

Chapter 2

Social Groups

Social fabric and structure are by and large described by means of social relations and networks, like kinship, and by group affiliation such as household membership or club membership. To accentuate special social features or to investigate specific societal issues, one descriptive tool, relations and networks, or the other, group membership, or a combination of both will be appropriate.

Social Networks. The main subjects of our inquiry are going to be household decisions and household formation in a competitive market environment or, more generally, collective decisions by groups and group formation under competitive market conditions. Therefore, our treatment of networks will be rather short despite the rapidly growing importance of networks and network analysis—which is now recognized in many fields, for instance in artificial intelligence, biology, business and finance, computer science, economics, electrical engineering, neuroscience, sociology, and physics.

Network analysis can be focused on network topology, network utilization, network formation, or the co-evolution of network utilization and network formation. Within game theory, several strands of literature on network creation (network formation, network design) have emerged. A number of recent contributions have treated social and economic networks as the outcome of a network formation game. The players of the game constitute the nodes of the network to be formed. In the purely non-cooperative approach of Bala and Goyal (2000), addition and deletion of links are unilateral decisions of the player from whom the respective links originate. The player's strategy is a specification of the set of agents with whom he forms links. The costs of link formation are incurred only by the player who initiates the link. The formed links define the network. Pairwise stability à la Jackson and Wolinsky (1996) treats addition of a link in a network as a bilateral decision by the two players involved, whereas severance of a link constitutes a unilateral decision. The costs of a link are borne by both players constituting the link. Consensual link formation can be and has also been formulated and studied in a purely non-cooperative context,

like in the seminal contribution by Myerson (1991, p. 448). For surveys on strategic network formation, see Goyal (2007), and Jackson (2005, 2008).

Local interaction or spatial games capture important aspects of network utilization. In a static local interaction game, players exhibit myopia in the spatial sense which means that the player's payoff is affected only by the strategic choices of his immediate neighbors. Most models in that literature, e.g. Berninghaus and Schwalbe (1996) and Blume (1995) also incorporate a dynamic or evolutionary element. In best response dynamics, at each time, one or every player plays a (static) best response against the empirical distribution of the last strategies chosen by his neighbors. This constitutes rational behavior impaired by spatial and temporal myopia. Myopia in the temporal sense means that the player is not forward looking, and does not take into account that other players might be changing their strategies as well. Furthermore, the literature considers small random deviations from best response play and corresponding notions of stochastic stability, for instance Baron et al. (2002), Berninghaus et al. (2006), Ellison (1993), and Young (1998, Chap. 6). The main alternative to best response dynamics are various types of imitation dynamics, for example in Eshel et al. (1998), Josephson and Matros (2004), Kirchkamp (2000), Nowak and May (1993) and Outkin (2003).

While the focus on either network formation or network utilization provides valuable insights, network design and network utilization may go hand in hand. The co-evolution of networks and their use has been modeled in Jackson and Watts (2002), Goyal and Vega-Redondo (2005), Hojman and Szeidl (2006), and Ehrhard et al. (2008), among others. Finally, while our focus will be solely on social groups, social groups and social networks frequently co-exist and may influence, presuppose or even cause each other. For instance, a member of a social network (modeled as a graph) plus that person's immediate neighbors form a specific social group, say the person's reference group in a model of opinion formation. Conversely, common membership in some socio-economic group may be a prerequisite or catalyst for two individuals to be linked in a particular social network. For example, with rigid social stratification, kinship may only be possible or likely within the same social class, caste, etc.

Social Groups. Formation, composition and behavior of groups are central topics of anthropology, sociology, economics, political science, and other social sciences. Members of a society or population can be classified and categorized in many ways, for instance by age, height, weight, race, gender, marital status, education, occupation, income, place of birth, place of residence, citizenship, language, or religion. Classification of individuals according to such attributes puts each individual into at least one class, category or group and sometimes into several categories, for example in the case of dual citizenship. While some attributes like age are innate, others are acquired and at least partially the consequence of own choices and decisions of others. While some common attributes like common language or common location facilitate social and economic interaction, they need not lead to interaction. This may be the case even if a person voluntarily joins a special interest group like the American Automobile Association (AAA). A member is entitled but not obliged to use certain services provided by the AAA, may not interact with any other AAA

member, and simply be satisfied to support a “good cause”, say particular lobbying activities.

Sociologists have forwarded a number of definitions of a “social group”, most of which imply drastic restrictions on group size. A widespread but by no means ubiquitous definition is the following, with minor variations: “*To sociologists a group is a collection of individuals who • interact and communicate with each other; • share goals and norms; and • have a subjective awareness of themselves as “we,” that is, as a distinct social unit.*”¹ In contrast, a social category is a collection of people who share similar attributes or characteristics but may not all interact with each other, for example men, women, the elderly, social security recipients, the urban youth, generation X, or generation Y. Almost every social category qualifies as a social group in the terminology of many social psychologists who tend to use a very broad definition of “social groups”.²

In economics, to the extent that the term is used at all, “social group” often refers to social categories at large. For instance, the economic analysis of the returns to education may deal with large jurisdictions, school districts, student and parent populations, teachers, and other stake-holders like tax paying local property owners and educational scholars. The term “socio-economic group” indicates or emphasizes economic activities and interactions of a group, for instance a trade union, rather than merely social ones. While some of these groups or categories can comprise thousands or millions of members, most socio-economic groups, mainly families and households, are very small.

Firms. Some cooperatives and most productive partnerships such as law firms clearly constitute socio-economic groups. In general, the nature and comprehensive description of a firm can be extremely complex. The socio-economic group aspect of the firm is but one of several characteristic features.

- A technological description deals with the firm as a production facility, as a set of feasible input-output combinations.
- Contract theory views the firm as a nexus of contractual arrangements such as employment contracts, procurement contracts, delivery contracts, financial contracts. According to some authors, that is all there is to it.
- From a Coasian or organizational perspective, the firm is a nexus of relations, exemplified by an information and communication structure, production lines and lines of command, decision-making units and processes.

Households. The household is commonly considered the basic unit of economic activity. Formal definitions of households differ across countries and disciplines, for instance the definition of households for tax purposes and the definition of households for census and demographic purposes. Some socio-economic entities clearly qualify as households: Nuclear families and married couples living together, single persons living alone, single parent homes. From an economic perspective, cohabiting partners (plus, if applicable, common children sharing their home) qualify as well. In other

¹Andersen and Taylor (2011), p. 109.

²See Table 1.1 in Stangor (2004).

cases like blended families, the household affiliation of some of the members may be more difficult to determine. If non-married or separated parents have joint custody and their child spends equal time in both homes, then arguably the child should be considered part of both households. If members of Congress share an apartment in Washington, D.C., they probably spend more time and meals together than with their families back home. Still, one tends to consider the respective family as the congress persons's household rather than the living arrangement in D.C. Despite these potential ambiguities, we shall always assume that each consumer belongs to exactly one household. That is, there exists a partition of the population into households. We call such a partition a household structure.

Households in General Equilibrium. Partial equilibrium analysis has produced countless theoretical and empirical studies of household related issues, involving numerous economic sub-disciplines and touching upon topics as diverse as fertility, mortality, demography, population dynamics, marriage and matching, status, income, poverty, nutrition, health, public transfers, education, social capital, human capital, employment, development, welfare, demand and supply, and so forth. Each of the sub-disciplines has developed its own rich body of theories and accumulated a host of empirical work.

Our approach differs from partial equilibrium analysis. We take a general equilibrium perspective that allows the synopsis of three interacting allocation mechanisms, each operating at a particular level of aggregation: Individual decisions are made to join or leave households. Collective decisions within households determine the consumption plans of household members. Competitive exchange across households achieves a feasible allocation of resources. Our investigation of general equilibrium models with multi-member households is motivated by the fact that the allocation of resources among consumers and the ensuing welfare properties are obviously affected by the specifics of a pre-existing partition of the population into households (household structure) and that conversely, the formation of households can—partly or fully—be driven by economic considerations, by the anticipated effects of the emerging household structure on the allocation of economic resources.

The traditional general equilibrium model of a pure exchange economy—and traditional economic theory at large—has treated households as if they were single consumers. When we consider households in the sequel, we depart from traditional economic theory and allow for households with several, typically heterogeneous, members; households that make (efficient) collective consumption decisions where different households may use different collective decision mechanisms; yet households that operate within a competitive market environment. The distinction between a household and its members potentially leads to inquiries into household decisions, household formation, household stability, the interaction between the competitive market allocation of private goods and household formation—and to a host of related modeling issues. The departure from the traditional market model with “unitary households” permits us to investigate the interplay of the dual role of households, households as collective decision making units on the one hand and households as competitive market participants on the other hand. While we maintain the term “household” throughout, the broader interpretation as socio-economic group or sim-

ply group would be appropriate in many instances, in particular since we do not impose restrictions on household or group size, respectively.

Household Decisions. Household decisions with an economic impact are manifold. The *Review of Economics of the Household* delineates the scope of household decisions as follows: “Household decisions analyzed in the journal include consumption, labor supply and other uses of time, household formation and dissolution, demand for health and other forms of human capital, fertility and investment in children’s human capital, demand for environmental and other public goods, migration, demand for religiosity, and decisions by agricultural households.” This list is far from being exhaustive.

Household decisions have been widely studied in the empirically oriented literature. Of particular interest for our purposes is the contribution of Chiappori (1988, 1992) who introduced a model of collective rationality (efficient consumption decisions) of multi-member households. Haller (2000) pioneered the study of general equilibrium implications of competitive exchange among multi-member households whose decision making is described by the collective rationality model in its most general form. He assumes a given household structure, that is a partition of the population into households, and addresses the optimality of competitive exchange under these circumstances. He finds that equilibrium outcomes are Pareto optimal as long as each household makes an optimal (efficient) choice subject to its budget constraint and, by doing so, exhausts its budget. Further details of efficient decision making within households like specifics of the bargaining protocol prove irrelevant for the conclusion. Haller identifies consumption externalities within households for which the budget exhaustion property obtains.

Household Formation. Formal models of household or group formation have existed prior to our work. What is new is the integrated view of three allocative mechanisms involving households: (a) Household formation (and dissolution), i.e., individual decisions are made to join or leave households. (b) Household decisions, i.e., collective decisions within households regarding the individual consumption plans of household members. (c) Competitive exchange across households. We aim to incorporate all three facets of households into the inquiry of which households form and, consequently, which household structure prevails.

Gary Becker (1978, 1981) constitutes the most prominent early voice on endogenous household formation. He and Pierre-André Chiappori have been the greatest inspiration for our research. But we use a different model and address questions different from Becker’s. For instance, household-specific externalities play an important role in our approach. In contrast, Becker’s model avoids consumption externalities in a unique way, by introducing a “household good”, the sole explicit consumption good which is non-tradable, yet perfectly divisible within each household and does not cause any consumption externalities.

Household formation or, more generally, group formation is the main subject of the literature on matching, assignment games, and hedonic coalitions. Our general framework includes models of two-sided matching as a special case. But it incorporates further aspects of group formation and group decisions, in particular (c) competitive exchange between groups (households) and the integrated treatment

of the three allocative mechanisms (a), (b) and (c) mentioned before. In Gersbach and Haller (2011), we present an example with two private goods and household formation reducible to a two-sided matching problem, that puts the traditional literature on matching into perspective: Stable matchings and market clearing cannot be achieved simultaneously. This kind of non-existence is notably absent from the vast majority of the matching literature, where markets are inactive and relative prices are irrelevant, simply because there exists at most one tradable commodity. Most of the work on hedonic coalitions (e.g. Banerjee et al. (2001), Bogomolnaia and Jackson (2002)), matching (e.g. Alkan (1988), Gale and Shapley (1962), Roth and Sotomayor (1990)), assignment games (e.g. Roth and Sotomayor (1990), Shapley and Shubik (1972)), and multilateral bargaining (e.g. Bennett (1988, 1997), Crawford and Rochford (1986), Rochford (1984)) focuses on group formation and lacks competitive markets for commodities. Consequently, this literature fails to observe that in general, stable matchings and market clearing cannot be achieved simultaneously. A noteworthy exception are Drèze and Greenberg (1980) who combine the concepts of individual stability and price equilibrium, but confine the analysis of their most comprehensive model to an instructive example.

Most of the club literature presumes a partition of the population into groups (clubs) and endogenous group formation as well. The more recent contributions allow also for multiple private commodities. However, there are no externalities in private good consumption and the procurement of private goods remains an individual decision. See for instance Gilles and Scotchmer (1997). The main purpose of clubs is the provision of club goods (local public goods) or club projects whose costs are recouped through the collection of admission fees. Consumers also care about the membership profile of their club. In contrast, our model of the household permits consumption externalities within households and assumes collective decisions regarding the individual consumption bundles of household members. Although all commodities are treated as private goods, we can accommodate local public goods via intra-household externalities by having individual welfare solely depend on the aggregate consumption of the good within the household. Household membership *per se* is not priced but the individual in a multi-member household is subject to the household's budget constraint and collectively rational consumption choice. Consequently, the expenditure on the individual's private consumption may differ from what the individual could afford as a single person. In Gersbach and Haller (2010), we clarify in a more systematic way the relationship between the general equilibrium model with multi-member households and club models with multiple private goods. A summary is provided in Chap. 9 below.

Integrating Three Allocation Mechanisms. Our general framework allows the integration of the three allocation mechanisms (a)–(c) operating at different levels of aggregation. It has been developed in several steps. In Haller (2000) and Gersbach and Haller (2001) we take a first step and incorporate the collective rationality concept of Chiappori (1988, 1992) into a general equilibrium framework. This setting has allowed us to study the interaction between two of the three allocation mechanisms: (b) collective decisions and (c) competitive markets. Haller (2000) assumes an exogenously given household structure. Every household member consumes an

individual bundle of private goods and has individual preferences. Preferences permit positive or negative intra-household externalities: Individual welfare can be affected by own consumption and the consumption of fellow household members. Gersbach and Haller (2001) introduce a variable household structure, with household specific preferences: An individual cares about who belongs to his household and who consumes what in his household. Hence, in general, there can be group externalities (related to household composition) as well as consumption externalities (related to household consumption). An allocation consists of two parts, an allocation of commodities to consumers and an allocation of people into households. In Gersbach and Haller (2010, 2011) we take further steps towards (c) an endogenous household structure, by amending the equilibrium conditions with stability requirements known from the matching literature.

Adding a Fourth Allocation Mechanisms. In our most recent work, we have added a fourth allocation mechanism: global collective decisions regarding public good provision and redistribution—thus defining the activities of the state in a jurisdiction. In this fourth allocation mechanism, household members act as citizens and decide (individually) how to cast their vote in referenda or in elections of candidates for public office.

Such an integration of household formation, local collective decisions, competitive markets³ and global collective decisions is arguably the most general and comprehensive challenge for any economic system, as put forward in the literature. Chapter 14 outlines the scope and potential of such a comprehensive model.

References

- Alkan, A. (1988). Nonexistence of stable threesome matchings: Note. *Mathematical Social Sciences*, 16, 201–209.
- Andersen, M. L., & Taylor, H. F. (2011). *Sociology: The essentials* (6th ed.). Belmont, CA: Wadsworth.
- Bala, V., & Goyal, S. (2000). A non-cooperative model of network formation. *Econometrica*, 68, 1181–1229.
- Banerjee, S., Konishi, H., & Sönmez, T. (2001). Core in a simple coalition formation game. *Social Choice and Welfare*, 18, 135–153.
- Baron, R., Durieu, J., Haller, H., & Solal, P. (2002). Control costs and potential functions for spatial games. *International Journal of Game Theory*, 31, 541–561.
- Becker, G. S. (1978). *The economic approach to human behavior*. Chicago, IL: University of Chicago Press.
- Becker, G. S. (1981). *A treatise on the family*. Cambridge, MA: Harvard University Press.
- Bennett, E. (1988). Consistent bargaining conjectures in marriage and matching. *Journal of Economic Theory*, 45, 392–407.
- Bennett, E. (1997). Multilateral bargaining problem. *Games and Economic Behavior*, 19, 151–179.
- Berninghaus, S. K., & Schwalbe, U. (1996). Conventions, local interaction, and automata networks. *Journal of Evolutionary Economics*, 6, 297–312.

³In some variants we also include production.

- Berninghaus, S., Haller, H., & Outkin, A. (2006). Neural networks and contagion. *Revue d'Économie Industrielle*, 114(115), 205–224.
- Blume, L. E. (1995). The statistical mechanics of best-response strategy revisions. *Games and Economic Behavior*, 11, 111–145.
- Bogomolnaia, A., & Jackson, M. O. (2002). The stability of hedonic coalition structures. *Games and Economic Behavior*, 38, 201–230.
- Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica*, 56, 63–89.
- Chiappori, P.-A. (1992). Collective labor supply and welfare. *Journal of Political Economy*, 100, 437–467.
- Crawford, V. P., & Rochford, S. C. (1986). Bargaining and competition in matching markets. *International Economic Review*, 27, 329–348.
- Drèze, J., & Greenberg, J. (1980). Hedonic coalitions: Optimality and stability. *Econometrica*, 48, 987–1003.
- Ehrhard, G., Marsili, M., & Vega-Redondo, F. (2008). Emergence and resilience of social networks: A general theoretical framework. *Annales d'Économie et de Statistique*, 86, 1–13.
- Ellison, G. (1993). Learning, local interaction, and coordination. *Econometrica*, 61, 1047–1071.
- Eshel, I., Samuelson, L., & Shaked, A. (1998). Altruists, egoists, and hooligans in a local interaction model. *American Economic Review*, 88, 157–179.
- Gale, D., & Shapley, L. (1962). College admissions and the stability of marriage. *American Mathematical Monthly*, 92, 261–268.
- Gersbach, H., & Haller, H. (2001). Collective decisions and competitive markets. *Review of Economic Studies*, 68, 347–368.
- Gersbach, H., & Haller, H. (2010). Club theory and household formation. *Journal of Mathematical Economics*, 46, 715–724.
- Gersbach, H., & Haller, H. (2011). Competitive markets, collective decisions and group formation. *Journal of Economic Theory*, 146, 275–299.
- Gilles, R. P., & Scotchmer, S. (1997). Decentralization in replicated club economies with multiple private goods. *Journal of Economic Theory*, 72, 363–387.
- Goyal, S. (2007). *Connections: An introduction to the economics of networks*. Princeton, NJ: Princeton University Press.
- Goyal, S., & Vega-Redondo, F. (2005). Network formation and social coordination. *Games and Economic Behavior*, 50, 178–207.
- Haller, H. (2000). Household decisions and equilibrium efficiency. *International Economic Review*, 41, 835–847.
- Hojman, D. A., & Szeidl, A. (2006). Endogenous networks, social games, and evolution. *Games and Economic Behavior*, 55, 112–130.
- Jackson, M. O. (2005). A survey of models of network formation: Stability and efficiency. In G. Demange & M. Wooders (Eds.), *Group formation in economics; networks, clubs and coalitions*, Chap. 1 (pp. 11–57). Cambridge, UK: Cambridge University Press.
- Jackson, M. O. (2008). *Social and economic networks*. Princeton, NJ: Princeton University Press.
- Jackson, M. O., & Watts, A. (2002). On the formation of interaction networks in social coordination games. *Games and Economic Behavior*, 41, 265–291.
- Jackson, M. O., & Wolinsky, A. (1996). A strategic model of economic and social networks. *Journal of Economic Theory*, 71, 44–74.
- Josephson, J., & Matros, A. (2004). Stochastic imitation in finite games. *Games and Economic Behavior*, 49, 244–259.
- Kirchkamp, O. (2000). Spatial evolution of automata in the prisoners' dilemma. *Journal of Economic Behavior and Organization*, 43, 239–262.
- Myerson, R. B. (1991). *Game theory: Analysis of conflict*. Cambridge, MA: Harvard University Press.
- Nowak, M. A., & May, R. M. (1993). The spatial dilemmas of evolution. *International Journal of Bifurcation and Chaos*, 3, 35–78.

- Outkin, A. V. (2003). Cooperation and local interactions in the prisoners' dilemma game. *Journal of Economic Behavior and Organization*, 52, 481–503.
- Rochford, S. C. (1984). Symmetrically pairwise-bargained allocations in an assignment market. *Journal of Economic Theory*, 34, 262–281.
- Roth, A. E., & Sotomayor, M. A. O. (1990). *Two-sided matching: A study in game-theoretic modeling and analysis*. Cambridge, UK: Cambridge University Press.
- Shapley, L. S., & Shubik, M. (1972). The assignment game I: The core. *International Journal of Game Theory*, 1, 111–130.
- Stangor, C. (2004). *Social groups in action and interaction*. New York, NY: Psychology Press.
- Young, H. P. (1998). *Individual strategy and social structure: An evolutionary theory of institutions*. Princeton, NJ: Princeton University Press.

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Gersbach, H.; Haller, H.

2017, X, 186 p. 1 illus., Hardcover

ISBN: 978-3-319-60515-9