which consists of only non-financial firms and a sample where there are financial firms as a blockholder in addition to the links of the first sample. Panel A of the table looks at the centrality measures of the blockholder in a weighted network. Panel B of the table looks at the centrality measures of the blockholder in an unweighted network. Panel C of the table looks at the centrality measures of the target of investment in a weighted network. Panel D of the table looks at the centrality measures of the target of investment in an unweighted network.

Panel A: Summary statistics of the centrality measures of blockholder in a weighted network setup:

This subsample consists of only non-financial firms						This subsample has financial firms as a blockholder but not as a target of investment					
Stats	Year	Mean	SD	Max	N	Stats	Year	Mean	SD	Max	N
Percentage of blockholding (%)	2007	5.01	17.92	100	8056	Percentage of blockholding (%)	2007	4.70	15.77	100	11055
Eigen vector of blockholder		0.00018	0.01114	0.71	8056	Eigen vector of blockholder		0.00013	0.00951	0.71	11055
Degree of blockholder		0.00692	0.02782	0.32	8056	Degree of blockholder		0.02917	0.09927	0.63	11055
Percentage of blockholding (%)	2008	5.38	17.98	100	7557	Percentage of blockholding (%)	2008	5.00	15.57	100	10655
Eigen vector of blockholder		0.00000	0.00000	0	7557	Eigen vector of blockholder		0.00000	0.00000	0.0000427	10655
Degree of blockholder		0.00762	0.03027	0.35	7557	Degree of blockholder		0.05388	0.17858	0.93	10655
Percentage of blockholding (%)	2009	5.50	17.82	100	7088	Percentage of blockholding (%)	2009	5.11	15.17	100	10352
Eigen vector of blockholder		0.00020	0.01188	0.82	7088	Eigen vector of blockholder		0.00013	0.00983	0.82	10352
Degree of blockholder		0.00793	0.03050	0.36	7088	Degree of blockholder		0.12636	0.39766	1.72	10352
Percentage of blockholding (%)	2010	5.86	19.00	100	6726	Percentage of blockholding (%)	2010	5.47	15.90	100	10266
Eigen vector of blockholder		0.00000	0.00000	0.00	6726	Eigen vector of blockholder		0.00000	0.00000	0.00	10266
Degree of blockholder		0.00997	0.03921	0.40	6726	Degree of blockholder		0.22138	0.63726	2.35	10266
Percentage of blockholding (%)	2011	6.55	19.84	100	6669	Percentage of blockholding (%)	2011	5.78	16.60	100	9980
Eigen vector of blockholder		0.00021	0.01224	0.71	6669	Eigen vector of blockholder		0.00014	0.01001	0.71	9980
Degree of blockholder		0.00998	0.03718	0.36	6669	Degree of blockholder		0.19875	0.58608	2.19	9980
Percentage of blockholding (%)	2012	7.02	20.74	100	6689	Percentage of blockholding (%)	2012	6.14	17.70	100	9754
Eigen vector of blockholder		0.00000	0.00000	0.00	6689	Eigen vector of blockholder		0.00000	0.00000	0.00	9754
Degree of blockholder		0.01166	0.04409	0.41	6689	Degree of blockholder		0.16527	0.51600	2.02	9754
Percentage of blockholding (%)	Total	5.84	18.87	100	42785	Percentage of blockholding (%)	Total	5.35	16.12	100	62062
Eigen vector of blockholder		0.00010	0.00837	0.82	42785	Eigen vector of blockholder		0.00007	0.00695	0.82	62062
Degree of blockholder		0.00891	0.03501	0.41	42785	Degree of blockholder		0.13008	0.45055	2.35	62062

Panel B: Summary statistics of the centrality measures of blockholder in an unweighted network setup:

This subsample consists of only non-financial firms						This subsample has financial firms as a blockholder but not as a target of investment					
Stats	Year	Mean	SD	Max	N	Stats	Year	Mean	SD	Max	N
Number of links	2007	0.16	0.65	7	8056	Number of links	2007	7.28	27.13	153	11055
Eigen vector of blockholder		0.00018	0.01114	0.71	8056	Eigen vector of blockholder		0.00013	0.00951	0.71	11055
Degree of blockholder		0.00013	0.00052	0.01	8056	Degree of blockholder		0.00334	0.01244	0.07	11055
Number of links	2008	0.19	0.76	10	7557	Number of links	2008	16.07	59.61	325	10655
Eigen vector of blockholder		0.00000	0.00000	0	7557	Eigen vector of blockholder		0.00000	0.00000	0.0000162	10655
Degree of blockholder		0.00015	0.00060	0.01	7557	Degree of blockholder		0.00700	0.02598	0.14	10655
Number of links	2009	0.19	0.73	9	7088	Number of links	2009	39.70	130.03	560	10352
Eigen vector of blockholder		0.00020	0.01188	0.71	7088	Eigen vector of blockholder		0.00014	0.00983	0.71	10352
Degree of blockholder		0.00015	0.00059	0.01	7088	Degree of blockholder		0.01768	0.05790	0.25	10352
Number of links	2010	0.21	0.85	10	6726	Number of links	2010	73.60	220.56	816	10266
Eigen vector of blockholder		0.00000	0.00000	0.00	6726	Eigen vector of blockholder		0.00000	0.00000	0.00	10266
Degree of blockholder		0.00018	0.00074	0.01	6726	Degree of blockholder		0.03130	0.09382	0.35	10266
Number of links	2011	0.23	0.86	9	6669	Number of links	2011	66.44	204.37	767	9980
Eigen vector of blockholder		0.00021	0.01224	0.71	6669	Eigen vector of blockholder		0.00014	0.01001	0.71	9980
Degree of blockholder		0.00018	0.00067	0.01	6669	Degree of blockholder		0.02834	0.08715	0.33	9980
Number of links	2012	0.29	1.13	11	6689	Number of links	2012	53.41	174.93	685	9754
Eigen vector of blockholder		0.00000	0.00000	0.00	6689	Eigen vector of blockholder		0.00000	0.00000	0.00	9754
Degree of blockholder		0.00021	0.00084	0.01	6689	Degree of blockholder		0.02357	0.07720	0.30	9754
Number of links	Total	0.21	0.84	11	42785	Number of links	Total	41.93	154.09	816	62062
Eigen vector of blockholder		0.00010	0.00837	0.71	42785	Eigen vector of blockholder		0.00007	0.00695	0.71	62062
Degree of blockholder		0.00017	0.00066	0.01	42785	Degree of blockholder		0.01818	0.06653	0.35	62062

Panel C: Summary statistics of the centrality measures of the target of investment in a weighted network setup:

This subsample consists of only non-financial firms						This subsample has financial firms as a blockholder but not as a target of investment					
Stats	Year	Mean	SD	Max	N	Stats	Year	Mean	SD	Max	N
Percentage of blockholding (%)	2007	5.01	17.92	100	8056	Percentage of blockholding (%)	2007	4.70	15.77	100	11055
Eigen vector of target		0.00018	0.01114	0.71	8056	Eigen vector of target		0.00013	0.00951	0.71	11055
Degree of target		0.00036	0.00520	0.16	8056	Degree of target		0.00054	0.00537	0.18	11055
Percentage of blockholding (%)	2008	5.38	17.98	100	7557	Percentage of blockholding (%)	2008	5.00	15.57	100	10655
Eigen vector of target		0.00013	0.01150	1	7557	Eigen vector of target		0.00019	0.00969	0.8399069	10655
Degree of target		0.00023	0.00363	0.08	7557	Degree of target		0.00061	0.00548	0.15	10655
Percentage of blockholding (%)	2009	5.50	17.82	100	7088	Percentage of blockholding (%)	2009	5.11	15.17	100	10352
Eigen vector of target		0.00020	0.01188	0.82	7088	Eigen vector of target		0.00013	0.00983	0.82	10352
Degree of target		0.00026	0.00385	0.08	7088	Degree of target		0.00095	0.00747	0.20	10352
Percentage of blockholding (%)	2010	5.86	19.00	100	6726	Percentage of blockholding (%)	2010	5.47	15.90	100	10266
Eigen vector of target		0.00021	0.01219	0.71	6726	Eigen vector of target		0.00019	0.00987	0.57	10266
Degree of target		0.00029	0.00433	0.13	6726	Degree of target		0.00098	0.00744	0.19	10266
Percentage of blockholding (%)	2011	6.55	19.84	100	6669	Percentage of blockholding (%)	2011	5.78	16.60	100	9980
Eigen vector of target		0.00021	0.01224	0.71	6669	Eigen vector of target		0.00014	0.01001	0.71	9980
Degree of target		0.00036	0.00566	0.31	6669	Degree of target		0.00119	0.00865	0.17	9980
Percentage of blockholding (%)	2012	7.02	20.74	100	6689	Percentage of blockholding (%)	2012	6.14	17.70	100	9754
Eigen vector of target		0.00037	0.01222	0.67	6689	Eigen vector of target		0.00015	0.01012	0.71	9754
Degree of target		0.00036	0.00652	0.41	6689	Degree of target		0.00139	0.01017	0.24	9754
Percentage of blockholding (%)	Total	5.84	18.87	100	42785	Percentage of blockholding (%)	Total	5.35	16.12	100	62062
Eigen vector of target		0.00021	0.01184	1.00	42785	Eigen vector of target		0.00016	0.00983	0.84	62062
Degree of target		0.00031	0.00495	0.41	42785	Degree of target		0.00093	0.00756	0.24	62062

Panel D: Summary statistics of the centrality measures of the target of investment in an unweighted network setup:

This subsample consists of only non-financial firms						This subsample has financial firms as a blockholder but not as a target of investment					
Stats	Year	Mean	SD	Max	N	Stats	Year	Mean	SD	Max	N
Number of links	2007	0.09	0.30	2	8056	Number of links	2007	0.26	0.62	4	11055
Eigen vector of target		0.00018	0.01114	0.71	8056	Eigen vector of target		0.00013	0.00951	0.71	11055
Degree of target		0.00001	0.00008	0.00	8056	Degree of target		0.00001	0.00008	0.00	11055
Number of links	2008	0.10	0.31	2	7557	Number of links	2008	0.30	0.68	5	10655
Eigen vector of target		0.00013	0.01150	1	7557	Eigen vector of target		0.00013	0.00969	0.8090646	10655
Degree of target		0.00000	0.00007	0.00	7557	Degree of target		0.00001	0.00009	0.00	10655
Number of links	2009	0.10	0.31	2	7088	Number of links	2009	0.38	0.80	5	10352
Eigen vector of target		0.00020	0.01188	0.71	7088	Eigen vector of target		0.00014	0.00983	0.71	10352
Degree of target		0.00000	0.00007	0.00	7088	Degree of target		0.00002	0.00013	0.00	10352
Number of links	2010	0.10	0.31	2	6726	Number of links	2010	0.42	0.85	5	10266
Eigen vector of target		0.00021	0.01219	0.71	6726	Eigen vector of target		0.00029	0.00987	0.40	10266
Degree of target		0.00001	0.00008	0.00	6726	Degree of target		0.00002	0.00013	0.00	10266
Number of links	2011	0.12	0.33	2	6669	Number of links	2011	0.39	0.79	5	9980
Eigen vector of target		0.00021	0.01224	0.71	6669	Eigen vector of target		0.00014	0.01001	0.71	9980
Degree of target		0.00001	0.00009	0.00	6669	Degree of target		0.00002	0.00014	0.00	9980
Number of links	2012	0.13	0.34	3	6689	Number of links	2012	0.36	0.75	6	9754
Eigen vector of target		0.00000	0.00000	0.00	6689	Eigen vector of target		0.00015	0.01012	0.71	9754
Degree of target		0.00001	0.00011	0.01	6689	Degree of target		0.00002	0.00017	0.00	9754
Number of links	Total	0.11	0.31	3	42785	Number of links	Total	0.35	0.75	6	62062
Eigen vector of target		0.00016	0.01081	1.00	42785	Eigen vector of target		0.00016	0.00983	0.81	62062
Degree of target		0.00001	0.00009	0.01	42785	Degree of target		0.00002	0.00013	0.00	62062

Table 4: Table 4 represents the summary statistics of the blockholder and its target of investment present in the BVD orbis database alone between 2007 and 2012. There are two subsamples of firms – a sample which consists of only non-financial firms and a sample where there are financial firms as a blockholder but not as a target of investment. Panel A of the table looks at the centrality measures of the blockholder in a weighted network. Panel B of the table looks at the centrality measures of the blockholder in an unweighted network. Panel C of the table looks at the centrality measures of the target of investment in a weighted network. Panel D of the table looks at the centrality measures of the target of investment in an unweighted network. The definitions of the centrality measures are explained in the Appendix A.

Panel A: Summary statistics of the centrality measures of the blockholder in a weighted network setup:

This subsample consists of only non-financial firms							This subsample has financial firms as a blockholder but not as a target of investment						
Stats	Year	Mean	SD	Min	Max	N	Stats	Year	Mean	SD	Min	Max	N
Percentage of blockholding (%)	2007	54.47	28.23	5	100	741	Percentage of blockholding (%)	2007	26.02	28.69	5	100	1996
Eigen vector of blockholder		0.002	0.037	0	0.71	741	Eigen vector of blockholder		0.001	0.022	0	0.71	1996
Degree of blockholder		0.075	0.057	0.004	0.32	741	Degree of blockholder		0.162	0.182	0.002	0.63	1996
Percentage of blockholding (%)	2008	53.95	25.01	5	100	752	Percentage of blockholding (%)	2008	24.34	26.64	5	100	2190
Eigen vector of blockholder		0.000	0.000	0	0	752	Eigen vector of blockholder		0.000	0.000	0	0.00004	2190
Degree of blockholder		0.077	0.063	0.004	0.35	752	Degree of blockholder		0.262	0.317	0.002	0.93	2190
Percentage of blockholding (%)	2009	53.65	22.70	5	100	726	Percentage of blockholding (%)	2009	22.20	24.92	5	100	2380
Eigen vector of blockholder		0.002	0.037	0	0.82	726	Eigen vector of blockholder		0.001	0.020	0	0.82	2380
Degree of blockholder		0.077	0.061	0.004	0.36	726	Degree of blockholder		0.550	0.675	0.002	1.72	2380
Percentage of blockholding (%)	2010	57.62	23.81	5	100	684	Percentage of blockholding (%)	2010	21.28	25.43	5	100	2630
Eigen vector of blockholder		0.000	0.000	0	0.00	684	Eigen vector of blockholder		0.000	0.000	0	0.00	2630
Degree of blockholder		0.098	0.081	0.004	0.40	684	Degree of blockholder		0.863	1.015	0.002	2.35	2630
Percentage of blockholding (%)	2011	56.93	23.54	5.43	100	766	Percentage of blockholding (%)	2011	23.16	26.50	5	100	2488
Eigen vector of blockholder		0.002	0.036	0	0.71	766	Eigen vector of blockholder		0.001	0.020	0	0.71	2488
Degree of blockholder		0.087	0.073	0.004	0.36	766	Degree of blockholder		0.796	0.949	0.002	2.19	2488
Percentage of blockholding (%)	2012	56.96	25.35	5.07	100	822	Percentage of blockholding (%)	2012	25.59	28.41	5	100	2335
Eigen vector of blockholder		0.000	0.000	0	0.00	822	Eigen vector of blockholder		0.000	0.000	0	0.00	2335
Degree of blockholder		0.095	0.089	0.004	0.41	822	Degree of blockholder		0.690	0.866	0.002	2.02	2335
Percentage of blockholding (%)	Total	55.61	24.90	5	100	4491	Percentage of blockholding (%)	Total	23.64	26.77	5	100	14019
Eigen vector of blockholder		0.001	0.026	0	0.82	4491	Eigen vector of blockholder		0.000	0.015	0	0.82	14019
Degree of blockholder		0.085	0.072	0.004	0.41	4491	Degree of blockholder		0.576	0.801	0.002	2.35	14019

Panel B: Summary statistics of the blockholder in an unweighted network setup:

This subsample consists of only non-financial firms							This subsample has financial firms as a blockholder but not as a target of investment						
Stats	Year	Mean	SD	Min	Max	N	Stats	Year	Mean	SD	Min	Max	N
Number of links	2007	1.79	1.28	1	7	741	Number of links	2007	40.31	52.40	1	153	1996
Eigen vector of blockholder		0.002	0.037	0	0.71	741	Eigen vector of blockholder		0.001	0.022	0	0.71	1996
Degree of blockholder		0.001	0.001	0.001	0.01	741	Degree of blockholder		0.018	0.024	0.000	0.07	1996
Number of links	2008	1.89	1.62	1	10	752	Number of links	2008	78.17	111.53	1	325	2190
Eigen vector of blockholder		0.000	0.000	0	0	752	Eigen vector of blockholder		0.000	0.000	0	0.00002	2190
Degree of blockholder		0.001	0.001	0.001	0.01	752	Degree of blockholder		0.034	0.049	0.000	0.14	2190
Number of links	2009	1.85	1.47	1	9	726	Number of links	2009	172.27	224.43	1	559	2380
Eigen vector of blockholder		0.002	0.037	0	0.71	726	Eigen vector of blockholder		0.001	0.020	0	0.71	2380
Degree of blockholder		0.001	0.001	0.001	0.01	726	Degree of blockholder		0.077	0.100	0.000	0.25	2380
Number of links	2010	2.04	1.83	1	10	684	Number of links	2010	287.17	358.50	1	816	2630
Eigen vector of blockholder		0.000	0.000	0	0.00	684	Eigen vector of blockholder		0.000	0.000	0	0.00	2630
Degree of blockholder		0.002	0.002	0.001	0.01	684	Degree of blockholder		0.122	0.152	0.000	0.35	2630
Number of links	2011	1.99	1.70	1	9	766	Number of links	2011	265.89	337.44	1	766	2488
Eigen vector of blockholder		0.002	0.036	0	0.71	766	Eigen vector of blockholder		0.001	0.020	0	0.71	2488
Degree of blockholder		0.002	0.001	0.001	0.01	766	Degree of blockholder		0.114	0.144	0.000	0.33	2488
Number of links	2012	2.36	2.34	1	11	822	Number of links	2012	223.10	300.02	1	685	2335
Eigen vector of blockholder		0.000	0.000	0	0.00	822	Eigen vector of blockholder		0.000	0.000	0	0.00	2335
Degree of blockholder		0.002	0.002	0.001	0.01	822	Degree of blockholder		0.098	0.132	0.000	0.30	2335
Number of links	Total	1.99	1.76	1	11	4491	Number of links	Total	185.42	279.87	1	816	14019
Eigen vector of blockholder		0.001	0.026	0	0.71	4491	Eigen vector of blockholder		0.000	0.015	0	0.71	14019
Degree of blockholder		0.002	0.001	0.001	0.01	4491	Degree of blockholder		0.080	0.121	0.000	0.35	14019

Panel C: Summary statistics of the centrality measures of the target of investment in a weighted network setup:

This subsample consists of only non-financial firms							This subsample has financial firms as a blockholder but not as a target of investment						
Stats	Year	Mean	SD	Min	Max	N	Stats	Year	Mean	SD	Min	Max	N
Percentage of blockholding (%)	2007	54.47	28.23	5	100	741	Percentage of blockholding (%)	2007	26.02	28.69	5	100	1996
Eigen vector of target		0.002	0.037	0	0.71	741	Eigen vector of target		0.001	0.022	0	0.71	1996
Degree of target		0.004	0.017	0	0.16	741	Degree of target		0.003	0.012	0	0.18	1996
Percentage of blockholding (%)	2008	53.95	25.01	5	100	752	Percentage of blockholding (%)	2008	24.34	26.64	5	100	2190
Eigen vector of target		0.001	0.036	0	1	752	Eigen vector of target		0.001	0.021	0	0.84	2190
Degree of target		0.002	0.011	0	0.08	752	Degree of target		0.003	0.012	0	0.15	2190
Percentage of blockholding (%)	2009	53.65	22.70	5	100	726	Percentage of blockholding (%)	2009	22.20	24.92	5	100	2380
Eigen vector of target		0.002	0.037	0	0.82	726	Eigen vector of target		0.001	0.020	0	0.82	2380
Degree of target		0.003	0.012	0	0.08	726	Degree of target		0.004	0.015	0	0.20	2380
Percentage of blockholding (%)	2010	57.62	23.81	5	100	684	Percentage of blockholding (%)	2010	21.28	25.43	5	100	2630
Eigen vector of target		0.002	0.038	0	0.71	684	Eigen vector of target		0.001	0.019	0	0.57	2630
Degree of target		0.003	0.013	0	0.13	684	Degree of target		0.004	0.014	0	0.19	2630
Percentage of blockholding (%)	2011	56.93	23.54	5	100	766	Percentage of blockholding (%)	2011	23.16	26.50	5	100	2488
Eigen vector of target		0.002	0.036	0	0.71	766	Eigen vector of target		0.001	0.020	0	0.71	2488
Degree of target		0.003	0.016	0	0.31	766	Degree of target		0.005	0.017	0	0.17	2488
Percentage of blockholding (%)	2012	56.96	25.35	5	100	822	Percentage of blockholding (%)	2012	25.59	28.41	5	100	2335
Eigen vector of target		0.003	0.035	0	0.67	822	Eigen vector of target		0.001	0.021	0	0.71	2335
Degree of target		0.003	0.018	0	0.41	822	Degree of target		0.006	0.020	0	0.24	2335
Percentage of blockholding (%)	Total	55.61	24.90	5	100	4491	Percentage of blockholding (%)	Total	23.64	26.77	5	100	14019
Eigen vector of target		0.002	0.036	0	1.00	4491	Eigen vector of target		0.001	0.021	0	0.84	14019
Degree of target		0.003	0.015	0	0.41	4491	Degree of target		0.004	0.015	0	0.24	14019

Panel D: Summary statistics of the centrality measures of the target of investment in an unweighted network setup:

This subsample consists of only non-financial firms							This subsample has financial firms as a blockholder but not as a target of investment						
Stats	Year	Mean	SD	Min	Max	N	Stats	Year	Mean	SD	Min	Max	N
Number of links	2007	1.02	0.13	1	2	741	Number of links	2007	1.42	0.71	1	4	1996
Eigen vector of target		0.002	0.037	0	0.71	741	Eigen vector of target		0.001	0.022	0	0.71	1996
Degree of target		0.000	0.000	0	0.00	741	Degree of target		0.000	0.000	0	0.00	1996
Number of links	2008	1.01	0.10	1	2	752	Number of links	2008	1.45	0.74	1	5	2190
Eigen vector of target		0.001	0.036	0	1	752	Eigen vector of target		0.001	0.021	0	0.81	2190
Degree of target		0.000	0.000	0	0.00	752	Degree of target		0.000	0.000	0	0.00	2190
Number of links	2009	1.01	0.07	1	2	726	Number of links	2009	1.64	0.85	1	5	2380
Eigen vector of target		0.002	0.037	0	0.71	726	Eigen vector of target		0.001	0.020	0	0.71	2380
Degree of target		0.000	0.000	0	0.00	726	Degree of target		0.000	0.000	0	0.00	2380
Number of links	2010	1.01	0.08	1	2	684	Number of links	2010	1.66	0.88	1	5	2630
Eigen vector of target		0.002	0.038	0	0.71	684	Eigen vector of target		0.001	0.019	0	0.40	2630
Degree of target		0.000	0.000	0	0.00	684	Degree of target		0.000	0.000	0	0.00	2630
Number of links	2011	1.01	0.11	1	2	766	Number of links	2011	1.58	0.81	1	5	2488
Eigen vector of target		0.002	0.036	0	0.71	766	Eigen vector of target		0.001	0.020	0	0.71	2488
Degree of target		0.000	0.000	0	0.00	766	Degree of target		0.000	0.000	0	0.00	2488
Number of links	2012	1.01	0.15	1	3	822	Number of links	2012	1.51	0.78	1	6	2335
Eigen vector of target		0.000	0.000	0	0.00	822	Eigen vector of target		0.001	0.021	0	0.71	2335
Degree of target		0.000	0.000	0	0.01	822	Degree of target		0.000	0.000	0	0.00	2335
Number of links	Total	1.01	0.11	1	3	4491	Number of links	Total	1.55	0.81	1	6	14019
Eigen vector of target		0.001	0.033	0	1.00	4491	Eigen vector of target		0.001	0.021	0	0.81	14019
Degree of target		0.000	0.000	0	0.01	4491	Degree of target		0.000	0.000	0	0.00	14019

Table 5: Summary statistics of the data used for the logit regression to measure the probability of a firm being a target or an acquirer. The sample includes all the firms between 2007 and 2012 that have been a part and not been a part of our network. Mean is the arithmetic average. Sd is the standard deviation. Min is the minimum and max is the maximum. The variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged database. The centrality measures are explained in Appendix 1.

Stats	Mean	Sd	min	Max	N
Acquirer	1.73%	13.05%	0	1	40106
Target	2.19%	14.64%	0	1	40106
Degree source weighted	0.00354	0.0289	0	2.56	40106
Degree source unweighted	0.00016	0.0038	0	0.38	40106
Degree target weighted	0.00153	0.02347	0	2.56	40106
Degree target unweighted	0.00018	0.00032	0	0.38	40106
Eigenvector source weighted	0.00018	0.0091	0	0.82	40106
Eigenvector source unweighted	0.00031	0.0090	0	0.71	40106
Eigenvector target weighted	0.00052	0.0122	0	0.96	40106
Eigenvector target unweighted	0.00092	0.0122	0	0.71	40106
Finance	26.44%	44.10%	0	1	40106
Ln(assets)	6.60	2.23	-1.72	15.14	30615
Leverage	0.17	0.20	0.00	0.89	30507
ROA	0.68%	22.23%	-122.50%	38.36%	30576
Property ratio	48.27%	42.47%	0.00%	191.83%	26143
Liquidity ratio	25.48%	25.59%	-35.03%	89.03%	24209
MTB	1.56	2.23	0.07	16.44	30507
HH index	688.50	684.70	128.54	3822.06	34366
Sales Growth	10.95%	42.88%	-82.49%	277.05%	28504
Cash asset	19.66%	22.60%	0.05%	94.79%	30614

Table 6: Summary statistics of the data used for the logit regression to see the probability of a firm being a target or an acquirer. The sample includes all the firms between 2007 and 2012 that have been a part and not been a part of our network. We also do a difference of means tests between financial and non-financial firms. Finance is a dummy which takes the value 1 if the firm is a financial firm and 0 if the firm is a non-financial one. Mean is the arithmetic average. Sd is the standard deviation. Min is the minimum and max is the maximum. T-stat represents the Student t-statistic of the difference of means test and p-val, the corresponding probability under the null hypothesis of no difference. The variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged database. The centrality measures are explained in Appendix 1.

Stats	mean	Sd	N	Finance	Non-finance	T stat	P- val
Acquirer	1.73%	13.05%	40106	1.74%	1.73%	0.02	0.98
Target	2.19%	14.64%	40106	0.59%	2.77%	-13.13	0.00
Degree source weighted	0.004	0.03	40106	0.004	0.003	3.31	0.00
Degree source unweighted	0.0001	0.00	40106	0.00044	0.0001	8.49	0.00
Degree target weighted	0.002	0.02	40106	0.002	0.001	4.18	0.00
Degree target unweighted	0.0001	0.00	40106	0.0003	0.00002	6.53	0.00
Eigenvector source weighted	0.0002	0.01	40106	0.0002	0.0001	-0.13	0.90
Eigenvector source unweighted	0.0003	0.01	40106	0.0007	0.0002	5.52	0.00
Eigenvector target weighted	0.001	0.01	40106	0.0006	0.0003	-2.53	0.01
Eigenvector target unweighted	0.0001	0.01	40106	0.0001	0.0001	0.47	0.64
Finance	26.44%	44.10%	40106	na	Na	na	na
Ln(assets)	6.60	2.23	30615	7.59	6.32	42.97	0.00
Leverage	0.17	0.32	30507	0.16	0.18	-3.17	0.00
ROA	0.68%	22.23%	30576	3.14%	-0.03%	10.40	0.00
Property ratio	48.27%	42.66%	26143	14.74%	51.89%	-43.42	0.00
Liquidity ratio	25.48%	25.59%	24209	23.36%	25.56%	-2.48	0.01
MTB	1.57	2.28	30507	0.86	1.78	-29.59	0.00
HH index	688.50	684.70	34366	405.14	814.97	-53.33	0.00
Sales Growth	10.94%	42.89%	28504	6.14%	12.37%	-10.34	0.00
Cash asset	19.67%	22.60%	30614	11.11%	22.13%	-36.39	0.00

Table 7: Summary statistics of the data used for the logit regression to see the probability of a firm being a target or an acquirer. The sample includes all the firms between 2007 and 2012 that have been a part and not been a part of our network. We also do a difference of means tests between acquirers and firms that have not been an acquirer. Mean is the arithmetic average. Sd is the standard deviation. Min is the minimum and max is the maximum. T-stat represents the Student t-statistic of the difference of means test and p-val, the corresponding probability under the null hypothesis of no difference. The variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged database.

Stats	Mean	sd	N	Acquirer	Non acquirer	T-stat	p-val
Acquirer	1.73%	13.05%	40106	na	Na	na	na
Target	2.19%	14.64%	40106	2.16%	2.19%	-0.06	0.95
Finance	26.44%	44.10%	40106	26.48%	26.44%	0.02	0.98
Ln(assets)	6.60	2.23	30615	8.46	6.56	22.15	0.00
Leverage	17.33%	31.87%	30507	19.05%	17.35%	1.37	0.17
ROA	0.68%	22.23%	30576	5.49%	0.57%	5.69	0.00
Property ratio	48.27%	42.66%	26143	40.71%	48.43%	-4.19	0.00
Liquidity ratio	25.48%	25.59%	24209	18.06%	25.64%	-6.59	0.00
MTB	1.57	2.28	30507	1.16	1.58	-4.70	0.00
HH index	688.50	684.70	34366	606.19	690.16	-3.16	0.00
Sales Growth	10.94%	42.89%	28504	15.44%	10.84%	2.72	0.01
Cash asset	19.67%	22.60%	30614	14.45%	19.78%	-6.07	0.00

Table 8: Summary statistics of the data used for the logit regression to see the probability of a firm being a target or an acquirer. The sample includes all the firms between 2007 and 2012 that have been a part and not been a part of our network. We also do a difference of means tests between firms that were targets and that have not been targets in this period. Mean is the arithmetic average. Sd is the standard deviation. Min is the minimum and max is the maximum. T-stat represents the Student t-statistic of the difference of means test and p-val, the corresponding probability under the null hypothesis of no difference. The variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged database.

Stats	Mean	sd	N	Target	Non target	T-stat	P-val
Acquirer	1.73%	13.05%	40106	1.71%	1.73%	-0.0607	0.9516
Target	2.19%	14.64%	40106	na	na	na	na
Finance	26.44%	44.10%	40106	7.17%	26.87%	-13.13	0.00
Ln(assets)	6.60	2.23	30615	6.37	6.60	-1.91	0.06
Leverage	17.33%	31.87%	30507	15.77%	17.41%	-0.93	0.36
ROA	0.68%	22.23%	30576	1.03%	0.68%	-0.55	0.81
Property ratio	48.27%	42.66%	26143	47.90%	48.27%	-0.15	0.71
Liquidity ratio	25.48%	25.59%	24209	27.45%	25.46%	1.26	0.21
MTB	1.57	2.28	30507	1.27	1.58	-2.41	0.02
HH index	688.50	684.70	34366	733.62	688.07	1.20	0.23
Sales Growth	10.94%	42.89%	28504	2.49%	11.04%	-3.51	0.00
Cash asset	19.67%	22.60%	30614	20.92%	19.65%	1.05	-0.29

Table 9: Summary statistics of the data used for the logit regression to see the probability of a deal completion. The sample includes all the deals both completed and uncompleted between 2007 and 2012. Success is a dummy variable taking 1 if the deal was completed and 0 if it was a failed bid. All the deal characteristics were collected from Thompson SDC Database. The control variables have been defined in Appendix 2. The centrality measures are explained in Appendix 1.

Stats	Mean	sd	Min	Max	N
Success	81.17%	39.11%	0	1	1662
Degree source weighted	0.0121	0.0294	0	0.26	1662
Degree source unweighted	0.0003	0.0014	0	0.03	1662
Eigenvector source weighted	0.00067	0.0153	0	0.58	1662
Eigenvector source unweighted	0.0012	0.0214	0	0.71	1662
Degree target weighted	0.00059	0.0043	0	0.08	1662
Degree target unweighted	0.00001	0.00007	0	0.0012	1662
Eigenvector target weighted	0.00065	0.0203	0	0.82	1662
Eigenvector target unweighted	0.00008	0.0002	0	0.09	1662
Target size	5.65	1.98	1.02	10.09	1662
NYSE AMEX	27.08%	44.45%	0	1	1662
Turnover	0.50	0.54	0.01	3.63	1662
Toehold	7.16%	25.79%	0	1	1662
Premium 4 week (%)	46.68	56.30	-49.08	362.50	1662
Bidder public	55.84%	49.67%	0	1	1662
Poison pill	2.05%	14.16%	0	1	1662
Horizontal	33.15%	47.09%	0	1	1662
All cash	62.70%	48.38%	0	1	1662
All stock	12.58%	33.17%	0	1	1662

Table 10: We use a logit regression to estimate the probability of being an acquirer. The dependent variable is a dummy variable equal to 1 if the firm was an acquirer and 0 otherwise. We control for annual and industrial fixed effects. The independent variables or the centrality measures and their interpretations have been defined in Appendix 1. The control variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged. We execute the regressions for two samples. Regressions on Panel A is when there are no financial firms in the sample and in Panel B when there are financial firms as blockholders in the sample. P-values are the values in the parentheses.

Panel A: Probability of a firm being an acquirer when there are no financial firms in the sample.

	Acquirer	Acquirer	Acquirer	Acquirer	Acquirer
Degree of Acquirer weighted		17.34			
		(0.000)			
Degree of Acquirer unweighted			820.2		
			(0.000)		
Eigenvector of Acquirer weighted				2.926	
				(0.241)	
Eigenvector of Acquirer unweighted					6.019
					(0.000)
Ln(assets)	0.532	0.309	0.347	0.532	0.533
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	0.498	0.505	0.536	0.496	0.492
	(0.009)	(0.008)	(0.004)	(0.009)	(0.010)
MTB	-0.125	-0.0976	-0.108	-0.125	-0.125
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ROA	0.0508	0.487	0.356	0.0464	0.0492
	(0.908)	(0.288)	(0.426)	(0.916)	(0.911)
Property ratio	-0.749	-0.420	-0.517	-0.745	-0.736
	(0.000)	(0.037)	(0.010)	(0.000)	(0.000)
Liquidity ratio	-0.551	-0.362	-0.467	-0.535	-0.517
	(0.200)	(0.426)	(0.297)	(0.213)	(0.230)
Sales growth	0.372	0.366	0.395	0.369	0.376
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
HH index	0.000189	0.000155	0.000182	0.000287	0.000167
	(0.681)	(0.748)	(0.699)	(0.559)	(0.715)
Cash	0.317	0.279	0.272	0.303	0.290
	(0.476)	(0.548)	(0.553)	(0.495)	(0.514)
_cons	-7.918	-6.293	-7.020	-8.126	-7.891
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industrial fixed effects	Yes	Yes	Yes	Yes	Yes
Annual fixed effects	Yes	Yes	Yes	Yes	Yes
N	20150	20150	20150	20150	20150

Panel B: Probability of a firm being an acquirer when there are financial firms in the sample as blockholders but not as a target of investment.

	Acquirer	Acquirer	Acquirer	Acquirer	Acquirer
Degree of Acquirer weighted		25.19			
		(0.000)			
Degree of Acquirer unweighted			53.58		
			(0.060)		
Eigenvector of Acquirer weighted				3.013	
				(0.223)	
Eigenvector of Acquirer unweighted					3.850
					(0.011)
Ln(assets)	0.535	0.366	0.528	0.535	0.534
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	0.513	0.498	0.509	0.511	0.506
	(0.006)	(0.008)	(0.006)	(0.006)	(0.007)
MTB	-0.123	-0.0947	-0.121	-0.123	-0.123
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.0410	0.0110	-0.0379	-0.0422	-0.0393
	(0.730)	(0.327)	(0.766)	(0.712)	(0.754)
Property ratio	-0.725	-0.476	-0.719	-0.721	-0.725
	(0.000)	(0.017)	(0.000)	(0.000)	(0.000)
Liquidity ratio	-0.474	-0.244	-0.473	-0.459	-0.478
	(0.253)	(0.570)	(0.256)	(0.268)	(0.249)
Sales growth	0.367	0.360	0.369	0.365	0.369
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
HH index	0.000287	0.000252	0.000275	0.000387	0.000286
	(0.529)	(0.598)	(0.548)	(0.429)	(0.531)
Cash	0.283	0.0868	0.265	0.269	0.273
	(0.499)	(0.841)	(0.528)	(0.519)	(0.513)
_cons	-8.141	-6.877	-8.077	-8.351	-8.126
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industrial fixed effects	Yes	Yes	Yes	Yes	Yes
Annual fixed effects	Yes	Yes	Yes	Yes	Yes
N	20792	20792	20792	20792	20792

Table 11: We use a logit regression to estimate the probability of being a target. The dependent variable is a dummy variable equal to 1 if the firm was a target and 0 otherwise. We control for annual and industrial fixed effects. The independent variables or the centrality measures and their interpretations have been defined in Appendix 1. The control variables have been defined in Appendix 2. All the control variables have been taken from CRSP and compustat merged. We execute the regressions for two samples. Regressions on Panel A is when there are no financial firms in the sample and in Panel B when there are financial firms as blockholders in the sample. P-values are the values in the parentheses.

Panel A: Probability of a firm being a target when there are only non-financial firms in the sample.

	Target	Target	Target	Target	Target
Degree of Target weighted		11.06			
		(0.004)			
Degree of Target unweighted			740.2		
			(0.007)		
Eigenvector of target weighted				-3634.0	
				(0.935)	
Eigenvector of target unweighted					-16.78
					(0.895)
Ln(assets)	-0.0570	-0.0631	-0.0649	-0.0569	-0.0569
	(0.091)	(0.058)	(0.050)	(0.091)	(0.091)
Leverage	-0.00252	0.00542	0.00944	-0.00210	-0.00234
	(0.993)	(0.985)	(0.973)	(0.994)	(0.993)
MTB	-0.0861	-0.0869	-0.0867	-0.0861	-0.0861
	(0.044)	(0.044)	(0.045)	(0.044)	(0.044)
ROA	0.552	0.567	0.570	0.552	0.553
	(0.167)	(0.155)	(0.153)	(0.168)	(0.167)
Property ratio	0.0458	0.0485	0.0471	0.0451	0.0454
	(0.833)	(0.822)	(0.828)	(0.835)	(0.834)
Liquidity ratio	0.368	0.378	0.379	0.368	0.368
	(0.292)	(0.279)	(0.278)	(0.293)	(0.292)
Sales growth	-0.642	-0.639	-0.637	-0.641	-0.642
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
HH index	-0.000182	-0.000168	-0.000170	-0.000192	-0.000181
	(0.731)	(0.752)	(0.749)	(0.718)	(0.733)
_cons	-3.570	-3.558	-3.546	-3.559	-3.571
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industrial fixed effects	Yes	Yes	Yes	Yes	Yes
Annual fixed effects	Yes	Yes	Yes	Yes	Yes
N	19783	19783	19783	19783	19783

Panel B: Probability of a firm being a target when there are financial firms in the sample as blockholders but not as a target of investment.

	Target	Target	Target	Target	Target
Degree of Target weighted		3.200			
		(0.526)			
Degree of Target unweighted			137.3		
			(0.610)		
Eigenvector of target weighted				-128937.7	
				(0.581)	
Eigenvector of target unweighted					-952459.1
					(0.731)
Ln(assets)	-0.0568	-0.0607	-0.0597	-0.0566	-0.0566
	(0.092)	(0.074)	(0.077)	(0.093)	(0.093)
Leverage	-0.00466	-0.000697	-0.00152	-0.00438	-0.00382
	(0.987)	(0.998)	(0.996)	(0.988)	(0.989)
MTB	-0.0848	-0.0844	-0.0845	-0.0850	-0.0849
	(0.048)	(0.049)	(0.049)	(0.048)	(0.048)
ROA	0.559	0.566	0.564	0.556	0.557
	(0.164)	(0.158)	(0.159)	(0.166)	(0.166)
Property ratio	0.0461	0.0498	0.0485	0.0456	0.0462
	(0.831)	(0.818)	(0.822)	(0.833)	(0.831)
Liquidity ratio	0.368	0.373	0.371	0.367	0.367
	(0.293)	(0.285)	(0.287)	(0.293)	(0.293)
Sales growth	-0.641	-0.640	-0.640	-0.640	-0.641
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
HH index	-0.000183	-0.000181	-0.000182	-0.000194	-0.000184
	(0.731)	(0.733)	(0.732)	(0.715)	(0.729)
_cons	-3.574	-3.557	-3.561	-3.562	-3.574
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Industrial fixed effects	Yes	Yes	Yes	Yes	Yes
Annual fixed effects	Yes	Yes	Yes	Yes	Yes
N	19783	19783	19783	19783	19783

Table 12: We use a logit regression to estimate the probability of deal completion from an acquirer's point of view. The dependent variable is a dummy variable success equal to 1 if the deal was completed and 0 otherwise. We control for annual fixed effects. The independent variables or the centrality measures and their interpretations have been defined in Appendix 1. We use the centrality measures of the acquirer in this case. The control variables have been defined in Appendix 2. All the deal characteristics have been taken from Thompson SDC Database. We execute the regressions for two samples. Regressions on Panel A is when there are no financial firms in the sample and in Panel B when there are financial firms as blockholders in the sample. P-values are the values in the parentheses.

Panel A: Probability of deal completion when there are only non-financial firms in the sample.

	Success	Success	Success	Success	Success
Eigen vector of acquirer unweighted		15.75			
		(0.000)			
Degree of acquirer unweighted			1183.0		
			(0.000)		
Eigen vector of acquirer weighted				19.19	
				(0.000)	
Degree of acquirer weighted					18.06
					(0.000)
ln(Target size)	-0.0114	-0.0121	-0.0552	-0.0120	-0.0526
	(0.778)	(0.764)	(0.187)	(0.766)	(0.207)
NYSE AMEX	-0.153	-0.149	-0.0848	-0.150	-0.0775
	(0.377)	(0.392)	(0.633)	(0.387)	(0.664)
Turnover	-0.494	-0.488	-0.482	-0.489	-0.465
	(0.240)	(0.246)	(0.268)	(0.245)	(0.281)
Poison Pill	-2.960	-2.961	-2.802	-2.961	-2.765
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toehold	-1.072	-1.070	-1.125	-1.070	-1.102
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public bidder	0.508	0.506	0.0843	0.508	0.0828
	(0.001)	(0.001)	(0.613)	(0.001)	(0.621)
Horizontal	0.0907	0.0946	0.146	0.0934	0.152
	(0.543)	(0.526)	(0.331)	(0.531)	(0.312)
Premium 4 week	0.00334	0.00331	0.00290	0.00332	0.00284
	(0.391)	(0.396)	(0.473)	(0.395)	(0.479)
Tender offer	1.147	1.148	1.081	1.148	1.077
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
All Cash	-0.108	-0.106	-0.183	-0.108	-0.181
	(0.542)	(0.550)	(0.315)	(0.542)	(0.320)
All stock	-0.461	-0.467	-0.247	-0.469	-0.252
	(0.051)	(0.049)	(0.293)	(0.047)	(0.285)
_cons	1.526	1.525	1.853	1.529	1.822
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Annual Fixed effects	Yes	Yes	Yes	Yes	Yes
N	1662	1662	1662	1662	1662

Panel B: Probability of a deal completion when there are financial firms in the sample as blockholders but not as a target of investment.

	Success	Success	Success	Success	Success
Eigen vector of acquirer unweighted		799851.8			
		(0.000)			
Degree of acquirer unweighted			1885.9		
			(0.000)		
Eigen vector of acquirer weighted				261746.3	
				(0.000)	
Degree of acquirer weighted					31.75
					(0.000)
ln(Target size)	-0.0114	-0.0138	-0.0654	-0.0129	-0.0609
	(0.778)	(0.732)	(0.124)	(0.749)	(0.147)
NYSE AMEX	-0.153	-0.149	-0.0979	-0.152	-0.0923
	(0.377)	(0.392)	(0.582)	(0.381)	(0.605)
Turnover	-0.494	-0.487	-0.634	-0.487	-0.528
	(0.240)	(0.248)	(0.162)	(0.248)	(0.221)
Poison Pill	-2.960	-2.960	-2.772	-2.960	-2.745
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toehold	-1.072	-1.069	-1.113	-1.070	-1.093
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public bidder	0.508	0.504	0.0566	0.507	0.0516
	(0.001)	(0.002)	(0.738)	(0.001)	(0.759)
Horizontal	0.0907	0.0918	0.183	0.0903	0.180
	(0.543)	(0.538)	(0.225)	(0.544)	(0.234)
Premium 4 week	0.00334	0.00329	0.00437	0.00328	0.00344
	(0.391)	(0.399)	(0.299)	(0.400)	(0.390)
Tender offer	1.147	1.152	1.098	1.149	1.087
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
All Cash	-0.108	-0.108	-0.180	-0.105	-0.187
	(0.542)	(0.541)	(0.319)	(0.554)	(0.303)
All stock	-0.461	-0.464	-0.286	-0.465	-0.285
	(0.051)	(0.050)	(0.230)	(0.049)	(0.229)
_cons	1.526	1.541	1.873	1.534	1.850
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Annual Fixed effects	Yes	Yes	Yes	Yes	Yes
N	1662	1662	1662	1662	1662

Table 13: We use a logit regression to estimate the probability of deal completion from a target's perspective. The dependent variable is a dummy variable success equal to 1 if the deal was completed and 0 otherwise. We control for annual fixed effects. The independent variables or the centrality measures and their interpretations have been defined in Appendix 1. We use the centrality measures of the target in this case. The control variables have been defined in Appendix 2. All the deal characteristics have been taken from Thompson SDC Database. We execute the regressions for two samples. Regressions on Panel A is when there are no financial firms in the sample and in Panel B when there are financial firms as blockholders in the sample. P-values are the values in the parentheses.

Panel A: Probability of deal completion when there are only non-financial firms in the sample.

	Success	Success	Success	Success	Success
Eigen vector of target unweighted		15.75			
		(0.000)			
Degree of target unweighted			372.0		
			(0.447)		
Eigen vector of target weighted				0.329	
				(0.000)	
Degree of target weighted					12.10
					(0.221)
ln(Target size)	-0.0114	-0.0121	-0.0135	-0.00246	-0.0143
	(0.778)	(0.764)	(0.738)	(0.658)	(0.724)
NYSE AMEX	-0.153	-0.149	-0.153	-0.0211	-0.153
	(0.377)	(0.392)	(0.377)	(0.373)	(0.379)
Turnover	-0.494	-0.488	-0.514	-0.0861	-0.510
	(0.240)	(0.246)	(0.225)	(0.253)	(0.229)
Poison Pill	-2.960	-2.961	-2.953	-0.529	-2.951
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toehold	-1.072	-1.070	-1.075	-0.194	-1.075
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public bidder	0.508	0.506	0.503	0.0680	0.500
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Horizontal	0.0907	0.0946	0.0920	0.0112	0.0948
	(0.543)	(0.526)	(0.538)	(0.565)	(0.525)
Premium 4 week	0.00334	0.00331	0.00353	0.000627	0.00348
	(0.391)	(0.396)	(0.369)	(0.378)	(0.375)
Tender offer	1.147	1.148	1.148	0.128	1.148
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
All Cash	-0.108	-0.106	-0.109	-0.0176	-0.111
	(0.542)	(0.550)	(0.538)	(0.452)	(0.532)
All stock	-0.461	-0.467	-0.459	-0.0641	-0.462
	(0.051)	(0.049)	(0.052)	(0.070)	(0.051)
_cons	1.526	1.525	1.536	0.824	1.538
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Annual Fixed effects	Yes	Yes	Yes	Yes	Yes
N	1662	1662	1662	1662	1662
adj. R-sq				0.095	

Panel B: Probability of a firm being a target when there are financial firms in the sample as blockholders but not as a target of investment.

	Success	Success	Success	Success	Success
Eigen vector of target unweighted		23331082.8			
		(0.513)			
Degree of target unweighted			827.0		
			(0.310)		
Eigen vector of target weighted				856421.9	
				(0.004)	
Degree of target weighted					15.63
					(0.321)
ln(Target size)	-0.0114	-0.0118	-0.0152	-0.0120	-0.0151
	(0.778)	(0.770)	(0.709)	(0.765)	(0.709)
NYSE AMEX	-0.153	-0.149	-0.152	-0.149	-0.151
	(0.377)	(0.389)	(0.382)	(0.392)	(0.386)
Turnover	-0.494	-0.475	-0.513	-0.450	-0.499
	(0.240)	(0.260)	(0.227)	(0.288)	(0.237)
Poison Pill	-2.960	-2.953	-2.962	-2.953	-2.961
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Toehold	-1.072	-1.067	-1.076	-1.084	-1.076
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Public bidder	0.508	0.499	0.502	0.487	0.502
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Horizontal	0.0907	0.0924	0.0919	0.0949	0.0944
	(0.543)	(0.535)	(0.537)	(0.525)	(0.526)
Premium 4 week	0.00334	0.00319	0.00352	0.00298	0.00340
	(0.391)	(0.415)	(0.370)	(0.448)	(0.386)
Tender offer	1.147	1.140	1.149	1.151	1.150
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
All Cash	-0.108	-0.103	-0.107	-0.0882	-0.106
	(0.542)	(0.560)	(0.548)	(0.618)	(0.553)
All stock	-0.461	-0.459	-0.458	-0.435	-0.459
	(0.051)	(0.053)	(0.053)	(0.067)	(0.052)
_cons	1.526	1.527	1.542	1.520	1.538
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Annual Fixed effects	Yes	Yes	Yes	Yes	Yes
N	1662	1662	1662	1662	1662

Appendix 1: Network Topology: Centrality measures and its meanings

VARIABLE	DEFINITION (MEASUREMENT)
Path	A unique tie of shareholding between Company A and Company B
Distance	Length of the shortest path (Percentage of share held) connecting company A and company B
Number of links	It's the number of links that one firm has with other firms in the network in the network in a year. It is calculated from both the perspective of the blockholder and its target of investment.
Degree	It is a measure of how well connected a firm is and firms with higher degree score tend to be more central in the network. For the blockholder it is the number of outgoing links based on the number of companies it has invested in. It is also known as out-degree or degree of blockholder/acquirer. For the target it is the number of links coming in based on the number of blockholders which have invested in it. It is also known as in-degree or degree of target. For a weighted network the measures are weighted based on the percentage of share held by a blockholder in its target of investment.
Eigen vector	If the firm has a lot of links with other firms or with important firms in the network, the measure will be higher for that company in the network. It measures the importance of a firm in the network. It is known as eigenvector of blockholder/acquirer and eigenvector of target for the target. The measures could be weighted based on percentage of shares held by a blockholder in its target of investment or it could be unweighted.

Appendix 2: Variable definitions

Variable Name	Definition	Database
Acquirer	A dummy variable which takes a value equal to 1 if it was an acquirer between 2007 and 2012 and 0 if it was not	SDC
All cash	A dummy variable which takes a value equal to one if the deal was all cash and 0 otherwise	SDC
All stock	A dummy variable which takes a value equal to one if the deal was all stock and 0 otherwise	SDC
Cash assets	The ratio of total cash to that of the total assets	Compustat
Finance	A dummy variable which takes a value equal to 1 if a financial firm (SIC 6000-6999) and 0 otherwise	Compustat
HHindex	Sum of the square of the market share of each company in a given sector where market share is calculated by the ratio of sales of a given company and the total sales of the industry	Compustat
Horizontal	A dummy variable which takes a value equal to one if the bidder and the target have the same 4 digit SIC code and 0 otherwise	SDC
Leverage	Long term debt (item DLTT) divided by total assets (item AT)	Compustat
Liquidity ratio	Current assets (item ACT) minus Current liability (item LCT) divided by total assets (item AT)	Compustat
Ln(Assets)	Natural logarithmic value of total assets (item AT) listed in ‘000000 dollars	Compustat
MTB	Ratio of the sum of market capitalization , which is nothing but the product of outstanding shares in the market and closing price on that day (item CSHO * item PRC) and long term debt (item DLTT) divided by total assets (item AT)	Compustat
NYSE AMEX	A dummy variable which takes a value equal to one if the target is listed in NYSE or AMEX and 0 otherwise	SDC
Poison Pill	A dummy variable which takes a value equal to one if the target has a poison pill and 0 otherwise	SDC

Premium 4 week	offer price divided by market price of the target 4 weeks before the announcement	SDC
Property Ratio	Ratio of gross property plant and equipment (item PPEGT) divided by the total assets (item AT)	Compustat
Public bidder	A dummy variable which takes a value equal to one if the Acquirer is listed publicly and 0 otherwise	SDC
ROA	operating income after depreciation and amortization (item OIADP) divided by the total assets (item AT)	Compustat
Sales growth	The annual sales growth rate of a firm in comparison to the previous year	Compustat
Success	A dummy variable which takes a value equal to one if the deal is completed and 0 otherwise	SDC
Target	Takes a dummy equal to one if the firm was a target between 2007 and 2012	SDC
Target size	Target market value 42 days before announcement (logarithm is used in regression)	CRSP, SDC
Tender offer	A dummy variable which takes a value equal to one if the deal was classified as tender offer by SDC and 0 otherwise	SDC
Toehold	A dummy variable which takes a value equal to one if the acquirer holds a non-zero percentage target's share before the announcement in the target before announcement and 0 otherwise	SDC
Turnover	Target average daily ratio of trading volume to total shares outstanding over the 52 weeks before the announcement	CRSP