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(How does the network structure affect firm performance and innovation incentives
in transition countries? The case of Armenia)

Does privatization Praise the productivity? The role of Social capital in
transition process. Empirical Evidence in Armenia.

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Abstract

The research describes the post-privatization ownership structure and how it affects further development of the Industry in Armenia. One of the main arguments of the study is that the lack of the market-supporting institutions during the transition period enhances the creation of the social network among the enterprises. The goal of the study is to examine the role of the corporate network on further development of the industry. For this purpose we use firm level data of the major Open joint stock companies, which has status of reporting issuer with minimum 50 shareholders and initial capital of 5.000.000 Armenian dram. We conducted several regression models to measure firm performance for the period 2000-2005.

The results show that the social capital plays a strong role in explaining firm performance for transitional economies such as Armenia. Empirical evidence indicates that firms cooperating more in the same industry perform better. We also found that resourcefulness of firm's ties with other firms had an important and positive impact on explaining how well firms perform in context of Armenian transition.

Introduction

Economic performance of firms in transition economies has been explained by ownership category, industry, geographic region, start-up capital (Sunit Kikeri and John Nellis, 2000, W.CarlinS. Fries,2001). In this study we examine the impact of board member network on firm performance and suggest a socioeconomic explanation of firm's performance. This study contributes to our understanding of firm's networks in transition economies as a facilitating mechanism for firms' ability to ride through the transition period. We argue that different network characteristics have varying effects on firm performance.

In this study, we extend the privatization-performance research agenda to Armenia , which has been the subject of relatively little systematic analysis. Drawing on social network theory, we attempt to link varieties of firm performance with initial networks of board members in the context of a transition economy.

The study is focused on the post privatization period, from 1999 to 2005. Firm's strategies in transition economies differ from those in developed economies, and strategies applied successfully in one country may fail in another. Corporate strategies in transition economies and other emerging markets can therefore be explained only by incorporating the specific institutional and social context in the analysis. Privatization is generally a part of a broader process of deregulation and institutional building. The future development of privatized firms is therefore highly interdependent with institutional change in their environment and public policy.

In the literature on privatization, many scholars discussed how privatization methods reshape post privatization reality. Proponents of rapid mass privatization argue that the benefits of a market economy can be created quickly once the power of the state to control economic activity is removed. Once private ownership rights were delineated and the state cut off from economic activities, market incentives would be sufficient to improve corporate governance and restructure companies (Boycko, Shleifer and Vishny, 1995). In contrast to this argument, proponents of gradual privatization emphasize the important role of institutions (Andrew Spicer, Gerald A. Mcdermot, Bruce Kogut, 2000). From the perspective of Institutional economics, Western economic development was based on the ability of institutional "rules of the game" to constrain and structure the activities of the economic actors who competed under these rules. The lack of complementary institutions to oversee and regulate the security market, is striking in the post privatization period in many transition economies. Mass privatization creates opportunities for the

market exchange, but within a context with no established judiciary or enforcement system to monitor and enforce the fulfilment of market contracts. The absence of a legal infrastructure resulting from rapid privatization makes market solutions to joint asset and coordination problems particularly costly. The lack of formal institutional mechanisms to support interpersonal market exchange in post socialist economies makes the role of informal agreements and relations even more important, leading many firms to pursue network strategies to grow in this environment.

In addition to the arguments of institutional economist, that lack of institutions encourages firms to rely more on informal relations, we consider other factors that also contribute to the high level of uncertainty in post privatization period. After the collapse of Soviet Union many former soviet countries were involved in different types of political conflicts and wars, which was source of economic instability as well. Armenia is one of those countries, which was engaged in a war with Azerbaijan, immediately after the collapse.

During the war from 1990-1995 , when Armenia was in economic blockade, it experienced a radical drop in industrial output (Ofer G. and Pomfret R., Chapter V, 2004). The post privatization period for Armenia was characterized as highly unstable, which has continued to be so also due to geographic location. Being a coastal country, economic and political isolation from neighbour countries emphasize the vital importance of the only working road. This road passes through Georgia, and connects Armenian enterprises with external markets, mainly Europe and Russia. Armenia does not have direct access to the sea, and Port of Poti and Batumi in Georgia providing sea access. The scarcity of local resources for local production make Armenian industry highly dependent on imported imputes. Political instability in Georgia, (which is not rare) creates additional barriers for Armenian firms. Firms in post privatization period in Armenia meet not only institutional but also political and geographical difficulties.

Figure 1. Armenian Communications. Source IEA

The third aspect to point out about the post privatization reality concerns the people who became owners of state owned enterprises. The privatization process in Armenia involved mostly employee buyouts, mass privatization methods, and only a few state-owned enterprises were privatized "case-by-case" method, after the mass privatization was over. As a result of employee buyout and mass privatization methods the post privatization ownership structure contains significant components of insider ownership. The majority of the shares were consolidated to the minority of the shareholders, which in many cases are directors and managers of the former state own companies.

The three conditions pointed out above: lack of institutions, geography and relations among the new owners in transition Armenia

These conditions are critical for the development of informal relations among firms. A study of Board member network is therefore important due to the fact that the initial statistical analysis of privatization results shows that in many cases Board members are major shareholders of the companies. The other important reason why the study focuses on board member network is the fact, that relations between new owners of enterprises reflect the paternalistic and hierarchic relations of the soviet period between employees and managers. This explains why the power of corporate governance was concentrated in the hand of Board members, who were the managers in the soviet period.

Corporate network have long tradition in developed economies, they are, however new in transitional economies like Armenia. Therefore we believe that the ways corporate network is formed determines the behaviour and performance of firms in post privatization period. Development of industrial networks can be considered as one of the mechanisms for firms to survive in an uncertain environment.

Therefore the focus of this research is to consider a network of board members and test empirically its impact on firm performance. We argue that given the economic, and social and political conditions in Armenia, corporate network may create more opportunities for firms.

2. Armenian Industry in post privatization period

2.1 Privatization in Armenia

The rules of privatization in transition economies largely determine the process of formation of the ownership structure. The condition and the mechanism under which privatization was implemented had a crucial role on the ownership type and formation corporate network. (R. Gevorgyan, 2004)

These conditions in Armenia have characterized by the following:

1. Absence of stock market financial intermediaries (investment funds, investment companies, etc.);
2. Weakness of state institutions in charge of privatization;
3. Low interest in the process of privatization on the part of external investors;
4. The majority of companies at the time of privatization were non-functioning.

In these conditions, interest in ownership came mostly from senior management, on behalf of the staff. In many cases, the only potential participants of auctions were managers of enterprises. Hence, there existed no competition, and the management was able to create at the most favourable conditions for purchase by boycotting several auctions. Usually in cases when the auction did not take place, the shares of the enterprises were sold under better conditions for the buyers.

Privatization conducted in such conditions led to high concentration of the ownership, which was also supported by low market price of companies. Privatization process was documented that most of the firms were privatised by small number of shareholders (Gevorgyan,). There for we argue that personal network might have strong impact on the firm's performance. In our study we focus on the network of board members, which was formed as a result of privatization in Armenia.

Before transition, the industry was the biggest sector of economy. However, a radical decline of GDP of 57.9 percent was recorded in 1991-1993 (see. Figure 2).

Figure 2: Real and Potential GDP
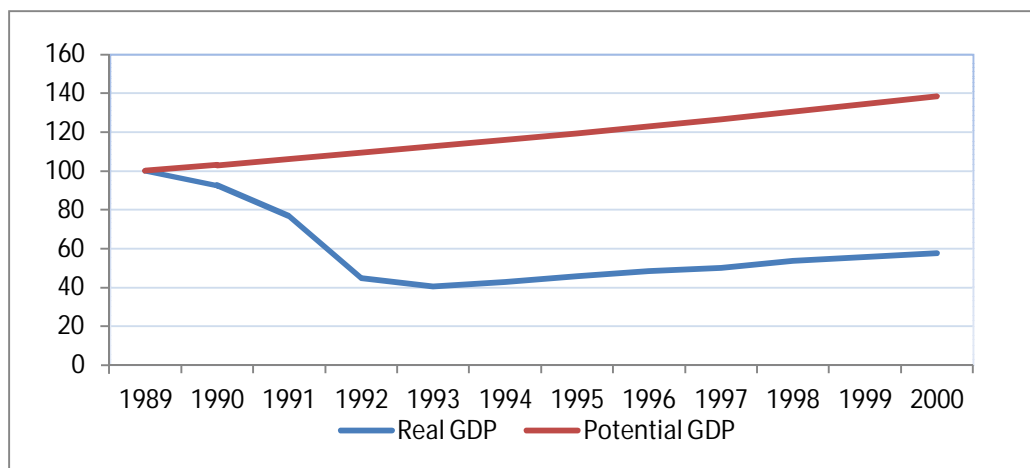
Source: UNDP, Growth Inequality and poverty in Armenia, Report (2002) Index: 1989=100, in calculating potential GDP authors assumed that economy is capable of growing over the long run at 3% a year.

In 2000 actual GDP was only 57,6 % of the GDP in 1989, whereas potential GDP was 38.4 % above the 1989 GDP (K.Griffin, 2002). Before the transition 44.7 % of country's GDP was originated from industrial sector. In 1990 machinery and metal processing had the biggest share (32.8 percent) in industry. The shares of light and food industries were 24.6 percent and 13.2

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percent. As a result of structural changes, machine and equipment production and metal processing have only 2.8 percent. As for food industry it has 38.3 percent share of the total industry in 2001(Report of Economic Development and Research centre).

The stage of mass privatization in Armenia took place between 1994-1997. During this period majority of firms were privatized. Among the companies included in our sample, either there is no foreign participation or it is insignificant. This is mainly explained by the way privatization was carried out in Armenia, according to which, in the process of privatization preference, is given to staff members, including managers (partial privatization without compensation, application of preference right while subscribing). This can be viewed as one of the reasons for the concentration of former administration property of the privatized company. Transfer of shares to employees and managers somehow blocked out the outside investor. The lack of foreign investor might explain poor performance of firms. As previous studies have shown the role of foreign ownership with better knowledge of market processes increases the opportunity for firms to have better performance in transition countries (Djankov, 2000; Ol. Havrylyashyn, 1999).

Proponents of mass privatization argue that insider privatization may improve work incentive, company loyalty, and support restructuring (Djankov, 2000; Earle John and Telegy Almos, 2002). Experience of countries that went through insider privatization shows different picture: employees and managers from planned economy have lack of necessary skills, capital, access to markets, and technologies required to turn their firms around, which consequently lead to a poor outcome for privatization. Corporate governance by employees may function particularly poorly, when the firms require difficult restructuring choices.

There are several theories defending the critical importance of privatization, most notable the "political theory", the "competence theory" and the "microeconomic theory" (Kogut, 2000; Nickell S, 1996). The most traditional and popular concept, is that when assets are owned and controlled by those individuals in the society who value them most highly, the assets will generate the highest discount present value of returns from the society's point of view. In the organizational theory, there is a separation of ownership and control. This creates an agency problem, situation caricaturized by the conflict of interest between owners and managers regarding the ways the assets of the company should be best utilized. Efficiency in private ownership might be possible if there is a mechanism to guarantee the ultimate control remains with the owners (Earle J. and Telegdy A, 2002). Such a mechanism is corporate governance, which was successfully developed in market economies. Its structure may vary from country to country depending on the concept of corporation. The managerial literature makes a distinction between market-oriented (Anglo-Saxon countries) and network oriented systems (Germany, Japan). But what system is emerging in transition economies?

Reports on enterprise behaviour in Armenia indicate that, in terms of their policies and responsiveness to market signals, difference between newly privatized firm and state owned companies are not big.

Many cross country studies on post privatization enterprises in Central and Eastern Europe, and Former Soviet countries conclude that the worst performance was observed in the countries that implemented mass privatization, such as Russia, Armenia (Djankov, 2000; Spicer et al, 2000; Sunit Kikeri and J. Nellis, 2002). It is a fact that in average Soviet enterprises used to be considerably bigger in terms of industrial capacity and employment than average firm in the West. Even when 51% of shares remain in the hands of the "work collective", which was very common, there are hundreds and thousands shareholders. This suggests that variation in the degree of owner's control may be partially responsible for the performance of privatized firms.

The other perspective for variation of firm's performance is outsider's shareholding in ownership structure of privatized firms. It is surprising that the role of small outsider shareholders was quit modest. The lack of secondary stock market after mass privatization did not contribute in feasible changes in the ownership structure created as result of the first wave of privatization process.

2.2 Corporate Network in Armenia

After the privatization process corporations also appeared in Armenian Industry.

By the time of mass privatization 90% of all firms in Armenia should have been in a private sector. 20% of the total shares of the firms were privatized to the employees, and 80% was auctioned. Our analysis of the post-privatization corporate network is based on the joint-stock companies with more than 50 shareholders. We used data from Securities' committee of the Republic of Armenia, where around 250 firms were consider reporting issuers by the criteria of more than 50 shareholders and the capital exceeding 5.000.000 AM drams(Armenian currency).

The previous studies on privatization process in former Soviet countries and Armenia, specifically, confirmed that as a result of managerial power during the former Soviet system, managers used to have better access of information concerning the privatization of the firms (Gevorgyan R. and Melikyan N.2004). Due to this asymmetric information managers became major shareholders and were controlling enterprises, without consideration of the interests of minority of shareholders.

This implies that in most newly privatized companies the important role is given to the relations between managerial and non-managerial employees. Despite many alterations caused by transition process, these relations still bear the stamp of the social organization of production in the Soviet enterprise. In the former Soviet Union managers tended to play the role of the representatives of

workers in securing the best conditions under which they could carry out their production tasks. Such paternalistic altitude had evolved as a reaction to the rigidities of the official Soviet production system, with its emphasis on the technological determinism leaving very little space for the human factor. To compensate for this, certain structural, cultural and ideological forms came into existence to provide an informal hierarchy cementing together the "work collective". As a result the soviet production system relies on its informal arrangements and networks as much as on the formal ones. With the mentality and spirit of paternalism mangers continue to enjoy the support and trust of the workers as far as strategic decisions making are concerned. During the transition formation of new institutional framework, as well uncertainty in the country combined with the old soviet mentality enforced mangers and firm's owners to rely more on informal relations. Studied examining the performance of the firms without consideration of the informal relation among the firms, might miss some important factors. Especially in the case of the transitional economies, where the market supporting institutions were not functioning, informal relations were the only important source of information. In our study we decided to examine the firm's board members network. We look at the boards' member network as a form of social capital, which might have strong affect on firms performance. Granovetter distinguished and stressed the unique roles that both "concrete personal relations and structures or networks of such relations" play in activities of economic actors (1985). Beyond the broad consensus about the importance of social capital, there is a debate regarding social capital's operational definitions and mechanism through which it has impact. The aim of the study is not only to observe the impact of social capital on firm performance, but also the ways that social structure influence on performance in case of Armenian corporate. Refining previous researches, which suggested that the composition, structure, configuration of firms' networks is important for their performance (Moran, 2005, and Burt, 1992), we focus on impact of different measures of network structure on firm performance. Due to the fact that we have data only on initial structure of board members, we will examine the impact of this structure on firms' performance the following years after privatization. Taking into consideration the transition specification of Armenia we think that that network ties may create advantages for firms, they can improve their chances to detect new market and innovation opportunities. To reduce the transaction and information costs firms in transition countries with the higher level of socio and economic uncertainty tend to rely more on their social networks.

3. Data and Empirical Hypotheses

3.1   Data description

We use two datasets. First dataset includes balance sheets, financial statements and information on board members of 207 companies, which are publicly listed companies. This data is for 1999 and 2000. The source of first dataset is the Central Brokerage committee, which was established in 1998. We used the first dataset to construct the network of board members. Using UCINET software we construct network of board member among 207 firms, and create variables for network characteristics.

Our socio-matrix is g x g matrix $X=[x_{ij}]$, where x_{ij} represented ties between firm i and j (i, j=1,…..g). In our case g=207. Network structure defined X matrix in time to, which in our case is 1999. We consider static network structure for the period 2000-2005.

Matrix 1   Matrix 2

$$
\begin{bmatrix}
F & n_1 & n_2 & n_g \\
n_1 & . & 1 & 0 \\
n_2 & 1 & . & 0 \\
n_g & 0 & 0 & .
\end{bmatrix}
\qquad
\begin{bmatrix}
F & n_1 & n_2 & n_g \\
n_1 & . & 3 & 0 \\
n_2 & 3 & . & 0 \\
n_g & 0 & 0 & .
\end{bmatrix}
$$

In the first matrix $x_{ij}=1$ if firm (i) and firm (j) share at least one board member, and $x_{ij}=0$ if between two firms there is no tie. In the second matrix $x_{ij}=$ (1,….n) any positive number, which shows how many board members are sharing firm i and j, and =0 if between two firms there is no tie. (See appendix)

Table 1. Number of companies per board member

Total number of board members	Mean	Std. Deviation	Min.	Max.
1482	1.051957	0.283462	1	5

Table 2 Number of board members listed in one or more companies.

Number of firms	Number of board members	Percent
1	1,422	95.95
2	48	3.24
3	8	0.54
4	3	0.2
5	1	0.07
Total	1,482	100

The second dataset consist of financial information of 224 firms which have status of reporting issuer, as well it contains information about firms such as address and phones, information about state participation in firm's shareholding. The data was acquired from Securities' committee established in 2000. Data was for the period 2000-2005. In the second dataset we have 16 variables of financial measurements for the 6 years. In our empirical model we used only:

1. Total Asset; Any property or possessions of a firm that has monetary value is an asset. We used annual book value of the total assets.
2. Equity; represent the residual equity of a business (after deducting from Assets all the liabilities) including Retained Earnings and Appropriations.
3. Net profit ; Net profit before tax
4. Long liabilities; represent the different types of long term economic obligations by a business, such as accounts payable, bank loan, bonds payable, accrued interest.
5. Sales; book value of annual sales.

Descriptive statistics for each financial variable for all years are presented in Appendix.

3.2 Hypotheses

We suggest five hypotheses to test the role of network structure on firm performance:

Hypothesis 1: Firms with more ties with other firms tend to perform better.

Social capital's impact on the performance has been studied at multiple levels, ranging from individuals (Burt1992, Podolny and Baron, 1997) to organizations (Walker, Kogut and Shan1997). Particularly important are social capital's features compared to other forms of capital. As one of the unique form of social capital we consider firm' ties with other firms. A social capital is a valuable asset and its value stems from the access to resources that it endangers through an actor's social relationship (Granovetter, 1992). In transition countries the capital market and the financial institutions are generally underdeveloped, ineffective. To overcome these limitations firms may resort to informal sources of capital and financial resources. This will give them more opportunity in the market. Ties with other firms may well prove to be the firm's strategic advantage, especially in transition process.

Hypothesis 2: Firm with less diversified ties are more likely to perform better.

Firms with ties in the same industry can benefit more from the cooperation: they can maximized their profits by sharing information, transaction cost for importing inputs, will have more monopolistic power for product price. The important aspect of these ties is the geographic location of Armenia and the fact that Armenian industries are highly dependent on the inputs. Firms in Armenia face high risk of importing and exporting products, because the only economic boarder is passing through the Georgia. Due to high level of political, economic instability and corruption, transportation cost is increasing. In addition firms should have good connections with officials in order to secure the transportation of their products through border. To overcome all these difficulties it is easier and cheaper for the firms to cooperate with others in the same industry.

There is one study to the best of our knowledge, which has empirically investigated effects of diversification of the ties on firm's performance. The study suggests that in the context of Russian entrepreneurship diversification of the personal ties will increase the chances of survival (Bat Batjargal, 2000). Firms may seek partners in different industries to decrease risks associated with instability in different industry. If shock happens in different time period in different industries firms, which diversified their ties with different industries may benefit more. Most likely they will receive support from the partners in the other industry if their own industry will have industry level shock. Diversification of the ties can be also considered as a mechanism to cope with industry level shock. This argument was supported by the evidence of bankers' strategy to build a broad range of clients' base with differentiated needs across different industries, and this may enable them to customize their products building customer loyalty and spread risks of defaults.

In contrast to this argument, we looked at the role of diversification of the ties in the context of Armenian corporations, which are facing different risk and uncertainties compared with Russian entrepreneurs. In addition to the country differences, the needs of entrepreneurial and corporations are different, thus strategy of diversification of ties affect differently on firms' performance.

Hypothesis 3: Firms connected with larger group of firms more likely to have better performance.

We define Group size as a number of firms connected directly and indirectly. The argument is that to belong larger group of enterprises might compensate for lack of individual ties with other firms. Firms will benefit through partner's ties. Group size measures the social capital in a group level. Larger groups have more power in the industry; they are more trustworthy and capable. Coleman (1990) argues that the power of social capital comes through closed networks of personal relations that endanger robust individual and collective actions. In closed networks each actor is more likely to convey and reinforce norms of exchange and more easily able to monitor actions of others and enforce sanctions. Group norms reduce uncertainty of surrounding exchange. The resulting social cohesion endangered by a closed network structure reduced exchange risk, enhancing the likelihood that actors will obtain the cooperation and resources of others (Moran, 2005). Though in our definitions of group size we do not only consider network closure, but his argument can explain why firms belonging to a large group may perform better. Especially, if we consider the context of Armenian reality, which characterised with high uncertainty and lack of formal information about other firms, firms tend to trust or rely more on establishing relations with firms, which were "friends of friends". In contrast to the individual ties group size measures the importance of indirect ties of firms. As we suggest firms indirectly connected are also willing to support and cooperate with each other. Given the network structure we had we could not empirically test the role of central players. We found only few large groups, and one third of the firms were isolates. Hence, it was not possible to discuss and test the role of structural holes.

Hypothesis 4: Those firms connected with less diversified group tend to perform better.
Compared with diversification of ties, a group diversification measure how homogeneous is a group. Due to the specification of Armenian transition process, where industry level barriers and uncertainties are dominated, homogeneity of group level social capital may provide better

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opportunities for the firms. We argue that groups which accumulate their social capital in one industry benefit more.

Hypothesis 5: Firms with higher average assets of Partner firms more likely to increase their performance.

Assets of linked firms show how resourceful are the ties, and they will produce higher rates of return when they are utilized. Partner's average assets measure the degree to which network ties contain valuable resources (Lai, et al, 1998, Lin & Dumin, 1986, Marsden & Hurlbert, 1988). The resourcefulness of ties has been referred as "the material quality of ties" (Uzzi, 1996). In transition economies, the capital market and financial institutions are generally underdeveloped, ineffective. To overcome this limitation, firms may resort to informal sources of capital (Newman, 2000). Thus firms with more resourceful ties are more likely to obtain necessary financial resources to develop their production.

4. Estimation Model

4.1 Variables

- Description of network characteristics

1. Repeated ties –we calculate number of ties with other firms including those multiple ties with the same firm, based on matrix 2.
2. Non Repeated ties – we calculate number of ties with other firms excluding multiple ties with the same firm, based on matrix 1.

These two variables we use as a substitute of each other in the estimation model.

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Number of ties assumed to have direct effects on firms' economic actions. Due to the direct relations of strategic managers firms may behave similarly. In this aspect, we can assume that repeated ties are stronger than non repeated ties. Firms sharing more board members tend to be connected much stronger with each other than those with less repeated ties. In the context of transition economy firms with the same board member will chose similar strategy to survive in uncertainty. This does not imply that that repeated actions and behaviour is assumed to be the best choice for the firm in order to maximize the profit in transition period.

On the other hand number of ties is indicating social embeddedness, which gives a firm competitive advantage in the market and increase the likelihood of survival. We can assume that ties enhance firm performance directly through trust building, information transfer, and joint problem solving arrangements.

There is no empirical study to date that examines effects of strong and weak ties on firm's performance. There is , however, a finding that relational trust and closeness is an indicator of relational quality have been found significantly related to managerial sales and innovation performance (Galunic and Moran, 1999).

3. We define group size as a number of firms, which are connected with each other with direct or non direct ties. To belong to a group of company can compensate lack of own ties with other firms. Larger is group larger are opportunities for firm to access to the other firms even it has a few ties.

4. Number of industries in a group is calculated by the number of firms presenting different industries in a group. This variable shows how group is heterogeneous in terms of different industry representation. Firm belonging to more heterogeneous group may enable to build a board range of business opportunities with different industries, as well to spread risks of defaults.

5. Number of manufacture in a group; we differentiate number of industries in a group into two parts-manufacture and non manufacture. This variable is calculated the number of firms with different sub industry in manufacture sector in a group.

6. Number of non-manufacture in a group is a number of firms presenting different industry in non manufacture sector.

7. Number of ties with industries different from own industry, is a number of ties with firms in different industries.

8. Number of ties with manufacture firms. The same differentiation we did among the ties per firm. This variable is a number of ties with firms presenting different industries in manufacture sector.

9. Number of ties with non manufacture firms; is a number of ties with firms presenting different industries in non manufacture sector.

10. Number of ties with same industry, is a number of ties with firms from the same industry.

11. Average assets of linked firms. To calculate this variable we use network structure and information on assets per firm from the second dataset. We calculate mean of total assets of firms tied with a certain firm for each year. This variable captures the resource embeddeness of a firm. Connection with larger firms shows resourcefulness of ties.

Table 3: Descriptive statistics of network characteristics

Variables	Observations	Mean	Std. Dev.	Min	Max
1. Repeated ties	207	.9758454	1.849796	0	13
2. Non-Repeated Ties	207	0.826087	1.427434	0	8
3. Group size	207	3.84058	6.008788	1	21
4. Number of Industries in group	207	1.73913	2.836921	0	9
5. Number of Manufacture in group	207	1.125604	1.914095	0	6
6. Number of ties with other industries	207	0.6570048	1.158856	0	8
7. Number of Non manuf. in group	207	0.6135266	1.049924	0	3
8. Ties with manufacture	207	0.4057971	0.841615	0	7

9. Ties with no manuf.	207	0.2512077	0.586818	0	3
10. Same industry	207	0.0676329	0.334527	0	3
11. Average partner asset	173	243671.7	776108.1	0	6484823

Network structure of Armenian corporations, shows that the biggest group is consist of 21 firms, maximum number of non-repeated ties is 8 and repeated ties -13. Table 3 shows that in average firms had 0.82 not repeated tie, in average group size is 3.8 and in average group represents 1.73 industries.

Dependent variables

The dependent variables measure firm performance. Organizational performance may be measured in various ways. In this study, firm performance is measured by sales growth, return on assets, and returns on equity, ROA and ROE growth. We also calculate average sales growth, ROA, ROE, ROA and ROA growth for six years.

1. Sales growth is calculated by taking a ratio of difference of sales volume of firm in current and previous year on the previous year. The formula we use for creating this variable is $\dfrac{(sales_{t1} - sales_{t0})}{sales_{t0}}$. The estimation model with Sales growth poorly explained firm performance. The reason for insignificance coefficients might be the fact that in post soviet countries reporting data might be miscalculated and thus divert from the real numbers (see Appendix 1).

2. Return on Asset is a ratio of net profit on total assets for each year. It measures the efficiency of Total assets in generating Net profit. The number of Armenian drams (AMD) in Net profit produced for every 1 AMD in Total Assets.

3. Return on Equity is a ratio of net profit on Equity calculated for each year. Similarly it measures the efficiency of Equity in generating Net profit before tax.

- Control Variables

Control variables are:

1. Industry dummy (manufacture or non manufacture sector.) Industry dummy takes 1 if firms belong to manufacture sector, and takes 0 if it is non manufacture sector.

2. Region dummy. It equals 1 if firm is register in Yerevan (capital of Armenia), and equals 0 otherwise. In Yerevan are conducted 50% of economic activities of the country.

3. Firm size was calculated as book value of total assets or log of the book value of total assets

4. Initial size of the firms is a book value of total asset in 2000

5. Percentage of State participation in the ownership structure

Table 4. Summery statistics of Sales growth, Average Return of Asset and Average Return on equity for the period of 2000-2005

Variable	Obs	Mean	Std. Dev.	Min	Max
1. Sales growth					
2. Average ROA	180	.1241756	.4791324	-0.58528	4.72491
3. Average ROE	181	.1166558	.8829488	-6.75922	5.042593
4. Dummy for industry	182	0.692308	0.462812	0	1
5. Dummy for region	182	0.516484	0.501107	0	1
6. Average Assets	182	410354.4	893262.9	0	6951709
7. Initial asset	182	374796.3	952117.8	-0.58528	4.72491
8. Percentage of state participation	182	2.986264	14.17231	0	80

Table 5: Frequency distribution the variable of state participation.

Percentage of state participation	Number of firms	Percent

0	173	95.05
15.4	1	0.55
33.9	2	1.1
70	1	0.55
70.3	1	0.55
80	4	2.2
Total	182	100

4.2 Estimation Model

Our empirical strategy follows the broader literature in estimating firm performance as a function of firm individual characteristic and network characteristics. In general, the statistical model of firm performance can be written as,

$$P_{it} = \beta_0 + \beta_1 IND_i + \beta_2 \operatorname{Re}gion_i + \beta_3 Log(asset)_{it} + \beta_4 Groupsize_i + \beta_5 Ties_i +$$

$$+ \beta_6 INDgroup_i + \beta_7 INDties_i + \beta_8 partner\_asset_{it} + \beta_9 Log(Initialasset)_i + \beta_{10} State + u_{it}$$

(1)

$$AverageP_i = \beta_0 + \beta_1 IND_i + \beta_2 \operatorname{Re}gion_i + \beta_3 AverageLog(asset)_i + \beta_4 Groupsize_i + \beta_5 Ties_i +$$

$$+ \beta_6 INDgroup_i + \beta_7 INDties_i + \beta_8 Averagepartner\_asset_i + \beta_9 Log(Initialasset)_i + \beta_{10} State + u_{it}$$

(2)

where i indexes firms and t indexes years. P_{it} is a measure of firm performance , IND is industry dummy , Region is dummy for Yerevan city, Ties is Repeated Ties or Non-Repeated ties of firms , Groupsize is a group size, INDgroup is number of industries in firm's group , INDties is Number of ties with industries different from own industry for firm i , Partner_asset$_{it}$ is a Average assets of linked firms for firm i in time period t , Log(Initial asset) is a log of book value of assets in 2000 for firm i, State participation is percentage of state shares in the total number of firm's shares, u$_{it}$ is a individual time variant error term. All variables capturing network effects they equal 0 for the firms which does not have any connection with other firms, Groupsize, INDgroup, INDties and Ties variables are for each individual firms and time invariant as they capture network structure in 2000. Log(Partner_asset) is varied across sample time period and firms, which have connections with other firms, and it equals 0 for not connected firms in our sample.

To estimate regression coefficients of the first model are used the model of random effect.

In our study we are interested in measuring effect of network characteristics, which in our model are mostly time invariant, because of the usage of fixed effects will bring to the fact that only coefficient of partner's assets we will be able to estimate. But before using the given model it is necessary to be sure in the feasibility of its prerequisites.

In random effect we assume that error term is consist of $u_{it} = w_i + v_{it}$, where $w_i \sim$ IID $(0, \sigma_w^2)$ and $v_{it} \sim$ IID $(0, \sigma_v^2)$. The w_i are assumed independent of v_{it} and X_{it}, which are also independent of each other for all i and t.

In the second model we estimate average value of time varied variables for the sample period from 2000 to 2005 for each firm. The model called average model. We use average model, because accounting incomes, such as ROA, ROE in a single year can be easily manipulated by managers.

5. Empirical Results and Discussion of Findings

The descriptive statistics on quantity of share and board members reveal that around 40 % of the corporate firms in Armenia are concentrated on the hands of less than 5% of board members. We also found that 81 firm from 207 have more than one tie with other firms before we merged the two datasets. After we have merged the two datasets the sample size becomes 182 firms in total and 71 of them have at least one tie with other firm. The empirical question we seek to answer is whether the network characteristics have an effect on firms' performance. We also test whether initial size of firms as well as state participation in shareholding matters for the future performance of the firms.

Our measure of firm performance in this study is annual ROA and ROE. This approach to measuring firm performance was based on the previous studies (see Hansen. G and Wernerfelt, 1989; among others).

Management researchers prefer accounting variables as performance measures such as return on equity (ROE) and return on assets (ROA). The idea behind these measures is to evaluate managerial performance - how well is a firm's management using the assets (as measured in Armenian drams) and equity to generate accounting returns on assets or from the borrowed capital. The problems with these measures are well known. For example, accounting returns include depreciation and inventory costs and these affect the accuracy of reported earnings. Return on equity (ROE) is a frequently used variable in judging top management performance, and for making executive compensation decisions.

Table 3. Regression of Firm's performance on measures of network characteristics.[1]

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[1] Note. In this table we use *** if P<0.01, ** P<0.05, *P<0.1.

Independent Variables	Model 1 (AROE)	Model 2 (AROA)	Model 3 (ROE)	Model 4 (ROA)
Meanlasset/ Log(Asset)2	.1771306** (.0724634)	.0254084 (.039926)	.0122359 (.071256)	-.0615379** (.0285419)
Meanpartner_asset/ Partner_asset 3	.0004717 *** (.0001148)	.0001552 ** (.0000623)	.0001933 ** (.0000863)	.0000693 ** (.0000315)
Initial asset1	-.0002338** (.0001039)	-.0000491 (.0000553)	-9.98e-06 (.0001024)	.0000514 (.0000432)
Non-Repeated Ties	.0402766 (.1009327)	-.0107686 (.0543763)	.0334192 (.1104446)	-.0181573 (.0477498)
Number of Industries in group	-.2001636** (.0996856)	-.0645072 (.0540644)	-.1483434 (.1028652)	-.0393469 (.044721)
Number of ties with other industries	-.0193684 (.1211906)	-.0042029 (.0656588)	-.0086695 (.1288968)	.0157974 (.0563611)
Group size	.0749553* (.0422788)	.0211931 (.0227804)	.0593853 (.0437122)	.0145596 (.0191022)
State participation	-.0049134 (.0061819)	-.0751127 (.0761296)	-.0022932 (.0076996)	-.001452 (.0032675)
Region dummy	.0049587 (.14076)	-.0751127 (.0761296)	-.0003904 (.1593931)	-.0253491 (.0686711)
Industry dummy	.0150952 (.149626)	-.2333574*** (.0812624)	-.0730139 (.166949)	-.2253207 *** (.0724283)
Const	.0354944 (.4622781)	.0475197 (.4604299)	.043356 (.8288145)	1.025892 *** (.3320714)
Number of observations	172	171	577	579
R_sq	0.1138	0.1072	0.0005	0.0308

We formulated five hypotheses in order to examine how the initial structure of board member network affected the performance of firms in post privatization period. Network analysis approach, OLS and Random effect models were employed to analyze the data. Taking into consideration the

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[2] We use Mean of Ln(Asset) for the AROE and AROA model (Model 1 and 2), and annual Ln(asset) for estimation annual ROE and ROA in Random effect model (Model 3 and 4).

[3] We use mean of Partners' assets for AROE and AROA model(Model 1 and 2), and annual partners' assets for Random effect model with annual ROE and ROA(Model 3 and 4).

specifications of privatization process in Armenia, we assume that initial structure is exogenous to firms' performance for the period 2000-2005.

The empirical results show that in the case of Armenian transition firms benefit more from the group level social capital, rather than firm level.(Hypothesis 3 and 1, respectively). Resourcefulness of ties has a significant positive impact on the firm performance (Hypothesis 5). This implies that in transition countries lack of financial institutions are compensated for with informal ties. Moreover, we found that Cooperation of firms in same industry offers considerable advantage to firm performance (Hypotheses 2 and 4). This suggests that in uncertain and potentially risky context, accumulation of social capital in one sector is beneficial for firms, facing not only political and institutional uncertainties, but also geographical conditions.

Conclusions

Our major findings are follows:

- For better firm performance, firm ties with other firms are less important than to belong to a large group of firms.
- While the large groups increases the chances to perform better, diversification of the group does not influence positively the firm performance.
- Resourcefulness of firm ties shows positive and significant contribution to firm performance.
- Initial size of the firm negatively affects the future performance level.

These finding have several important policy implications. The fact that Armenian economy is small make easier to the group of enterprises to monopolize the industry. The absence of appropriate institutions and regulatory mechanisms in the transition period creates appropriate conditions for monopoly behaviour. When the group is more homogeneous in term of industry representation, it easily gains monopoly power in the market. Thus the group of firms in the same industry performs better than heterogeneous groups.

Furthermore these results imply that firms in transition receive support from their partner firms. In transition period, when important institutions to support firms do not exist, social resourcefulness serves as a mechanism to overcome economic uncertainties.

 The results further indicate in socialist regime, the overriding objectives were plan-fulfilment. The incentives created by central planning led to severe distortions, such as the production of large volumes of standardized, low quality products, lack of concern of consumer demand. After the collapse the Soviet Union the production chain was destroyed. Transformation has to reprogram a

firm that had a central planning orientation to act by the rules of the market economy. This requires radical configuration of resources, skills capabilities and organizational structure, which was much easier to do in small size firms than in large firms.

In transition period firms in order to survive need to adjust faster to the changes, which was more difficult with large number of shareholders. To improve the productivity firms have to acquire resources and reorganize the existing ones to improve "strategic flexibility. Lack of secondary trading of shares enhances the lack of financial resources. Due to the prevailed soviet mentality new owners (managers and employees) of state enterprises were not eager to sell the shares of enterprises even if enterprise was going to become bankrupt. Another important factor is radical decline of demand of the Armenian production, which enforce firms to adjust their production to new demand. Firms with small production benefit more from these new conditions of local market.

With lower level of flexibility in a changing economic environment and lack of financial recourse make transition process for large firms more difficult.

References

1. Aldrich H. and Zimmer C. (1986). Entrepreneurship through social networks. The art and science of entrepreneurship. Ed. Sexton D. and Smilor R.3-23. Cambridge.

2. Asta Salmi Institutional Change of Business Networks: Russian transition revisited. Working paper.

3. Batjargal B.(2000). Social Capital and Entrepreneurial Performance in Russia: A panel study. Peking University. Working paper 352.

4. Bresnahan T. and Reiss Peter.(1991). Entry and Competition in Concentrated Markets.. Journal of Political Economics, vol. 99.

5. Brown D., Earle John and Telegy A.(2004). Does privatization praise productivity?. Evidence from Comprehensive Panel data on manufacturing firms in Hungary, Romania, Russia and Ukraine. Institute of Economics of Hungarian academy of Science, Discussion Paper N: 25.

6. Brown J.David, John S.Earle, and Almos Telegdy (2006).The Productivity Effects of Privatization: Longitudinal Estimates from Hungary, Romania, Russia, and Ukraine. International Political Economy :

7. Cheng Sh.(2008). Board size and the variability of corporate performance. Journal of Financial Economics, vol.87, 157-176.

8. Earle John and Telegy Almos (2002). Privatization Method and Productivity Effects in Romanian Industrial Enterprises. Upjohn Institute. Working Paper N: 02-18.

9. Ferreria M, Li Dan and Serra F.(2008). Composition of small and large firms' business networks in transition economies. UNISUI Business school, working paper N:22.

10. Gevorgyan R. and Melikyan N.(2004). The effect of ownership type and concentration on performance of Joint Stock Companies in Armenia. Armenian Research Policy. Working paper 04/06.

11. Granovetter Ms.(1983) The strength of weak ties: A network theory revised. Sociological theory, 201-233.

12. Granovetter Ms.(1990). The old and the new economic sociology: A history and an agenda. Beyond the market place. Rethinking Economy and Society Journal, 89-112.

13. Hansen S. Gary (1989). Determinants of firm Performance: The Relative importance of economic and organizational Factors. Strategic Management Journal, vol. 10, 399-411.

14. Kogut Bruce and Gordon Walker (2001). The Small World of Firm Ownership and Acquisitions in Germany from 1993 to 1997: The Durability of National Networks. American Sociological Review, Vol. 66, 317-335.

15. Laszlo Tihani and Allan Ellstrad (1998). The involvement of board of directors and institutional investors in investing in transition economies: An Agency theory approach. Journal of International Management. Vol.4, 337-351.

16. McDermott Geral (2007). Politics and the Evolution of Inter-firm networks. A post-communist lesson. Organization studies Journal, vol. 28.

17. Meyer E. Klaus(2002). Management challenges in privatization acquisitions in transition economies. Journal of World Business, vol.37. 266-276.

18. Moran Peter (2005).Structural vs. Relational Embeddedness: Social Capital and Managerial Performance. Strategic Management Journal. Vol.26:1129-1151.

19. Nickell S.(1996). Competition and Corporate Performance. Journal of Political Economy. Vol 104.

20. Ofer G and Pomfret R. (2004). The Economic Prospects of the CIS: Sourrces of Long Growth. Publishing by Edward Elgar Publishing.

21. Pahor Marko; Janez Pra nikar; Anu ka Ferligoj (2004). Building a corporate network in a transition economy: the case of Slovenia. Journal of Post-communist economies, volume 16, Sept .

22. Peng Mike and Luo Y.(2000). Managerial ties and firm performance in transition economy: The nature of micro-macro link. Academy Management Journal, vol. 43, 486-501.

23. Podolny Jm. And Baron Jn.(1997). Resources and relationship: social networks and mobility in the workplace. American Sociological Review, vol. 62, 673-693.

24. Powell, Walter W. Kenneth W. Koput, Laurel Smith-Doerr and Jason Owen-Smith (1999). Network Position and Firm Performance: Organizational Returns to Collaboration in the Biotechnology Industry. Research in the Sociology of Organizations, vol. 16, 129-159.

25. Spicer A, McDermott G. and Kogut B.(2000). Entrepreneurship and privatization in Central Europe: The Tenuous balance between destruction and creation. The academy of Management Review, vol 25, 630-649.

26. Stark David and Vedres B.(2005), Pathways of property transformation: Enterprise network careers in Hungary, 1988-2000. Working Paper.

27. Tsai W., Ghoshal S.(1998). Social capital and value creation: the role of intra firm networks. Academy of Management Journal, vol 41, 64-96.

28. Uzzi B. (1999). Embeddedness in making of financial capital: How social relations and networks benefit firms seeking finance. American Sociological Review, vol. 64, 481-505.

29. Wasserman S. and Faust K., (1994). Social Network Analysis: Methods and applications.Ed. by M. Granovetter. Cambridge University Press.

30. Wendy Carlin, Steven Fries, Mark Schaffer and Paul Seabright.(2001). Competition and Enterprise Performance in Transition Economies. Journal of Economic Literature:

31. Keith Grifiin(2002). Growth, Inequality and Poverty in Armenia. UNDP Report

32. Oleh Havrylyashyn(1999). Growth Experience in transition countries,1990-1998

Appendices.

Appendix 1

Table 1A. Summery statistics of financial variables for the period 2000-2002

2000					
Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	182	374796.3	952117.8	0	7551127
Equity	181	254168.5	825300.4	-716677	6852407
Net profit	18	-13850	53252.23	-184883	90352
Long liab	181	15064.77	56547.46	0	493920
Sales	181	148809.9	519234.6	0	4956812
2001					
Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	182	375173	952441.9	0	7551127
Equity	182	242528.1	587082.4	-84076	5642122
Net profit	182	139931.4	480703.8	0	3920200
Long liab	182	17696.4	70456.93	0	721336
Sales	182	150763.3	510619.8	0	4434332
2002					
Variable	Obs	Mean	Std. Dev.	Min	Max

Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	182	379243.1	770013.3	0	6991776
Equity	182	239505.3	527216.7	-58918	5143905
Net profit	56	-5101.21	61595.51	-277270	249856
Long liab	182	21033.7	81634.87	0	668195
Sales	182	167041.7	613213.9	0	6501513

2003					
Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	182	379243.1	770013.3	0	6991776
Equity	182	252040.8	655052.5	-283765	6713215
Net profit	59	-16455.1	70959.06	-391426	82718
Long liab	182	35743.33	143057.6	0	1193886
Sales	182	214509.3	909952.8	0	9709053

2004					
Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	182	379579.4	769881.9	0	6991776
Equity	162	308666.7	753818.2	-234043	7381484
Net profit	155	-2024.96	526870.8	-3447608	5517572
Long liab	162	44154.22	137618	0	973926
Sales	162	334239.7	2387882	0	3.00E+07

2005					
Variable	Obs	Mean	Std. Dev.	Min	Max
Asset	153	636012.4	2345923	9495	2.78E+07
Equity	153	398269.5	1330594	-348741	1.52E+07
Net profit	152	51924.14	653263.1	-616589	7867774
Long liab	153	95623.77	497320	0	5852470
Sales	153	587540.5	5218876	0	6.44E+07

Table 1B. Display mean annual ROE and ROA for Manufacture, agriculture, Mining and construction.

2000	Manufacturing sector		Agricalture		Mining		Construction	
Variable	Obs	Mean	Obs	Mean	Obs	Mean	Obs	
ROE	12	-0.19424	1	-0.00509	0		3	0.074013
ROA	12	-0.10817	1	-0.00489	0		3	0.050461
2001								
ROE	124	0.556867	9	0.145976	3	1.917807	31	0.758304

Variable	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
ROA	121	0.248249	9	0.083342	3	1.447686	31	0.75408
2002								
ROE	39	-0.05409	5	0.974813	1	0.165784	7	-0.06288
ROA	38	-0.02213	5	-0.0888	1	0.073897	7	-0.03426
2003								
ROE	41	-0.03845	5	-0.0219	1	0.111443	8	-0.34683
ROA	40	-0.05183	5	-0.04243	1	0.055905	8	-0.00802
2004								
ROE	108	-0.04762	6	-0.04094	3	0.172533	24	-0.86066
ROA	109	-0.0769	6	-0.02584	3	0.921856	24	-0.02094
2005								
ROE	107	-0.08477	6	-0.05641	3	0.045891	24	0.574216
ROA	107	-0.0462	6	-0.03915	3	0.051848	24	0.213758

Table 1B. Continued. Displays mean of annual ROE and ROA for Sales, Transportation, Health and Electricity and Gas sector.

2000	Sales		Transport		Health		Electricity, Gaz	
Variable	Obs	Mean	Obs	Mean	Obs	Mean	Obs	Mean
ROE	0		0		1	0.133124	0	
ROA	0		0		1	0.079835	0	
2001								
ROE	2	0.17193	2	0.125675	3	0.597853	4	0.035807
ROA	2	0.161168	2	0.109595	2	0.540926	4	0.290712
2002								
ROE	0		1	-0.00383	1	0.020334	1	-0.22791
ROA	0		1	-0.00313	1	0.011908	1	-0.10324
2003								
ROE	0		1	-0.00437	1	0.03677	1	-0.20927
ROA	0		1	-0.00356	1	0.022356	1	-0.09216
2004								
ROE	2	-0.18479	2	-0.09952	3	0.392516	3	-0.04146
ROA	2	-0.11513	2	-0.07709	3	0.148873	3	-0.05319
2005								
ROE	2	-0.14689	2	-0.12368	3	-0.47289	3	-0.04203
ROA	2	-0.121	2	-0.10896	3	-0.09656	3	-0.02886

Apendix1 : Models with Sales growth as a dependent variable

	Model 1	Model 2
Dependent Variable	Sales growth	Sales growth
Explanatory variables		
Log (Assest)	4.378	4.929
	(-13.45)	(-13.55)
Initial Assets	-0.004352	-0.005394
	(-0.01941)	(-0.01957)
Partner's Assest	0.00111	0.0009766
	(-0.0167)	(-0.01676)
Firms ties(repeated)	-0.2542	
	(-15.56)	
Number of ties with other industries	-0.6022	
	(-25.25)	
Group size	3.471	4.609
	(-8.541)	(-8.931)
Number of Industries in group	-10.62	
	(-19.7)	
State participation in percentage	0.1631	0.05795
	(-1.387)	(-1.439)
Region Dummy	24.15	25.85
	(-29.68)	(-29.96)
Industry dummy	-43.28	-50.82
	(-31.64)	(-34.37)
Firms Ties (non repeated)		2.061
		(-22.92)

Number of ties with firms in manufacture		-3.907
		(-27.43)
Number of ties with firms in non manufacture		8.083
		(-42.73)
Number of ties with firm in same industry		-4.416
		(-56.81)
Number of manufactory in the group		-2.588
		(-24.26)
Number of non Manufactory firms in group		-35.71
		(-47.21)
Constant	-13.77	-16.48
	(-157.2)	(-158.4)
Observations	721	721
Number of nv	169	169
Standard errors in parentheses		
* significant at 5%; ** significant at 1%		

Appnedix 2: Network structure and Summery statistics for dataset 1.

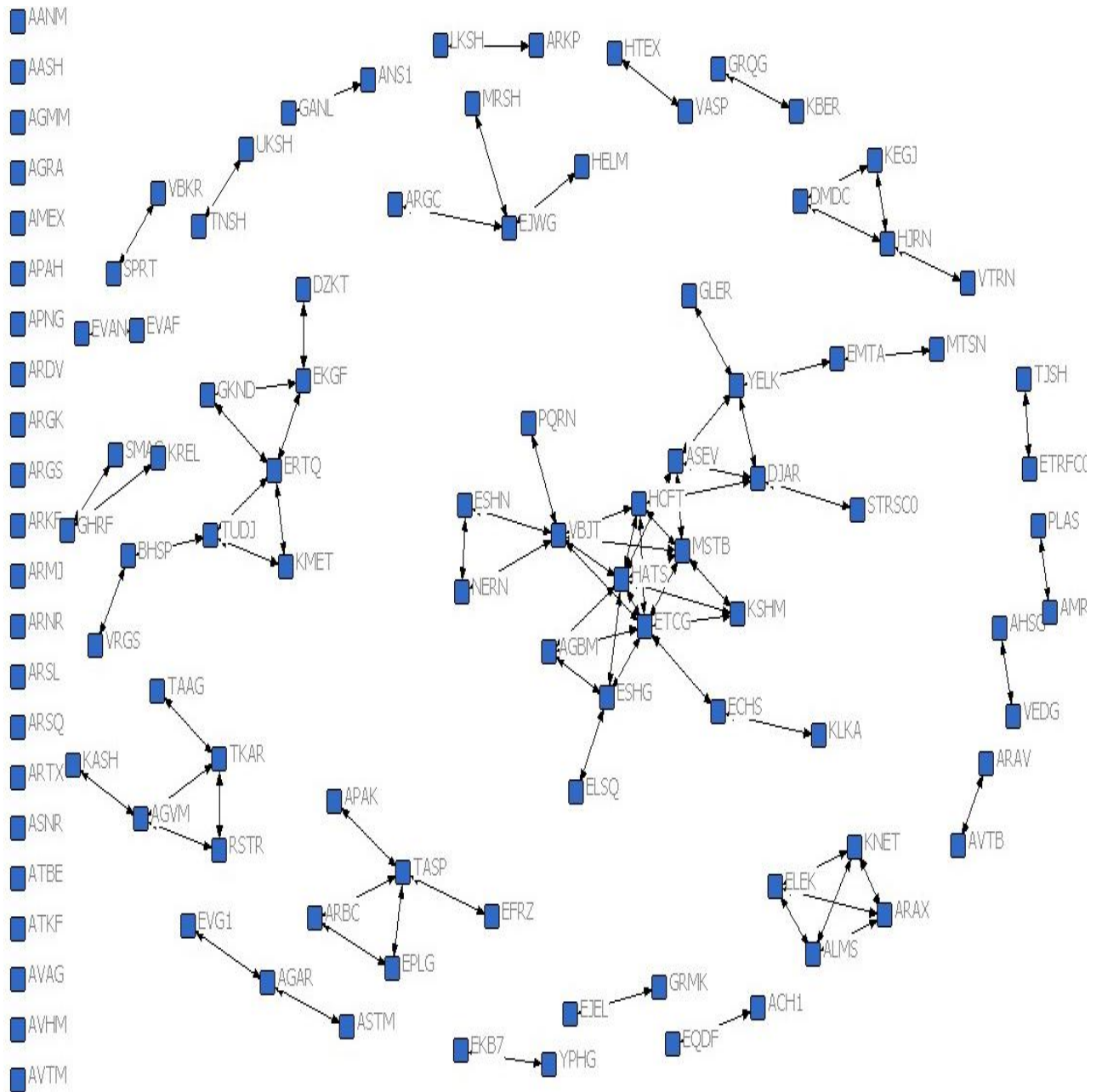Picture A: Structure of board member network of Armenian corporations.

Table 4D. Correlations Matrix

	roa	roe	lasset	partne~1	inasset1	sumties	tiesin~y	groups~e	tiesin~p	ofstate	dregion	dindus~y
roa	1.0000											
roe	0.5065	1.0000										
lasset	-0.0503	-0.0114	1.0000									
partner_as~1	0.1154	0.0918	0.1455	1.0000								
inasset1	0.0063	0.0139	0.5542	0.3998	1.0000							
sumties	-0.0486	0.0101	0.1778	0.2686	0.1088	1.0000						
tiesindsutry	-0.0424	-0.0045	0.1867	0.2825	0.1301	0.8929	0.6261	1.0000				
groupsize	-0.0493	0.0215	0.1418	0.1884	0.0285	0.7061	0.6261	1.0000				
tiesingroup	-0.0478	0.0045	0.1952	0.2928	0.1058	0.7674	0.7151	0.9556	1.0000			
ofstate	-0.0295	-0.0132	0.1804	0.1627	0.3037	0.1290	0.1327	0.1632	0.1661	1.0000		
dregion	-0.0459	-0.0043	0.2727	0.0582	0.1410	0.1195	0.1531	0.1383	0.1557	-0.0910	1.0000	
dindustry	-0.1579	-0.0050	0.1381	-0.0154	0.1215	0.0069	-0.0045	0.0180	-0.0039	0.0395	0.1239	1.0000