International transferability of corporate cultures: a formal approach to feasibility

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Abstract

A corporate culture exists in every company. Therefore it has to be taken into account by managers, who have to decide about firms strategies. In todays global economy it becomes even more important, especially for firms expanding internationally. But the concept of corporate culture is defined very diversely in the literature, so are its implications. Therefore this article tries to give some insights on the construct of corporate culture, especially with respect to its transferability internationally. An article by Rob and Zemsky (2002) will be used as a basis. One of the results of their formal model will be further developed to demonstrate the possibility and the conditions for an international transfer of corporate cultures.

Keywords: corporate culture ; social capital; transferability

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1 Introduction

A corporate culture exists in every company. In todays global economy more and more companies expand internationally and are therefore not only located in their home country anymore. Going abroad requires a lot of decisions. An effective strategy has to be chosen, employees have to be hired and the corporate culture also has to be taken into account. The last part is probably the most difficult one. Can a decision maker simply transfer the corporate culture from the headquarter? Or does corporate culture evolve over time in an historical process and is therefore not transferable? Maybe only certain parts of a corporate culture can be transferred and other parts will evolve over time. Despite the fact that academic research examining the construct of corporate culture is very diffuse and diverse, it is crucial for a multinational corporation (MNC) to take its organizational culture and its implications into account in the decision process determining strategy and structure.

The construct of corporate culture has been examined from various angles. Hence, a multitude of definitions exist, which significantly differ from each other. The intersection among the variety of definitions is very small. As a consequence implications of corporate cultures for a firm are very diverse and sometimes even contradictory. This is partly due to the different approaches to corporate cultures. Hence, diverse and even contradictory implications found, do not necessarily have to be wrong. Therefore this article will try to shed some light on the construct of corporate culture and its implications. The focus of the article is on its transferability to other countries focusing on certain aspects of a corporate culture. This approach will be taken in order to show, that contradictory findings regarding transferability hold simultaneously without one of them being invalid. They might rather be due to the conditions under which a corporate culture exists or is being implemented. Or to put it alternatively: this article examines the feasibility of transfer and the conditions under which it is possible given the modelling framework that I use. Since the effect of culture or more specific corporate culture on efficiency of companies has been recognized by economics as well during the last years, I will adopt such an approach to model the problem. Relying on a limited view of corporate culture I will characterize the conditions under which a transfer of corporate culture is a feasible option.

In the first section the construct of corporate culture will be defined and embedded in the broader context of national culture. Different views of organizational culture will be presented in order to show how many different approaches exist and how diverse the research area of the phenomenon of corporate cultures is. Furthermore the implications and the importance of existing corporate cultures for companies will be pointed out. In the next section a brief explanation of the different methods used to study the phenomenon of corporate cultures will be given. Afterwards a literature overview of empirical investigations about the transferability of corporate cultures and the impact of differences in corporate as well as national cultures follows. This section will be summarized by some of the major findings and their implications for future research. In the third section the model of Rob and Zemsky (2002) will be presented, because it serves as a basis for the argument, which will be developed in this paper. Therefore the main points of their model will be outlined first. To motivate the adoption of this particular approach, in the next section, the economic definition used by Rob and Zemsky (2002) and the behavioral definitions of corporate culture will be contrasted. In the following section a demonstration of the feasibility of the transferability will be developed taking into account the solution of the original model of Rob and Zemsky (2002) and its results will be discussed. The paper finishes with a summary and an outlook on future research.

2 Corporate Culture, National Culture and their implications for firms

Before starting to examine the construct of corporate cultures and its implications for firms, it is useful to embed corporate cultures in the broader context of national cultures.

This is important, because interdependencies between national and corporate cultures exist. A lot of researchers like Ouchi and Wilkins (1985), Hofstede, Neuijen, Ohayv, and Sanders (1990) or Gooderham and Nordhaug (2003) state, that values held by employees in firms have been acquired long before entering the company and are therefore national culture and not corporate culture dependent. More evidence of the pre-existence of values is the incongruence between values within the organization and the ones held by its employees [Lachman, Nedd, and Hinings (1994)]. Ouchi and Wilkins (1985) point out that national cultures could possibly be the main reason for differences in corporate cultures. Most of the research defines culture in general, not bound to country borders. But over time researchers started to use culture as a synonym for national culture as pointed out by Kelley, Whatley, and Worthley (1987). In this article the term culture will be replaced by the term national culture, except for the original quotations, in order to avoid confusion.

Defining national culture first, helps to understand the origins of corporate cultures and fosters the understanding of their development into certain directions. The existence of so many different definitions of national culture, is due to the fact that the construct of culture has been elaborated by a wide range of different disciplines, e.g. anthropology, sociology, philosophy or psychology. The definition of Schein (1999, p.29) is quite comprehensive, because it includes elements, which are most common in the different definitions:

> Culture is the sum total of all the shared, taken-for-granted assumptions that a group has learned throughout its history.

The important point in this definition is the aspect of evolution and therefore time. National cultures do not start existing ad hoc, they develop in an evolutionary process over decades or centuries. Using the article of Rob and Zemsky (2002) as a basis for developing the model, it is crucial for understanding the reasoning behind the model later on to point out their definition of national culture as well:

> Culture is referring to a stable, self-reproducing behavioral pattern exhibited

> by a group.

This definition also emphasizes the evolutionary aspect of national cultures. Moreover, in contrast to the definition of Schein it explicitly points out the steady-state character of national culture. In Schein's definition the use of the formulation "has learned" only implies that the process of learning has converged to a stationary state.

The definitions of national culture and corporate cultures have a lot of commonalities, which is due to the fact, that corporate cultures evolve within the context of national cultures. Before giving some definitions of corporate cultures, it is important to point out, that the terms "corporate culture" and "organizational cultures" are used synonymously in the literature as well as in this article. The comments stated above about various definitions of national culture hold for the definition of corporate cultures as well. This phenomenon has also been studied within a lot of different research areas. Therefore little consensus exists about what elements constitute a corporate culture. A very broad definition is the one of Marvin Bower in Deal and Kennedy (1988, p.4):

> The way we do things around here.

Another more elaborate widely used in the literature definition is the one of Schein (2004, p.17):

> A pattern of basic assumptions that was learned by a group as it solved its problems of external adaption and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.

Most of the other definitions of corporate culture like the ones of Barney (1986) and Chatman and Jehn (1994) furthermore include values besides assumptions, claiming that those are essential for the way people interact in a business context. Hofstede, Neuijen, Ohayv, and Sanders (1990) summarize different definitions of corporate culture by enumerating the following characteristics used for defining organizational cultures: they are

> (1) holistic, (2) historically determined, (3) related to anthropological concepts, (4) socially constructed, (5) soft, and (6) difficult to change

Rob and Zemsky (2002) use a complete different terminology for their definition of organizational cultures and define it as

> a steady-state of social capital

adopting the definition of social capital by Putnam (1995) as a basis.

> [S]ocial capital refers to features of social organizations such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefits.

In addition, they use their general definition of culture, which was quoted earlier, for corporate cultures as well, since it encompasses aspects, which are also crucial for and exist in corporate cultures.

Besides the quoted definition above, Schein divides corporate culture into three different levels ranging from visible to tacit features: Artifacts, espoused values and basic underlying assumptions. The first level comprises different types of artifacts like organizational structures and processes. They are easy to identify for outsiders, because they include features like dress codes, management style, incentive schemes and so on, but it is difficult for anyone not being employed within the company to decipher what they stand for. The second level are espoused values. Those include strategies, goals and philosophies. In order to identify them, employees of the firm need to be interviewed about the meaning of the firm's artifacts. There might be inconsistencies or even contradiction between the values announced and the ones incorporated in the artifacts. Therefore another level is needed to understand and explain organizational cultures. The third level is constituted by the basic underlying assumptions, which build the basis for values and action. They are unconscious, taken-for-granted and internalized by the employees. Due to their tacit nature it is almost impossible for an outsider to identify them [Schein (2004, pp.30)].

Additional to the distinction of different levels, Schein (1999, pp.29) emphasizes the fact that corporate cultures do not only have to cope with their internal organization, but also with the various environments they have to correspond with. He refers to the first as internal integration issues, which include the allocation of rewards and status among other things and to the latter as external survival issues, including mission, strategy and goals. The focus on incentive and reward systems and the degree of teamwork among other factors is furthermore a very popular perspective of corporate cultures [Schein (1999, p.41)]. The aspect that reward systems are an element of corporate culture is e.g. also supported by Wiener (1988). Schein (1999, p.47) furthermore points out, that it is hard for an outsider or a new employee of a firm to find out, what kind of behavior, i.e. cooperative or individual behavior, is rewarded within a firm. This is in line with his distinction, that reward systems belong to the level of artifacts. It is especially difficult, since the type of behavior being rewarded by a company, seems to differ among countries. In some countries, where cooperative behavior is embedded in the national culture, the focus is probably more on rewarding individual behavior, since cooperation is implemented naturally already. In rather individualistic countries, to use the terminology of Hofstede (2001), it is likely that cooperative behavior will be rewarded by a company, because it will probably not be exerted by employees without receiving extra benefits. The latter holds, given cooperation is needed to achieve a company's goals. Moreover according to the empirical evidence given by Mueller and Clarke (1998) compensation schemes vary among countries. Schemes transferred from the home country can be perceived as unjust by employees of the host country. As a result the aspired work behavior in the host country will not be achieved by the incentive system of the firm.

The reason for enumerating and quoting those different definitions of corporate or organizational cultures is not the attempt to combine economic and psychological views as explanations for corporate cultures and their implications for businesses, in the sense to merge both approaches into one. It is rather to point out that studying corporate cultures is a very broad field, in which the phenomenon to be studied is defined very diversely.

Some scholars like Morey and Luthans (1985) even go that far to say, that it is often not defined at all. Furthermore it is not an area, which can be studied by examining hard facts only, it is rather a soft phenomenon, which tends to be fuzzy and hard to capture. Therefore the application of approaches from economics can be seen as a complement to the behavioral approach. Economic methods, e.g. formal approaches, enables one to model certain aspects of a corporate culture like the development of organizational cultures over time or the influence of national- on corporate culture, which would be hard to capture if research was limited to behavioral approaches. It seems to be especially difficult to model the various aspects of organizational culture simultaneously in behavioral research. Economics furthermore opens up an opportunity for useful measures of certain aspects like incentive systems or the degree of cooperation reflected as reciprocity, which improves the feasibility of empirical research in the field as well.

It needs to be emphasized, that these formal approaches cannot function as substitutes of behavioral approaches, because the modelling of other features of corporate cultures seems to be more difficult or impossible, e.g. emotional or psychological aspects of employees and managers or group processes. Furthermore it seems that the influence of corporate culture on firms' strategies or structures can also be modelled better by behavioral approaches than economics. Another aspect is, that due to the mathematical features economic approaches are most of the time highly abstract, which implies that the reflection of reality is often very limited and a lot of details, which are captured in behavioral approaches, are lost. Qualitative approaches are useful in order to fill in the details, which have been excluded by definition in most of the economic approaches. Still, opening up to other disciplines like economics enables researchers to capture more features of the construct of corporate culture and facilitates empirical research in this area. Thus a lot of different approaches exist to study corporate culture, focusing on different elements of it, each having its own merits and limitations.

The majority of research focuses on the two main aspects of corporate culture, namely the impact of national culture on corporate culture, like e.g. Ouchi and Wilkins (1985), Trompenaars and Hampden-Turner (1997), Weber, Shenkar, and Raveh (1996) or Newman and Nollen (1996), or on the evolution of national as well as corporate culture over time, like e.g. Saffold (1988), Wilkins and W. Gibb Dyer (1988) and Schein (2004). But only very few, e.g. Lubatkin, Calori, Very, and Veiga (1998), combine both aspects in their research. An examination of both aspects at the same time is crucial though, since national- and corporate culture interact and corporate culture is, at least to a certain extent, shaped by national culture. Both systems evolve over time, which implies, that a change in national culture could lead to a change in corporate culture and vice versa. Taking this process into account, might help to explain some of the contradictory findings in the corporate culture literature. Using approaches from other areas, like e.g. mathematical models from economics, enables researchers to model both aspects at the same time.

Diversity in research is even wider, when it comes to the transferability of corporate cultures, especially in an international context, but also within countries. To support this statement an overview of some of the different approaches will be given. Beforehand some comments will be made about the necessity and use of studying corporate culture at all. There are implications of the existence of corporate cultures for a company, which make it crucial for a firm to take that phenomenon into account, when deciding about their strategies and structures.

The different possible positive and negative implications of organizational culture have been discussed by Jones (1983), Barney (1986), Rob and Zemsky (2002), Chatman and Jehn (1994), Camerer and Vepsalainen (1988), Sheridan (1992), Saffold (1988), Deal and Kennedy (1988, p.7), Deal and Kennedy (2000, p.24)] and Nahapiet and Goshal (1998).

Another important reason for taking culture into account is its connection to strategy. The relationship between both is not clearly defined. Several authors like Weick (1985), Barney (1986), Schein (1999, p.35), Hofstede, Neuijen, Ohayv, and Sanders (1990), Marcoulides and Heck (1993), Deal and Kennedy (2000, pp.37), Camerer and Vepsalainen (1988) and indirectly Rob and Zemsky (2002) and Nahapiet and Goshal (1998) have been considering this problem.

Corporate culture can also have an impact on performance. Barney (1986), Saffold (1988); Deal and Kennedy (1988, p.7), Deal and Kennedy (2000, p.24) and Sørensen (2002) examine the possible positive or negative impacts on performance as well as the conditions under which such effects occur. On the contrary Marcoulides and Heck (1993) state, that the causal relationship between both is still unclear. In line with the economic definition of corporate culture, namely a stock of social capital e.g. Rob and Zemsky (2002), Knack and Keefer (1997) and Arrow (2000) point out the influence of social capital on performance.

3 Empirical work on the transferability of corporate cultures and differences in international cultures

The empirical work on the transferability of corporate cultures and the impact of differences in national cultures examines the concept of organizational culture from a lot of different perspectives. One focus is on the consequences of transferring corporate culture in international mergers and acquisitions. Weber, Shenkar, and Raveh (1996) as well as Lubatkin, Calori, Very, and Veiga (1998) examine the impact of national culture as well as corporate culture on mergers and acquisitions.

Chatterjee, Lubatkin, Schweiger, and Weber (1992) and Nahavandi and Malekzadeh (1988) found out how important acculturation and adaptation to the new corporate culture for successful mergers and acquisitions are. Grotenhuis (2001) states, that certain parts of a corporate culture are transferable in mergers and acquisitions with the help of expatriates. In the context of joint ventures, a lot of research focuses rather on the impact of national cultures than on the one of organizational cultures, like e.g. Park and Ungson (1997), Barkema, Bell, and Pennings (1996) or Pothukuchi, Damanpour, Choi, Chen, and Park (2002).

Jaeger (1983) explicitly focuses on the transfer of corporate cultures overseas. He thinks a transfer is feasible with intensive use of expatriates, extensive training and a lot of personal communication between headquarter and subsidiaries. The study of Galgóczi (2003) supports his statement, but not unrestricted. Some companies also adapt to the host country's culture. This decision depends on their home countries.

To summarize the enumerated literature the following conclusions can be drawn: in the context of corporate cultures a lot of different approaches have been used with respect to the dimensions of organizational cultures being transferred. There are also major differences in the methods applied for measuring the transferability and its impact and the context in which corporate cultures are transferred. The focus in the literature is more on the clash of two corporate cultures, which need to be combined for various reasons than on the actual transfer of the culture from, for example a headquarter of a multinational firm to a foreign subsidiary. Even with respect to opinions about the transferability of organizational culture there is no consensus. Some scholars support the view that it is transferable, others say it is not. Furthermore most of the studies differentiate between degrees of impact of corporate cultures in contrast to national cultures. The results of the different approaches vary and often contradict each other. The question concerning the validity as well as the applicability of the results naturally appears. Evaluating the conclusions lead to the insight that contradicting results do not have to be wrong, they might rather be a manifestation of different conditions under which corporate cultures are transferable or not.

Research conducted in this area focuses on companies in different countries. In the previous section it was outlined, that corporate cultures are shaped by or dependent on national cultures to a significant degree. Furthermore it was pointed out, that in many cases corporate cultures are rather adapted to national cultures in the foreign countries than being established in the same way, as they are in the home countries. Both findings lead to the *conjecture*, that *differences in the national cultures of the home and host country of the multinational organization could determine the conditions under which a corporate culture is transferable or not. There might be certain national cultures, even though they might not be identical or very similar, which allow for a successful transfer of the organizational culture and others which do not.* In the latter case, the corporate culture must be adapted to the national culture of the host country as it was found by Lubatkin, Calori, Very, and Veiga (1998). It might be the case, that the transferred organizational culture might converge to an optimal one over time, which supports profit maximization, if national cultures of home and host country differ within certain boundaries. Eventually the corporate culture in home and host country will be optimal and contribute positively to the firm's goals. To give further insights to the problem of transferability a modelling framework will be introduced to study the problem.

The framework will be set up such, that it allows to model the influence of national culture on corporate culture as well as the evolutionary aspect of organizational culture, namely its development over time. As stated earlier, according to Jermier, John W. Slocum, Fry, and Gaines (1991) it is not possible to model all elements of a corporate culture at once. Hence, the approach used in this paper will also focus on a particular set of elements of an organizational culture. The incentive systems and the degree of cooperation motivated by reciprocity will be modelled. The degree of reciprocity is mainly shaped by the national culture of the foreign employees. Therefore this approach allows to show the impact of national culture on corporate culture. The second focus of the modelling framework is on the evolutionary aspect, showing that transferred corporate cultures can converge to an optimal corporate culture over time. The limitation to this set of parameters is necessary, because first of all not all parameters can be modelled in the mathematical way applied in the approach developed in the following sections. Secondly otherwise it would not be possible to draw useful conclusions, which help to solve the problem of contradicting results in the mainly behavioral literature dealing with the problem of transferability of organizational cultures.

The following modelling framework opens up the opportunity to demonstrate, that the contradicting results in the behavioral literature do not necessarily have to be wrong, but that they are rather a manifestation of the different conditions, namely a country's culture and its interplay with a firm's culture over time, under which the organizational culture has been transferred. The modelling framework developed in this paper tries to shed some light on the questions, if it is feasible to transfer a corporate culture and the conditions under which this is doable, given the limitations of the framework. It furthermore allows to account for the decision of a company to adopt a multi-domestic strategy. So far the framework – not being a holistic approach – is limited. For the benefit of simplicity it rather focuses on a particular set of characteristics of corporate cultures as already stated above. It neither can explain nor give constructive advise with respect to the transfer of other aspects of Schein's three levels of organizational culture. Its focus is entirely on incentive schemes and reciprocity. The need for a stepwise introduction of other aspects into this framework is obviously given.

Furthermore this economic approach is in line with the advise of some scholars, like e.g.O'Reilly III, Chatman, and Caldwell (1991), Marcoulides and Heck (1993), Jermier, John W. Slocum, Fry, and Gaines (1991), Hofstede, Neuijen, Ohayv, and Sanders (1990), who examine corporate cultures, to use more mathematical and quantitative methods to examine this phenomenon. Marcoulides and Heck (1993) point out that the causal relationship between corporate culture and performance is still unclear due to the lack of meaningful measures. Therefore they advise to use more mathematical models in order to make the relationship more transparent. But despite the request for more mathematical and quantitative methods, most of the named scholars acknowledge the use of qualitative methods as well and emphasize the complementary use of both. They also point out the difficulties of using mathematical and quantitative methods, like O'Reilly III, Chatman, and Caldwell (1991) or Jermier, John W. Slocum, Fry, and Gaines (1991), who indicate measurement problems, stating, that only parts of a corporate culture are accessible for empirical measurement. The latter also state, that it is impossible to model all elements of a corporate culture at once, therefore it is only feasible to focus on certain aspects of it, which require different methods for measuring. It is important to point out, that quantitative as well as qualitative approaches are useful and feasible. They can be seen as complementary methods helping to clarify the complex construct of corporate culture.

4 Sketch of the Rob and Zemsky model

Before explaining my own modelling framework, the basic ideas of the model by Rob and Zemsky (2002) will be outlined, because their model serves as a basis for mine. Rob and Zemsky (2002) view corporate culture as a stock or steady-state of social capital accumulated by a firm. The amount of social capital is mainly determined by the degree of cooperation of employees. They assume that a profit maximizing firm influences the behavior of utility maximizing employees (who choose between individual and cooperative effort) through an incentive system thereby influencing the formation of social capital. For the role of incentive systems in corporate cultures, see Schein (1999), Deal and Kennedy (1988) and Wiener (1988). The problem is, that a company does not know how much of the observed output of a worker is due to his individual effort and how much was produced with the help of his co-workers. Hence, the incentive system of the firm is based on the output of each employee a firm is able to observe. Therefore a company rewards total output or effort of the employee, which is the sum of individual effort times his productivity and cooperative effort.

As a consequence employees face a prisoners' dilemma. Everyone could be better off if all cooperated, but each employee receives more reward if he or she exerts more individual effort, since this part of his or her effort is directly measurable by the firm. As a utility maximizing individual, every employee would show more individual effort. Furthermore it is assumed, that each employee has a preference for cooperation, which is caused by reciprocity. The intrinsically derived utility from cooperating, and with it cooperation itself, increases with the amount of help an employee has experienced in the past. Therefore, the preferences of employees underlie an ongoing process of formation, which relies on the cooperation of co-workers in the past (reciprocity). Rob and Zemsky (2002) also assume, as stated above, that incentives can influence an employee's decision to cooperate. In their infinite horizon version of the model a sequence of profit maximizing incentive intensities exists, which leads to a stable stock of social capital, i.e. to a corporate culture. The incentive system has to be based on inter-temporal considerations, because in the short-run a firm could increase its profit by setting high incentives, which would lead to high individual effort now, but to less cooperation in the future and with it to less social capital.

The purpose of their paper is to show that setting an optimal incentive-scheme can generate corporate culture differences across similar firms, given different initial conditions. Those differences might eventually lead to a sustainable competitive advantage. Hence their formal model supports the statement of Barney (1986). The authors interpret different initial conditions the following way: some firms employ individuals, who are more cooperative than others by nature, which results in a larger original stock of social capital than the ones of firms, which have less cooperative workers as a basis to start from. Of course, as already pointed out, the generalizability of an economic approach is limited and it only captures certain, limited aspects of a corporate culture. First of all, the perspective to view organizational culture as a stock of social capital is quite abstract and therefore looses a lot of the details, which determine a corporate culture. As emphasized before there are a lot of other aspects belonging to a corporate culture like other values, norms, company logos etc. Furthermore a corporate culture is not only determined by the degree of cooperative and individual effort in a firm, the level of teamwork certainly is one aspect of it, but not the only one. The assumption that cooperative effort can only be influenced by rewarding total output of an employee is probably limited as well. There will certainly be other options for a firm to increase cooperation among its employees, like for example team experiences outside the firm, that increase trust and therefore cooperation . But for the purpose of their model, namely to show that identical firms can create a competitive advantage solely by their corporate cultures, everything else being equal, the limited perspective of corporate culture is necessary and sufficient.

5 Corporate culture and social capital

Before presenting my own approach and after having outlined the basic features of the Rob and Zemsky (2002) model, I would like to clarify the relation between the definitions of corporate culture used in the behavioral literature and the economic one used in this paper. Establishing a close relation between both supports the statement made earlier, that it is useful and appropriate to use economic approaches to examine the phenomenon of corporate culture. By demonstrating that the economic definition used by Rob and Zemsky (2002) is very similar in meaning to the behavioral ones also justifies the use of this particular model to assess the transferability of corporate cultures in international organizations.

Comparing the economic definition of corporate culture used by Rob and Zemsky (2002) and some of the definitions of corporate culture in behavioral approaches does not reveal a lot of similarities at first sight. But closer examination shows, that both approaches describe the same characteristics and features of organizational culture only adopting different perspectives and with it different terminology. To be able to compare both approaches the definition by Rob and Zemsky (2002) and the definition by Schein (2004) will be quoted and afterwards examined to point out the similarities of both definitions. Since the definition by Schein (2004) encompasses other behavioral definitions, I will limit the comparison to these two definitions. To make my point, comparing the two definitions should be sufficient.

Rob and Zemsky (2002) define corporate culture as a steady-state of social capital that has evolved over time. They furthermore adopt the definition of culture for organizational culture as well, i.e. they characterize it as a stable self-reproducing pattern of behavior in a group. The term *steady-state* could be replaced by the term *stock*, because both expressions are used in their paper complementary. A stock of an asset always refers to something, that was built up over time by following a consistent strategy, or to put it differently, as it was formulated by Dierickx and Cool (1989) is

> accumulated by choosing appropriate time paths of flows over a period of time.

This definition also points out the main difference between stocks and flows. While flows can be adjusted any time ad hoc, stocks cannot, because it takes time to accumulate them. Hence, a stock of social capital has to be build up over time as well. This implies, that during the building process the term *stock of social capital* is appropriate. But once a certain optimal stock of social capital is reached, it will reinforce or reproduce itself over and over again, which indicates stability of the stock over time. This condition or state is referred to as *steady-state* in the economic literature.

Behavioral research has generated a lot of different definitions of corporate culture, which are more or less comprehensive, among those is the one by Schein (2004, p.17), which encompasses a lot of the other definitions of organizational culture like the ones by e.g. Bower in Deal and Kennedy (1988), Jackie and Kevin Freiberg in Deal and Kennedy (2000), Barney (1986) and Chatman and Jehn (1994). The definition by Schein (2004) includes additional features, so that this definition captures a lot of aspects, that characterize a corporate culture:

> A pattern of basic assumptions that was learned by a group as it solved problems of external adaption and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as a correct way to perceive, think and feel in relation to those problems.

Since the last definition captures all aspects of the definitions used by the authors enumerated above and additional ones, this definition will be compared with the one by Rob and Zemsky (2002) in order to stress the similarities or in a certain sense even the equivalence of both definitions.

Schein (2004), in his definition, makes the statement, that those basic assumptions of a group have been learned [*was learned*]. Learning something takes time. He continues by saying that the group learned, while it was dealing with problems of external adaption and internal integration. Those are major issues for a company, which cannot be dealt with or solved in one week or a month. Hence, he is referring to a longer period of time. Analogous to this expression Rob and Zemsky (2002) define corporate culture as

> a steady-state of social capital that has *evolved over time.*

This implies that the evolution of a corporate culture is a time-consuming process. Therefore the first analogy has been established. Concluding it could be said that both approaches point to the dynamic aspect of corporate cultures, which is absolutely essential.

To bring out the second analogy I focus on the phrases

> A pattern of basic assumptions...to be considered valid...to be taught to new members...

used by Schein (2004) and on the terms

> *self-reproducing* or *steady-state*

in the definition of culture adopted by Rob and Zemsky (2002). Both phrases describe the same phenomenon. In that sense they have exactly the same meaning. Even if the expression *self-reproducing* by Rob and Zemsky (2002) is for culture in general, not corporate culture in particular, it is interchangeable with the term *steady-state*, which is used in their definition of corporate culture. The latter term is simply the mathematical term for a stable self-reproducing state of a process. If a certain pattern is taught by old members to new members in a group in exactly the same way and those new members will teach it to other newcomers, who will join the group after them, it could also be called self-reproducing. The members of the group themselves make sure that the same routine or pattern of actions will be adopted by every new member joining the group.

Another analogy is that the concept of *social capital* as used by Rob and Zemsky (2002) captures all of the aspects of corporate culture stated explicitly in the behavioral definitions. To make this point clear the definition of social capital by Nahapiet and Goshal (1998) will be adopted. They

> define social capital as the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.

This definition is a refined version of the seminal one by Putnam (1995), which is relied upon in the article by Rob and Zemsky (2002)

> [S]ocial capital refers to features of social organizations such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefits.

The definition by Nahapiet and Goshal (1998) focuses on networks and its implications for individuals, which are embedded in one. They furthermore follow a request by Putnam (1995) to determine the dimensions of social capital. Therefore they divide it into three interrelated dimensions. A structural, a relational and a cognitive one. This distinction allows once more to clarify the relationship between the quoted economic and behavioral definitions of corporate cultures, because most elements of the behavioral definitions can be assigned to one or more dimensions of social capital.

To make my point clear I will only assign the elements of the behavioral definition by Schein (2004) and the elements of the economic definition by Rob and Zemsky (2002) to the different dimensions of social capital, even though the other definitions referred to above could all equally well be related to the different dimensions. But first the dimensions of social capital will be explained. The structural dimensions deals with the pattern of connections between individuals, the ties of a network and the configuration of the network. The relational dimension refers to created and leveraged assets in the network. The main focus is on the key relational premises that are needed for asset creation and leverage, namely trust, trustworthiness, norms, sanctions, obligations, expectations, identity and identification. It is also described as the bonding of actors. The cognitive dimension refers to characteristics, which signal shared representation, interpretation and meaning within the network, like for example a common language, shared symbols or shared stories.

Rob and Zemsky (2002) *explicitly* define a corporate culture as a stock of social capital in the sense of Putnam (1995). According to his definition networks are considered to be a part of social capital. By including networks he implies cooperation to a certain extent, which is also used as a parameter in the Rob and Zemsky model. Therefore networks directly and cooperation indirectly belong to the structural dimension, even though the latter is not explicitly modelled. Putnam (1995) furthermore states that social capital incorporates norms and social trust. These two features rather belong to the relational dimension of social capital and refer to another variable in the Rob and Zemsky model, namely reciprocity. There is no aspect in the definition of Rob and Zemsky adopting Putnam's definition of social capital which could be assigned to the cognitive dimension.

Schein (2004) states that the patterns of behavior are learned by solving problems regarding internal integration. Internal integration issues could be related to the structural dimension of social capital, because the formation of network ties and configuration can play a crucial role in solving integration problems. The pattern of basic assumptions can be assigned to the relational as well as to the cognitive dimension of social capital, because it defines the identity in a group and generates trust. A pattern of assumptions usually includes certain norms and expectations of behavior. Hence, it can be assigned to the relational dimension. But those assumptions also reflect a shared system of meaning, especially since Schein (2004) emphasizes, that those are the basis for a *correct way to perceive, think and feel.* Therefore they can be related to the cognitive dimension as well. Relating Schein's and Rob and Zemsky's definitions to social capital shows, that both definitions include the same elements of a corporate culture and capture the same phenomena.

Concluding it can be said, that both definitions, the behavioral as well as the economic one, comprise almost the same key characteristics of corporate cultures, only expressed differently. The economic definition is less detailed than the behavioral one and uses more abstract and/or mathematical terminology. Equating corporate culture with *social capital* is rather unusual in the behavioral literature. In this discipline it is more commonly used in the context of value creation [e.g. Tsai and Goshal (1998)], network theory [e.g.Garguilo and Benassi (2000), Tsai and Goshal (1998); Nahapiet and Goshal (1998)] and knowledge creation, transfer and exploitation [e.g. Reagans and McEvily (2003); Nahapiet and Goshal (1998); Yli-Renko, Autio, and Sapienza (2001)]. Therefore it was absolutely crucial to relate the behavioral definition of organizational culture to the economic one by Rob and Zemsky (2002). By comparing the two approaches it was shown, that the definitions are close to being equivalent. They express the same phenomenon in different terminology. Although I did not list alternative behavioral definitions in this article, it should be pointed out that some of them only focus on certain aspects of social capital. After having established this fact, it can be said that it is appropriate and useful to adopt an economic definition of corporate culture as well as an economic model to examine the feasibility of transfer of corporate cultures.

6 The (a, r)-contour of the corporate culture $\bar{z}$

In this section, I discuss a result which expands the work by Rob and Zemsky (2002). The result deals with a subset of the parameter space of their model. It states conditions under which there exist infinitely many values of a and r which - everything else being equal - will guarantee the convergence to a given corporate culture $\bar{z}$. This result will be used now to discuss the problem of transferability of corporate culture.

If the firm solves the inter-temporal maximization problem then, the steady state solution, if it exists, takes the form

$$\bar{z} = \frac{hcd^2\{2 + (1-a)p - \delta r\} - a^2(1-\delta r)(pd-1)}{hcd^2\{2 - r(1+\delta)\} + a^2(1-r)(1-\delta r)} \tag{1}$$

where the notation is given in the table below:

Table 1: Notation (Rob and Zemsky 2002)

Symbol	Interpretation
e_C	cooperative effort
h	level of e_C for which marginal effect of e_C is 0
a	marginal product of individual effort
r	reciprocity parameter
z	average cooperative effort (normalized); social capital of the firm
p	output price
δ	discount rate

To make my point, an infinite time horizon is not necessary, therefore I simplify the case by considering a myopic firm, i.e. $\delta = 0$. For this case the following result can be established:

Resultat 1 *Consider the case of a rational, myopic firm solving the optimization problem. For the set of parameters (h, c, a, r) the steady-state social capital (or corporate culture) $\bar{z} = f(a, r; h, c)$ given in (1) exists. Suppose that $p > hc + 2$. Then there exists a set*

$$\mathcal{C}(\bar{z}) = \{(a', r') \mid (a', r') \neq (a, r) \ \wedge a' \in (0.5, 1) \ \wedge \ r' \in (0, 1) \wedge \ \bar{z} = f(a', r'; h, c)\} \neq \emptyset.$$

Proof: In the first part of the proof, I will show that r can be represented as an explicit continuous function of a given $\bar{z}$.

Therefore the function has to be transformed in the following way: having set $\delta = 0$, equation (1) simplifies to

$$\bar{z} = \frac{hcd^2\{2 + (1-a)p\} - a^2(pd-1)}{hcd^2\{2-r\} + a^2(1-r)} \tag{2}$$

The numerator of (2) depends solely on the parameter a , while the denominator depends on both parameters a and r. Note that the denominator of (2) is a linear function of r:

$$\begin{aligned} hcd^2\{2-r\} + a^2(1-r) &= 2hcd^2 - hcd^2 r + a^2 - a^2 r & (3) \\ &= (2hcd^2 + a^2) - (hcd^2 + a^2)r & (4) \end{aligned}$$

Having this result, (2) can be rewritten in the way below and afterwards be solved for r:

$$\begin{aligned} \bar{z} &= \frac{hcd^2\{2 + (1-a)p\} - a^2(pd-1)}{(2hcd^2 + a^2) - (hcd^2 + a^2)r} \\ \{(2hcd^2 + a^2) - (hcd^2 + a^2)r\}\bar{z} &= hcd^2\{2 + (1-a)p\} - a^2(pd-1) \\ r(a; h, c, p, \bar{z}) &= \frac{2hcd^2 + a^2 - \frac{1}{\bar{z}}\{hcd^2\{2 + (1-a)p\} - a^2(pd-1)\}}{hcd^2 + a^2} \end{aligned}$$

For a given level of $\bar{z}$ the last equation describes the functional relationship existing between a's and r's which lead to an identical steady-state $\bar{z}$. For each $a' \in (0.5, 1)$ the last equation assigns a value to r. The points on the graph of this function over the relevant part of the (a, r)-space are elements of the set $\mathcal{C}(\bar{z})$. For examples based on specific parameter values see Figure 2 and 3.

In the second part of the proof I will show that the set $\mathcal{C}(\bar{z})$ is non-empty. The following outline describes the idea for this part of the proof.

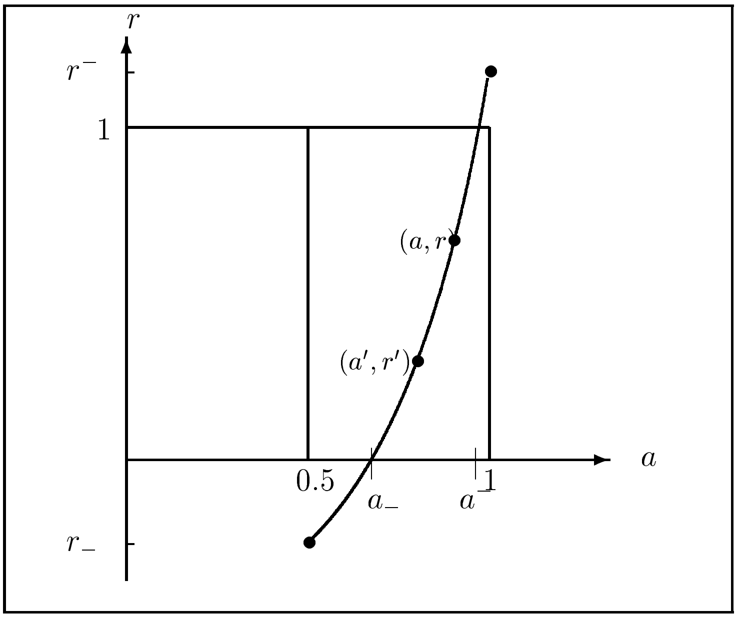

Figure 1: Sketch of the proof

In the graph above a lower r_- and an upper bound r^- of r are introduced. As a first step, I will show that $r(a' = 0.5) = r_- \leq 0$. Note that the point is below the area of interest. Then I will demonstrate that $r(a' = 1) = r^- \geq 1$. This point is above the area of interest and therefore also not of interest. I state that since r is a continuous function of a there must be infinitely many points on the line joining the two points $(0.5, r_-)$ and $(1, r^-)$. Since this line has to have a positive intersection with the relevant area of the (a, r)-space, the set $\mathcal{C}(\bar{z})$ is non-empty.

The fact that $r_- \leq 0$ holds is assured by the fact that $\bar{z} \leq 1$, which is shown in the following inequation:

$$r_- = r(a' = 0.5) = 1 - \frac{1}{\bar{z}} < 0 \;\Leftrightarrow\; 1 \leq \frac{1}{\bar{z}} \;\Leftrightarrow\; \bar{z} \leq 1.$$

The validity of this statement is not bound to any conditions. This is not so for $r^- \geq 1$, which is demonstrated by the inequation written below:

$$r^- = r(a' = 1) = \frac{2 + hc - \frac{1}{\bar{z}}\{hc - p + 2\}}{\frac{1}{2}(4 + hc)} \quad \geq \quad 1 \tag{5}$$

$$
\begin{aligned}
2 + hc - \frac{1}{\bar{z}}\{hc - p + 2\} &\geq \frac{1}{2}(4 + hc) &\quad (6)\\
p &\geq -\frac{1}{2}\{(\bar{z} - 2)hc - 4\} &\quad (7)\\
p &\geq \left(1 - \frac{\bar{z}}{2}\right) hc + 2 &\quad (8)
\end{aligned}
$$

If $\bar{z} \in [0, 1]$ then we can be sure that the right hand side of (8) is dominated by $hc + 2$. This is shown by the following inequation :

$$
\begin{aligned}
hc + 2 &\geq \left(1 - \frac{\bar{z}}{2}\right) hc + 2 &\quad (9)\\
0 &\geq -\frac{\bar{z}}{2} &\quad (10)
\end{aligned}
$$

Requiring $p > hc + 2$, I ensure that (8) holds and therefore $r^- \geq 1$.

q.e.d.

For a given level of $\bar{z}$ the last equation describes the relationship prevailing between a and r which leads to an identical steady state $\bar{z}$.

There exists a non-empty set of valid parameter values (a', r') which differ from (a, r), that will eventually lead to the same steady-state social capital (or corporate culture) as the original (a, r). The set $\mathcal{C}(\bar{z})$ contains all the productivity/reciprocity combinations which will cause an identical corporate culture $\bar{z}$.

An example for a set $\mathcal{C}(\bar{z})$ is exhibited in Figure 2. Setting $h = 1$, $c = 4$, $p = 7$, I consider $(a, r) = (0.7, 0.4)$. To determine the steady-state social capital for this parameter constellation, I set the parameter values into the right hand side of (1). The computed value for $\bar{z}$ is 0.8364. The parameter constellations of (a', r') which would also lead to the steady state $\bar{z} = 0.8364$ are represented by the *blue* curved *line* in the productivity-reciprocity space. I ignore the other two lines for the time being and will comment on those later on. As can be seen in the graph, there are infinitely many points or parameter constellations $(a'r')$, which are different from $(a = 0.7, r = 0.4)$. Each productivity value in the interval $(a_-, a^-) = (0.53, 0.86)$ is associated with a unique reciprocity value r, which lies in the interval $(r_-, r^-) = [0, 1]$. The graph clearly reflects the *non-linear* functional relationship that exists between productivity and reciprocity. The blue line represents the function $r(a; h, c, p, \bar{z})$ stated in the proof on page 23. To be specific, it is the graph of that function for a specific set of parameters, i.e. $r(a; 1, 4, 7, 0.8364)$. In the following section, I refer to the set of all valid points which are not an element of $\mathcal{C}(\bar{z})$, i.e. those will not eventually lead to a steady state social capital of $\bar{z}$, as the complement of $\mathcal{C}(\bar{z})$. The complement will be denoted as $\bar{\mathcal{C}}(\bar{z})$.

7 $\mathcal{C}(\bar{z})$ and the transferability of corporate culture

To demonstrate the implications of my model I use an example of an imaginary head quarter (HQ) located in a fictitious national culture, which implies that a typical member of the workforce has a productivity of individual effort of $a(= 0.7)$ and his reciprocity is defined by $r(= 0.4)$. I assume that the HQ has recruited employees from this workforce. The firm as well as the employees comply with the assumptions of the Rob and Zemsky model. The parameter h is known $(= 1)$ and the effort function is specified, i.e. c is fixed $(= 4)$. The firm also knows the output price p. The firm has already solved the profit maximization problem stated by Rob and Zemsky (2002) by choosing a sequence of incentive intensities w_t. This implies that the firm has accumulated a steady-state stock of social capital $\bar{z}$ $(= 0.8364)$ over time, or formulated differently, a self-reproducing corporate culture $\bar{z}$ evolved over time. Furthermore, given the assumptions of the model, the steady-state $\bar{z}$ is locally stable. It is important to point out, that even if the process of social capital formation starts in the surrounding of the steady-state, the stock of social capital will eventually converge to it, i.e. corporate culture $\bar{z}$ will evolve.

The next assumption is, that the HQ sets up a subsidiary in a country whose national culture differs from the one the HQ is embedded in. This foreign national culture implies that typical members of the local workforce are characterized in terms of a productivity of individual effort a' and a reciprocity behavior represented by r', where a' and r' both differ from the characteristics a and r of the workforce in the home country. The question whether or not the corporate culture can successfully be transferred to the subsidiary abroad can be answered by using the result of the previous section. A positive as well as a negative answer is logically possible considering the framework of the model.

If the productivity and reciprocity parameters (a', r') are an element of the contour set $\mathcal{C}(\bar{z})$, then the sequence of profit maximizing incentive intensities which exists in the subsidiary will lead to a stock of social capital, that will converge to the steady-state $\bar{z}$, i.e. to a corporate culture, which is identical to the one which evolved in the HQ. This process is even robust. For any initial stock of social capital z_0 in the subsidiary, which lies in the surrounding of $\bar{z}$ the corporate culture will eventually converge to exactly that point $(\bar{z})$. This result is not obvious for an outside observer, especially if he has access to data measured at only one point in time. In the beginning of this process the observer could misinterpret the observed distance to $\bar{z}$, saying that this indicates an obvious difference in cultures. Thus only time series observations enables an outsider to identify the inherent tendency of final adjustment to the HQ culture $\bar{z}$. For empirical evidence for the fact that successful transfer takes time, see Jaeger (1983).

This process can be demonstrated for the opposite as well. Assume that (a', r') lies in the complement of the contour set $\mathcal{C}(\bar{z})$. That implies that the process will converge to a stock of social capital $\tilde{z}$, which will not be identical to the culture of the HQ. The national culture of the host country could comprise a combination $(a', r') = (0.95, 0.1)$, - a point down in the right corner of Figure 2, far away from the blue contour line, represents such a case - in that case the model predicts culture $\bar{z}$ not to evolve. This case would be consistent with the observation by Lubatkin, Calori, Very, and Veiga (1998) pointed out above, that corporate cultures are rather adapted to national cultures of foreign countries than transferred from the home country. In fact, trying to enforce the culture of the HQ in this case would, given the stylized framework of the model, lead to a suboptimal result. It would be irrational for the HQ to insist on implementing its culture in the subsidiary.

If it did, it would choose a suboptimal strategy for the international firm, because it implies the violation of the superior goal of profit maximization. It needs to be stressed that a situation in which points lie in the complement of the contour set $\mathcal{C}(\bar{z})$ does not necessarily lead to suboptimal results. Only the ambition to enforce the HQ corporate culture in such a case, would lead to a suboptimal outcome. The implementation of a multi-domestic strategy could be an optimal strategy in this case. It implies that the organizational culture of the HQ is not transferred, but rather evolves in the subsidiary under the influence of the national culture of the host country. Hence, the framework accounts for a multi-domestic strategy as well. The need for it would be reflected as a point in the complement of $\mathcal{C}(\bar{z})$.

Therefore, it can be concluded that in a setting in which a corporate culture evolves as a consequence of choices made by rational actors (e.g. capital owners and/or managers and employees of the firm) it might be both rational as well as feasible to have identical HQ and subsidiary cultures despite the fact that the two national cultures, in which the HQ and the subsidiary are located, differ within certain boundaries. But if the discrepancy in the two national cultures is too big, in the sense that the national culture of the subsidiary does not imply a' and r' values lying on the contour of the HQ culture ($\mathcal{C}(\bar{z})$) it would be an irrational strategy for the firm to insist on identical cultures within the multinational organization.

The analysis of the contour set of $\bar{z}$ has shown, that it is always possible to define an interval of productivity values $[a_{-},\, a^{-}]$ over which values for the reciprocity parameter r in the interval $[0, 1]$ can be found. The amplitude of the interval $[a_{-},\, a^{-}]$, measured by the difference $\Delta_a = a^{-} - a_{-}$, can be used as an indicator of all possible national cultures in which the implementation of the headquarter culture $\bar{z}$ would represent a rational strategy. Δ_a reflects characteristics of the contour $\mathcal{C}(\bar{z})$ and thus depends on the parameters of the model. Now I will try to demonstrate the dependence of the contour set on the parameter c, which influences the slope of the cost of effort function, as well as on the output price p using graphical information.

The blue line in Figure 2 represents for example the contour set for the HQ culture $\bar{z} = 0.84$. The parameter values on which the calculations are based are specified in the first row of Table 2. Suppose the HQ would face an output price of 10 instead of 7 as in the baseline situation (everything else being equal). The calculations show that a steady-state stock of social capital $\bar{z} = 0.56$ would evolve. The red line now represents all those combinations of productivity and reciprocity which would imply the same culture. Note that the associated Δ_a is lower than the one in the baseline situation. It decreases again, if the price gets even higher. This feature of $\mathcal{C}(\bar{z})$ is inherent in all cases considered below. (See also column 10 of Table 2). In scenarios with higher output prices, the set of national cultures in which the HQ culture would evolve will decrease significantly.

An inspection of Figures 2 and 3 suggests a second qualitative result. As the cost of effort function (disutility of effort) becomes flatter the contours $\mathcal{C}(\bar{z})$ become less curvy - r and a are eventually related in a linear fashion.

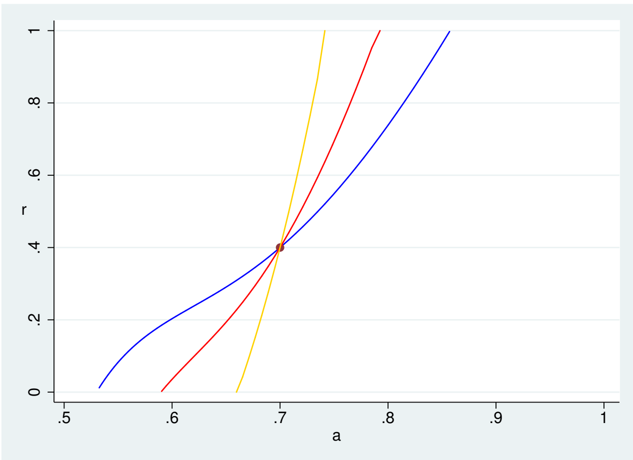

Figure 2: $\mathcal{C}(\bar{z})$ for $p = 7$ (blue), $p = 10$ (red), $p = 13$ (gold) ($h = 1$, $c = 4$)

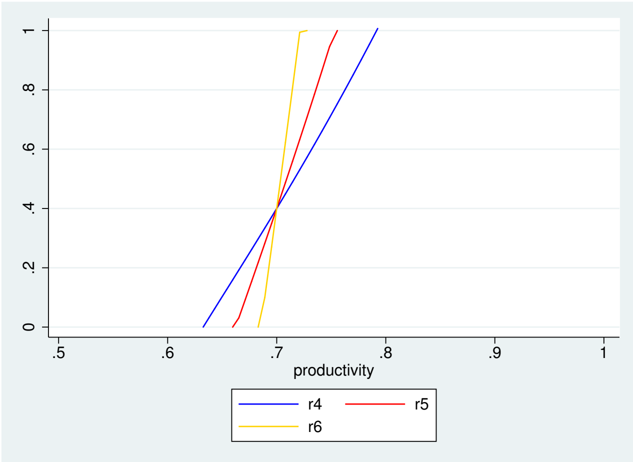

Figure 3: $\mathcal{C}(\bar{z})$ for $p = 6$ (blue), $p = 7$ (red), $p = 8$ (gold) ($h = 1$, $c = 2$)

The examination of the contour set as well as the inspection of figures 2 and 3 also allow to formulate 2 possible hypotheses, which can be tested empirically in future research:

H1: The probability for a corporate culture transfer decreases, as the distance of the reciprocity and productivity conditions for the subsidiary from the contour set $C(\bar{z})$ increases.

H2a: The higher the output price, the smaller the set of admissible productivity levels for successful transfer of corporate culture.

H2b: The lower the output price, the larger the set of admissible productivity levels for successful transfer of corporate culture.

8 Conclusion

So far the opinions about the international transferability of corporate cultures have been very diverse and even contradictory. Some scholars state that transfer is feasible others conclude that it is impossible due to the evolutionary character of organizational cultures and its embeddedness in national cultures. The article of Rob and Zemsky (2002) contributes to the literature in proving that differences in corporate cultures among firms exist, although the companies are perfectly identical otherwise. The argument developed in this paper, based on the model of Rob and Zemsky (2002) tries to shed some light on the transferability question. It shows that identical corporate cultures can exist in a HQ and its subsidiary, although the national cultures of the two host countries differ within certain boundaries. Therefore the choice made by rational actors, for example the capital owners and/or managers of the firm, to establish the same corporate culture might be rational and also feasible in the light of profit maximization. If the two national cultures differ too much though, in the sense that the national culture of the subsidiary does not imply a' and r' values which lie on the contour of the HQ culture $\mathcal{C}(\bar{z})$), insisting on identical cultures is an irrational strategy for the MNC. A multi-domestic strategy should be implemented instead.

Given the complexity of corporate cultures the argument developed in this paper is only valid for the very stylized version modelled in the paper. It of course depends on the definition of organizational culture as a stock of social capital. If a firm intends to transfer other aspects of a corporate culture, additional to the ones used in this framework, e.g. other artifacts or espoused values, it might be rational as well as feasible to transfer them, although a' and r' do not lie on the contour set. They are not accounted for in the contour $\mathcal{C}(\bar{z})$ and therefore cannot be explained by this framework. Nevertheless the approach developed in this paper implies some insights for scholars as well as for practitioners concerning the contradicting results of the transferability of corporate cultures. Given the constraints of the model, transfer is rational and feasible under certain conditions, whereas it is irrational under others. Therefore the different findings in the literature concerning this problem are contradictory, but not wrong. To robustify this result empirical testing of the argument would be valuable. Testable hypotheses have been derived from my approach. Future research could also be concerned with the question, which nations comprise those combinations of the parameters used in the argument under which a transfer is rational and doable. Furthermore other parameters could be identified, which support the transferability of cultures to other countries. Those findings could be very valuable for practitioners, especially in times where going international becomes more and more essential for surviving and being successful in the global economy.

Appendix 1

Table 2: Parameter constellations underlying Figures 2 and 4

Figure	h	c	p	a	r	$\bar{z}$	a_-	a^-	$\Delta_a = a^- - a_-$
2	1	4	7	0.7	0.4	0.84	0.53	0.86	0.33
	1	4	10	0.7	0.4	0.56	0.59	0.79	0.20
	1	4	13	0.7	0.4	0.29	0.66	0.74	0.08
3 (r4)	1	2	6	0.7	0.4	0.49	0.63	0.79	0.16
(r5)	1	2	7	0.7	0.4	0.31	0.66	0.76	0.10
(r6)	1	2	8	0.7	0.4	0.14	0.68	0.73	0.05

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