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# **Actions with economic elements embedded in the social networks of Danish farmer investors abroad**

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## **Abstract**

The main aim of this paper is to investigate the “embeddedness” of business relationships with social relationships of Danish farmer investors (DFI) concerning agricultural investment and expansion abroad. A survey was sent to 61 DFIs with activities in Central and Eastern European countries who are members of an organisation named Danish Farmers Abroad. The survey elicited information regarding their organisational network connections to other DFIs who also have activities abroad. Information about the DFIs’ network was obtained regarding their business relationships (cooperation, competition and advice given and received to and from other DFIs) and social relationships (friendship). The data of the four different networks was analysed by the Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure in UCINET. The results indicate that cooperation as well as received and given advice are positively related to social ties, whereas competition is negatively related to social ties. These results support the idea that business relationships (with the exception of competition) of DFIs are embedded in social relationships. This indicates that the same actors may behave less cooperatively in environments with low trust where they have to compete for scarce resources.

**Keywords:** Embeddedness, social network analysis, Danish farmer investors

**JEL codes:** M14, L22

## 1. Introduction

One of the focal questions that social theorists try to answer is how behaviour and institutions are affected by social relations. Most neoclassical economics assumes that rational behaviour is minimally affected by social relations and there are no institutions or society in the neoclassical economic world. Everything as generally known is controlled by the invisible hand of Adam Smith. Alternatively, new institutional economic theory adds institutions into the picture arguing that economic transactions take place within an institutional framework. Furthermore, economic analysis can be extended to explain the emergence and nature of institutions (Williamson, 2000). Economic sociologists added one more layer in the economic analysis of transactions arguing that economic transactions not only take place within an institutional nexus, but economic transactions are also socially embedded (Granovetter, 1985).

Embeddedness is a theoretical concept introduced by Polanyi (1944) and has since captured the interest of many researchers. Polanyi (1944) found little evidence that supports the self-regulated free market but on the other hand supports the idea of over-socialised behaviour, where free markets are human objects created and maintained by government intervention. Several studies supporting the contextualised approach regarding organisation theory include Granovetter (1985) and Zukin and Di Maggio (1990), amongst others. Embeddedness refers to on-going economic action into the social context (Granovetter, 1985). This embeddedness concept of economic action has been used in many different settings (Borgatti and Foster, 2003), but has been criticised for being narrow. The embeddedness concept of Granovetter (1985) has since been expanded into different categories like cognitive, cultural, political and structural (Zukin and Di Maggio, 1990). The emphasis of Zukin and Di Maggio (1990) was on the interconnectedness of power, culture and organisation which was also a contribution of the embeddedness approach in economic-sociology. Nevertheless, the classic discussion of embeddedness from Granovetter (1985) still remains an important motivation for further research (Dacin et al., 1999). Social structures are seen as closely linked to different economic outcomes such as allocation of labour, productivity, price and innovation (Granovetter, 2005). Recent empirical studies focus on the benefits to firms of embedded social relations related to business relations and linking them to generate an exchange system which differs from traditional arm's length market relations (Uzzi, 1996; Uzzi 1997; Uzzi and Gillespie, 2002). For example, Uzzi (1996) applied a combination of organisation theory and social networks to relations between apparel manufactures and their subcontractors in New York to distinguish between arm's length

personal ties and embedded ties. Identifying the failure of the firm as the dependent variable the paper found that the embedded ties seem to make the firm less likely to fail than the traditional arm's length ties. Furthermore, again using data from the apparel industry, Uzzi (1997) tries to determine the features and functions of embeddedness by extending the classic approaches of Polanyi (1944) and Granovetter (1985). He finds that in line with Polanyi (1944), the interpersonal relation can govern some transaction, while he finds that in line with Granovetter (1985), the main transactions of the firm are embedded in social networks of relations and cannot be replicated by other means. Embedded relations have three main features that regulate the behaviour among partners - trust, information exchange and social arrangements for solving problems (Uzzi, 1997). Uzzi (1997) stresses that greater empirical attention should be paid to the concept of embeddedness, given there is a lack of knowledge about how embeddedness affects economic behaviour.

Other empirical results of the classical embeddedness theory are related directly to the links between friendship and competitors and the effect that the social action has on the performance of the firm (Ingram and Roberts, 2000). The results of this work indicate that the link between friendship and competitors is positive among managers within the Sydney hotel industry and that friendship among competitors improves the performance of the business. It could be argued that this is due to friendship ties being governed by norms in which actors are obliged to consider each other's interest rather than being in an arm length transaction where every actor seeks only to maximise their own benefits (Clark and Millis, 1982; Pahl, 2000). The Ingram and Roberts (2000) paper does, however, also state that more research should be done regarding the friendship and competitive relations, suggesting the extension of the knowledge of these relations in different industries rather than the service industry (Ingram and Roberts, 2000) or knit wearing industry (Lazerson, 1995) and also to show whether the relations follow the same direction as previous studies. A more recent study by Westphal et al. (2006) also shows that friendship ties between top executives of large and mid-sized US industrial and service firms provide potential benefits to the firm. Overall this literature on social embeddedness suggests that these informal ties between managers of different organisations show that opportunism exists in economic exchange relationships.

Our paper uses data from a survey sent out to 61 Danish farmer investors (DFI) operating or investing in farms in Central and Eastern European countries. These DFIs are all members of an

organisation called Danish Farmers Abroad which can be classified as inter-organisational according to the categories given in Carpenter et al. (2012) in that they do not act together as a group but act more in their own interests (in contrast to inter-relational as is most often observed within firms). We analyse the structure of ties among these farmers. Included in this analysis is an investigation of whether business relations are embedded in social relations. We also build upon the idea of friendship being positively related to the competitive relation (an action with economic elements) as only touched upon by the limited number of abovementioned studies. We do this by including more actions with economic elements (business relations) in our analysis and we focus on the relationship that these actions containing economic elements have with social actions. Additionally, we focus on a different industry (farming) and we investigate whether the DFIs behave in the same way under new institutions as they are assumed to behave when in their home environment. For example, Danish farmers have strong social ties with other farmers when they are in Denmark (Kindleberger 1951; Borish, 1991; Campbell and Pedersen, 2007; Faber, 1918). From a managerial perspective it will be interesting to assess what will happen when farmers change from the stable Danish environment to a foreign one. Will they be still cooperating with each other or they will adjust to the new institutions?

## **2. Theoretical Background**

Embeddedness is referred to as the degree of social location of network participants and measured in terms of the depth or degree of connectivity associated with established relationships among the network participants (Thompson, 2003). The embeddedness concept is also referred to as a logic of exchange that encourages economies of time, integrative agreements, Pareto improvements in allocate efficiency and complex adaption (Uzzi, 1997). The level of embeddedness is lower in earlier societies and has not changed much with modernisation, however, economic sociologists argue that this level is much more essential than what economists have considered so far in their analyses (Granovetter, 1985).

The theoretical arguments in classical and neoclassical economics do not include any impact of social relations or social structure in the production function, distribution or consumption. In a competitive market neither producer nor consumer influences the demand, supply or price. This is what Granovetter (1985) defines as the under-socialised concept or what Burt (1992) defines as the atomic view of actions. This perspective assumes that actors are isolated from each other. So every

actor, individual, firm, farm or organisation do not interact with each other and therefore isolate themselves from the others. As Hirschman (1982, p. 1473) states “*Under perfect competition there is no room for bargaining, negotiation, remonstrations or mutual adjustment and the various operators that contract together need not to enter into recurrent or continuing relationships as a result of which they would get to know each other*”. Social relations may affect their decision-making process, but in the neoclassical economic world, this is only seen as a friction that slows down the competitive markets.

In the social context, behaviour is highly determined by norms and values, a concept defined as over-socialised by Polanyi (1944) and Granovetter (1985) or normative by Burt (1992). This concept differs from the under-socialised concept of action because actors’ behaviour is seen as being completely controlled by social norms in which they are socialised instead of being isolated. This shows the importance that social relations have for decision making in modern society.

The under-socialised concept of human behaviour is mostly linked to new institutional economics which concentrates on explaining the social institutions from a neoclassical point of view. The new institutional economists see social institutions from the perspective of economics, using neoclassical marginalist theories in order to explain institutions. Granovetter (1985) suggests that new institutional economics and transaction cost economics (TCE) should seek inspiration for the analyses of institutions from social arguments to show that social arguments appear as efficient solutions to economic problems. What both the over-socialised and under-socialised concepts assume is that actors are not influenced by existing social relations. Later research tries to merge the approaches of embeddedness and TCE (Jones et al., 1997; Blumberg, 2001). Both these approaches fall under relational theory, but the difference is that TCE reverses the traditional view of embeddedness by reasserting the importance of economic performance as a driver of exchange behaviour (Borgatti and Foster, 2003). As Jones et al., (1997) show in their study, social ties exist to safeguard the economic transaction.

Granovetter (1985) attempts to find a theory (known as organisation theory) which avoids the extreme views of human behaviour (the economic theory that under-socialises behaviour, and the sociological theory that over-socialises behaviour). Additionally, Uzzi (1996; 1997) adds to the classical approach the idea that it is embeddedness that creates economic opportunities. These are

opportunities that are not easy to replicate via markets, contracts or vertical integration. Embeddedness mainly comes in two main perspectives, namely relational (micro) and structural (macro). The former arises from interpersonal pair-wise ties and focuses on the quality of these ties, whereas the latter comes from the structure of the overall network of relations and is more focused on the configuration of the network (Granovetter, 1992; Moran, 2005; Carpenter et al., 2012). There is no consensus among scholars regarding which structure is best.

The notion of embeddedness is closely related to social networks (recall that embeddedness is how much economic transaction is embedded in as well as affected by networks of interpersonal relations and the structure of the entire network of relations). A network consists of a finite set of nodes connected by a set of ties. Nodes (often called actors) represent entities at different levels of collectivity. Examples can be individuals, firms, farms, organisations, countries, etc. Ties (also called edges) connect pairs of nodes and can be of different types. For example there can be friendship ties, cooperation ties, advice ties, competitor ties and trading ties.. The collection of ties of a specific kind among members of a finite set of nodes is called a relation and each relation is itself a network (Wasserman and Faust, 2009; Borgatti and Foster, 2003; Scott, 2009). For example a friendship network is quite distinctive from a cooperation network though they may be empirically correlated. Therefore, for any finite set of nodes we can measure various relations.

### 3. Hypotheses

The core question in our paper is whether actions with economic elements are embedded in social relations. Generally speaking there are four common relation types in an organisation, the relation between advisors, between friends and those you cooperate with and the relation between the people that compete with each other. Though there may be some overlap of these relations in an organisation, they all have distinct features. In this paper, we categorised four different types of relationships within the organisation of DFIs such as cooperation, advice, friendship and competition. We do not necessarily test for causality here, but rather for correlation<sup>1</sup>. Network data are by definition interconnected and therefore there is no clear causality and no clear choice of dependent variable. In our data there are three actions with economic elements and one that is a

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<sup>1</sup> As a robustness test we repeated the statistical analysis (three times) by using each of the other three relations (economic actions) as explanatory variables. The test showed that the results are robust to the selection of the dependent variable. These results are available from the author upon request.



pure social action (friendship), which we use as the dependent variable. The dependent variable, friendship, is defined as a relation among DFIs which is not work-related. The independent variables are:

- 1) Cooperation, which is defined as a relation among DFIs that work together, share machinery or rent land to and from each other.
- 2) Advice, which is defined as a relation among DFIs that give and receive advice to and from each other.
- 3) Competitive behaviour, which is defined as a relation among the DFIs regarding the way that they perceive each other when asked about whether they sell the same products or buy/rent the same land.

### **3.1 Hypothesis 1 – Cooperation and Informal Ties**

As presented by Hall and Soskice (2001) there are two basic types of capitalism. The first is liberal market economies (LME) that coordinate economic activity through the markets and corporate hierarchies. The second type is known as coordinated market economies (CME) that coordinate economic activity more through non-market mechanisms such as informal networks or corporatist bargaining. In the latter we do not have formal contracting among firms but more non-market relations, more collaboration and more cooperation (Hall and Soskice, 2001). Denmark can be said to be included in the CME type of economy and in that sense Danish people are brought up in a cooperative environment and are thus trained to cooperate with each other. The DFIs in our sample belong mostly to middle size farms which focus mainly on stability rather than growth. The Danish farmer cooperative development is commented on by many studies, but as Kindleberger (1951) and Borish (1991) emphasise, the cooperation in Denmark flourished because of social cohesion which allowed farmers to create necessary institutions and, when the occasion demanded, economies of scale in marketing along with labour intensive production. Given that Danish farmers are highly educated, both the quantity and quality of communication may increase, indicating interconnection of a close set of values with more internal social mobility. In other words, Denmark exhibits a high degree of social cohesion. The performance of Danish socioeconomic factors exceeds or equals several cases that have pure examples of capitalism (Campbell and Pedersen, 2007). If we go further back in time we can even find more facts that support the cooperative behaviour of Danish farmers. Faber (1918) emphasises that since ancient times, Danish peasants are accustomed to

manage the affairs of their village communities collectively, and had learned to trust each other and to cooperate in many different ways. So, Danish farmers have gone through a process of building shared values and communication. They have a sense that they are engaged in the same common association, they face shared challenges and they belong to the same community. While the above cultural explanation for the connection between friendship and cooperation could be true for many countries, the literature would suggest that it is particularly strong for Denmark.

It is therefore natural to expect that social and cooperative ties among Danish farmers should exist when these farmers move abroad just as they exist when they were back in Denmark. So in this case we expect social relations to be positively affected by cooperation relations.

***Hypothesis 1(H1):***            *The cooperation relation between two DFIs is positively related to the social relation between them.*

### **3.2 Hypothesis 2 – Advice and Informal Ties**

Giving or receiving advice is also an important relation among different individuals or DFIs when creating on-going social relations. The exchange of advice helps in strengthening not only the social relations but also the business relations or the level of cooperation among actors, individuals or groups. Research in Social Network Analysis (SNA) has demonstrated the importance of personal connections in seeking information (Granovetter, 1973; Burt, 1992). On the other hand, as Cross et al. (2001) emphasise, surprisingly we do not know much about how seeking information from other people at work results in actionable knowledge, given that social interactions are seen as a vehicle for creating knowledge and using it. A network of professional advice relations develops as people seek information and opportunities for solutions to their problems among their colleagues in an organisation. Repeated interaction between the actors in an advice relation can further create patterns of exchange which define the role that each actor plays in the network (Gibson, 2004). There is not much research related to what advice is given and received when members of an organisation go to each other for work-related advice. There are benefits when seeking information from each other, such as people providing information that directly solves a problem or answers a question (Cross et al., 2001) and improving the performance of an organisation (Sparrowe et al., 2001). The above issues with regards to the advice relation can also be applied to DFIs. They may get many benefits by seeking information from each other, interacting with each other and creating

patterns of exchange which can help them in finding a solution to a raised problem and so forth. DFIs can also achieve benefits given that they may receive social approval for their decision while they seek information and actions.

The more the DFIs give and receive advice to and from each other, the higher is the chance that they can create social relations among them – and vice versa. When the DFIs are interacting with each other they may increase the willingness to help each other with different issues. They will more likely discuss work related problems and they will discuss more broad issues (Sias and Cahill, 1998). These experiences may develop trust among DFIs which thereafter can increase the willingness of creating friendship ties. As Shaw (1981) and Bridge and Baxter (1992) show in their studies the advice relation sometimes develops into a friendship relation (friendship ties embedded into the work relation). In line with this research, we expect social relations to be positively related to the advice relation. The reverse relationship is also possible: when a DFI shares a social relation with another DFI, the probability that he receives or gives professional advice from or to that person is higher. There is therefore a positive correlation between the social (non-business) and advice ties between two DFIs.

***Hypothesis 2 (H2):*** *The advice relation between two DFIs is positively related to the social relation between them.*

### **3.3 Hypothesis 3 – Competition and Informal Ties**

Empirical research shows that embedded relations are more likely to improve performance and increase benefits of firms even when they are competitors (Uzzi, 1996; Uzzi, 1997; Uzzi and Gillespie, 2002; Gerlach, 1992; Lazerson, 1995; Ingram and Roberts, 2000; Westphal et al., 2006). For example, research on US firms with different sizes and different ethnicities shows that they perform better in the presence of embedded ties than arm's length contracts (Uzzi, 1997). Similar results come from Japan, where Japanese firms can successfully manage inter-firm ties by using personal relations (Gerlach, 1992; Gjerding, 2005). The knitwear industry in Italy has also been characterised by extended personal relations and trust (Lazerson, 1995). Their research has a common finding, indicating the importance of embedded ties among actors that compete with each other. The results of Ingram and Roberts (2000) and Coser et al. (1982), who document competitor-friendship relations in two different industries, directly indicate the presence of a potential benefit

of such a relation. This has also been reported by Westphal et al. (2006) who show that top executives of large and mid-sized US industrial and service firms maintaining or reconstituting broken friendship ties to executives of competitor firms reduce competitive uncertainty and provide potential benefits to their own firm. Our next hypothesis then is testing whether the positive relationship between social (non-business) relations is also positive among Danish farmer investors that compete with each other abroad.

***Hypothesis 3 (H3):** The competition relation between two DFI's is positively related to the social relation between them.*

It is important in the context of our study to examine whether Danish farmers exhibit similar behaviour both at home and abroad. The fact that Danish farmers exhibit strong social ties with other farmers is well documented in the literature, as we have seen above (Kindleberger 1951; Borish, 1991; Campbell and Pedersen, 2007; Faber, 1918). It is important to examine whether the same behaviour is exhibited among Danish farmers when they operate their farming activities outside Denmark. In our hypothesis above we postulate a positive relationship between friendship, cooperation, advice and competitive relation and the question is whether this relationship holds among farmers that compete for land and other resources in a foreign environment (and perhaps also more unknown and hostile environment).

### **3.4 Control variables and sub-hypotheses**

In addition to the main model we add variables such as size of production abroad, level of activity abroad and whether the actors own and run their businesses themselves. We use these variables as control variables to check whether the relations among the main variables did not occur by chance and to see whether these variables will strengthen or weaken the embeddedness of the main variables.

Large production units tend to be more influential than small units (Tsai, 2002) and this may have an effect on the friendship ties. A large unit will tend to have more financial resources and perhaps a more developed strategic plan toward collaboration with their competing partners. Collaborating with each other can lead to the creation of social ties. The larger firms tend to be more efficiency-seeking (Dunning, 2009; Karantininis and Zylbersztajn, 2007) and because of this they are more

likely to form social ties with their competitors in order to gain more knowledge and information on their competition. When the large production units compete with each other they have a strong incentive to understand and learn from each other and they may not do this in a formal way. There may be an interest to stay informed and up to date with the activities and strategies of competitors so that improvements can be made to their own businesses in order to prepare for the next step. In this way they also safeguard themselves from their competitors. The process of knowing and learning about each other should lead to more interaction, which can be either social or business interactions. The large firms are usually the first-movers when expanding or investing abroad and therefore are in search of new ties that will provide them with important information. In the process they build their network which may include competitors that also aim at expanding or investing abroad and hence the large firm can have access to important information (i.e. regarding the best strategy or the latest technology or even the latest move done by their competitors).

As competitors, there may be potential benefits from having knowledge of each other and this should have a stronger effect the larger your production is. So in the presence of a large size of production, the relation among the competitive relation and the social relation may become stronger. This leads to our first sub-hypothesis: ***Hypothesis 3a (H3a): The previously hypothesised positive relationship between the competitive relation and the social relation is stronger among the DFIs with large production units.***

The level of activity abroad is also one of the factors that may influence the friendship relation among DFIs. By level of activity abroad we mean the number of farms abroad that the DFIs are involved in. If DFIs have several activities abroad then this may increase the probability of having a social tie with other DFIs. Additionally, when there is a tendency for the DFIs to invest in several activities abroad they may be more willing to exchange advice with each other which can become intensive and develop into a social relation. This leads to a second sub-hypothesis: ***Hypothesis 2a (H2a): The previously hypothesised positive relationship between the advice relation and the social relation is stronger when the DFIs have a higher level of activity abroad.***

Owning and running your own business instead of renting out or hiring managers to oversee operations, may lead the DFIs to show more interest in each other and therefore increase the probability of having more social ties between each other. This may also lead to the DFIs being

more willing to exchange advice when they themselves own and run their businesses. This leads to a third sub-hypothesis: **Hypothesis 2b (H2b)**: *The previously hypothesised positive relationship between the advice relation and the social relation is stronger when the DFIs own and run their businesses themselves.*

Finally, geographic location could also have an influence on the main variables, in that the country of operation may affect the way that different DFIs share friendship ties among each other. Two DFIs operating in the same geographic area are more likely to contact each other (Tsai, 2002) and possibly develop non-working ties. Being located in the same country also creates an opportunity for cooperating with each other. If both DFIs operate in the same country, then the chances of them sharing information which are work related are higher and sometimes they may even work together to find solutions to problems. This potentially turns into a social relation that may not have been the case if the DFIs had their activities in separate countries. This leads to the final sub-hypothesis: **Hypothesis 1a (H1a)**: *The previously hypothesised positive relationship between the cooperation relation and the social relation is stronger when the DFIs operate in the same country.*

#### 4. Method

To test our hypotheses, data from a mail survey is used to analyse the network of DFIs abroad. Surveys and questionnaires are the most common and predominant research method used in SNA (Marsden, 1990). The mail survey was conducted with Danish farmers, owners of the company and representative managers who had invested or moved to Central or Eastern European countries. The survey was designed in a six month period in 2011, during which time a focus group and a pilot test were conducted. The final version of the survey was sent out to an initial 66 respondents in mid-July 2011. Five respondents were removed from the sample either due to non-response or isolation from the network, thereby resulting in a final sample of 61 DFIs.

The unit of analysis in this study is the relationship between pairs of DFIs, so all of the variables are dyadic. Network data are of high interest if they are seen as component of measures that characterise a unit's location within a network, or a property of a dyad (Marsden, 1990). For each pair of DFIs we can see the links to which they are connected through social relations (friendship). This variable is considered as our endogenous variable. Our exogenous variables are the relations between DFIs working together, sharing machinery or renting land to and from each other

(cooperation), giving or receiving advice to and from each other (advice) and the possibility that a DFI is selling the same product or buying/renting the same land (competition). All these variables enter in the model first as 61×61 matrixes to analyse the relation among the main variables. The variables used in the analysis are summarised in Table 1, including the wording given to respondents in the survey to describe the variables.

**Table 1. Main variables used**

	Description given to respondents	Coding
<i>Endogenous Variable</i>		
Friendship	A person that you share time with and talk about things not related to work	1 if yes; 0 otherwise
<i>Exogenous Variables</i>		
Cooperation	A person that you work with or share machines with or rent land to/from	1 if yes; 0 otherwise
Advice	A person that you talk to professionally or give/receive input, suggestions or feedback to/from	1 if yes; 0 otherwise
Competition	A person that you think offers the same product as you or wishes to buy/rent the same land as you	1 if yes; 0 otherwise

To extend the first model we include control variables and interaction variables to investigate some of the factors that may strengthen or weaken the embeddedness among the main variables. These are summarised in Table 2.

**Table 2. Control variables used**

	Description	Coding
<i>Control variables</i>		
Size of production	Whether the DFIs have small or large size of production	1 if yes; 0 otherwise
Level of activity abroad	Whether the DFIs have several activities abroad	1 if yes; 0 otherwise
Own and run self	Whether the DFIs own and run their businesses themselves	1 if yes; 0 otherwise
Country of operation	Whether the DFIs have activities in the same country	1 if yes; 0 otherwise

When adding the control variables, the analysis is done on 44 DFIs given that we had missing attribute data. This is done in order to be consistent with our analyses. Therefore the main variables

such as friendship, cooperation, advice and competition enter into the models that include the control variables, as 44×44 matrices. The first control variable, size of production abroad, is created as a network matrix from node attribute data using the outer product of the vectors of the variable (where Matrix  $X$  is formed by  $X(i,j) = \text{vector}(i) \times \text{vector}(j)$ ). Thus, a 44×44 matrix of the production size is created which is coded 1 if both DFIs have a large production abroad and 0 otherwise. Level of activity abroad is created as a 44×44 network matrix also using the outer product and coded as a binary variable indicating 1 when both DFIs have more than two activities abroad and 0 otherwise. The own and run variable enters the model as a 44×44 network matrix again using the outer product and coded as 1 when both DFIs own and run their businesses themselves and 0 otherwise. The variable country of operation is constructed and included in the model as a 44×44 matrix of geographic proximity in which a cell was coded 1 if two DFIs have their business activity in the same country, and 0 otherwise.

When we have information about multiple relations among the same sets of actors, it is often of considerable interest whether the strength of a tie of one type is related to the probability strength of another (Hanneman, 2000; Scott, 2009). According to Borgatti and Cross (2003), network data do not satisfy the assumptions of statistical inference in classical regression due to the dependency that occurs among the variables. Additionally, network data are assumed to be dependent on one another according to which row or column they belong, indicating that the error term is assumed to be auto-correlated to some degree within rows and columns (Krackhardt, 1988). So in this case the Ordinary Least Square techniques cannot be applied. In our analysis we use Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure (MRQAP) approach in UCINET (Borgatti et al., 2002). We also extend this model to include control and interaction variables to investigate some of the factors that may strengthen or weaken the embeddedness among the main variables. The result from this analysis can be interpreted in a similar manner as the results that come from an ordinary multiple regression (Tsai, 2000).

The main aim of this method is to regress a dependent relation (matrix) on one or more independent relations (matrices), and evaluate the significance of the R-square and regression coefficients. So this procedure is in principle a nonparametric statistical algorithm used to model a social relation using values of other relations. The algorithm proceeds first with performing a standard multiple regression across corresponding cells of the dependent and independent relations and second,



randomly permutes rows and columns (together) of the dependent relation and recalculates the regression. This permutation regression process is repeated numerous times (in this case 5000 times). This process defines if the relation between two matrices is random and helps in adjusting for the autocorrelation process (Kilduff and Krackhardt, 1994). An advantage of this regression in network data is that it can be very effective in computing the correlation between network and non-network data (Carpenter et al., 2012). The regression also requires both dependent and independent variables to be square matrices of the same size (Hanneman, 2000; Scott, 2009). That is the reason why the node attribute data such as the ones we mentioned above (production size, level of activity, own and run and the country of operation) are entered into the regression as matrices.

## 5. Results

### 5.1 Descriptive Statistics

In Table 3 we show the descriptive statistics of the four relations (matrices not row or columns) friendship, cooperation, advice, and competition of the 61 DFIs.

**Table 3. Descriptive Statistics of friendship, cooperation, advice and competition relations**

	Friendship	Cooperation	Advice	Competition
Density (Mean)	0.039	0.026	0.021	0.002
Std. dev.	0.192	0.159	0.14	0.05
Sum	141	95	74	8
N of Obs.	3660	3660	3660	3660

We see in Table 3 that the friendship relation has 3660 observations which range from a minimum of zero to a maximum of one. The sum of the ties is 141, and the average value of the ties is  $141/3660 = 0.039$ . Given that our data are binary (coded 0 for no relation and 1 for a relation) the mean stands for the proportion of possible ties that are present (or the density), or the probability that any given tie between two random actors is present (Hanneman, 2000). In our case there is a 3.9% chance that indicates the probability for any given tie. A quick look at the table tells us that the density for the competition relation is lower, and has less variability compared to the other relations.

## 5.2 Double Dekker Semi-Partialling MRQAP Approach

We apply the Double Dekker Semi-Partialling MRQAP approach in UCINET (Borgatti et al., 2002). The results from this method are shown in Table 4.

**Table 4. Double Dekker Semi-Partialling MRQAP approach**

	Model 1	Model 1a	Model 2 <sup>a</sup>	Model 3 <sup>a</sup>
Intercept	0.016	0.033	0.0123	0.0121
Advice	0.43 <sup>***</sup>	0.57 <sup>***</sup>	0.54 <sup>***</sup>	0.50 <sup>***</sup>
Cooperation	0.13 <sup>***</sup>	0.07 <sup>**</sup>	0.06 <sup>**</sup>	0.05 <sup>**</sup>
Competition	-0.11 <sup>***</sup>	-0.49 <sup>***</sup>	-0.50 <sup>***</sup>	-0.51 <sup>***</sup>
Same country of operation			0.03 <sup>**</sup>	0.02 <sup>*</sup>
Large production abroad			0.06 <sup>**</sup>	0.04
High level of activity abroad			0.07 <sup>***</sup>	0.06 <sup>**</sup>
Own and run self			0.04 <sup>**</sup>	0.03 <sup>**</sup>
Adv×High level of activity				0.03 <sup>**</sup>
Adv×Own and run self				0.01 <sup>**</sup>
Comp×Large production abroad				-0.90 <sup>***</sup>
Coop×Same country of operation				0.01 <sup>**</sup>
R-square	0.131	0.192	0.206	0.214
No. of Observations	3660	1892	1892	1892

<sup>\*\*\*</sup> indicates significance at 1% level, <sup>\*\*</sup> at 5% level and <sup>\*</sup> at 10% level,

<sup>a</sup> Model 2 and 3 run with data from 44 DFIs

As shown in Table 4, Model 1 contains the main variables cooperation, competition and advice, all of which appear significant. Two of the variables are positive, thereby supporting hypotheses *H1* and *H2*. More specifically, the variable for the advice relation is positive implying that the more the DFIs exchange information in relation to their work, the higher is the chance that they also have an on-going social relation. The coefficient for the cooperation relation is positive, indicating the DFIs tend to cooperate (for example sharing machinery) more with DFIs that they also have social ties with. Hypothesis *H3*, however, is not supported by the results where the coefficient for competition has a negative sign. This finding implies that when DFIs perceive another DFI as a competitor, they are less likely to form a social tie with that DFI. The variable that has the highest marginal effect on

the dependent variable (the social relation) is advice (with an estimated coefficient of 0.43), followed by cooperation (coefficient of 0.13) and finally the lowest effect comes from competitive relation (coefficient of -0.11).

The table also includes Model 1a, which is the same as Model 1, except that the model is run with 44 DFIs compared to the 61 of Model 1. This is done so as to assess if the reduction in observations (due to the removal of non-respondents and isolated actors, in order to include the control variables and interactions in subsequent models), has an effect on the main variables. As can be seen from the results from Model 1a, only the competition variable sees a change in its relative importance compared to the other variables. This could be due to the small number of competitive ties that were reported by the respondents.

Model 2 includes the control variables in addition to the main variables. As shown in Model 2 the main variables still remain significant. The additional variables such as country of operation, size of production and level of activity abroad as well as owning and running the business themselves are all significant. These indicate that if DFIs operate in the same host country or both have a large production size in that country then they tend to have more social ties with each other. Furthermore, the coefficient for the level of activity abroad is positive implying that if DFIs have several investments they will be willing to build more social ties. The coefficient related to the DFIs owning and running their businesses themselves is also positive, indicating that the position the DFIs have in the business is important when they form social ties.

To further extend the main model, Model 3 investigates factors that may strengthen or weaken these embedded relations. Firstly, the model shows that the coefficient of the interaction term between size of production and advice is positive, suggesting that the embeddedness of advice in the non-working relation is strengthened when DFIs have large sizes of production. Secondly, the coefficient for the interaction between advice and level of activity abroad appears positive suggesting that the effect of the advice relation on the non-working relation becomes stronger when there is a high level of activity abroad. Additionally, the coefficient of the interaction term between the size of production and the competitive relation is large (-0.90) and negative, suggesting that when actors are characterised as having large sizes of production then the negative effect of competition relation on the non-working relation becomes much stronger. This result does not

support sub-hypothesis H3a. The last interaction is the country of operation and cooperation which has a positive coefficient, indicating that the cooperation relation's effect on the non-working relation becomes stronger if the DFIs share the same country of operation.

## 6. Discussion

The results from this paper indicate that business ties (with the exception of competitive ties) are positively related to social ties. This supports two of our main hypotheses, but the third hypothesis is rejected. Our analysis supports that Danish farmers abroad tend to have social relations with other farmers with whom they receive (or give) advice (*H2*). Similarly they are socially linked to farmers with whom they cooperate with (*H1*). However, they do not have any social ties with farmers whom they consider competitors (*H3*). In addition to the main variables, the interaction variables extended the main model results by investigating factors that may affect the strength between the relations. The most interesting being the size of production interacted with the competitive relation. The coefficient appears large and negative indicating that if both DFIs have a large size of production, the likelihood that they have friendship ties with their competitors becomes even smaller. This indicates that under the presence of strong economic factors, the negative relationship between the social relation and the competitive relation becomes even more negative. The other interactions show a strengthening effect on cooperation and advice's effect on the social relation. Working together as well as giving and receiving advice implies more social ties among the DFIs where the effect of advice has the largest relative effect on the social relations.

These findings are mostly in line with the literature presented earlier with the exception of the relation between social ties and competitive ties. The latter is not in line with existing literature (see for example Ingram and Roberts (2000)). There may be several reasons why this is the case. One possible explanation for this result may have to do with the fact that Danish society and its economy is in transition from a coordinated market economy (CME) to a liberal market economy (LME). Denmark is currently rather a hybrid economy recognised as increasing the exposure of actors to market forces and decentralising collective learning and decision making. Denmark is a country that is recognised as being successful from the interaction of market and non-market institutions (Campbell and Pedersen, 2007).

A second explanation for the negative relation between social ties and competition among Danish farmers abroad may have to do with the DFIs having to compete for the same scarce resource, such as fertile land, or skilled labour. Notice that the definition of competition presented to the DFIs in the survey shown in Table 1 includes land, which is an important factor affecting a DFI's decision about investing abroad (Hajderllari et al., 2012). Although land is also scarce in their home country, Danish farmers face a more established and well-functioning land market in Denmark, where information on quality and other traits is almost perfect. This is not the case abroad where they chose to invest or perhaps establish themselves. Then, the competitive element in their relationship with other Danish farmers in the area may be tenuous. Some of the additional comments made by the DFIs in the surveys showed that they believe a large problem while abroad is trust. The DFIs possibly become more suspicious toward each other when operating abroad, which would lead to a strong competitive relation which perhaps can suppress the creation of social relations. What we observe here, perhaps, is a phenomenon where an existing path-dependency in socio-economic behavior, such as for instance cooperation among farmers, may break with an abrupt change in the institutional and economic environment. Removing the Danish farmer from their safe and trustful environment into an unknown territory where they have to compete with other (albeit Danish) farmers for the same scarce resource, may change the Danish farmers' behaviour. This calls for further study of this change of behaviour. The Danish farmers abroad provide an almost ideal "experiment" where the same person operates under diverse environments.

Another reason that our results differ from existing literature may be the differences in industries being studied. Perhaps the service industry and manufacturing or garment industries (studied in Ingram and Roberts (2000) and Lazerson (1995), respectively) have some characteristics that make the actors in top positions behave differently. This result presents several questions to address for further research. Perhaps there are general attributes that differentiate the two industries. These can be different factors that may explain the differences in results of this paper and the previous literature outlined earlier, such as the uniformity of the transaction, the magnitude of relation and the risk factor. For example, if an actor is already settled and satisfied with the current situation of their business and they do not see themselves as threatened by competitors, then there may be a good chance that a competitive relation could be positively related to a social relation. This would allow the sharing of information and help as is observed in the hotel industry case (Ingram and Roberts, 2000). On the other hand, when an actor's aim is investing in agriculture abroad (which

can be seen as specific and risky), then the chances that he will create friendship ties with competitors will be very low. Here they will most likely not be sharing any social ties, but instead trying to hide information from the competition as much as they can. It can therefore be said that the type industry matters for the direction of the competitor-friendship relation. As was shown in the previously mentioned studies regarding the competitor-friendship relation (Ingram and Roberts, 2000; Lazerson, 1995; Westphal et al., 2006), there are certain business benefits to be gained from maintaining social ties with your competitors. Therefore the DFIs in our study who do not have social ties with DFIs that they perceive to be the competition, could seek to enhance friendship ties with their competitors in order to benefit from the competitor-friendship relation.

An avenue for future research within this field could be to extend the idea of embeddedness when applied to multinational firms, i.e. the extent to which firms have direct relationships with customers, suppliers and competitors (Andersson, et al. 2002). It would be interesting to extend the issues of our paper into the trading context and analyse to what extent farms have direct relationships with firms, suppliers and retailers and whether they serve as sources of learning.

## **7. Conclusions**

This study has focused on the embedded relations between economic and social actions. An empirical application of a classic embeddedness approach was analysed using different networks from a mail survey with 61 Danish farmer investors abroad. The data were analysed by the Double Dekker Semi-Partialling Multiple Regression Quadratic Assignment Procedure in UCINET. We found that cooperation and advice are relations that positively correlate with social non-business relations. We also found that competition is negatively related with the social relations. In our case competition is shown to be a negative motivation for social relations and implies that the Danish farmer investors abroad do not perceive a social relation with their competitors as a beneficial one. Nevertheless, we still find evidence that economic action is embedded in social action. The social relation is most likely to be observed between Danish farmer investors who are cooperating with each other as well as giving and receiving advice to and from each other, where the advice relation has the strongest relative influence on the social relations.

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