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From Local to Global Markets through Organizations' Aspirations and Limitations

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1 Introduction

Looking back in history, it can be observed that companies had mostly local businesses and their partnerships were established with those which were also located nearby. As the means of communication became cheaper (either through less strict regulations or technological advancements), the companies started to partner up with the distant ones as well; to such an extent that today we can see many partnerships established from one country to the other. However, we still see that the major companies of different countries are of local origin (Rangan 2000). Starting from this observation, in this work I propose an agent-based model to better understand and explain how firms' behaviors lead to limited globalization with strong local ties. Marquis et al. (2009) state that "globalization is a homogeneity-producing process [and that] society is moving from particularism to universalism". They further argue that "with globalization, not only has the local remained important, but in many ways local particularities have become more visible and salient." While they take a sociological approach to this situation based on institutional theory, they also identify economic market mechanisms as an important factor maintaining the communities. Focusing on economic mechanisms, I model firms as value-maximizing units with bounded rationality under uncertainty and complexity (Simon 1972, Williamson 1975) in spatially distributed competitive markets. As such, I aim to investigate not only the emergence of global markets versus local markets, but also emergence of population demographics and market network structures, due to the self-interested behavior of firms under environmental influence. Furthermore, this work contributes to the literature of agent-based simulations used in social sciences (see for example Epstein 1999, Jung et al. 2011 and review Wall 2016).

2 Markets as Networks, Geography as Environment

What makes a market local or global is to what extent is the market is spread out regarding the geography. Given that a market is defined as the place where trades take place, we can also say that the extent to which the buyers and suppliers are spread out determines the locality of a market. At the same time, what keeps a market together over distances is the connections between the buyers and suppliers, hence a network structure which is called a market. Due to these features, geography and networks become important concepts to investigate a market. While many researchers look into economies connected to geographies and corresponding local populations (Jaffe et al. 1993, Hedstrm 1994, Greve 2002) or networks structures (Greve 1995, Podolny et al. 1996, Bothner 2003, Fleming et al. 2007), lately there has been also many works that take into account both of these concepts at the same time (Sorenson et al. 2001, Singh 2005, Sorenson et al. 2006). Looking at the literature with many other works, it can be suggested that network analysis approach might be the most natural way of analyzing the question presented in the introduction, more specifically analyzing why do organizations stay local despite the inclination towards globalization. Next to the natural compatibility of network analysis with the system and the question at hand, there are two other reasons to choose this method which are also presented by Zaheer et al. (2010) in their review on the use of social network analysis in interorganizational research. Network structure offers three levels of analysis classified as ego, dyadic and network-wide. Using these levels, one can monitor and obtain valuable information about individual firms' properties such as connectivity or centrality, the number and quality of their connections with other firms and the general structure of the network respectively. Furthermore, the authors identify some topics for future works, which are related to the structure of this work. The authors mention that "software developments in empirically modelling change and understanding the coevolution of 'networks structure together with relevant actor attributes as joint dependent variables in a longitudinal framework' are well worth exploring." (the inner quote refers to Snijders 2007). They also point out that "more explicit cross-level research to tease out isomorphic effects across levels would enhance scholarly understanding in this domain", where levels are taken as levels of

analysis in interorganizational research. My work's aim is in accordance with both of these suggestions; the model is proposed to understand the relationship between actors, other actors and their environment and see how individual behaviors aggregate into higher levels of analysis, where geographic and population effects emerge. Before moving on to the model, some general remarks have to be made about the nature of interorganizational research, that are important for understanding the structure of the model and its validity. The model is built in such a way that the organizations have individual aims and aspirations, but have to interact with others to achieve them. However, how they can and would interact depends on environmental factors, which leads to emergence of populations. The connection between populations are still achieved through individual organizations interactions with others over distance, hence there is not any higher-level interaction present. This construction corresponds to the three highest of five levels of analysis in interorganizational research identified by Hannan and Freeman (1977): 1) members, 2) subunits, 3) organizations, 4) population of organizations, and 5) community of organizations. With this framework, the problematic is tackled naturally by a model which has a behavioral mechanism on organizations level, limitations on population level (local boundaries) and an emergent community structure on global level, which can be analyzed in any scale, specifically in egoistic micro-, dyadic meso- or network-wide macroscale. The authors furthermore discuss about organizational inertia, which is crucial to interorganizational research and recognized by many researchers. In a general sense, organizational inertia describes the inability of an organization to adapt to its environment consisting of other actors and the external environmental conditions. There are many factors that contribute to the inertia, but I mention the two that are relevant to the model: One internal factor for inertia is caused by "the inaccessibility of full information state by organizational decision makers", which is "accompanied by the external costs of information acquisition". Another internal factor is the political constraints in an organization, which for example could lead to a certain world-view or business conduct in organizations. Organizational inertia is crucial to organizational research by making the differentiation of an organization from its environment possible; hence they are modelled as micro- and meso-level limitations in this work.

3 The Model

I present the model in three different levels of analysis, starting from the macro-level where the emergent network structure should take place to the micro-level where organizations' behaviors depend on the macro-level outcomes but have a consistent mechanism. The consistent behavioral mechanism of the organizations leads to the dynamic nature of the simulation in the meso-level, where the dyadic relationships occur and vanish.

3.1 Community and Populations: Global and Local Market

In this model, in the macro-scale, we are looking at a collection of different organizations which live in different environments and they repeat the same action for their survival (even if deaths of firms are not included). While the organizations belong to a community due to their common way of acting, they belong to different environmental conditions to which they had to adapt. These environmental conditions correspond to the physical distances as well as "regulative, social and cultural underpinnings of organizational behavior" (Marquis et al. 2009) typical to this environment. To model the environmental conditions, I use the NK-model by Levinthal (1997) where the organizations have N many features represented by a vector which might be intercorrelated in groups of K features and they adapt to or get selected by the environmental conditions (a variation of the attributes are mentioned as blueprints by Hannan and Freeman 1977). The initial point of the model includes many organizations that have almost adapted to their environment, where some small local diversity exists, however the favorable organizational attributes differ strongly from one environment to the other. While adaptation might be driven by higher

profitability, it is not a necessary mechanism as some social factors do not have rational justifications and the attributes of the organizations are only used as identification of populations and identification of organizations. The environmental conditions which determine the adaptation and selection processes differ from one geographic location to the other, which are separated from each other by a physical distance.

3.2 Actors and Actions: Organizations and Partnerships

Organizations are defined as value creating units, which can create even more value if they partner up with other organizations. Some examples of such a nature could be found in knowledge networks (Huggins 2010, Phelps et al. 2012) and VC funds (Sorenson et al 2001). Hence, in this model the main action of the firms is defined as establishing partnerships that allow them to create (or own) more value due to their inability to create more value by own efforts. However, the partnerships do not simply create an extra value which is shared by the partners, but it also leads to the diffusion of value from partners of partners. Once again, it is shown in many R&D related research that the knowledge diffuses over networks and especially locally nearby companies gain a lot from the spill-over effects. However, it must be pointed out that diffusion is an inefficient process of value transfer. For example, in knowledge networks, the innovation templates become more and more erroneous and more difficult to implement at the focal organization if it arrives from a far connection (Sorenson et al. 2006). Similarly, if we look at VC firms and their partnerships, it might be that the information about an investment opportunity can lose its value (as time passing decreases opportunity value) if it has to traverse through many partners before reaching the focal firm (Sorenson et al.2001). Hence, the second-hand value will have less value than first, the third-hand less than second and so on. The maximum amount of jumps that a value is allowed to make can be determined by the time-scales of partnership establishment frequency. For low frequency, value would have long time to travel and for high frequency only shortest distance partners might contribute to the value. The model allows to distinguish the value obtained from nearest neighbors and from the ones lying further in the network.

3.3 Why and How: Aspirations and Limitations

What makes the organizations look for partnerships, if they are already creating enough value for themselves? For this I refer to two mechanisms identified in the literature namely matching of aspiration levels of organizations (Greve 1998) and absorptive capacity (Cohen et al. 1990), and choose the former work as it does not require path dependence strictly as it allows to work with social comparison theory: The aspiration levels of the organizations are set at the mean value level of the local market and the empirically found probability distribution presented by Greve is used as a probability to look for new partners for a given distance from the aspiration level. In the more general exploitation vs. exploration context, this can be seen as the driving mechanism of exploration. However, as Lavie et al. (2006) and Siggelkow et al. (2003) have shown, balancing the exploration and exploitation is important for organizations and can lead to more profitable outcomes. In the framework of organizational inertia, an internal strategic decision of exploitation could be seen as a source of internal inertia. This factor is incorporated in the model in the form of an exploration budget which is a percentage of the total accumulated value in an organization (which is fortunately also in accordance with the self-feedback mechanism of absorptive capacity). The external counterpart of the inertia is incorporated as every exploration attempt costs the firm a certain amount. Furthermore, I impose a limit on the partnerships that can be maintained once at a time as realistically they might have higher costs or there might be an external regulation that limits the amount of partnerships an organization can have. The details of the exploration are described below. To form partnerships, the organizations engage in search and deliberation, both of which have their own costs due to their nature (Rangan 2000). It must be pointed out that these costs act as an external factor

contributing to the inertia of the organizations. Search and deliberation costs have been shown to be proportional to geographic distance by a decreasing trend (Sorenson et al. 2001) and, in case of high costs, the geography dependent search and deliberation are replaced by such social network dependent ones. At this point, I discuss two different partnerships that have different processes in search and deliberation, more specifically short-range and long-range partnerships. The short-range partnerships are found in the same environment as the focal organization. Due to high geographic proximity, search has low costs, and due to familiarity with local genetics, the firms establish homophily driven partnerships optimized with less redundant contacts. Hence, these partnerships are mainly driven by homophily (McPherson et al. 2001) and value (structural hole) maximization (Burt 1992). The long-range partnerships are established from one environment to the other. They have high costs of search and the unfamiliarity in genetics leads to using the status of the potential partner as a signal of quality (Podolny 1993). The status is calculated as the amount of connections the partner has and how high value the partners of partners are. For both processes of forming partnerships, a unit cost is defined for revealing some information. For short-range this could be revealing a redundant partner, whereas for long-range this could be revealing any partner. Hence, given the exploration budget the organizations are limited in their search and deliberation process, leading to imperfect partnerships only to be revealed over time, hence to a dynamic network structure. The summary of the simulation and technical details can be found in Appendix.

3.4 Hypotheses

The model allows a cross-parametric analysis of the system, such as effects of exploration budgets, of search and deliberation costs, of different aspiration levels and others. However, at this stage with fixed parameters the following are expected to emerge on global level from the micro-level driving mechanisms with limitations in micro- and meso-level.

1. The emergent global network structure should be relatively cohesive in local networks (Burt 1992) and should resemble weak-ties (Granovetter 1973) in global scale.

2. Although the organizations try to maximize structural holes, the homophily and cost of information acquisition should limit the amount of structural holes that can be achieved.

3. The network dynamics should converge to a certain rate of partnership search as the aspiration levels will be unsatisfying for the half of the local market.

4. Organizations having more accumulated value are going to be more connected with other environments. (Huggins 2010) It could be that we identify local high value and global high value organizations.

   With changing costs and/or exploration budgets, we might observe an increase in global connections (Hypotheses 1,4) and a decrease in limitation of structural holes (Hypothesis 2). At the same time, higher aspiration levels would lead to more dynamism in the partnership network and vice versa (Hypothesis 3). The population feature is mainly driven from evolutionary theory of organizations:

5. High value organizations and low value organizations might separate away giving rise to the U-shaped population size distribution proposed by Hannan and Freeman (1977). This would result from competition and that the higher value organizations get to partner up with other higher value ones and similarly for low value ones.

4 Conclusion and Outlook

In this work, I developed a means of analyzing how the self-interested behaviors of firms on micro-level lead to the emergent macro-level observations in population demographics, in geographically distant connections and in network structures. Respectively, it is expected that we observe a U-shaped value distribution in the local populations (Hannan and Freeman 1977), that local markets are connected to each other through small number of firms that were motivated and succeeded in forming global partnerships despite the high search and deliberation costs (Rangan 2000, Marquies et al. 2009) and that we observe a mixture of small world structure with structural holes (Burt 1992, Fleming 2007). Furthermore, correlations between these findings might occur as well; for example, high value firms might be the ones that had more structural holes around them in the past (as expected by the theory) or the ones that are at the same time globally connected. This theory contributes to the literature mainly in two ways. First, it contributes to the literature of agent-based models applied to management science. Wall's (2016) review reveals that the literature on "exploitation vs. exploration" focuses mainly on inner structure of organizations, whereas according to Lavie et al. (2006) this can happen in different ways as well. My theory differs in its investigation of "exploitation vs. exploration" in knowledge generation resources as well as alliances/partnerships from other works. Second, I contribute to the literature of isomorphism (aggregation) through this theory. While micro- and macro-level organizational behaviors/theories are well understood, the aggregation process is still open to systematic research. Keeping a fairly realistic picture of firms' motivations, limitations and their interactions with others through value transfer and diffusion, I propose a simulation that can be systematically analyzed to understand the process of aggregation towards macro-level outcomes. However, at this stage the model has its limitations and can be certainly improved. First of all, this model does not include any path dependency. The firms are set to be "machiavellists", following a Markov-like behavior where their past partnerships do not affect their future partnerships apart from the accumulated value. Literature has shown that trust and economic advantages of long time partnerships can be important and such dynamics should be incorporated in the model. Second, although the model makes use of NK model, the organizational structure exploration is not included. Partnerships' values increase when organizations adapt to each other and this might lead to groups of organizations that are similar to each other and sustain themselves in certain landscapes, even if they are not the local best fit. At the same time, local "boundary organizations" might emerge which adapt to their global partners; hence an organizational representation of geographic boundaries might emerge. Another important concept of evolutionary theory of organizations is the birth and death of organizations. While in this model, I hold the number of firms constant, this could be adapted similar to the original paper by Levinthal (1997), where the organizations either mimic the best firms or come up with new forms of organizations. Finally, with all these additions the resilience of organization networks can be investigated. While Levinthal's paper (1997) looks at the survival of organizations in changing environmental conditions depending on K number, the work can be extended by the power of network effects where organizations keep each other alive and we might observe the emergence of globally connected organizations as the heroes of the local networks, due to their geographically diversified partnership portfolio. On the other hand, some works have shown that the interconnectedness of networks with each other might lead to failure of the whole system. Hence, a disruption in one local network might lead to a global disruption, as observed in world-wide financial crisis (Acemoglu 2015). Such simultaneous rugged landscape and network effects can be an interesting next step to this work.

5 References

- Acemoglu, D., Ozdaglar, A. and Tahbaz-Salehi, A., 2015.Networks, shocks, and systemic risk(No. w20931). National Bureau of Economic Research.

- Bothner, M.S., 2003. Competition and social influence: The diffusion of the sixth-generation processor in the global computer industry.American Journal of Sociology,108(6), pp.1175-1210.
- Burt, R.S., 1992. Structural hole.Harvard Business School Press, Cambridge, MA.
- Cohen, W.M. and Levinthal, D.A., 1990. Absorptive capacity: A new perspective on learning and innovation.Administrative science quarterly, pp.128-152.
- Epstein, J.M., 1999. Agent?based computational models and generative social science.Complexity,4(5), pp.41-60.
- Fleming, L., King III, C. and Juda, A.I., 2007. Small worlds and regional innovation.Organization Science,18(6), pp.938-954.
- Fombrun, C.J., 1994. Taking on strategy, 1-2-3.Evolutionary dynamics of organizations, pp.199-204.
- Granovetter, M.S., 1973. The strength of weak ties.American journal of sociology,78(6), pp.1360-1380.
- Greve, H.R., 1995. Jumping ship: The diffusion of strategy abandonment.Administrative Science Quarterly, pp.444-473.
- Greve, H.R., 1998. Performance, aspirations, and risky organizational change.Administrative Science Quarterly, pp.58-86.
- Greve, H.R., 2002. An ecological theory of spatial evolution: Local density dependence in Tokyo banking, 1894?1936.Social Forces,80(3), pp.847-879.
- Hannan, M.T. and Freeman, J., 1977. The population ecology of organizations.American journal of sociology,82(5), pp.929-964.
- Hedstrm, P., 1994. Contagious collectivities: On the spatial diffusion of Swedish trade unions, 1890-1940.American Journal of Sociology,99(5), pp.1157-1179.
- Huggins, R. and Johnston, A., 2010. Knowledge flow and inter-firm networks: The influence of network resources, spatial proximity and firm size.Entrepreneurship & regional development,22(5), pp.457-484.
- Jaffe, A.B., Trajtenberg, M. and Henderson, R., 1993. Geographic localization of knowledge spillovers as evidenced by patent citations.the Quarterly journal of Economics,108(3), pp.577-598.
- Jung, D.F. and Lake, D.A., 2011. Markets, Hierarchies, and Networks: An Agent?Based Organizational Ecology.American Journal of Political Science,55(4), pp.972-990.
- Lavie, D. and Rosenkopf, L., 2006. Balancing exploration and exploitation in alliance formation.Academy of Management Journal,49(4), pp.797-818.
- Levinthal, D.A., 1997. Adaptation on rugged landscapes.Management science,43(7), pp.934-950.
- Marquis, C. and Battilana, J., 2009. Acting globally but thinking locally? The enduring influence of local communities on organizations.Research in organizational behavior,29, pp.283-302.
- McPherson, M., Smith-Lovin, L. and Cook, J.M., 2001. Birds of a feather: Homophily in social networks.Annual review of sociology,27(1), pp.415-444.
- Phelps, C., Heidl, R. and Wadhwa, A., 2012. Knowledge, networks, and knowledge networks: A review and research agenda.Journal of Management,38(4), pp.1115-1166.
- Podolny, J.M., 1993. A status-based model of market competition.American journal of sociology,98(4), pp.829-872.
- Podolny, J.M., Stuart, T.E. and Hannan, M.T., 1996. Networks, knowledge, and niches: Competition in the worldwide semiconductor industry, 1984-1991.American journal of sociology,102(3), pp.659-689.
- Rangan, S., 2000. The problem of search and deliberation in economic action: When social networks really matter.Academy of Management Review,25(4), pp.813-828.
- Simon, H.A., 1972. Theories of bounded rationality.Decision and organization,1(1), pp.161-176.
- Singh, J., 2005. Collaborative networks as determinants of knowledge diffusion patterns.Management science,51(5), pp.756-770.
- Siggelkow, N. and Levinthal, D.A., 2003. Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation.Organization Science,14(6), pp.650-669.
- Snijders, T., Steglich, C. and Schweinberger, M., 2007.Modeling the coevolution of networks and behavior(pp. 41-71).

- Sorenson, O. and Stuart, T.E., 2001. Syndication networks and the spatial distribution of venture capital investments.American journal of sociology,106(6), pp.1546-1588.
- Sorenson, O., Rivkin, J.W. and Fleming, L., 2006. Complexity, networks and knowledge flow.Research policy,35(7), pp.994-1017.
- Williamson, O.E., 1975. Markets and hierarchies: analysis and antitrust implications: a study in the economics of internal organization.
- Wall, F., 2016. Agent-based modeling in managerial science: an illustrative survey and study.Review of Managerial Science,10(1), pp.135-193.
- Zaheer, A., Gzbyk, R. and Milanov, H., 2010. It's the connections: The network perspective in interorganizational research.The Academy of Management Perspectives,24(1), pp.62-77.

6 Appendix

6.1 Summary of Simulation

Below, I present the algorithm of the simulation and note down some of the technical aspects of it. Measurements such as centrality, values, number of partnerships, maximum distance over which organizations partner up and many others can be saved and analyzed throughout the simulation; hence they are not explicitly indicated.

1. The firms are initiated with randomly selected N attributes according to the referred paper by Levinthal (1997). Additionally, L different environmental conditions are set along with L different relative distances characteristic to each environment.

2. All firms set their aspirations levels. In this work, I take all aspiration levels the same, the average local market value. If firms are below their aspiration levels, they proceed to looking for partnerships with higher probability (e.g. 0.8), if they are above, they look for partnerships with less probability (e.g. 0.1). This step can be improved by connecting it to a genetic feature, which determines the aggressiveness of the firm in its aspirations. More aggressive firms might aspire being in the top three of the market and as the aggressiveness falls, firms might aspire much lower positions, where they would only care about having value.

3. Using their exploration budget (determined as a percentage of the firm value which bears the property of absorptive capacity), all firms look for partners. Every extra revealed information costs a certain amount of money. In case of local markets, initial expense of search does not exist and information is gathered for checking redundancy in the market (maximizing structural holes) and maximizing value through similarity. Each information gathered about partners of partners cost some unit search expense. In global markets, the initial expense of search is inversely proportional to the distance and information is for value of partners only (measurement of status), as similarity is unfamiliar and a bad signal of quality for global partnerships. Hence, the potential partners are determined as profitable partnerships. We assume that firms do not know about the search process of other firms. The value of the partnership is determined by the rate of value flow allowed over the connection and this rate is proportional to firm similarity for local partnerships and inversely proportional to distance starting at the minimum of the local partnership value rate for global partnerships. While a partnership between two perfectly similar firms would have rate 1, completely dissimilar firms have rate 0. The dissimilarity is measured as the square root of the Euclidean distance between the attribute vectors, and similarity is taken as the difference from the maximum possible value. The rate for global partnerships is simply $1/d$ (d geographic distance) times the minimum rate either one of the potential partners have.

4. The search is limited by three potential partners or the exploration budget. When more profitable partnerships compared to the ones at hand are discovered, requests are sent to the corresponding potential partners. A matching algorithm such as Gale-Shapley for stable marriage problem or similar can be used to match the firms with their potential partners.

5. At the end of the matching process, the companies gather their values from their partnerships for a given amount of time steps. The procedure is represented as following:

$$v_i(t+1) = v_i(t) + \gamma \sum_j A_{ij} v_j(t), \tag{1}$$

where $v_i(t)$ denotes the value of firm i at time t, A_{ij} the weighted connectivity matrix and the deprecation coefficient of value over every transfer step. Furthermore, at every time step after the first one, the values of the firms are corrected by the following formula to take redundancy into account:

$$v_i(t) = v_i(t) - \sum_{k>1} \sum_j \gamma'_k A^k_{ij} v_j(t-k), \tag{2}$$

where $\gamma'_k < \gamma$ denotes the magnitude of the correction for the value transfer from the redundant kth nearest neighbor. More complicated coefficients depending on the number of redundancies can be chosen in future works. As an improvement in a further work, this correction mechanism which is based on triangular and square-shaped alliance structures. The triangles would mean that the focal organization two partners who are also partners of each other and this might be an advantage if the value's nature is complementary and disadvantage if substitute. The squares would mean that focal organization has two partners who share a partner that the focal one is not connected to. This would lead to a different kind of redundancy that should be corrected.

6. End of the period. The values accumulated are renormalized by the total value created in the market during that period to keep the numbers tractable. From here, repeat the steps 2-6.