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Abstract

In this paper technical standardisation is understood and explained in a model where economic analysis is coupled with an analysis of the political system as proposed in rational choice theory. The aim is to answer both the question why various countries (e.g. the United States versus European countries) let either the market or public intervention determine the mode of technical standardisation and the possible implications of these two ways of organizing technical standardisation from an economic and a political point of view. Based upon the analysis of the paper a couple of general policy recommendations are made concerning the mode of technical standardisation.

Keywords: Rational choice, market failures, technical standards, standardisation, government failures.

1. Introduction

The aim of this paper is to propose a deductive theoretical model for analysing technical standardisation[2]. Generally, the study of technical standardisation from a political economy angle is often neglected (e.g. Tirole, 1992: 409; Schmidt & Werle, 1993: 2-11). There are at least two reasons for this. First, hereby one needs contributions from economic theory as well as from political theory, and these interdisciplinary demands are often difficult to fulfil. Second, there is also a need to integrate both macro and micro theoretical dimensions of these two lines of theories in order to construct a coherent theory that captures the activities of firms and consumers as well as their impact on the society as a whole.

In general, the analysis of technical standardisation from a political economy point of view has almost exclusively taken place at the level of society, leaving aside the micro level.[3] However, in this paper both the macro and the micro level are integrated as well as both economic and political theory. The aim is to put a spotlight on the basic problems of technical standardisation: How can we analytically capture the fact that various countries let either the market or public intervention determine the mode of technical standardisation?[4] What are the possible implications of these two ways of organizing technical standardisation seen from an economic and a political point of view?

In response, this paper will produce a model and concepts that put us in a position to answer these two questions better than has hitherto been the case. The paper will not, however, give an empirical answer of the two basic problems of technical standardisation, but some general policy recommendation will be made concerning technical standardisation.

2. What is technical standardisation?

Technical standardisation is an area full of varying definitions and concepts. Hence, a few introductory remarks are needed in order to clarify the issue. First, technical standards can be categorized in accordance with their offspring. Technical standards, like technical artefacts, are socially constructed. They result from social efforts to construct and implement technical efforts in order to make more comprehensive systems work (Schmidt & Werle, 1993: 6).

However, in principle, standards can be the result of either a market-driven private initiative or a public intervention involving private firms and other non-governmental actors. In this respect, a variety of national traditions can be identified due to various mixtures of involvement of non-governmental and governmental actors. In the huge internal market of the United States, technical standards are, normally, based upon public intervention only when related to the military-industrial complex (Nedergaard, 1994).[5] This approach is often justified on the basis of the reasoning in the property rights school: Technical standardisation is embedded in the technological innovation process, and, therefore, public intervention in the technical standardisation process would harm technological innovation as it would make it more difficult to patent products that are based on technical standards decided upon by public authorities in collaboration with the various firms (e.g. Coase, 1960; Alchian, 1965).

In Europe, however, with a two-layered internal market (one national and one European), the public authorities are generally much more involved in the technical standardisation process even though in Europe there are also differences as far as the character of public intervention is concerned. This approach is often justified on the basis of the reasoning of the various “schools” of market failures

(e.g. in the school of industrial economics arguing in favour of public intervention in order to avoid technological lock-ins on inferior path of technological development) (Weitzel & Westarp, 2002).

Within Europe, specifically in France and Germany, big firms in collaboration with the public sector often play an important role for technical standardisation through their national standardisation organizations, Association Française de Normalisation (AFNOR) and Deutches Institut für Normung (DIN). In the UK, the semi-public organisation, the British Standards Institution (BSI), has always had a significant and independent position in the UK technical standardisation process (*Financial Times*, 6 June, 1993). The Nordic countries (Denmark, Norway, Sweden, Finland and Iceland), on the other hand, are characterized by the fact that technical standards are to a large extent developed in collaboration between the semi-public standardisation organisations, the social partners, i.e. both trade unions and employers associations, as well as, sometimes, civil society organizations like consumer organizations (Nedergaard, 1994).

However, the type of technology also plays a role for the chosen mode of technical standardisation. Normally, technical standardisation is based solely on the competition in the market when markets are characterized by a dynamic technological development, as a public intervention here is doomed to be a failure as was seen, for example, when in the 1980's the European Union tried to intervene in the development of technical standards for television sets in favour of the HD-TV standards of French origin. At the same time, market based technical standardisation – even in the area of high-tech - does not guarantee that the most optimal technical solution will prevail, as the dominant standard is most often also the result of market strength of certain firms, first-mover advantages, etc. due to the fact that a standard may be imposed by large and powerful firms (e.g. Windows operating system vs. Apple's OS or vs. Linux) (Miller, 2001).

Sometimes, at the end of the day, technical standards, which are the result of public intervention, become legal standards that are adopted by a national or an international standardisation organization. The technical specifications of a legal standard are always written down in a document that is accessible to the public. Market based technical standards are, on the other hand,

often pronounced industrial standards which can, eventually, become so-called de facto standards if and when they rise to a position as a dominant technical standard in a specific product market. The technical specifications of market-based standards are, however, often kept a secret for other actors or they are most often patented as part of a new technological invention.

In an empirical sense, one can argue that it is less relevant whether it is one or the other institution that is the source of a technical standard. What is relevant, however, is that the standards do exist and that they functions as restrictions and incentives for actual behaviour by firms and consumers (Kristensen, 1988). On the other hand, for individual firms, consumers and the economic welfare of society as a whole, the mode of technical standardisation is important. The mode of technical standardisation – or the institutional set-up of technical standardisation – is a question of whether standards arise as a result of firms' own decisions or as a result of decisions by public authorities and firms in collaboration. This is important because it will influence the size of market failures and so-called government failures during the standardisation process. The institutional offspring of technical standards is therefore discussed in detail in the following, as it is also the foundation for evaluating the dominant American and European way of handling technical standardisation.

3. Market failures and government failures

Essentially, in order to analytically capture the problems of technical standardisation both from a micro and macro point of view, I argue that technical standardisation can only be understood and explained if the economic analysis is coupled with an analysis of the political system as proposed in rational choice theory.

According to Kindleberger (1983), one can separate standards into various groups. There are standards that look like public goods, standards that look like collective goods, standards that look like quasi-private goods (a result of a coalition of firms, etc.) and standards that look like private goods. According to the welfare economic theory on public goods, only private goods are not potential candidates to a market failure (Samuelson, 1954). In this perspective, market failure covers situations when the full competitive market model is not welfare economic optimal due to

increasing returns. Not least in the study of technology, economists have become increasingly interested in the idea of increasing returns (North, 1990). As Pierson (2000: 254) state it: “With increasing returns, actors have strong incentives to focus on a single alternative and to continue down a specific path once initial steps are taken in that direction.” However, not all technologies are prone to increasing returns. Arthur (1994) and Pierson (2000) argued that four features of a technology and its social context generate increasing returns. First, when set-up or fixed costs are high due to scale economics, individuals and organizations have a strong incentive to identify and stick with a single option. Second, if learning effects in the operation of complex systems are high, it leads to higher returns from continuing use. Third, if technologies embody positive network externalities, then a given technology will become more attractive as more people use it. Fourth, if future aggregate expectations lead individuals to adopt their actions in ways that help make expectations come true. In these cases, the well-known prisoner’s dilemma game reflects market failures in this respect in a world of interdependence with non-private goods present (Elsner, 2005).

This is also why, according to Tirole (1992), the analogy between standards and public goods is useful but far from complete. The reason is that the analogy does not catch the costs involved in shifting standards. The new user who shifts to new technological standards implies a negative externality on those who prefer the old technology and the so-called installed base. The new user could also have used the old technology, which would, however, have increased the inertia in the process of standardisation. At the same time, an exact welfare economic analysis of the two situations is very difficult to make when the analyst have no precise knowledge of the preferences of consumers.

Hence, on the one hand, there seems to be much theoretical backing for the public intervention mode of technical standardisation. On the other hand, however, this “at first hand” theoretical backing will be severely nuanced in the following.

Traditional welfare economic theory, generally, has market failures as its starting point and, thereby, is often biased toward justification of public intervention. However, one could refer to many

examples of “failed” public intervention in the technical standardisation even though the intervention could be justified on the basis of market failures. This is also part and parcel of the rational choice theoretical criticism of the market failure argument. Always, when the theory of market failure is used as an argument in favour of public intervention, one is in risks of disregarding the existence of so-called government failures or political failures.

In this respect, government failures as part of the standardisation process are due to the fact that a centralized public standardisation procedure implies too little knowledge about the standardized product, the standardisation process are exploited in order to serve special interests, or the final standards are decided upon before the technological development has produced the most optimal standards.

Therefore, welfare economic theory cannot be used alone as the basis for explaining the technical standardisation process because in so doing one would be overlooking all characteristic features of the political system and political actors which are, as mentioned in the introduction, to be included in the model. Only through such a model can the political black box be opened, which also implies that all altruistic assumptions about political actors are revised because it becomes openly inconsistent to model actors in the economic system as self-interested, whereas the same actors striving for the same benefits in the political system are modelled as altruists.

In the next section, the political black box on the technical standardisation process is opened in order to analyse the individual decision units that are the political decision-makers (politicians and bureaucrats) and political partners (producers and consumers) with an interest in technical standardisation. Here, the basic feature of the theoretical model of the paper is explained.

4. The theoretical model of technical standardisation

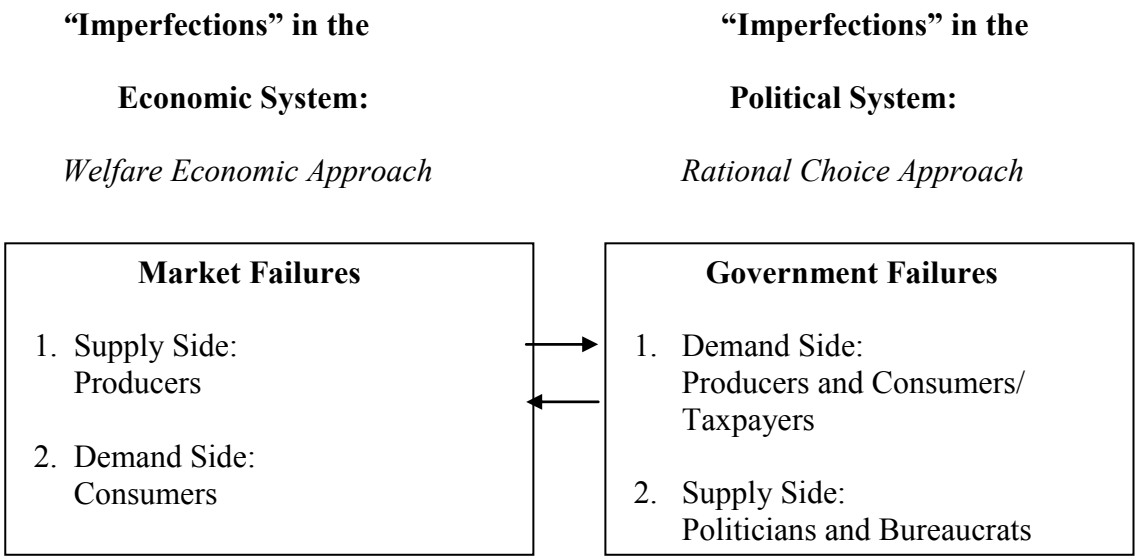
In the proposed theoretical model in this paper, at the micro economic level, the unit of analysis is the individual decision-makers in the market, i.e. producers and consumers. If the micro economic model of supply and demand model is transferred to the political system, the relevant decision-units

are the political decision-makers (politicians and bureaucrats) and political partners (producers and consumers) with an interest in political decisions on technical standardisation. This is the methodological individualist foundation of the theoretical model that is so often asked for in theoretical models of political economy phenomena (e.g. North 1990; Keohane, 1984). Politicians and bureaucrats supply political decisions while producers and consumers demand political decisions. As in neo-classical micro economic theory, all parties are expected to maximise their utility function no matter whether the analysis is dealing with producers (revenue and expansion), consumers (purchasing power and purchasing possibilities), politicians (re-election and government power) or bureaucrats (power base and career possibilities).

At the micro level, market failure means that various actors become potential rent-seekers in the political system and create government failures that influence the micro economic level with the resulting increase or decrease in market failures. However, rent-seeking can both take the form of promoting and of avoiding public intervention in the technical standardisation process. Therefore, public intervention in the technical standardisation process is always a two-edged sword as elimination of market failures might risk creating even more government failures and thereby reduce instead of increase economic welfare resulting from technical standardisation. At the same time, public intervention could probably also be used in order to reduce market failures, but this does not happen due to pressure from strong actors (especially producers) in the economic system.

In figure 1 below, the arguments put forward above are put together in a model for analysing technical standardisation.

Figure 1. Model for analysing technical standardisation



Source: Compiled by the author.

In figure 1, it is assumed that there are a number of economic interests in the political system that try to build coalitions because various forms of political decision-making or non-decision-making lead to different benefits and costs for the various actors in society.

The arrows between the boxes in the figure indicate structural causal relations between the two boxes in the theoretical model. It is also assumed that there is equilibrium between the politicians' and the bureaucrats' supply of political decisions, on the one hand, and the producers' and consumers' demand on the other hand. At the same time, this equilibrium is biased or asymmetric because it is dominated by the producers' demand for public intervention or demand for public non-

intervention (strong demand = strong political voices), while the consumers as a whole only have few claims (weak demand = weak political voices) or a low level of interest in the technical standardisation process (cf. also Hirschman, 1970).

Following the methodological individualism of the rational choice theory, the starting point of the theoretical model is the individual producer generating not yet technically standardised products for the consumer. Potentially, this will bring him or her in contact with political decision-makers. However, as always there is collective action problems involved when individual actors wants to influence the political decision-making process.

Both in the United States and in Europe the collective action problems are minimized in the technical standardisation process as far as the producers are concerned. In the United States the collective action problems are minimized due to the dominance of monopolistic and quasi-monopolistic producers on many products markets. Often, this means that a few producers can determine the mode of technical standardisation at relatively low costs. In Europe, the colective action problems as far as the mode of technical standardisation is concerned are minimized due to the large number of possibilities offered by the extensive public sector, both a European and a national layer of access possibilities for producers and a long tradition for corporatism.

5. Market failures and the supply side: Producers

As mentioned previously, market failures cover situations when the full competitive market model is not welfare-economically optimal due to increasing returns. These kinds of market failures may imply incentive problems for the firms as far as technical standardisation is concerned.

Therefore, generally, firms are faced with insecurity problems when it comes to development of new standardized products. One way to reduce the fundamental insecurity (and transactions costs) in the technical standardisation process is to engage in cooperation with other firms and public authorities as far as the development of technical (and legal) standards is concerned. Hence, private-public bureaucracies have been established to assist the development of technical

standard-setting justified by the argumentation that it will prevent potential blockages vis-à-vis a technical standardisation process from becoming effective and, thereby, avoid a sub-optimal prisoners' dilemma among private actors (Elsner, 2005).

However, at the same time, firms may also have an interest in putting pressure on political decision-makers not to intervene in the technical standardisation process. If firms have a monopolistic or semi-monopolistic position on the relevant product market, i.e. sell products that are based upon de facto standards, they probably do not have an interest in having these technical standards transformed into legal standards, which would become technical standards that all firms are free to use. In other words, the political asymmetry in this situation is biased in favour of non-intervention as this corresponds to the preferences of the strongest voices on the political market.

In figure 2, the various possibilities resulting from the technical standardisation process are presented. Technical standardisation can either be market based or a result of public intervention. In both cases, government failures (G) might exceed market failures (M), i.e. G >M, or market failures might exceed potential government failures, i.e. G < M. The "yes" and "no" in figure 2 is an answer to the question on whether or not the chosen path is most optimal from a welfare economic point of view.

It is evident from figure 2 that nothing definite can be said a priori about the welfare economic implications of applying either a market based or a public intervention based mode of technical standardisation even though, as mentioned, in high-tech areas going throgh a rapid technological development, government failures are probablyb higher than market failures. Both modes of technical standardisation might lead to welfare economic sub-optimal solutions depending on the size of market failures and government failures. Hence, in order to reduce the size of governmental failures, a better solution would be to correct the political asymmetry that is responsible for the government failures. One logical solution would be to empower the weak part in the economic market place of technical standardisation, namely the consumers. Another solution would be to

increase the collective action problems, i.e. to liberalize markets, tigthen up competion policy and/or eliminate traits of corporatism in the standardisation policy.

Figure 2. Technical standardisation: Market based or public intervention based?

Technical standardisation

Market based		Public intervention based	
G < M	G > M	G < M	G > M
Yes	No	Yes	No

Source: Compiled by the author.

When it comes to market failures on the supply side, network externalities are some of the most common market failures. Here, the prognosis is that the existence of huge network externalities means that standards should be decided upon by public intervention or by close cooperation among the actors on the market. Hereby, the tendency in direction of excessive inertia is prohibited and, at the same time, information on transaction costs is reduced. However, as always, there is a risk that the product diversity is reduced and that a dominant actor set the standard, which increases the risk of market failures through monopolisation.

At the same time, there might also be efforts to avoid public intervention which might be a result of political rent-seeking for “intellectual property rights” in the interest of the most powerful firms (Elsner, 2005) because rent-seeking is used both to promote public intervention in the technical standardisation process and avoid public intervention in the technical standardisation process.

6. Market failures and the demand side: Consumers

Asymmetric information on a market implies a potential market failure that is strongly relevant for consumers. Asymmetric information means that consumers are not aware of all risks involved in buying products. Public authorities take care of these risks by setting standards that are aimed at avoiding health and safety problems. However, technical standardisation concerning health and safety can be manipulated and, for example, used as a protectionist weapon against foreign products and against products from domestic rival firms. The so-called Cassis-de-Dijon Ruling of the Court Justice of the European Union showed that Germany exploited a health and safety standard in order to protect German producers of spirits (ECJ, c 120/78, 1979).

However, consumers are also hurt by market failures in the technical standardisation process through the so-called network externalities. Generally, in the literature on industrial economics the problem of technical standardisation, as seen from the perspective of consumers, is treated as part of the analysis of network externalities. Network externalities can be treated from the demand side as well as from the supply side. As far as the demand side is concerned, users must get information in order to foresee what technical standards other users want to use. This implies coordination problems as the various users probably have different preferences. As a result, there is a risk of one or two forms of sub-optimal situations: extreme inertia or excessive haste as far as technical standardisation is concerned.

Positive network externalities arise when an increasing number of consumers use the same product standard, e.g. the usefulness of a PC with specific technical standards increases when many other consumers have bought a PC with the same technical standards because the result is that there is more useful software available on the market.

In other words, the excessive inertia arises when users are waiting too long to use the new technological standards. The reason is that they are waiting to buy a product until many other users are doing the same thing. Therefore, potential users are holding back each other from using the new technical standards. This situation is similar to a sub-optimal prisoner's dilemma game.

The excessive haste arises when users are rushing to acquire the newest technology even though the technical standards are far from fully developed.

7. Government failures and the demand side: Producers and consumers

As mentioned before, market failures in technical standardisation are partly due to a fundamental insecurity in production of technical standards. This situation creates an incentive among producers that it is legitimate to use the political system alone or through collective action as an alternative way to pursue their own interest in having or not having public intervention in the technical standardisation process. Stated in the terms of the rational choice theory, producers see that their economic profit seeking in the market is insecure. Therefore, they put pressure on political decision-makers in order to reduce the level of insecurity. However, just to have an incentive to become a political rent-seeker is not enough.

In order to be rational, when an economic actor decides to become a political rent-seeker, he or she has to judge whether the potential benefits exceed the foreseeable costs. Costs are incurred by the administration and co-ordination that is necessary in order to acquire political influence. If an economic actor belongs to a group (e.g. a group of firms wanting the same technical standards as legal standard) with structural features, which imply few organizational costs, this group must be expected to be easily organised in order to put pressure on relevant political decision-makers.

However, at the same time, firms run the risk of some other firms' free-riding when they organise themselves in order to acquire political influence with the aim of enhancing their interests. Political influence has many features in common with public goods since it is impossible to exclude non-participating producers from benefiting from the efforts made by the rent-seeking producers unless the resulting technical standards are more suited for the participating firms. This is the selective incentive for firms to participate in public-private standardisation processes that Olson (1965) was the first to point out as a necessity if individuals are to participate in a collectively beneficial activity that looks like a public good.

In the technical standardisation process, consumers are expected to have opposite interests vis-à-vis rent-seeking firms.

When firms are demanders of public interventions, the demand of the consumers is expected to pull in the opposite direction. When firms are in opposition to public intervention in the technical standardisation process, the demand of the consumers is again, ideally expected to pull in the opposite direction.

In this light, the actual public intervention in the technical standardisation process can be regarded – according to the proposed theoretical model - as a function of the investment made in political influence on behalf of the firms and consumers respectively. The result is assumed to be an equilibrium situation between opponents and supporters of intervention in the specific technical standardisation process against the background of calculations of the marginal benefits, respectively the marginal costs, of the investments made in political influence.

The equilibrium situation in the political market is asymmetric because the producers are able to press the slope of their lobby-curve downwards due to the selective incentives stemming from ex-post technical standards being similar to their-ex ante technical standards, no matter whether the aim of rent-seeking is public intervention or non-intervention. The potential opponents of the producers are consumers, but they are seldom organised at all.

8. Government failures and the supply side: Politicians and bureaucrats

The organisational strength of producers (relative to other groups) and the consumers' relatively weak organizational strength are necessary conditions for political decisions being pro-producer in a status quo perspective. Besides, political decision-makers (politicians and bureaucrats) are required to be willing to fulfil the wishes of producers to a smaller or larger extent.

In this context, it is a widespread notion that politicians and bureaucrats in a democratic society make decisions reflecting the wishes, attitudes and preferences of the people, in particular, the political goals that are common among a majority within the electorate and that these decisions are assumed to make up the foundation of the political decisions of society.

According to the rational choice theory, however, the existence of such correspondence between the democratic, collective decisions and policy objectives based on individual preferences is a much too optimistic, although long lasting, democratic theory. Because the gain from leaving technical standardisation to the market in favour of consumers or intervening in favour of consumers is spread collectively among all consumers, extraordinary incentives are needed to mobilise consumers in the political process, and more fundamentally, the selective incentives are lacking. Consumers are a loosely organised group who are confronted with a smaller, but much more homogeneous group of producers who enjoy the benefits of political intervention or lack of political intervention. The gains and losses of this group are concentrated and private in character (Grossman & Helpman, 1994).

Normally, politicians decide on a political issue (like whether to have public intervention in the technical standardisation process) according to how voters will react. Voters, on the other hand, have to consider the costs in time and money when they form their preferences and transmit them to the politicians. If the voter is rational, a minimum of benefits for him or her is necessary if he or she wants to pay the costs of collecting information and transmitting preferences to the political decision-makers (Nello, 1984). As mentioned above, just getting information about the impact and size of public intervention (or the opposite) in the technical standardisation process is difficult and costly because very often either the actual content of the public intervention is ”hidden” in the prices or “hidden” in bureaucratic measures.

In the theory of rational choice - where “the political market” is used as a metaphor - it is assumed in the theoretical model that politicians “supply” political decisions in order to be re-elected. Re-

election depends on various factors: the number of voters affected by the political decisions, how voters are affected by political decisions, the political influence of the affected voters, whether the politicians regard it as acceptable that certain groups of voters get benefits, the possibility that the affected group of voters will punish the politicians for a bad political result and whether a bad political result for an affected group will have an impact on public opinion (Nedergaard, 2006).

Alongside the politicians, the bureaucrats are important suppliers of technical standardisation decisions whether it implies public intervention or non-intervention. In the rational choice theory it is assumed – even though politicians formally take the political decisions under counselling by the administration – that bureaucrats are also independent actors who are maximising utility by preserving or expanding their power base, their career possibilities, etc. In the technical standardisation area, bureaucrats probably have quite a considerable amount of influence in the technical standardisation policy area because this area is characterised by a lot of technicalities and many specific rules. A result of the technical character of technical standardisation processes is that politicians avoid dealing directly with the many regulatory and distributive questions in standardisation policy. When technical standardisation political decisions are transformed into quasi-political and bureaucratic-technical questions, technical standardisation policy takes on a seemingly objective character.

In conclusion, both politicians and bureaucrats are expected to be tuned into giving into demands from producers with an interest in technical standardisation, no matter whether the interest is public intervention in the technical standardisation process (e.g. in order to avoid insecurity) or avoiding public intervention in the technical standardisation process (e.g. if the firm already has the de facto standard on the product market).

9. Conclusion

This paper analyses the basic problems of technical standardisation: How can we analytically capture the fact that various countries let either the market or public intervention determine the

mode of technical standardisation? What are the possible implications of these two ways of organizing technical standardisation seen from an economic and political point of view?

The proposed theoretical model is an interdisciplinary model drawing on elements from economics and political science. As argued by several scholars, such a theory should build on individual choices because this theoretical approach is logically consistent. Hence, methodological individualism is a starting point of the proposed theoretical model.

The next point of departure for the proposed theoretical model for technical standardisation is the existence of a number of market failures which might potentially bring producers in contact with actors in the political system (i.e. politicians and bureaucrats) in order to either promote public intervention (the dominant European mode of technical standardisation) or to avoid public intervention (the dominant American mode of technical standardisation).

Fundamentally, both in Europe and in the United States, technical standardisation is – according to the model – framed by the asymmetry of the political market where producers have gained the upper hand in the rent-seeking process vis-à-vis other actors. Within this frame, it is the calculations of cost and benefits at the level of the individual firms that determines the final mode of technical standardisation.

Of course, there are variations in this overall tendency, due to the kind of product that is analysed, but the general picture is clear.

At the same time, there is no clear evidence of which mode of technical standardisation that has to be judged as the most optimal from a welfare economic point of view as it would mean that we knew all economic costs as a result of both the involved market failures and the involved government failures.

If the present producer-biased mode of technical standardisation had to be changed, a solution according to the model would be to decrease the collective action problems through an empowerment of the group of consumers in the technical standardisation process, i.e. through the allocation of public subsidies to consumer organisations in order to take part in the technical standardisation process. To a certain extent this is also a model that has been applied in the Nordic countries as far as technical standardisation is concerned.

Another way to change the producer-biased mode of technical standardisation would be to increase the collective action problems for producers, i.e. to liberalize markets, tighen up competion policy and eliminate traits of corporatism in the standardisation policy.

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Notes

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[2] Technical standards are a part of the group of all standards, which, however, also includes basic standards like the metric system, terminological standards, security standards, etc. I define technical standards as standards that are invented as part of the construction of technologies, e.g. telecommunication products, arms, mechines, television sets etc.

[3] The scolarly discussion on the implication of patents in the relation to the analysis of technical standardisation, however, is not the same thing. Technical standards are part and parcel of all patented products, but they are much more fundamental than patented products.

[4] In fact, the theoretical model of this paper is a model of the mode of technical standardisation.

[5] To use the term coined by President Dwight D. Eisenhower.