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# **The importance of place-based, internal resources for the population development in small rural communities**

## **ABSTRACT**

The purpose of this paper is to examine whether place-based, internal resources are related to population growth in small rural communities. Presumably due to data unavailability, very few previous studies have tried to model population growth at the sub-municipality level so far. This paper attempts to fill some of this gap by using a unique parish sample ( $n = 489$ ) to model population growth in rural parishes in Denmark during the period 2012-2017. The paper employs a capital framework approach and initially identifies six place-based stocks of capital that might be important to the population development in small rural communities. Moreover, the paper makes a distinction between rural parishes located in predominantly rural municipalities and rural parishes located in predominantly urban municipalities. Based on multiple regression analyses, initial levels of physical capital, economic capital and human capital were found to be related to population growth in rural parishes located in predominantly rural municipalities, whereas only symbolic capital (place reputation) was found to be related to population growth in rural parishes located in predominantly urban municipalities.

**Keywords:** small rural communities; population growth; determinants; internal and external factors; new rural paradigm; Denmark

## **1. Introduction**

In recent decades, a growing number of papers have sought to identify the determinants behind uneven economic rural development in advanced countries. One strand in this literature investigates the question of whether differential economic development in rural areas is driven by internal factors or external factors – or a combination. Inspired in terminology by neo-classical endogenous and exogenous growth theory, the question in this strand is whether rural economic development is characterised by endogenous development and/or exogenous development (Terluin, 2003).

By mid-2000s, researchers in this strand of literature concluded that not only external factors, but also internal factors are important in explaining differential economic development in rural areas in advanced countries. This was found by Bryden and Munro (2000) by investigating one specific enterprise in a Scottish rural area that was regarded as performing economically well. It was also found by Terluin and Post (2000) and Terluin (2003) by comparing ‘leading’ and ‘lagging’ rural regions in nine EU member states and by Cerccato and Persson (2003) by comparing four ‘well performing’ and ‘less well performing’ rural municipalities in Sweden.

The finding that internal factors are important for economic rural development called for a rural policy approach with more emphasis on the specific internal resources and strengths of rural areas. Accordingly, as a partial consequence of the above research, the Organisation for Economic Co-operation and Development (OECD) drafted a policy document in 2006 entitled *The New Rural Paradigm: Policies and Governance* (Organisation for Economic Co-operation and Development, 2006). This document recommended a change of discourse from a top-down rural policy with a focus on structural and industry-related conditions to a rural policy with a focus on the valorisation of place-based resources and a bottom-up approach whereby progress had to be secured through the inputs from local actors. The latter discourse was henceforth called ‘the new rural paradigm’.

Since 2006, the new rural paradigm has been introduced in many support schemes of the European Union, e.g. in support schemes within the EU Rural Development Programme aimed at the diversification of the rural economy and quality of life issues. At the national level, these schemes are administered by the so-called Local Action Groups (LAGs) with representatives from the municipality, the local business

community, local civic associations and local citizens, and their aim is to support projects that strengthen the local place-based resources in rural areas. As such, these support schemes thus target place-based, internal resources in a rural area and do not aim at external factors over which the rural area itself has no control.

The underlying contention in the new rural paradigm is that the development in a rural area, e.g. its population development, is affected by its internal resources. This, however, raises some critical questions which this paper attempts to shed light on by focussing on small rural communities and their population development: How important are place-based, internal resources for the population development in small rural communities? And is there any difference as to how important internal resources are depending on whether the rural community is located within a wider area that is primarily urban or rural?

To answer these questions, the paper uses Danish data at the parish level and a capital framework to model internal resources. The paper attempts to analyse how much the population growth during a five-year period in a sample of Danish rural parishes is related to internal resources as measured by initial stocks of nature capital, physical capital, economic capital, human capital, social capital and symbolic capital. The paper relies on data from Statistics Denmark and data from a national survey called Danish Rural-Urban Survey (DRUS), which was carried out in the end of 2011.

The paper is positioned in the strand of literature that explores the determinants behind differential economic performance of rural areas in advanced countries, including Europe (Terluin and Post, 2000), Sweden (Ceccato and Persson, 2003), Denmark (Svendsen and Sørensen, 2007), England (Courtney and Moseley, 2008; Agarwal et al., 2009), the US (Isserman et al., 2009), and Spain (Sánchez-Zamora et al., 2014). Given that the main problem of many rural communities in Denmark and in other developed Western countries is depopulation, as argued by Svendsen and Sørensen (2007), population growth can be viewed as an appropriate measure or proxy of economic performance at the rural community level. Subsequently, therefore, the paper uses the term population development instead of the term population growth at various places to indicate that the outcome measure is a proxy of economic performance.

The paper contributes in several ways to the literature. First, there is an evident lack of micro-level evidence in previous papers. In most previous studies, data is collected at the regional or municipal level, and only very few studies have looked at the community level (Svendsen and Sørensen, 2007). Second, the paper uses a quantitative method and a relatively large dataset, and this has not been done before in community-level studies, presumably due to lack of data availability. Third, unlike other quantitative studies in this field, this paper partly relies on data from a questionnaire survey which allows for the measurement of more intangible forms of capital. Fourth, the paper includes an intangible form of capital that has not been looked at in previous studies: symbolic capital (Bourdieu, 1986, 1987). Finally, differentiating between rural areas located in generally urban surroundings and rural areas located in generally rural surroundings has not received much attention so far.

The rest of the paper is organised as follows. The second section reviews the literature related to the uneven economic performance of rural areas with an emphasis on the contribution of nature capital, physical capital, economic capital, human capital, social capital and symbolic capital. The third section describes the data and the methods used. The fourth section presents the results. The final section concludes on and discusses the results.

## **2. Conceptual framework and previous research**

As mentioned, this paper attempts to examine whether the following stocks of capital has a measurable impact on the population development in small rural communities: nature capital, physical capital, economic capital, human capital, social capital, and symbolic capital. Most of these forms of capital have been addressed in previous studies on the differential economic performance of rural areas in advanced countries, either explicitly (e.g. Svendsen and Sørensen, 2007; Courtney and Moseley, 2008; Agarwal et al., 2009; Sánchez-Zamora et al., 2014) or implicitly (e.g. Terluin and Post, 2000; Ceccato and Persson, 2003).

The term ‘capital’ originates from classical economics where ‘capitals’ are perceived as inputs to the production apparatus. The firstly coined forms of capital were economic capital (money) and physical capital (production sites), which were discussed in terms of their ability to generate a return for single companies and entire nations

(Smith, 1904 [1776]). Later, the attention was directed to other forms of capital; first human capital (e.g. Becker, 1962; Sjaastad, 1962) and then social capital (Bourdieu, 1986; Knack and Keefer, 1997; Putnam, 1993). Social capital relates to the profits at the individual and the macro level that can be achieved through networking, co-operation and the resulting formation of trust (Coleman, 1990; Hanifan, 1916). Symbolic capital relates to the profits that can be achieved by having a certain prestige, honour or attention in society, e.g. a person holding a high public office (Bourdieu, 1986, 1987). In classical economic thought, nature capital is related to nature resources that can be exploited in production (e.g. Acemoglu et al., 2005).

Common to all forms of capital is the notion that they hold an inherent value that can be *capitalised*, i.e. that can be used to generate economic returns (Lin, 2001). For example, people can capitalise their human capital by getting a wage in a job they got because of their education. Empirically, the forms of capital have especially been studied at the macro level with the question of whether they have had a significant impact on country or regional GDP, e.g. by Knack and Keefer (1997) and Weckroth et al. (2015) with regards to social capital.

Inspired by Svendsen and Sørensen (2007), this paper seeks to relate various forms of capital to the population development in small rural communities in Denmark. Considering the substantial depopulation challenges in small rural communities in Denmark and elsewhere in many other Western countries (Eurostat, 2012; UN, 2014), population growth can be viewed as the most appropriate measure of economic performance at the rural community level.

### *2.1 Forms of capital*

The inclusion of forms of capital in this paper was guided by previous research into the differential economic development of rural areas in advanced countries. For a detailed overview, Table 1 presents the methodology and the findings of previous empirical studies.

**Table 1. Studies on the differential economic performance of rural areas in advanced countries**

Authors	Method	Data sources and geographical level	Main findings
Terluin and Post (2000)	9 matched-pair comparisons of 'leading' and 'lagging' rural regions in nine EU member states.	Available socio-economic quantitative data used for basic comparisons. Region level	Among other things, leading regions were characterised by a better road infrastructure and a better-developed capacity among actors. No relationship was found between the endowment of natural resources and being a leading region. Rural amenities were not found to play a role.
Ceccato and Persson (2003)	2 matched-pair comparisons of 'well performing' and 'less well performing' rural municipalities in Sweden within a prosperous region and in a less prosperous region, respectively.	Interviews with 15 stakeholders in each of the 4 study areas. Municipality level	Nature resources, human resources, transport and economic structure and community values were assessed to be important in varying degrees.
Svendsen and Sørensen (2007)	1 matched-pair comparison of one rural parish with population decline (Karby) and one rural parish with population growth (Klitmøller) over a 10-year period. Both situated in the same Danish county.	Interviews with 14 stakeholders in one parish and 15 in the other parish. Community level	Klitmøller's positive development seemed related to its larger stocks of physical and human capital. The stocks of nature and social capital seemed unrelated to differential local performance.
Courtney and Moseley (2008)	4 matched-pair comparisons of 'generally well-performing' and 'generally poorly-performing' rural Local Authority Districts (LADs) in England.	In-depth interviews with 15 stakeholders in each of the eight study areas. LAD level <sup>1</sup>	The investigated forms of capital – economic, human, social, environmental and cultural capital – were all assessed to be important in varying degrees.
Agarwal et al. (2009)	Regression analysis (three stage least squares). Modelling economic performance in 149 English rural Local Authority Districts (LADs) with various measures of stocks of economic, human and nature (environmental) capital as explanatory variables.	Accessible quantitative data on stocks of capital. LAD level	Human capital as measured by educational level, economic capital as measured by enterprise (number of business start-ups), and economic capital as measured by road infrastructure (length of motorways/dual carriageways per square km land area) were found to be most significant predictors of positive rural economic performance. Nature capital was found to have a neutral (when measured by a natural beauty index) to negative effect (when measured by a peripherality index based on distance to London) on economic performance.

<sup>1</sup>: In 2015, England had 326 Local Authority Districts (LADs), 324 of which had between 30,000 and 1.1 million inhabitants ([www.ons.gov.uk](http://www.ons.gov.uk)).

**Table 1 continued. Studies on the differential economic performance of rural areas in advanced countries**

Authors	Method	Data sources and geographical level	Main findings
Isserman et al. (2009)	Probit regressions. Modelling being a prosperous rural county versus not being one in a sample of 1348 non-core rural counties in USA. Economic, human, social, and location factors were used as explanatory variables.	Accessible quantitative data. County level	Prosperous counties were found to have more educated populations, more diverse economies, more creative class occupations, more equal wage distributions and more social capital (as measured by adherents to civically engaged religions). Amenities (measured by index incorporating climate, water and topography), distance to airports and length of interstate highway were found to be relatively unimportant.
Sánchez-Zamora et al. (2014)	Linear regression analysis. Modelling STD (successful territorial dynamics) in terms of population, income, employment rate, and environment during 2000-2009 among 698 rural municipalities in the Autonomous Region of Andalucía, Spain. Change during 2000-2009 in a substantial number of indicators of economic, human, cultural, and social capital were included as explanatory variables.	Accessible quantitative data. Municipality level	Relatively few of the many capital variables showed a significant relationship with STD. For example, STD measured in relation to population development showed a significant positive relation with only a few of the economic capital indicators (percentage of built-up land and amount of funds received via the Common Agricultural Policy), a positive and negative relationship with two human capital variables (percent of foreign population and number of primary care resources, respectively) and no relationship with the indicators of social and environmental capital.



It was an obvious choice to include *nature capital* and *social capital* in the analysis. These two factors have been discussed in previous studies on differential economic development of rural areas (e.g. Terluin and Post, 2000; Svendsen and Sørensen, 2007; Courtney and Moseley, 2008; Isserman et al., 2009). They have also been suggested as important competitive forces for rural areas in other connections. In the foreword of the OECD policy document *The New Rural Paradigm: Policies and Governance* (Organisation for Economic Co-operation and Development, 2006), for example, nature and social capital are referred to as being among the few key assets of rural areas. Thus, faced with difficulties of obtaining ‘a critical mass needed for effective public services, infrastructure and business development’, rural areas are encouraged to focus on ‘their existing assets, such as location, natural and cultural amenities, and social capital’ (Organisation for Economic Co-operation and Development, 2006, p. 3). Further, León (2005, pp. 308-309) points to nature and social capital as being the two ‘trump cards’ of rural areas, and in a recent opinion poll Danish people have indicated that they see nature and social cohesion as being among the most important qualities of Danish rural areas (Realdania, 2012). Interestingly, the first scientific journal to use the term social capital was about rural community development: ‘If he may come into contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community. The community will benefit by the cooperation of all its parts, while the individual will find in his association the advantages of the help, the sympathy, and the fellowship of his neighbors’ (Hanifan, 1916, pp. 130-131).

In this paper, *physical capital* is understood as those types of buildings that contain public and private services such as public school and local grocery and other types of service infrastructure such as highway and train station. The importance to rural areas of having access to public and private services has been stressed in several studies (e.g. Oncescu, 2014; Slee and Miller, 2015; Clifton et al., 2016). Moreover, the transportation infrastructure in rural areas has been identified as an important factor in explaining differential economic development of rural areas (e.g. Terluin and Post, 2000; Ceccato and Persson, 2003; Svendsen and Sørensen, 2007; Courtney and Moseley, 2008;). Agarwal et al. (2009), for example, found road infrastructure as

measured by length of motorways and/or dual carriageways to be one of the most important predictors of rural economic performance in a sample of English rural local administrative districts. On the other hand, Isserman et al. (2009) found the distance to airports and the length of interstate highways to be relatively unimportant when investigating the characteristics of prosperous rural counties in a sample of 1338 non-core rural counties in the US. Generally, including nature capital and physical capital is consistent with the many studies that argue that individuals ‘vote with their feet’ and locate in the community that offers the mix of amenities and public services that they like best (e.g. Herzog and Schlottmann, 1986; Findlay and Rogerson, 1993; Tiebout, 1956; Whisler et al., 2008).

*Economic capital* is understood as the economic resources in a small rural community. If the economic resources are large, it might lead to investments in local businesses, which in turn may lead to a more positive population development. Previous studies indicate that economic capital in the sense of availability of financial capital or level of local purchasing power has some importance for differential economic performance of rural areas in England (Courtney and Moseley, 2008; Agarwal et al., 2009) and Sweden (Ceccato and Persson, 2003).

*Human capital* covers the human resources. As suggested by previous research (Ceccato and Persson, 2003; Svendsen and Sørensen, 2007; Agarwal et al., 2009; Isserman et al., 2009), the educational level is likely to play a role in the differential economic performance of rural areas. A high educational level among the residents in a rural area may thus generate activity; be it higher activity in the business or civil society sphere. Moreover, if a rural area has a young population and thereby many inhabitants in the reproductive age, this must be expected to have a positive effect on its development (Preston, 1970; Horiuchi and Preston, 1988; Liu et al., 2017).

*Symbolic capital* is understood as the prestige, image or reputation of a given area. This type of capital has not been investigated in previous studies on the differential development of rural areas. The idea for including this type of capital arose from the fact that in recent years several less flattering words have emerged in the vocabulary of the Danish media when talking about rural areas in Denmark, e.g. the terms ‘Outskirt Denmark’ and ‘The Rotten Banana’. The most prominent of these is the term ‘The Rotten Banana’, which was first seen in print in a Danish newspaper in 2006. The term

symbolises the curved geographical shape of Denmark and is meant to describe the west coast areas of Denmark and the smaller islands to the south. That these areas are described as ‘rotten’ indicates a belief that they are characterised by depopulation, backwardness, decay, and lack of productivity and sustainability. Winther and Svendsen (2012) demonstrate a rapid increase in the use of the term ‘The Rotten Banana’ in the Danish media coverage from 2006 to 2011. The use of the somewhat derogatory terms might have given rural areas an undeserved bad reputation in the eyes of the Danish population which in turn could have a negative effect on the population development in rural areas. In this connection, Sørensen (2015) found that, if they could choose freely, people would choose to live in the residential environment that in their opinion would give them the highest status among fellowmen, all things equal.

### **3. Data and Methods**

This section describes the used data sources and the used variables and statistical methods.

#### *3.1 Data*

The paper is based on data from two data sources. The first data source is Statistics Denmark, which is the central authority on statistics in Denmark. From this source, parish population data was acquired as well as data to measure economic capital and human capital at the parish level. The second data source is a national household survey called the Danish Rural-Urban Survey (DRUS). From this source, data to measure nature capital, physical capital, social capital and symbolic capital at the parish level was extrapolated.

DRUS was conducted in 2011/2012 by the Danish Centre for Rural Research, University of Southern Denmark, with the purpose of collecting information about rural and urban dwellers on a wide number of issues related to their living conditions, aspirations, values, and attitudes. The collection of data was done among Danish respondents aged 18 and above. Respondents were randomly selected within four geographical strata based on a rural district classification that divides the 98 Danish municipalities into four municipality groups depending on the degree to which they contain rural areas: peripheral municipalities, rural municipalities, intermediate

municipalities, and town municipalities (Kristensen et al., 2006).<sup>1</sup> The purpose of this stratified sampling design was to secure a reasonable number of responses from rural dwellers. The DRUS data was collected by a professional institute via telephone-based interviews conducted from 1 November 2011 to 26 January 2012, and 2,000 responses were collected: 496 from peripheral municipalities, 522 from rural municipalities, 491 from intermediate municipalities and 491 from town municipalities. The professional institute acquired a representative population extract from Statistics Denmark in September 2011, covering each of the four strata separately. Statistics Denmark has access to the Danish *Central Civil Register*, containing information about all people legally residing in Denmark, and Statistics Denmark drew the extracts from that register. DRUS contains the parish in which the respondent lives. This makes it possible to extrapolate parish data from the DRUS data file.

### 3.2 Identifying rural parishes

To identify rural parishes, the paper uses the parish-based rural-urban categorisation that was produced by the Danish Ministry of Housing, Urban and Rural Affairs (MHURA) in 2013. The purpose of this new categorisation was ‘to achieve a more precise categorisation of various area types and to facilitate a more varied description of the areas’ (Danish Ministry of Housing, Urban and Rural Affairs, 2013, 9). MHURA’s categorisation divides the parishes in Denmark into four types: 1) peripheral rural parish, 2) city near rural parish, 3) peripheral urban parish, and 4) city parish. The categorisation is constructed around two dimensions. The first is the *rural-urban dimension* where the dividing line is whether at least half of the parish population lives in towns with less or more than 3,000 inhabitants. The second is the *periphery-centre dimension* where the dividing line is whether a given parish is located close to (less than 30-minute drive) or farther away from the twelve largest towns in Denmark: Copenhagen, Aarhus, Odense, Aalborg, Esbjerg, Randers, Kolding, Horsens, Vejle, Roskilde, Herning and Helsingør (Danish Ministry of Housing, Urban and Rural Affairs, 2013, p. 9). These two dichotomous dimensions produced the four parish

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<sup>1</sup> The rural district classification is based on 14 indicators outlined by Kristensen et al. (2006) and was used by various ministries in their biennial surveys on Danish rural districts in 2009 and 2011 (Danish Ministry of Welfare & Danish Ministry of Food, Agriculture and Fisheries, 2009; Danish Ministry of the Interior and Health and Danish Ministry of Food, Agriculture and Fisheries, 2011).

categories covering the total of 2161 parishes in Denmark: 1) peripheral rural parish ( $n = 929$ ), 2) city near rural parish ( $n = 647$ ), 3) peripheral urban parish ( $n = 139$ ), and 4) city parish ( $n = 446$ ).<sup>2</sup>

Overall, DRUS contains data from respondents living in a total of 941 parishes in Denmark. This number is equal to the number of parishes in which the DRUS respondents were located at the time when the DRUS was conducted. The parish location of the respondent is not self-reported. It was included in the representative population extract that was delivered by Statistics Denmark. The parishes in the sample are distributed as follows: 311 peripheral rural parishes, 201 city near rural parishes, 118 peripheral urban parishes, and 311 city parishes. This paper only uses the 512 rural parishes, and these correspond to around a third of all rural parishes in Denmark.

### 3.3 Rural parishes by type of municipality

As mentioned above, the 98 Danish municipalities can be divided into four types based on the degree of rurality: peripheral municipalities, rural municipalities, intermediate municipalities, and town municipalities. Table 2 shows the distribution of rural parishes by municipality type where peripheral municipalities and rural municipalities are merged into ‘predominantly rural municipalities’ and intermediate municipalities and town municipalities are merged into ‘predominantly urban municipalities’. As can be seen in Table 2, the sampled rural parishes are located in both predominantly rural municipalities ( $n = 367$ ) and predominantly urban municipalities ( $n = 145$ ).

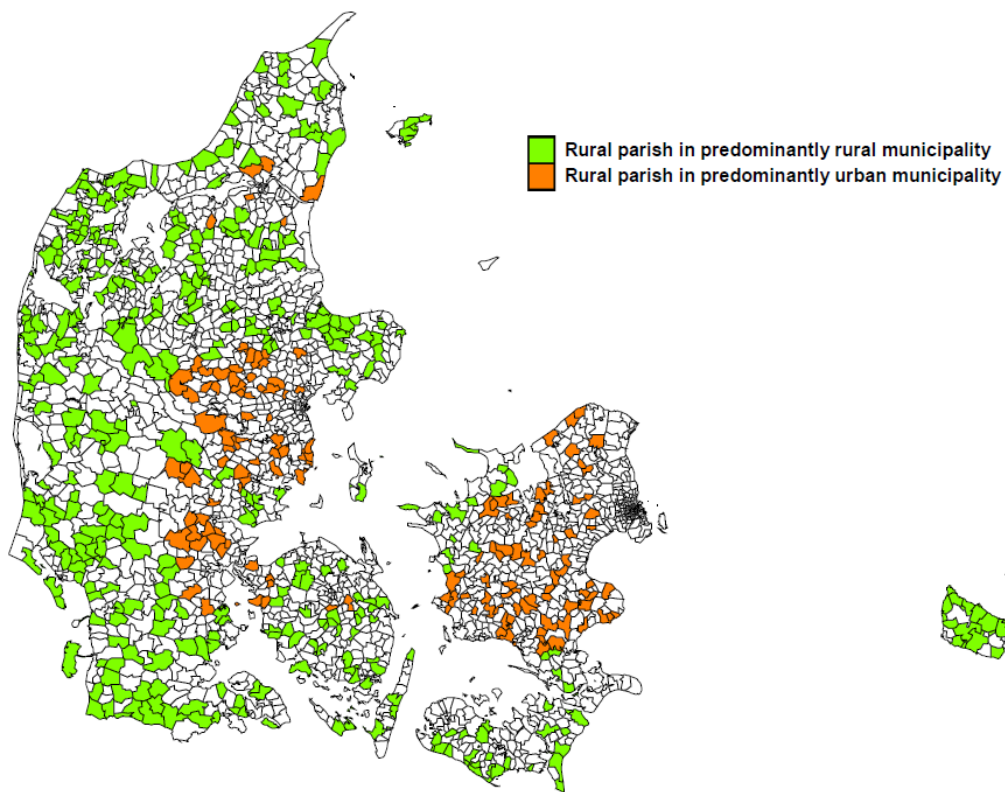
**Table 2. Number of rural parishes in sample by parish type and by the type of municipality in which the parish is located ( $n = 512$ )**

	Number of peripheral rural parishes	Number of city near rural parishes	Total
Location: Predominantly rural municipality	254	113	367
Location: Predominantly urban municipality	57	88	145
Total	311	201	512

<sup>2</sup> In Danish Ministry of Housing, Urban and Rural Affairs (2013), it was not stated which parishes belonged to which of the four parish categories. This information (parish names and their administrative codes) was retrieved by the author by contacting the Danish Ministry of Housing, Urban and Rural Affairs.

Figure 1 contains a map of Denmark that shows the location of the 512 rural parishes that are included in this study. The colours indicate whether the parish lies in a predominantly rural or predominantly urban municipality. As can be seen in Figure 1, the sampled rural parishes in predominantly urban municipalities are located on the large island of Zealand to the east, on the island of Funen in the middle of the country, and on the large peninsula of Jutland to the west. The sampled rural parishes in predominantly rural municipalities are located all over the country; especially in Western and Southern Denmark, on the smaller islands, and on the island of Bornholm to the far east.

**Figure 1. Map of Denmark with the location of the rural parishes included in the study ( $n = 512$ )**



### *3.4 Measuring population growth*

The paper will model the parish population growth for the period from 1 January 2012 to 1 January 2017. Parish population data was obtained from Statistics Denmark.

### 3.5 Measuring the forms of capital (internal resources)

The paper investigates the following forms of capital: nature capital, physical capital, economic capital, human capital, social capital, and symbolic capital. As mentioned, data for economic and human capital was acquired from Statistics Denmark. Data for the remaining forms of capital was extrapolated from DRUS, where parish data were constructed by calculating the average response among respondents from each parish. The stocks of all six forms of capital are measured around 1 January 2012. Below is an account of how each form of capital is measured.

*Nature capital* is measured by the average parish response to the following item in DRUS: ‘How many natural amenities are located in and around your local area?’ The respondents were asked to answer this question on a scale from 1 (none at all) to 10 (very many).

*Physical capital* is measured as the average parish response to nine questions in DRUS on the distance to various types of infrastructure as measured by the estimated driving time by car (distance to the municipal service office, the nearest grocery, the respondent’s general practitioner (GP), the nearest hospital, the nearest kinder garden or daily care, the nearest public school, the nearest library or library bus, the nearest train station, and the nearest highway). There were six response options available: 1 = more than 2 hours, 2 = 1-2 hours, 3 = 30-60 minutes, 4 = 15-29 minutes, 5 = 5-14 minutes, 6 = less than 5 minutes. A scale variable was generated to represent a composite measure for the nine questions. Doing so is reasonable as Cronbach’s  $\alpha$  was calculated to be 0.78, cf. the 0.70 threshold level that was recommended by Nunnally (1978).

*Economic capital* is measured by the median wealth per resident in the parish for persons aged 18 and above as of 1 January 2012, as acquired by Statistics Denmark.

The paper includes three measures for *human capital*, all calculated from data acquired from Statistics Denmark. The first human capital variable relates to the gender distribution in the parish, and it measures the share of the male population in the parish. The second human capital variable relates to the age distribution in the parish, and it is measured by the share of people aged 18-39 in the parish. These two variables were included to take in the fact that population growth is not only determined by in- and outmigration, but also by birth and death rates in the parish. In many peripheral rural communities in Denmark, for example, there is a surplus of males, and this is likely to

adversely affect birth rates. The third human capital variable measures the educational level in the parish. It is a ratio measure which was calculated like this: the share of persons in the parish with a further education as highest education (short, medium, bachelor, long further education, and PhD) divided by the share of people in the parish with primary school as highest education. Accordingly, the larger the value of this variable, the larger is the educational level in the parish.

*Social capital* is measured by combining five questions from DRUS that deal with the degree of social interaction and cohesion in the local community. The five questions are formulated as statements, and respondents were asked to state how much they disagree or agree in them (fully disagree, disagree in part, both/and, agree in part, or fully agree): 1) 'You feel a strong solidarity with the other people of your local community', 2) 'You feel a strong attachment to your local community', 3) 'Everyone knows everyone in your local community', 4) 'You feel safe and secure in your local community', and 5) 'People in your local community are good at helping each other'. Combining the five items into a single scale variable seems reasonable enough as Cronbach's  $\alpha$  was calculated to be 0.69.

*Symbolic capital* is measured by the average parish response to the following question in DRUS: 'How much status do you think is attached to living in the place where you live?'. Respondents were asked to answer on a scale from 1 (none at all) to 10 (very high status). The interviewers were asked to specify that 'with status is meant the recognition or prestige from the outside world'. So, the status question was intended to measure the 'average' opinion of people outside the local community, as estimated by people inside the local community. The variables are described in more detail in Table 3.



**Table 3. Variables**

Variables	Definition
Population growth	Population growth in percent in parish from 1 January 2012 to 1 January 2017
Peripheral rural parish	1 = Rural parish further away from the largest towns; 0 = otherwise
City near rural parish	1 = Rural parish close to the largest towns; 0 = otherwise
Nature capital	Response to the question: 'How many natural amenities are located in and around your local area?' Measured on a scale from 1 (none at all) to 10 (very many). Extracted from DRUS
Physical capital	Average response to nine questions on the distance to various types of infrastructure as measured by the estimated driving time by car (distance to the municipal service office, the nearest grocery, the respondent's GP, the nearest hospital, the nearest kinder garden or daily care, the nearest public school, the nearest library or library bus, the nearest train station, and the nearest highway). Six response options: 1 = more than 2 hours, 2 = 1-2 hours, 3 = 30-60 minutes, 4 = 15-29 minutes, 5 = 5-14 minutes, 6 = less than 5 minutes. Extracted from DRUS
Economic capital	The median wealth in DKK (excluding pension scheme and cash holdings) per resident in parish for persons aged 18 and above as of 1 January 2012
Human capital (share of male population)	Share of male population in the parish (all ages included) as of 1 January 2012
Human capital (18-39 years)	Share of people aged 18-39 in the parish as of 1 January 2012
Human capital (education)	Share of persons as of 1 January 2012 in the parish with a further education as highest education (short, medium, bachelor, long further education, and PhD) divided by share of people in the parish with primary school as highest education
Social capital	Average response to five statements concerning social capital in the local community (high solidarity in local community, feel highly attached to local community, everyone knows everyone in local community, feeling safe and secure in local community, people good at helping each other in community). Measured on a scale from 1 (highly disagree) to 5 (highly agree). Extracted from DRUS
Symbolic capital	Response to the question: 'How much status do you think is attached to living where you live?'. Measured on a scale from 1 (none at all) to 10 (very high status). Extracted from DRUS
Population density	Population density in parish as of 1 January 2012 measured by number of inhabitants per km <sup>2</sup> in parish

*Note:* The data for the various forms of capital were measured around 1 January 2012.

### 3.6 Statistical methods

Multiple linear regression analyses were performed using the 2012-2017 population growth as the dependent variable and the initial stocks of capital as the independent variables. An equal gender distribution or a skewed gender distribution with a slight majority of females is likely to be the optimal gender configuration in terms of achieving high birth rates (Hamilton and Seyfrit, 1994; Johnson, 1994; Hamilton and Otterstad, 1998). To accommodate for this, both the non-squared and squared gender

distribution were included. In addition to the initial stocks of capital, two control variables were included. The first control variable was the parish population density as of 1 January 2012. The squared parish population density was included alongside the non-squared population density to adjust for possible saturation points. It is thus imaginable that there is only limited housing-related capacity for further population growth in very populous and densely built parishes. The second control variable was a dummy for city near rural parishes since city near rural parishes can be expected to benefit from a fixed effect from being located near a city.

Regression analyses were performed in three ways. First, a regression analysis included all rural parishes. Second, a regression analysis was performed separately for rural parishes located in predominantly rural municipalities, and third, a regression analysis was performed separately for rural parishes located in predominantly urban municipalities, cf. Table 2. The two latter regressions were performed to investigate whether the effect of internal resources differs depending on whether the rural parish is located in an overall rural or urban geographical setting. In all three regressions, dummies for the five regions in Denmark were included, thus controlling for region fixed effects.<sup>3</sup> Moreover, in all three regressions, standard errors were adjusted for municipality-based clusters. This cluster-based standard error method adjusts the standard errors for the possible dependence among parishes within the same municipality.

### *3.7 Descriptive statistics*

Table 4 shows population growth during 2012-2017 by rural parish type.<sup>4</sup> Within each parish type, there has been a substantial variation among parishes, and the variation is similar across rural parish types, cf. the standard deviations (S.D.). There is not a huge difference in mean population growth across parish type. However, on average, peripheral rural parishes have had the largest population decline, and rural parishes in

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<sup>3</sup> The five Danish regions are: Capital Region of Denmark, Region Zealand, Region of Southern Denmark, Central Denmark Region and North Denmark Region. In the EU statistical nomenclature, these regions constitute the NUTS 3 level in Denmark. Below the NUTS level, the Danish Local Administrative Units (LAU) consist of municipalities (LAU 1) and parishes (LAU 2).

<sup>4</sup> Note that population growth figures are only available for 506 of the 512 rural parishes, which is because some parishes have merged with other parishes at some time during 2012-2017.

predominantly urban municipalities have had the largest population growth during the period.

**Table 4. Population growth from 1.1.2012 to 1.1.2017, %. By rural parish type**

	<i>n</i>	Mean	S.D.	Min.	Max.
Peripheral rural parish	307	-3.17	5.28	-19.27	18.46
City near rural parish	199	0.27	5.21	-16.45	20.88
Rural parish in predominantly rural municipality	363	-2.85	5.25	-18.60	20.88
Rural parish in predominantly urban municipality	143	0.81	5.29	-19.27	17.35

Descriptive statistics for all the variables are presented in Table 5. On average, the population number in the sampled rural parishes fell by 1.82% during 2012-2017. The largest population decline for one parish was 19.3%, and the largest population growth for one parish was 20.9%. It can be noted that 64% of the parishes had a population decline. The average initial size of the rural parishes was 1,351 inhabitants, and the average initial population density was 66 inhabitants per km<sup>2</sup>. Table 5 shows substantial variation in the variables that measure the initial stocks of capital. For economic capital, for example, there was a huge difference between the parish with the lowest median wealth per resident and the parish with the highest median wealth per resident.

**Table 5. Descriptive statistics**

	<i>n</i>	Mean	S.D.	Min.	Max.
Population growth, 1.1.2012-1.1.2017	506	-1.82	5.51	-19.27	20.88
Peripheral rural parish	512	0.61	0.49	0	1
City near rural parish	512	0.39	0.49	0	1
Nature capital	512	8.29	1.82	1	10
Physical capital	512	4.79	0.42	3.56	5.78
Economic capital	512	51,369	46,306	-6,044	371,291
Human capital (share of male population)	512	0.51	0.02	0.46	0.60
Human capital (share of people aged 18-39)	512	0.21	0.04	0.10	0.35
Human capital (education)	512	0.47	0.23	0.12	1.75
Social capital	512	4.30	0.60	1.4	5
Symbolic capital	495	5.28	2.70	1	10
Number of inhabitants, 1.1.2012	512	1,351	982	97	6,235
Population density, 1.1.2012	512	66	77	3	884

*Note:* The data for the various forms of capital were measured around 1 January 2012.

Table 6 shows the correlation matrix for the variables that were used in the regression analyses. The first column shows a significant positive correlation between population growth during 2012-2017 and the following variables: physical capital, economic capital, human capital (share of people aged 18-39), human capital (education), initial population density, and residing in a city near rural parish. Moreover, it shows a significant negative correlation between population growth during 2012-2017 and human capital (share of male population) and no significant correlation between population growth and nature capital, social capital, and symbolic capital.

**Table 6. Correlation matrix**

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Population growth, 1.1.2012-1.1.2017	1									
2. Nature capital	-0.04	1								
3. Physical capital	0.27***	-0.16***	1							
4. Economic capital	0.11**	0.23***	-0.12***	1						
5. Human capital (share of male population)	-0.27***	-0.05	-0.24***	-0.15***	1					
6. Human capital (share of people aged 18-39)	0.12***	-0.20***	0.21***	-0.46***	0.30***	1				
7. Human capital (education)	0.29***	0.20***	0.15***	0.49***	-0.13***	-0.14***	1			
8. Social capital	-0.07	0.17***	-0.06	0.05	0.07	-0.0002	-0.02	1		
9. Symbolic capital	0.06	0.16***	0.04	0.13***	-0.08*	-0.05	0.06	0.20***	1	
10. Population density	0.19***	0.004	0.24***	0.08*	-0.41***	-0.22***	0.18***	-0.10**	-0.004	1
11. City near rural parish	0.31***	-0.05	0.25***	0.01	-0.05	0.26***	0.30***	-0.07	-0.01	0.03

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

Meanwhile, Table 6 also shows a strong correlation among the independent variables. For example, there is a high degree of positive correlation between economic capital and human capital (education), a high degree of positive correlation between nature capital and economic capital, and a high degree of positive correlation between nature capital and social capital. To unravel these connections, it is necessary to conduct multiple regression analyses.

The correlation among independent variables could have led to multicollinearity in the regression analyses. To check whether multicollinearity constitutes a problem, variance inflation factor (VIF) multicollinearity tests was performed on the three regressions in Table 7. The VIFs for single independent variables were found to be well below 5. The common rule of thumb is that multicollinearity is present if the VIF of a single variable exceeds 10 (Gujarati, 2003, p. 362). Thus, the regression analyses do not seem to suffer from problems of multicollinearity.

#### **4. Results**

Table 7 presents the results of the three regression analyses. The table shows that the relationship between initial stocks of capital and population growth very much depends on the geographical location of the rural parish. In Model 1, which includes all rural parishes, economic capital and human capital are positively related to population growth, whereas physical capital, nature capital, social capital and symbolic capital are non-related to population growth. In Model 2, which includes only rural parishes in predominantly rural municipalities, physical capital, economic capital and human capital are positively related to population growth, whereas nature capital, social capital and symbolic capital are non-related to population growth. Finally, in Model 3, which only includes rural parishes in predominantly urban municipalities, only symbolic capital is positively related to population growth.

**Table 7. Relating initial stocks of capital in rural parishes to their population growth in the period 2012-2017**

	All rural parishes (Model 1)	Rural parishes in predominantly rural municipalities (Model 2)	Rural parishes in predominantly urban municipalities (Model 3)
Constant	-1.4956 (0.8467)*	-2.0047 (0.9549)**	-0.5328 (2.4869)
Nature capital	-0.0002 (0.0012)	0.0008 (0.0013)	-0.0015 (0.0016)
Physical capital	0.0069 (0.0069)	0.0161 (0.0070)**	-0.0152 (0.0104)
Economic capital	0.0150 (0.0081)*	0.0247 (0.0122)**	0.0106 (0.0086)
Human capital			
Share of males	5.6941 (3.1859)*	7.2695 (3.5380)**	2.6706 (9.7528)
Share of males <sup>^2</sup>	-6.0593 (3.0394)**	-7.4484 (3.3420)**	-3.2101 (9.6107)
Share aged 18-39	0.3600 (0.0996)***	0.4045 (0.1173)***	0.2104 (0.1886)
Education	0.0302 (0.0122)**	0.0397 (0.0156)**	-0.0027 (0.0201)
Social capital	-0.0011 (0.0034)	0.0004 (0.0043)	-0.0028 (0.0071)
Symbolic capital	0.0010 (0.0010)	-0.0006 (0.0009)	0.0061 (0.0022)**
Population density	2.0248 (0.6170)***	1.5330 (0.6442)**	8.9099 (2.7585)***
Population density <sup>^2</sup>	-26.2414 (9.1397)***	-17.6203 (8.2064)**	-259.7695 (75.9727)***
City near rural parish	0.0207 (0.0062)***	0.0201 (0.0075)***	0.0064 (0.0091)
Region dummies	Yes	Yes	Yes
R <sup>2</sup>	0.27	0.25	0.31
n (number of parishes)	489	349	140

*Notes:* Dependent variable: Population growth from 1 January 2012 to 1 January 2017. Population growth is measured in point figures instead of percent figures, e.g. 0.11 instead of 11 percent. Economic capital (median parish wealth per capita) is measured in DKK 100,000. Population density is measured in 10,000 inhabitants per km<sup>2</sup>. Municipality-based cluster adjusted standard errors are in parentheses.

\*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  (two-tailed)

The effect of initial stocks of capital on population growth is thus largest in rural parishes located in predominantly rural municipalities. In these rural parishes, the closeness to public and other service institutions, as captured by physical capital, seems to play a significant positive role. Likewise, economic capital as measured by the median wealth of the parish residents seems to play a significant positive role. Thus, if the median wealth in a parish is increased by 100,000 DKK, the population growth will increase by 2.47%, cf. Model 2. All three measures of human capital are statistically significant. The results for the gender distribution turned out to be as expected in the form of a reversed U-shaped relationship; cf. the coefficient for the share of the male population is positive and the coefficient for squared share of the male population density is negative. The turning point of this curve is around a male share of the population of 48.8% (using coefficient values with 6 decimals). This suggests that a

skewed gender distribution with a slight majority of females is the optimal configuration in terms of achieving high birth rates and thus population growth. Also, the share of people aged 18-39 in the parish shows a significant positive effect. Thus, if this share of people increases by 1%, the population growth will increase by 0.40%. Finally, the educational level in the rural parish shows a significant positive effect on population growth.

As mentioned, the effect of initial stocks of capital on population growth is small in rural parishes located in predominantly urban municipalities. Only symbolic capital (as measured by parish reputation) turned out to play a significant role. This suggests that only certain special and well-reputed rural parishes can outperform other rural parishes in the same urban municipality environment.

There were two control variables in the models: initial population density and a dummy for city near parishes. In Models 1 and 2, the dummy for at city near parish shows a positive fixed effect on population growth. In these two models, city near parishes have a population growth that is around 2% higher than peripheral rural parishes. As expected, in all three models, the effect of initial population density in rural parishes is inversely U-shaped. This means that the larger the population density, the larger the population growth but only up to a given saturation point, after which population density will be negatively related to population growth. In the pooled sample of rural parishes (Model 1), this saturation point was calculated to be equal to around 385 inhabitants per km<sup>2</sup> (using coefficient values with 6 decimals). In the pooled sample, 99.0% of the rural parishes had a population density below this saturation point. For the sample of rural parishes located in rural municipalities, the saturation point was calculated to be 435 inhabitants per km<sup>2</sup>, and 98.6% of these rural parishes had a population growth below this point. For the sample of rural parishes located in urban municipalities, the saturation point is 171 inhabitants per km<sup>2</sup> and 88.0% of these rural parishes are below this saturation point. Therefore, for the overwhelming majority of rural parishes, population density is positively related to population growth. However, the population growth in parishes located in predominantly urban municipalities is to some degree determined by saturation effects.



## 5. Conclusion and Discussion

The purpose of the paper was to answer two questions: How important are place-based, internal resources for the population development in small rural communities? And is there any difference as to how important internal resources are depending on whether the rural community is located within a wider area that is primarily urban or rural? To this end, using a Danish parish sample, the paper examined how much parish-level population growth during 2012-2017 could be related to internal resources (initial stocks of capital) when controlling for initial population density, region fixed effects and the fixed effect of being located near a city. The following stocks of capital were included: nature capital, physical capital, economic capital, human capital, social capital, and symbolic capital.

The paper found initial stocks of capital to be quite important for the population growth in rural parishes located in predominantly rural municipalities. For these rural parishes, physical capital, economic capital, economic capital and human capital had a significant positive effect on population growth. For rural parishes in predominantly urban municipalities, however, only symbolic capital (as measured by place reputation) had a significant impact on population growth.

Overall, the results show that the population development in rural parishes in predominantly urban municipalities is much less determined by internal resources than the population development in rural parishes in predominantly rural municipalities. In fact, the results suggest that the population development in rural parishes in predominantly urban municipalities is more determined by external factors, that is, factors that exist in the surrounding urban areas within the municipality. To use another terminology (Terluin, 2003), the paper finds evidence of endogenous development in rural parishes in predominantly rural municipalities and mainly exogenous development in rural parishes in predominantly urban municipalities.

For rural parishes located in predominantly rural municipalities, it seems beneficial to lie near or indeed possess various service infrastructures. The positive effect of physical capital as measured by closeness to infrastructure such as schools, grocery, health service etc. thus underlines the rationale of trying to preserve local service facilities. The positive relationship between economic capital and population growth suggests that higher wealth levels among parish residents generate activity in the

parish; be it higher activity in the business or civil society sphere. The same can be said about the positive relationship between human capital as measured by educational level and population growth. With regards to the two other human capital variables, the paper found a positive effect of having a young population and an equal gender distribution, preferably with a slight overweight of females. These two factors are quite important for the population development in rural parishes located in predominantly rural municipalities, as they support the reproductive capacity of the parish.

As for other internal factors, the initial stocks of nature capital and social capital were found to be non-related to population growth. The finding of a non-effect of nature capital is in line with the findings of Agarwal et al. (2009), Isserman et al. (2009), and Sánchez-Zamora et al. (2014). Other studies have pointed out that people migrating into rural communities often mention natural amenities and the local sense of solidarity as main reasons for moving (Johansen and Thuesen, 2011; Nørgaard, 2013). However, this paper indicates that these positive features of rural life are not powerful enough to pull the overall population development in a positive direction. The finding of a significant positive coefficient for symbolic capital in the case of rural parishes in predominantly urban municipalities corroborates the findings of a few previous studies that suggest that place reputation is likely to play a role in residential sorting (Tsfati and Cohen, 2003; Andersen, 2008; Permentier et al., 2009; Sørensen, 2015).

Overall, parish size as measured by population density turned out to be an important factor for the population development in small rural communities. Thus, the population development in small rural communities seems in part to be subject to an agglomeration effect. The agglomeration effect in the sampled rural parishes is revealed by the fact that more populous rural parishes experience higher population growth rates than less populous rural parishes. A general urbanisation trend has existed in the Danish society ever since year 1801 when records were first kept (Matthiessen, 1985; Sørensen, 2014). The paper shows that the urbanisation trend not only takes place at the national level, but also at the parish level. In agglomeration theory (e.g. Mulligan, 1984), the general urbanisation trend is explained by referring to economics of scale that can be achieved when companies and public institutions on the one side and consumers and employees on the other side localise closer to one another. In the private sector, for example, scale economics arise through the reduction of transportation costs and easier

access to the labour force. In the public sector, scale economics relate to the possibility of achieving improved cost efficiency per inhabitant.

### *5.1 Policy implications*

The paper offers some support for the underlying contention in OECD's new rural policy paradigm that the development in rural areas is affected by their internal resources and assets. However, at the community level, this only seems to be the case for rural communities located in a wider geographical setting that is primarily rural. The results suggest that improving internal economic resources could have a positive effect on the population development in such communities. Such improvement could, for example, come about by introducing a special tax deduction for people residing in small rural communities. Also, the results show that keeping a certain amount of service functions in or close to small, peripheral rural communities has a positive effect. Further, the paper shows that having a young population has a positive effect on the population development in small, peripheral rural communities, and the same can be said for having an equal gender distribution or a slight majority of females. One obvious policy recommendation is therefore to launch initiatives that might attract the younger part of the population and more females to live in the communities. Meanwhile, the paper did not find evidence of nature and social capital being the two trump cards of rural areas, as suggested by León (2005). This result suggests that improving natural amenities or the social cohesion in small rural communities probably would not have any population impact at the community level.

One finding is that the population development in small rural communities is to some degree subject to an agglomeration effect. The agglomeration effect shows itself by bigger rural parishes getting bigger and smaller rural parishes getting smaller, regardless of their stocks of capital. For this reason, politicians might consider concentrating their efforts on the largest, i.e. most populous, rural parishes. Considerations of this kind have been voiced in Denmark by different parties (Danish Broadcasting Corporation, 2013; Kristeligt Dagblad, 2013), but this is of course a political balancing act.

## 5.2 Limitations and future research

In the three regression models in this paper,  $R^2$  ranged from 0.25 to 0.31. The explanatory power of the models seems relatively high when you consider that the population development in small geographical units is subject to more randomness than the population development in larger geographical units. For example, in the sample, 17% of the parishes had a population in 2012 of less than 500 residents, and 45% of the parishes had a population in 2012 of less than 1,000 residents. The population development during a five-year period beyond this point is thus very much affected by whether a few single families *coincidentally* move to or from the parish. This more random measurement makes it harder to predict the population growth for smaller than for larger geographical units.

Nevertheless, future studies could try to improve the explanation power of used models. Firstly, attempts could be made to measure some of the forms of capital in a different way. For example, nature capital could be measured more objectively, e.g. by using variables that measure the prevalence of coastal lines or forest acreage. Moreover, social capital could be measured in a different way. This paper used a so-called ‘bonding’ social capital variable (Putnam, 2000, 22), which corresponds well with the notion that rural areas may have an advantage when it comes to the degree of internal social interaction. However, future studies could experiment with including a ‘bridging’ social capital variable (Putnam, 2000, 22) measuring the social interaction between residents inside the small rural community and residents outside the small rural community. Research has indicated that the more extrovert bridging social capital may be more conducive to development than the more introvert bonding social capital (Woolcock and Narayan, 2000; Callois and Aubert, 2007; Sørensen, 2016). Future studies could also consider a measure for physical capital that relates to the quality of the physical buildings, possibly including buildings of cultural-historic importance. Obviously, introducing new measurements requires data availability or new collection of data. Secondly, an attempt could be made to include more rural parishes in the sample. The sample in this paper included roughly a third of the rural parishes in Denmark, and had it been larger, maybe one or more of the initial stocks of capital had turned out to be significant.

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