Indicators of rural vitality. A GIS-based analysis of socio-economic development of the rural Netherlands

Koomen, E.

2011

Faculty of Economics and Business Administration

Indicators of rural vitality. A GIS-based analysis of socio-economic development of the rural Netherlands

Research Memorandum 2011-50

Eric Koomen

INDICATORS OF RURAL VITALITY

A GIS-based analysis of socio-economic development of the rural Netherlands

Eric Koomen[1]
Department of Spatial Economics/SPINlab, VU University Amsterdam,
Amsterdam, The Netherlands

Abstract
Concern for the socio-economic vitality of rural areas has stimulated various development programmes. This paper proposes a methodology to quantify this policy concept following a strict socio-economic interpretation and use it to assess the structural characteristics and performance of rural vitality in the Netherlands. The use of a Geographical Information System (GIS) and highly detailed spatial data are crucial in this approach. The study shows that developments as regards population, employment and facilities in small settlements in the generally well-accessible Netherlands do not differ greatly from the national trends. The results thus question the basis for the specific rural development objectives of the new National Spatial Strategy.

Key words: rural vitality; socio-economic development; small settlement; indicator; geographical information system; the Netherlands

1. INTRODUCTION

Many people consider that the vitality or socio-economic potential of rural areas is at risk. In particular, the continuously decreasing importance of the agricultural sector in many western countries (see, for example, Ploeg, 2006) has led to serious concern about the socio-economic prospects of predominantly rural areas. Especially the rural areas in the more remote parts of the EU "are still being depleted of population and economic activity through cumulative self-perpetuating cycles of decline" (Copus et al., 2006). This decline, by the way, has many more causes than a decreasing importance of agriculture alone. The concern about rural vitality has motivated the initiation and continuation of various rural development programmes including the EU's reformed Common Agricultural Policy (CAP) and LEADER initiative. The current Dutch National Spatial Strategy also has the specific objective of improving rural vitality that is believed to be at stake in various areas in the country (VROM et al., 2004). In fact, improving countryside vitality is considered such an important issue that a related policy agenda and execution program have been drafted (LNV, 2004; LNV et al. 2007). The current analysis aims to capture the essence of the concept of 'rural vitality' and, furthermore, describe its current state and development over time in The Netherlands. The analysis was commissioned by the Netherlands Ministry of Housing, Spatial Planning and the Environment as part of the evaluation of their National Spatial Strategy. It is interesting to note that this important policy document neither exactly defines the concept of rural vitality nor explicitly specifies where vitality problems occur. The assumed decline in vitality is

[1] De Boelelaan 1105, 1081 HV, Amsterdam, The Netherlands. Email: e.koomen@vu.nl

specifically associated with a decreasing local importance of agriculture that, amongst others, causes agricultural buildings to become vacant (VROM et al., 2004). The Spatial Strategy and related agenda and program, furthermore, lack a clear description of the proper instruments to improve rural vitality, but the policy documents stress the importance of providing rural communities with ample opportunities for residential and economic development. These policy guidelines do not distinguish between peripheral and more central rural areas and aim to improve conditions in all rural areas. Seeing the uncertainties mentioned above this paper centres around three research questions: 1) Can the concept of rural vitality be quantitatively described? 2) What is the current state of this vitality? And 3) How did this develop in the period preceding the implementation of the new Spatial Strategy, when more severe spatial restrictions were supposedly hampering the rural development potential?

The presence of specific rural development policies indicates that the long-lasting academic debate questioning the actual existence of rural areas (e.g. Friedland, 1982; Mormont, 1990) has bypassed policy makers. The current paper does not participate in this debate, but rather follows the point of view of Léon (2005) and "describe the rural world as a geographical reality characterized by low population density and where the relative abundance of land and natural resources leads to a specific combination of built areas and open spaces". This is very much in line with the functional concept of rurality described by Cloke (2006) that is characterized by the presence of extensive land uses and small lower-order settlements. More specifically, the current analysis of rural areas is limited to small settlements with less than 2000 residences and their surrounding open (non-built-up) areas. This definition is comparable to the one favoured by the US Census Bureau that classifies places with fewer than 2500 residents and open territory as rural areas (USDA, 2007).

The current paper first introduces the methodology of the research in Section 2, which describes, in turn, this interpretation of the concept of rural vitality, the selected set of indicators, and the spatial definition of the small settlements that constitute the spatial units of the analysis. Section 3 then presents and analyses the results for the rural Netherlands in comparison with the average national trends. Finally, Section 4 draws a general conclusion and discusses the policy implications of the outcomes of the study and how they compare with similar (inter)national studies. A more comprehensive description of this research, which also contains an analysis of regional policy and an in-depth discussion of five local case study areas, can be found in Smaal et al. (2005a; 2005b).

2. METHODOLOGY

'Rural vitality' is a rather broad concept that hints at the potential of rural areas to overcome possible problems, such as the diminishing importance of agricultural production, and to function as relatively independent entities that survive without substantial external support. It is related to equally vague and popular terms like 'sustainability' and 'liveability'. This study gives a socio-economic interpretation of the concept of vitality that allows for a relatively straightforward, quantitative temporal analysis. It thus refrains from including issues such as social cohesion and community identity that are more difficult to quantify and therefore lack the availability of temporal series of detailed (spatial) data.

In this socio-economic interpretation three main attributes are distinguished: 1) population/ demography; 2) economic activity; and 3) available facilities. These attributes are measured in terms of structure (actual state) and performance (development over time), providing an interrelated 3 x 2 matrix, comparable to the analysis of socio-economic sustainability offered by Copus and Crabtree (1996). For each of the six cells in the matrix, one or more related indicators are selected that quantify the distinguished socio-economic attributes (Table 1). More specifically these are:

Number of residences: indicating the size of the settlement and, by approximation, its number of households. In accordance with spatial policy this is an especially meaningful indicator because it relates to the intention of the National Spatial Strategy to provide ample room for natural population growth in rural areas and thus maintain rural vitality. These data are obtained from the dwelling stock statistics of Statistics Netherlands (CBS, 2007) and are coupled to the centre points of six-digit postal code zones that correspond to (part of) a street with, on average, 16 residences.

Employment: described here as the total number of jobs per settlement and thus directly related to the strength of local economic activity. The derived performance indicator characterising local employment growth is particularly interesting since it is closely linked to the policy objective of job creation (Terluin, 2001). The data for this indicator originate from the yearly national inventory of workplaces and are also available at the level of six-digit postal code zones. This data set lists the type of activity, number of employees and place of business of individual companies, institutions and self-employed workers (LISA, 2002). To describe total employment in a settlement the numbers of employees from all types of activities are added up.

Age distribution: related to the issue of vitality through the share of young people (0-15 years) that offer promise for the future, and the share of elderly (65+ years) people that supposedly characterize less vital communities. These demographic data are taken from the key figures of districts neighbourhoods collected by Statistics Netherlands that have been combined with a geographical data set delineating these areas (Geodan, 2003). The spatial level of these data is coarser than that of the other data sets that are available at the six-digit postal code level. Neighbourhoods are roughly equivalent to small settlements, but they can also be larger or smaller.

Available facilities: characterized by the number of basic facilities (retail outlets, schools, catering establishments, basic medical services and bank/post offices), the presence of which indicates the liveliness and attractivity of settlements. The data on available facilities is also taken from the yearly national inventory of workplaces. In this case, the number of individual companies, institutions or self-employed workers belonging to each of the distinguished types of facilities are counted irrespective of their size.

Table 1. Overview of the attributes of rural vitality and the structural and performance dimensions in which they are studied

Attributes	Structure	Performance
Population/demography	Number of residences	Rate of change [%]
	Age distribution	Rate of change [%]
Economic activity	Employment	Rate of change [%]
Available facilities	Number of basic facilities (retail outlets, schools, catering establishments, basic medical services, bank/post offices)	Rate of change [%]

By comparing the socio-economic structure in different years (1996 and 2000) it is possible to provide an overview of the rural vitality performance since the time of the much-criticized restrictive spatial policy of the Fourth Physical Planning Report (VROM, 1989). The supposed loss of rural vitality is often linked to the many spatial restrictions in rural areas and has given rise to the change in spatial policy laid down in the current National Spatial Strategy that aims to give the countryside more scope for development.

The current analysis relies on the use of a Geographical Information System (GIS) and highly detailed spatial data that enable individual small settlements to be distinguished. These are defined here as: *continuous built-up areas with a minimum of 5 hectares and containing 11-2000 residences.* The starting point in this definition of small settlements is a geographical data set that describes built-up areas, which is derived from the spatial land-use database of the Central Bureau for Statistics (CBS). This data set considers as built-up areas: primary urban areas of every kind (residential areas, retail, business and industrial areas) and the functions related to the urban area (various facilities, dumping sites, parks, cemeteries,

recreational areas, et cetera) as far as these are enclosed within the primary urban area. Furthermore, built-up areas have to cover at least 5 hectares. An extensive description of the way the basic built-up area file is established can be found in Odijk et al. (2004). In addition, this data set considers as open (non-built-up) areas: water, agricultural zones, nature reserves, airports, building sites and sites with recreational accommodation areas.

Built-up areas that are quite close together (within 500 metres) and, as such, can be supposed to be a coherent village area have been combined in this study by means of a buffer operation in a standard desk-top GIS. The (combined) built-up areas that have a minimum size of 5 hectares are then selected and used to aggregate the various fine-level socio-economic attribute data sets relating to, for example, number of residences and jobs. The aggregation is a straightforward procedure for the data that are available at the level of the centre points of the six-digit postal code zones. In order to correctly assign the coarser neighbourhood-level demographic data to the settlements the age distribution statistics are first assigned to the individual six-digit postal code zone centre-points located in a neighbourhood. Subsequently, these values are averaged per individual settlement. This approach has the limitation that it ignores possible differences in the number of inhabitants per postal code zone needed to correctly weigh the importance of each of these zones. The demographic statistics are, furthermore, assumed to have a homogenous spatial distribution within a neighbourhood. Without more detailed data, however, the current approach provides the most accurate results possible. By way of example, Figure 1 illustrates the different spatial levels of the available data sets. All available data sets refer to 1996 and 2000, apart from the demographic data for which the best possible alternative years were selected (1995 and 2001 respectively).

Small rural settlements are then considered to be those built-up areas with 11-2000 residences in the year 2000, excluding residences meant specifically for recreation (holiday homes) or group accommodation (student housing complexes, et cetera). Small settlements that have a predominant employment function have also been left out of this analysis. These concern fairly extensive business and industrial areas with relatively few residences, in this case those that have a jobs-to-residences ratio of 20:1 or more, which cannot really be considered small (village) settlements. By deliberately constructing a spatial reference data set of small settlements according to a meaningful definition, it becomes possible to analyse rural vitality at the level where it matters. This approach has the advantage of not having to perform the analysis at the level of existing administrative units that are generally considered to be rather arbitrary (Cloke, 2006). The relevance of the local, settlement level is questionable for phenomena such as employment and service level, as most inhabitants in possession of a car will be able to travel the nearest (larger) settlement that provides the needed employment or wanted services. Nevertheless, the settlement level is chosen as vitality problems are supposed to occur at this level (VROM et al., 2004). The selection of services is, furthermore, restricted to the basic services that are considered vital for local communities.

To reflect the diversity within the small settlements a subdivision is made, based on the number of residences per settlement. A distinction into five size groups is established, each group having roughly the same number of settlements. In order to place the analysis of the settlements in a broader perspective, the results have also been included for the average over all small settlements (11-2,000 residences) and, by way of reference categories, the medium-sized settlements with 2,001 to 8,000 residences, and the Netherlands as a whole are included. The picture of the countryside is completed by the (total) figures for the open area outside the settlements. This area also contains built-up areas smaller than 5 hectares and larger ones with less than 10 residences (small hamlets). Although the open areas are part of the rural Netherlands, they are of less interest for this study, as the supposed lack of vitality is mainly expected to manifest itself in the small settlements.

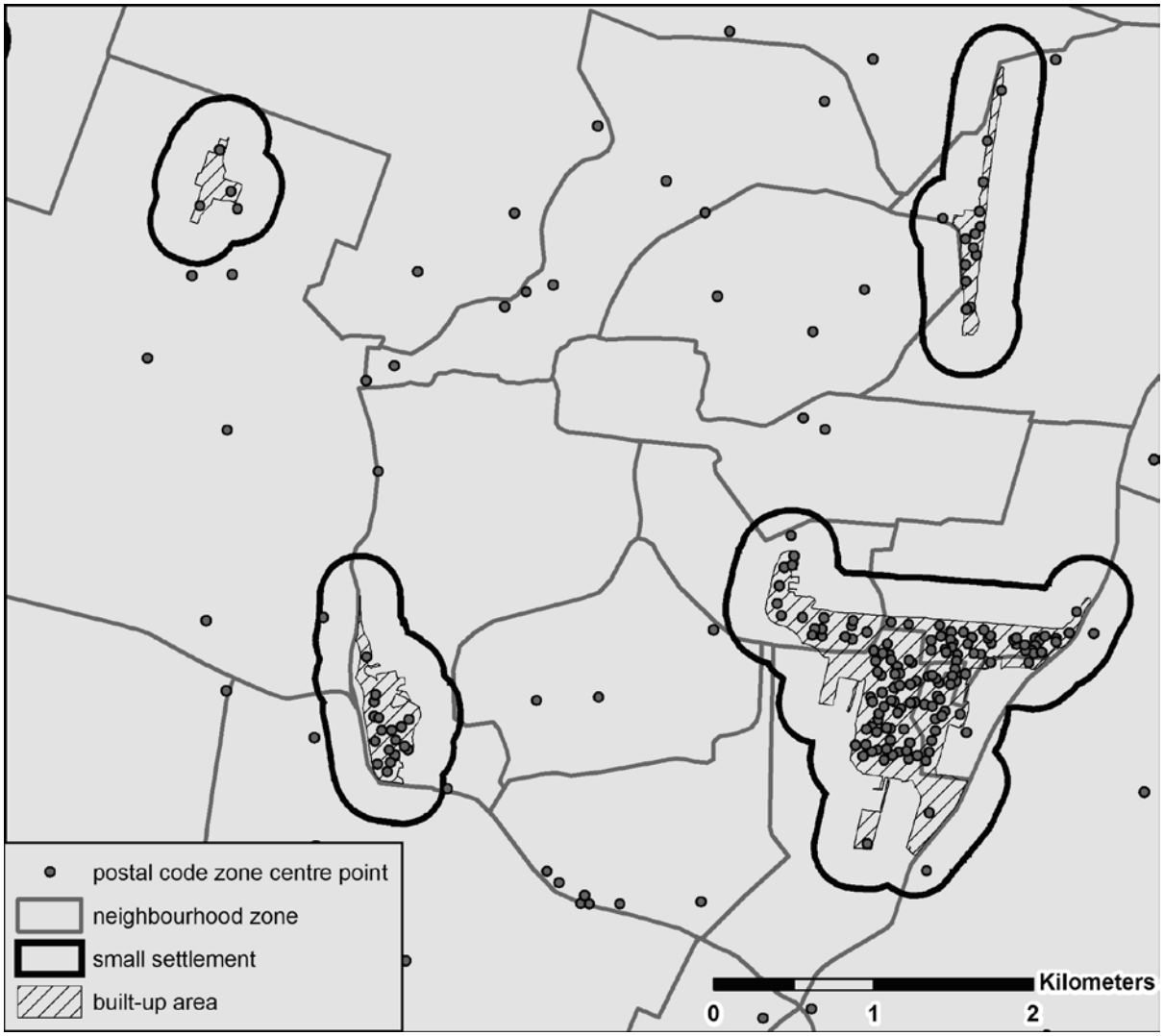

Figure 1. Different spatial levels of the included data sets.

3. RESULTS

3.1 Population/demography

Table 2 shows the structural and performance dimensions of the population indicator. On average, the number of residences in the Netherlands has increased by 5 per cent and in the small settlements by 10 per cent in the survey period (1996-2000). In the smaller settlements (101-500 residences) the average increase is largest. In other words: villages are growing faster than the rest of the country. In the open area the number of residences has only increased by 2 per cent. The vigorous building in the countryside seems to be in contradiction with the pursuit of the long-standing policy to preserve open space (RNP, 1958; V&B 1960) and compact urbanization (V&RO, 1977; VROM, 1989) and the general feeling that building is close to impossible in the countryside.

Earlier studies, however, also point in the same direction as this study. The *Balance spatial quality 2000* (VROM, 2000) describes an even stronger increase of residential addresses in the open, rural areas in the period 1990-1999. This increase is stronger because of differences in the used base data and the applied definition of open areas, but nonetheless confirms the observation that significant building activities are occurring in the Dutch

countryside. A similar conclusion is drawn in another recent study that uses more detailed spatial data (MNP, 2004). What is particularly interesting is that this study points out that the percentage increase of addresses is higher in the small settlements than in the villages and small towns. The increase is by far the smallest (about 3 per cent) in the open areas outside the built-up area, which is in accordance with the general spatial planning philosophy that such areas should be protected. Specific studies on the impact of the restrictive zoning policies that concern substantial parts of the rural areas in the contested western part of the country point out that development of new urban areas is less widespread here, but not fully absent (Bervaes et al., 2001; Gies et al., 2005; Koomen et al., 2008). So restrictive policy in the form of clear zoning regulations limits new urban development, but only up to a certain extent. The relatively strong increase in residences in the small settlements observed in this analysis is thus expected to occur especially in those vast parts of the countryside that are not part of specific restrictive zoning regulations. The link between rural vitality and residential development restrictions is explored further in a recent study focusing on a specific restricted development zone in the Netherlands (van Rij and Koomen, 2010).

Table 2. Number of residences by settlement size group (average per settlement), the open area, and the Netherlands as a whole (absolute figures) and their performance (percentage change 1996-2000)

Settlement size	N	Nr of residences 1996	Nr of residences 2000	Change [%]
11-100	175	50	56	13
101-250	332	159	180	13
251-500	396	309	363	17
501-1000	291	647	704	9
1001-2000	215	1363	1448	6
11-2000	*1409*	*472*	*518*	*10*
2001-8000	231	3757	3978	6
open area		306,027	312,524	2
the Netherlands		6,276,066	6,589,699	5

Source: Statistics Netherlands (CBS, 2007).
Note that the column headed 'N' indicates the total number of settlements per size group.

Figure 2 shows that the structural dimension of the age distribution of the population in small settlements is nearly equal to the national average. Small settlements and especially the open area contain relatively more persons in the 0 to 14 year age bracket and fewer persons aged over 65 years. This contradicts the current expectation that the rural area has aged more considerably than the rest of the Netherlands.

An analysis of the demographic performance in the period 1995-2001 (Table 3) shows that the percentage of persons aged 45-65 (the baby-boom generation) and older than 65 has increased faster in the small settlements than in the rest of the Netherlands. So, in fact, the proportion of aged, although still lower than the national average, is increasing relatively. Possibly the increase of the ageing population will materialize here more strongly in the future. The proportion of the age bracket 15-24 years is decreasing throughout the Netherlands, but more strongly in the open area than in the small settlements and the Netherlands as a whole. So it is not true that this age group is decreasing faster in the small settlements than in the whole of the Netherlands, even though that is often supposed to be the case. Incidentally, these developments are very significant for housing policy: especially for aged people more specific housing will have to be provided. A more extensive analysis of the demography and further intricacies of the applied methodology are discussed in Smaal et al. (2005b).

It should be noted here that regional variation in demographic development exists. Especially at the southern and eastern extremities of the country, municipalities tend to have a higher share of persons older than 65 years, higher mortality and lower birth rates than the rest of the country (CBS, 2003; 2007). In combination with a negative or neutral net migration balance this will lead to a population decline. During the observation period this

was first observed at the southern tip of the country,, spreading to other mostly peripheral regions after 2000 (Derks et al., 2006). This observed population decline is still fairly limited compared to more traditional areas of decline in Europe, but is it causing concern amongst spatial planners as future projections show that this decline is expected to manifest itself more strongly in both urban and rural regions (Haartsen and Venhorst, 2010). Interestingly enough these projections show strong local variation, with population growth and decline occurring in bordering municipalities across the whole country. Section 3.4 discusses regional variation in population and demographic development for a selected number of case studies.

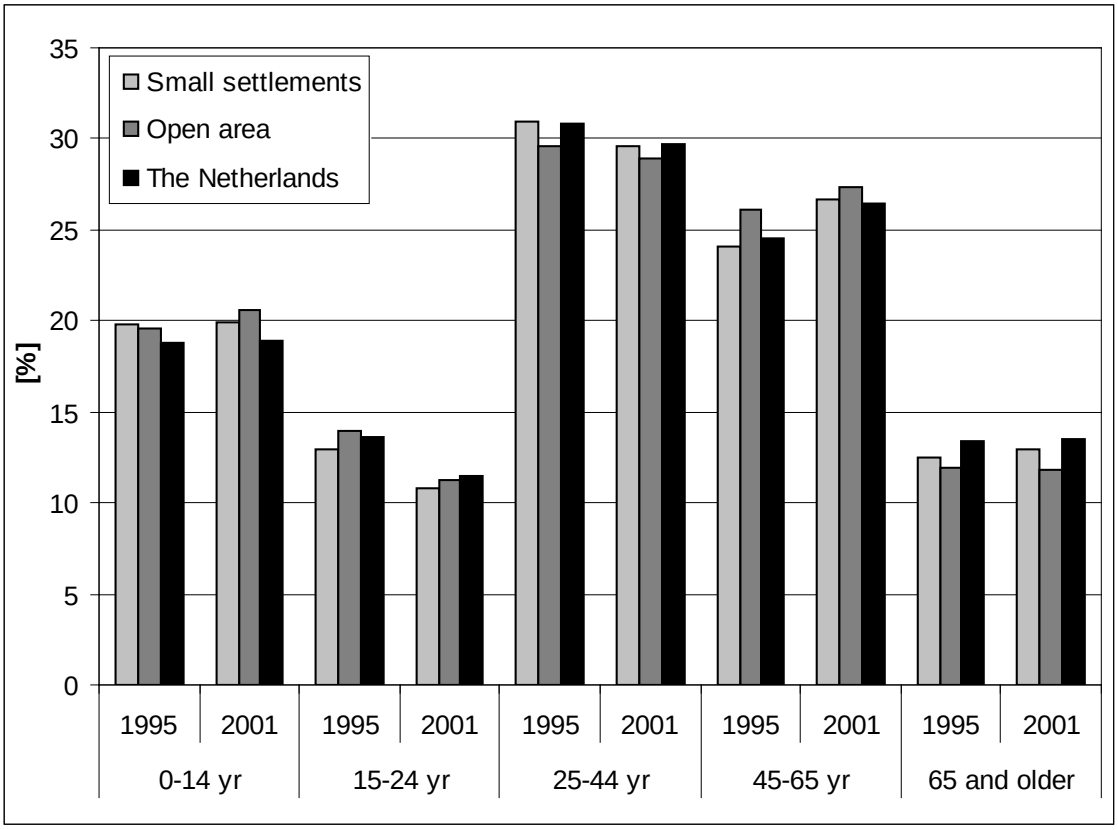

Figure 2. Structural dimension of age distribution in small settlements, the open area, and the Netherlands as a whole for the years 1995 and 2001. Source Statistics Netherlands/ Geodan (2003). The figures on the y-axis indicate percentage of total population.

Table 3. Age distribution performance in 1995-2000 by settlement size group, open area, and the Netherlands as a whole (percentage difference)

Settlement size	0-14 years	15-24 years	25-44 years	45-64 years	65 and over
11-100	0.2	-2.4	-1.1	2.8	-0.3
101-250	0.4	-2.4	-1.1	2.6	0.2
251-500	0.0	-1.9	-1.4	2.8	0.3
501-1000	0.2	-2.0	-1.5	2.7	0.5
1001-2000	0.1	-2.1	-1.6	2.4	1.2
11-2000	*0.1*	*-2.1*	*-1.4*	*2.6*	*0.5*
2001-8000	-0.1	-2.2	-1.5	2.2	1.3
open area	0.2	-2.1	-1.1	1.9	0.1
the Netherlands	1.0	-2.7	-0.6	1.3	-0.1

Source: Statistics Netherlands/ Geodan (2003).

3.2 Economic activity

The structural dimension of economic activity in small settlements differs considerably from the country as a whole. Small settlements both absolutely, as well as relatively, offer less employment than the rest of the Netherlands (Table 4). The lesser settlements (101-1000 residences) have roughly 1 job for every 2 residences, while for the medium-sized settlements (2001-8000 residences) and the whole of the Netherlands the ratio is about 1:1. The reason that the smallest settlements (11-100 residences) have relatively more jobs is mainly because they contain some relatively large industrial or business areas[2].

It is particularly remarkable that the employment performance in various-sized settlements, as well as in the Netherlands and the open area, is nearly the same. There is no reason then to suppose that the development of employment in the small settlements is less favourable than the national average. It will not do, however, to overestimate the importance of local employment. Many employees are willing to commute to their work and settlements with more than 2000 residences are a short distance away from almost any smaller settlement in the country.

In the above-mentioned analysis, employment in the agricultural sector has not been considered, as there are no reliable data available at this level of detail. National statistics show that, within the period 1996-2000, the number of jobs in the agricultural sector has decreased by about 10,000. This decrease will have mainly taken place in the open area, but is relatively low compared with the total increase in other employment of over 40,000 jobs in that same area.

Table 4. Employment by settlement size group (average per settlement), the open area, and the Netherlands as a whole (absolute figures) and their performance (percentage difference 1996-2000)

Settlement size	Number of jobs 1996	Number of jobs 2000	Change [%]
11-100	79	88	12
101-250	82	94	15
251-500	180	206	15
501-1000	334	377	13
1001-2000	853	956	12
11-2000	*279*	*315*	*13*
2001-8000	3082	3505	14
open area	271,327	313,398	16
the Netherlands	5,995,670	6,830,006	14

Source: LISA (2002).

3.3 Facilities

The availability of basic facilities is considered an important indicator of the quality of life in rural areas, and thereby their potential to sustain their population level and possibly attract new residents. The relevant services selected were: retail outlets (shops), schools, catering establishments (cafes, restaurants, hotels), basic medical services (general practitioner's practice), banks or post offices. The structural dimension of the facility level is, as was expected, directly related to the size of the settlements (see Table 5). Only when a settlement has more than 1,000 residences is it, on average, likely to have at least one basic medical service. Most of the settlements with less than 500 residences lack banking or postal facilities. The smallest settlements with less than 100 residences, on average, also have no schools. But other facilities (retail outlets and catering establishments) are available in most cases.

[2] Predominantly industrial areas containing only a few residences have been removed from small settlements selection when their jobs-to-residences ratio is 20:1 or more. Settlements where this ratio falls just below the threshold have however been included, thus influencing the results.

To compare the availability of facilities across different settlement size groups, Table 5 also contains density levels that indicate the total numbers of specific facilities per 1,000 residences. Remarkably, the numbers of specific facilities per 1,000 residences (apart from retail outlets) are larger than the national average. Apparently, most facilities occur in larger numbers than was to be expected from the available number of residences. This might indicate the presence of policies that stimulate the presence of specific facilities within a certain range of small settlements (e.g. to maintain schools or basic medical facilities) or the lack of competition (e.g. in case of catering establishments). In general, the larger small settlements (with 1001-2000 residences), have facility levels that are comparable to the national averages. In case of basic medical facilities and bank or post offices, this class group has slightly higher facility levels. Interestingly enough the density of schools and catering establishments is relatively high in the smallest settlements. Obviously, these facilities will not be available in all individual smallest settlements (that on average contain only about 50 residences), but they occur more frequently than could be expected from the number of residences in these settlements.

Table 5. Level of facilities by settlement size group (average per settlement), the open area, and the Netherlands as a whole (absolute figures) in 1996 and 2000

Settlement size	Retail outlets		Schools		Catering establishments		Basic medical services		Bank or post offices	
	1996	2000	1996	2000	1996	2000	1996	2000	1996	2000
11-100	0.5	0.6	0.2	0.2	0.5	0.6	0.0	0.0	0.0	0.0
	(11.0)	(10.3)	(4.0)	(3.7)	(11.0)	(9.9)	(0.2)	(0.2)	(0.5)	(0.3)
101-250	1.6	1.5	0.9	0.8	1.3	1.3	0.1	0.1	0.2	0.2
	(10.1)	(8.2)	(5.5)	(4.6)	(7.9)	(7.0)	(0.3)	(0.3)	(1.3)	(0.8)
251-500	4.1	3.9	1.2	1.2	2.6	2.7	0.3	0.3	0.7	0.6
	(13.4)	(10.7)	(4.0)	(3.3)	(8.4)	(7.3)	(0.9)	(0.8)	(2.2)	(1.5)
501-1000	9.9	9.5	1.7	1.7	4.7	4.9	0.8	0.8	1.2	1.1
	(15.3)	(13.5)	(2.6)	(2.4)	(7.2)	(6.9)	(1.2)	(1.1)	(1.9)	(1.6)
1001-2000	22.5	22.3	2.7	2.7	7.8	8.2	1.4	1.4	1.8	1.7
	(16.5)	(15.4)	(2.0)	(1.9)	(5.7)	(5.7)	(1.0)	(1.0)	(1.3)	(1.2)
11-2000	*7.1*	*6.9*	*1.3*	*1.3*	*3.2*	*3.4*	*0.5*	*0.5*	*0.8*	*0.7*
	(15.0)	*(13.3)*	*(2.8)*	*(2.6)*	*(6.9)*	*(6.5)*	*(1.0)*	*(0.9)*	*(1.6)*	*(1.3)*
2001-8000	70.4	70.4	8.3	8.0	20.4	21.0	3.0	3.2	4.1	3.7
	(18.7)	(17.7)	(2.2)	(2.0)	(5.4)	(5.3)	(0.8)	(0.8)	(1.1)	(0.9)
open area	2650	2876	457	456	2344	2492	57	56	53	47
	(8.7)	(9.3)	(1.5)	(1.5)	(7.7)	(8.0)	(0.2)	(0.2)	(0.2)	(0.2)
the Netherlands	105009	103494	13560	13220	36676	37782	4522	4705	5005	4488
	(16.7)	(15.7)	(2.2)	(2.0)	(5.8)	(5.7)	(0.7)	(0.7)	(0.8)	(0.7)

Source: LISA (2002).
Figures in between brackets denote facility levels as number of facilities per 1000 residences in year of observation.

Regarding the development of the countryside's vitality, it is especially interesting to see its performance in facility level. Table 6 shows the percentage difference between the absolute (total) numbers of facilities in both observation years for the different settlement size groups. It is important to note that the indicated performance is generally related to very small absolute differences in the level of facilities. Within the smallest settlements (11-100 residences) often only two or less individual facilities disappear or appear in the period 1996-2000. These specific cases have been put between brackets and are not taken into account.

On average, the development of the number of facilities in the small settlements is keeping pace with the trends applying for the Netherlands as a whole: the number of retail outlets (shops), schools and banks/post offices is decreasing considerably, while the number of catering establishments and basic medical services is only decreasing a little. The smaller settlements (101–500 residences) usually develop less favourably than the greater small settlements (1001-2000 residences). This survey suggests that the small settlements are, on

average, subject to the same general socio-economic factors (such as increase in the scale of retail businesses and schools, reduction of the bank networks) as the rest of the Netherlands and do not have their own, more negative, dynamics.

Nevertheless, the national data considered here tend to obscure the local impact that the described developments can have. A reduction in the number of schools by 5 per cent, as can be seen for the settlements with 101-250 residences, may seem negligible, but it does mean the disappearance of three schools in four year's time. It is likely that three small settlements will have been wholly deprived of schools in this period. These incidental occurrences are of great importance for the local perception of rural vitality. When such occurrences are reported in the media, they feed the image of a dwindling countryside.

Concerning the figures discussed here, it should also be mentioned that the number of residences per small settlement has increased by 10 per cent on average. So this implies that the number of facilities per household in small settlements has decreased relative to the larger settlements and the Netherlands as a whole.

Table 6. Facility level performance in 1996-2000 by settlement size group, the open area, and the Netherlands as a whole (percentage difference)

Settlement size	Retail outlets	Schools	Catering establishments	Basic medical services	Bank or post offices
11-100	5	(3)	(1)	(0)	(-25)
101-250	-8	-5	(1)	(11)	-30
251-500	-6	-2	2	3	-17
501-1000	-4	1	4	3	-10
1001-2000	-1	-2	6	1	-7
11-2000	*-3*	*-2*	*4*	*2*	*-12*
2001-8000	0	-4	6	7	-9
open area	9	(0)	6	-2	-11
the Netherlands	-1	-3	3	4	-10

Source: LISA (2002).
Note that the performance indicators that are based on a very small (<=2) absolute difference are shown in lighter print within brackets.

3.4 Regional variability

Socio-economic development in rural areas and small settlements can generally be linked to the proximity of larger urban areas; the more accessible rural tend to perform better in various socio-economic phenomena than the more remote rural areas (UK Cabinet Office, 2000; USDA 2005; 2006; Copus, 2006). To test this situation for the Dutch situation five different rural regions in different parts of the country are compared to the average developments (Figure 3).

The regions are defined at the spatial level of intermunicipal cooperation regions following the Intermunicipal Statutory Regulations Act (*WGR: Wet Gemeenschappelijke Regelingen*). Municipalities in these regions have formally agreed to cooperate on various issues that may differ per region. The regions range in size from 306 to 837 km^2 and have about 150,000 to 220,000 inhabitants. Three regions (Oost-Groningen, Oosterschelde and Kop van Noord-Holland) were selected because of their location at the periphery of the country. Their population densities lie well below the national average of 473 inhabitants per km^2. By way of comparison, two regions are included with a more central location, either in the vicinity of the second biggest city in the country (Midden-Holland) or near a series of smaller cities (Rivierenland). These regions have a higher population density. All regions have at least one central settlement with more than 8000 residences. To facilitate an easy comparison between the regions, the percentage differences of each vitality attribute in the survey period are classified with respect to the averaged national change. This straightforward approach only indicates whether the local developments are more favourable (i.e. a stronger increase in, for example residences and jobs or a decrease in the share of

elderly people) or less favourable than the average. Differences of less than one per cent are indicated with a '0'. The applied method does not state the degree of deviation from the average.

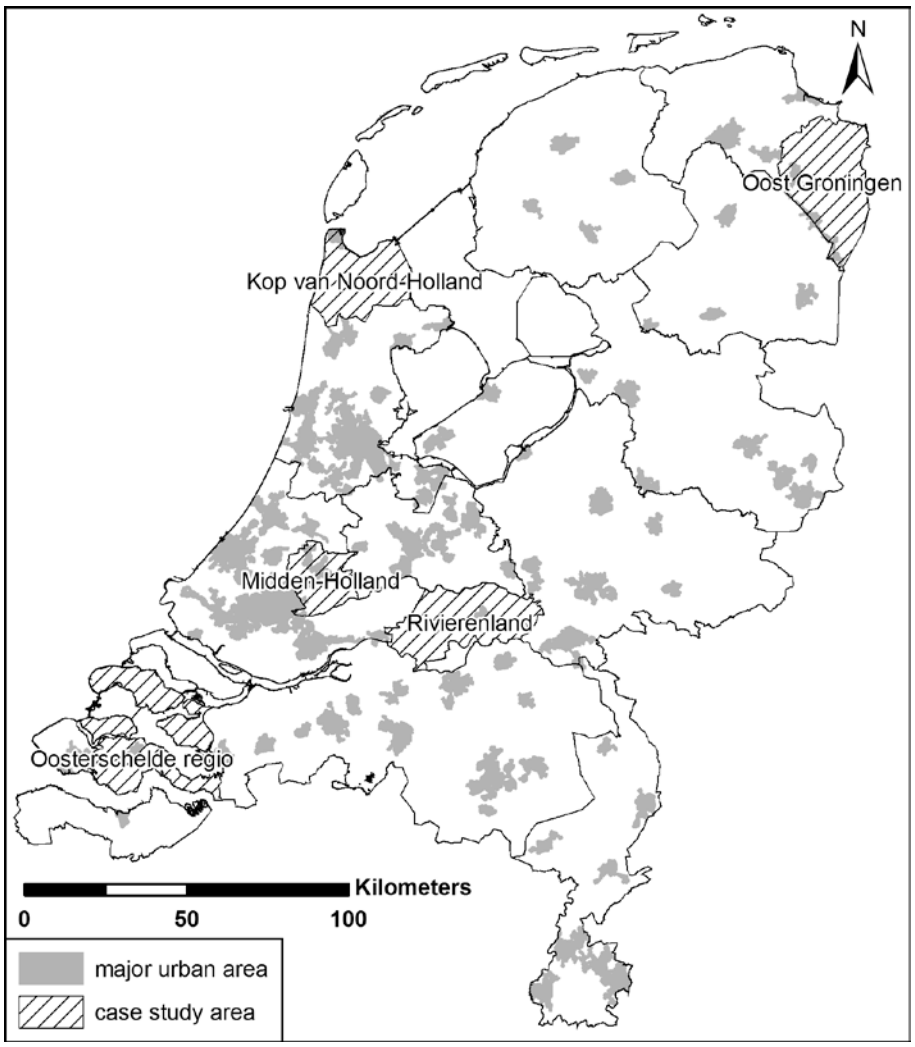

Figure 3. The five case study regions and major urban areas in the Netherlands.

The socio-economic performance described by this set of indicators differs strongly between the selected regions (Table 7). Within the regions we, furthermore, find marked differences between the small settlements and surrounding open areas. This points, foremost, at the fact that the observed developments are related to an accumulation of coincidental events. The relocation or closure of one local firm, or the development of a small new neighbourhood has a significant impact on the regional statistics that rely on relatively few settlements. On the whole, the Oosterschelde, Oost-Groningen and Rivierenland regions seem to perform better than the national average, whereas Midden-Holland and Kop van Noord-Holland show less favourable developments.

In the interviews that were conducted by Smaal et al. (2005b) as part of this rural vitality study the relevant regional stakeholders put the general image that the vitality in their regions is at stake into similar perspective. In fact, the regional and local administrators in the relatively peripheral regions of Oosterschelde, Oost-Groningen and Kop van Noord-Holland state that their rural areas are not facing vitality problems. Stakeholders in the more centrally located Rivierenland and Midden-Holland regions, on the other hand, fear a shortage of residences and a decline in service provision. Interestingly, the results of quantitative analysis

based on the set socio-economic indicators and the more qualitative interviews do not match completely. This may be due to the fact that perception of vitality varies per person and points at the general difficulty in making the rather general concept of rural vitality concrete. The selected case studies do, however, not indicate that socio-economic vitality develops less favourably in more remote areas. It should be noted here that peripheral areas in the Netherlands can be considered well accessible compared to many other, less densely populated countries.

Table 7. Performance (percentage change 1996-2000) in five rural regions compared to the national average

Region	Population density [inh./km^2]	Spatial level	N	Percentage difference (1996-2000)						
				residences	jobs	0-14 yr.	65+	shops	catering establ.	total
Midden-Holland	718	small settlements	12	-	0	0	-	-	+	--
		open area		-	-	0	-	-	+	---
Rivierenland	328	small settlements	61	+	+	0	0	-	0	+
		open area		-	+	0	0	-	+	0
Oosterschelde	186	small settlements	58	+	-	0	0	-	-	---
		open area		-	-	+	+	+	+	++
Oost-Groningen	184	small settlements	31	+	-	0	0	-	+	0
		open area		-	+	0	+	-	+	+
Kop Noord-Holland	262	small settlements	24	0	-	0	0	-	-	---
		open area		-	-	0	0	+	-	--
The Netherlands	473	average [%]		5	14	0.2	0.1	-1	3	0

Sources: CBS (2007), Geodan (2003), LISA (2002).
The differences are classified as being positive (+), negative (-) or smaller than 1% (0).

4. CONCLUSION AND DISCUSSION

The methodology presented in this analysis allows for a quantitative assessment of the socio-economic vitality of the small settlements and surrounding open areas in the Netherlands. Following this socio-economic interpretation, it is possible to actually measure this broad policy concept, quantitatively assess its actual state in relation to various reference categories, and analyse its development over time. If the themes of housing, employment, demography and level of facilities are considered important conditions for vitality, it can be concluded that their structural characteristics and performance development are no different in the rural Netherlands than in the rest of the country. Or to put it even more strongly: on the basis of the indicators submitted here it cannot be concluded that the general vitality of the countryside is deteriorating within the period considered. This is in contradiction with the National Spatial Strategy (VROM et al., 2004) that introduces this policy concept and states that the quality of life and vitality of various, more rural areas, are deteriorating, as a consequence of the continuous decrease in the number of agricultural businesses. This analysis questions which form of vitality is meant in the National Spatial Strategy and on what developments the recorded deterioration is based. Furthermore, the suggested link with the decreasing agricultural activity is weak. The remaining local employment has shown an appreciably greater increase, within the studied period, than the actual decrease in agricultural employment. In fact, the general spatially non-explicit policies hinted at in the policy agenda and execution program related to the National Spatial Strategy seem to lack a foundation in the observed rural developments. At specific locations and for certain socio-economic groups the vitality of their rural surroundings may indeed be at stake, but in order to formulate sensible spatial policies a more precise definition of the problems at hand is needed.

The use of GIS proved to be essential in this analysis. Its spatial analytical capabilities allowed the detailed reconstruction of the small settlements that are at the heart of this approach. The availability of several highly detailed socio-economic data sets for different time steps made it possible to build a time series of vitality indicators. With the power of contemporary personal computers, it becomes possible to integrate and process the large amounts of spatial and tabular data for the whole country

Obviously, some critical comments in interpreting the presented results are called for. First, the submitted figures only represent the average development for all small settlements in the Netherlands. It is important to consider the fact here that situations can greatly differ regionally and especially locally: a facility will appear in one settlement, while it will disappear in another. The national trends only represent the net balance of all local developments. They may, however, indicate which changes are structural and, as such, are relevant to National policy. A good insight into the local situation is essential, however, for actually formulating a workable policy. The analysis of regional variability based on five selected regions presented in this paper shows that local variation is indeed substantial, but no evidence was found that the more remote areas developed less favourably.

A second comment relates to the fact that, in this research, the indicators are a simplified rendering of the socio-economic phenomena behind them. For example, jobs represent employment and the number of facilities represents the availability of basic facilities. The size and quality of the facilities concerned, however, are being ignored. As regards schools, either a small primary school or an extensive institution for secondary education could be involved. Likewise, a local shop has the same importance in these analyses as a large supermarket. Simply adding up these facilities and setting the figures side by side for different years then comes close to comparing apples and oranges. Again, it implies that the observed trends only give a rough indication of the possible national developments. Thirdly, the time sequence in this research (1996-2000) is rather short. When more recent data become available, the applied set of indicators can be better utilized to trace the development of the small settlements over the course of time.

However, notwithstanding the drawbacks mentioned above, the conclusions in this analysis correspond to a recent, comparable investigation in the Netherlands (Reijden et al., 2002*)*. That study on developments in small settlements for the period 1990-2000 used a different definition of small settlements (as locations with 500 to 5000 inhabitants), but reaches similar conclusions as regards the increase in residences and businesses, the decrease in shops and schools, and the relatively low share of elderly people. These findings that development in the rural zone does not differ greatly from that of the Netherlands as a whole are also consistent with the findings of other research into the economy of the Dutch countryside (Bauwens and Douw, 1986; Terluin et al., 2005). The latter study concludes that the socio-economic differences between the urban and rural groups of administrative regions in the country are limited; their indicators, at the moment, do not give cause for great anxiety about the socio-economic development in rural regions.

The relatively favourable development of rural areas described here for the comparatively urbanized country of the Netherlands is, interestingly enough, comparable to the situation in similar rural areas in other, developed countries. The United States Department for Agriculture states that: “The U.S. economic environment is quite favourable for rural areas” (USDA, 2005). Rural population growth is, on average, below that of metropolitan areas, but shows strong regional differences: the rural counties adjacent to metropolitan ones grew considerably, whereas the more remote counties showed a population decline (USDA, 2006). The relatively highly urbanised UK also experiences population and employment growth in its more accessible rural areas (Ward, 2000; UK Cabinet Office, 2000). Even its most remote corners show little evidence of any relationship between remoteness and levels of economic activity (Copus and Crabtree, 1996). This may, in their opinion, be partly attributed to the regional policies funded by the national Government and European structural funds. The overall favourable development in these regions may, however, obscure the fact that

problematic situations may exist for specific locations and especially for certain low-income, less mobile cohorts of the community (Higgs and White, 1997; White et al., 1997). In fact, numerous inventories of rural development in Europe point at a growing dichotomy between the more accessible regions that perform rather well in terms of population growth and economic development and the more peripheral regions that lag behind (Terluin and Post, 1999; Copus at al, 2006). The rural areas in the relatively well accessible Netherlands clearly belong to the former group that performs rather well.

The conclusion that, contrary to underlying assumptions in Dutch national policy, rural vitality is not performing badly, is very much in line with the analysis of persistent presumptions about conditions in rural England presented by Hodge and Monk (2004). They term generalisations relating to, amongst others, economic decline and lack of services as 'stylised fallacies' as these are rarely justified for rural areas as a whole. A recent, extensive survey analysing several quality of life aspects in 28 European countries indicators also sheds an interesting light on the local perceptions of rurality. This study focused on the urban-rural differences (Shucksmith et al., 2006) and reveals that the perceived rurality and the degree of urbanization according to the official statistics may deviate strongly. In most countries people perceive their environment as being more rural than follows from the statistics. This points to an interesting discrepancy between the formal description of rural areas and the way these are perceived by a local people (as described in Shucksmith et al., 2006). A comparable discrepancy is found between our socio-economic analysis of rural vitality and the national policy makers perception of this issue. These significantly differing viewpoints give rise to potentially heated, but unproductive debates that can only be prevented by agreeing upon common definitions of the relevant concepts. The conceptualization of the rural vitality theme presented here can hopefully provide a starting-point for a more fruitful discussion on the future of our rural areas.

ACKNOWLEDGEMENTS

The author wishes to thank the Netherlands Ministry of Housing, Spatial Planning and the Environment and H&S consultants for providing the opportunity for this research and for their kind cooperation. The help of Rosan van Wilgenburg was indispensable for the preparation and analysis of the numerous geographical data sets. The research programme 'Environment, Surroundings and Nature' (GAMON) of the Netherlands Organisation for Scientific Research (NWO) funded the present dissemination of the research results. Further thanks go to Eva Jane Stam and Patricia Ellman for providing linguistic assistance and three anonymous reviewers for their constructive comments on an earlier version of this manuscript.

REFERENCES

Bauwens, A.L.G.M. and Douw, L. (1986) Rural development: A minor problem in the Netherlands? European Review of Agricultural Economics 13: 343-366.

Bervaes, J.C.A.M. Kuidersma, W. and Onderstal, J. (2001) Rijksbufferzones; verleden, heden en toekomst, Alterra rapport 360, Alterra, Wageningen.

CBS (2003) Bevolkingstrends. Statistisch kwartaalblad over de demografie van Nederland 51 (3): 7-8.

CBS (2007) Statline; online statistical database. Centraal Bureau voor de Statistiek, http://www.cbs.nl/en-GBl (last accessed September 10, 2007).

Cloke, P. (2006) Conceptualizing rurality. In: Cloke, P.J., Mooney, P.H. and Marsden, T. (eds.), Handbook of rural studies, Sage Publications, London, pp: 18-28.

Copus A.K. and Crabtree, J.R. (1996) Indicators of socio-economic sustainability: An application to remote rural Scotland, Journal of Rural Studies 12 (1): 41-54.

Copus, A., Hall, C., Barnes, A., Dalton, G., Cook, P., Weingarten, P., Baum, S., Stange, H., Lindner, C., Hill, A., Eiden, G., McQuaid, R., Grieg, M., Johansson, M. (2006) Study on Employment in Rural Areas (SERA), Final Deliverable. A study commissioned by the European Commission, DG for Agriculture, Brussels.

Derks, W., Hovens, P. and Klinkers, L.E.M. (2006) Structurele bevolkingsdaling: Een urgente nieuwe invalshoek voor beleidsmakers. Ministerie van Verkeer en Waterstaat, Den Haag.

Friedland, W.H. (1982) The end of rural society and the future of rural sociology, Rural Sociology 47: 598-608.

Geodan (2003) CBS Wijk en Buurtdataset Nederland 2001, Geodan IT BV, Amsterdam.

Gies, E., Groenemijer, L., Meulenkamp, W., Smidt, R. Naeff, H. and Pleijtte, M. (2005) Verstening in het landelijk gebied; een onderzoek naar de aard en omvang van verstening in het landelijk gebied ten behoeve van het monitorings- en evaluatieprogramma van Nota Ruimte, rapport in voorbereiding, Alterra, Wageningen.

Haartsen, T. and Venhorst, V. (2010) Planning for decline: anticipating on population decline in the Netherlands. Tijdschrift voor Economische en Sociale Geografie, 101 (2): 218–227.

Higgs, G. and White, S.D. (1997) Changes in service provision in rural areas. Part 1: the use of GIS in analysing accessibility to services in rural deprivation research, Journal of Rural Studies 13 (4): 441-450.

Hodge, I. and Monk, S. (2004) The economic diversity of rural England: stylised fallacies and uncertain evidence. Journal of Rural Studies 20(3): 263-272.

Koomen, E., Dekkers, J. and van Dijk, T. (2008) Open-space preservation in the Netherlands: planning, practice and prospects, Land Use Policy 25 (3): 361-377.

Léon, Y. (2005) Rural development in Europe: a research frontier for agricultural economists, European Review of Agricultural Economics 32(3): 301-317.

LISA (2002) LISA handboek; Definities, samenstelling en achtergronden LISA, versie 01-05-2005, available from www.lisa.nl, Stichting LISA, Tilburg/Den Haag.

LNV (2004) Agenda voor een Vitaal Platteland – Visie; Inspelen op veranderingen, Ministerie van Landbouw, Natuur en Voedselkwaliteit, Den Haag.

LNV, VROM, V&W and OCW (2007) Agenda voor een Vitaal Platteland; meerjarenprogramma Vitaal Platteland 2007-2013, Ministeries van Landbouw, Natuur en Voedselkwaliteit (LNV), Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM), Verkeer en Waterstaat (V&W), Onderwijs, Cultuur en Wetenschap (OCW), Den Haag.

MNP (2004) Milieu- en natuureffecten Nota Ruimte, RIVM-rapport 711931009, Milieu- en Natuurplanbureau, Bilthoven.

Mormont, M. (1990) What is rural? Or how to be rural: Towards a sociology of the rural. In: Marsden, T., Lowe, P. and Whatmore, S. (eds.), Rural restructuring and global processes, David Fulton, London.

Odijk, M., Bleek, B. van and Louwerse, P. (2004) Begrenzing Bebouwd Gebied 2000, Ministerie van VROM, Den Haag.

Ploeg, J.D. van der (2006) Agricultural production in crisis. In: Cloke, P.J., Mooney, P.H. and Marsden, T. (eds.), Handbook of rural studies, Sage Publications, London, pp: 258-277.

Reijden, H. van der, Grinsven, A. van and Butter, S. (2002) Kleine Kernen; Quickscan beleidsmotieven en ontwikkelingen, RIGO Research en Advies BV, Amsterdam.

RNP (1958) De ontwikkeling van het Westen des Lands, Rijksdienst voor het Nationale Plan, Den Haag.

Shucksmith, M., Cameron, S., Merridew, T. and Pichler, F. (2006) First European Quality of Life Survey: Urban–rural differences, Office for Official Publications of the European Communities, Luxemburg.

Smaal, P., van den Heuvel, J., Koomen, E. and Wilgenburg, R. van (2005a) Vitaal platteland, vitale kleine kernen; evaluatie in het kader van de Nota Ruimte – hoofdrapport, Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer/DG Ruimte, Den Haag.

Smaal, P., van den Heuvel, J., Koomen, E. and Wilgenburg, R. van (2005b) Vitaal platteland, vitale kleine kernen Achtergrondrapport bij de evaluatie in het kader van de Nota Ruimte, Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer/DG Ruimte, Den Haag.

Terluin, I.J. (2001) Rural regions in the EU: exploring differences in economic development, dissertation, University of Groningen.

Terluin, I.J. and Post, J.H. (1999) Employment in leading and lagging rural regions of the EU: Summary report of the RUREMPLO project, LEI-DLO, Den Haag.

Terluin, I.J., Slangen, L.H.G., Leeuwen, E.S. van, Oskam, A.J. and Gaaff, A. (2005) De plattelandseconomie in Nederland; Een verkenning van definities, indicatoren, instituties en beleid, Rapport 4.05.04, LEI, Den Haag.

UK Cabinet Office (2000) Sharing in the nation's prosperity, HMSO, London.

USDA (2005) Rural America at a glance, 2005 edition, United States Department for Agriculture/Economic Research Service, Economic Information Bulletin No. EIB-4 Washington DC. http://www.ers.usda.gov/publications/eib4/ .

USDA (2006) Rural America at a glance, 2006 edition, United States Department for Agriculture/Economic Research Service, Economic Information Bulletin No. EIB-18 Washington DC. http://www.ers.usda.gov/publications/eib18/ .

USDA (2007) Briefing room measuring rurality: what is rural, http://www.ers.usda.gov/Briefing/Rurality/ last accessed 17 march, 2007.

V&B (1960) Nota inzake de ruimtelijke ordening in Nederland, Ministerie van Volkshuisvesting en Bouwnijverheid staatsdrukkerij en uitgeverijbedrijf, Den Haag.

V&RO (1977) Derde Nota over de Ruimtelijke Ordening (verstedelijkingsnota), Ministerie van Volkshuisvesting en Ruimtelijke ordening, Staatsuitgeverij, Den Haag.

Van Rij, E. and Koomen, E. (2010) Analysing the rural vitality argument for residential development: linking discourses and actual spatial developments, Tijdschrift voor Economische en Sociale Geografie 101,5 (forthcoming).

VROM (1989) Vierde Nota over de Ruimtelijke Ordening, Ministerie van Volkshuisvesting, Ruimtelijke ordening en Milieubeheer, SDU uitgeverij, Den Haag.

VROM (2000) Balans ruimtelijke kwaliteit 2000, Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer, Den Haag.

VROM, LNV, V&W and EZ (2004) Nota Ruimte. Ruimte voor ontwikkeling, Ministeries van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, Landbouw, Natuur en

Voedselkwaliteit, Verkeer en Waterstaat en Economische zaken, SDU uitgeverij, Den Haag.

Ward, N. (2000) Actors, Institutions and Attitudes to Rural Development: The UK National Report, Research Report to the WWF and the Statutory Countryside Agencies of Great Britain, Department of Geography, University of Newcastle upon Tyne.

White, S.D., Guy, C. and Higgs, G. (1997) Changes in service provision in rural areas. Part 2: changes in post office provision in mid-Wales: a GIS-based evaluation, Journal of Rural Studies 13 (4): 451-465.

2007-1	M. Francesca Cracolici Miranda Cuffaro Peter Nijkamp	Geographical distribution of enemployment: An analysis of provincial differences in Italy, 21 p.
2007-2	Daniel Leliefeld Evgenia Motchenkova	To protec in order to serve, adverse effects of leniency programs in view of industry asymmetry, 29 p.
2007-3	M.C. Wassenaar E. Dijkgraaf R.H.J.M. Gradus	Contracting out: Dutch municipalities reject the solution for the VAT-distortion, 24 p.
2007-4	R.S. Halbersma M.C. Mikkers E. Motchenkova I. Seinen	Market structure and hospital-insurer bargaining in the Netherlands, 20 p.
2007-5	Bas P. Singer Bart A.G. Bossink Herman J.M. Vande Putte	Corporate Real estate and competitive strategy, 27 p.
2007-6	Dorien Kooij Annet de Lange Paul Jansen Josje Dikkers	Older workers' motivation to continue to work: Five meanings of age. A conceptual review, 46 p.
2007-7	Stella Flytzani Peter Nijkamp	Locus of control and cross-cultural adjustment of expatriate managers, 16 p.
2007-8	Tibert Verhagen Willemijn van Dolen	Explaining online purchase intentions: A multi-channel store image perspective, 28 p.
2007-9	Patrizia Riganti Peter Nijkamp	Congestion in popular tourist areas: A multi-attribute experimental choice analysis of willingness-to-wait in Amsterdam, 21 p.
2007-10	Tüzin Baycan-Levent Peter Nijkamp	Critical success factors in planning and management of urban green spaces in Europe, 14 p.
2007-11	Tüzin Baycan-Levent Peter Nijkamp	Migrant entrepreneurship in a diverse Europe: In search of sustainable development, 18 p.
2007-12	Tüzin Baycan-Levent Peter Nijkamp Mediha Sahin	New orientations in ethnic entrepreneurship: Motivation, goals and strategies in new generation ethnic entrepreneurs, 22 p.
2007-13	Miranda Cuffaro Maria Francesca Cracolici Peter Nijkamp	Measuring the performance of Italian regions on social and economic dimensions, 20 p.

2007-14	Tüzin Baycan-Levent Peter Nijkamp	Characteristics of migrant entrepreneurship in Europe, 14 p.
2007-15	Maria Teresa Borzacchiello Peter Nijkamp Eric Koomen	Accessibility and urban development: A grid-based comparative statistical analysis of Dutch cities, 22 p.
2007-16	Tibert Verhagen Selmar Meents	A framework for developing semantic differentials in IS research: Assessing the meaning of electronic marketplace quality (EMQ), 64 p.
2007-17	Aliye Ahu Gülümser Tüzin Baycan Levent Peter Nijkamp	Changing trends in rural self-employment in Europe, 34 p.
2007-18	Laura de Dominicis Raymond J.G.M. Florax Henri L.F. de Groot	De ruimtelijke verdeling van economische activiteit: Agglomeratie- en locatiepatronen in Nederland, 35 p.
2007-19	E. Dijkgraaf R.H.J.M. Gradus	How to get increasing competition in the Dutch refuse collection market? 15 p.

2008-1	Maria T. Borzacchiello Irene Casas Biagio Ciuffo Peter Nijkamp	Geo-ICT in Transportation Science, 25 p.
2008-2	Maura Soekijad Jeroen Walschots Marleen Huysman	Congestion at the floating road? Negotiation in networked innovation, 38 p.
2008-3	Marlous Agterberg Bart van den Hooff Marleen Huysman Maura Soekijad	Keeping the wheels turning: Multi-level dynamics in organizing networks of practice, 47 p.
2008-4	Marlous Agterberg Marleen Huysman Bart van den Hooff	Leadership in online knowledge networks: Challenges and coping strategies in a network of practice, 36 p.
2008-5	Bernd Heidergott Haralambie Leahu	Differentiability of product measures, 35 p.
2008-6	Tibert Verhagen Frans Feldberg Bart van den Hooff Selmar Meents	Explaining user adoption of virtual worlds: towards a multipurpose motivational model, 37 p.
2008-7	Masagus M. Ridhwan Peter Nijkamp Piet Rietveld Henri L.F. de Groot	Regional development and monetary policy. A review of the role of monetary unions, capital mobility and locational effects, 27 p.
2008-8	Selmar Meents Tibert Verhagen	Investigating the impact of C2C electronic marketplace quality on trust, 69 p.
2008-9	Junbo Yu Peter Nijkamp	China's prospects as an innovative country: An industrial economics perspective, 27 p
2008-10	Junbo Yu Peter Nijkamp	Ownership, r&d and productivity change: Assessing the catch-up in China's high-tech industries, 31 p
2008-11	Elbert Dijkgraaf Raymond Gradus	Environmental activism and dynamics of unit-based pricing systems, 18 p.
2008-12	Mark J. Koetse Jan Rouwendal	Transport and welfare consequences of infrastructure investment: A case study for the Betuweroute, 24 p
2008-13	Marc D. Bahlmann Marleen H. Huysman Tom Elfring Peter Groenewegen	Clusters as vehicles for entrepreneurial innovation and new idea generation – a critical assessment
2008-14	Soushi Suzuki Peter Nijkamp	A generalized goals-achievement model in data envelopment analysis: An application to efficiency improvement in local government finance in Japan, 24 p.
2008-15	Tüzin Baycan-Levent	External orientation of second generation migrant entrepreneurs. A sectoral

	Peter Nijkamp Mediha Sahin	study on Amsterdam, 33 p.
2008-16	Enno Masurel	Local shopkeepers' associations and ethnic minority entrepreneurs, 21 p.
2008-17	Frank Frößler Boriana Rukanova Stefan Klein Allen Higgins Yao-Hua Tan	Inter-organisational network formation and sense-making: Initiation and management of a living lab, 25 p.
2008-18	Peter Nijkamp Frank Zwetsloot Sander van der Wal	A meta-multicriteria analysis of innovation and growth potentials of European regions, 20 p.
2008-19	Junbo Yu Roger R. Stough Peter Nijkamp	Governing technological entrepreneurship in China and the West, 21 p.
2008-20	Maria T. Borzacchiello Peter Nijkamp Henk J. Scholten	A logistic regression model for explaining urban development on the basis of accessibility: a case study of Naples, 13 p.
2008-21	Marius Ooms	Trends in applied econometrics software development 1985-2008, an analysis of Journal of Applied Econometrics research articles, software reviews, data and code, 30 p.
2008-22	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Changing trends in rural self-employment in Europe and Turkey, 20 p.
2008-23	Patricia van Hemert Peter Nijkamp	Thematic research prioritization in the EU and the Netherlands: an assessment on the basis of content analysis, 30 p.
2008-24	Jasper Dekkers Eric Koomen	Valuation of open space. Hedonic house price analysis in the Dutch Randstad region, 19 p.

2009-1	Boriana Rukanova Rolf T. Wignand Yao-Hua Tan	From national to supranational government inter-organizational systems: An extended typology, 33 p.
2009-2	Marc D. Bahlmann Marleen H. Huysman Tom Elfring Peter Groenewegen	Global Pipelines or global buzz? A micro-level approach towards the knowledge-based view of clusters, 33 p.
2009-3	Julie E. Ferguson Marleen H. Huysman	Between ambition and approach: Towards sustainable knowledge management in development organizations, 33 p.
2009-4	Mark G. Leijsen	Why empirical cost functions get scale economies wrong, 11 p.
2009-5	Peter Nijkamp Galit Cohen-Blankshtain	The importance of ICT for cities: e-governance and cyber perceptions, 14 p.
2009-6	Eric de Noronha Vaz Mário Caetano Peter Nijkamp	Trapped between antiquity and urbanism. A multi-criteria assessment model of the greater Cairo metropolitan area, 22 p.
2009-7	Eric de Noronha Vaz Teresa de Noronha Vaz Peter Nijkamp	Spatial analysis for policy evaluation of the rural world: Portuguese agriculture in the last decade, 16 p.
2009-8	Teresa de Noronha Vaz Peter Nijkamp	Multitasking in the rural world: Technological change and sustainability, 20 p.
2009-9	Maria Teresa Borzacchiello Vincenzo Torrieri Peter Nijkamp	An operational information systems architecture for assessing sustainable transportation planning: Principles and design, 17 p.
2009-10	Vincenzo Del Giudice Pierfrancesco De Paola Francesca Torrieri Francesca Pagliari Peter Nijkamp	A decision support system for real estate investment choice, 16 p.
2009-11	Miruna Mazurencu Marinescu Peter Nijkamp	IT companies in rough seas: Predictive factors for bankruptcy risk in Romania, 13 p.
2009-12	Boriana Rukanova Helle Zinner Hendriksen Eveline van Stijn Yao-Hua Tan	Bringing is innovation in a highly-regulated environment: A collective action perspective, 33 p.
2009-13	Patricia van Hemert Peter Nijkamp Jolanda Verbraak	Evaluating social science and humanities knowledge production: an exploratory analysis of dynamics in science systems, 20 p.

2009-14	Roberto Patuelli Aura Reggiani Peter Nijkamp Norbert Schanne	Neural networks for cross-sectional employment forecasts: A comparison of model specifications for Germany, 15 p.
2009-15	André de Waal Karima Kourtit Peter Nijkamp	The relationship between the level of completeness of a strategic performance management system and perceived advantages and disadvantages, 19 p.
2009-16	Vincenzo Punzo Vincenzo Torrieri Maria Teresa Borzacchiello Biagio Ciuffo Peter Nijkamp	Modelling intermodal re-balance and integration: planning a sub-lagoon tube for Venezia, 24 p.
2009-17	Peter Nijkamp Roger Stough Mediha Sahin	Impact of social and human capital on business performance of migrant entrepreneurs – a comparative Dutch-US study, 31 p.
2009-18	Dres Creal	A survey of sequential Monte Carlo methods for economics and finance, 54 p.
2009-19	Karima Kourtit André de Waal	Strategic performance management in practice: Advantages, disadvantages and reasons for use, 15 p.
2009-20	Karima Kourtit André de Waal Peter Nijkamp	Strategic performance management and creative industry, 17 p.
2009-21	Eric de Noronha Vaz Peter Nijkamp	Historico-cultural sustainability and urban dynamics – a geo-information science approach to the Algarve area, 25 p.
2009-22	Roberta Capello Peter Nijkamp	Regional growth and development theories revisited, 19 p.
2009-23	M. Francesca Cracolici Miranda Cuffaro Peter Nijkamp	Tourism sustainability and economic efficiency – a statistical analysis of Italian provinces, 14 p.
2009-24	Caroline A. Rodenburg Peter Nijkamp Henri L.F. de Groot Erik T. Verhoef	Valuation of multifunctional land use by commercial investors: A case study on the Amsterdam Zuidas mega-project, 21 p.
2009-25	Katrin Oltmer Peter Nijkamp Raymond Florax Floor Brouwer	Sustainability and agri-environmental policy in the European Union: A meta-analytic investigation, 26 p.
2009-26	Francesca Torrieri Peter Nijkamp	Scenario analysis in spatial impact assessment: A methodological approach, 20 p.
2009-27	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Beauty is in the eyes of the beholder: A logistic regression analysis of sustainability and locality as competitive vehicles for human settlements, 14 p.

2009-28	Marco Percoco Peter Nijkamp	Individual time preferences and social discounting in environmental projects, 24 p.
2009-29	Peter Nijkamp Maria Abreu	Regional development theory, 12 p.
2009-30	Tüzin Baycan-Levent Peter Nijkamp	7 FAQs in urban planning, 22 p.
2009-31	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Turkey's rurality: A comparative analysis at the EU level, 22 p.
2009-32	Frank Bruinsma Karima Kourtit Peter Nijkamp	An agent-based decision support model for the development of e-services in the tourist sector, 21 p.
2009-33	Mediha Sahin Peter Nijkamp Marius Rietdijk	Cultural diversity and urban innovativeness: Personal and business characteristics of urban migrant entrepreneurs, 27 p.
2009-34	Peter Nijkamp Mediha Sahin	Performance indicators of urban migrant entrepreneurship in the Netherlands, 28 p.
2009-35	Manfred M. Fischer Peter Nijkamp	Entrepreneurship and regional development, 23 p.
2009-36	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage and creative cities: An economic evaluation perspective, 20 p.
2009-37	Enno Masurel Peter Nijkamp	Bridging the gap between institutions of higher education and small and medium-size enterprises, 32 p.
2009-38	Francesca Medda Peter Nijkamp Piet Rietveld	Dynamic effects of external and private transport costs on urban shape: A morphogenetic perspective, 17 p.
2009-39	Roberta Capello Peter Nijkamp	Urban economics at a cross-yard: Recent theoretical and methodological directions and future challenges, 16 p.
2009-40	Enno Masurel Peter Nijkamp	The low participation of urban migrant entrepreneurs: Reasons and perceptions of weak institutional embeddedness, 23 p.
2009-41	Patricia van Hemert Peter Nijkamp	Knowledge investments, business R&D and innovativeness of countries. A qualitative meta-analytic comparison, 25 p.
2009-42	Teresa de Noronha Vaz Peter Nijkamp	Knowledge and innovation: The strings between global and local dimensions of sustainable growth, 16 p.
2009-43	Chiara M. Travisi Peter Nijkamp	Managing environmental risk in agriculture: A systematic perspective on the potential of quantitative policy-oriented risk valuation, 19 p.
2009-44	Sander de Leeuw	Logistics aspects of emergency preparedness in flood disaster prevention, 24 p.

	Iris F.A. Vis Sebastiaan B. Jonkman	
2009-45	Eveline S. van Leeuwen Peter Nijkamp	Social accounting matrices. The development and application of SAMs at the local level, 26 p.
2009-46	Tibert Verhagen Willemijn van Dolen	The influence of online store characteristics on consumer impulsive decision-making: A model and empirical application, 33 p.
2009-47	Eveline van Leeuwen Peter Nijkamp	A micro-simulation model for e-services in cultural heritage tourism, 23 p.
2009-48	Andrea Caragliu Chiara Del Bo Peter Nijkamp	Smart cities in Europe, 15 p.
2009-49	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage: Hedonic prices for non-market values, 11 p.
2009-50	Eric de Noronha Vaz João Pedro Bernardes Peter Nijkamp	Past landscapes for the reconstruction of Roman land use: Eco-history tourism in the Algarve, 23 p.
2009-51	Eveline van Leeuwen Peter Nijkamp Teresa de Noronha Vaz	The Multi-functional use of urban green space, 12 p.
2009-52	Peter Bakker Carl Koopmans Peter Nijkamp	Appraisal of integrated transport policies, 20 p.
2009-53	Luca De Angelis Leonard J. Paas	The dynamics analysis and prediction of stock markets through the latent Markov model, 29 p.
2009-54	Jan Anne Annema Carl Koopmans	Een lastige praktijk: Ervaringen met waarderen van omgevingskwaliteit in de kosten-batenanalyse, 17 p.
2009-55	Bas Straathof Gert-Jan Linders	Europe's internal market at fifty: Over the hill? 39 p.
2009-56	Joaquim A.S. Gromicho Jelke J. van Hoorn Francisco Saldanha-da-Gama Gerrit T. Timmer	Exponentially better than brute force: solving the job-shop scheduling problem optimally by dynamic programming, 14 p.
2009-57	Carmen Lee Roman Kraeussl Leo Paas	The effect of anticipated and experienced regret and pride on investors' future selling decisions, 31 p.
2009-58	René Sitters	Efficient algorithms for average completion time scheduling, 17 p.

2009-59	Masood Gheasi Peter Nijkamp Piet Rietveld	Migration and tourist flows, 20 p.

2010-1	Roberto Patuelli Norbert Schanne Daniel A. Griffith Peter Nijkamp	Persistent disparities in regional unemployment: Application of a spatial filtering approach to local labour markets in Germany, 28 p.
2010-2	Thomas de Graaff Ghebre Debrezion Piet Rietveld	Schaalsprong Almere. Het effect van bereikbaarheidsverbeteringen op de huizenprijzen in Almere, 22 p.
2010-3	John Steenbruggen Maria Teresa Borzacchiello Peter Nijkamp Henk Scholten	Real-time data from mobile phone networks for urban incidence and traffic management – a review of application and opportunities, 23 p.
2010-4	Marc D. Bahlmann Tom Elfring Peter Groenewegen Marleen H. Huysman	Does distance matter? An ego-network approach towards the knowledge-based theory of clusters, 31 p.
2010-5	Jelke J. van Hoorn	A note on the worst case complexity for the capacitated vehicle routing problem, 3 p.
2010-6	Mark G. Lijesen	Empirical applications of spatial competition; an interpretative literature review, 16 p.
2010-7	Carmen Lee Roman Kraeussl Leo Paas	Personality and investment: Personality differences affect investors' adaptation to losses, 28 p.
2010-8	Nahom Ghebrihiwet Evgenia Motchenkova	Leniency programs in the presence of judicial errors, 21 p.
2010-9	Meindert J. Flikkema Ard-Pieter de Man Matthijs Wolters	New trademark registration as an indicator of innovation: results of an explorative study of Benelux trademark data, 53 p.
2010-10	Jani Merikivi Tibert Verhagen Frans Feldberg	Having belief(s) in social virtual worlds: A decomposed approach, 37 p.
2010-11	Umut Kilinç	Price-cost markups and productivity dynamics of entrant plants, 34 p.
2010-12	Umut Kilinç	Measuring competition in a frictional economy, 39 p.

2011-1	Yoshifumi Takahashi Peter Nijkamp	Multifunctional agricultural land use in sustainable world, 25 p.
2011-2	Paulo A.L.D. Nunes Peter Nijkamp	Biodiversity: Economic perspectives, 37 p.
2011-3	Eric de Noronha Vaz Doan Nainggolan Peter Nijkamp Marco Painho	A complex spatial systems analysis of tourism and urban sprawl in the Algarve, 23 p.
2011-4	Karima Kourtit Peter Nijkamp	Strangers on the move. Ethnic entrepreneurs as urban change actors, 34 p.
2011-5	Manie Geyer Helen C. Coetzee Danie Du Plessis Ronnie Donaldson Peter Nijkamp	Recent business transformation in intermediate-sized cities in South Africa, 30 p.
2011-6	Aki Kangasharju Christophe Tavéra Peter Nijkamp	Regional growth and unemployment. The validity of Okun's law for the Finnish regions, 17 p.
2011-7	Amitrajeet A. Batabyal Peter Nijkamp	A Schumpeterian model of entrepreneurship, innovation, and regional economic growth, 30 p.
2011-8	Aliye Ahu Akgün Tüzin Baycan Levent Peter Nijkamp	The engine of sustainable rural development: Embeddedness of entrepreneurs in rural Turkey, 17 p.
2011-9	Aliye Ahu Akgün Eveline van Leeuwen Peter Nijkamp	A systemic perspective on multi-stakeholder sustainable development strategies, 26 p.
2011-10	Tibert Verhagen Jaap van Nes Frans Feldberg Willemijn van Dolen	Virtual customer service agents: Using social presence and personalization to shape online service encounters, 48 p.
2011-11	Henk J. Scholten Maarten van der Vlist	De inrichting van crisisbeheersing, de relatie tussen besluitvorming en informatievoorziening. Casus: Warroom project Netcentrisch werken bij Rijkswaterstaat, 23 p.
2011-12	Tüzin Baycan Peter Nijkamp	A socio-economic impact analysis of cultural diversity, 22 p.
2011-13	Aliye Ahu Akgün Tüzin Baycan Peter Nijkamp	Repositioning rural areas as promising future hot spots, 22 p.
2011-14	Selmar Meents Tibert Verhagen Paul Vlaar	How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal, 29 p.

2011-15	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Measuring regional creative capacity: A literature review for rural-specific approaches, 22 p.
2011-16	Frank Bruinsma Karima Kourtit Peter Nijkamp	Tourism, culture and e-services: Evaluation of e-services packages, 30 p.
2011-17	Peter Nijkamp Frank Bruinsma Karima Kourtit Eveline van Leeuwen	Supply of and demand for e-services in the cultural sector: Combining top-down and bottom-up perspectives, 16 p.
2011-18	Eveline van Leeuwen Peter Nijkamp Piet Rietveld	Climate change: From global concern to regional challenge, 17 p.
2011-19	Eveline van Leeuwen Peter Nijkamp	Operational advances in tourism research, 25 p.
2011-20	Aliye Ahu Akgün Tüzin Baycan Peter Nijkamp	Creative capacity for sustainable development: A comparative analysis of European and Turkish rural regions, 18 p.
2011-21	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Business dynamics as the source of counterurbanisation: An empirical analysis of Turkey, 18 p.
2011-22	Jessie Bakens Peter Nijkamp	Lessons from migration impact analysis, 19 p.
2011-23	Peter Nijkamp Galit Cohen-blankshtain	Opportunities and pitfalls of local e-democracy, 17 p.
2011-24	Maura Soekijad Irene Skovgaard Smith	The ‘lean people’ in hospital change: Identity work as social differentiation, 30 p.
2011-25	Evgenia Motchenkova Olgerd Rus	Research joint ventures and price collusion: Joint analysis of the impact of R&D subsidies and antitrust fines, 30 p.
2011-26	Karima Kourtit Peter Nijkamp	Strategic choice analysis by expert panels for migration impact assessment, 41 p.
2011-27	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	The market value of listed heritage: An urban economic application of spatial hedonic pricing, 24 p.
2011-28	Peter Nijkamp	Socio-economic impacts of heterogeneity among foreign migrants: Research and policy challenges, 17 p.
2011-29	Masood Gheasi Peter Nijkamp	Migration, tourism and international trade: Evidence from the UK, 8 p.
2011-30	Karima Kourtit	Evaluation of cyber-tools in cultural tourism, 24 p.

	Peter Nijkamp Eveline van Leeuwen Frank Bruinsma	
2011-31	Cathy Macharis Peter Nijkamp	Possible bias in multi-actor multi-criteria transportation evaluation: Issues and solutions, 16 p.
2011-32	John Steenbruggen Maria Teresa Borzacchiello Peter Nijkamp Henk Scholten	The use of GSM data for transport safety management: An exploratory review, 29 p.
2011-33	John Steenbruggen Peter Nijkamp Jan M. Smits Michel Grothe	Traffic incident management: A common operational picture to support situational awareness of sustainable mobility, 36 p.
2011-34	Tüzin Baycan Peter Nijkamp	Students' interest in an entrepreneurial career in a multicultural society, 25 p.
2011-35	Adele Finco Deborah Bentivoglio Peter Nijkamp	Integrated evaluation of biofuel production options in agriculture: An exploration of sustainable policy scenarios, 16 p.
2011-36	Eric de Noronha Vaz Pedro Cabral Mário Caetano Peter Nijkamp Marco Paínho	Urban heritage endangerment at the interface of future cities and past heritage: A spatial vulnerability assessment, 25 p.
2011-37	Maria Giaoutzi Anastasia Stratigea Eveline van Leeuwen Peter Nijkamp	Scenario analysis in foresight: AG2020, 23 p.
2011-38	Peter Nijkamp Patricia van Hemert	Knowledge infrastructure and regional growth, 12 p.
2011-39	Patricia van Hemert Enno Masurel Peter Nijkamp	The role of knowledge sources of SME's for innovation perception and regional innovation policy, 27 p.
2011-40	Eric de Noronha Vaz Marco Painho Peter Nijkamp	Impacts of environmental law and regulations on agricultural land-use change and urban pressure: The Algarve case, 18 p.
2011-41	Karima Kourtit Peter Nijkamp Steef Lowik Frans van Vught Paul Vulto	From islands of innovation to creative hotspots, 26 p.
2011-42	Alina Todiras Peter Nijkamp Saidas Rafijevas	Innovative marketing strategies for national industrial flagships: Brand repositioning for accessing upscale markets, 27 p.

2011-43	Eric de Noronha Vaz Mário Caetano Peter Nijkamp	A multi-level spatial urban pressure analysis of the Giza Pyramid Plateau in Egypt, 18 p.
2011-44	Andrea Caragliu Chiara Del Bo Peter Nijkamp	A map of human capital in European cities, 36 p.
2011-45	Patrizia Lombardi Silvia Giordano Andrea Caragliu Chiara Del Bo Mark Deakin Peter Nijkamp Karima Kourtit	An advanced triple-helix network model for smart cities performance, 22 p.
2011-46	Jessie Bakens Peter Nijkamp	Migrant heterogeneity and urban development: A conceptual analysis, 17 p.
2011-47	Irene Casas Maria Teresa Borzacchiello Biagio Ciuffo Peter Nijkamp	Short and long term effects of sustainable mobility policy: An exploratory case study, 20 p.
2011-48	Christian Bogmans	Can globalization outweigh free-riding? 27 p.
2011-49	Karim Abbas Bernd Heidergott Djamil Aïssani	A Taylor series expansion approach to the functional approximation of finite queues, 26 p.
2011-50	Eric Koomen	Indicators of rural vitality. A GIS-based analysis of socio-economic development of the rural Netherlands, 17 p.