

Closing the Group or the Market?

The Two Sides of Weber's Concept of Closure and Their Relevance for the Study of Intergroup Inequality

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SFB 882 "From Heterogeneities to Inequalities"
University of Bielefeld
Faculty of Sociology
PO Box 100131
D-33501 Bielefeld
Germany
Phone: +49-(0)521-106-4942 or +49-(0)521-106-4613
Email: office.sfb882@uni-bielefeld.de
Web: <http://www.sfb882.uni-bielefeld.de/>

DFG Research Center (SFB) “From Heterogeneities to Inequalities”

Whether fat or thin, male or female, young or old – people are different. Alongside their physical features, they also differ in terms of nationality and ethnicity; in their cultural preferences, lifestyles, attitudes, orientations, and philosophies; in their competencies, qualifications, and traits; and in their professions. But how do such heterogeneities lead to social inequalities? What are the social mechanisms that underlie this process? These are the questions pursued by the DFG Research Center (Sonderforschungsbereich (SFB)) “From Heterogeneities to Inequalities” at Bielefeld University, which was approved by the German Research Foundation (DFG) as “SFB 882” on May 25, 2011.

In the social sciences, research on inequality is dispersed across different research fields such as education, the labor market, equality, migration, health, or gender. One goal of the SFB is to integrate these fields, searching for common mechanisms in the emergence of inequality that can be compiled into a typology. More than fifty senior and junior researchers and the Bielefeld University Library are involved in the SFB. Along with sociologists, it brings together scholars from the Bielefeld University faculties of Business Administration and Economics, Educational Science, Health Science, and Law, as well as from the German Institute for Economic Research (DIW) in Berlin and the University of Erlangen-Nuremberg. In addition to carrying out research, the SFB is concerned to nurture new academic talent, and therefore provides doctoral training in its own integrated Research Training Group. A data infrastructure project has also been launched to archive, prepare, and disseminate the data gathered.

Research Project A1 “Social Closure and Hierarchization: Contextual Conditions of Unequal Developmental Opportunities in Early Phases of Life”

This project extends research on the genesis and effects of individual heterogeneity to cover psychological characteristics and their interplay with socioeconomic characteristics. It looks at cognitive and non-cognitive competencies on the one hand, and various dimensions of cultural and social capital on the other, asking how far these overlap, how far each determines the genesis of the other, and how far each impacts upon academic success and a successful life. Do they contribute particularly strongly to the early and largely irreversible reduction of opportunities, to the accumulation of advantage and disadvantage? For the first time, two established but previously unconnected research traditions are being integrated into one research design. Although this means a certain degree of competition between them, it simultaneously creates the possibility of integrating the two bodies of existing knowledge.

The studies are conducted not only on the level of the individual life course, but also taking into consideration the contextual conditions of different family constellations, social networks and neighborhoods, and educational organizations and institutions. All these contextual levels may harbor social exclusion mechanisms. The particular significance of the family of origin for the genesis of social inequalities is taken into account by considering both the stratification features of families of origin and the increasing diversity of family structures, with the resulting hierarchization of family positions and roles. In addition, the project goes beyond differences between families to study differences in the significance of one and the same family for its various members – particularly for siblings in terms of gender, age difference, and birth order. The project focuses on the early phases of life. Empirically, it will pay special attention to developing and implementing innovative operationalizations of life-course cohort analyses, based on the German Socio-Economic Panel Study (SOEP) and comparable panel studies in other countries, primarily the Child Development Supplement of the Panel Study of Income Dynamics (PSID).

The Author

Andrés Cardona is a member of the SFB 882 research project A1 “Social Closure and Hierarchization: Contextual Conditions of Unequal Developmental Opportunities in Early Phases of Life”, and PhD candidate at the Bielefeld Graduate School in History and Sociology. His research interests include agent-based modeling (ABM), social network analysis, and the intergenerational transmission of social inequality.

Contact: andres.cardona@uni-bielefeld.de

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The Two Sides of Weber's Concept of Closure and Their Relevance for the Study of Intergroup Inequality[†]

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andres.cardona@uni-bielefeld.de

Abstract

The Weberian concept of closure, the concerted collective action aimed at excluding rival groups from competition for economic opportunities and resources, has captured the attention of sociologists studying stratification and social inequality for decades. Closure has been suggested as a cause of intergroup inequality across professional, ethnic, religious, and national boundaries, among others. However, most studies applying the concept have ignored a basic distinction drawn by Weber between closing the market to competitors and closing the group to outsiders. This inattention has not only been responsible for conceptual confusion but also threatens to undermine the usefulness of the concept in understanding intergroup inequality. The aim of this paper is twofold. First, it re-examines Weber's definition of closure and shows that in its original formulation, market closure is different from group closure. Second, it argues that making this conceptual distinction is essential for disentangling two phenomena that are equally capable of producing inequality among groups. Apart from a brief exegesis of Weber's account of closure, a simple computer-simulated agent-based model (ABM) is offered to illustrate how market closure and group closure, combined with individual competition, are independently sufficient to bring about an unequal distribution of resources among groups. The message for empirical researchers using closure as an explanation of inequality is clear: failing to draw the distinction between closing the market and closing the group will, at best, lead to causal indeterminacy or, at worst, to false causal conjectures.

Keywords: *social closure, exclusionary action, intergroup inequality, agent-based models (ABM), ODD protocol*

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Introduction

As briefly discussed in *Economy and Society*, Weber introduced the concept of closure to describe two different group-related phenomena.¹ Closure denotes, first, the more or less intentional process of groups drawing boundaries against outsiders, driven not only by economic interests but also by tradition or affectual bonds (Weber 1978, 43–6). Group closure leads to the formation of exclusive groups regulated by formal or informal membership rules such as those observed, for example, in private clubs or political parties. Besides the creation of group boundaries, Weber also used the word ‘closure’ to describe a form of economic action in which groups strategically instrumentalize their boundaries with the sole purpose of limiting or eliminating competition from rival groups to secure access to economic resources and opportunities (Weber 1978, 339–48). In this second type of closure, it is not the group but the market that becomes closed to free entry and free competition. In closed markets, allocation is conditioned by group membership, as in the extreme case of regulated markets for professional services where entry is reserved only for licensed practitioners.

Since, in both cases, the outcome of closure is the emergence of ‘outsiders,’ either in the form of individuals excluded from a group (e.g., women in a men-only club) or groups excluded from a market (e.g., unlicensed lawyers in a regulated market for legal services), the concept has greatly appealed to contemporary sociologists devoted to the study of stratification and intergroup inequality. On the theoretical side, the concept of closure with its double meaning of market closure and group closure has been extended and articulated into broader theories of stratification by Parkin (1979), Murphy (1988), and, more recently, Tilly (1998).² At the same time, and mostly influenced by the works of Parkin and Murphy, empirical research on stratification over the past two decades has shown a growing interest in closure as a mechanism producing different forms of intergroup inequality, including dimensions such as gender, race, occupation, and citizenship, among others (See Appendix 1 for a list of selected empirical studies on closure and inequality).

While both efforts to expand the theoretical leverage of closure as the primary force driving intergroup inequality and the growing empirical studies applying the concept are valuable and welcome contributions to stratification research, they have been accompanied by an unfortunate conceptual inattention. The problem, already pointed out over 30

¹ There are at least two alternative uses of the word ‘closure’ in sociology which are not directly related to the Weberian definition. The first is found in Giddens (1973) and his theory of class structuration. There, he uses the word ‘closure’ to refer to intergenerational and individual mobility chances (p. 107). Coleman (1988) also employs the word ‘closure’ in his seminal article on social capital to refer to the density of personal ties in social networks. Network closure is a condition both for the effective normative control of individuals and the emergence of trustworthiness within networks (pp. 105–7) and has subsequently been used in research on social capital (e.g., Burt 2007). Neither of these two alternative usages of the word ‘closure’ should be confused with the Weberian definition reviewed here.

² Concepts similar to the Weberian notion of closure and their use in stratification theory are discussed in Murphy (1988) and Manza (1992). In economics, too, the dynamics of groups acting strategically to secure benefits has been widely studied. Prominent examples in this literature are the economic theory of groups (Olson 1971), the theory of clubs and public goods (Buchanan 1965), studies on rent-seeking, and the voluminous body of research on economic regulation and interest groups (Buchanan 1980; Tollison 1982; Rowley 1991).

years ago by Giddens (1980, 887) in a critical appraisal of Parkin (1970), consists in ignoring the distinction drawn by Weber between collective efforts to close the market by excluding rivals from competition, and the process of closing the group by erecting boundaries against outsiders. Some, like Parkin, have done this knowingly, claiming that market closure and group closure are the same processes (Parkin 1980).³ Others, mainly those working with the concept empirically, appear to have drawn selectively from Weber's writings on closure using one of the two meanings of the word and ignoring the second. For example, while some use the concept to denote closing the market (e.g., Weeden 2002), others refer to closing the group (e.g., Macdonald 1985; Brubaker 1992) and still others merge both phenomena into one term (e.g., Tomaskovic-Devey 1993a; Elliott & Smith 2001).

The purpose of this paper is not simply conceptual clarification. Nor does it aim to echo Giddens (1989) in calling the attention of scholars using the concept of closure to its two distinct meanings. What is more urgent than that, at least for empirical research, is to show why ignoring this distinction will probably lead to incomplete or incorrect causal accounts of intergroup inequality. In other words, the present paper is not about repeating arguments already made elsewhere on the meaning of words, nor to convince anyone about the 'right' definition of closure. Instead, the goal is to make it clear why anyone interested in studying intergroup inequality should take care to distinguish between processes of market closure and group closure.

To achieve this goal, the first section of this paper deals with definitional issues. It briefly reconstructs Weber's original formulation of closure and reiterates the importance of keeping market closure and group closure conceptually separate. To demonstrate that this distinction is not an inconsequential definitional dispute, an agent-based simulation is conducted in the second section, illustrating the combined dynamics of market closure and group closure in producing intergroup inequality. The model shows how the two forms of closure taken separately are sufficient to bring about an unequal distribution of resources among groups, hence the importance of distinguishing between these distinct processes when formulating causal explanations of observed intergroup inequalities.

1. Weber's Original Formulation: Defining Group Closure and Market Closure

Reconstructing Weber's use of the word 'closure' is the first step towards disentangling the differences between closing the market and closing the group. To begin with, a short summary of his discussion on open and closed relationships will be provided (Weber 1978, 43–6), where closure is introduced to refer to closing group boundaries. Next, a widely quoted fragment of his section on the economic relationships of organized groups

³ In Parkin's reply to Giddens' (1980) critical assessment of his *Marxism and Class Theory: A Bourgeois Critique*, Parkin concludes: "It simply does not make sense to say, as Giddens does, that the attempt by one group to monopolize resources to the exclusion of another is a separate phenomenon from group closure against outsiders. They are merely different ways of saying the same thing" (p. 892).

will be commented on (Weber 1978, 339–48), where closure describes strategic collective efforts to neutralize competition or market closure. The two meanings of the word will be explained and some translation slips between the original German version and the English version will be uncovered.⁴ The relationship between market and group closure will be further explored in the next section using an agent-based model.

1.1. Group Closure⁵

A social relationship, regardless of whether it is communal or associative in character, will be spoken of as “open” to outsiders if and insofar as its system of order does not deny participation to anyone who wishes to join and is actually in a position to do so. A relationship will, on the other hand, be called “closed” against outsiders so far as, according to its subjective meaning and its binding rules, participation of certain persons is excluded, limited, or subjected to conditions (Weber 1978, 43).⁶

The process of closing a relationship, Weber adds, may be driven by tradition, affectual bonds, or rational considerations. Thus, even if, for example, families, erotic relationships, or economic groups all draw boundaries against outsiders, the logic underlying the emergence of those boundaries varies. The numerous motives for relationships to be closed or open (traditional, affectual, or rational) combines with the wide range of collective phenomena subsumed by Weber under his concept of relationship to produce a myriad of possible conditions of participation (p.45).⁷ At one end of the spectrum, formally constituted groups such as private clubs may screen new members through formal membership rules attached to achieved or ascribed individual characteristics. At the other end, more diffusely bounded groups might be found, such as “a party rally to which the largest possible number has been urged to come” (p.45).

In fact, closing a relationship in the Weberian sense, or, to use a more generic word, closing a group can be understood as a special case of the more contemporary notion of ‘boundary making.’ As Lamont & Molnar (2002) summarize, boundaries are not only drawn by clearly identifiable groups using formal or informal membership rules to keep unwanted non-members at bay as in the Weberian version; they might also be symbolic. Symbolic boundaries segregate individuals in diffusely defined categories, such as ethnic-

⁴ For the sake of precision and comparability, the English version of Weber’s works referred to in the following pages (Weber 1978) is the same as that used by Parkin (1979) and Murphy (1988).

⁵ Sørensen (1983) uses this same notion of open and closed relationships to discuss what he calls ‘closed positions.’ Closed positions, such as jobs with tenure, are those to which individuals have access only when the positions have been vacated by previous incumbents (p.206). Although Sørensen’s starting point is Weber’s passage on open and closed relationships, the two definitions should not be confused. While Weber is referring to the emergence and permeability of group boundaries, Sørensen is interested in positions in organizations and the dynamics of vacancy chains in labor markets and educational systems.

⁶ While communal relationships (*Vergemeinschaftung*) refer to individuals held together by affectual or traditional bonds, associative relationships (*Vergesellschaftung*) describe individuals brought together by rational agreements or mutual consent (Weber 1978, 40–2).

⁷ Moreover, once members are accepted into a closed relationship, not all are given equal treatment. Additional closed relationships *within* the group might prevail which regulate the internal allocation of group privileges following rules similar to those applied to the admission of new members (p.45–6).

ity or class, and are constantly renegotiated through ever changing patterns of interaction within and across boundaries.

1.2. Market Closure

As well as in the discussion on group boundaries, Weber also uses the word ‘closure’ to designate the type of collective, exclusionary action practiced by groups when pursuing common economic interests. Compared to the process of drawing boundaries or group closure, which, Weber argues, might follow affectual, traditional, or rational motives, according to this second definition, ‘closure’ denotes rationally driven, economically motivated collective behavior. He describes this very particular form of economic action as follows:

One frequent economic determinant is the competition for a livelihood – offices, clients and other remunerative opportunities. When the number of competitors increases in relation to the profit span, the participants become interested in curbing competition. Usually one group of competitors takes some externally identifiable characteristic of another group of (actual or potential) competitors – race, language, religion, local or social origin, descent, residence, etc.– as a pretext for attempting their exclusion. It does not matter which characteristic is chosen in the individual case: whatever suggests itself most easily is seized upon (Weber 1978, 341–2).

Hence, groups practicing market closure as a strategy for accumulating resources and economic opportunities may avoid the uncertainties and difficulties of becoming better competitors by redirecting their efforts to exclude adversaries from the competition altogether. Not surprisingly, as Weber points out, the best way to secure group-related preferential access to markets is by mobilizing the support of the state. This is the case with successful professionalization projects which grant a small circle of specialists, such as lawyers or doctors, the exclusive right to offer specialized services. It also applies to trade protectionism driven by industry lobbying which excludes foreign competitors from domestic markets by means of prohibitive tariffs and restrictive non-tariff regulations.

This is not to say, however, that neutralizing competition from a particular group *always* requires the support of the state and the legal system. Excluding rival groups from the market can also be achieved through informal means such as bad publicity, as in the case of western medical practitioners calling alternative practitioners unscientific. It can also be done by other less subtle yet highly effective means such as those used by the Sicilian mafia to protect the territorial claims of their clients’ businesses from unwanted competition (Gambetta 1996: Ch. 8). In any case, the crucial precondition for market closure practices is the existence of a group capable of collective action. To speak about closure practices of bounded groups not capable of concerted action would be to commit the fallacy of “groupism” (Brubaker 2004). As Brubaker (2004, Ch. 1) warns, not all groups or categorically bounded collectives, such as those defined along the lines of ethnicity and religion, can be assumed to act concertedly the way professional organizations or firms do when pursuing their common economic interests.

Although Weber provides some historical examples of market closure practices, such as professional organizations lobbying the state for the legal privilege to offer their ser-

vices, he does not discuss in any detail the *outcome* of such acts of strategic exclusion of competitors. Complementing Weber's definition of market closure, two main outcomes can be expected to follow from a group acting collectively to exclude rivals from the market. First, closing the market should, by definition, lead to a new market situation where market participation is a function of group membership. To close a market is to change its allocation rules from a free-for-all contest where the best contender wins, irrespective of group membership to an administered competition in which some groups but not others, and certainly not all, have the privilege of participating. Second, and as consequence of the first, closing a market, if done successfully, should translate into a process of unequal accumulation of resources and economic opportunities favoring the excluding party at the expense of those against whom exclusionary action was directed. Market closure then produces both a closed market and intergroup inequality.

It is very important to note that Weber's second definition of closure refers to the *act* of collectively excluding competitors from the market and not to any of its two outcomes – a closed market or intergroup inequality *per se*. It would be misleading to assume that the mere existence of inequality in a market, for instance, the observed dominant position of one group compared to other groups, should always be attributed to closure practices, a confusion found in prominent works such as Murphy's theory of monopolization and exclusion (Murphy 1988; e.g. p. 71-2). Just as a group may achieve a dominant position by disrupting competition, acting against the market through concerted exclusionary action directed against rival groups, it can also bring about the same result by being a better competitor and playing by the rules (Weber 1978, 936-7). The same caveat applies to closed markets. The existence of a monopoly benefiting a group should not be taken at face value as evidence of market closure practices. Legally protected group monopolies may also result from broader societal processes which are to a large extent unrelated to the economic interests of the group enjoying the privilege. For example, even if the state passes laws to regulate certain occupational groups through exclusionary instruments such as licenses, the capacity of professional groups to influence the state cannot always be assumed to be the catalyst for such regulations (Adams 2008). Moreover, a closed market might also be the result of group-related discrimination, such as racism or sexism, where categorically-biased cognitive rules of thumb and non-concerted collective action are responsible for undermining the capacity of individuals to compete in the market (Roscigno 2007).

1.3. An Example: Accountants in UK between 1957 and 1970

One of the many possible instances of group and market closure that can be cited is a case study stemming from the history of professions.⁸ This study was conducted by Walker and Shackleton (1998) and deals with the failed attempt of the accountancy profession in UK to secure a state-sanctioned monopoly between 1957 and 1970. The main drive behind these efforts was to exclude unqualified practitioners from the market through the

⁸ The selection of this study was not entirely arbitrary. There are two good reasons for choosing it: first, the literature on professions is one of the most prolific fields in sociology empirically applying the concept of closure (see Appendix); and second, this particular case offers a clear example of both group closure and market closure practiced by the same group.

creation of a unified professional body whose members would hold a legal monopoly on the provision of accounting services. For this purpose, proponents of the initiative agreed on two main strategies (pp. 44ff.):

- i) An umbrella organization was to be created to integrate competing professional bodies and offer standardized training for its members with clearly defined entry requirements based on several criteria such as education and training, work experience, employment status, location, and type of service. Not all accountants were to be included in this unified organization, and particularly not those regarded as lowering the standards of the profession.
- ii) With the support of the legislator, the members of this newly formed organization were to be granted a legal monopoly on accounting services. The creation of competing accounting organizations in the future was to be prohibited.

With i), accountants expected to unify their organization by setting training requirements and by keeping out unqualified accountancy practitioners from their group. This, however, would not have stopped non-members from offering accounting services, or prevented the formation of new organizations claiming to train and certify accountants. In other words, i) would simply have regulated who could offer his or her services as a certified member of the new organization of professional accountants. The market would have still remained formally open to competitors offering accounting services and would also have allowed clients to choose freely among alternative practitioners regardless of their credentials. With ii), on the other hand, not only was the new organization to be made exclusive, but, in addition, taking part in the market would have become the sole privilege of its members. Had the law been introduced and effectively enforced, accountants outside the new umbrella organization would not have been able to offer their services. Even if achieving i) would have granted members of the group the privileges of membership in a consolidated professional body, access to the market could only have been closed after having successfully accomplished ii).

It can easily be seen how each of these two strategies fits into the concepts of group closure and market closure. While i) can be regarded as rationally driven group closure, ii) is a prototypical case of attempts at closing the market. Although, as it turned out, accountants did not succeed in convincing state agencies of the benefits of their plan and abandoned their efforts before seeing any results, the two intended strategies clearly show the difference between closing the group through membership rules and closing the market by conditioning market participation to group membership and individual competition.

1.4. Is Closing the Market Independent from Closing the Group?

To draw a distinction between market closure and group closure is not to deny that, under certain conditions, the two processes might respond to the same motives and reinforce each other. In cases where making the group more exclusive responds to the same economic considerations pursued through market closure practices, closing the group might

correlate or even be consciously aligned with collective attempts to reduce competition from rival groups. Regarding this particular overlap of market closure with rationally driven group closure, Weber remarks:

If the participants [in a relationship] expect that the admission of others will lead to an improvement of their situation, an improvement in degree, in kind, in the security or the value of the satisfaction, their interest will be in keeping the relationship open. If, on the other hand, their expectations are of improving their position by monopolistic tactics, their interest is in a closed relationship (Weber 1978, 43).

Therefore, according to Weber, protecting or enhancing the privileges enjoyed by a group might indeed be a reason to tighten group boundaries. Religious sects or craft guilds closing their boundaries with the overt purpose of maintaining ethical standards or protecting their monopolistic position in the market are two examples given by Weber to illustrate rationally driven group closure (Weber 1978, 45).

It would be tempting to conclude that when groups pursue their collective economic interests, a combination of market and group closure leads to the most favorable results. Market closure could be deployed to accelerate the accumulation of resources and economic opportunities, while group closure could be used to protect accumulated resources. As Weber observes, however, this combined tactic is neither infallible nor always desirable. Instead, groups may oscillate between openness and exclusivity depending on their priorities (Weber 1978, 45). Keeping group boundaries open might well be necessary to expand the group's influence through the effect of sheer size. On the other hand, restricting the number of members through stronger boundaries becomes essential when the goal is to keep or increase the value of privileges already accumulated. Hence, even when group closure complements market closure in securing acquired privileges, the very process of collective accumulation probably entails periods of expansion and permeable group boundaries as well as periods of consolidation and tight group boundaries.

1.5. Why Were the Two Meanings of Closure Conflated in the First Place?

So far, the two meanings of the word 'closure' have been discussed and illustrated with an historical example. Yet, despite the palpable differences between these two phenomena, research and theorizing on closure tend to ignore the distinction. Why is this so?

There are at least three possible answers to this question. First, Weber's readers may be guilty of reading *Economy and Society* selectively, quoting the passages on closure without being aware of the two meanings of the word. This also includes instances in which, as mentioned by Parkin, they were aware of the two meanings of the word but saw no point in differentiating between them. A second possible explanation for this conceptual confusion is to blame the author, Max Weber. In fact, he used the word 'closure'—*Schließung* in German—in two different contexts. As summarized above, in Weber's original version of the text, the word *Schließung* first appears under the heading "open and closed relationships" (Weber 1972, 23–5); once to describe the exclusion of outsiders from participating in a group through membership rules (*Schließung nach außen*) and again to indicate the exclusion of members from privileges *within* the group (*Schließung nach innen*). In a later chapter, the word *Schließung* appears once more, this time as part

of the discussion on “open and closed economic relationships” (Weber 1972, 201–3). But besides Weber and his readers, the third possibility is to blame the translators of Weber’s original text. The slippery conceptual choice made by Weber when using the word ‘closure’ was further obscured by slight inconsistencies in its translations into English.⁹ Thus, for instance, in one passage, what Weber terms “*Regulierung und Schließung*” was translated as “regulation and exclusion” (*Schließung* = exclusion), while “*Reguliertheit und Geschlossenheit*” became “regulation and closure” (*Geschlossenheit* = closure). Yet, after introducing the translations of the two terms, the text refers in a later passage to *Schließung* no longer as ‘exclusion’ but as ‘closure.’¹⁰ As summarized in **Table 1**, while *Schließung* can mean both ‘exclusion’ and ‘closure,’ the word ‘closure’ is used in the translation to refer to both *Schließung*, the active act of ‘closing,’ and *Geschlossenheit*, which could be translated as ‘closedness’ and describes the resulting *state* of being ‘closed.’

Table 1. Different translations of the words *Schließung* and ‘closure’

Section in <i>Economy and Society</i>	Original text and translations
Open and closed relationships ^a	<i>Schließung</i> : closure, exclusion. <i>Geschlossenheit</i> : closure.
Open and closed economic relationships ^b	<i>Schließung</i> : closure.

^aWeber (1972, 23–5), Weber (1978, 43–6). ^bWeber (1972, 201–3), Weber (1978, 341–3).

A more reasonable position is to attribute the confusion surrounding the concept of ‘closure’ to the composite effect of readers’ inattention, multiplicity of meanings in Weber’s original text, and small but consequential inconsistencies in the English translation of the concept. The result is a word with not only two, but even three meanings: the first two, as explained above, are genuine distinctions drawn by Weber between closing the market and closing the group that can be traced back to the word *Schließung*. The third meaning was *gained* in translation and refers to the *outcome* of a group closing its boundaries to outsiders, or internally for the distribution of privileges within the group. It is termed *Geschlossenheit* by Weber, meaning the *state* of being closed. The third meaning of closure, artificially created in translation, must have been a challenge for readers of the English version of the text who were confronted with the seemingly incomprehensible assertion that closure (*Schließung*; the act of closing) produces closure (*Geschlossenheit*; the state of being closed).

⁹ Again, this applies to the English translation of Weber’s *Economy and Society* by Guenther Roth and Claus Wittich (Weber 1978), the version usually quoted in subsequent discussions on closure and the one used by Parkin (1979) and Murphy (1988).

¹⁰ The exact passages referred to here are the following, quoted in German and English, respectively. (i) *German*: “Das Maß und die Mittel der Regulierung und Schließung nach außen können sehr verschieden sein, so daß der Übergang von Offenheit zu Reguliertheit und Geschlossenheit flüssig ist” (Weber 1972, 24). (i) *English*: “Both the extent and the methods of regulation and exclusion in relation to outsiders may vary widely, so that the transition from a state of openness to one of regulation and closure is gradual” (Weber 1978, 45). (ii) *German*: “Motiv der Schließung kann sein...” (Weber 1972, 24). (ii) *English*: “The principal motives for closure of a relationship are...” (Weber 1978, 46).

To avoid any misunderstandings, Weber's two forms of closure (*Schließung*) can be easily distinguished by explicitly naming the object of the action of 'closing,' as has been done so far in the present article: *market* closure or the collective exclusion of rival groups from competition and *group* closure or the collective exclusion of individuals from the group. Furthermore, to improve the inaccurate translation of the word *Geschlossenheit* (literally meaning 'closedness'), the word 'exclusivity,' the adjective 'closed' or the expression 'degree of closure' might be used instead. The level of exclusivity of a group or its degree of closure is nothing more than the permeability of its boundaries to outsiders. If boundaries are impenetrable, the group might be described as being 'closed.' Moreover, just as group closure leads to group exclusivity or to a closed group, a market that is only accessible to members of a certain group can be described as an exclusive market, a closed market, or a market with a high degree of closure. Arbitrary as it may seem, 'exclusivity,' 'degree of closure,' and being 'closed' appear to be distinct enough from 'closure' to reduce the risk of confusing the phenomena they describe. More importantly, making this distinction allows us to refer separately to the action of closing and the outcome or state following that action.

1.6. Closing the Market vs. Closing the Group: A Summary

To close this section on the definition of group closure and market closure, **Table 2** summarizes the conceptual issues discussed so far. Four dimensions are compared: action, actors, motive of action, and outcome.

Table 2. Two meanings of closure

	Group closure	Market closure
Action	Groups draw boundaries against outsiders.	Groups influence resource allocation rules in a market to limit or eliminate competition from rival groups.
Actors	Any group with clearly defined boundaries and the capacity to modify its membership rules.	Group capable of concerted collective action and the power to modify market allocation rules. The latter can also be effected indirectly through a third party (e.g., the state).
Motive	Economic interests or also shared values, tradition, and affectual bonds.	Economic interests.
Outcome	Exclusive group. Participation in the group regulated by membership rules.	Closed market. Market allocation conditioned by group membership.

2. The Relevance of Distinguishing Group Closure from Market Closure in the Study of Inequality

Why is it important to make the conceptual distinction between closing the group and the market? Readers who value conceptual clarity and yet are wary of endless conceptual discussions with tenuous practical implications for research and theorizing might be wondering about the relevance of the previous pages. To appease their justified skepticism, this section illustrates how ignoring the difference between group closure and market closure may lead to incomplete or outright false explanations of group-related inequality. Building on the foregoing discussion, the section starts by spelling out four distinct causal paths which may lead to inequality among groups. Next, a computer simulation using agent-based models (ABM), representing the theoretically predicted dynamics of the two forms of closure in a simplified manner, is designed and implemented using Python. The results of the simulation show that different degrees of group and market closure combine with individual competition to produce very varied outcomes, from one group controlling all resources to a relatively equal distribution of resources among groups.

2.1. Individual and Group Competition in Producing Intergroup Inequality: Four Mechanisms

Implied in the Weberian notion of closure is the idea that competition for economic resources and opportunities can take the form of individuals going up against each other in a free-for-all market or of groups acting strategically by tightening their boundaries or attempting to exclude competitors with the purpose of raising the market success of its members. Abstracting from these dynamics of individual and group competition, four mechanisms connecting individuals and groups to intergroup inequality can be spelled out.

- i) *Pure individual competition.* The definition of closure suggests that without group intervention in the free flow of the market, those best suited for competition end up better off than others not equally well equipped. Hence, the first mechanism connects individual attributes to market outcomes directly, independently of group membership.
- ii) *Individual competition through group membership.* The definition of group closure implies the possibility that groups confer advantages to their members which enhance their capacity to compete for resources. If belonging to a group furthers individual market chances by improving their market-relevant attributes, for example, by having access to group-specific expertise, then group membership may be causally connected to market outcomes. Individuals still compete against each other in the market but they also compete for group membership. This competition for group access makes other attributes (not those necessary to be successful in the market) equally important. Thus, gender, age,

ethnicity, or any other individual trait may indirectly affect market success insofar as these condition access to a group that increases individual market opportunities, even if taken alone those attributes do not affect market performance.

- iii) *Group competition through group closure.* Intimately related to the latter, when groups have an impact on individual outcomes, they may act strategically by modifying their boundaries to enhance accumulated advantages by members. This is the case with rationally driven group closure. Membership rules are enacted and group advantages protected from outsiders. Groups that are more successful in protecting valued resources and opportunities will prevail in competition. Yet, even if groups compete to protect their assets, their advantage still depends on the attributes of their members. If group members fail in the market as individual competitors – for example, if the expertise hoarded by a professional group is no longer advantageous in the eyes of clients – group closure in itself cannot do much to curve market outcomes in favor of its members.
- iv) *Pure group competition through market closure.* A fourth mechanism draws a direct line between group membership and market outcomes, bypassing individual attributes. In a closed market, group affiliation exerts an independent effect on market access, hampering allocation rules based solely on individual attributes. If a group completely closes a market for itself, individual competition might still exist but only for members of the group that closed the market. All other potential contenders are not allowed to compete.

Needless to say, these four mechanisms are mere analytical distinctions distilled from the very particular scenario depicted by the Weberian concept of closure where individuals and groups compete against each other with the sole purpose of securing economic advantages. In the following, it will be shown using a simple ABM how these four mechanisms, individually or in combination, are sufficient to produce comparable levels of inequality among groups.

2.2. Simulating Individual and Group Competition Using ABM

Computer-based simulation models are a powerful and versatile method relatively underused in the social sciences as compared to the physical and life sciences. Among the many uses of computer models to assist social scientists – including explanation, prediction, experimentation, and policy formulation (Grüne-Yanoff & Weirich 2010) – theory development is one of the lowest cost and relatively less controversial in a discipline still distrustful of the advantages of computer simulation techniques.

Instead of gaining theoretical insights through sheer introspection, computer-based simulations applied to theory development provide the option of running virtual thought experiments to extensively explore the internal consistency and hidden complex implications of interacting theoretical premises. Simulation is then, as some have argued, a third symbol system available to scientists for formulating theories in addition to mathematics

and natural language, and an ideal tool for theory development (Hanneman et al. 1995, Ostrom 1988). Of the various existing simulation techniques such as microsimulation, system dynamics, or cellular automata, agent-based models (ABM) stand out as the preferred choice when simulated entities are thought to be heterogeneous, embedded in an environment, and expected to interact autonomously to reproduce non-linear and out-of-equilibrium system dynamics (Gilbert & Toitzsch 2005). These properties combined with increasing computing power, object-oriented programming, and advances in distributed artificial intelligence have given ABM the edge in the vibrant and rapidly growing field of social computational modeling (Gilbert 2008; Miller & Page 2007; Squazzoni 2012).

In the following, a theoretical agent-based model of individual and group competition will be offered to illustrate the dynamics of market and group closure. In the simulation, a simplified labor market for professional services is assumed. The purpose of the simulation is not to model realistically how individuals and groups compete in a particular market. Instead, the goal is to conduct a thought experiment based on the premises implicit in the definition of closure and to reproduce the dynamics of the four mechanisms identified above under simplified assumptions. Two main modeling decisions underlie the simulation.

- i) While allocation in markets for professional services can be affected both by self-employed practitioners who administer the conditions under which services are offered as well as by employers who hire those professionals as salaried labor, only the latter case was chosen for the simulation as it separates more clearly supply from demand on the one hand, and distinguishes between group and market closure on the other hand. In labor markets for professional services, professional groups (demand) can open and close their group boundaries independently from hiring decisions by employers (supply), who in turn can decide independently from group closure to close the market by favoring one group over the rest in the hiring process (Haupt 2012).
- ii) Although inequality in labor markets is usually measured at the level of individuals –higher pay, shorter working hours, more stable jobs – the simulation focuses on differences between groups. In particular, it is assumed that groups compete for market share by attracting skilled workers in a market niche where the number of jobs is fixed and where worker skills are influenced by group average skills. Thus, high intergroup inequality is reached if a group dominates the market by hoarding workers with high skills, while at the same time preventing workers with low skills from entering the group.

Additional model assumptions and their implementation in the model are explained in detail in the following subsection.

2.3. Describing the Model Using the ODD Protocol

ODD stands for Overview, Design concepts and Details. It is a standard protocol developed by agent-based modelers in the field of ecology to overcome the difficulties of doc-

umenting, communicating, and replicating simulation models, which so far have mostly lacked standardized guidelines (Grimm et al 2006; 2010). The purpose of the ODD protocol is to provide readers with the necessary general information to understand any simulation model as well as detailed technical information to replicate it in later independent simulation studies. Since its publication and subsequent update, the protocol has gradually won adepts not only among ABM modelers in ecology but also in other disciplines, including the social sciences (Janssen et al. 2008).

Reading the “overview” section should be enough to get a general idea of the model. If readers are interested in understanding the inner workings of the model and how each process was designed and implemented, going through the “design concepts” and “details” sections is indispensable. Otherwise, these sections can be skipped.

Overview (Purpose, State Variables and Scales, Process Overview and Scheduling)

Purpose

The purpose of the model is to illustrate how individual competition, group closure, and market closure individually or in combination are causally sufficient to produce inter-group inequality. The model does not attempt to realistically replicate any empirically observable system, but instead aims at revealing the distinct causal paths by which each of these processes affect the distribution of resources among groups. It simulates a simplified labor market with different degrees of market and group closure. Individual workers compete for a fixed number of jobs offered by a unique employer by choosing group membership, while groups compete for market share by closing or opening their boundaries and letting in more or fewer workers with different skill levels. The degree of market closure is given exogenously and benefits only one group.

Entities, State Variables, and Scales

The simulated market consists of three types of agents: workers, groups, and an employer. The only scale the model has is time, which is defined on a positive discrete scale starting at $t=0$. Since the time scale serves only to coordinate the decisions of the employer, workers, and groups, its exact meaning is irrelevant. States variables and scales are summarized in **Table 3**.

- Hiring decisions are made by a unique employer. There are three state variables: a fixed number of available jobs, group-specific hiring probabilities, and a hiring bias coefficient, which captures the degree to which a market is closed by modifying hiring probabilities of workers belonging to a particular group. The hiring bias coefficient is activated by default at $t=1$ and favors one group only.
- Workers belong to a particular group. They possess observable skills and a binary employment status (employed/unemployed). Workers’ skills improve as a function of the average group skills of the group they belong to. There are no wages.

- Group size, potential size growth, market share, average skills, and employment rate are group-level auxiliary variables computed from worker variables. Market share differences are the main indicator of intergroup inequality. As agents, groups have only one state variable, a protection/expansion coefficient that indicates the group's preference for present and future market share. The coefficient is used to compute the degree of group closure in the form of an exclusivity factor or the probability that a group rejects a new member.

Table 3. State and auxiliary variables

Agents	State variables	Auxiliary variables
Employer	Number of jobs (demand)	
	Hiring probability for each group	
	Hiring bias coefficient	
Workers	Skills	Number of workers (supply)
	Group membership	
	Employment status	
Groups	Protection/expansion coefficient	Group size
		Potential size growth
		Market share
		Average skills
		Employment rate
		Exclusivity factor

Process Overview and Scheduling

Time t is discrete. Each t can be divided into three stages: before hiring, hiring, and after hiring. Before hiring, workers take actions aimed at enhancing their market chances in t . During hiring, the employer hires workers. After hiring, groups adapt to the resulting market conditions by closing or opening their boundaries and prepare for $t+1$.

Before hiring: At the beginning of each t , workers observe their own employment status and, if unemployed, they move to a group with a higher employment rate. A group's degree of closure determines whether these attempts are successful. If unemployed workers fail to enter the new group because of a high degree of group closure, they stay in their current group until $t+1$. Only after all workers have had the chance to move to a new group do groups compute their average skills, group size, and potential size growth. Workers then update their skills as a function of group average skills. Finally, groups update their average skills.

Hiring: The employer observes the updated distribution of skills after some unemployed workers have moved to a new group and, given a certain degree of market closure, hires workers until the fixed number of jobs demanded is reached. All workers are hired again at each t .

After hiring: Given the new distribution of employed and unemployed workers, groups update their market share and employment rate. They also decide whether to open or close their boundaries by modifying their exclusivity factor, which determines the probability of a worker being rejected when attempting to enter the group at $t+1$.

At the end of each t , time is increased by one unit and market share inequality is computed. The sequence of processes can be summarized as follows:

Before hiring

1. Workers [simultaneously]: Change group.
2. Groups [simultaneously]: Compute group size, average skills, and potential size growth.
3. Workers [simultaneously]: Update skills as a function of group average skills.
4. Groups [simultaneously]: Update group average skills.

Hiring

5. Employer: Hire workers.

After Hiring

6. Groups [simultaneously]: Compute group market share and employment rate.
7. Groups [simultaneously]: Close/open group.
8. Increase time by one unit. Compute market share inequality.

Design Concepts

Basic principles: The basic processes modeled are pure individual competition, individual competition through group membership, and group competition through group closure under varying degrees of market closure. Implicit in these processes are four basic premises:

- i) Individual attributes are of importance for the allocation of resources (pure individual competition). Skills determine access to jobs.
- ii) When a group offer advantages to its members, individuals have an incentive to enter the group (individual competition through group membership). Workers skills grow as a function of group average skills.
- iii) Groups have an incentive to close their boundaries to protect the resources held by their members (group competition through group closure). Workers with low skills are left out of the group.
- iv) Groups benefit from closing the market and excluding rival groups from competition (pure group competition through market closure). All workers in one group benefit from higher hiring probabilities.

In the model, individuals compete for jobs either directly by offering their skills to the employer or indirectly by choosing group membership and benefiting from future skill upgrades. In the case of group closure, the model concentrates on strategic boundary making driven by shared economic interests, operationalized as behavioral rules which are sensitive to market share and potential size growth, depending on the preferences of the group for present or future market share. No other motives for group closure are modeled. Market closure is not explicitly modeled as a collective action. Instead, only the effect of closing the market, namely the degree of market closure (*Geschlossenheit*), and not the process itself (*Schließung*) was implemented as a simplification of pure group competition through market closure. As discussed in Section 1 above, strategically closing a market to favor one's group requires some form of concerted action aimed at modifying the allocation rules of the market (e.g., the employer), which in turn presupposes a direct intervention of the state or other entity capable of regulating market transactions. Developing an explicit model for market closure that takes into account these complexities exceeds the analytical simplicity sought with the present model and therefore this was not implemented.

Emergence: Intergroup inequality is the most interesting emergent property of the model and is a direct result of the combined effect of individual and group competition. Differences in market share are the clearest indicator of inequality. The higher the difference, the higher intergroup inequality will be (see *Index of market share inequality* in the Appendix).

Adaptation: Unemployed workers adapt to market conditions by moving to a group with a higher employment rate. At the same time, groups adapt to market conditions by opening or closing group boundaries in an attempt to protect or increase market share in the next period by keeping workers with lower skills at bay. To do so, they have to decide between tightening group boundaries, which protects group average skills and secures current market share, or making boundaries more permeable, which increases group size and may secure a larger portion of the market in the longer term at the cost of lowering average skill levels in the short run. Whether protection of accumulated resources or expansion is preferred depends on the group's protection/expansion coefficient as well as on their current market share and potential size growth. By contrast, since the degree of market closure is exogenous and fixed at $t=1$, it is insensitive to market conditions. All decisions in the model are rule based and involve no costs.

Objectives: Neither workers nor groups have an explicit objective function to maximize. However, both groups' and workers' rule-based adaptive behavior assumes an implicit objective. Groups strive to increase their market share, while workers aim at increasing the probability of getting a job. Adaptive behavior is heuristic and does not guarantee obtaining the expected results.

Prediction: A form of prediction is implied by the behavioral rules that groups and workers follow to adapt to market conditions. When a group closes its boundaries, it behaves

as if it knew that by doing so the level of skills, and with it its market share, will be safeguarded against new members with low skills in the future. Similarly, when a group opens its boundaries, it acts as if it could foresee the higher market share that could be achieved later if the group grew in size by admitting new members. By the same token, unemployed workers move to groups with a higher employment rate as if they could estimate the probability of getting a job in $t+1$. This predictive behavior is, again, ruled based and does not follow from the maximization of any explicit objective function.

Sensing: The model assumes a market with perfect information. Sensing is global and information is observed without error. The employer observes the skills of all workers. Workers observe their own skills and employment rates of all groups. Groups observe their average skills, group size, market share, and total number of workers in the market.

Interaction: Individual and group competition for jobs is the main form of interaction in the model. Competition is not direct but mediated. In the case of workers, they compete against each other for jobs and for group membership. Job competition is mediated by the employer, who has the power to change the employment status of workers. Group membership competition is in turn mediated by groups and their decision to accept or reject new group members based on their exclusivity factor. Similarly, group competition does not involve a direct interaction among groups. Rather, it is mediated by the degree of group and market closure. When closing boundaries, groups compete for workers and their skills by modifying their exclusivity factor, depending on market conditions, particularly market share and potential size growth. Group competition is further mediated by the size of the employer's hiring bias coefficient. If the coefficient is high, a group may secure an advantage in hiring for all their members on top of skill level, and thus gain a decisive edge over rival groups.

Stochasticity: Random numbers are used to generate agents' heterogeneity. Workers' skills are random in order to avoid creating intergroup inequality from the outset and to allow for differences in market share among groups to emerge from the adaptive strategies of agents. The protection/expansion coefficient of each group is also randomized. This makes the model less predictable and makes it possible to explore the dynamics of individual competition under different protection/expansion tendencies of groups.

Collectives: Groups are both a collection of workers and a type of agent in the model.

Observation: A dataset with average values of key variables for each model variation, design point, experimental run, and time period is produced (see experimental design below). In addition to the parameters of each design point, including number of groups, unemployment rate, and hiring bias coefficient, the dataset reports average protection/exclusion coefficients and exclusivity factors of the top percentile of groups ranked according to their employment rate. The maximum group size in each period and the main output variable, the index of inequality in market share, are also reported.

Details

Initialization

Time starts at 0. The model was initialized with 30 unemployed workers in each group. The exclusivity factor was initialized with the value of 1 to prevent workers from changing group in $t=1$ when all workers are still unemployed. The hiring probability for each group was set to 1 divided by the number of groups. The hiring bias coefficient at $t=0$ is 0. Hence, without market closure, members of all groups have the same probability of being hired. A log-normal distribution with identical parameters for each equally sized group is used to generate workers' initial skill level. There are two reasons why a log-normal distribution is suitable for representing workers' skills. First, all values of a log-normal distribution are positive, something that cannot be guaranteed with a normal distribution. And second, the skewness and right tail of the resulting skill distribution resembles observed income distributions in real labor markets.¹¹ Skills are redrawn every simulation run. The speed of skill growth, which is controlled by a constant C or skill growth modifier (see submodels below), was set at a low arbitrary level of 1% to avoid explosive skill growth. Similarly, to prevent all unemployed workers rushing to the group with the highest employment rate, they choose randomly among the top 20% of the distribution of group employment rate. Initialization values are summarized in **Table 4**.

Table 4. Initialization

Constants	
Workers per group (supply)	30
C (skill growth modifier)	0.01
Reference percentile for group change	80
Agents' State/Auxiliary Variables	
Employment status	0
Hiring probability	1/number of groups
Hiring bias coefficient	0
Exclusivity factor	1
Pseudo-random parameters	
Workers' skills (one distribution for each group)	Log-normal distribution (underlying normal distribution with $\mu=1$; $\sigma=0.2$)
Protection/expansion coefficients (one value for each group)	Uniform continuous distribution; range: see factorial design

Input data. No external data was used to initialize the simulation.

¹¹ See Limpert et al. (2001) for a discussion of these and more properties of log-normal distributions.

Submodels

For each of the processes listed above in the model description, the exact agent behavior is explained below.

Change group (workers). After hiring takes place, some workers remain unemployed. Faced with unemployment, workers have to choose between remaining in their current group and profiting from the skills of their fellow workers, or changing to a new group and profiting from them instead. To avoid complicated calculations of the probability of getting a job as a member of any group at $t+1$ given observed group average skills and hiring probabilities at t , workers make their decision to change groups based on a simple heuristic followed simultaneously by all unemployed workers (synchronous updating). Unemployed workers move to one randomly chosen group from the top x percent of the group employment rate distribution. All things equal, the observed group employment rate at t is the best indicator of the probability of getting a job as a member of a given group at $t+1$. However, not all things are equal. Given that workers' own skill level affects group average skills, changing group in this way involves a sizable amount of uncertainty. Even if all workers observe the same group employment rate distribution before changing groups, the number of workers actually moving to a new group and the resulting modified group skills are unknown to each worker. Moreover, they are also unaware of how many workers are in fact accepted in the new group and hence cannot accurately predict their skills level *after* workers have been reshuffled. Whether workers changing groups are rejected by the new group depends on the group's exclusivity factor or probability of rejection. This is operationalized for every attempted change of group as a unique trial drawn from a binomial distribution with p =exclusivity factor.

Compute group variables (groups). At each t , group size (S), potential size growth (S_p), market share (M), average skills (K_{Avg}), and employment rate (E) of a group g comprising n workers i are described by equations (1) to (5)

$$(1) \quad S_{P,t}^g = 1 - \frac{S_t^g}{\text{Total supply}}$$

$$(2) \quad S_t^g = \sum_{i=1}^{n_t^g} \text{Workers}_{i,t}^g$$

$$(3) \quad M_t^g = \frac{\sum_{i=1}^{n_t^g} \text{Employed Workers}_{i,t}^g}{\text{Total demand}}$$

$$(4) \quad K_{Avg,t}^g = \frac{\sum_{i=1}^{n_t^g} K_{i,t}^g}{n_t^g}$$

$$(5) \quad E_t^g = \frac{\sum_{i=1}^{n_t^g} \text{Employed Workers}_{i,t}^g}{S_t^g}$$

Update skills (workers). Workers i in each group g update their skills (K) as a function of groups' average skills according to equation (6)

$$(6) \quad K_{i,t}^g = K_{i,t-1}^g + C \cdot \ln\left(\frac{2 \cdot K_{Avg,t}^g}{K_{i,t-1}^g}\right)$$

Without the inclusion of a simple mechanism to update workers' skills, the results of the simulation would be trivial. Given that the employer hires workers with the highest skills and that skills are randomly distributed among individuals and groups, not allowing skills to be modified would mean workers on the upper area of the skill distribution would tend to remain employed until the end of the simulation. The same result would be achieved if skill growth is a linear function of actual skill growth: the higher the skill level, the faster the skill growth. The solution is to allow skills to grow as a function of group average skills but correct for actual skill level. As given by equation (6), the skills of workers below group average grow faster than those above group average. Multiplying group average skills by 2 prevents growth from becoming negative for workers with above-average skills. The constant C or skill growth modifier controls how fast or slowly skills grow within the group.

Hire workers (employer). Hiring is an iterative process. The employer observes the updated distribution of skills after unemployed workers have moved to a new group and puts them in descending order. He then hires workers one at a time by setting their employment status to *employed* starting from the worker with the highest skill level down the distribution of skills until the fixed number of jobs demanded is reached. It is assumed that at each t , all workers are actively looking for a job, regardless of market conditions and employment history. This implies that before hiring, the employment status of all workers is set to unemployed. Although in principle all members of a given group enjoy the same probability $P_H = 1/(\text{number of groups})$ of being hired, those at the end of the queue are less likely to get the job since the probability that vacancies remain unfilled falls with each hiring iteration. The decision of hiring is operationalized as a unique trial drawn from a binomial distribution with $p = \text{group's hiring probability } (P_H)$. Hiring decisions are, without hiring bias, 'group blind.' However, if the degree of market closure is greater than 0, the hiring probability P_H of the one group favored by market closure is modified upwards by a hiring bias coefficient (C_H), while that of the excluded groups is modified downwards as described by equation (7).

$$(7) \quad \text{Modified } P_H^g = \begin{cases} P_H^g + C_H \cdot (1 - \frac{1}{N}) & \text{if group benefits from market closure,} \\ P_H^g - C_H \cdot \frac{1}{N} & \text{if not} \end{cases}$$

The hiring bias coefficient (C_H), takes values between 0 (open market with equal hiring probabilities for each group) and 1 (closed market with hiring probability of 1 for one group and 0 for all others). Note that since $1/N$ is the initial hiring probability, what equation (7) does is to modify the hiring probability of each group, either bringing it closer to

1 (first if condition) or closer to 0 (second if condition). The magnitude of the modification in both cases is a percentage of the distance between actual hiring probability and 1 or 0, respectively. As shown in **Table 5**, with two groups (1 and 2), this means that the gain in absolute terms in the hiring probability of the group benefiting from market closure (P_H^1) is identical to the loss of group 2 (P_H^2). Hence $\Delta P_H^1 = \Delta P_H^2$. With $N > 2$, the equal losses of each group not benefiting from closure is added to the hiring probability of the privileged group.

Table 5. Modified P_H^g with $N=2$ for different levels of C_H .

C_H	P_H^1	P_H^2	$\Delta P_H^1 = \Delta P_H^2$
0.00	0.50	0.50	0.00
0.20	0.60	0.40	0.10
0.40	0.70	0.30	0.20
0.60	0.80	0.20	0.30
0.80	0.90	0.10	0.40
1.00	1.00	0.00	0.50

Close/open group (groups). Unlike market closure, group closure is endogenous. At each t , groups compute an exclusivity factor (EF) based on observed market share (M_t^g), potential size growth ($S_{P,t}^g$), and protection/expansion coefficient ($C_{P/E,t}^g$) as described by equation (8).

$$(8) \quad EF_t^g = 0.5 + \frac{C_{P/E,t}^g \cdot M_t^g - (1 - C_{P/E,t}^g) \cdot S_{P,t}^g}{2}$$

PE controls the relative importance of present market share and future market share in deciding how closed or open group boundaries should be. There is no utility function to maximize, nor a discount rate for values of future market share. A simple behavioral rule is assumed on the basis of observed state variables. The higher the value of PE and the higher the market share, the more likely it is that a group protects current employed workers by closing its boundaries to incoming unemployed workers. The more exclusive a group becomes, the higher the probability of rejecting new members up to a maximum value $EF = 1$ ($C_{P/E,t}^g = 0$, $M_t^g = 1$). By contrast, the lower the value of PE and the higher the potential size growth, the more a group values growing in size as a means to a higher market share in the future. This leads to more permeable boundaries or no boundaries at all if the minimum is reached, where 0% of all new members are accepted ($C_{P/E,t}^g = 0$, $S_{P,t}^g = 1$). PE varies among groups. It is defined at the beginning of every simulation and remains constant for a particular simulation run.

The simple mechanism to set the exclusivity factor described by (8) captures the logic of rationally driven group closure, as discussed in Section 1.4 above. Driven by shared economic interests, groups close their boundaries to protect accumulated resources and

open their boundaries to expand group size in the hope of increasing market share. Moreover, given that the exclusivity factor takes the form of a probability, it is not necessary to be explicit about which attributes of workers are relevant for gaining access to the group. In the case of professional associations, it could, for example, be assumed that membership rules focus on those same skills that members need to be successful in the market. However, this need not always be the case. Group membership may be decided on the basis of ascriptive traits such as gender, ethnicity, or religion which bear little weight on the skills valued in the market. Explicitly modeling membership rules using different individual attributes correlated to different degrees to skills might be an interesting extension of this submodel.

Index of market share inequality (intergroup inequality). The index measures the ratio of the average distance of individual group market shares to mean market share and the maximum possible size of that distance. For a total of N groups, the numerator of the index is defined as the mean absolute deviation (MAD) of the distribution of group market shares M at t , as given by equation (9). With market share defined in the interval $[0,1]$, mean market share $M_t^{Avg} = 1/N$.

$$(9) \quad MAD_t = \frac{\sum_{g=1}^N |M_{g,t} - M_t^{Avg}|}{N}$$

Since market share is a number between 0 and 1, the maximum mean absolute deviation of the distribution MAD^{max} for the market share (M) of any given number of groups N is reached when one group dominates the market with a market share of 1 while all other groups have a market share of zero. Thus, MAD^{max} can be simplified to equation (10).

$$(10) \quad MAD_t^{Max} = \frac{2 \cdot (N - 1)}{N^2}$$

Dividing (9) by (10), the index of intergroup market share inequality (I) is obtained in equation (11).

$$(11) \quad I_t = \frac{MAD_t}{MAD_t^{Max}} = \frac{N \cdot \sum_{g=1}^N |M_{g,t} - M_t^{Avg}|}{2 \cdot (N - 1)}$$

If the market share of all groups is equal, the index drops to the minimum value of 0. By contrast, if one group dominates the market, the index peaks at a maximum value of 1. For example, **Table 6** shows the results of equations (9), (10), and (11) with $N=2$ groups in the market and using arbitrarily chosen market shares. A maximum level of intergroup inequality is reached at $t=1$ and $t=7$, while the minimum level is obtained at $t=4$.

Table 6. Example of values of index of market share inequality (I)

t	$M_{1,t}$	$M_{2,t}$	M_t^{Avg}	MAD_t	MAD_t^{Max}	I_t
1	0.00	1.00	0.50	0.50	0.50	1.00
2	0.20	0.80	0.50	0.30	0.50	0.60
3	0.40	0.60	0.50	0.10	0.50	0.20
4	0.50	0.50	0.50	0.00	0.50	0.00
5	0.60	0.40	0.50	0.10	0.50	0.20
6	0.80	0.20	0.50	0.30	0.50	0.60
7	1.00	0.00	0.50	0.50	0.50	1.00

2.4. Experimental Design: Exploring Different Combinations of Market and Group Closure under Varying Levels of Individual Competition

The model was implemented using Python. DOE (Lorscheid et al. 2011) was used to set up the experiment and initialize the remaining model parameters, including number of time periods, number of groups, unemployment rate (intensity of individual competition), and hiring bias coefficient. As already explained above, the hiring bias coefficient implements the degree of market closure as an exogenous parameter. By contrast, the degree of group closure captured by the exclusivity factor is determined endogenously (see sub-models). **Table 7** summarizes dependent, independent, and control variables.

Table 7. Classification of variables

Dependent variable	Independent variables	Control variables
Average differences in market share over all t (index of market share inequality)	Hiring bias coefficient	Time periods Number of groups Unemployment rate

A factorial experimental design with three factor levels for control variables and eleven factor levels for the independent variable, a total of 108 design points, was implemented (**Table 8**). To establish the optimal number of runs (n) for each set of factors, the experimental error was computed for the dependent variable in a subsample of 48 design points for $n = 5, 10, 15, 20, 25, 50, 100, 250,$ and 500 . For each n and each design point, the coefficient of variation $Cv = \text{std. dev.}/\text{mean}$ was estimated (Lorscheid et al. 2011). Results indicate that Cv stabilizes around 30 iterations at most, although for over half of the subsample of 48 design points, results are stable even with as few as 5 runs. As a result, 30 iterations were run for each design point.

Table 8. Factorial design

Factors	Factor level range	Factor levels
Hiring bias coefficient	$[\in 0, 1]$	$\{0, 0.2, 0.4, 0.6, 0.8, 1\}$
Time periods	$[\in 0, \infty]$	$\{100, 300\}$
Number of groups	$[\in 2, \infty]$	$\{5, 10, 25\}$
Unemployment rate	$[\in 0, 1]$	$\{0.1, 0.2, 0.4\}$

Using this factorial design, three models were explored. First, a null model was run for the 18 combinations of control variables in which all workers' and groups' actions are turned off. Workers do not change groups, nor are their skills updated. Groups refrain from closing the group. Second, an open-groups model was run for all 108 design points with group closure turned off. Third, a full model including all processes described in the previous section was used. The diverse constellations produced by these three models allow us to explore intergroup inequality under varying degrees of market and group closure, time horizons, number of competing groups, and labor market conditions. Most importantly, it makes it possible to investigate the four causal paths connecting individual and group competition to intergroup inequality separately (see Section 2.3). **Table 9** summarizes the three model variations.

Table 9. Model variations

Model	Restrictions	Design points
Null model	Workers: no skill upgrade, no group change Groups: no group closure Hiring bias coefficient (degree of market closure) = 0	18
Open-groups model	Groups: no group closure	108
Full model	None	108

2.5. Results

To better understand the different processes modeled, each of the four causal paths identified in Section 2.1 was isolated and analyzed separately. Since the simulations were run 30 times and over various time periods for each parameter setting, results are presented as box plots of the distribution of model outcomes over all time periods, except for the initial period $t=0$, and all model runs.

(i) *Pure individual competition (null model)*. Turning off group closure and workers' skill updates, and setting the degree of market closure to zero, the model becomes predictable. Without group hiring bias and skill growth, market inequality is fully explained by the differences in skill levels among groups. Although those with the highest skills are more

likely to be employed, since skills are drawn randomly from a log-normal distribution with identical parameters for each group, differences in market share among groups remain low. Intergroup inequality could be arbitrarily raised by simply initializing the model with an unequal distribution of skills among groups.

As shown in **Figure 1**, the only factor that affects the overall level of intergroup inequality is the unemployment rate. Given that hiring starts with the workers with highest skills and goes on iteratively down the distribution of skills until all vacancies are filled, the higher the unemployment rate, or, in other words, the fewer the vacancies, the more crucial it is to be at the front of the skills queue. In other words, given the way the hiring process was implemented, a tight labor market elevates the premium of having higher skills. Higher rates of unemployment magnify any small differences in the skill distribution among groups and produce comparatively greater intergroup inequality.

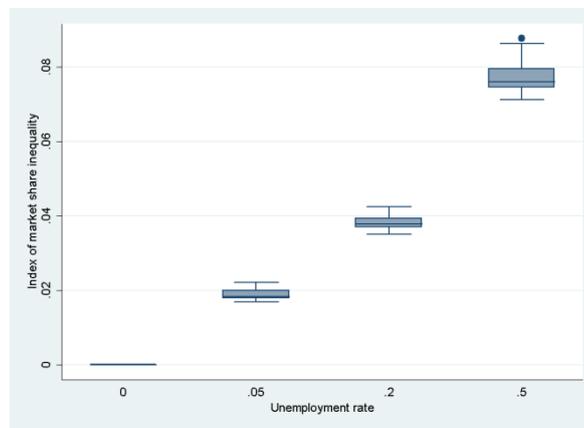


Figure 1. Pure individual competition, intergroup inequality and unemployment

(ii) *Individual competition through group membership (open-groups model with degree of market closure = 0).* Allowing for skills to grow as a function of group average skills and for unemployed workers to move freely to groups with higher employment rates dramatically increases the levels of intergroup inequality. As shown in **Figure 2**, a smaller number of groups and larger unemployment rates are associated with higher intergroup inequality. As unemployment rates grow, the pressure on unemployed workers to leave the group increases. Groups with higher employment rates tend to attract more unemployed workers over time and quickly consolidate into a few big groups. Some groups even lose all their members during this process of polarization of market share. The fewer groups in the market, the more likely it is that a single dominant group emerges and hoards most of workers. Thus, in addition to inequality produced by pure individual competition, as individual competition through group membership increases, driven by high unemployment and small numbers of alternative groups to move to, intergroup inequality explodes.

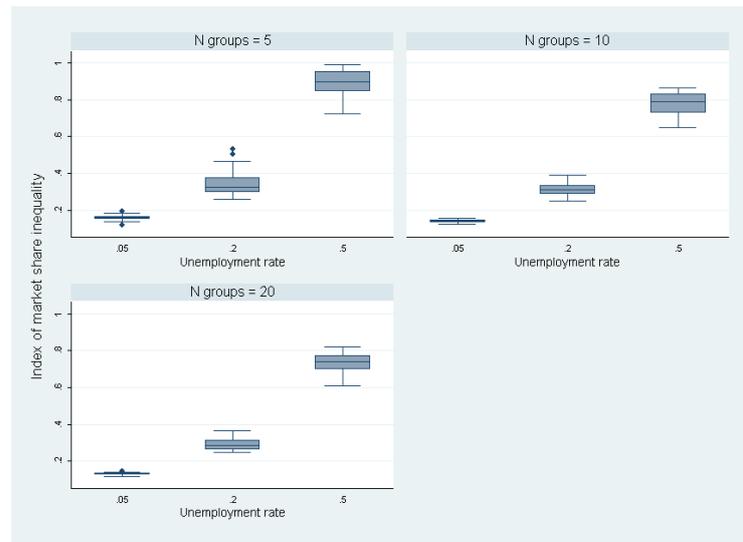


Figure 2. Intergroup inequality, number of groups and unemployment

(iii) *Group competition through group closure (full model with degree of market closure=0).* Adding group closure to the mix, groups have the choice of regulating how many unemployed workers they let in. The more they value present market share, the more likely they are to reject new workers. The opposite is true when groups place more emphasis on size growth and future market share than in protection of current market share. However, all else held constant, more groups necessarily implies smaller initial market shares for each group and hence bigger potential size growth. Therefore, even when protection/expansion coefficients indicate a high preference for present market share, and irrespective of level of unemployment, if the number of groups is large, groups are more readily inclined to open their boundaries and bet on expansion. This tendency is depicted on **Figure 3** using mean values of the exclusivity factor for the top quintile of groups with the highest employment rate over all experiments.

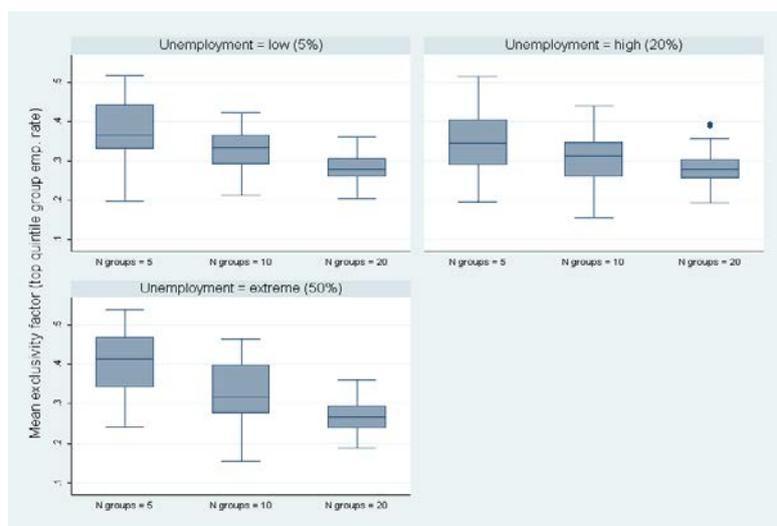


Figure 3. Mean exclusivity factor and group size

As it was shown with models (i) and (ii), with open groups, higher unemployment leads to a process of market share polarization and high intergroup inequality, particularly pronounced when the number of groups is small. However, allowing for group closure, the same process that drives group consolidation forward also pushes groups to tighten their boundaries. Instead of exacerbating intergroup inequality when unemployment is high, group closure in fact reduces inequality by putting a cap on the process of group consolidation and limiting the emergence of extreme differences in market share. Closed groups do not grow. As shown in **Table 10**, the relationship between group closure and intergroup inequality tends to be more negative with fewer groups and higher unemployment rates. The higher the floating population of unemployed workers, the more effective is group closure in preventing one group from dominating the market, although inequality tends to be greater with higher unemployment. At extreme levels of unemployment and with many groups in the market, the negative relationship between group closure and inequality seems to flatten somewhat. Under such extreme conditions, the sheer number of workers rushing to the groups with the highest employment rate takes away some of the effectiveness of group closure to slow down market share polarization.

Table 10. Correlation between market share inequality and mean exclusivity factor

	Unemployment		
	low (5%)	high (20%)	extreme (50%)
N groups = 5	-0.03	-0.60	-0.57
N groups = 10	-0.24	-0.69	-0.56
N groups = 20	-0.33	-0.57	-0.36

(iv) *Pure group competition through market closure (open-groups model with variable degree of market closure)*. Contrary to the inhibitory effect of group closure on the process of consolidation of group size and polarization of market share observed in a model with unfettered individual competition in a market with open group boundaries (ii), market closure acts as a catalyst. By allowing workers to move freely into the group benefiting from market closure, the emergence of a dominant group that hoards all workers and jobs is unavoidable and swift. The higher the degree of market closure, the faster a dominant group appears. Increasing the number of groups slightly slows down the process (see **Figure 4**), while higher unemployment further accelerates it (see **Figure 5**).¹² In the end, however, is only a matter of time until intergroup inequality inescapably reaches its maximum value of 1.

¹² Given that in some cases the steady state of the model is not reached after 100 periods of time, the graphs only show the design points where time was allowed to reach 300.

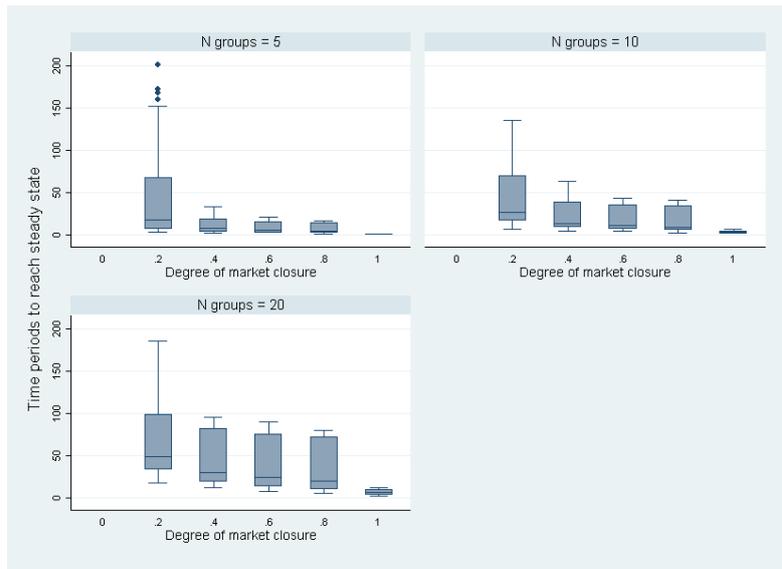


Figure 4. Number of groups and number of periods to reach maximum inequality

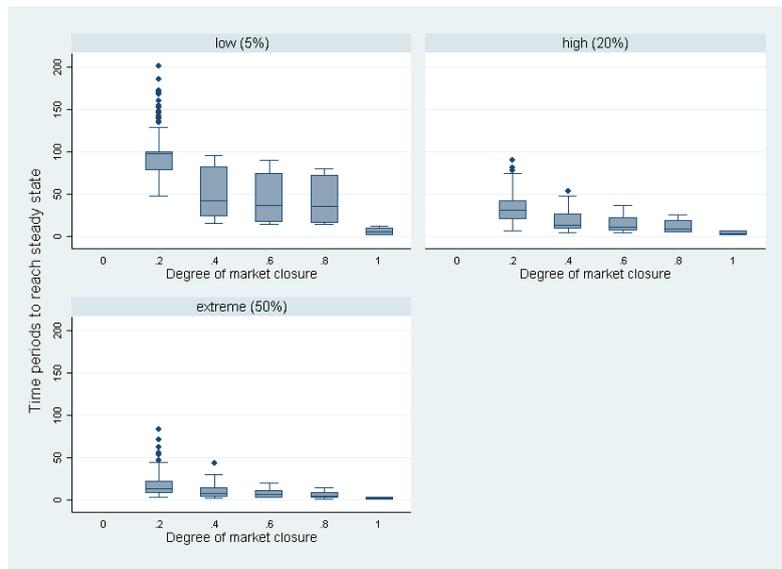


Figure 5. Unemployment and number of periods to reach maximum inequality

After this discussion of how each of the four processes of individual and group competition bring about intergroup inequality separately, **Table 11** summarizes the minimum, mean, and maximum levels of market share inequality produced by each process. As was argued above, results show that each process is independently sufficient to produce moderate and high levels of intergroup inequality. The fact that pure individual competition generates only relatively low levels of market share inequality should not affect the validity of this conclusion, since it follows from the conscious decision to initialize the model with worker skills equally distributed among groups. Initializing the model with an une-

qual distribution of skills would mean market share inequality reaching high values comparable to those in processes ii, iii, and iv.

Table 11. Different levels of inequality obtained from each model variation

Index of market share inequality	Min	Mean	Max
(i) Pure individual competition	0.02	0.04	0.09
(ii) Individual competition through group membership	0.12	0.42	0.99
(iii) Group competition through group closure	0.10	0.32	0.78
(iv) Pure group competition through market closure	0.61	0.95	1.00

(v) *All processes at the same time (full model).* While each process can produce high levels of inequality separately, what happens if they all interact simultaneously? Letting all independent and control variables vary in the full model makes it difficult to understand the output using simple two-dimensional graphs as has been done so far. Instead, regression analysis was used on the output dataset to produce a three-dimensional response surface that represents the relationship between degree of market closure, degree of group closure, and intergroup inequality under different combinations of number of groups and unemployment rate for each experiment across all design points. Since the dependent variable, the index of market share inequality, is defined in the range [0,1], a Tobit regression was used with right-censored values set at 1. Independent and control variables were included linearly in the model, as well as interaction terms among them and quadratic terms for degree of market and group closure.

Results are shown in **Figure 6**. Darker regions of the surface (red) correspond to higher inequality, lighter regions (blue) to lower inequality. Three results are worth mentioning. First, as already shown in the previous model variations, it is still true that higher unemployment and fewer groups exert pressure on workers to amalgamate into a few dominant groups and produce high levels of intergroup inequality. Thus, on average, market share inequality is highest in the top right-hand graph (5 groups and extreme unemployment) and lowest in the bottom left-hand graph (20 groups and low unemployment).

Second, the interaction between group and market closure is not linear and depends on both number of groups and unemployment rate. Although low degrees of group closure combine with high levels of market closure to increase intergroup inequality, as group closure increases, it waters down the impact of market closure on inequality. Therefore, from the perspective of group closure, market closure enhances its power to slow down market share polarization; from the perspective of market closure, group closure reduces its effectiveness to accelerate that same process. The negative interaction between the two forms of closure becomes stronger the more intensive individual competition for group membership is, as captured by number of groups and unemployment rates. Why the interaction is negative is easy to reconstruct. If employers are only allowed to hire workers from one group (high degree of market closure) but only a small portion of unemployed workers are permitted into the group (high degree of group closure), a labor short-

age is created that reduces the overall number of employed workers and limits market share differences among groups. The interesting question raised by this combination of high levels of market and group closure is what happens when demand remains unsatisfied, something that was not modeled in the simulations. Will groups change their preference for future market share and open the group despite market dominance to meet excess demand? Or will the employer simply decide to ignore market closure and hire workers from other groups to fill all vacancies? If labor shortage leads to opening the group, intergroup inequality would rise further, whereas if it leads to opening the market, inequality would fall.

Third, and in line with the results summarized in **Table 11**, different combinations of individual and group competition produce varying levels of intergroup inequality, from low through intermediate to high. A high degree of market closure leads to high levels of inequality if combined with a low degree of group closure, but it produces intermediate market share inequality if group closure is high. By contrast, while a low degree of group closure produces low intergroup inequality if combined with no market closure, as the degree of market closure grows, so does inequality. In addition, and irrespective of levels of group or market closure, a reduced number of groups and a higher unemployment rate push market share inequality upwards.

In conclusion, not only are pure individual competition, individual competition through group membership, group competition through group closure, and pure group competition through market closure independently sufficient to produce comparable levels of inequality, but also their interaction is equally capable of bringing about a comparably broad spectrum of possible levels of intergroup inequality. This is the reason why, in the face of a given unequal distribution of resources, for instance, a market for accountancy services where 80% of all transactions are in the hands of one particular professional association, these four different mechanisms have to be analyzed and their distinct causal paths disentangled both analytically and empirically. Are practitioners accounting for 80% of the market better competitors if taken individually? Is their individual advantage the result of group membership? What attributes are decisive for becoming part of a group that grants advantages to its members? Or is their advantageous position the inevitable consequence of a market in which allocation rules are biased towards one group? Failure to answer these questions will render any explanation of group-related inequality incomplete.

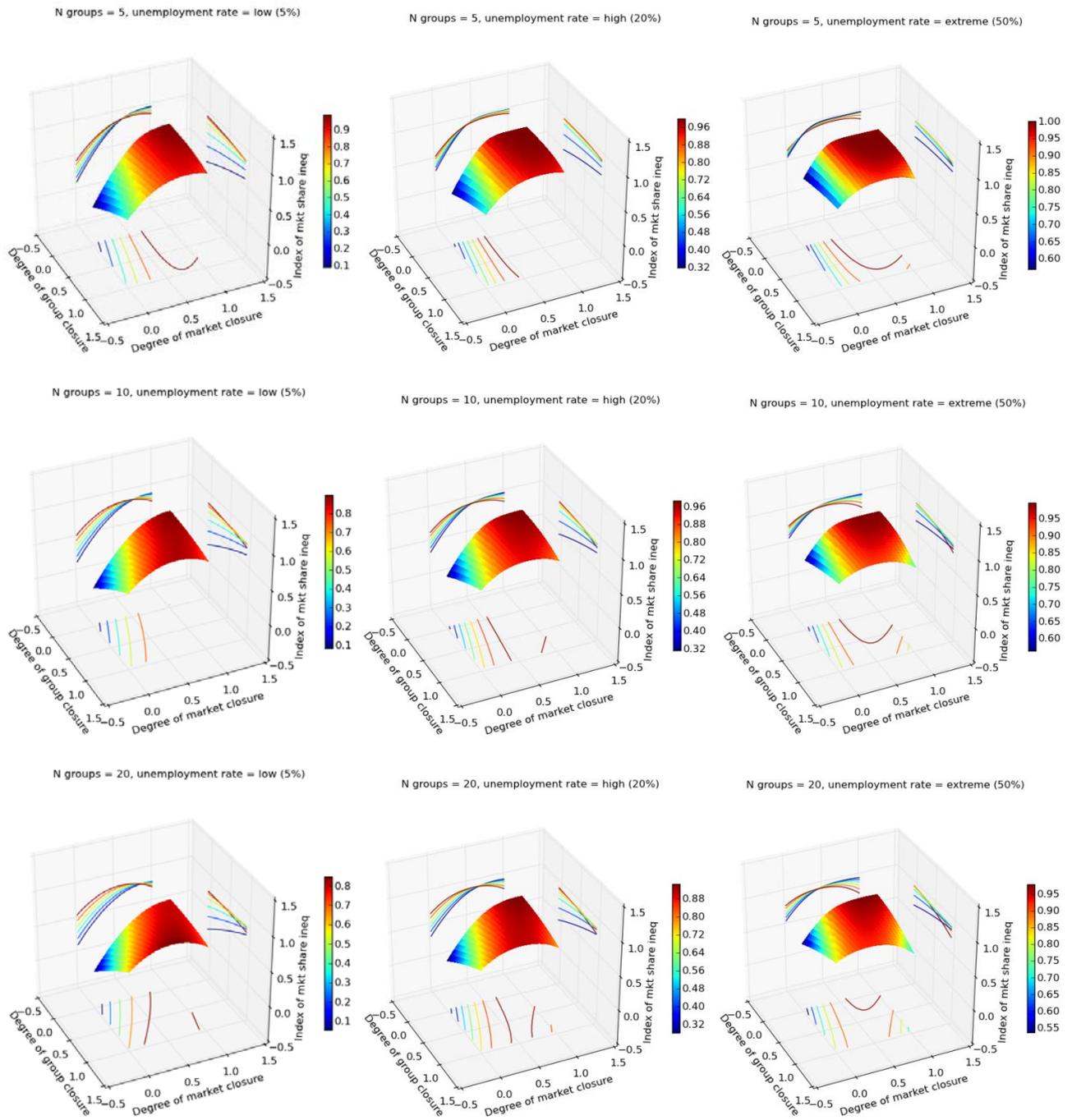


Figure 6. Response surface for market share inequality and degree of market and group closure

3. Concluding Remarks

Revisiting Weber, two forms of closure were identified. The first, market closure, denotes collective action aimed at excluding rival groups from competition. The second, group closure, refers to groups drawing boundaries against outsiders. The acts of closing the market and closing the group (*Schließung*), which necessarily imply the existence of collective actors and agency, were in turn distinguished from their outcomes; the mere existence of a closed market, or a market where allocation is conditioned by group membership, and a closed group, or the mere existence of membership rules. To refer to the latter, the concept of degree of closure was introduced (*Geschlossenheit*). The importance of distinguishing between these two forms of closure and drawing a line between closure as an action and its outcome was further illustrated using a simple computational agent-based model (ABM) implemented using Python. The results of the simulation show that individual competition, market and group closure, both individually and in combination under different market conditions, are causally sufficient to produce varying levels of intergroup inequality.

The discussion on the meaning of closure and the simulation model can be seen as a plea for urgently needed conceptual and methodological rigor when raising causal claims about the origin of intergroup inequality. Any empirical study making a case for closure as an explanation of inequality should provide unambiguous evidence of the existence of a collective actor, the ability of this to take concerted action and the effectiveness of efforts to exclude individuals from the group and rivals from the market. Gender, age, or occupation certainly might provide a basis for boundary making, collective action, and closure practices. It is, however, a mistake to *animate* these categories and regard them as collective actors acting strategically and effectively simply because we observe an unequal distribution of resources among individuals grouped by them. Although it could be shown that some categorically defined collectives do constitute a group with shared economic interests (e.g., lawyers), this need not imply that the group is capable of concerted collective action (Olson 1971). Moreover, the fact that a well-constituted group decides to act upon its interests does not guarantee that its action will bring about the desired results, as was shown in the case of British accountants discussed by Walker & Shackleton (1998).

Finally, even if it were the case that collective actors do in fact exist and successfully practice closure, it is not *a priori* clear, as illustrated by the simulation, what combination of pure individual competition, individual competition through group membership, group competition through group closure, and pure group competition through market closure causes intergroup inequality. These processes must be disentangled and isolated both analytically and empirically if they are to be used constructively as an explanation for inequality. Otherwise, claims about the importance of closure in the production of inequality would at best be incomplete, if not entirely misleading. Ignoring this warning will inevitably lead to sloppy storytelling, which, if not prevented, threatens to drain the explanatory substance from the notion of closure.

Appendix

Table 12. Selected studies applying the concept of closure empirically

Subject	Article(s)
Professions and occupations	Macdonald (1985); Amark (1990); Chua & Clegg (1990); Chua & Poullaos (1998); Richardson (1997); Walker & Shackleton (1998); Ramirez (2001); Weeden (2002); Kidder (2004); Welsh et al. (2004); Hollenberg (2006); Kelner et al. (2006); O'Regan (2008); Giesecke & Verwiebe (2009); Groß (2009); Lee (2010); Weiss & Miller (2010); Haupt (2012).
Gender and racial discrimination	Roscigno et al. (2007); Roscigno (2007); Roscigno et al. (2009); Stainback (2009); Tomaskovic-Devey (1993a 1993b); Elliott & Smith (2001); Neuwirth (1969).
Ageism	Roscigno et al. (2007).
Workplace incivilities	Roscigno et al. (2009).
Educational homogamy	Smits (2003); Smits & Park (2009).
Citizenship	Brubaker (1992).
Welfare state	Rodger (1992).
Social movements	McCauley (1990).
Religion	Vertigans (2007).

References

- Amark, K. (1990). Open cartels and social closures: Professional strategies in Sweden, 1860-1950. In M. C. Burrage & R. Torstendahl (Eds.), *Professions in theory and history*, 94–114. London: Sage.
- Adams, T. L. (2008). Understanding Professional Regulation. *Conference Papers - American Sociological Association*, 1–22.
- Brubaker, R. (1992). *Citizenship and nationhood in France and Germany*. Cambridge, Mass.: Harvard University Press.
- Brubaker, R. (2004). *Ethnicity without groups*. Cambridge, Mass.: Harvard University Press.
- Buchanan, J. M. (1965). An economic theory of clubs. *Economica*, 32(125), 1–14.
- Buchanan, J. M. (1980). *Toward a theory of the rent-seeking society*. College Station: Texas A & M University Press.
- Burt, R. S. (2007). *Brokerage and closure: An introduction to social capital*. Oxford: Oxford University Press.
- Chua, W.-F. & Clegg, S. (1990). Professional closure: The case of British nursing. *Theory and Society*, 19(2), 135–172.
- Chua, W.-F. & Poullaos, C. (1998). The dynamics of “closure” amidst the construction of market, profession, empire and nationhood: An historical analysis of an Australian accounting association, 1886-1903. *Accounting, Organizations and Society*, 23(2), 155–187.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94(1), 95–120.
- Elliott, J. R. & Smith, R. A. (2001). Ethnic matching of supervisors to subordinate work groups: Findings on “bottom-up” ascription and social closure. *Social Problems*, 48(2), 258–276.
- Gambetta, D. (1996). *The Sicilian mafia. The business of private protection*. Cambridge, Mass: Harvard University Press.
- Giddens, A. (1973). *The class structure of the advanced societies*. London: Hutchinson & Co.
- Giddens, A. (1980). Classes, capitalism, and the state: A discussion of Frank Parkin, Marxism and Class Theory: A bourgeois critique. *Theory and Society*, 9(6), 877–890.
- Giesecke, J. & Verwiebe, R. (2009). Wachsende Lohnungleichheit in Deutschland. Qualifikations- und klassenspezifische Determinanten der Entlohnung zwischen 1998 und 2006. *Berliner Journal für Soziologie*, 19(4), 531–555.
- Gilbert, N. & Troitzsch, K.G. (1999). *Simulation for the social scientist*. Buckingham: Open University Press.
- Gilbert, N. (2008). *Agent-based models*. Thousand Oaks, Calif: SAGE.
- Grimm, V., Berger, U., Bastiansen, F., Eliassen, S., Ginot, V., Giske, J., Goss-Custard, J., Grand, T., Heinz, S. K., Huse, G., Huth, A., Jepsen, J. U., Jørgensen, C., Mooij, W. M., Müller, B., Pe'er, G., Piou, C., Railsback, S. F., Robbins, A. M., Robbins, M. M., Rossmann, E., Rüger, N., Strand, E., Souissi, S., Stillman, R. A., Vabø, R.,

- Visser, U. & DeAngelis, D. L. (2006). A standard protocol for describing individual-based and agent-based models. *Ecological Modelling*, 198 (1-2), 115–126.
- Grimm, V., Berger, U., DeAngelis, D. L., Polhill, J. G., Giske, J. & Railsback, S. F. (2010). The ODD protocol: A review and first update. *Ecological Modelling* 221 (23), 2760–2768.
- Groß, M. (2009). Markt oder Schließung? Zu den Ursachen der Steigerung der Einkommensungleichheit. *Berliner Journal für Soziologie*, 19(4), 499–530.
- Grüne-Yanoff, T. & Weirich, P. (2010). The Philosophy and Epistemology of Simulation: A Review. *Simulation & Gaming*, 41 (1), 20–50.
- Hanneman, R. A., Collins, R. & Mordt, G. (1995). Discovering Theory Dynamics by Computer Simulation: Experiments on State Legitimacy and Imperialist Capitalism. *Sociological Methodology*, 25, 1–46.
- Haupt, Andreas (2012): (Un)Gleichheit durch Soziale Schließung. Effekte offener und geschlossener Teilarbeitsmärkte auf die Lohnverteilung in Deutschland. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, 183(4).
- Hollenberg, D. (2006). Uncharted ground: Patterns of professional interaction among complementary/alternative and biomedical practitioners in integrative health care settings. *Social Science & Medicine*, 62(3), 731–744.
- Janssen, Marco A.; Alessa, Lilian Na'ia; Barton, Michael; Bergin, Sean; Lee, Allen (2008). Towards a Community Framework for Agent-Based Modelling. *Journal of Artificial Societies and Social Simulation* 11 (26).
- Kelner, M., Wellman, B., Welsh, S., & Boon, H. (2006). How far can complementary and alternative medicine go? the case of chiropractic and homeopathy. *Social Science & Medicine*, 63(10), 2617–2627.
- Kidder, W. C. (2004). The bar examination and the dream deferred: A critical analysis of the mbe, social closure, and racial and ethnic stratification. *Law & Social Inquiry*, 29(3), 547–589.
- Lamont, M. & Molnar, V. (2002). The study of boundaries in the social sciences. *Annual Review of Sociology*, 28, 167–195.
- Lee, T. A. (2010). Social closure and the incorporation of the society of accountants in Edinburgh in 1854. *Accounting, Business & Financial History*, 20(1), 1–22.
- Limpert, E., Stahel, W. A. & Abbt, M. (2001). Log-normal Distributions across the Sciences: Keys and Clues. *BioScience* 51 (5), 341–352.
- Lorscheid, I., Heine, B.-O. & Meyer, M. (2012). Opening the ‘black box’ of simulations: increased transparency and effective communication through the systematic design of experiments. *Computational and Mathematical Organization Theory*, 18 (1), 22–62.
- Macdonald, K. M. (1985). Social closure and occupational registration. *Sociology*, 19(4), 541–556.
- Manza, J. (1992). Classes, status groups, and social closure: A critique of Neo-Weberian closure theory. *Current perspectives in social theory*, 12, 275–302.
- McCauley, T. (1990). Nativism and social closure: A comparison of four social movements. *International Journal of Comparative Sociology*, 1(2), 86–93.

- Miller, J. H. & Page, S. E. (2007). *Complex adaptive systems. An introduction to computational models of social life*. Princeton: Princeton University Press.
- Murphy, R. (1988). *Social closure: The theory of monopolization and exclusion*. Oxford: Clarendon Press.
- Neuwirth, G. (1969). A Weberian outline of a theory of community: Its application to the 'dark ghetto'. *British Journal of Sociology*, 20(2), 148–163.
- Olson, M. (1971). *The Logic of Collective Action: Public Goods and the Theory of Groups*. New York: Schocken Books.
- O'Regan, P. (2008). 'elevating the profession': The institute of chartered accountants in Ireland and the implementation of social closure strategies, 1888-1909. *Accounting, Business and Financial History*, 18(1), 35–59.
- Ostrom, T. M. (1988). Computer simulation: The third symbol system. *Journal of experimental social psychology*, 24 (5), 381–392.
- Parkin, F. (1979). *Marxism and class theory: A bourgeois critique*. New York: Columbia University Press.
- Parkin, F. (1980). Reply to Giddens. *Theory and Society*, 9(6), 891–894.
- Ramirez, C. (2001). Understanding social closure in its cultural context: Accounting practitioners in France (1920-1939). *Accounting, Organizations and Society*, 26(4-5), 391–418.
- Richardson, A. J. (1997). Social closure in dynamic markets: The incomplete professional project in accountancy. *Critical Perspectives on Accounting*, 8(6), 635–653.
- Rodger, J. (1992). The welfare state and social closure: Social division and the 'underclass'. *Critical Social Policy*, 12(35), 45–63.
- Roscigno, V. J. (2007). *The face of discrimination: How race and gender impact work and home lives*. Lanham, Md.: Rowman & Littlefield.
- Roscigno, V. J., Garcia, L. M., & Bobbitt-Zeher, D. (2007). Social closure and processes of race/sex employment discrimination. *The ANNALS of the American Academy of Political and Social Science*, 609(1), 16–48.
- Roscigno, V. J., Hodson, R., & Lopez, S. H. (2009). Workplace incivilities: The role of interest conflicts, social closure and organizational chaos. *Work, Employment & Society*, 23(4), 747–771.
- Roscigno, V. J., Karafin, D. L., & Tester, G. (2009). The complexities and processes of racial housing discrimination. *Social Problems*, 56(1), 49–69.
- Roscigno, V. J., Mong, S., Byron, R., & Tester, G. (2007). Age discrimination, social closure and employment. *Social Forces*, 86, 335–355.
- Rowley, C. K. (1991). *The political economy of rent-seeking* (2. print. ed.), volume 1. Boston: Kluwer.
- Silver, H. (1994). Social exclusion and social solidarity: Three paradigms. *International Labor Review*, 133(5-6), 531–578.
- Smits, J. (2003). Social closure among the higher educated: Trends in educational homogamy in 55 countries. *Social Science Research*, 32(2), 251–277.
- Smits, J. & Park, H. (2009). Five decades of educational assortative mating in 10 East Asian societies. *Social Forces*, 88(1), 227–255.

- Sørensen, A. B. (1983). Processes of allocation to open and closed positions in social structure. *Zeitschrift für Soziologie*, 12, 203–224.
- Squazzoni, F. (2012). *Agent-based computational sociology*. Chichester, West Sussex: Wiley.
- Stainback, K. (2009). Social contacts and race/ethnic job matching. *Social Forces*, 87(2), 857–886.
- Tilly, C. (1998). *Durable inequality*. Berkeley: University of California Press.
- Tollison, R. D. (1982). Rent seeking: A survey. *Kyklos*, 35(4), 575–602.
- Tomaskovic-Devey, D. (1993a). *Gender & racial inequality at work: The sources and consequences of job segregation*. Ithaca, NY: Cornell University Press.
- Tomaskovic-Devey, D. (1993b). The gender and race composition of jobs and the male/female, white/black pay gaps. *Social Forces*, 72(1), 45–76.
- Vertigans, S. (2007). Militant Islam and weber's social closure: Interrelated secular and religious codes of exclusion. *Contemporary Islam*, 1(3), 303–321.
- Walker, S. P. & Shackleton, K. (1998). A ring fence for the profession: Advancing the closure of British accountancy 1957-1970. *Accounting, Auditing & Accountability Journal*, 11(1), 34–71.
- Weber, M. ([1922] 1972). *Wirtschaft und Gesellschaft: Grundriß der verstehenden Soziologie* (5., rev. ed.). Tübingen: Mohr.
- Weber, M. ([1922] 1978). *Economy and Society: An Outline of Interpretive Sociology* (Günther Roth and Claus Wittich ed.). Berkeley: University of California.
- Weeden, A. K. (2002). Why do some occupations pay more than others? social closure and earnings inequality in the united states. *American Journal of Sociology*, 108(1), 55–101.
- Weiss, R. M. & Miller, L. E. (2010). The social transformation of American medical education: Class, status, and party influences on occupational closure, 1902–1919. *Sociological Quarterly*, 51(4), 550–575.
- Welsh, S., Kelner, M., Wellman, B., & Boon, H. (2004). Moving forward? complementary and alternative practitioners seeking self-regulation. *Sociology of health & illness*, 26(2), 216–241.

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Amelina, Anna (2012): Jenseits des Homogenitätsmodells der Kultur: Zur Analyse von Transnationalität und kulturellen Interferenzen auf der Grundlage der hermeneutischen Wissenssoziologie, SFB 882 Working Paper Series, No. 4, DFG Research Center (SFB) 882 From Heterogeneities to Inequalities, Research Project C3, Bielefeld.

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