

Paths of Capital: The Creation and Dissolution of the Slovenian Corporate Network

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Abstract. Previous research (Pahor 2004) showed a very dynamic process of ownership network building between public limited companies in Slovenia. The ownership relations were growing in volume and strength throughout the 2000-2002 period. However, after the network density reached its maximum around the end of 2002, it started to diminish and today we face a relatively sparse network dominated by some strong interlinked “islands”. The present paper tries to examine the dynamics of the network evolution, especially around the tipping point and tries to examine the reasons for the creation and dissolution of the network. First we divide the 2000-2009 period into two sub-periods based on the prevalent direction of change in density – period of creation and period of dissolution. Results show that although the periods seem quite different, very similar rules govern the evolution of the network in both.

1 Introduction

Corporate network² describes a group of companies that are integrated neither completely nor barely at all. In traditional economies they are built by voluntary actions of economic actors trying to lower the uncertainty and costs and thereby reducing risk (Podolny, 1994). The key feature of corporate networks depends on the context of the study. In some contexts the key feature of business networks is that their members engage in repeated exchange that helps sustain cooperation and collusion. This defines business networks as “a group of agents that peruse repeated, enduring exchange relations with one another” (Podolny and Page, 1998). In other contexts the key feature of a corporate network is that the network members have thorough knowledge of each others’ characteristics, which helps them match each other or refer each other to outside business opportunities. In such a context a

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² Sometimes also terms business networks or business groups are used.

business network is “a set of actors who know each others’ relevant characteristics or can learn them through referral” (Granovetter, 1995b).

Empirical study of corporate network comprises studies concerning networks with publicly recorded membership (e.g. Gerlach, 1992 or Uzzi and Gillespie, 2002), as well as more hidden networks of coalitions, strategic alliances or joint-ventures (e.g. Gulati and Gargiulo, 1999; or Gebrekidan and Awuah, 2002). Typical mechanisms serving to integrate the firms include in the former case mutual stockholdings, financing links and/or interlocking directorates, and in the later case some form of contractual agreement like a joint-venture agreement, collaboration agreement, etc. Business networks are examined on different levels reaching from international networks (e.g. Rauch, 2001), networks on the national level to networks on even smaller levels, e.g. regions or industries. The analytical level for studying organizational networks may also range from egocentric through dyadic to sociocentric, depending on the stress of the analysis (cf. Mizruchi and Marquis, 2006)

Research on the structure of national social networks is mainly based on networks of interlocking directorates, although there is some research on networks based on some other form of publicly recorded connections. Networks based on different relations (e.g. network of cross-ownership and network of interlocking directorates) can overlap to a certain extent, however, as Granovetter (1995a) argues, the correlation between different dimensions of a network is often surprisingly weak.

Historical and cultural background strongly influences the structure of national corporate networks so that they differ widely between countries. There is a striking difference between more decentralized (anglo-saxonian) and more centralized (continental) systems of corporate networks. Certain mutual characteristics however still exist, e.g. financial centrality and the emergence of business groups.

The British network has a low level of concentration, which is probably due to a relatively sparse distribution of shares in British companies (La Porta et al., 1999). There is a high degree of integration between the financial and industrial sector. Especially important is the role of clearing banks that create bank-centered spheres of interest. These banks are usually found among the largest owners of the companies and are also important providers of long term financial capital for the companies (Scott, 1987; Windolf and Beyer, 1996). Similarly, the corporate network in the United States is a loosely integrated system characterized by financial centrality,

interest-group formation and regional density (Bearden and Mintz, 1985). Financial institutions are clearly the most central companies in the network at any level.

Austrian corporate network is characterized by three large groupings around (formerly) state owned holding companies and financial institutions. Groupings are tightly connected together but do communicate between them. On the periphery some smaller centers formed around multinational companies (Ziegler et al., 1985). Similarly, the German network (Scott, 1987; Windolf and Nollert, 2001; Windolf and Beyer, 1996) showed a densely connected centre to which the largest commercial banks, the biggest insurance companies and the most important domestic corporations belonged. The network showed no regional base and the sphere of influence of the largest banks covered approximately one third of the non-isolated firms. The existence of mainly large firms in this common domain indicates that there is probably not a single-side bank control but a coalescence of interests between financial and non-financial sector. Ownership is highly concentrated, i.e., shareholdings - generally by the non-financial sector - tend to be sufficiently large to allow the owners to dominate the firm. The network of interlocking directorates is closely related to the capital network, i.e., it serves to enhance the power of the owners.

Corporate networks in Belgium, France and Italy differ in some points from prevailing two models. Corporate networks detected in Belgium followed the finance capital model, with the holding companies as nodes of the structure (Cuyvers and Meeusen, 1985; Scott, 1987). The centrality detected in Belgian network is higher than in other countries, with the overwhelming Societe Generale de Belgique controlling almost a quarter of the largest Belgian companies. The control is in Belgium exercised mainly through the use of the so-called "pyramidal structures" (Renneboog, 1998). As opposed to the highly concentrated network in Belgium, French capital is not highly integrated and centralized around a network centre. Rather, it is organized around a few ownership interest groups and their corresponding spheres of interest (Schwartz, 1985). The state still plays an important role in French corporate network through state-owned companies (Windolf and Nollert, 2001). The Italian network also shows a relatively low level of density and concentration. Two separate centers with few connections between themselves existed. On the other hand several multinational companies are isolated from the rest

of national network. Typical for Italy is also a relatively high level of influence of regionalism. There is a clear distinction between the Rome-based (formerly) state-owned enterprises and the traditionally family owned companies typically situated in one of the northern cities (e.g. the Agnelli family consortium around FIAT with headquarters in Turin) (Chiesi, 1985).

In this study we focus on corporate networks in transitional economies. It should be noted that in former socialist economy corporate networks in the traditional sense did not exist³. The privatization brought changes in the domain of corporate networks, and the choice of privatization method heavily influenced the structure of corporate networks.

The research on corporate networks in transitional economies is up to now relatively scarce. Most research was done on networks in Hungarian economy. Hungarian corporate network as described in Vedres and Stark (2001) is less dense and even losing its centralization over time. The main reason for that is the way a lot of their main companies were privatized through direct sales to foreign companies. Usually, this means that a company shifts out of the national corporate network and is instead integrated into the multinational network of the acquiring company⁴.

The present study examines the evolution of the corporate network in Slovenia, which is a result of voucher (mass) privatization with the aid of privatization funds in the mid- to late 1990-ies. As such it is similar to corporate networks in other countries that chose this option and significantly different from networks in countries, that opted for sale to individual investors (Pahor et al., 2005). Stark (1996) argues that ownership networks in the post-socialist countries were a response to uncertainty. For post-socialist firms cross-ownership networks were as safety ropes binding them together. Stark (1996) also claims that some of the firms were diversifying their portfolio of resources for the purpose of socializing liabilities

³ Some sorts of networks were presented even in socialist economies. Apart from the evident relation of companies being linked by the same owner (the state), many countries had the banking system that catered the companies organized on regional level. Companies and banks from the region formed a sort of network, which was quite artificial in nature but not necessarily ineffective.

⁴ Although rarely treated in literature on transitional economies, the eastern part of Germany (former Democratic Republic of Germany) faced similar problems of transformation as other transitional economies. Windolf and Schief (1999) found out that almost 60 percent of firms in East Germany are owned by West German/Western owners. Whereas the corporate network in West Germany protects companies against external influence (cooperative capitalism), the corporate network in East Germany exposes East German firms to external influence.

while privatizing assets. In this respect corporate networks were not used for the purpose of risk spreading but rather risk shedding.

2 The voucher privatization

Governments in transitional countries faced the fact that there were no legitimate sources of private wealth with which to accomplish the privatization. Apart from the illegitimate and spontaneous types of privatization, two main options remained – a sale of national assets abroad or voucher privatization. The question is really whether the ownership in the state or socially⁵ owned enterprises (SOE) should be transferred to individual investors or to a dispersed multitude (see e.g. Boycko et al., 1994; or Schmidt and Schintzer, 1993). The later became known by the term “mass privatization”, which effectively meant a give-away to the entire population (Bos and Harms, 1997). The bright sides of this approach are usually seen in its high speed, its potential to yield a “fair” distribution of ownership,⁶ and its ability to generate political support and thus to guarantee the irreversibility of the whole privatization program.⁷ The dark sides of the mass privatization, often seen by critics, are on the issues of corporate control, arguing that widespread ownership reduces the owners’ incentives to restructure enterprises (e.g. Bolton, 1995).

Voucher privatization was the method of choice for privatizing in many transitional countries. They were used in one way or another in Bosnia and Herzegovina, Bulgaria, Czech Republic, Estonia, Latvia, Romania, Russia, Slovakia and Slovenia (Chun, 2000). The actual execution of privatization, extent of use of vouchers and the use of privatization funds as intermediaries of privatization, however, differed from country to country. The Czech Republic for example offered 97 percent of shares of each company being privatized at voucher auction, the remaining three percent were reserved for the state (Katz and Owen, 1997). Russia offered 29 percent of the shares at voucher auction and for the remainder of the shares the government created three options, with most firms choosing the option that left insiders with majority control (Boycko et al., 1995). In Poland there was a rejection of

⁵ Companies in ex-Yugoslavia were mostly not owned by the state but were termed to be “socially” owned by the society as whole. See Prašnikar and Svejnar (1991) for the elaboration of the Yugoslav self-management and social ownership.

⁶ see e.g. Boycko and Schleifer, 1993 or Frydman et al., 1993

⁷ see e.g. Bolton and Roland, 1992

the mass privatization model, leading to a great delay in its implementation. Finally it was implemented in much smaller scale than originally planned, most of the companies being privatized beforehand with other methods (Lewandowski and Szyszko, 2000). In mass privatization the state selected privatization funds that managed the assets for the people. It performed the privatization without a proper auction, giving one of the funds the predominant role in a company (Sachs, 1993).

Bös and Harms (1997) argue, that "... it is not necessarily the political weight of the broad population that induces government to privatize an industry by allocating shares to a large number of individuals. Instead, the choice of a mass privatization scheme can rather be explained by government's concern about the support of the incumbent managerial class." Lack of proper corporate governance structures left managers in the transitional economies (temporarily) with a lot of discretionary power to steer their companies in ways that maximized their well-being. King (2001), in a comprehensive study of 60 case studies in four countries identified several types of strategies, through which managers achieve this goal. They may join forces with the emerging financial institutions ("financial capitalism") or workers ("manager and employee buy-outs"). They may exploit legal loops to mutually gain control with other managers ("auto cross-ownerships"). If they don't succeed on their own, they may join forces with foreign companies and get a position in the multinational company as a repayment for their help in privatization of the company to a foreign owner.

As mentioned, privatization changed the corporate networks domain in transitional economies, and the choice of the privatization method clearly influenced the resulting structure of national corporate network. Polish design of mass privatization with few privatization funds and the ownership allocated between them (Sachs, 1993) resulted in a highly centralized and dense network. On the other end the large sale of companies to foreign owners lead to the dismantlement of ownership network as the companies are being integrated in the multinational networks of the acquiring company (Vedres, 2000).

However, King (2001) describes a network that evolved in Czech Republic around the MegaChem corporation. Managers of the corporation used some loops in privatization legislation to gain control over a group of companies through a system of auto-cross-ownership with interlocking board membership reinforcing the

ownership ties. We can infer on the structure of Czech corporate network from the description of groups that formed around privatization funds given in Roland (2000). He presents this groups being knit together with a lot of cross-ownership between banks and privatization funds into a very dense and centralized network. These “incestuous relations” with non-transparent cross-ownership structure⁸ and a matching governance structure can be one of the reasons for poorly performance of transitional economies as it is referred also by Stiglitz (1999)⁹.

3 Data and methodology

Data for the present study consists of 19 observations of a complete cross-ownership network between 518 public limited companies in Slovenia, that had their shares listed in the Central deposit clearing house database. The database contains data on nearly all public limited companies in Slovenia¹⁰. Records in the database are essentially continuous, for the purpose of the analysis we took cross-sections six months apart. The records consist of lists of 50 largest owners of each of the securities issued by a company; we limited the research on cross holdings of regular shares. A network of cross-holdings was constructed in each of the periods where the nodes were individual public limited companies and the tie was “is one of the top 50 owners in this company”.

We started with approximately 750 companies on record in the beginning of the year 2000. First all companies that had no incoming or outgoing ties were filtered out, since they don’t contribute to the analysis and should be analyzed separately. There were 124 such companies. After some preliminary analysis we also eliminated 108 financial companies (banks, investment funds, insurance companies) for two reasons. First, financial companies behave significantly differently than non-financial companies. This introduces a lot of variability in the data and in the modeling process

⁸ See also Turnovec (1999).

⁹ At an aggregate level, Svejnar (2002) points out that in the first dozen years of the transition the countries of the former Soviet bloc and former Yugoslavia have performed poorly relative to (a) expectations and (b) performance of advanced economies. Surveys of the effects of privatization on performance in the transition economies vary from finding no systematic effect (Bevan, Estrin and Schaffer, 1999) to noting that a weak positive effect probably dominates (Megginson and Netter, 2001), to concluding that the overall effect is probably positive (Djankov, Murrel, 2000; Carlin et al., 2000, and Shirley and Walsh, 2000). Combined with the finding that better performing firms tend to be privatized first and that many studies are hence likely to overestimate the positive effect of privatization (Gupta, Ham and Svejnar, 2001), one may conclude that a positive privatization effect, if any, is smaller and less definitive than was originally expected.

¹⁰ Dru to the law on dematerialized trade in shares, passed in 1997.

most of the observed changes in the network can be than explained with the differences between financial and non-financial companies, leaving no space for some substantive results. Second, financial companies are supposed to have financial investments in other companies, as this is their core business, while for non-financial companies this is not the case. Thus we performed the analysis on the 518 non-financial companies that were connected at least once in the observed period.

We analyze the data first at looking at some of the descriptive statistics of the network, in particular number of ties and density, number of isolates and clustering in the network, which we measure by observing the number of strong components and the size of the largest strong component (cf. De Nooy et al., 2004 for the description of network properties). Next we tested the rules for the evolution of the network using the stochastic modeling for dynamic networks (Snijders 2001, Snijders et al., 2007). The model uses actor-oriented simulation models to estimate the parameters, connected with network structure, actor-related and dyadic covariates. The model predicts the effects on the probability of a new tie to be created or an existing one to be dissolved given a set of parameters. The model offers the possibility to model three functions (rate, evaluation and endowment function), at this stage only the evaluation function was estimated leaving the rate and endowment unaffected by parameters.

The larger Slovenian companies are mainly publicly-held joint stock companies – despite a relatively small economy there were at the time more than 900 public stock companies. Corporate governance is based on a system similar to the German two-tier system with Management and Supervisory Boards (Prašnikar and Gregorič, 2002). The 2006 amendment of the corporate law allowed for one-tier system to be implemented as well, however, until the first half of 2009 only a handful of companies opted for this change. Although the Management Board runs the company, the Supervisory Board is relatively influential as it has the power to nominate and fire the managers and in most companies it has to give its approval to close certain deals. The Supervisory Board is formally independent, but a member of the board at least to a certain extent represents the interests of the group that nominated them to the board¹¹. If one can ensure control over the majority of Supervisory Board members, one can effectively control the company.

¹¹ The Supervisory Board has two types of representatives. Representatives of owners are nominated by the shareholders' assembly, while representatives of employees are nominated by the workers' council.

Stark and Vedres (2006) propose three possible developments of a national network of post-socialist companies; one is that the network will grow in density, strong business groups will be formed that will lock out foreign capital. This process also corresponds to the crowding in Russian economy as analyzed by Burawoy (1996). Second possibility is the eradication of the national network due to high levels of foreign ownership and the third possibility is a dual economy. Due to a relatively low observed foreign ownership in the Slovenian economy we believe that the first scenario is the most plausible for Slovenia, thus we propose:

H1: Increasing concentration and cohesion will be observed in the Slovenian corporate network.

We will try to test this hypothesis first by looking at the descriptive statistics and next also in the stochastic models by modeling network closure with transitivity and direct and indirect ties effects. We further test two different clustering effects, namely betweenness (tendency toward indirect ownership) and 3-cycles effects.¹²

In social networks theory and research it is often argued and proved that geographic and social proximity spawns social ties. In the corporate networks context this may translate into companies being managed by managers that know each other and/or are in friendly relations are more likely to cross-own each other. We may thus observe that companies in the same industry or geographically closed are more connected.

H2: Geographically close and companies in the same industry will be more likely to cross-own each other.

As suggested by Snijders et al. (2007) we include the effects of density and reciprocity. We also control for the cross-effects of reciprocity with industry and region.

4 Corporate network in Slovenia in the 2000-2009 period

In the privatization process corporations appeared in the Slovenian economy. The 1992 Privatization Law allocated 20 percent of a firm's shares to insiders (workers), 20 percent to the Development Fund that auctioned the shares off to investment funds, 10 percent to the National Pension Fund, and 10 percent to the

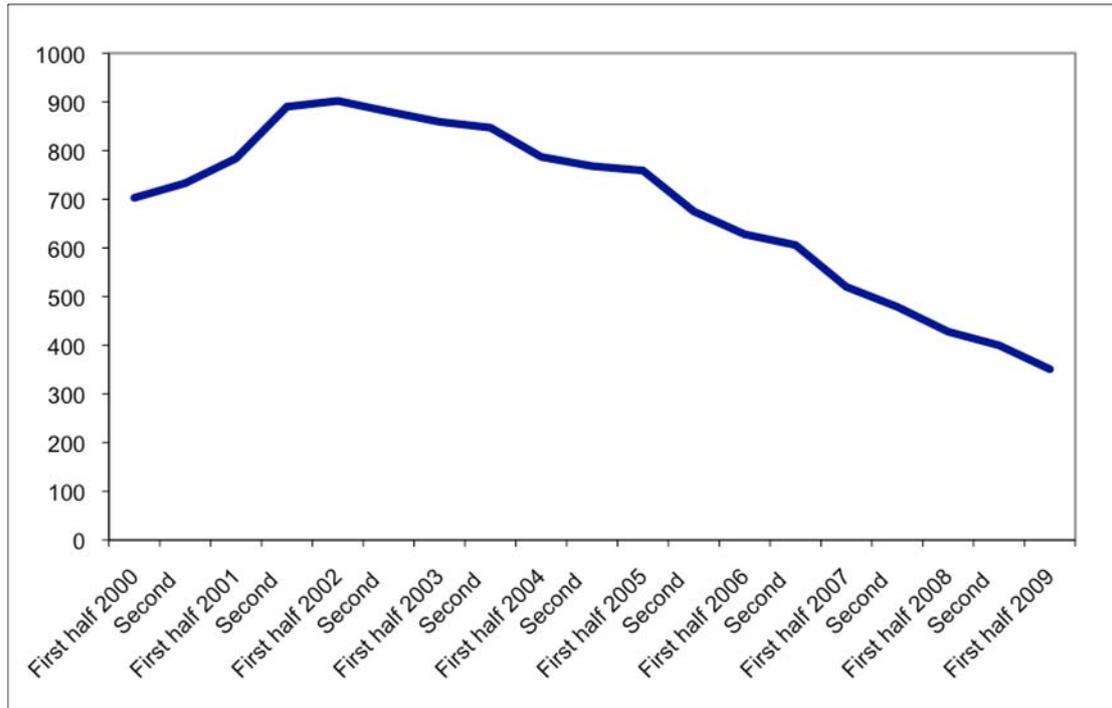
¹² Cf. Snijders et al. (2007) for the description of effects.

Restitution Fund. In addition, in each enterprise the workers' council or board of directors (if one existed) was empowered to allocate the remaining 40 percent of a company's shares for sales to insiders (workers) or outsiders (through a public tender). Based on the decision on the allocation of this remaining 40 percent of shares, firms could be classified as being privatized to insiders (the internal method) or outsiders (the external method).

After the formal process of privatization was finished, trading in shares began. Today, stocks are being traded in the organized market of the Ljubljana Stock Exchange (LSE), where mostly smaller investors trade. Institutional investors (i.e. privatization and other funds) trade mostly over-the-counter in large, package deals. The beginning of trade has opened up possibilities for other companies to become owners, to acquire companies and merge with them and thereby form a corporate network.

If we first take a look at the total number of ties and the resulting density of the network, we may observe two things (see Figure 1) we first see that the general density of the network is very low, ranging from 0.13 to 0.34 percent in different periods. This is not surprising, it was observed already by Kogut and Walker (2001) that ownership network are generally rather sparse. The second interesting observation is that the total number of ties increases for the first two years, remains relatively stable for another two and then starts to drop after 2003. At the end of the period just over a third of the ties present at the peak in the second half of 2002. This indicates that Slovenian corporate network went through at least two distinct periods, the first one roughly corresponding the first proposition by Stark and Vedres (2006), while the second being one of the degradation of the network.

Figure 1: Total number of ties in the cross ownership network in 2000-2009 period



If we take a deeper look in the network descriptive statistics (Table 1) we may notice that in accordance with the total number of ties, the number of isolates (disconnected companies) drops at first and then starts to increase again, in the end almost tripling the lowest number reached in 2002. In the first half of the observed period the largest weak component (companies connected to other companies disregarding the direction of the links) encompasses roughly two thirds of the companies. Its size starts to decrease rapidly after 2003 more than halving until the end of the observed period. At the same time the number of weak components increases only slightly. Number and size of the largest strong component (cross-owned companies; essentially, in a strong component every company directly or indirectly owns stakes in every other member of the component) on the other hand shows no apparent trend until the first half of 2007, when the size of the largest component collapses to nearly one third of the previous size.

Table 1: Number of isolates, week and strong components in the Slovenian corporate network in 2000-2009 period

		weak components	strong components
Period	disconnected units	number largest	number largest

First half 2000	177	14	311	9	34
Second half2000	161	14	323	13	29
First half 2001	139	15	347	12	26
Second half2001	130	10	370	10	36
First half 2002	130	12	365	9	41
Second half2002	138	11	358	10	33
First half 2003	140	12	355	12	26
Second half2003	152	14	336	14	29
First half 2004	172	12	319	10	33
Second half2004	180	13	309	10	32
First half 2005	187	12	307	12	38
Second half2005	205	15	281	8	39
First half 2006	235	13	258	9	30
Second half2006	242	11	252	8	30
First half 2007	240	15	226	11	12
Second half2007	278	17	205	8	14
First half 2008	294	20	177	8	9
Second half2008	303	17	176	8	9
First half 2009	324	17	151	8	10

From these data we may clearly observe two distinct periods in the Slovenian corporate network – the first period of network building and strengthening and the second period of network dissolution. Before moving to the discussion about the possible reasons for this observation, we will test the rules of network evolution using the stochastic models for network dynamics. We will test a model with the before mentioned effects in three different periods, namely the total 2000-2009 period, in the 2000-2003 period and 2004-2009 period. Results of the stochastic model estimation for dynamic networks are given in Table 2.

Contrary to what we could expect from looking at the descriptive statistics the results of the stochastic modeling reveal that the network evolution was governed by roughly the same rules in both periods. There are relatively few differences in parameter estimates for the first and the second period. If we first take a look at the estimates for the whole 2000-2009 period, the negative outdegree parameter is associated with low density of the network (a tie is much more likely not to be there). There is a general tendency toward reciprocating the ownership relation, less so if the tie is in the same industry. Clustering is present, indicated by a significant effect of direct and indirect ties and betweenness.

Table 2: Results of stochastic model estimation for dynamic networks

	Whole period		2000 thru 2003		2004 thru 2009				
	parameter	(s.e.)	parameter	(s.e.)	parameter	(s.e.)			
outdegree (density)	-5,22	(0,24)	*	-4,30	(0,14)	*	-6,98	(0,26)	*

	reciprocity	2,30 (0,35) *	1,92 (0,34) *	3,01 (0,59) *
Network closure	transitive triplets (direct and indirect) ties	0,47 (0,27)	0,46 (0,28)	0,96 (0,67)
	3-cycles	1,61 (0,6) *	1,12 (0,57)	1,46 (2,09)
	betweenness	-0,56 (0,31)	-0,13 (0,3)	-1,64 (0,88)
		0,17 (0,06) *	0,06 (0,04)	0,38 (0,12) *
Proximity	industry (centered)	1,47 (0,19) *	1,33 (0,16) *	1,62 (0,35) *
	industry (centrd) × reciprocity	-1,25 (0,52) *	-1,06 (0,57)	-1,86 (1,49)
	region (centered)	0,95 (0,16) *	0,91 (0,13) *	0,68 (0,28) *
	region (centrd) × reciprocity	-0,18 (0,45)	-0,17 (0,48)	0,29 (0,82)

Significant parameters (t values over two) are indicated with a star.

If we next turn to the differences between the two periods, we first notice that the only substantial difference is in the betweenness parameter, which is significant in the second but not in the first period. Other network effects are not significant in either of the periods, although direct and indirect ties comes close. Taken together, these results would indicate that group formation takes a longer period and that the nature of the groups is changing through time. In any of the tested periods, same industry and geographic proximity were beneficial for tie formation. In general we may note that the second hypothesis about geographic and social proximity being a facilitator for tie formation is fully confirmed, while the first hypothesis on cluster formation needs some consideration.

5 Discussion and conclusion

Cross-ownership networks are a form of corporate network based on formal and publicly recorded ties. This type of networks are less often encountered in literature since they are not very common in the developed economy, although there are some exceptions (e.g. Japanese keiretsu). The ownership transformation in post-socialist economies on the other hand offers a laboratory for observing the network formation and evolution. Evolution of a network in a post-socialist economy was first observed by Stark (1998, 2001, Stark and Vedres, 2006) on the case of Hungary. Stark proposed three different scenarios for the development of the network, of which we believe the scenario of dense cross-ownership network between nationally owned companies in order to fight uncertainty and foreign capital seems the most appealing for the Slovenian case.

We analyzed a complete network of 518 Slovenian public limited non-financial companies in the 2000 thru 2009 period. The network was quite sparse in absolute term but reasonably dense in cross-ownership network terms. Descriptive statistics show quite a lot of clustering and they reveal two distinct periods in the network – a period of network creation and a period of network dissolution. The first period from 2000 thru 2003 is characterized by increasing density and clustering, the second on the other hand by decreasing density and precipitating clustering. However, stochastic modeling revealed that the network evolution is governed by similar principles in both periods – reciprocity, strong tendency to form ties within industry and region and a slight inclination toward network closure.

It seems however that the minute differences in network closure parameters are the key to resolve the question of the two periods. In the first period transitive triplets and direct and indirect ties effects are relatively strong (although not exactly significant), while betweenness is important in the second period. The first mechanism would result in relatively large and connected groups – a suitable mechanism for fighting uncertainty and foreign investors. High betweenness results in chains and stars, rather smaller and sparser groups, easier to manage. Together with high effect of industry parameter we may conclude that while companies diversified their portfolio in the first period, they consolidated their assets in the second, forming more focused horizontal and vertical alliances as a response to the changing business environment.

In the future, more research is needed in this field. The next step will involve adding more actor covariates like profitability and testing their effect on the network and the effect of network on them.

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