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Density of resident farmers and rural inhabitants' relationship to agriculture: operationalizing complex social interactions with a structural equation model

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Abstract
The presence of agriculture is diminishing in today's society: it provides only a small percentage of jobs, and the number of visible farms that can provide exposure to agricultural processes is continuously decreasing. We hypothesize that the direct involvement with farm activities or interaction with farmers and visual appreciation of agricultural processes of all kinds, influences rural inhabitants' relationship to agriculture. We assume that the latter plays a role in how far inhabitants are attached to their place, and more specifically, perceive rural place. In this paper, we aim to initiate a discussion on this complex social relationship and suggest a model to capture fine interactions between *relationship to agriculture* and *rural place attachment.* We examine the direct and indirect effects from the *density of resident farmers* on these interactions. We set up a model using data from empirical research in Germany conducted in 2016. We surveyed rural inhabitants and interviewed farmers in villages purposefully sampled based on high and low density of resident farmers. To reveal underlying relationships among the latent constructs and more directly measurable indicators, as well as the indirect effect of farm presence on place attachment through its effect on forming perceptions about agriculture, we operationalized our analysis using a structural equation model. Besides a good model fit, our initial results indicate that rural inhabitants form stronger *relationship to agriculture* when the *density of resident farmers* is higher. Further, farm presence and attachment to rural place are positively related, but needs to be better captured.

Keywords Farm presence · Place attachment · Non-farmer perception · Distribution of landownership · Rural development · SEM · Germany

Abbreviations
GDR German Democratic Republic
SEM Structural equation model

Introduction

There is an increasing importance of agriculture in light of continuously growing need for food in many countries across the globe. Yet with the unprecedented levels of industrialization and urbanization the presence of agricultural processes seems to be decreasing. Germany represents such a case with a declining presence of agriculture in everyday life (Zander et al. 2013). Even though the country has more than enough food to feed its population, only 1.28% of workforce is employed in agriculture (World Bank 2018). The agricultural output of the country is immense—in 2016 Germany exported food and fodder[1] worth of €51.04 billion. Nevertheless, when compared to the top three goods—vehicles, machinery and chemical products, which were worth €504.46 billion (Statistisches Bundesamt 2016), agriculture can be seen as an important but not outstanding sector of economy.

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[1] Including processed food and fodder.

It has been argued that the industrialization of agriculture led to a decreased understanding of agricultural processes in society (Zander et al. 2013; Neu 2015). One can expect that the change from agrarian to industrial society and nowadays to service and information society (Pierenkemper 2010) has implications on how inhabitants in rural areas see agriculture and how they perceive life in rural settings. Earlier rural settlements were mainly formed by the needs of agricultural laborers, feudal landowners and other professions involved in agricultural productivity, which might be still visible in historical parts of various village centers (Henkel 2014). Contemporary rural settlements look different, often because they fulfill different needs, inhabitants increasingly commute greater distances to their workplaces, single-family homes with gardens are more prominent than wind-protected farmhouses (Bredenbeck 2014). The function of a village, where agriculture has been traditionally organized and embedded into the community, is clearly going through fundamental transformations.

Our paper analyzes four selected villages in an agricultural context in the eastern part of Germany, a particular case of transformation as a result of reunification of German Democratic Republic (GDR or East Germany) and Federal Republic of Germany (FRG or West Germany) which is still influencing everyday life (Laschewski 2014). More specifically, we explore how rural inhabitants associate themselves with agriculture, the main function of their rural place in the recent past. We also want to find out about rural inhabitants' attachment to their villages, and whether there is a bond to agriculture that plays a role in forming the place attachment. The underlying research question that drives us is whether and to what extent agricultural production and farm structure as materialized at present play an important role for today's rural inhabitants. Answering this question could give us further indications about the connection between agrarian and rural development processes (Baldock et al. 2001; Galdeano-Gomez et al. 2011; Lyson et al. 2001).

We assume that rural inhabitants with a stronger relationship to agriculture have also a stronger attachment to their villages. Their insights to and experience with the agricultural processes create both a bond with and a tolerance of various agricultural processes, such as valuing the blooming fields or understanding the necessity of tractors slowing the traffic during the harvest season. In general, visible agricultural processes such as sowing, harvesting and machinery moving on the main roads between fields are often referred to as typical for rural life (European Commission 2017). More generally, as noted above, agriculture is increasingly seen not only as the basis for food production, but also as the satisfaction of societal needs (Zander et al. 2013; European Commission 2016). As the interaction between residents of rural areas that are not directly involved in agriculture and farmers is a two-way relationship, we also consider whether and how far density of resident farmers might be favorable for forming inhabitants' relationships to agriculture. Yet we understand that this notion of relationship to agriculture is rather complex, and knowledge and experience with agricultural processes might not necessarily result in tolerance or appreciation of these processes.

This brings us to the second notion of interest in this paper—rural place attachment, treated as one ingredient for strengthening vitality of rural life according to the present political will in Germany (Landesregierung Sachsen-Anhalt 2010; MULE 2018; LNV 2004; Koomen 2011). We explore if the above described relationship to agriculture can, among all the other complex socioeconomic factors and processes, play a role in forming the place attachment of rural inhabitants, directly through farm activities or interaction with farmers and visual appreciation of farming processes of all kinds. By place attachment, we understand the desire of an inhabitant in a given area to stay in the area or to return to it once left due to a combination of bonds formed with social and physical attributes of the area (Low and Altman 1992; Quinn and Halfacre 2014; Eisenhauer et al. 2000). McAndrew (1998, p. 411) mentioned that strong place attachment would cause expectations of future stability, and would be attended by local knowledge and "greater investment of time in resources in that place." Furthermore, we keep in mind that rural place attachment in this context is also a complex notion as rural areas increasingly fulfill myriad functions apart from agriculture, often as residential areas, and serving as places for small to big non-agricultural businesses (Henkel 2014). Place attachment also draws from connections of individuals to broader values involving relationships with family and friends as well as feelings that might be related to physical attributes of places (Stedman 2003). We suggest that rural place attachment, as well as relationship to agriculture, can vary from weak to strong, as will be discussed in more detail in the following section, largely characterized by social and cultural connections individuals build throughout time, as well as knowledge about and fondness towards the physical attributes of a place.

This paper aims to fill the research gap in the current literature for explaining how all these individual elements from agricultural and rural development are linked together in a broader picture. Based on Quinn and Halfacre (2014, p. 129), who noted that "[f]uture research should also examine place attachment developed by consumers who frequent particular farms and have a relationship with farmers," we offer lessons from our attempt to disentangle the complex relationships among what we see as three key variables. The first two are latent, not directly observable constructs—inhabitants' *rural place attachment* and *relationship to agriculture*, respectively, as described above. The third one is based on whether "density of resident farmers" is relatively high or low that we identify based on number of farmers who are

resident in the area in relation to total area and number of residents. We purposefully sampled our villages to identify the effects of this variable. Thus, the objective of the paper is fourfold. First, we would like to initiate a discussion on possible interdependencies within and between the two latent constructs. Second, we would like to discuss our initial findings on whether density of resident farmers has an effect on the degree of these two. Third, we would like to offer a model-based approach that attempts to measure and quantify these latent variables and their nuanced interrelations using observed variables in a structured equation model (SEM). Finally, we illustrate and discuss results from an initial operationalization of this model using available empirical data from a field study conducted in four villages of Saxony-Anhalt, a federal state in East Germany, in 2016. The gathered data is the foundation of the analysis in this paper.

Rural place attachment and relationship to agriculture

Since the interrelations among the above three variables are crucial for present agricultural policy-making, yet are taken for granted in the ongoing political debate (Landesregierung Sachsen-Anhalt 2010; MULE 2018), this research contributes to fulfilling the need to explore some ways of operationalizing these interrelations with a suitable modeling approach. In this section, first, we want to highlight the reasoning behind the concept of place attachment and indicators that determine *rural place attachment*. Second, we provide indicators for *relationship to agriculture* by rural inhabitants. The observed indicators help us to operationalize both concepts and develop an initial model capable to generate evidence about their interconnectedness. We treat *density of resident farmers* as an exogenous variable in our model. We posit that it affects rural place attachment directly—farmers' presence might affect rural inhabitants' place attachment, but also indirectly—through contributing to forming certain relationship to agriculture first, which then affects rural place attachment. We continue by elaborating on each of these variables.

Place attachment

Place can be regarded as a construct, a perception, a social relation as well as a geographical place (Bowen 2011). In geography and landscape sciences, for example, it is important to distinguish the concepts of place and space. The latter refers to the physical entity, while the former focuses on social relations within space (Hunziker et al. 2007). There seems to be lack of agreement as to the exact definition of space and its delineation from place. For example, Bowen's perspective, space is not just natural space but also a product of social interaction (Lefebvre 1991). The sociologist Giddens (1990, p. 18) states that place "is best conceptualized by means of the idea of locale, which refers to the physical settings of social activity as situated geographically." Here, we want to analyze spatial-social interaction, the relationship between the individual and their physical and social surroundings—thus, the sphere of what encompasses *place*.

The relationship between people and places is important for natural resource management (Wynveen et al. 2017). We follow the concept of place attachment to bring out the relationship between villagers and their village, while trying to understand better the role of their relationship to agriculture. Place attachment is analyzed in human geography (Brown et al. 2015; Lu et al. 2018; Lokocz et al. 2011), environmental psychology (Raymond et al. 2010; Hernández et al. 2007; Scannell and Gifford 2017) and other broader research areas such as sociology (Rodriguez Castro 2017) and anthropology (Low and Altman 1992). Scannell and Gifford (2017, p. 256) regard place attachment from a psychological point of view and describe it as a "cognitive-emotional bond that forms between individuals and their important settings." Stedman (2003) emphasizes that the physical dimensions of a place are also important for place attachment. Windsong (2014) shows that both—connections to physical land and social interactions around land—are intertwined and relevant. A neighboring concept to place attachment is place identity, which means that the physical appearance of a place is crucial for a person's identity and belongingness (Wester-Herber 2004; Lijadi and Van Schalkwyk 2017). We build our analysis on a more comprehensive and nuanced definition by Scannell and Gifford (2010, p. 5), who suggested that place attachment "[…] is a bond between an individual and a place that can vary in terms of spatial level, degree of specificity, and social and physical features of the place, and is manifested through affective, cognitive, and behavioral psychological processes." Thus, the relationship between the individual and the place is subjective and encompasses social as well as physical components. It will be likewise treated here as a proxy for vitality of rural life, representing a strong political will and taken as an argument, for instance, to design certain agricultural land and structural policies (Landesregierung Sachsen-Anhalt 2010; MULE 2015, 2018). Once again, this assumption of a relationship between the role of agriculture and vitality of a rural place is yet to be scientifically tested.

A limited number of scholars reflected also on the role of land ownership for place attachment. Riger and Lavrakas (1981) distinguish between social bonding (social dimensions, such as involvement in the neighborhood) and physical rootedness (physical dimensions of a place, such as ownership and period of residence). They researched an urban neighborhood and found that the two dimensions are

correlated. For example, young families usually have higher interactions than elderly people, but both groups tend to stay in the area if they are homeowners. Nevertheless, Riger and Lavrakas (1981) do not label their findings directly as *place attachment*. Sargeson (2018) highlights the potentially adverse consequences of changing land ownership. She found that collective land ownership stimulated community engagement, while private property would weaken participation in self-governance of a local community. Although the example is in the context of China, interestingly, it addresses the transformation of collectively owned land into state ownership and its subsequent privatization.

There are a few studies that aim to measure place attachment. The approaches range from a number of elaborated and combined proxies to direct questions on the perception of place attachment. Researchers tried to measure the bond between people and place either from its spatial context, using for example GIS technologies (Brown et al. 2015), or from psychological standpoints (Scannell and Gifford 2010). The latter created a three-dimensional, person-process-place organizing framework, based on an empirical study, where people were asked about their bond to a certain place (Scannell and Gifford 2010, p. 1). Raymond et al. (2010) added a fourth and fifth dimensions and reduced the psychological components in their reasoning. They measured place identity, place dependence, social bonding (including family and friend bonding) and nature bonding. Hinojosa et al. (2016, p. 310) were less proxy-based and asked mountain farmers directly to indicate their attachment to their municipality on a scale from 1 (not attached at all) to 10 (fully attached). Wynveen et al. (2017) analyzed the limitations of comparing place attachment across cultures and suggested to assess place attachment scales for various research areas. We want to contribute to the work of these scholars with our measurement approach of place attachment.

The concept of rural place attachment (RPA)

Interestingly, the literature related to the rural place attachment is concentrated more around farmers, with less emphasis on non-farmer rural inhabitants. Farmers are expected to have a stronger level of rural place attachment, as their livelihoods depend on land use. Hinojosa et al. (2016) studied if farmers had a strong place attachment in the higher alps. Their findings pointed to the assumption that the farmers were committed to pursue agriculture despite the difficult terrain because they felt attached. Quinn and Halfacre (2014) asked farmers in the US about their attachment to their land and focused on behaviors that could lead to place attachment. According to Quinn and Halfacre (2014) farmers received security from their land which led to strong place attachment.

Walker and Ryan (2008) are some of the few scholars that researched place attachment of inhabitants in rural areas. They confirmed a positive correlation between social engagement and place attachment. In contrast, Theodori and Luloff (2000) indicated that there might be a variation in attachment based on specifics of location but could not confirm that community attachment would be higher in rural areas compared to urban communities.

Moroney and Castellano (2018) analyzed how urban and rural populations are concerned differently with loss of farmland due to urban growth. They found that rural people were more concerned about farmland loss due to urbanization. Moroney and Castellano (2018) assumed that it could be explained by place attachment, but they did not ask about personal relationship to agriculture. Another relevant aspect to take into account is that nowadays rural inhabitants are usually mobile because they have to reach their workplaces increasingly further away from their residences, and the rural infrastructure is often inadequate in terms of supermarkets, medical services and public transportation (Neu 2015). Nevertheless, a mobility study in Germany likewise confirmed that commuters who were homeowners were more attached to their residence than those with temporary lease (Meyer et al. 2003).

Deriving indicators for rural place attachment

Here we offer an operationalization of the concept of rural place attachment (RPA) by forming seven indicators for its measurement allowing us to refer to the degree of rural place attachment. Each indicator is derived from literature with empirically-based reasoning on related themes. This means that most of our mentioned studies are based on empirical research, often reported as a case study, whereas two are studies of theoretical nature (Moore 2000; Rao 2018). Even though the study areas differ (e.g. cases are in Canada, USA, Israel, Europe), all of them help us reveal various important dimensions of rural place attachment in the context of developed countries. These studies are also useful because of their methodology. We searched for indicators which were already tested and demonstrated potential to contribute to our concept. As we are aware that there are regional differences between the case study areas, we focused on the methodology of deriving relevant indicators that could explain rural place attachment. Thus, we compare what creates a bond to rural places and how it could be measured with various indicators.

Windsong (2014) found that in her researched rural communes in the US, since the early settlement of residents in 1960s, the social interactions have decreased while the commitment to the physical environment remained strong. The respondents were asked to describe the environment, and the researcher detected only positive descriptions. Referring

to Windsong (2014), we asked the respondents to indicate their *fondness of their home village* (*RPA1*) on a scale from 1 (very fond) to 5 (not fond at all), using the scale that resembles the common school grades in Germany. Riger and Lavrakas (1981, p. 59) distinguished three factors that represent the extent to which a person is settled or rooted in their neighborhood. From these three, we adopted the *duration of residence* (*RPA2*) as an indicator affecting the rural place attachment (Hernández et al. 2007) and the question whether the rural inhabitant *planned to leave their place of residence in the next 3 years* (*RPA3*). According to Casakin et al. (2015) people might be willing to leave should they not succeed in creating a bond to their place of residence. Ngo and Brklacich (2014) observe new farmers in Canada and their attempt to create a sense of place, emphasizing place identity. We likewise formed an *identity* (*RPA4*) indicator and asked the respondents to name how they identified themselves in terms of place. If the respondents mentioned, for example, a village name, that would mean they associated themselves with the name of their residential village, while broader associations could be Eastern German, German or European, or even names of other places. If the person calls themselves with the names closer to the home village, we assume a stronger place identity for that specific rural area. Moreover, in accordance with Moore (2000, p. 207), who showed that home transcends the material characteristics of domestic space, we elaborated an indicator by openly asking *what home means* (*RPA5*), and clustered the answers according to physical place, social relationship and feeling as well as a combination of these three. Here we assume respondents have the strongest attachment when they name all three categories, while in case two or single categories expressed, we followed the order of social relationship, feeling and place as our guide to measure the relative degree of attachment. To check whether the respondent is an active member of the community, and thus has a social bond, we introduced the indicator of *social engagement of the respondent* (*RPA6*). A direct question on whether they are culturally-socially engaged, accompanied by various examples, was asked to measure this indicator. A similar indicator has been used in a study across the member-states of the European Union about quality of life (Eurofound 2018), where the authors found that civic engagement was higher in the countryside (20.00) compared to the city (17.4) (both Europe-wide). In addition, based on Meinzen-Dick (2014) and Rao (2018) we introduced an indicator of *land ownership* (*RPA7*) associated with non-farmer rural inhabitants. Under land ownership we specified here additional agricultural or forestry land that might be rented out, excluding housing and family garden property. However, we should be cautious in analyzing the direction of causality here, as rural place attachment and land ownership can have causal relations in both directions—one might acquire land after forming rural place attachment, as well as form rural place attachment because of land ownership. As non-farmer residents are restricted in purchase of agricultural land under German law (Real Property Transaction Act)(Bundesrepublik Deutschland 1961), and those who own agricultural land mostly inherited it or were formerly farmers, for the purposes of analysis in this paper, we assume that owning land in the studied villages was likely to cause rural place attachment and not otherwise.

The concept of relationship to agriculture

Similarly, we base indicators for measuring the concept of *relationship to agriculture* on a combination of factors derived from the literature. However, there is not a dedicated theory particularly dealing with the notion the way we define it. Central is the relationship between non-farmer rural inhabitants and locally visible or experienced farm-life or agricultural production processes in broader terms. We derive the meaning of *relationship to agriculture* rather from exposure of rural inhabitants to agricultural processes. Literature review shows that the *relationship to agriculture* can be also understood in an economic context, for example as employment or expenditures of a household for agricultural products (Hawkins et al. 1993; Nkegbe et al. 2018; Mensah 2017), but also with a social connotation (Obach and Tobin 2014; Migliore et al. 2014; Sumner et al. 2010). A large part of Germany`s rural society is neither employed in agriculture nor in their villages, commuting to cities or suburbs instead (Neu 2015). Thus, relationship to agriculture does not only mean in the narrow sense being employed in agriculture, or having a small home garden, but the term relationship is used in the sense of a social bond or engagement (Obach and Tobin 2014) experiencing agriculture and perceiving it in a certain conscious way. In this study, we integrate the socioeconomic relationship between farmer and non-farmer inhabitants which is also widely analyzed in studies using the concept of embeddedness of food production (Penker 2006; Constance 2017).

Relationship to agriculture, the way we analyze it here, is found also in relation to "civic agriculture" (Obach and Tobin 2014). Civic agriculture stands as an alternative to large-scale profit-oriented agriculture and comprises locally oriented, small-scale agricultural enterprises. They utilize more traditional farming methods which furthermore emphasize importance of direct distribution of agricultural products as farmers may connect with consumers through farmers' markets (Obach and Tobin 2014). The recently booming organizational form of community-supported agriculture does also belong to the concept of civic agriculture (Obach and Tobin 2014). Migliore et al. (2014) show that agricultural production processes, when embedded in society, could create civic agriculture, thus forming a social relationship to agriculture with insights to the production

processes. Furthermore, Obach and Tobin (2014, p. 307) found a "higher level of voluntarism and engagement in local politics among civic agriculture participants relative to the general population". Civic agriculture could be regarded as a bridge between villagers and agricultural production, but the consumers or participants of civic agriculture tend to be inhabitants of urban areas engaged with agriculture rather for idealistic reasons such as to reject the capitalistic mode of production (Boddenberg et al. 2017), hence it is a somewhat different target group, whose social interaction, we aim to study here.

Deriving indicators for measuring relationship to agriculture (RA)

As described above, our concept of relationship to agriculture by rural inhabitants encompasses economic engagement in agriculture as well as social bonds towards farmers and agricultural processes more generally. We offer an operationalization of relationship to agriculture by forming five indicators for its measurement that allow expressing the degree of relationship to agriculture. We elaborated these indicators based on literature (Weiss et al. 2013; European Commission 2016; Zander et al. 2013) that provided empirical work on related themes.

The study of Weiss et al. (2013) showed that farmers' engagement could be a connecting point between a village and a farm. Standardized survey data underlines such relationship and the importance of the farm managers' behavior as well. For instance, European citizens are regularly surveyed about their opinion on agricultural policy in the European Union. The latest survey was conducted in 2015 and included questions on responsibilities of farmers perceived as important for society (European Commission 2016). "Supplying the population with a diversity of quality products" was named by 42% of the respondents. "Maintaining employment in rural areas" was mentioned by 29%. An answer most related to our research focus "encouraging and improving life in the countryside" was named as responsibility of farmers by 24% of the respondents (European Commission 2016, p. 12). Thus, we included an indicator on *perceived engagement of farmers* (*RA1*) which alludes whether respondents of our survey believe that farmers are engaged in social activities. Mirroring insights from our literature review, we include economic aspects as indicators for engagement in agriculture. We derived an indicator from the fact, whether the respondent is or was *employed in agriculture* (*RA2*). Here, in terms of direction of causality, similar to our reasoning related to RPA2 and RPA7, we propose that employment in agriculture affects individual's relationship to agriculture and not the other way around. We also controlled for the awareness about resident farmers by asking the inhabitants to *name up to three farmers* (*RA3*) in the vicinity. This gives information about the farmers' visibility in the community. Zander et al. (2013) found that German citizens have different expectations concerning agriculture depending on their own exposure to agricultural processes. Thus, we asked *how often the interviewee visits a farm* (*RA4*) and derived an indicator on that. Finally, we asked directly *how important agriculture is for the respondents' village* (*RA5*), on a scale from not at all important to very important.

Density of resident farmers

Following the above two sections, there is a clear indication that rural inhabitants' relationship to agriculture can be influenced by the possible interactions with farmers.

There is an important historical background in the context of East Germany that needs to be considered when studying the relationship between rural inhabitants and farms. Borstel (2010) asserted that the collectivization in agriculture during GDR times led to a division of individual homesteads into the village and agricultural production. As traditional structures were eliminated, farmers worked apart from their homestead. Often one large agricultural enterprise, as it has become common since GDR times, has its headquarter in one village where most part of the social interaction with rural inhabitants is likely to take place, while cropping additional lands across several villages. A contrasting structure, as can be observed for example in West Germany or occasionally in some areas of East Germany, is one with agricultural enterprises with individual plots of land spread across villages more densely. As those farms are smaller, we see by nature more farmsteads spread within the villages. The higher density of resident farmers, as investigated in our research, could then simply create more possibilities for non-farmer rural inhabitants' interaction with farmers.

Nevertheless, we have to note that the importance of the agricultural sector and the high employment rates in that sector during the GDR times created a new bond between villages and agriculture, where agriculture was still deemed very important. However, this changed significantly after reunification, when about 80% of the jobs in the agricultural cooperatives were lost as the centralized funding seized, and only those that continued to produce were considered important. These disruptions are mentioned as one reason to leave villagers discontent (Borstel 2010). Weiss et al. (2013) conducted a study on demographic change in East Germany, including aspects of farmer's engagement in the rural community. In general, Weiss et al. (2013) count farm enterprises' engagement as communal engagement and thus, see from the perspective of the agricultural producer many bonds between the village and the farm. In this study, to explore the effects from contrasting structural settings, we purposefully sampled villages with higher and lower density of resident farmers.

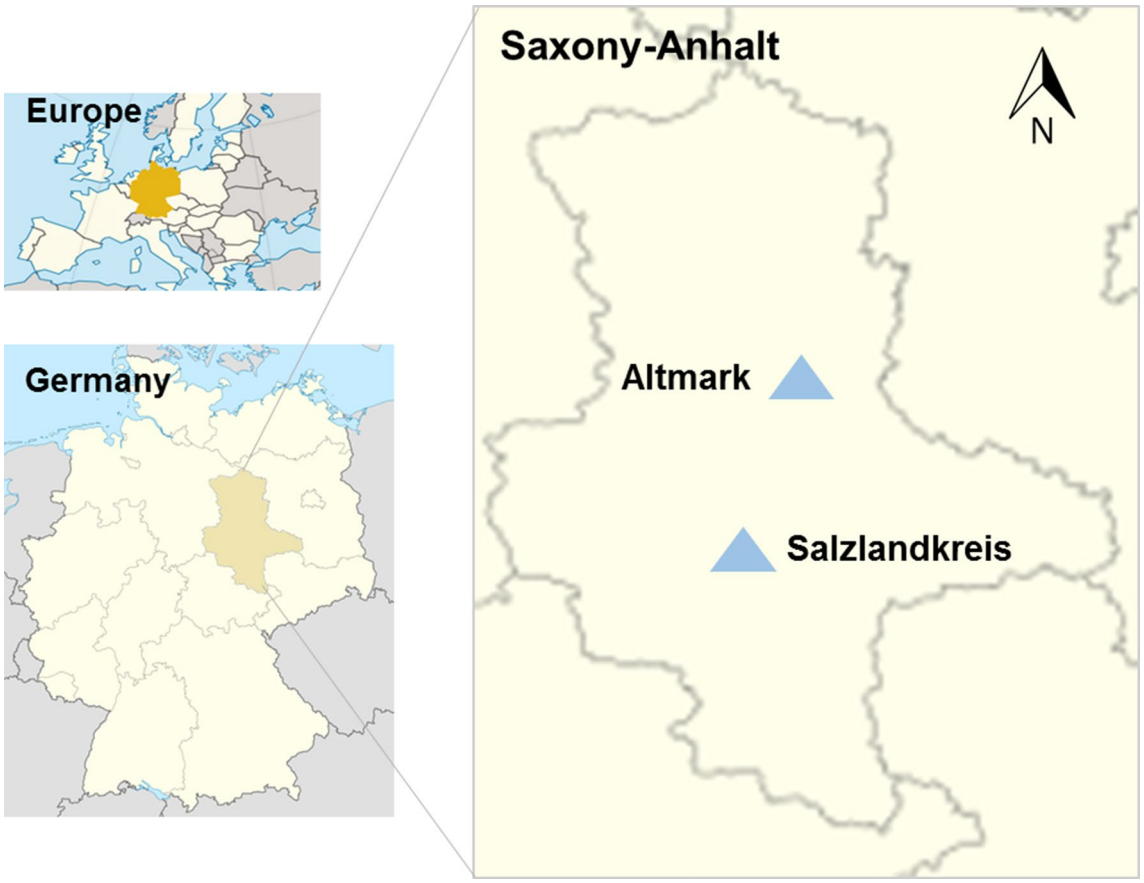

Fig. 1 Saxony-Anhalt and the study area. *Source* authors' own illustration based on TUBS (2011) and NordNordWest (2008)

Materials and methods

To understand how relationship to agriculture is related to rural place attachment we now explore how these two concepts can be quantified and operationalized. At the same time, we look at the effects from density of resident farmers on these two concepts. We set up a corresponding model and test its ability to show correlations among them.

Background to study area

Saxony-Anhalt is one of the federal states of Germany, located in the central eastern part of the country (Fig. 1), which until reunification was a part of the former GDR. After the transition phase following the reunification in 1990, East German agriculture turned out to be dominated by large-scale farms, which are still larger than those in West Germany. These uneven circumstances are due to different development trajectories taken already during the GDR times when large-scale agriculture of cooperative farms dominated (for details of developments related to agricultural transition, see e.g. Beckmann and Hagedorn 1997). In West Germany, as of 2016 the average farm size was 44 ha compared to 224 ha in East Germany. In West Germany, single enterprise farms (natural persons), which represent about 99.3% of farms, cultivate about 99% of the farmland. In East Germany, 85.1% of all farm businesses is led by natural persons, but they cultivate only 49.8% of the agricultural area. This means 14.9% of farms cultivate about half of the land in East Germany (Tietz 2017, p. 4). Further, there are more consolidated plots for cultivation of land in East Germany. Looking more closely at land ownership and land lease structure, the share of leased land in East Germany is comparatively high with 71% in 2013 (yet declining from 90% in 1993). In West Germany, one can observe an opposite—increasing—trend with 55% in 2013 (up from 40% of the agricultural land in leasehold in 1993) (BMEL 2000, 2015). East German agriculture is known to be very productive due to the resulting economies of scale (Boddenberg et al. 2017). Further, particularly Saxony-Anhalt has a very good soil quality—the best soils in Germany can be found in the Magdeburger Boerde, in the center of the federal state.

The economy in the federal states of former GDR is still weaker compared to the western regions. The unemployment rate in 2017 was 8% in Saxony-Anhalt compared to the average of 4.9% in West Germany (Bundesagentur für

Arbeit 2018). In 2016, over 2,241,500 inhabitants lived in Saxony-Anhalt, with 50.3% of population in the age suitable to be a gainfully employed. In 2015, 25.1% of inhabitants were older than 65 years and 13.9% younger than 18 years (Destatis 2017). Between 1991 and 2001, the population of Saxony-Anhalt declined by about 20%. This also lowered the birth rate and led to a decrease of population density in the rural areas (Neu 2015). Still, in 2015 more people left Saxony-Anhalt compared to how many new inhabitants it could gain (− 5400 inhabitants). The largest cities are Magdeburg and Halle with about 230,000 inhabitants each (Destatis 2017). The research by Jantsch et al. (2016) indicated that there were discrepancies in the perceived quality of life between rural and urban population. Rural participants in West Germany were about as happy as participants who lived in urban areas, while in East Germany the rural population was significantly less happy with their life. But, according to a recent study by Eurofound (2018), life satisfaction in Germany was better than the life satisfaction across Europe. The level of enduring well-being in 2016 (life evaluation) was 71.0 (out of 100) for Germany compared to 69.1 for Europe. All this shows that the relationship to agriculture of rural inhabitants is just one factor among many that drive structural rural development contributing to a general trend.

A long-term study (Becker and Tuitjer 2016), which includes data starting from 1952 in West Germany and 1993 in East Germany, confirms the agricultural structural change as well as the structural rural development over time. Wirth et al. (2016) emphasized that also small towns in rural areas experienced negative consequences by the loss of importance of the agricultural sector, struggling to diversify their economy into other businesses.

Data collection and criteria for case study design

We visited four villages in 2016, purposefully sampled according to higher or lower density of resident farmers. The normative discussion of the socially desired density of farms in the rural countryside currently gained additional attention in the context of the land grabbing debate. This is lately also so in the European context, where social consequences of less dense farm structures, as a result of large scale investments in land are considered (Bunkus and Theesfeld 2018). Due to privacy and data protection concerns, we do not provide the names of the villages in this paper. Two villages (village 1 and 2) are located in the north of Saxony-Anhalt, Altmark area, where the soil has medium to poor quality; and the other two (village 3 and 4) are in the south, Salzlandkreis area, where the soil has very good soil quality. The core criterion assumed important for this study is the density of resident farmers.

To qualify as a resident farmer, we considered farmers who either lived or had the headquarter of the enterprise in the selected villages. Further, they needed to cultivate a respective part of their land in the village district area (in German: Gemarkung) or adjacent to that. Furthermore, we only considered full-time agricultural enterprises with agricultural land under production greater than 100 hectares, as we assumed a certain size was needed to become "visible" to the non-farm rural inhabitants. Based on two relative parameters of density—number of resident farmers versus total agricultural area and number of resident farmers versus total number of rural inhabitants—we identified that village 1 can be seen as one with clearly higher density of resident farmers compared to the other three. At the same time, having all four villages from the same federal state ensures that they experienced very similar historical background of transition from the former GDR.

The study combines data from two empirical sources—a structured survey with rural inhabitants and semi-structured interviews with farmers. Our focus is on the quantitative data analysis, but we used insights from qualitative data analysis to validate some indicators and the model's conceptual set-up.

Survey of non-farmer inhabitants

The survey was done in public places of the four villages. The interviewer went through the streets and the market square, and asked villagers to participate in the study. Only non-farmer rural inhabitants who lived in the village or in one of the neighbor villages were considered. We only included interviews with local inhabitants who lived not further than 30 km. Thus, the sample is non-random, but represents a quota sampling (Bryman 2012) achieved by approaching villagers of certain age or gender. Accordingly, the data analysis focuses rather on the relationship between variables in contrasting conditions and not their representativeness. Even though more than 400 villagers were approached, only 130 agreed to participate in the survey (in the south—n = 27 in village 1, n = 29 in village 2, and in the north—n = 27 in village 3 and n = 47 in village 4). The full questionnaire contained 59 questions, most of them with a multi-choice option and some with open-ended questions.

Interviews with farmers

We define "farmers" as operators of their agricultural enterprise, and therefore we only interviewed persons with responsibility for the enterprise. We conducted 16 semi-structured interviews with farmers in these villages with the purpose to validate our theoretical model (n = 9 in village 1, n = 2 in village 2, n = 2 in village 3, n = 3 in village 4). The interviews were conducted at headquarters of agricultural

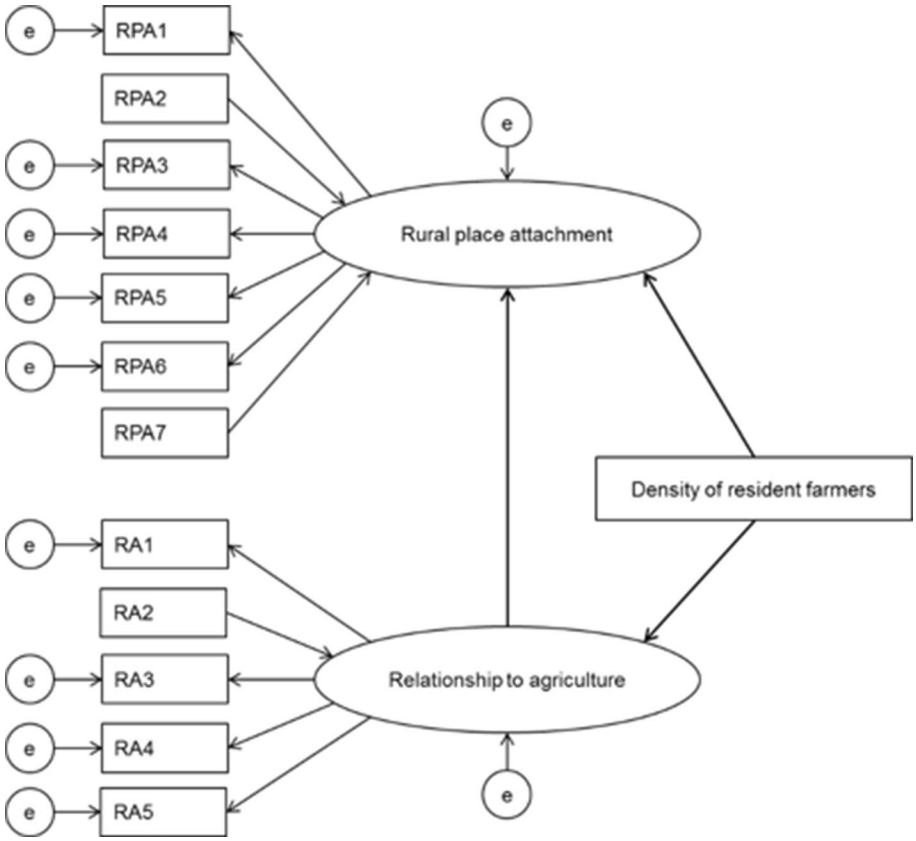

Fig. 2 Hypothesized structural equation model. *Source* authors' own illustration. *Note* Boldface arrows indicate structured component, *e* error

enterprises or at the farmers' homes. We gained access to the farmers initially through the online directories and continued by chain-referral-sampling (Bryman 2012) as the online directories did not include all farmers or their correct data.

Analytical approach and specifications of structural equation model

We explore two concepts as "building blocks of theory" in this paper (Bryman 2012, p. 163): *relationship to agriculture* and *rural place attachment*. Both are latent variables, which cannot be observed directly. One way to account for effects of latent variables is to develop observable indicators that can be better measured. Our analysis employs seven and five indicators accordingly to operationalize the two concepts, as described in the previous section.[2] At the same time, we aim to understand not only the direct but also indirect effect from density of resident farmers on rural place attachment. With an indirect effect, we want to see whether density of resident farmers contributes to forming place attachment through its influence on relationship to agriculture by non-farmer rural inhabitants. For analysis of such complex, or so-called mediated interactions, where effect of one variable can be seen in its effect through another variable, we also develop an early version of a structural equation model (SEM), a relatively novel approach in social-ecological research, particularly aimed at capturing social interactions in an agricultural context (Stofferahn et al. 1991; Welsh 2009; Pambo et al. 2008). Application of SEM as an analytical method seems particularly appropriate in our case as it integrates a number of multivariate techniques into one model fitting framework, including measurement of concepts, factor (latent variable) analysis, path analysis, regression and simultaneous equations (see for example Byrne (2010) and Doering et al. (2016)). Nevertheless, the purpose of the model here is not to reach conclusive results on the questions at hand but to initiate a discussion and demonstrate a way to start disentangling the complex social interactions in an agricultural context using SEM.

The complex interrelationships are conceptualized in a hypothesized SEM graphically (Fig. 2). "Rural place attachment" is a structural component of the SEM and its measurement component consists of the indicators from RPA 1 to RPA 7. The error terms (e) include the information that cannot be explained by the model. "Relationship to agriculture" is another structural component of the SEM, with RA 1 to RA 5 being the measurement indicators. The independent variable in this model—density of resident farmers—classifies the rural inhabitants according to their villages into ones

[2] Hair et al. (2010) suggest at least three indicators.

with high or low density of resident famers accordingly. The information about density is recoded into an ordinal variable to fit the capabilities of the statistical packages (SPSS 23 and AMOS 23) used in this research, where village 1 corresponds to 5 (high density of resident farmers) and each of the other three is 1 (low density of resident farmers). Similar re-coding is implemented for RPA7 and RA2 (see original questions in Table 1). Overall, dealing with dichotomous variables could be seen as a challenge as well as an opportunity of working with SEM (e.g., in a large sample with two groups of comparable size, the issue with the dichotomous variable could be addressed through calculating a separate model for each of the groups). Circles represent latent variables and rectangles represent measure variables.

The questions used to derive indicators for both concepts, the sets of answers, and their codes for the model calculation are displayed in Table 1.

We also report two further procedures that are recommended before discussing the empirical results of the model—internal reliability of multiple-indicator measures and model fit. Testing for internal reliability for multiple-indicator measure ensures coherence among the used indicators. Bearing in mind that our sample, although represents real empirical data, is limited and non-probabilistic, reliability test shows that although we would need to re-visit our items measuring *rural place attachment* (Cronbach's $\alpha = 0.489$), we have evidence of internal reliability close to the recommended threshold in our construct *relationship to agriculture* ($\alpha = 0.607$; Nunnally 1967). Hence, it can be used in similar contexts, as no context-specific scales yet exist in the literature. In this sense, our study provides a proof of concept for usefulness of the SEM application in the studied case.

Further, we can see that our results demonstrate an acceptable model fit. We chose maximum likelihood parameter estimation as an estimation method without removing any observation. Depending on whether the data are normally distributed or not researcher might make decisions as to the method of the estimation (e.g. see Gao et al. (2008) for detailed discussion of advantages and disadvantages of various strategies). In our model, the model fit is acceptable as can be seen in root mean square error of approximation (RMSEA) = 0.074 (general rule being RMSEA < 0.06 to 0.08 for acceptable fit) and Chi square/degrees of freedom < 5 (see e.g. Schreiber et al. 2006), although two other indices of model fit (TLI = 0.583, CFI = 0.711) are below recommended thresholds (recommended TLI ≥ 0.95 or 0 > TLI > 1 for acceptance and CFI ≥ 0.95 for acceptance). We did not conduct post hoc modifications of the model because of rather small sample and demonstrative purpose of this SEM example but it should be noted that the SEM allows such modifications by reorganizing the relationships and indicators.

Results and discussion

As noted in the previous section, a particular advantage of using SEM is that it allows testing for both direct and indirect effects of independent variables. While density of resident farmers can directly affect rural place attachment, we assumed that it would also have an indirect effect through its impact on relationship to agriculture. This is particularly important in our example, where analysis of both direct and indirect effects is relevant.

First, looking at direct effects (Fig. 3), we can see that relationship to agriculture was predictive of stronger rural place attachment (standardized coefficient = 0.05) (standard error = 0.02, $R^2 = 0.27$), and higher density of resident farmers was predictive of stronger relationship to agriculture (standardized coefficient = 0.31, standard error = 0.05, $R^2 = 0.22$). These are in line with our assumptions. However, what can seem a somewhat surprising finding is that density of resident farmers had a direct negative effect on rural place attachment (standardized coefficient = −0.32). Although this result seems contrary to the findings by Walker and Ryan (2008) who confirmed a positive correlation between social engagement and place attachment (see "The concept of rural place attachment (RPA)" section), our result is also in line with their findings in that it highlights the importance of quality of interaction. We assumed that inhabitant's relationship to agriculture was influenced by possible interactions with farmers. The result indicates that this relationship might be affected by both quantity and quality of interactions. The quality of interaction, and not only the quantitative aspect reflected in density of farmers, may influence the image of agriculture and rural areas associated with agriculture. In our interviews with farmers too, most farmers indicated that it was quite important to them to make a positive impression on non-farmer inhabitants explaining that they were aware of a generally unattractive image of agriculture. That in turn seems to be in line with recent findings on farmers' social engagement by Weiss et al. (2013), who in the example of Saxony-Anhalt found that farmers often took over public services in the community. According to them, farmers are indeed quite active, yet most of the services they take over seem to be of technical nature (e.g., cleaning the streets, fire services, transportation services, disaster prevention), emphasizing the need to assess the interactions between farmers and non-famer residents not only with a quantitative approach but also qualitatively.

Second, only by looking at indirect effects can we reveal that density of resident farmers has a positive effect on rural place attachment through its impact on relationship to agriculture. In our case, this is reflected in the positive standardized coefficient of 0.01. This is a strong

Table 1 List of indicators to measure rural place attachment (RPA) and relationship to agriculture (RA), with answers recoded into an ordinal scale from 1 (weakest indication) to 5 (strongest indication)

Indicator	Question	Answers	Re-coded
Rural place attachment (RPA)			
RPA1	How fond are you of living in this village?	Not at all	1
		Not so much	2
		Neither like nor dislike	3
		Quite some	4
		Very much	5
RPA2	What is the duration of your residence in this village?	Less than 1 year	1
		1–5 years	2
		6–10 years	3
		11–25 years	4
		More than 25 years	5
RPA3	Would you like to stay in this village in the next 3 years?	No	1
		Rather not	2
		Not sure	3
		Rather yes	4
		Yes	5
RPA4	How would you identify yourself in terms of place?	Answer matches "Beyond country level"	1
		Answer matches "On the country level (e.g. German)"	2
		Answer matches "On the regional level"	3
		Answer matches "On the district level"	4
		Answer matches "On the village level"	5
RPA5	What does "home" mean to you in terms of place?	Claims it is not related to "place"	1
		Answer contains "feeling" only	2
		Answer contains "feeling and relationship" or "relationship"	3
		Answer contains "place" or "place and feeling" or "place and relationship"	4
		Answer contains "place, feeling and relationship"	5
RPA6	Would you consider yourself as socially engaged?	No	1
		Rather no	2
		Neither no nor yes	3
		Rather yes	4
		Yes	5
RPA7	Do you own land in this village?	No	1
		Yes	5
Relationship to agriculture (RA)			
RA1	Would you consider farmers in this village as socially engaged?	No	1
		Rather not	2
		Neither engaged nor disengaged	3
		Rather yes	4
		Yes	5
RA2	Are you currently employed or were you employed in the past in agriculture?	No	1
		Yes, in the past	4
		Yes, currently employed in agriculture	5
RA3	How many farmers from your village do you know by name?	I don't know any farmer	1
		I know a famer or farmers but can't remember the name	2
		I know 1 farmer	3

Table 1 (continued)

Indicator	Question	Answers	Re-coded
		I know 2 farmers	4
		I know 3 farmers	5
RA4	Which of these represents best for how often you visit a farm in your village?	Never	1
		Annually	2
		Monthly	3
		Weekly	4
		Daily	5
RA5	In your opinion, how important is agriculture for your village?	Not at all important	1
		Relatively unimportant	2
		Neither important nor unimportant	3
		Relatively important	4
		Very important	5

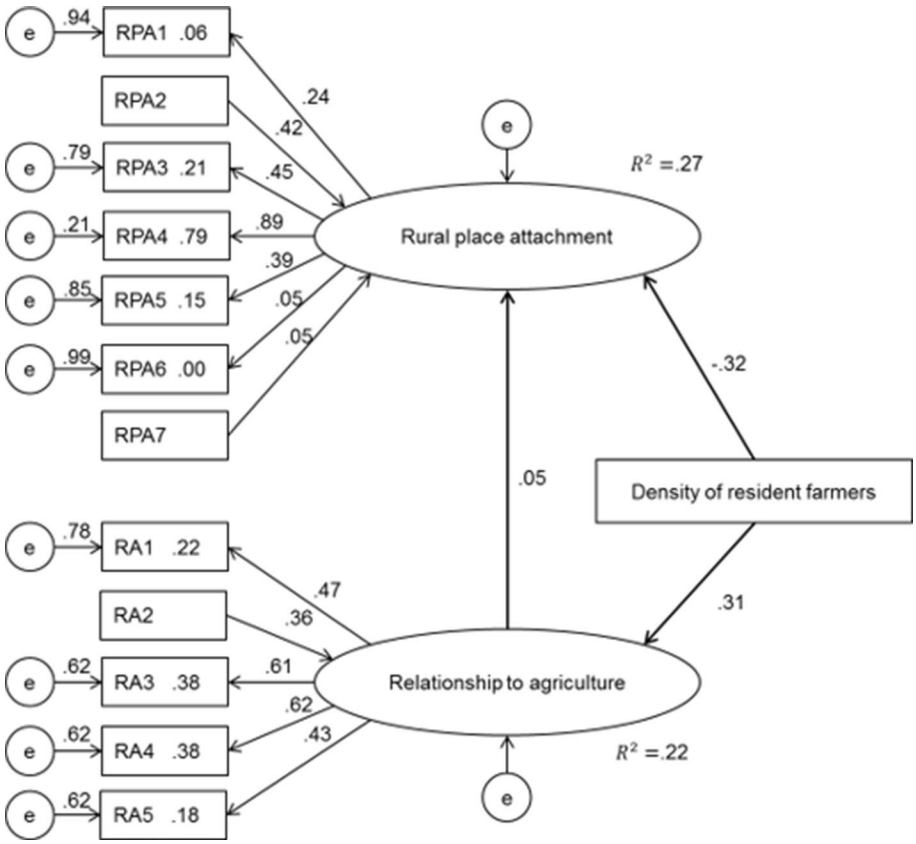

Fig. 3 Results for the structural equation model. *Source* authors' own illustration based on SEM results. *Note* TLI = 0.583; CFI = 0.711; RMSEA = 0.074; Chi square = 107.281; degrees of freedom = 63; e = error. Indirect effect from density of resident farmers on rural place attachment = 0.01 (standardized coefficient)

indication that farm presence and rural place attachment are positively correlated, although the relationship is not straightforward. This is perhaps because the number of factors affecting rural place attachment, which we used as a proxy to rural vitality actively debated by policy makers (Landesregierung Sachsen-Anhalt 2010; MULE 2015, 2018) might be considerably broader than just density of farmers. The positive effect of density of farmers could be captured only through a mediating variable, in our case another broader construct of relationship to agriculture. Thus, our analysis reveals that the construct *relationship to agriculture* can be seen as the missing link that allows us to better understand the effects of farm presence on rural vitality. This shows that density of farmers is likely to affect the image of non-farmer inhabitants about agriculture first, which then influences their perception about

rural place, once again making the quality of interaction between farmers and non-farmer residents important for whether or not non-farmer rural inhabitants feel more attached to rural place as a result of more interaction with farmers. This finding also highlights how complex perception about agriculture can be. Relationship to agriculture can be influenced by a wide range of factors, not only direct social interactions with farmers and awareness about agricultural processes as included in our model, but also additional factors such as particularly outstanding aesthetics of farms, particularly positive or negative experiences a respondent might have had, or the perception formed by the style the agricultural sector is currently presented in the media, that our model does not capture. All of these support that there is need for more in-depth qualitative understanding of relationships between farmers and non-farmer rural inhabitants, as well as whether and how density of farmers affects this quality of interaction.

What has been revealed from the interviews also shows that the quality of interaction might vary across farmers. First of all, farmers themselves reported a varying degree of social engagement, while for example about two-thirds reported to be very active through their participation in local clubs (e.g. sports, fishing, hunting, club dedicated to local traditions, etc.) or gatherings at local church, about one-third did not report to be so active beyond their work in agriculture. Second, it could be also observed during the interviews, that farmers' personality might play a role in the quality of interaction. Interviews usually lasted for about 1 h, where it was possible to have a glimpse on how outgoing and welcoming the farmers were, for example, already in responding to a request to be interviewed from outside but also in their reactions to the topics that, in a way, put their activities under scrutiny. While that is not sufficient to make a conclusive statement on the effect of their personalities, it is probably safe to assume that personal characteristics do have an effect on the quality of interaction. Further, perceptions on the desirable quality of interaction seem to vary on the farmers' side too as some farmers for example seemed content with the monetary contribution they make through their donations in the village, while others seemed to place importance on personal interaction with neighbors or fellow villagers overall, about half of the interviewed farmers for example reporting to have cooperated with kindergartens or schools to provide insights to agriculture for educational purposes.

Further, looking at regression weights of individual relationships in the model, we found that if the density of farmers went up by one unit, the strength of relationship to agriculture likewise went up, by 0.133. With this we can show another indication, that relationship to agriculture is affected by farm presence, which weakens if land concentration increases—also something very relevant for the current political debate on the role of distribution of land ownership and with that farm steads/headquarters or active resident farmers in the villages. One of the topics of current political debate within the agricultural sector in Germany revolves around this very subject with some government attempts to refine laws and regulations concerning agricultural land ownership and tenancy transfers (MULE 2015; Bund-Länder-Arbeitsgruppe Bodenmarktpolitik 2015). The debated changes are about whether and to what extent non-agricultural and non-regional capital-strong investors should be prevented from buying agricultural land, leaving the preferential right in the hands of (regional) farmers. As mentioned earlier ("Deriving indicators for rural place attachment" section), Germany already has the Law on Real Property Transactions which favors local farmers and forbids selling land to non-agricultural buyers. Nevertheless, loopholes can be found. Investors could buy shares of agricultural companies through so so-called share deals, investing in firms that hold own land as a large part of their equity. By that they become land owners without inspection and approval procedure (Tietz 2017). Changes have been largely debated on the level of federal states. Lower Saxony, for instance, plans to pass a law to regulate the rent market (Deter 2016), while the former government of Saxony-Anhalt saw a broader distribution of landownership as a basis for rural vitality as well as a strengthened role of farmers (MULE 2015). The government has not been able to pass the new law, however, most of the issues related to socio-economic and policy-institutional consequences of regulating the agricultural land market remain, and it is yet to be seen whether and how far ongoing societal and political changes can further contribute to setting the agenda on broader distribution of landownership. Interestingly, during the interviews, the farmers discussed this question with us, and most of them expressed clear discontent about the idea of state adopting more regulations and introducing any limit for the amount of owned land. This illustrates a very interesting case of ongoing struggles in political framing and resistance related to agricultural change and rural development—as the state initially framed the draft law, among other, as a step necessary to strengthen local farming, certain groups of farmers turned out to be the main and powerful enough group that resists such a reform.

Overall, the findings seem to be in line with the earlier studies that highlight the risks associated with industrialization in agriculture. For example, the seminal review of 51 empirical studies of community effects from industrialized farming by Lobao and Stofferahn (2008) demonstrate that industrialized farming can lead to deterioration of socioeconomic well-being (e.g. lower incomes, higher unemployment rates), social fabric (e.g. declining population, increased inequality, lower civic participation and quality of local governance), and environment (depletion of resources and

pollution). Similarly, Pedroli et al. (2016) discussed how rural practices of industrialized agriculture can become disconnected from their affected communities, accompanied by a loss in landscape diversity. Our study complements these discussions by revealing how rural inhabitants' perceptions can be affected by these trends of industrialization and urbanization, and how non-farmer residents' perception of agriculture might push them further away from agricultural processes. Even though rural inhabitants claimed that agriculture was important for their village, only few (36%) of the interviewed rural inhabitants actually visited a farm more often than once a year, while 39% reported that they never visited a farm, and only about half of the respondents (55.1%) could name two or three regional farmers. Farmers, on the other hand, while aware of decreasing social role of agriculture in rural areas, seem to be in favor of less state involvement although that aims at guaranteeing a broader distribution of land ownership and less concentration of land ownerships and tenancy. This explains the vicious cycle in the ongoing processes between agriculture as a sector and human perceptions towards this sector at least to some degree. Less exposure to agriculture results in declining perceived importance of agriculture, which in turn prevents agriculture from attracting new employees or attention of broader population leading to declining understanding of agricultural processes.

Conclusion

Although the farmers' presence and density is increasingly debated in the policy arena, particularly in relation to rural vitality, studies demonstrating and measuring its effects, neither direct—on forming specific relationship to agriculture by non-farm rural inhabitants, nor indirect—on forming bond with the rural place, remain scarce in the literature. We aimed at contributing to filling this gap. We concur that the presence of agriculture is indeed diminishing in today's society: it provides only a small percentage of jobs, and the number of visible farms that can provide exposure to agricultural processes is continuously decreasing. We hypothesized that the exposure to agricultural processes, whether it is a direct involvement with farm activities or through interaction with farmers and visual appreciation of farming processes of all kinds, influences rural inhabitants' relationship to agriculture. We found that the latter indeed played a role in how far inhabitants were attached to their place, and more specifically, perceived rural place. The rural place today is still associated largely, although decreasingly, with agriculture. We investigated how these complex social interactions between farmers and rural inhabitants, observable and unobservable, interacted, and offered an initial test of our theoretical constructs using a SEM. The SEM described here is not without its own challenges such as selection of latent variables, observable indicators, and hypothesized causal relationships. Yet it proved to be advantageous, particularly in measuring latent constructs and disentangling complex interactions among variables. Clearly, further research with comparable data is needed to improve the model and theoretical understanding presented here. While the construct *relationship to agriculture* as suggested here seems to have a fairly satisfactory internal reliability among its indicators, the construct *rural place attachment* appears to require a much broader set of indicators capable of capturing its effects. Overall, coming back to our initial research question, the analysis shows that agricultural structural change and rural development are connected, and density of resident farms, or more generally farm structure, plays a role in shaping development processes in rural areas.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

References

Baldock, D., J. Dwyer, P. Lowe, J.-E. Petersen, and N. Ward. 2001. *The nature of rural development: Towards a sustainable integrated rural policy in Europe*. London: Institute for European Environmental Policy.

Becker, H., and G. Tuitjer. 2016. Ländliche Lebensverhältnisse im Wandel 1952, 1972, 1993, 2012. *Aus Politik und Zeitgeschichte* 66 (46–47): 6.

Beckmann, V., and K. Hagedorn. 1997. Decollectivisation and privatisation policies and resulting structural changes of agriculture in Eastern Germany. In *Agricultural privatization, land reform and farm restructuring in Central and Eastern Europe*, ed. J.F.M. Swinnen, A. Buckwell, and E. Mathijs. Aldershot: Ashgate.

BMEL. 2000. *Agrarbericht 2000. Agrar- und ernährungspolitischer Bericht der Bundesregierung*. Berlin: Bundesministerium für Ernährung und Landwirtschaft.

BMEL. 2015. *Agrarpolitischer Bericht der Bundesregierung 2015*. Berlin: Bundesministerium für Ernährung und Landwirtschaft.

Boddenberg, M., M.H. Frauenlob, L. Gunkel, S. Schmitz, F. Vaessen, and B. Blättel-Mink. 2017. Solidarische Landwirtschaft als innovative Praxis—Potenziale für einen sozial-ökologischen Wandel. In *Soziale Innovationen für nachhaltigen Konsum: Wissenschaftliche Perspektiven, Strategien der Förderung und gelebte Praxis*, ed. M. Jaeger-Erben, J. Rückert-John, and M. Schäfer, 125–148. Wiesbaden: Springer Fachmedien Wiesbaden.

Borstel, D. 2010. Zivilgesellschaft in dörflichen Kontexten—eine ostdeutsche Perspektive. In *Stadtentwicklung, Zivilgesellschaft und bürgerschaftliches Engagement*, ed. E. Becker, E. Gualini, C. Runkel, and R. Strachwitz. Stuttgart: Lucius & Lucius.

Bowen, S. 2011. The importance of place: Re-territorialising embeddedness. *Sociologia Ruralis* 51 (4): 325–348.

Bredenbeck, M. 2014. Neu-Wilhelmsdorf, Wertheim Village und der Wiederaufbau der Frankfurter Altstadt. Der Einfluss dörflicher Strukturen auf die Architektur der Gegenwart. In *Imaginäre Dörfer. Zur Wiederkehr des Dörflichen in Literatur, Film und Lebenswelt*, ed. W. Nell and M. Weiland, 157–174. Bielefeld: Transcript.

Brown, G., C.M. Raymond, and J. Corcoran. 2015. Mapping and measuring place attachment. *Applied Geography* 57: 42–53.

Bryman, A. 2012. *Social research methods*, 4th ed. Oxford: Oxford University Press.

Bund-Länder-Arbeitsgruppe Bodenmarktpolitik. 2015. *Landwirtschaftliche Bodenmarktpolitik: Allgemeine Situation und Handlungsoptionen*. Bonn: Bund-Länder-Arbeitsgruppe Bodenmarktpolitik.

Bundesagentur für Arbeit. 2018. Arbeitslosenquote in Deutschland nach Bundesländern (Stand: Dezember 2017). https://de.statista.com/statistik/daten/studie/36651/umfrage/arbeitslosenquote-in-deutschland-nach-bundeslaendern/. Accessed 25 Jan 2018.

Bundesrepublik Deutschland. 1961. *Gesetz über Maßnahmen zur Verbesserung der Agrarstruktur und zur Sicherung land- und forstwirtschaftlicher Betriebe (Grundstückverkehrsgesetz - GrdstVG)*. Bonn: Bundesrepublik Deutschland.

Bunkus, R., and I. Theesfeld. 2018. Land grabbing in Europe? Socio-cultural externalities of large-scale land acquisitions in East Germany. *Land* 7 (3): 98.

Byrne, B.M. 2010. *Structural equation modeling with AMOS: Basic concepts, applications, and programming*, 2nd ed. New York: Routledge Taylor & Francis Group.

Casakin, H., B. Hernández, and C. Ruiz. 2015. Place attachment and place identity in Israeli cities: The influence of city size. *Cities* 42: 224–230.

Constance, C.Z. 2017. *What if the trucks stop coming? Exploring the framing of local food by cooperative food retailers in New Mexico*. Wageningen: Wageningen University.

Deter, Alfons. 2016. Niedersachsen plant Pachtpreisbremse in der Landwirtschaft. https://www.topagrar.com/news/Home-top-News-Niedersachsen-plant-Pachtpreisbremse-in-der-Landwirtschaft-3947136.html. Accessed 28 June 2017.

Destatis. 2017. *Statistisches Jahrbuch 2017*. Wiesbaden: Statistisches Bundesamt.

Doering, N., J. Bortz, S. Pöschl, C.S. Werner, K. Schermelleh-Engel, C. Gerhard, and J.C. Gäde. 2016. *Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften*. Berlin: Springer.

Eisenhauer, B.W., R.S. Krannich, and D.J. Blahna. 2000. Attachments to special places on public lands: An analysis of activities, reason for attachments, and community connections. *Society & Natural Resources* 13 (5): 421–441.

Eurofound. 2018. *Social cohesion and well-being in Europe*. Luxembourg: P. O. o. t. E. Union.

European Commission. 2016. *Europeans, agriculture and the CAP*. Special eurobarometer 440. Brussels: European Commission.

European Commission. 2017. *The EU explained: Agriculture. A partnership between Europe and farmers*. Luxembourg: Publicatons Office of the European Union.

Galdeano-Gomez, E., J.A. Aznar-Sánchez, and J.C. Pérez-Mesa. 2011. The complexity of theories on rural development in Europe: An analysis of the paradigmatic case of Almería (South-east Spain). *Sociologia Ruralis* 51 (1): 54–78.

Gao, S., P. Mokhtarian, and R. Johnston. 2008. *Non-normality of data in structural equation models*. Davis: UC Berkeley.

Giddens, A. 1990. *The consequences of modernity*. Cambridge: Polity Press.

Hair, J., W. Black, B. Babin, and R. Anderson. 2010. *Multivariate data analysis: A global perspective*. Harlow: Pearson.

Hawkins, E.A., J.M. Bryden, N. Gilliatt, and N. MacKinnon. 1993. Engagement in agriculture 1987–1991: A west European perspective. *Journal of Rural Studies* 9 (3): 277–290.

Henkel, G. 2014. *Das Dorf. Landleben in Deutschland—gestern und heute*. Bonn: Bundeszentrale für politische Bildung.

Hernández, B., M.C. Hidalgo, M.E. Salazar-Laplace, and S. Hess. 2007. Place attachment and place identity in natives and non-natives. *Journal of Environmental Psychology* 27 (4): 310–319.

Hinojosa, L., E.F. Lambin, N. Mzoughi, and C. Napoléone. 2016. Place attachment as a factor of mountain farming permanence: A survey in the French Southern Alps. *Ecological Economics* 130: 308–315.

Hunziker, M., M. Buchecker, and T. Hartig. 2007. Space and place—Two aspects of the human-landscape relationship. In *A changing world*. Landscape series, ed. F. Kienast, O. Wildi, and S. Ghosh. Dordrecht: Springer.

Jantsch, A., C. Wunder, and N. Hirschauer. 2016. Lebensqualität in Deutschland - Ein Vergleich von städtischen und ländlichen Regionen. Paper presented at the 56. Jahrestagung der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V., Bonn, 29 Sep 2016.

Koomen, E. 2011. *Indicators of rural vitality. A GIS-based analysis of socio-economic development of the rural Netherlands*. Amsterdam: VU University Amsterdam.

Landesregierung Sachsen-Anhalt. 2010. *Landesentwicklungsplan 2010 des Landes Sachsen-Anhalt*. Magdeburg: Landesregierung Sachsen-Anhalt.

Laschewski, L. 2014. *Rural restructuring and conflicting definitons of the rural (problem) in East Germany*. Cottbus: BTU Cottbus-Senftenberg.

Lefebvre, H. 1991. *The social production of space*. Cambridge: Blackwell.

Lijadi, A.A., and G.J. Van Schalkwyk. 2017. Place identity construction of Third Culture Kids: Eliciting voices of children with high mobility lifestyle. *Geoforum* 81: 120–128.

LNV. 2004. *Agenda voor een Vitaal Platteland*. Den Haag: Ministerie van Landbouw Natuur en Voedselkwaliteit.

Lobao, L., and C.W. Stofferahn. 2008. The community effects of industrialized farming: Social science research and challenges to corporate farming laws. *Agriculture and Human Values* 25 (2): 219–240.

Lokocz, E., R.L. Ryan, and A.J. Sadler. 2011. Motivations for land protection and stewardship: Exploring place attachment and rural landscape character in Massachusetts. *Landscape and Urban Planning* 99 (2): 65–76.

Low, S.M., and I. Altman. 1992. Place attachment. In *Place attachment*, ed. I. Altman and S.M. Low, 1–12. Boston: Springer.

Lu, T., F. Zhang, and F. Wu. 2018. Place attachment in gated neighbourhoods in China: Evidence from Wenzhou. *Geoforum* 92: 144–151.

Lyson, T.A., R.J. Torres, and R. Welsh. 2001. Scale of agricultural production, civic engagement, and community welfare. *Social Forces* 80 (1): 311–327.

McAndrew, F.T. 1998. The measurement of 'rootetness' and the prediction of attachment to home-towns in college students. *Journal of Environmental Psychology* 18 (4): 409–417.

Meinzen-Dick, R. 2014. Property rights and sustainable irrigation: A developing country perspective. *Agricultural Water Management* 145: 23–31.

Mensah, A.H. 2017. Urban households' engagement in agriculture: Implications for household food security in Ghana's medium sized cities. *Geographical Research* 55 (2): 217–230.

Meyer, K., F. Böltken, F. Gödderz, and W. Neußer. 2003. *Lebensbedingungen aus Bürgersicht*. Bonn: Bundesamt für Bauwesen und Raumordnung.

Migliore, G., F. Caracciolo, A. Lombardi, G. Schifani, and L. Cembalo. 2014. Farmers' participation in civic agriculture: The effect of social embeddedness. *Culture, Agriculture, Food and Environment* 36 (2): 105–117.

Moore, J. 2000. Placing home in context. *Journal of Environmental Psychology* 20 (3): 207–217.

Moroney, J.L., and R.S. Castellano. 2018. Farmland loss and concern in the Treasure Valley. *Agriculture and Human Values* 35 (2): 529–536.

MULE. 2015. *Regierungserklärung: Eine Politik der Verantwortung für eine zukunftssichere Landwirtschaft*. Magdeburg: Ministerium für Landwirtschaft und Umwelt Sachsen-Anhalt.

MULE. 2018. *Leitbild „Landwirtschaft 2030 Sachsen-Anhalt"*. Magdeburg: Ministerium für Umwelt Landwirtschaft und Energie des Landes Sachsen-Anhalt.

Neu, C. 2015. Peripherisierung und Landflucht 3.0. Sozialwissenschaftliche Perspektiven auf die Veränderung von Stadt und Land im demographischen Wandel. In *Landflucht 3.0. Welche Zukunft hat der Ländliche Raum?*, ed. Herbert Quandt-Stiftung, 18–33. Freiburg: Herder.

Ngo, M., and M. Brklacich. 2014. New farmers' efforts to create a sense of place in rural communities: Insights from southern Ontario, Canada. *Agriculture and Human Values* 31 (1): 53–67.

Nkegbe, P.K., H. Alhassan, M.B. Abu, Y. Ustarz, E.D. Setsoafia, and S. Abdul-Wahab. 2018. *Rural non-farm engagement and agriculture commercialization in Ghana: Complements or competitors?*. Ghana: PAGE policy analysis on growth and employment.

NordNordWest. 2008. Germany location map. https://commons.wikimedia.org/wiki/File:Germany_location_map.svg. Accessed 17 Dec 2018.

Nunnally, J.C. 1967. *Psychometric theory*. New York: McGraw Hill.

Obach, B.K., and K. Tobin. 2014. Civic agriculture and community engagement. *Agriculture and Human Values* 31 (2): 307–322.

Pambo, K.O., R.M. Mbeche, J.J. Okello, G.N. Mose, and J.N. Kinyuru. 2008. Intentions to consume foods from edible insects and the prospects for transforming the ubiquitous biomass into food. *Agriculture and Human Values* 35 (4): 885–898.

Pedroli, B., T. Pinto Correia, and J. Primdahl. 2016. Challenges for a shared European countryside of uncertain future. Towards a modern community-based landscape perspective. *Landscape Research* 41 (4): 450–460.

Penker, M. 2006. Mapping and measuring the ecological embeddedness of food supply chains. *Geoforum* 37 (3): 368–379.

Pierenkemper, T. 2010. *Wirtschaftsgeschichte: Die Entstehung der modernen Volkswirtschaft*. Akademie Studienbücher. Berlin: Akademie-Verlag.

Quinn, C.E., and A.C. Halfacre. 2014. Place matters: An investigation of farmers' attachment to their land. *Human Ecology Review* 20 (2): 117–132.

Rao, J. 2018. Fundamental functionings of landowners: Understanding the relationship between land ownership and wellbeing through the lens of 'capability'. *Land Use Policy* 72: 74–84.

Raymond, C.M., G. Brown, and D. Weber. 2010. The measurement of place attachment: Personal, community, and environmental connections. *Journal of Environmental Psychology* 30 (4): 422–434.

Riger, S., and P.J. Lavrakas. 1981. Community ties: Patterns of attachment and social interaction in urban neighborhoods. *American Journal of Community Psychology* 9 (1): 55–66.

Rodriguez Castro, L. 2017. The embodied countryside: Methodological reflections in place. *Sociologia Ruralis* 58 (2): 293–311.

Sargeson, S. 2018. Grounds for self-government? Changes in land ownership and democratic participation in Chinese communities. *The Journal of Peasant Studies* 45 (2): 321–346.

Scannell, L., and R. Gifford. 2010. Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology* 30 (1): 1–10.

Scannell, L., and R. Gifford. 2017. The experienced psychological benefits of place attachment. *Journal of Environmental Psychology* 51: 256–269.

Schreiber, J.B., A. Nora, F.K. Stage, E.A. Barlow, and J. King. 2006. Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research* 99 (6): 323–338.

Statistisches Bundesamt. 2016. Exporte aus Deutschland nach Güterabteilungen (Top 15) im Jahr 2016 (in Milliarden Euro). https://de.statista.com/statistik/daten/studie/151019/umfrage/exportgueter-aus-deutschland/. Accessed 15 Jan 2018.

Stedman, R.C. 2003. Is it really just a social construction?: The contribution of the physical environment to sense of place. *Society & Natural Resources* 16 (8): 671–685.

Stofferahn, C.W., C.A. Fontaine, D.J. McDonald, M. Spletto, and H. Jeanotte. 1991. Growth fundamentalism in dying rural towns: Implications for rural development practitioners. *Agriculture and Human Values* 8 (25): 25–34.

Sumner, J., H. Mair, and E. Nelson. 2010. Putting the culture back into agriculture: Civic engagement, community and the celebration of local food. *International Journal of Agricultural Sustainability* 8 (1–2): 54–61.

Theodori, G.L., and A.E. Luloff. 2000. Urbanization and community attachment in rural areas. *Society & Natural Resources* 13 (5): 399–420.

Tietz, A. 2017. *Überregional aktive Kapitaleigentümer in ostdeutschen Agrarunternehmen: Entwicklungen bis 2017*. Braunschweig: Johann Heinrich von Thünen-Institut.

TUBS. 2011. Germany in the European Union on the globe (Europe centered). https://de.wikipedia.org/wiki/Datei:Germany_in_the_European_Union_on_the_globe_(Europe_centered).svg. Accessed 17 Dec 2018.

Walker, A.J., and R.L. Ryan. 2008. Place attachment and landscape preservation in rural New England: A maine case study. *Landscape and Urban Planning* 86 (2): 141–152.

Weiss, W., A. Wolz, T. Herzfeld, and J. Fritzsch. 2013. *Sozialökonomische Effekte des demographischen Wandels in ländlichen Räumen Sachsen-Anhalts*. Halle: IAMO.

Welsh, R. 2009. Farm and market structure, industrial regulation and rural community welfare: Conceptual and methodological issues. *Agriculture and Human Values* 26 (1–2): 21–28.

Wester-Herber, M. 2004. Underlying concerns in land-use conflicts—The role of place-identity in risk perception. *Environmental Science & Policy* 7 (2): 109–116.

Windsong, E.A. 2014. Insights from a qualitative study of rural communes: Physical and social dimensions of place. *Society & Natural Resources* 27 (1): 107–116.

Wirth, P., V. Elis, B. Müller, and K. Yamamoto. 2016. Peripheralisation of small towns in Germany and Japan—Dealing with economic decline and population loss. *Journal of Rural Studies* 47: 62–75.

World Bank. 2018. Europäische Union: Verteilung der Erwerbstätigen auf die Wirtschaftssektoren in den Mitgliedsstaaten im Jahr 2017. https://de.statista.com/statistik/daten/studie/249086/umfrage/erwerbstaetige-nach-wirtschaftssektoren-in-den-eu-laendern/. Accessed 18 Dec 2018.

Wynveen, C.J., I.E. Schneider, S. Cottrell, A. Arnberger, A.C. Schlueter, and E. Von Ruschkowski. 2017. Comparing the validity and reliability of place attachment across cultures. *Society & Natural Resources* 30 (11): 1389–1403.

Zander, K., F. Isermeyer, D. Bürgelt, I. Christoph-Schulz, P. Salamon, and D. Weible. 2013. *Erwartungen der Gesellschaft an die Landwirtschaft*. Braunschweig: Johann Heinrich von Thünen-Institut.

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