6 Theoretical implications: towards an interdisciplinary network theory

"An economic theory of norms and standards (...) is still lacking"

[Knieps/Müller/Weitzsäcker 1982, 213]

The analysis has shown some important properties of systems subject to network effects that make standardization problems challenging for traditionally established scholarly systems, especially neo-classical analysis as one of the quite few fully axiomatized theoretical systems in economics. Beneath the externality property, there are other shortcomings of the neo-classical framework when information and communication systems (and their contents like for example information products) are the basic unit of analysis. Hence, after identifying these drawbacks, a requirements catalogue for an interdisciplinary theory of network effects and a possible methodological approach is proposed.

6.1 General drawbacks of the neo-classical paradigm

"I'd like to see a little less 'crash' and a little more 'program.'"

Wernher von Braun

Although individual utility maximization, as unanimously agreed upon throughout the neo-classical paradigm, should not be disputed here (the notion of network effects is a utility-theoretical construction) the "homo oeconomicus" comes with further premises, the economic literature on network effects quoted above implicitly assumes to fulfill. What these premises are and which one of them may default within an interdisciplinary context, will be discussed in the following.

However, if (and only if) all of these premises hold, then the validity of the following two so-called "fundamental theorems of welfare economics" (Hildenbrand 1976) can be proven:

- A competitive total equilibrium always represents a Pareto-optimal allocation of the total bundle of economic goods (a so-called Pareto optimum).
- For each realizable Pareto optimum a (positive) price vector exists, for which this Pareto optimum represents a competitive equilibrium.

The goal of an economy thus is to reach a Pareto-optimal allocation of goods. The ability of the market mechanism to accomplish this task (more or less strongly) depends on the following implicit assumptions summarized in sections 6.1.1 to 6.1.8:
6.1.1 Absence of externalities

In earlier definitions, an externality was considered to be present whenever the utility function $U_i$ of some economic agent $i$ includes real variables whose values are chosen by another economic agent $j$ without particular attention to the welfare effect on $i$'s utility. Three principal solutions to the problem of externalities have been proposed. Pigou (1920) suggests a tax imposed by a regulator. This Pigovian tax "corrects" the externality if the regulator knows its correct level (see the discussion about the data problem in section 5.2.2.1) (although then he could also just regulate the optimal level of the underlying problem). In the context of positive network effects this implies negative taxes, i.e. subsidies. A problem is that the Pigovian tax is only "right" in equilibrium and the theory does not say much about the optimal (intertemporal) price path [Wiese 1990, 5].

Another solution is shown by Coase (1960). He argues that the market mechanism may overcome some of these problems by adding well-defined "property rights" as tradable goods to the economy. Agents can then reach efficient outcomes by negotiation (given transaction costs are zero) the structure of which remains open, though. Accordingly, Arrow (1970) suggests setting up a market for the externality as the institution providing a negotiation structure. Therefore, nowadays an externality is said to be present whenever there is insufficient incentive for a potential market to be created for some good and the non-existence of this market leads to a non-Pareto-optimal equilibrium. So far, the absence of externalities is the only premise network effect literature – as discussed above – is trying to relax.

6.1.2 Complete rationality of the homo oeconomicus

Network effect literature often relies on the neo-classical assumption that all agents not only know their own action space and utility function but likewise have a complete and realistic model of all the other agents' current allocation, action spaces and utility functions as well. In a pure neo-classical "exchange economy" this assumption may be relaxed and even when we only bargain with our direct neighbors the decentralized exchange still leads to a unique and Pareto-optimal equilibrium, but unfortunately only if there are no network externalities or indivisibilities (see below). But for "real world" individuals, parametric and strategic (or strategic and statistical [Williamson 1985]) uncertainty [Hayek 1937] imposes constitutional bounds [Hayek 1994, 171] to the knowledge their decisions can be based upon. Additionally, heterogeneous institutional and structural environments influence the decisions of individual socio-economic agents. A frequent sociological argument for applying non-economic methodologies (i.e. surpassing the notion of a homo oeconomicus) is that "social patterns of human interaction transcend reductionist economic agendas" [Alstyne 1997]. The procedural setback is associated with the concept of a methodological individualism associated with a homo oeconomicus that is "a generic individual distinguished not by sex, ethnicity, religion, age, or any other social characteristic" [Biggart/Hamilton 1993, 480] while the "pursuit of economic goals is typically accompanied by [such] non-economic [goals] as sociability, approval, status, and power... Economic action is socially