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Quantifying Land Fragmentation: an Entropy-Based Approach

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Abstract

Landscapes fragmented by transportation infrastructure and built-up areas are characterized by small, isolated fragments of natural habitat, and such idea of disorder in the land patches is here linked to the concept of entropy. This work aims to quantify land fragmentation through the estimation of spatial mutual information and spatial residual entropy, which allow to decompose entropy into a term accounting for the role of space and a second term quantifying the residual heterogeneity. Results are easily interpretable and can be used both as absolute measures of land fragmentation as well as for a comparison over space and time. This method has proven useful in synthesizing land fragmentation with a single, interpretable number but it does not allow to make inference on the phenomenon. For this reason, in the second part of this works a two-levels geostatistical binary probit model is employed to obtain a Bayesian estimate of the probability components of entropy and a consequent Bayesian estimator of entropy. Results show that the entropy of the underlying spatial process can be estimated in a proper way by the aforementioned model and the resulted entropy surfaces have proved to be useful to satisfactorily visualize the phenomenon of land fragmentation.

Keywords Spatial Entropy · Land Fragmentation · Spatial Mutual Information · Spatial Residual Entropy · Geostatistical Binary Probit Model

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1 Introduction

Landscapes are the setting for all human activities, contributing in a precious way to the cultural identity of a country and providing a home to humans and other life forms. Landscapes change constantly due to natural causes, but in recent decades humans have often hasten the process by shaping them with little thought to the cumulative impacts and at a pace that is unprecedented (EEA, 2011).

One of the most important issues is fragmentation of landscapes, a process defined as the breaking up of a habitat into smaller, disconnected sections (Mitchell et al., 2015) which is known to have multiple ecological effects in terrestrial ecosystems such as direct habitat and wildlife loss, traffic mortality, barrier for migration and dispersal, spreading of invasive species and cutting populations into sub-populations (Fahrig, 2003; Camerini, 2018). This phenomenon is most evident in regions characterized by processes of urbanization and rural development, where land fragmentation is caused by the linkage of built-up areas via linear infrastructures (Goosem, 1997).

In spite of the planning concept of preserving large unfragmented areas put into effect by UNCCD (United Nations Convention to Combat Desertification) with the writing of the Land Degradation Neutrality (LDN) Target Setting Programme - engaged to date by over 120 countries - fragmentation steadily increased in the last decades (UNCCD, 2018). It is clear that this current negative trend of growing landscape fragmentation contradicts the principle of sustainability, leading to an urgent need for action. Land fragmentation must therefore be carefully monitored through the full commitment of all relevant public authorities, in particular those governance entities which are normally responsible for the management of land. In Italy, the Italian National Institute of Statistics (Italian: Istituto Nazionale di Statistica, ISTAT) is the custodian agency for fragmentation analysis, and the share of natural and agricultural territory with high/very high fragmentation is included as national context measure for UN-IAEG-SDG[1] Indicator 15.3.1 regarding the proportion of land that is degraded over total land area.

This work, that has been possible thanks to an internship opportunity offered by ISTAT, contributes to explore the topic of fragmentation analysis. We assess the possibility of quantify land fragmentation via estimation of spatial entropy, both trough the direct application of spatial entropy measures to synthesize the observed land consumption data in a single, interpretable number, as well as through Bayesian estimation of the probability components of spatial entropy in order to make inference on the phenomenon of land fragmentation. In particular, we quantitatively investigated the degree of land fragmentation in the 563 municipalities of the Italian Veneto region for the years 2012, 2015, 2018 and 2019 using spatial mutual information and spatial residual entropy (Altieri et al., 2017), and propose a two-levels geostatistical binary probit model to obtain a Bayesian estimate of the probability components, and hence making inference on the phenomenon of land fragmentation.

The dissertation is therefore organized as follows. First, in Chapter 2, we present the background on land fragmentation, its relation with Sustainable Development Goals and information on how land fragmentation is assessed by UNCCD and ISTAT. A review of popular entropy measures and their properties is presented in Chapter 3, followed by details on the application of spatial mutual information and spatial residual entropy (Altieri et al., 2017) to data regarding land consumption in the Venetian municipalities in order to estimate their degree of land fragmentation. Information about trends in land consumption at regional-, provincial- and muncipal-level are also included. Chapter 4 aims to estimate the entropy of land fragmentation, i.e. to make inference on the phenomenon through a two-levels geostatistical binary probit model. A Bayesian estimator of entropy is therefore obtained and the entropy surfaces of two small areas of Veneto region, characterized by different spatial configurations, are computed in order to assess the performance of the proposed model. Finally, we present and discuss the results, draw the relevant conclusions and make recommendations for further research.

[1] Inter-agency and Expert Group on Sustainable Development Goal Indicators created by the United Nations Statistical Commission

2 | Land Fragmentation and Sustainable Development Goals

2.1 Key definitions

Before attempting to understand the nature of the phenomenon of land fragmentation and its relation with the Sustainable Development Goals (SDGs), it is important to begin by providing some clarity in the definitions used because they are all terms used differently by stakeholders and researchers working within different disciplines.

Land fragmentation is a process by which large and contiguous areas of natural land cover get divided into smaller, isolated patches, independent of a change in the total area of natural land cover (Mitchell et al., 2015). Causes of land fragmentation include geological processes that slowly alter the layout of the physical environment (Sahney et al., 2010) and human activity such as land consumption, when natural environment is cleared for human activities (e.g. agriculture, rural development and urbanization).

Land consumption - also referred to as land take - is a measure of how much land covered by agriculture, forests and semi-natural land, wetlands and water is converted to land cover for urban, commercial, industrial, infrastructure, mining or construction purposes (EEA, 2017). This increment of artificial covered land is mainly related to settlement dynamics, since the expansion of cities and the conversion of land within an urban area imply the construction of new buildings and linear infrastructures. Consequently, the concept of land consumption must be defined as a variation of land cover, from a non-artificial covering (unconsumed land) to an artificial covering (consumed land) (Munafò, 2019). This definition extends also to rural and natural areas but excludes, instead, natural and semi-natural urban areas which do not represent forms of land consumption, regardless of their intended use. Nevertheless, new artificial coverings of these areas should be avoided given that also urban densification, meant as the conversion of land within an urban area, is considered a form of land consumption (European Commission, 2012).

In many existing classifications, land cover is often confused with land use. Despite of their very specific meaning, these terms are often erroneously used interchangeably and therefore, it becomes necessary to give a proper definition of the two phenomena. *Land cover* is defined as the ensemble of physical and biological characteristics of the land discernible by Earth observation. This description enables various land categories to be distinguished - basically, artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands and water bodies (EEA, 2017). Land cover does not describe the use of land, and the use of land may be different for lands with the same cover type. For instance, an area identified as forest may be used for timber production, wildlife management or recreation.

While land cover indicates the physical land type, *land use* is rather related to how men are using the land. It establishes a direct link between land cover and the actions of people in their environment and it is defined as "territory characterized according to its current and future planned functional dimension or socio-economic purpose - e.g. residential, industrial, commercial, agricultural, forestry, recreational" (Directive 2007/2/EC). As specified by this definition, land use can be itself classified into two different types: the current land use, which objectively depicts the use and functions of a territory as it has been and effectively still is in real life; and the future planned land use, which corresponds to spatial plans depicting the possible utilization of the land in the future. A change in land use may not have any effect on the state of land, which could preserve its capabilities to provide ecosystem services and therefore, it may not represent a real consumption of land.

Land taken by urban areas and infrastructure is generally irreversible but, according to the Italian National Institute for Environmental Protection and Research (Italian: Istituto Superiore per la Protezione e la Ricerca Ambientale, ISPRA), it is possible to identify two different types of land consumption related to soil sealing. *Permanent land consumption* is associated to the construction of buildings, asphalted roads, railways, airports, ports, paved permanent greenhouses, landfills or other waterproof areas such as squares, parking lots, courtyards and sports fields. *Reversible land consumption* is instead represented by those types of transformations that do not provide for a total waterproofing and/or consumption of the soil resource: dirt roads, construction sites and other areas in beaten earth, denaturalized extraction areas, quarries in the pitch, photovoltaic fields on the ground or other artificial coverings which removal restores the initial soil conditions. Sealing by its nature has a major effect on the soil resource as it determines the total loss of its functionality and inhibits its irreplaceable role in the nutrient cycle. This is a cause of serious concern, because soil is a vulnerable, limited and non-renewable resource which formation is a very slow process, taking centuries to build up even a centimetre. Soil sealing affects fertile agricultural land causing losses of food and fibre production, puts biodiversity at risk, increases the risk of flooding and water scarcity, alters albedo, evaporation and local air temperatures, contributes to global warming and is guided to a large extent by land planning decisions (European Commission, 2012). Planning for multiple land uses is nearly always a trade-off between social, economic and environmental needs, between biodiversity and commercial factors. Spatial planning can play an important role in achieving a more sustainable use of land by taking account of the quality and characteristics of different land areas and soil functions against competing objectives and interests.

2.2 Land fragmentation: what is the issue?

Land fragmentation is the process of breaking up a habitat or vegetation type into smaller, disconnected sections in which movement between different parts of the landscape is interrupted by the presence of artificial, often impervious surfaces and traffic infrastructure, including medium sized roads (EEA, 2019). Due to the increased isolation of populations and the isolation of ecosystem patches that breaks the structural connections and decreases resilience and ability of habitats to provide various ecosystem services, fragmentation of landscapes is a major cause of biodiversity loss (Fahrig, 2003). Habitat fragmentation reduces the amount of suitable habitat available for organisms and this is considered to be the greatest threat to species (Camerini, 2018). Moreover, fragmentation has also been shown to affect species' behaviours and the dynamics between differing species as well: it impacts on reproduction, mating systems, inbreeding avoidance, foraging, species dispersal, communication and movement patterns but also on interspecific interactions such as predator-prey and host-parasite relationships (Banks et al., 2007). In addition, when animals happen to venture into unknown areas in between fragmented forests or landscapes, human-caused disturbance may occur putting them at a great risk and further decreasing their chances of survival (Kupfer et al. 2006).

A leading cause of fragmentation must be sought in transportation infrastructure.

These intrusions cause breakage in landscape connectivity due to infrastructure creation and maintenance, which is known to have multiple ecological effects in ecosystems such as spread of invasive alien species, desiccation, windthrow, fires, roadkill, microclimate and vegetation changes (Goosem, 1997; Camerini, 2018). Moreover, these linear opening through the landscape detrimentally affects also human communities, agriculture and overall quality of life increasing pollution, reducing in size and quality the recreation areas and increasing ecosystem pressures from development, tourism, hunting and garbage disposal (Jaeger et al, 2006; ISPRA, 2011; Raman, 2011). One solution to the problem of habitat fragmentation is to help increase connectivity linking the fragments by preserving or planting corridors of native vegetation, buffers and steppingstones to help wildlife move around. This has the potential to mitigate the problem of isolation but not the loss of interior habitat although, in some cases, a bridge or underpass may be enough to join two fragments (Van Der Ree et al., 2009). Also the enlargement of small remnants to increase the amount of interior habitat could be considered as another mitigation measure. However, developed land is often more expensive and requires significant time and effort to restore making this technique an impractical solution (Lindenmayer & Fischer, 2006, p. 206). Generally, it does not exist a unique remedy to land fragmentation since it is not an issue that stands alone. The best choices must be made according to the particular species or ecosystem that is being considered: the same open land that could expose to predation some smaller animals, like rodents, may be the perfect habitat for mobile species, like most birds.

Monitoring how fragmentation affects landscape quality provides information for policy measures that aim at improving ecosystem condition and restoration as well as maintaining the attractiveness of landscapes for recreational activities. Although reconnecting habitats is not always straightforward and it could result in further problems (e.g. increasing the number of alien species), environmental issues can be avoided with some careful planning and re-establishing a more connected landscape should be seen as a conservation priority.

2.3 SDG 15.3: measuring Land Degradation (Neutrality)

In 2015 United Nations Convention to Combat Desertification (UNCCD) and the UN Environment Programme (UN Environment) acted together to achieve the United Nations General Assembly adoption of the "2030 Agenda for Sustainable

Development". At its heart are the 17 Sustainable Development Goals (SDG), defined in a list of 169 SDG Targets, which are a universal call to action to address the global challenges faced by developing countries as well as developed ones. It has to be stressed that these 17 SDGs are integrated, meaning that action in one area will affect outcomes in others. For this reason, countries development must balance social and economic sustainability while at the same time tackling climate change and working to prevent environmental degradation.

In order to target the efforts to protect land-based ecosystems, UNCCD and UN Environment had specifically formulated SDG 15 (Life on land), which is concerned with sustainable management of our terrestrial ecosystems in a more densely populated world where natural resources are increasingly subject to taxation.

"Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss."
(UN General Assembly, 2015, p.14)

Targeted efforts are necessarily required to preserve diverse forms of life on land. Protected and restored ecosystems support biodiversity, help mitigate climate change and provide increased resilience in defiance of increased human pressures and mounting disasters. Healthy ecosystems also produce multiple benefits for all communities such as clean air, water, food and raw materials, to name a few. Goal 15 has objectives to be achieved by 2030 through 12 targets and Target 15.3 focuses specifically on land degradation:

"Target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world."
(UN General Assembly, 2015, p.24)

Land degradation is defined by UNCCD as the "reduction or loss, in arid, semi-arid and dry sub-humid areas, of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: soil erosion caused by wind and/or water; deterioration of the physical, chemical and biological or economic properties of soil; and long-term loss of natural vegetation" (UNCCD, 1994: Article 1).

Although this phenomenon is caused by multiple forces, including extreme weather conditions and other natural phenomena as erosion and desertification, land degradation due to human activities represents the most aggressive and least reversible form. Urbanization is an ongoing trend both in Italy and at European level, leading to soil sealing (permanent covering of agricultural land and other open landscapes with impermeable artificial material) which negative impacts on natural ecosystems and human health affecting food production, livelihoods, and the provision of goods and services. It must be also pointed out that land degradation has not only trans-boundary effects on people and ecosystems throughout the planet, it also comes with high costs. UNCCD in the 2018 review of 21 countries that completed Land Degradation Neutral (LDN) Country Profiles, as part of UNCCD efforts to achieve a land degradation neutral world, estimates that poor land use translates in an economic loss equivalent to 9% of countries' GDP. UNCCD also warns that "The global economy will lose a whopping US$ 23 trillion by 2050 through land degradation," whereas the cost of taking immediate action is estimated to be around US$ 4.6 trillion which is "only a fraction of the predicted losses."

2.3.1 UNCCD methodology

SDG 15 aims to preserve terrestrial ecosystems along with their biodiversity and target 15.3 focuses specifically on combating desertification and restore degraded land. Pressures from food producer and demands from industries are stressing arable lands and pastures, land degradation decreases crop cultivation, water and other resources grow scarce and food insecurity can be a consequence.

The UNCCD is the custodian agency of Indicator 15.3.1, leading an Inter-agency Advisory Group (IAAG) composed of the Food and Agriculture Organization (FAO), the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Programme (UNEP) and the United Nations Statistics Division (UNSD) to monitor progress towards achieving SDG Target 15.3, further refine the methodology and define data tools useful for this purpose.

Indicator 15.3.1 is defined as the amount, expressed as proportion, of land that is degraded over total land area and it is derived from a binary classification of land condition (i.e., degraded or not degraded) based on three sub-indicators and associated metrics including land cover and land cover change, Land Productivity Dynamics

(LPD), and change in Soil Organic Carbon stocks (SOC change).

Land cover refers to the observed physical cover of the Earth's surface which describes the distribution of vegetation types, water bodies and artificial infrastructures (Di Gregorio, 2005) and reflects the purpose for which land resources are used in a particular land type (FAO-GTOS, 2009). This sub-indicator serves two functions for SDG indicator 15.3.1 since changes in land cover may point to land degradation when there is a loss of ecosystem services that are considered desirable in a local or national context and, at the same time, a land cover classification system can be used to disaggregate the other two sub-indicators, thus increasing the indicator's policy relevance. An international standard is defined by the International Organization for Standardization (ISO) for this sub-indicator which includes the Land Cover Meta Language (LCML), a common statistical standard reference structure that allows different land cover classification systems to be described based on the physiognomic aspects, so that they can be compared and data classified according to different land cover classification systems can be combined. (ISO, 2012).

Land productivity refers to the total above-ground net primary production (NPP) defined as the rate of accumulation of biomass or energy, or rather, the difference between the rate at which solar energy is captured during photosynthesis and the energy loss by plats due to respiration (Millennium Ecosystem Assessment, 2005). This sub-indicator aims to detect changes in the health and productive capacity of the land, where declining trends are often a defining characteristic of land degradation (Joint Research Centre of the European Commission, 2017). The LPD methodology and data set, developed by the Joint Research Centre of the European Commission and used in the UNCCD pilot programme, employs the ISO standard to calculate NPP ($gC/m^2/day$) time series trends and change analyses (Ivits and Cherlet., 2013). This international standard was established in 1999 by the U.S. National Aeronautics and Space Administration (NASA) in anticipation of the launch of the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor and enables the estimation of NPP from remotely-sensed, multi-temporal surface reflectance data, accounting for the global range of climate and vegetation types (Running et al., 1999).

Carbon stock refers to the quantity of solid terrestrial matter, including both soil organic matter and inorganic carbon as carbonate minerals, stored in soils (Jobbágy and Jackson, 2000). In UNCCD decision 22/COP.11, change in Soil Organic Carbon (SOC) stocks was adopted as the metric to be used since SOC stocks reflect the balance between organic matter gains, dependent on plant productivity and management practices, and losses due to decomposition through the action of soil organisms and physical export through leaching and erosion (Smith et al., 2008).

Land condition changes based on these three sub-indicators are binary evaluated (i.e., degraded or not degraded land) in order to quantify SDG 15.3.1 and, consequently, to determine the extent of land that is degraded over total land area. Changes in the sub-indicators are defined as (i) positive or improving, (ii) negative or declining, or (iii) stable or unchanging. As a result, The One Out, All Out (1OAO) principle is then applied: a location is considered degraded if at least one of the three indicators is negative - or stable when degraded in the baseline or previous monitoring year (Cowie et al., 2018). The entire method of computation for SDG indicator 15.3.1 is illustrated in Figure 2.1.

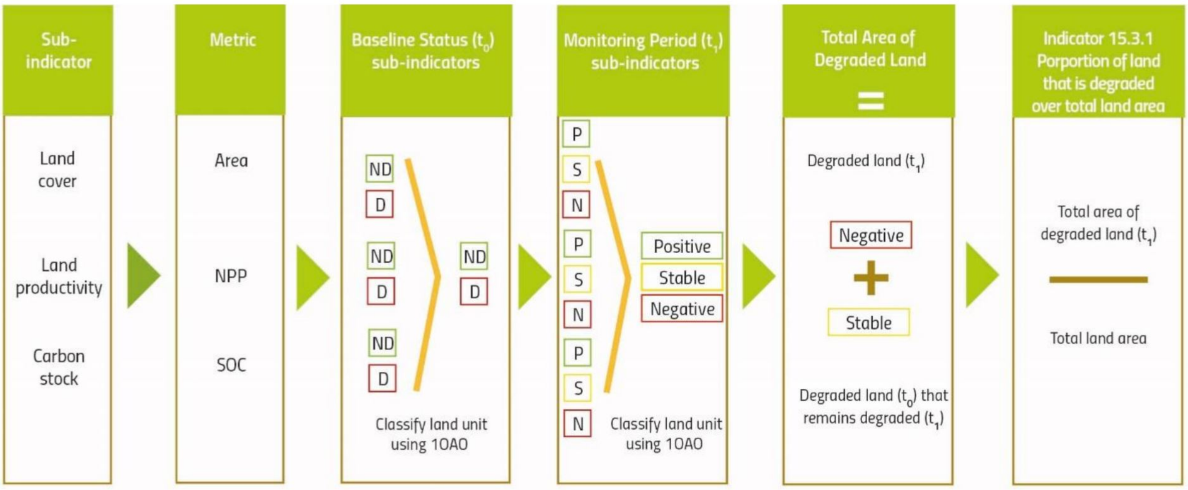


Figure 2.1: Steps to derive indicator 15.3.1 from the sub-indicators, where ND is not degraded and D is degraded

(Source: UNSD - SDG Indicators Metadata Repository. Indicator 15.3.1, p.7)

The total area of land that is degraded over total land area is given by the accumulation across the m land cover classes, within the monitoring period t_n, of all the degraded area units within each land cover class plus all area units previously defined as degraded and that remain degraded:

$$A(degraded)_n = \sum_{i=1}^{m} A(degraded)_{i,n} \tag{2.1}$$

$$= \sum_{i=1}^{m} A(recent)_{i,n} + A(persistent)_{i,n} \tag{2.2}$$

where

$A(degraded)_n$ is the total area degraded in the monitoring year n (ha);

$A(degraded)_{i,n}$ is the total area of land cover type i degraded in the monitoring year n (ha);

$A(recent)_{i,n}$ is the area of land cover type i defined as degraded in the monitoring year n, following 1OAO assessment of the sub-indicators (ha);

$A(persistent)_{i,n}$ is the area of land cover type i which has previously been defined as degraded and that remains degraded in the monitoring year n, following the 1OAO assessment of the sub-indicators (ha).

Finally, the total proportion of land that is degraded over total land area is given by:

$$P_n = \frac{A(degraded)_n}{\sum_{i=1}^{m} A(total)} \tag{2.3}$$

where

P_n is the proportion of land that is degraded over total land area in monitoring year n;

$A(degraded)_n$ is the total area degraded in monitoring year n (ha);

$A(total)$ is the total area within the considered boundary (ha).

It is necessary to highlight that during the 10th Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) meeting in October 2019, Indicator SDG 15.3.1 has been upgraded from Tier 2, denoting an “indicator conceptually clear with an internationally established methodology, available standards, but data is not regularly produced by countries”, to Tier 1, meaning that the “indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50% of countries and of the population in every region where the indicator is relevant.” (UNSD, 2020). For Tier 1 and 2 indicators, countries can create their own Tier classification for implementation since the availability of data at the national level may not necessarily conform with the global Tier classification. For example, the Italian National Institute of Statistics (Italian: Istituto Nazionale di Statistica, ISTAT) monitors land degradation using a national context indicator which quantifies SDG 15.3. estimating soil sealing rate at national level and the share of natural and agricultural territory with high/very high fragmentation (ISTAT, 2020).

2.3.2 ISTAT statistical measures: soil sealing and land fragmentation

ISTAT releases 20 statistical measures referred to 9 UN-IAEG-SDGs global indicators to assess Italian progress of SDG 15 which focuses specifically on protecting terrestrial ecosystems and their biodiversity. In the case of SDG 15.3 the progress towards a land degradation neutral world is assessed using two national indicators: the percentage of soil sealed by artificial land cover (SDG 15.3.1) and the percentage of fragmented natural and agricultural land (SDG 15.3.2).

As the custodian agency for SDG 15.3, Italian National Institute for Environmental Protection and Research (Italian: Istituto Superiore per la Protezione e la Ricerca Ambientale, ISPRA) has developed recommendations on how to calculate SDG 15.3.1 and 15.3.2 as two indicators referred to anthropogenic pressures generated by soil consumption due to urbanization processes.

The first indicator has a taxonomy similar to UN-IAEG-SDG 15.3.1 and it is defined as the "proportion of land area that is artificially covered by buildings, infrastructures and other permanent structures, which make the underlying soil totally or partially impervious to water so preventing it to perform its vital functions" (ISTAT, 2020, p.2). The annual monitoring activities of the territory in terms of land use, land cover and land consumption in Italy are ensured by the National Protection System of the Environment (Italian: Sistema Nazionale per la Protezione dell'Ambiente, SNPA), the Regional Environmental Protection Agencies (Italian: Agenzie Regionali per la Protezione Ambientale, ARPA) of all Italian regions (excluding Trentino-Alto Adige/Südtirol) and by the environmental agencies of the two Autonomous Provinces of Trento and Bolzano (Italian: Agenzie Provinciali per la Protezione dell'Ambiente, APPA). Monitoring occurs through the production of a national cartography of land use on a raster basis (regular grid) of 10x10m, produced according to a two-level classification system. The annual calculations follow an homogeneous methodology and involve a process with the following phases (Munafò, 2020, p.15):

- Acquisition of input data (Sentinel 1 and Sentinel 2 images, other satellite images available, ancillary data)
- Data pre-processing
- Semi-automatic classification of Sentinel 1 and 2 images about the complete time series of current and previous years
- Production of a preliminary cartography

- Complete multi-temporal photointerpretation of the entire territory and editing on a detailed scale ($\geq$ 1:5.000)
- Revision of the time series
- Rasterization
- Validation
- Tiling of national geographical data and reprojection in an equivalent system
- Data processing and return of indicators

The first level classification subdivides the entire territory in consumed soil and not consumed soil. Furthermore, the classification system divides soil consumption into two main categories, permanent and reversible soil consumption, which constitute a second level of classification. Where it is possible, it could be identified a third level which classifies land according to the system showed in Table 2.1 (Munafò, 2020, p.16).

As a result, SDG 15.3.1 is given by:

$$P_n = \frac{A(consumed)_n}{A(total)} \tag{2.4}$$

where

P_n is the proportion of land area that is consumed in monitoring year n;

$A(consumed)_n$ is the total area artificially covered by buildings, infrastructures and other permanent structures monitoring year n (ha);

$A(total)$ is the total area within the considered boundary (ha).

Indicator 15.3.2 is defined as the share of natural and agricultural territory with high or very high level of fragmentation, which is the process of reducing the continuity of ecosystems, habitats and landscapes caused by phenomena such as urban expansion and the development of infrastructural network. These anthropogenic processes lead to the transformation of large patches (areas not consumed without significant artificial elements) in parts of territory of lesser extent and more isolated.

The evaluation of the territorial fragmentation is carried out through the calculation of the effective mesh-size ($meff$), a geo-statistical measure related to the probability that two points chosen at random in a given area are located in the same un-fragmented territorial particle (Jaeger, 2000). Firstly, a binary categorical map is prepared according to the decision of which landscape elements are assessed as fragmenting. The remaining areas are defined as patches, the set of remaining n patches of a landscape

Code	Land classification
1	Consumed Land
11	Permanent land consumption
111	Buildings
112	Paved roads
113	Railways
114	Airports (waterproof/paved runways and handling areas)
115	Ports (docks and waterproof/paved handling areas)
116	Other non-built-up waterproof/paved areas (parking lots, sports fields, etc.)
117	Permanent paved greenhouses
118	Landfills
12	Reversible land consumption
121	Unpaved roads
122	Construction sites and other clayey areas (squares, car parks, courtyards, sports fields, permanent deposits of material, etc.)
123	Extractive areas not re-naturalized
124	Groundwater quarries
125	Ground photovoltaic systems
126	Other artificial hedges not related to agricultural activities whose removal restores the initial conditions of the soil
2	Unconsumed land
20	Other forms of land cover not included in land consumption
201	Artificial water bodies (excluding groundwater quarries)
202	Permeable areas between junctions and roundabouts road
203	Not paved greenhouses
204	Bridges and viaducts on non-artificial soil

Table 2.1: Land cover classes - Report SNPA n. 15/2020

is denoted by $\Phi = \{A_i | i = 1, ..., n\}$ and the total area of the region is given by $A_t \geq \sum_{i=1}^{n} Ai$. Secondly, $meff$ is calculated as an index which denotes the size of the areas when the region under investigation is divided into S areas (each of the same size $\frac{A_t}{S}$) with the same degree of landscape division as for Φ:

$$meff = \frac{A_t}{S} = \frac{1}{A_t} \sum_{i=1}^{n} A_i^2 \tag{2.5}$$

Smaller $meff$ means less landscape connectivity and higher landscape fragmentation, which is the inverse of connectivity. In order to obtain a more intuitive evaluation of the territorial fragmentation, the final result is presented through the effective mesh-density ($Seff$) index, the reciprocal value of $meff$:

$$seff = \frac{1}{meff} = \frac{S}{A_t} \tag{2.6}$$

$Seff$ represents the density of the territorial patches (number of meshes per 1000 km^2) and measures the obstacle to movement starting from a point within the reporting unit due to the presence on the territory of so-called "fragmenting elements" barriers: the higher $Seff$, the higher landscape fragmentation. In particular, five fragmentation classes were identified according to $Seff$ values specified in Table 2.2.

For the estimation of Indicator 15.3.2, $Seff$ is calculated at a national level with respect to a regular grid of meshes equal to 1 km^2, considering artificial covered land units as fragmenting elements. Data on land consumption used in the process are obtained from the national map of land use, appropriately integrated with the vector information of OpenStreetMap in order to improve the identification of linear infrastructures. Final information about land fragmentation is also obtained at the

Number of meshes per 1000 km^2	**Fragmentation class**
(0 - 1.5]	Very low
(1.5 - 10]	Low
(10 - 50]	Average
(50 - 250]	High
>250	Very high

Table 2.2: Fragmentation classes according to the effective mesh-density (ISPRA, 2019)

municipal level, as weighted mean of the $Seff$ value estimated for each reporting unit inside the municipality boundaries.

2.3.3 Interlinkages with other SDGs

The 17 SDGs form a universal and integrated policy agenda to be realized over the next 10 years and one of the targets concerns the attainment of policy coherence for sustainable development. This objective requires the individual goals to become interlinked since understanding possible trade-offs, as well as synergistic relations between the different SDGs, is crucial for achieving long-lasting sustainable development outcomes.

In this respect, the United Nations General Assembly, in its resolution 71/229 notes that "the achievement of the Sustainable Development Goals and targets, including Goal 15 and Target 15.3, would serve as an accelerator to ending poverty and hunger, tackling inequality, empowering women and stimulating economic growth". Land restoration initiatives, if designed with the intent of fulfill multiple benefits simultaneously, can not only help achieve Land Degradation Neutrality (LDN), but also underpins and catalyzes achievement of other Goals and their related targets (Figure 2.3).

Target 15.3 calls for combating desertification and restoring degraded land and soil, which supports agricultural food production. Increases in agricultural productivity ensure food security, key to the implementation of SDG 2 which aims to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture". However, intense agriculture and revenue increase based solely on agricultural productivity without sustainability may lead to deforestation, counteracting Target 15.2 on halting deforestation, and land degradation, counteracting Target 15.3. Governance can play a significant role in developing better interactions between SDG 2 and SDG 15, planning settings such as the plan for Actions launched by the UN Convention to Combat Desertification (UNCCD), including targets to achieve LDN (Orr et al., 2017) and food security through biodiversity preservation.

Direct effect of the link between Target 15.3 and SDG 2 is that LDN serves as a catalyst in achieving SDG 1. Since eradicating poverty cannot be achieved without ensuring food and nutrition security for all, the only solution is to protect biodiversity and ecosystem services in order to obtain equitable and fair access to natural resources. Progress in working towards "zero hunger" is also highly dependent on progress

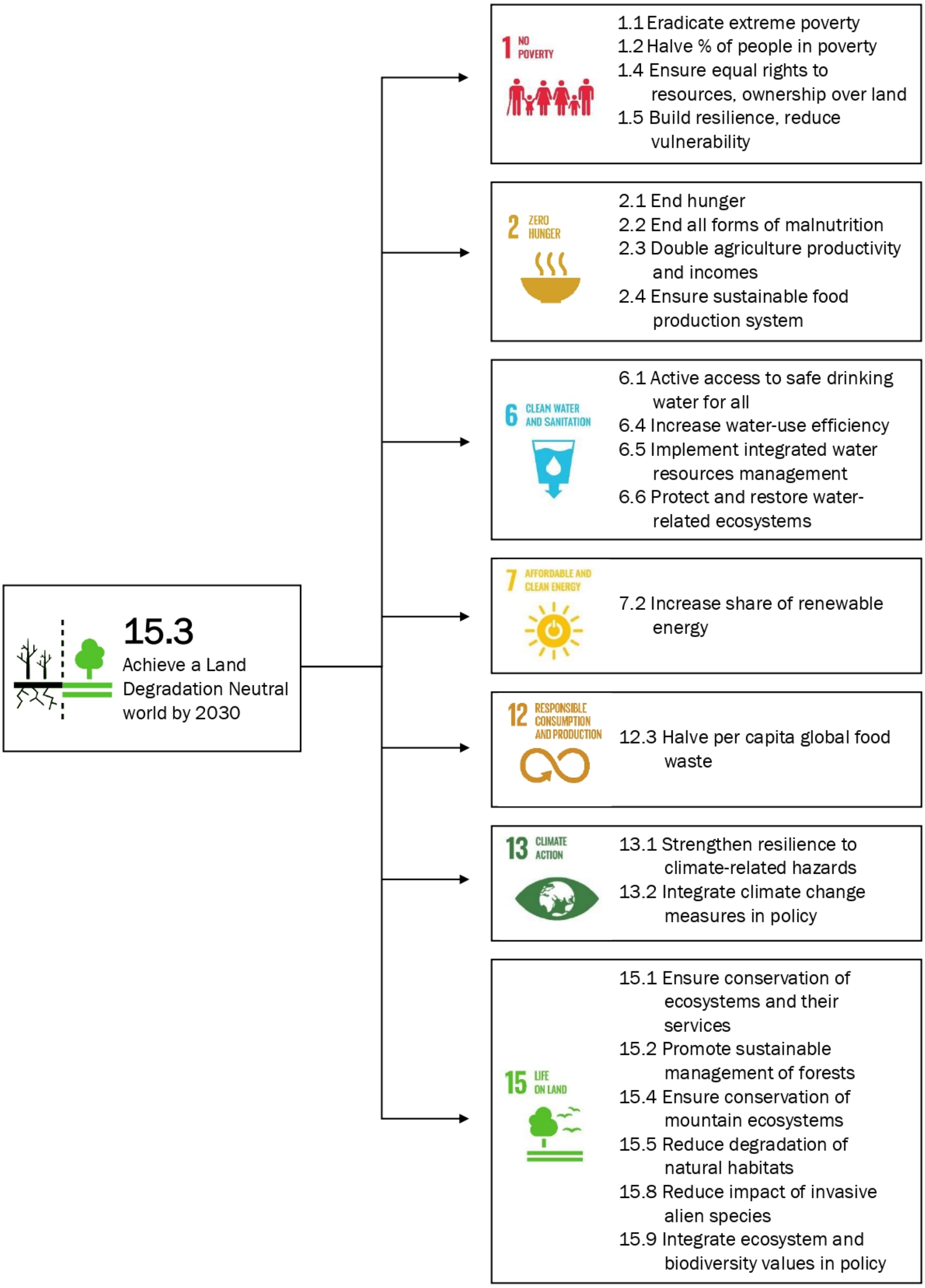


Figure 2.3: Sustainable Development Goal target 15.3 on achieving a land degradation-neutral world as a catalyst for achieving other SDG targets.

(Adapted from Akhtar-Schuster et al. 2016, p.5) in ensuring availability and sustainable management of water and sanitation (SDG 6). The conservation of forests, wetlands, mountains and drylands helps ensure reliable supplies of good-quality water which is needed to maintain ecosystems and ecosystems services. Recent research also suggests that protecting watersheds reduces long-term water treatment and storage costs for consumers (Hanson et al., 2011). Furthermore, more agricultural productivity can result in an increased biofuel production for renewable energy (Target 7.2) and therefore, can improve access to affordable energy services. Also in this case, Governance plays a fundamental planning role since energy projects need to be carefully located, and the energy mix carefully planned, to avoid a negative impact on terrestrial ecosystems and biodiversity and ensure sustainable consumption and production patterns (SDG 12).

SDG 13 on climate change is particularly connected with Target 15.3. Multiple relationships and feedbacks between land and climate are noted in the literature (e.g. Reed and Stringer, 2016) since land degradation is both affected by climate change and contributes to it. The rate and magnitude of several ongoing land degradation processes are intensified by climate change but, at the same time, land degradation is also a driver of climate change through reduced rates of carbon uptake and emission of greenhouse gases, exacerbating the impacts of natural hazards such as droughts, heat-waves and dust storms (Olsson et al., 2019).

Lastly, the remaining targets of SDG 15 all relate closely to Target 15.3 since it calls for combating desertification and restoring degraded land and soil, which entail ensuring conservation of ecosystems and promoting sustainable policies and use of natural resources. It must be pointed out that the interlinkages between Target 15.3 and SDG 16 and 17 have not been analysed, as the latter two can be conceived as enablers rather than goals by themselves. None of the SDGs will be achieved in the absence of peace, justice and strong institutions (SDG 16). Strengthen the means of implementation and revitalize the global partnership for sustainable development (SDG 17) are another fundamental precondition that must be met since the SDGs can only be realized with strong global cooperation (Tosun and Leininger, 2017).

3 | Measuring Land Fragmentation via Spatial Entropy

3.1 Spatial entropy measures

Among all drivers on biodiversity change, land cover change is considered to have the largest impact on terrestrial ecosystems (Sala et al., 2000) and to be, consequently, one of the major causes of habitat fragmentation, the process in which contiguous natural habitats are substituted by anthropogenic land covers. Human-induced landscape fragmentation results in smaller and disconnected patches of nature (Bogaert et al., 2002; Vogt, 2015) causing habitat loss, isolation and edge effects (Maxwell et al., 2016; Püttker et al., 2020). An adequate metric for landscape fragmentation appraisal is consequently needed for policy development with respect to nature and biodiversity conservation.

It has been demonstrated by Forman and Gordon (1986) that pattern heterogeneity and entropy can be considered as equivalent terms. Observing the presence of a given type of land cover in a specific patch of the landscape is equivalent to gain one unit of information about the degree of heterogeneity of this land cover type (p.202). Information is therefore knowledge gained from observing an event and if heterogeneity is presented, it will result in uncertainty when searching which is called entropy in mathematical theory of communication (Shannon, 1948).

In more recent years, the relation between entropy and several patch size metrics has been discussed in detail by Bogaert et al. (2005) showing that landscape fragmentation can be considered as the deviation from a contiguous space and its assessment is related to patch size diversity measurement, i.e. patch size heterogeneity, and hence to landscape entropy.

3.1.1 Shannon's Entropy

The basics to define entropy were provided by Claude Shannon in his 1948 paper "A Mathematical Theory of Communication" as a way to estimate the average minimum amount of information related to a message transmitted by a communication channel which adds noise (Stone, 2019). In particular, the message is treated as a discrete random variable X, which can as assume different values according to I possible outcomes (x_i, $i = 1, \ldots, I$). The term information is also called surprisal and it is associated with the concept of uncertainty: when our uncertainty is increased, we gain information, i.e. the greater the surprise in observing a value $X = x_i$, the greater the information it contains.

In order to measure the amount of information contained in an outcome with probability $p(x_i)$, Shannon (1948) introduced the information function $I(p_X)$, a random variable where $p_X = (p(x_1), \ldots, p(x_I))'$ is the probability mass function (pmf) of X:

$$I(p(x_i)) = log\left(\frac{1}{p(x_i)}\right). \tag{3.1}$$

Here the selection of the base logarithm is irrelevant since entropy properties are invariant with respect to the choice of the base. Shannon's entropy $H(X)$ (Shannon, 1948) is therefore given by the formula

$$H(X) = E[I(p_X)] = \sum_{i=1}^{I} p(x_i) log\left(\frac{1}{p(xi)}\right). \tag{3.2}$$

Entropy $H(X)$ is defined as the expected value of the information theory and it measures the average amount of information generated by the pmf p_X through the realizations of X. Information and entropy are two sides of the same coin: the higher the entropy, the higher the amount of information the next realization brings since no precise information is available about its occurrence; on the other hand, if the outcome of the next realization is quite sure, its occurrence does not carry much information and the entropy is low.

As a measure of uncertainty, Shannon's entropy $H(X)$ as several desirable properties:

1) Events have non-negative uncertainty.
   $H(X)$ is non-negative and has range $[0, log(I)]$

2) Events with a certain outcome have zero uncertainty.
   The minimum 0 is reached when a singular value x_i has probability $p(x_i) = 1$ (i.e. certainty about the variable outcome)

3) Uniform distributions have maximum uncertainty.
   The maximum $log(I)$ is achieved when X is uniformly distributed, and all the possible values x_i are equally probable

4) Uniform distributions with more outcomes have more uncertainty.
   Since $max(H(X)) = log(I)$, the higher the number of possible outcomes of X (i.e. the number of categories I), the higher the computed entropy.

5) Uncertainty is additive for independent events.
   Given two independent events X and Y, $H(X,Y) = H(X) + H(Y)$

6) Adding an outcome with zero probability has no effect.
   $H(p(x_1),\dots,p(x_I)) = H(p(x_1),\dots,p(x_I),0)$

7) Flipping the arguments has no effect.
   For the case of two outcomes, $H(p(x_1),p(x_2)) = H(p(x_2),p(x_1))$

Since it is demonstrated that heterogeneity (of landscape pattern) can be assumed equivalent to uncertainty or entropy (Forman & Gordon, 1986), Joshi et al. (2006) use Shannon's entropy as a measure of disorder of forest patches in remote sensing imagery of Northeast India. They redefine (3.2) setting $p(x_i)$ equal to the proportion of variable (non-forest) in the i-th zone or forest class and I equal to the total number of forest classes in the region. This reformulation of Shannon's entropy has proved to be useful for the appraisal of the degree of fragmentation: increasing degrees of fragmentation coincided with increasing entropy, increasing number of patches and decreasing habitat area. Nonetheless, the authors remark that the above-defined entropy depends on the size of the examined area, and this should be considered as a drawback. The absolute values for entropy should not therefore be compared between sites of different area (although the discrepancy is negligible for large areas), but rather, data should only be interpreted as increasing/decreasing trends for a particular site.

3.1.2 Batty's spatial entropy

The first attempt to include spatial information into Shannon's entropy (3.2) is taken by Batty (1974; 1976) re-coding the categorical variable X into I dummy variables, each identifying a specific category of X. The probability of success of each dummy variable is defined as $p_i = p(x_i)$ and each non-occurrence of the i-th category implies the occurrence of another category, i.e. $1 - p_i = \sum_{i' \neq i}^{I} p_{i'}$. As a consequence, $\sum_{i=1}^{I} p_i = 1$, since the certain event is constituted by the collection of occurrences. Therefore, expanding Theil's work (1972), Batty (1974) defines Shannon's entropy as

$$H(X) = \sum_{i=1}^{I} p_i log\left(\frac{1}{p_i}\right) \tag{3.3}$$

In a spatial context, F is then defined as the phenomenon of interest which occurs in an observation window of size T partitioned in G areas of size T_g with $\sum_{g=1}^{G} Tg = T$. In this case, F is identified by G dummy variables and, given that F occurs somewhere over the observation window, its occurrence in zone g has probability p_g where again $1 - p_g = \sum_{g' \neq g} p_{g'}$ and $\sum_{g=1}^{G} p_g = 1$.

The collection of p_g meets the criteria to be a pmf, hence it is possible to define the pmf of F over the observation window as $p_F = (p_1, \ldots, p_g, ..p_G)'$. The phenomenon intensity, assumed to be constant within each area g, is then obtained dividing p_g by the area size T_g as

$$\lambda_g = \frac{p_g}{T_g}. \tag{3.4}$$

Shannon's entropy of F is written as

$$H(F) = E[I(p_F)] \tag{3.5}$$

$$= \sum_{g=1}^{G} p_g log\left(\frac{1}{p_g}\right) \tag{3.6}$$

$$= \sum_{g=1}^{G} \lambda_g T_g log\left(\frac{1}{\lambda_g}\right) + \sum_{g=1}^{G} \lambda_g T_g log\left(\frac{1}{T_g}\right). \tag{3.7}$$

Defining the continuous version of Shannon's entropy (3.2) as

$$S(X) = \int p(x) log\left(\frac{1}{p(x)}\right) dx, \tag{3.8}$$

it can be demonstrated that the first term of (3.7) tends to the differential entropy $S(X)$ as $T_g \rightarrow 0$ (Batty, 1976). The second term of (3.7) is instead discarded, leading to the rewriting of the differential entropy $S(X)$ in terms of p_g and to the subsequent definition of Batty's spatial entropy

$$H_B(F) = \sum_{g=1}^{G} p_g log\left(\frac{T_g}{p_g}\right). \tag{3.9}$$

Batty's entropy expresses the amount of information (or average surprise) brought by the occurrence of F in an area g. As Shannon's entropy is maximum when the I categories of X are equally probable in a non-spatial context, Batty's entropy is high when F is equally intense over the G areas of the observation window (and $\lambda_g = \lambda$ $\forall g$). Moreover, the multiplicative component T_g is related to space and accounts for unequal partitions of the observation window. Therefore, $H_B(F)$ reaches its minimum, $log(T_{g^*})$, when the area with the smallest size has $p_{g^*} = 1$ and all the other areas $g \neq g^*$ have $p_g = 0$, while the maximum value $log(T)$ is reached when the intensity of F is constant over the G areas (i.e. $\lambda_g = 1/T$ $\forall g$).

It must be pointed out that the maximum of $H_B(F)$ only depends on the size of the observation window and not on the characteristics of F nor on the area partition. Any information on the I categories of variable X defined in the previous section is lost since none of the different categories are used in (3.9). Furthermore, when $T_g = 1$ the range of $H_B(F)$ becomes $[0, log(G)]$ and Batty's entropy becomes equivalent to a Shannon's entropy of F which as the same form of (3.2) and, if we applied Batty's entropy to the assessment of the degree of fragmentation, absolute values could not be compared between sites of different area, in the same manner as Shannon's entropy.

3.1.3 Karlström and Ceccato's spatial entropy

In 2002, Karlström and Ceccato aim at including neighborhood and additive properties in Batty's entropy index (3.9) following the idea of Local Indices of Spatial Association (LISA) proposed by Anselin (1995).

LISA is any statistic that satisfies two basic requirements (p. 94):

a) *"the LISA for each observation gives an indication of the extent of spatial clustering of similar values around that observation"*
In the spatial context described above, in which F is the phenomenon of interest that occurs in an observation window of size T partitioned in G areas of size T_g with $\sum_{g=1}^{G} Tg = T$, the LISA may be defined as $L_g = f(\lambda_g, \lambda_{g' \in \mathcal{N}(g)})$, where $\mathcal{N}(g)$ is the neighbourhood of g.

b) *"the sum of LISAs for all observations is proportional to a global indicator of spatial association"*
This describes the advantageous additive property of local spatial measures since the sum of the indices at all spatial units g is proportional to the overall index at the observation window, i.e. $\alpha \sum_{g=1}^{G} L_g = L$ where L is a global version of the LISA.

Karlström and Ceccato (2002) use the spatial weighted information measure as hinted above to derive a measure of spatial association.

First of all, considering the phenomenon of interest F, they weight the probability of occurrence of F in a certain area g, p_g, with its neighbour values:

$$\tilde{p}_g = \sum_{g'=1}^{G} a_{gg'} p_{g'}. \tag{3.10}$$

Here, $a_{gg'}$ is an element of the $G \times G$ row-standardized adjacency matrix A. The spatial weight matrix A entails the spatial configuration since it is able to describe the neighbouring areas and the associated probabilities $p_{g'}$.

Secondly, fixing $T_g = 1$, an information function is defined as $I(\tilde{p}_g) = log(1/\tilde{p}_g)$. Defining the cardinality of $\mathcal{N}(g)$ as $|\mathcal{N}(g)|$, in the case of all equal weights $a_{gg'} = \frac{1}{|\mathcal{N}(g)|}$, an average of the $p_{g'}$ is obtained as $\sum_{g'=1}^{G} a_{gg'} p_{g'} = \sum_{g' \in \mathcal{N}(g)} \frac{p_{g'}}{|\mathcal{N}(g)|}$. In this specific situation, each area neighbours itself and is included in the computation of $I(\tilde{p}_g)$ and therefore the diagonal elements of the adjacency matrix A are non-zero.

Finally, Karlström and Ceccato entropy index is defined as

$$H_{KC}(F) = E[I(\tilde{p}_g)] = \sum_{g=1}^{G} p_g log\left(\frac{1}{\tilde{p}_g}\right). \tag{3.11}$$

This formulation highlights an important feature of a local measure of spatial association, in that (3.11) allows us to decompose the global measure into local components. $H_{KC}(F)$ is asymptotically normal distributed while its local components are asymptotically log-normal distributed as the number of neighbours grows. Moreover, as the neighbourhood reduces to the unit itself, the adjacency matrix A becomes the identity matrix and $H_{KC}(F)$ coincides with Batty's spatial entropy (3.9) with all $T_g = 1$. It can also be shown that $max(H_{KC}(F)) = log(G)$, i.e. the maximum does not depend on the chosen neighbourhood. LISA Condition 1 is satisfied by the local measures $L_g = p_g I(\tilde{p}_g)$ while their sum preserves LISA Condition 2 of additivity forming the global index (3.11) with proportionality constant $\alpha = 1$.

$H_{KC}(F)$ has simple intuitive interpretation in the context of spatial segregation and allows the analysis of whether a significant global measure is due to a pattern of spatial association. On the other hand, local components are not expectations and therefore they cannot be considered entropy measures.

3.1.4 O'Neill spatial entropy and Leibovici's spatial entropy

Many spatial entropy indices are based on the transformation of the study variable X in a new categorical variable Z whose categories identify co-occurrences of the variable of interest over space, i.e. groups of realizations of X.

In order to define Z, we denoted as m the degree of co-occurrences (e.g. couples, triplets) of X, which must be decided along with whether to preserve the order of realization of the co-occurrences over space. For example,"unordered couples" means that couple (x_i, x_j) of degree $m = 2$ is identical to (x_j, x_i) and hence the relative spatial location is irrelevant. Then, for a generic degree m and I categories of X, Z has $R_m^o = I^m$ categories if the order should be preserved and $R_m^{no} = \binom{I+m-1}{m}$ otherwise.

When all possible co-occurrences within the observation window are considered, Shannon's entropy (3.2) of Z may be computed as

$$H(Z) = \sum_{r=1}^{R_m} p(z_r) log \left(\frac{1}{p(z_r)} \right) \tag{3.12}$$

where $p(z_r)$ is the probability of observing the r-th co-occurrence of X over different spatial units. Shannon's entropy of Z varies between 0 and $log(R_m)$, R_m being equal to R_m^o or R_m^{no}. If the order is not preserved, $H(Z)$ does not depend on the spatial configuration of the co-occurrences (i.e. Z maintains the information of X), while if the order is preserved, $H(Z)$ depends both on the pmf of X and on the spatial order of its realizations.

Also the concept of neighbourhood must be defined according to the definition of Z. The adjacency matrix A, for a generic degree m, generalizes to a m-dimensional hypercube and this implies that the univariate distributions used in entropies are conditional and defined as $p_{Z|A} = (p(z_1|A), ..., p(z_{R_m}|A))$. Realizations of $Z|A$ are the realizations of Z that are conditioned to a fixed neighbourhood and hence identified by non-zero elements of A.

In the context of regular lattice data, O'Neill et al. (1988) define co-occurrences as ordered couples ($m = 2$) of contiguous (sharing a border) realizations of X. The contiguity matrix O is then built and the consequent variable of interest is $Z|O$ with $R_2^o = I^2$ categories.

Shannon's entropy (3.2) for variable $Z|O$ (O'Neill et al., 1988) is defined as

$$H(Z|O) = E[I(p_{Z|O})] = \sum_{r=1}^{R_2^o} p(z_r|O) log \left(\frac{1}{p(z_r|O)} \right). \tag{3.13}$$

O'Neill entropy ranges from 0 to $log(R_2^o)$ and its maximum is reached when the pmf $p_{Z|O}$ is uniform.

Leibovici (2009) and Leibovici et al. (2014) aim to extend $H(Z|O)$ so that Z can represent also further degrees m of co-occurrences and space is allowed to be continuous, replacing the concept of contiguity between lattice cells with the concept of distance between occurrences. To this end, a distance d is fixed and the co-occurrences are defined for each m and d as m-th degree simultaneous realizations of X at any distance $d^* \leq d$. An adjacency hypercube L_d is then built and the variable of interest is defined as $Z|L_d$ with Leibovici's spatial entropy

$$H(Z|L_d) = E[I(p_{Z|L_d})] = \sum_{r=1}^{R_2^o} p(z_r|L_d) log \left(\frac{1}{p(z_r|L_d)} \right). \tag{3.14}$$

Also in this case $p(z_r|L_d)$ is the element of a univariate pmf $p_{Z|L_d}$. Moreover, in the case of lattice data, when $m = 2$ and d equals the cell's width, O'Neill's entropy (3.13) is obtained as a special case of (3.14).

The main differences in using an appropriate adjacency matrix to build realizations of $Z|A$ with respect to Karlström and Ceccato's approach can be summarized in two points:

1) In Leibovici's approach, the adjacency matrix A is needed from the beginning to switch from X to $Z|A$ and to define the pmf $p_{Z|A}$ while, in Karlström and Ceccato's approach, p_g does not depend on A and A is only used to derive $\tilde{p}_g$, the probability of occurrence of the phenomenon weighted with its neighbouring values;

2) In Leibovici's approach, probabilities $p(z_r|A)$ are not referred to a specific location while, in Karlström and Ceccato's approach, probability p_g takes values over a location g and the other probabilities $p_{g'}$ ($g' \neq g$) are used to evaluate $\tilde{p}_g$ in the neighbourhood of each g.

It is also important to stress that unlike Karlström and Ceccato's entropy (3.11), this approach based on the construction of Z is able to maintain the information about all the categories of X. However, (3.14) is not decomposable in partial terms and it is based on a univariate distribution which prevents the investigation of advantageous properties related to bivariate distributions such as the use of a probabilistic approach to exploit the additivity property for a global index.

3.1.5 Bivariate properties of spatial entropy measures

In information theory, the adoption of a bivariate prospective is crucial in order to discern the amount of information related to the original noised message X from the noise. A second discrete variable Y representing the original non-noised message is introduced to this end in addition to the study variable X. Y is characterized by $j = 1, ..., J$ possible outcomes y_j, pmf p_Y and marginal Shannon's entropy $H(Y)$. Considering these two variables together allows the derivation of new expectations with reference to a joint pmf p_{XY} (Stone, 2019). A first fundamental example is given by the mutual information of X and Y which measures the association of the two messages and is defined as

$$
\begin{aligned}
MI(X,Y) &= D_{KL}(p_{XY}||p_x p_y) && (3.15)\\
&= E\left[I\left(\frac{p_X p_Y}{p_{XY}}\right)\right] && (3.16)\\
&= \sum_{i=1}^{I}\sum_{j=1}^{J} p(x_i,y_j) log\left(\frac{p(x_i,y_j)}{p(x_i)p(y_j)}\right). && (3.17)
\end{aligned}
$$

The mutual information of X and Y is a Kullback-Leibler distance (3.15), or relative entropy, in which the reference joint pmf is given by $p_X p_Y$, the independence distribution of the two variables. When X and Y are independent ($p_{XY} = p_X p_Y$), the mutual information is null since the logarithm term of (3.17) equals zero for each i and j. Moreover, the mutual information is a symmetric measure, $MI(X,Y) = MI(Y,X)$, i.e. the amount of information of X due to Y is equal to the the amount of information of Y due to X.

Mutual information is not only a Kullback-Leibler distance on a joint pmf, but also a weighted sum of Kullback-Leibler distances on univariate pmfs if expression (3.17) is rewritten mirroring the structure of Shannon's entropy (3.2)

$$MI(X,Y) = \sum_{i=1}^{I} p(x_i) \sum_{j=1}^{J} p(y_j|x_i) log \left(\frac{p(y_j|x_i)}{p(y_j)} \right) \tag{3.18}$$

where, for each i, the information function in (3.2) is replaced by a Kullback-Leibler distance $D_{KL}(p_{Y|x_i}||p_Y)$, or $D_{KL}(p_{X|y_j}||p_X)$ by symmetric property. This reformulation evaluates the average difference between each value of the conditional distribution $p_{Y|x_i}$ and the marginal p_Y and therefore assesses how much the conditional distribution differs from independence.

Another important measure which can be derived with reference to a joint pmf p_{XY} is known as conditional entropy and is defined as

$$H(X)_Y = E[H(X|y_j)] = \sum_{j=1}^{J} p(y_j) H(X|y_j) \tag{3.19}$$

$$= E[E[I(p_{X|y_j})]] = \sum_{j=1}^{J} p(y_j) \sum_{i=1}^{I} p(x_i|y_j) log \left(\frac{1}{p(x_i|y_j)} \right) \tag{3.20}$$

$$= \sum_{i=1}^{I} \sum_{j=1}^{J} p(x_i, y_j) log \left(\frac{1}{p(x_i|y_j)} \right). \tag{3.21}$$

Conditional entropy represents the residual amount of information brought by the noised variable X once the influence of non-noised Y has been removed, hence it is also called residual or noise entropy: if Y partially explains X, $H(X)_Y$ should be lower than $H(X)$. Since the components $H(X|y_j) = E[I(p_{x|y_j})]$ of (3.20) are entropies, the additive property applies to $H(X)_Y$ and therefore (3.20) is an example of the law of iterated expectations while marginal Shannon's entropy (3.2) is not. Moreover, each random component $H(X|y_j)$ in (3.20) can be analysed to assess how much it differs from independence. Finally, also (3.19) can be rewritten using the structure of (3.2)

$$H(X)_Y = \sum_{i=1}^{I} p(x_i) \sum_{j=1}^{J} p(y_j|x_i) log \left(\frac{1}{p(x_i|y_j)} \right). \tag{3.22}$$

It has been demonstrated that marginal entropy can be obtained by the sum of mutual information and residual entropy (Cover & Thomas, 2006, p.20):

$$MI(X,Y) = H(X) - H(X)_Y = H(Y) - H(Y)_X. \tag{3.23}$$

When $H(X) = H(X)_Y$, or $H(Y) = H(Y)_X$ by symmetry, X is independent from Y while if $H(X) = MI(X;Y)$, there is a perfect relation between the two variables.

The entropy of a single random variable (3.2) can be extended to a pair of random variables obtaining a further important quantity named joint entropy

$$H(X,Y) = E[I(p_{XY})] \tag{3.24}$$

$$= \sum_{i=1}^{I}\sum_{j=1}^{J} p(x_i,y_j)log\left(\frac{1}{p(x_i,y_j)}\right) \tag{3.25}$$

which represents the total amount of information given by a simultaneous realization of X and Y. $H(X,Y)$ can be obtained from (3.2) when a joint pmf p_{XY} is considered and it is also called total entropy, since here "joint" is not referred to some kind of association but rather to an entropy measure of the two variables considered together. Moreover, some of the properties of the univariate entropy (3.2) carry over to the bivariate case:

1) The joint entropy of a set of random variables is non-negative
   $H(X,Y) \geq 0$

2) The joint entropy of a set of variables is greater than or equal to the maximum of all of the individual entropies
   $H(X,Y) \geq max\{H(X), H(Y)\}$

3) The joint entropy of a set of variables is less than or equal to the sum of the individual entropies (subadditivity)
   $H(X,Y) \leq H(X) + H(Y)$

4) $H(X,Y) = H(X) + H(Y)$ if and only if X and Y are statistically independent.

Cover & Thomas (2006) also derived two more relationships between entropy indices:

$$H(X,Y) = H(X) + H(Y) - MI(X,Y) \tag{3.26}$$

which follows from the symmetric property and has $H(X,Y) = H(X) + H(Y)$ as special case when independence occurs (Cover & Thomas, 2006, p.21), and

$$H(X,Y) = H(X)_Y + H(Y) = H(Y)_X + H(X). \tag{3.27}$$

which is called chain rule (Cover & Thomas, 2006, p.17) and shows that the entropy of a pair of random variables is given by the entropy of one plus the conditional entropy of the other.

3.1.6 Spatial mutual information and spatial residual entropy

As discussed in the previous sections, spatial entropy measures are expected to fulfill some essential requirements in order to exploit completely the relationship of the study variable with space. First of all, an entropy measure must preserve the information about all categories of the study variable and quantify in a proper way the overall role of space. Properties of bivariate entropy measures need to be met in order to represent space as an additional study variable and thus be able to consider different set of distances at the same time. Furthermore, a proper entropy measure must be additive and decomposable, allowing the property of additivity to be exploited for a global index by using rigorous probabilistic approach.

Altieri et al. (2017) observe that all these properties are enjoyed by mutual information (3.15) and by residual entropy (3.19) if their relationship with Shannon's entropy (3.2) is considered in (3.22). They assume that the realizations of the variable of study X occur over a regular lattice subdivided in equal areas, distances between areas are given by Euclidean distances between centroids and that the transformed variable Z is built using unordered associations of the co-occurrences of X, thus fixing the degree of co-occurrences $m = 2$, the couple $z_r = (x_i, x_j)$ is considered equal to the couple $z_r = (x_j, x_i)$.

The new contribution of Altieri et al. (2017) is the classification of the distance at which co-occurrences take place through the introduction of a new discrete variable W. Its pdf is given by $p_W = (p(w_1), ..., p(w_K))$ where $p(w_k)$ is the probability associated to the k-th distance range w_k ($k = 1, ..., K$). These distance classes w_k cover all possible distances within the observation window and are fixed exogenously, driven by the researcher's experience. The choice of distance classes w_k and degree of co-occurrences m implies therefore the choice of a particular adjacency matrix A_k representing the associations of X which is used to define $Z|A_k$. As a consequence, $p_{Z|A_k} = p_{Z|w_k}$, the set of K conditional distributions can be collected in a $R_m^{no} \times K$ matrix

$$p_{Z|W} = \left[\, p_{Z|w_1} \cdots p_{Z|w_k} \cdots p_{Z|w_K} \,\right] \tag{3.28}$$

and the discrete joint pmf p_{ZW} can be decomposed in a $R_m^{no} \times K$ matrix

$$p_{ZW} = p_{Z|W} diag(p_W) \tag{3.29}$$

in order to stress that W influences Z and not viceversa. In addition, this decomposition underlines the fact that the marginal pmf of W and the set of $Z|w_k$ are the elements which permit to obtain entropy measures that satisfy properties of bivariate distributions. These elements are also used to re-define conditional entropy (3.20) in order to obtain the entropy measure called spatial global residual entropy

$$\begin{aligned} H(Z)_W = E[H(Z|w_k)] &= E[E[I(p_{Z|w_k})]] && (3.30)\\ &= \sum_{k=1}^{K} p(w_k) \sum_{r=1}^{R_m^{no}} p(z_r|w_k) log\left(\frac{1}{p(z_r|w_k)}\right) && (3.31)\\ &= \sum_{r=1}^{R_m^{no}} p(z_r, w_k) log\left(\frac{1}{p(z_r|w_k)}\right) && (3.32)\\ &= \sum_{k=1}^{K} p(w_k) H(Z|w_k). && (3.33) \end{aligned}$$

The components of (3.33)

$$H(Z)_{w|k} = E[I(p_{Z|w_k})] = \sum_{r=1}^{R_m^{no}} p(z_r|w_k) log\left(\frac{1}{p(z_r|w_k)}\right) \tag{3.34}$$

are named spatial partial residual entropies where "partial" refers to a specific distance class w_k. When spatial global residual entropy (3.30) is obtained by weighting the spatial partial residual entropies (3.34) with the probabilities of W, $p(w_k)$, the additive property (3.33) holds. Therefore, the spatial global residual entropy represents the amount of information still brought by Z after removing the effect of W, the spatial configuration, and the partial spatial residual entropies show how much each distance contributes to the entropy of Z. As a consequence, the mutual information (3.23) of Z and W, named spatial mutual information, can be defined as

$$MI(Z, W) = H(Z) - H(Z)_W \tag{3.35}$$

where Shannon's entropy of Z, $H(Z)$, does not consider any spatial configuration since it is computed using the univariate marginal p_Z. Also in this case, spatial mutual information can be defined similarly to (3.15) using a Kullback-Leibler distance

$$\begin{aligned}
MI(Z,W) &= D_{KL}(p_{ZW}||p_Z p_W) && (3.36)\\
&= E\left[I\left(\frac{p_Z p_W}{p_{ZW}}\right)\right] && (3.37)\\
&= \sum_{r=1}^{R_m^{no}}\sum_{k=1}^{K} p(z_r,w_k)log\left(\frac{p(z_r,w_k)}{p(z_r)p(w_k)}\right) && (3.38)\\
&= \sum_{k=1}^{K} p(w_k)\sum_{r=1}^{R_m^{no}} p(z_r|w_k)log\left(\frac{p(z_r|w_k)}{p(z_r)}\right). && (3.39)
\end{aligned}$$

Spatial mutual information can also be additively decomposed according to (3.39) to quantify the contribution of space at every distance range w_k in the same way as spatial global residual entropy (3.32) and the k-th partial term is named spatial partial information

$$\begin{aligned}
PI(Z,w_k) &= D_{KL}(p_{Z|w_k}||p_Z) && (3.40)\\
&= E\left[I\left(\frac{p_Z}{p_{Z|w_K}}\right)\right] && (3.41)\\
&= \sum_{r=1}^{R^{no}} p(z_r|w_k)log\left(\frac{p(z_r|w_k)}{p(z_r)}\right). && (3.42)
\end{aligned}$$

Once again mutual information can be rewritten in terms of (3.40) since the additivity property holds once spatial partial informations are weighted by $p(w_k)$:

$$MI(Z,W) = \sum_{k=1}^{K} p(w_k)PI(Z,w_k) \tag{3.43}$$

In light of this, the entropy of Z may be decomposed into the sum of spatial mutual information and spatial global residual entropy

$$\begin{aligned}
H(Z) &= MI(Z,W) + H(Z)_W && (3.44)\\
&= \sum_{k=1}^{K} p(w_k)[PI(Z,w_k) + H(Z|w_k)] && (3.45)
\end{aligned}$$

where $MI(Z,W)$ quantifies the role of space while $H(Z)_W$ the remaining information brought by Z once that spatial configuration is taken into account. Therefore, the more the realizations of the study variable X are positively or negatively spatially associated, the higher mutual information whereas a weak association among realizations of X

translates in an high spatial global residual entropy. Moreover, (3.45) shows how Shannon's entropy $H(Z)$ can be written in additive form applying the bivariate properties of entropy.

Finally, in order to quantify the role of space in proportional terms the following ratio which ranges in $[0,1]$ can be defined

$$MI_{prop}(Z,W) = \frac{MI(Z,W)}{H(Z)} = 1 - \frac{H(Z)_W}{H(Z)} \tag{3.46}$$

which gives the proportion of entropy of Z due to a specific spatial configuration while, similarly, the ratio $\frac{H(Z)_W}{H(Z)}$ quantifies the contribution of other source of heterogeneity other than space to the entropy of Z.

3.2 Case study: quantifying land fragmentation in Veneto (Italy)

3.2.1 Why spatial mutual information and spatial residual entropy?

All the entropy measures analyzed in Section 3.1 have been taken into account to quantify land fragmentation in the Italian region of Veneto, but only spatial mutual information and spatial residual entropy met the required properties.

Shannon's entropy (3.2) is non-spatial since its computation is based on the proportions of the land use classes and not on their spatial configurations. Shannon's entropy is not affected by size, shape or number of sub-areas of a territory and there are not distinct measures for different spatial configurations: two areas with the same proportions and very different degrees of compactness for the consumed tissue have the same entropy value. The same holds for territories with different area size and this is the major drawback for a spatial metric that in real life situations should be able to quantify and compare fragmentation between different administrative divisions. Another drawback is that Shannon's entropy preserve the pair order, which is not reasonable since spatial phenomena are not usually assumed to have a direction. Moreover, Shannon's entropy present the problems of not preserving additivity in constructing the entropy measures, and of not exploiting their bivariate properties.

Also Batty (3.9) and Karlström and Ceccato (3.11)'s entropies have to be ruled out regardless the LISA-type properties. They are also affected by the choice of the area partition and they do not consider unordered couples with the aforementioned consequences. Karlström and Ceccato's entropy (3.11) enjoy the additivity property but it loses information about the variable categories, preventing from answering a wider set of questions. Furthermore, it focus on a single definition of neighbourhood which is a drawback in practical situations.

O'Neill's entropy (3.13) and Leibovici's entropy (3.14) have been excluded as well. O'Neill's entropy (3.13) only consider contiguous pairs (i.e. at distance 1) without giving a global view of what happens in the whole studied area. Leibovici's entropy (3.14) extends instead to further distances but it does not consider unordered pairs and does not allow to investigate what happens at different distance ranges.

The application of spatial mutual information (3.36) and spatial residual entropy (3.30) of Altieri et al. (2018) to quantify land fragmentation offers several advantages instead. As stated in Section 3.1.6, these measures consider different matrices (or hypercubes) to cover all possible distances between observed patches and exploit the bivariate properties of entropy to decompose the entropy of the categorical variable under study into a term accounting for the role of space and a noise term summarizing the residual information. Any categorical variable can be managed regardless the number of categories and unordered couples are considered. Moreover, the global values and the partial terms can be investigated jointly and the comparison between sites of different size is allowed, which is fundamental for planning polices.

For these reasons, spatial mutual information and spatial residual entropy are the only measures applied to quantify landscape fragmentation in Veneto region. The two measures are calculated for each of the 563 municipalities of the 7 Venetian provinces in four different years (2012, 2015, 2018 and 2019) and the results are both compared between different municipalities and interpreted as increasing/decreasing trends in land fragmentation for a particular municipality.

3.2.2 Study methodology

As stated in the previous section, several entropy measures have been considered in order to measure the disorderness in the consumed landscape patches of Veneto region in Italy but only spatial mutual information and spatial residual entropy have been deemed suitable for the purpose (and so calculated). These two measures share all the desiderable features of entropy measures and allow to identify the most informative distances to properly interpret the spatial phenomenon of land fragmentation.

Different data sets are therefore employed in order to estimate spatial mutual information and spatial residual entropy for each municipality of the region. First of all, data on soil consumption in Veneto are extracted from the raster data sets released by ISPRA regarding soil consumption in Italy in 2012, 2015, 2018 and 2019 (see Appendix A.1 for details). Using QGIS[1], these rasters are then joint by location with the shape file regarding the boundaries of the Italian administrative units as of 1 January 2020 released by ISTAT (details in Appendix A.2) in order to obtain data on soil consumption at municipal level. Given the peculiarity of Venetian territory, a further integration with data sets concerning hydrographic networks (WISE Large rivers and large lakes, released by EEA - Appendix A.3) and coastline (Europe coastline, released by EEA - Appendix A.4) was necessary to identify the portion of land area occupied by large lakes, in particular by Lake Garda, and by the waters of the Venetian lagoon. In this way, data on soil consumption and coverage by water surfaces are obtained for each of the 563 municipalities and for each of the 7 provinces of the region. Figure 3.1 shows the resulted integrated raster for the year 2019.

The consequent integrated raster data sets are therefore made up of pixels with 10m resolution, each classified according to the 23 land cover classes defined in the Report SNPA n. 15/2020 (Table 2.1). To estimate land fragmentation, these pixels are then reclassified in consumed/not consumed and each binary raster is converted into a shapefile suitable for spatial analyses using the software environment R[2].

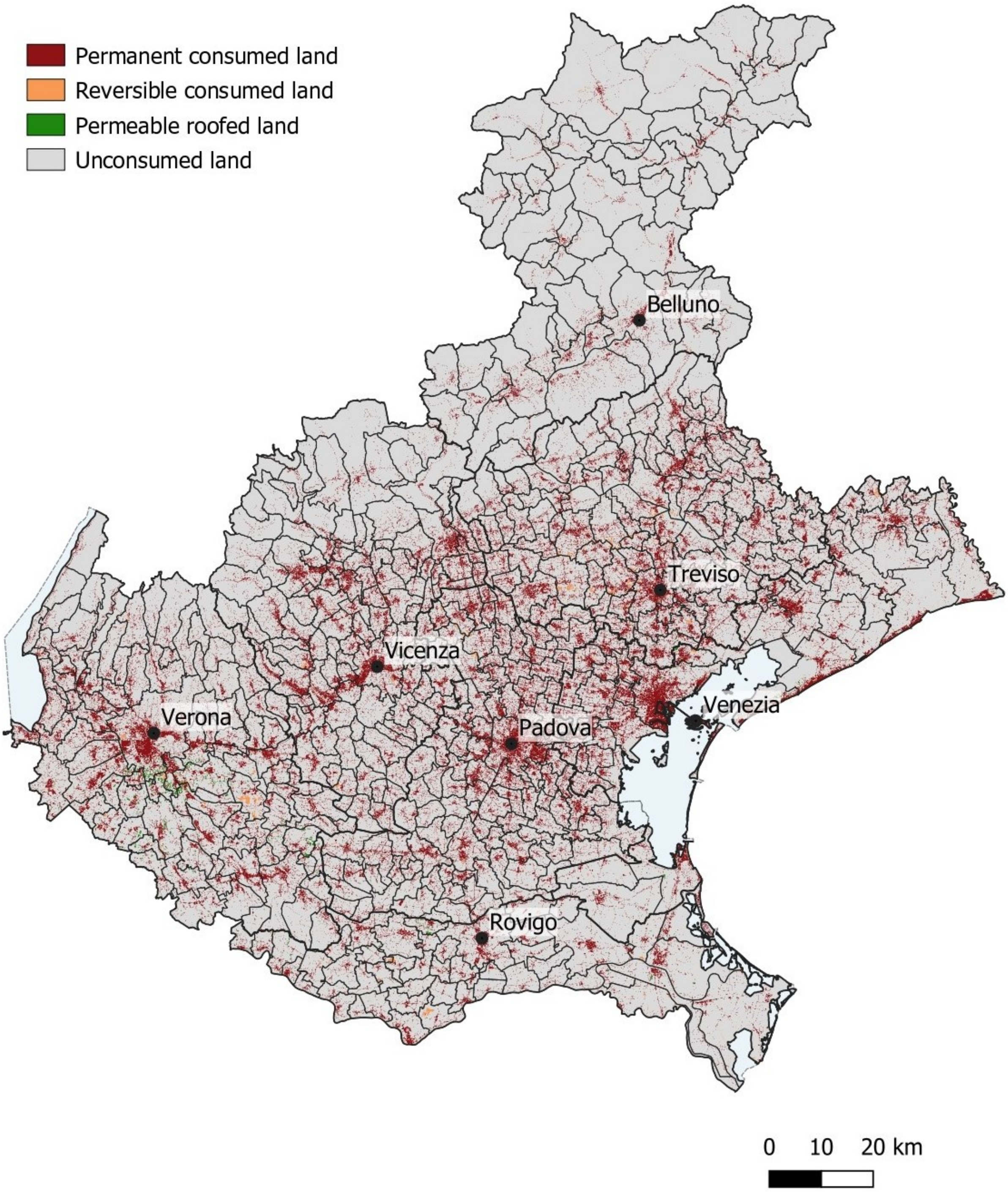
However, the original 10m resolution of the rasters generates huge shapefiles that make the analysis slow and consuming in terms of memory. For this reason, the binary rasters are first re-sampled using B-spline interpolation (Briand & Monasse, 2018) to obtain a lower resolution of 100m and, consequently, shapefiles of reduced size. Despite the lower resolution, it is still possible to obtain faithful results about the spatial distribution of the consumed land areas and it is furthermore possible to identify more precisely and compactly the urban areas, which is indispensable to correctly apply spatial entropy measures for estimating the degree of land fragmentation.

The interpolated rasters are therefore converted in shapefiles composed by 100×100m pixels in which the territory of each province is included in a rectangular window. This passage is fundamental in order to translate the spatial structure of a territory with irregular boundaries into a rectangular matrix. It must be pointed out

[1]QGIS Development Team (2020). *QGIS Geographic Information System*. Open Source Geospatial Foundation Project. http://qgis.osgeo.org

[2]R Core Team (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

Figure 3.1: Land consumption in Veneto (2019)



Source: elaboration on ISPRA data

that when a pixel intersects the territory of more than one municipality, is duplicated in the shapefile data so that for each municipality the entire area of pixels crossed by municipal boundaries is considered in the calculation of spatial entropy. Despite the resulting number of pixels being greater than the true number of pixels presented in the whole region, the final results are not affected since land fragmentation is a trans-boundary phenomenon and the amount of territory considered more than once is furthermore less than 2 km^2 for each province, small portions of territory compared to the total areas. Information about the dimension of the observation window and the number of pixels presented in the shape file are summarized for each province in Table 3.1 (named `data_shp_provinces.xlsx` in Appendix B.2).

Table 3.1: Dimension of the 100m resolution shapefiles regarding Venetian provinces

Province	Verona	Vicenza	Belluno	Treviso	Venice	Padova	Rovigo
Numeric code (COD_PROV)	23	24	25	26	27	28	29
Number of municipalities	98	114	61	94	44	102	50
Window length in pixels (x_pxl)	683	545	803	737	876	641	1092
Window height in pixels (y_pxl)	858	840	904	614	903	658	412
Pixels considered	313,859	291,200	376,611	265,448	218,196	228,736	182,272
True number of pixels	296,823	274,380	363,564	249,892	209,673	214,320	174,182
Overlap in km^2	1.70	1.68	1.30	1.56	0.85	1.44	0.81

As regards the quantification of land fragmentation, the measures spatial mutual information and spatial residual entropy (Altieri et al., 2017) are estimated for each municipality using R software. New functions based on the already existing functions `pair_count`, `shannonZ` and `spat_entropy` contained in `SpatEntropy`[3] CRAN package have been written in order to allow the application to observation windows with irregular borders, such as municipal boundaries, deal with missing data and at the same time reduce the amount of RAM used. The entire codes of these functions named `pair_count_IB`, `shannonZ_IB` and `spat_entropy_IB` are presented in Appendix B.

Spatial residual entropy and spatial mutual information are therefore calculated for each municipality considering only the mainland (not the territory covered by water) and a range of 8 distances intended as the distances in meters between pairs of pixel centroids

w_1 = 100 (4-nearest-neighbors system),

w_2 = 200 (12-nearest-neighbors system),

w_3 = 400 (up to 4 pixels along the cardinal directions),

w_4 = 600 (up to 6 pixels along the cardinal directions),

w_5 = 1000 (up to 10 pixels along the cardinal directions),

w_6 = 1500 (up to 15 pixels along the cardinal directions),

w_7 = 2000 (up to 20 pixels along the cardinal directions),

w_8 = maximum distance between centroids.

In order to compare municipalities with different extensions and allow an intuitive temporal analysis, a proportional version of the two measures (3.46) is calculated by setting the sum between the residual spatial entropy and the spatial mutual information equal to 1 (3.46) for each distance w_k ($k = 1, ..., 8$). In this way, focusing in particular on the values of the spatial mutual information, it is possible to identify with ease a variation in the degree of land fragmentation: high values of partial information indicate positive associations between consumed land pixels and positive associations between unconsumed land pixels. These relations can be translated into "compactness" of the consumed land zones and, consequently, in a lower degree of fragmentation.

3.2.3 Results

Land consumption in Veneto continues to transform the territory at high speeds. Regardless the construction sector crisis that has hit Italy since 2015 resulted in a national slowdown of soil sealing (Munafò, 2020), land take continues to increase at

[3] L. Altieri, D. Cocchi and G. Roli (2018). *SpatEntropy: Spatial Entropy Measures*. R package version 0.1.0. https://CRAN.R-project.org/package=SpatEntropy

a worrying extent in the areas of the Po Valley, becoming more intense in areas that were already heavily affected.

Between 2012 and 2015, the artificially covered surface registered at regional level an increase of 13.42 km^2 (Table 3.2). Although the data itself could be of little significance, the seriousness of the phenomenon appears focusing on the percentages: the increment of sealed land almost doubled over the next three years, passing from the 12.06% of land consumed with respect to the total mainland area in 2012 to the 12.27% of 2018 (+38.70 km^2). The province of Vicenza recorded a trend similar to the regional one with an increase of 6.92 km^2, passing from 12.27% to 12.52% during the six-year period. The minor increases occurred in the provinces of Belluno (+1.05 km^2) and Rovigo (+1.25 km^2) while the greatest consumption of land was registered in the province of Treviso with an increase of 9.86 km^2.

	Area	% Consumed Mainland				Increment (km^2)			
	(km^2)	2012	2015	2018	2019	2012-2015	2015-2018	2018-2019	2012-2019
Belluno	3609.98	2.78	2.79	2.81	2.81	+0.23	+0.82	+0.06	+1.11
Padova	2144.12	18.45	18.53	18.71	18.76	+1.67	+3.78	+1.02	+6.47
Rovigo	1819.88	8.86	8.89	8.94	8.96	+0.37	+0.88	+0.33	+1.58
Treviso	2479.78	16.24	16.41	16.64	16.71	+4.02	+5.84	+1.72	+11.58
Venice	2472.87	16.84	16.99	17.17	17.24	+2.93	+3.66	+1.45	+8.04
Verona	3096.28	13.61	13.68	13.87	13.96	+1.79	+5.79	+2.50	+10.08
Vicenza	2722.46	12.27	12.35	12.52	12.55	+2.41	+4.51	+0.73	+7.65
Veneto	18345.37	12.06	12.13	12.27	12.32	+13.42	+25.28	+7.81	+46.51

Table 3.2: Changes in consumed mainland at provincial level

Unfortunately this negative trend shows no signs of slowing down. Between 2018 and 2019, 7.81 km^2 of permeable soil were defaced by new artificial coverings that is on average more than 5 hectares per day. The province with major land take was Verona with 2.50 km^2 of new artificial land, which is also the highest increment registered between all the Italian provinces (Munafò, 2020), followed by Treviso (+1.72 km^2) and Venice (+1.45 km^2) while again the minor increments occurrd in the provinces of Belluno (+0.06 km^2) and Rovigo (+0.33 km^2).

Up to 2019, the province of Padua is the most affected by the phenomenon of land consumption with 18.76% of its mainland defaced by artificial coverings. The province of Treviso registered the greatest increment of consumed mainland with 11.58 km^2 of sealed land more than in 2012 (from 16.24% to 16.71%). Also the province of Venice showed a similar percentage trend (+8.04 km^2, from 16.84% in 2012 to 17.24% in 2019). At municipal level, the highest land consumption between 2012 and 2019 was found in the Veronese municipalities of Verona (+3.71 km^2), Zevio (+2.35 km^2), Oppeano (+1.77 km^2), San Giovanni Lupatoto (+1.67 km^2), Isola della Scala (+1.36 km^2), Buttapietra (+1.34 km^2) and in the municipality of Venice (+2.01 km^2). Detailed information about land consumption between 2012 and 2019 at provincial level are provided in Appendix C1 while information about land consumption in the 563 Venetian municipalities are provided in Appendix C2.

As regards the quantification of land fragmentation, spatial residual entropy $H(Z)_W$ (3.30) and spatial mutual information $MI(Z, W)$ (3.36) have been computed as described in section 3.2.1. To allow a temporal comparison between municipalities of different extension, a proportional version of the two resulting measures (3.46) was also calculated both globally that for each distance range by setting their sum equal to 1.

Global proportional mutual information $MI_{prop}(Z, W)$ resulted inadequate to identify shapes and pattern of consumed land and this limitation becomes clear when comparing, for example, results for the mountain municipality of Auronzo di Cadore (Figure 3.2) in the province of Belluno and the municipality of Lazise (Figure 3.3) situated on the eastern shore of Lake Garda in the province of Verona. Regardless the very different configuration of their territories, both proportional mutual information values for the year 2019 are close to zero (see Table C3.4). This occurs since the overall value of $MI_{prop}(Z, W)$ is often negatively influenced by what happens at large distances where usually scarce correlation is present. Hence, global proportional mutual information for the whole municipality may be low even when a clustered pattern occurs. This drawback can be overcame through variable W since the two terms forming $H(Z)$ can be further decomposed in a weighted sum of partial terms reflecting the contribution of the k-th distance range to the global mutual information.

In fact, the bar plots in Figure 3.2 and Figure 3.3 representing partial information and partial residual entropy for each distance w_k, suggest that the two measures succeed in capturing the clear different spatial patterns of consumed land. A partial information found to be high at small distances and lower as the distance considered increased, indicates a positive association between pixels of the same type. This association can be translated into "compactness" of the artificially covered zones and hence in a low degree of fragmentation. As a result, it is possible to conclude that in 2019 Auronzo di Cadore is characterized by a lower degree of fragmentation with respect to Lazise.

Small distances proved to be the most suitable for describing the phenomenon of land fragmentation since at greater distances ($w_6 = 1500$m, $w_7 = 2000$m, $w_8 =$ maximum distance in meters) the partial terms of the spatial mutual information are very low, close to zero, for many Venetian municipalities. Thus, distances w_6, w_7 and w_8 are less informative and should be aggregated in future works while shorter distances are the most interesting ones and ought to be analyzed in detail.

In the study presented here, partial information resulted quite low for all the municipalities examined, revealing a trend of inefficient urban expansion spread throughout the region. Moreover, higher degrees of land fragmentation were recorded in municipalities with high percentages of territory defaced by artificial covering. Due to this natural relation between the two phenomena, fragmentation helps to more effectively represent the impact of land consumption on the environment which affects a much wider perimeter than that of artificially sealed surfaces.

And here a specific discourse opens for the municipality of Venice. The capital of the Veneto region has an unique spatial configuration since it is situated on a group of 118 small islands (UNESCO, 2020). This structure of the territory hinders the estimation of land fragmentation through spatial entropy due to the fact that spatial continuity is lacking, and consequently the concept of neighborhood cannot be applied. For this reason, results regarding global and partial proportional mutual information for the municipality of Venice are missing in the tables of Appendix C3.

As for the other municipalities, in year 2019 the municipalities of Bardolino in the province of Verona (Figure 3.4) and Codevigo in the province of Padua (Figure 3.5) resulted with the lowest partial information and therefore with the highest degree of fragmentation. The two municipalities with the highest partial information and consequent lower degree of fragmentation are instead Calalzo di Cadore (Figure 3.5) and Pieve di Cadore (Figure 3.6), both located in the province of Belluno.

Furthermore, comparisons of the results over time reveal that just under one-fourth of the municipalities registered a decrease in the degree of fragmentation between 2012 and 2019. This fact can also be read as an increasing trend in environmental degradation, since the splitting of large agricultural or natural areas into smaller separate parts hinders or prevents the connections necessary for ecosystems and biodiversity conservation.

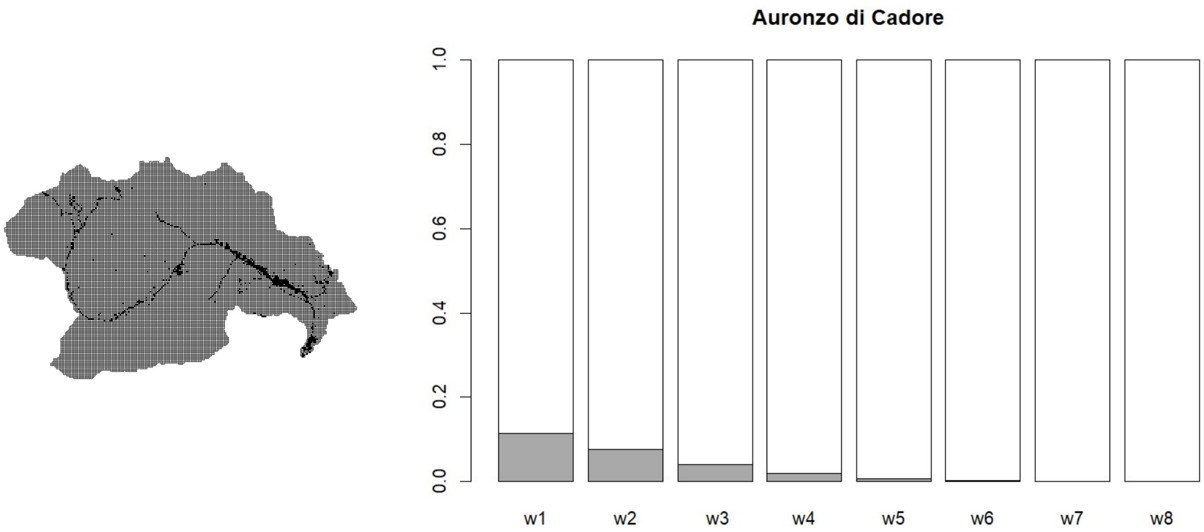


Figure 3.2: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Auronzo di Cadore (BL), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

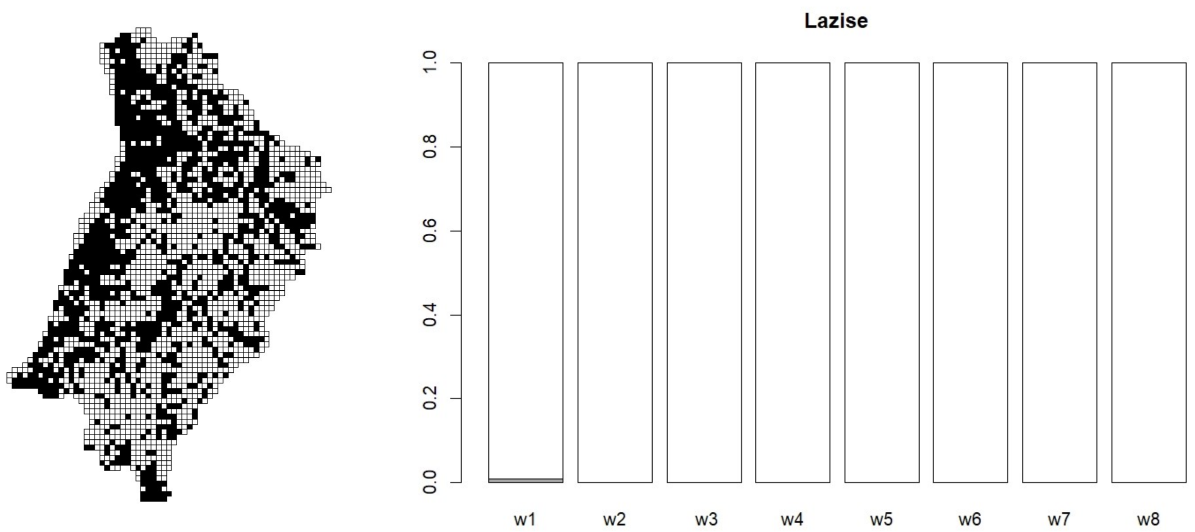


Figure 3.3: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Lazise (VR), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

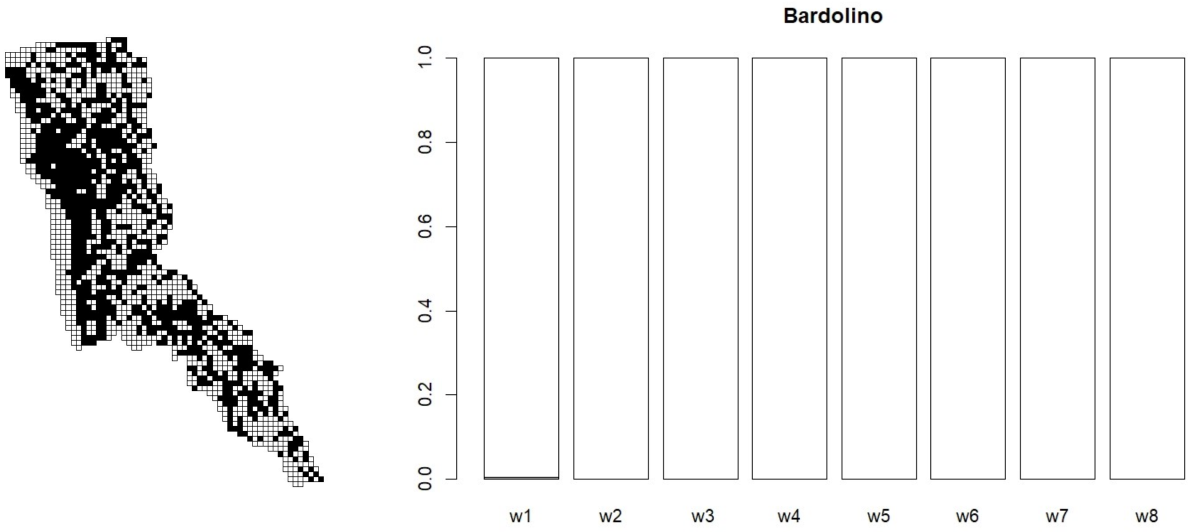


Figure 3.4: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Bardolino (VR), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

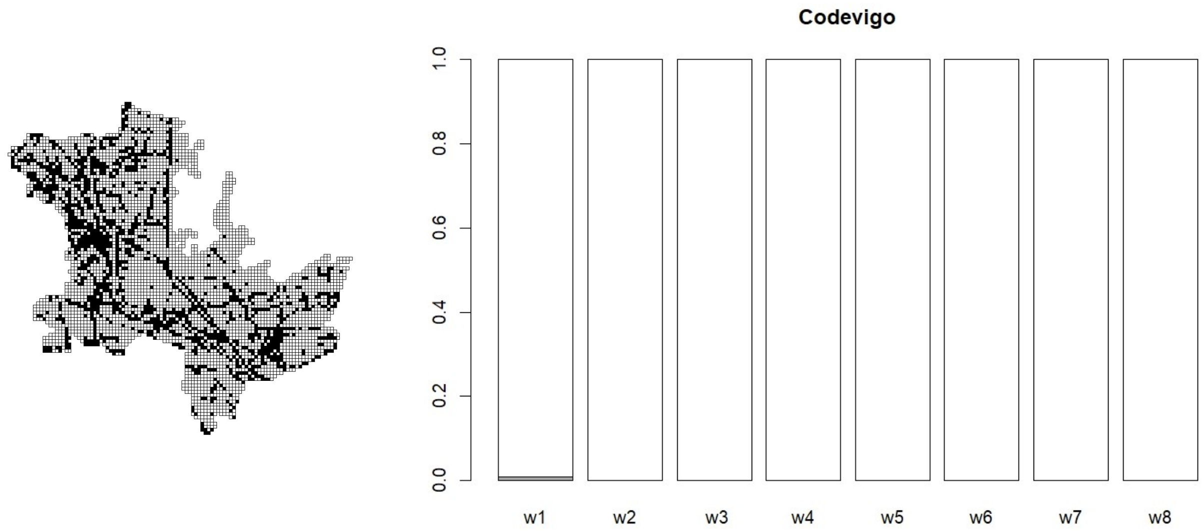


Figure 3.5: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Codevigo (PD), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

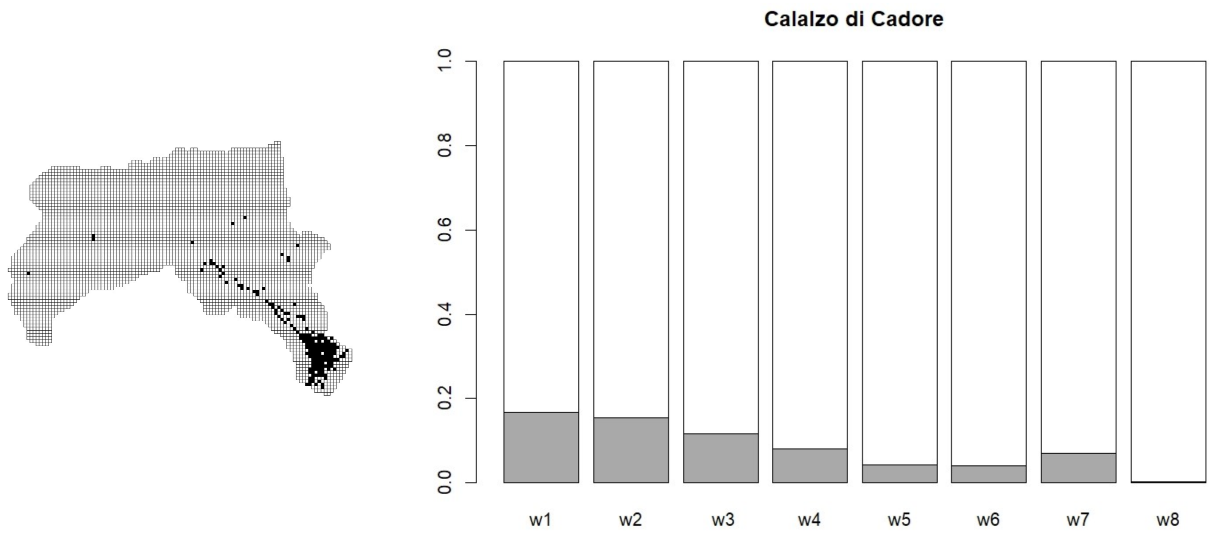


Figure 3.6: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Calalzo di Cadore (BL), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

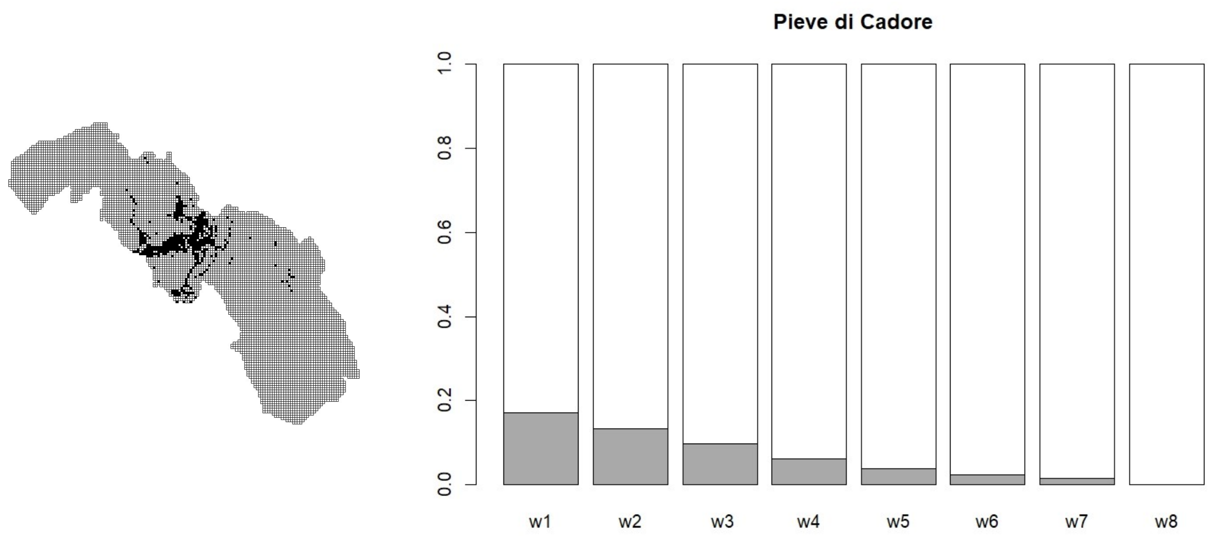


Figure 3.7: a) Pixel lattice with 100x100m resolution of consumed areas (black) in the municipality of Pieve di Cadore (BL), 2019; b) Partial information (grey) and partial residual entropy (white) in proportional terms for each distance range

4 | Measuring Land Fragmentation via Bayesian Estimation of Spatial Entropy

4.1 The two-levels geostatistical binary probit model

In Chapter 3, the interest lied in measuring entropy of spatial data regarding land fragmentation through the approach proposed in Altieri et al. (2018), which allows to decompose entropy into a term accounting for the role of space and a second term quantifying the residual heterogeneity. This method, however, focuses on describing and synthesizing land fragmentation through values of spatial entropy referred to the whole studied territory (values of spatial mutual information and spatial residual entropy refer to the entire municipality) without considering that, in areas within the same territory, entropy can take different values due to the fact that land fragmentation is not a constant phenomenon.

For this reason, the aim of this chapter lies in estimating the entropy of land fragmentation, i.e. in making inference on the phenomenon rather than describe it. With this is mind, data is assumed to be generated by a stochastic process according to an unknown probability function and an unknown entropy where only one realization of the process is observed and exploited in entropy estimation.

Paninski (2003) proposes a way consisting in a widely used approach in the following years which relies on the so-called "plug-in" estimate of entropy. The probabilities presented in the standard formula of Shannon's entropy (3.1) are substituted with observed relative frequencies obtaining the non-parametric and maximum likelihood estimator

$$\hat{H}_p(X) = \sum_{i=1}^{I} log(\hat{p}(x_i)) log\left(\frac{1}{\hat{p}(x_i)}\right) \tag{4.1}$$

where $\hat{p}(x_i) = \frac{n_i}{n}$ is the relative frequency of category i over n data.

The main limit of this approach concerns the estimation of entropy for variables presenting spatial association: the assumption of independence between the observations is never relaxed making this method unsuitable for the estimation of many spatial phenomena as, for example, land fragmentation. In addition, spatial entropy studies referring to (4.1) do not consider inference.

Altieri et al. (2019) proposed a different path for spatial entropy estimation which focuses on the components of the entropy index, i.e. the probabilities, rather than on the index itself, in order to account for spatial effects. Considering that Shannon's entropy (3.1) is a deterministic function of the probability mass function (pmf) of the studied variable, once the probabilities are suitably evaluated, estimating entropy is straightforward. Bayesian spatial regression allows to derive the pmf of such distribution accounting for spatial correlation among categories and therefore, the posterior distribution of entropy can be obtained as transformation of a posterior distribution for the parameters.

The present work addresses the estimation of land fragmentation using geostatistical data described in Section 3.2.1 and therefore, the studied variable is considered to be binary since each pixel of the raster data set is classified as consumed/unconsumed territory. A convenient strategy to model binary outcomes is to assume that they are actually generated by some underlying and unobserved continuous process, where the latter is commonly described by a Gaussian random field (De Oliveira, 2020). This leads to the so-called probit models (Collett, 2003) which are particularly appealing in practice, considering that the underlying continuous random field may have a well defined physical interpretation or just serve as a convenient device to model spatial association among the binary data, beyond that described by the covariates. De Oliveira (2020) also showed that geostatistical models with a link function other than the probit link do not have a flexible second-order structure, which is a problem when we are dealing with hierarchical-structured data. It must be finally pointed out that probit models relax the assumption of stochastic independence between the observations by allowing spatially correlated residuals: in this way the main drawback of (4.1) is overcame and the underlying continuous process can be modeled to predict outcomes at a new location.

The model employed in this work is therefore the geostatistical binary probit model (Diggle & Giorgi, 2019) and, in particular, a two-levels model is specified so as to potentially include individual-level (in this case pixel-level) and cluster-level (municipality-level) variables. Let i and j denote the indices of the i-th pixel within the j-th municipality. The response variable Y_{ij} is a binary indicator taking value 1 if the pixel represents a consumed area and 0 otherwise. Sampling locations can be defined by writing $\mathcal{X} = x_1, ..., x_n$ for the set of n locations at which the outcome variable will be recorded and by calling $\mathcal{X}$ the sampling design. A proxy for the combined effects of all unidentified (i.e. unmeasured) explanatory variables that influence the outcome at location x_i is given by the stochastic term $S(x_i)$. Specifically, the stochastic elements $S(x_i)$ are not mutually independent since the nature of their dependence is determined by their spatial locations: pairs of values at close locations are assumed to be more strongly dependent than pairs at distant locations (Tobler, 1970).

Conditionally on a stochastic model for a spatial surface $S(x_i)$, Y_{ij} are mutually independent Bernoulli variables

$$Y_{ij}|S(x_i) \sim Ber(p_{ij}) \tag{4.2}$$

with probit link function $\Phi^{-1}(\cdot)$, i.e.

$$\Phi^{-1}(p_{ij}) = \alpha + \boldsymbol{z}'_{ij}\boldsymbol{\beta} + S(x_i) \tag{4.3}$$

where $\Phi(\cdot)$ is the cumulative standard normal distribution function, α is a common intercept term for the fixed effects and z_{ij} is a vector of covariates, both at individual- and municipality-level, with associated regression coefficients β. $S(x)$ is constructed as a Gaussian process in which for any finite set of locations $x_1, ..., x_n$, the joint probability distribution of $S(x_1), ..., S(x_n)$ is Multivariate Normal. In this context, the mean of each $S(x)$ is assumed to be zero, because any non-zero mean is expressed through the regression component of (4.3). To complete the specification of the Gaussian process, its covariance function $\gamma(x, x') = Cov\{S(x), S(x')\}$, where x and x' two are arbitrary locations, must be specified. $S(x)$ is assumed to be stationary and isotropic for simplification purposes, whereby the variance of $S(x)$ is a constant (σ^2) and the correlation between $S(x)$ and $S(x')$ only depends on the distance between the two locations x and x', hence $\gamma(x, x') = \sigma^2\rho(||x - x'||)$. Furthermore, the correlation function, $\rho(u)$, must be defined to be a symmetric function since the covariance between two random variables must be symmetric in its arguments. The choice fell on the Matérn covariance function (Rasmussen & Williams, 2006) due to the presence of the parameter ϕ that allows to control the rate at which spatial correlations decay towards zero with increasing spatial separation. The Gaussian process $S(x_i)$ has therefore isotropic Matérn covariance function defined for two points separated by u distance units as

$$\rho(u; \phi, \kappa) = \frac{2^{1-\kappa}}{\Gamma(\kappa)} \left(\frac{u}{\phi}\right)^{\kappa} K_{\kappa} \left(\frac{u}{\phi}\right) \tag{4.4}$$

where $\phi > 0$ is scale parameter, $\kappa > 0$ is the shape parameter and $K_{\kappa}(\cdot)$ is the modified Bessel function of the third kind of order κ (Abramowitz & Stegun, 1965, sec. 9.6).

Defining θ as the vector of the covariance parameters σ^2 and ϕ, each component of θ has independent priors while the vector of regression coefficients β has a multivariate Gaussian prior with zero mean and covariance matrix Σ. Therefore, the hierarchical structure of the priors is the following:

$$\beta \sim MVN(0, \Sigma) \tag{4.5}$$

$$\phi \sim U(0, b_{\phi}) \tag{4.6}$$

$$\sigma^2 \sim U(0, b_{\sigma}) \tag{4.7}$$

An auxiliary variable technique based on Rue and Held (2005) was adopted in order to update regression coefficients β and random effects $S(x_i)$. Defining V_{ij} as a set of random variables that conditionally on β and $S(x_i)$, are mutually independent Gaussian with mean $\alpha + \mathbf{z}'_{ij}\boldsymbol{\beta} + S(x_i)$ and unit variance. Then, $Y_{ij} = 1$ if $V_{ij} > 0$ and $Y_{ij} = 0$ otherwise. Using this representation of the model, a Gibbs sampler is used to simulate from the full conditionals of $\boldsymbol{\beta}$, $S(x_i)$ and V_{ij} (Rue and Held, 2005, section 4.3). In the MCMC algorithm implemented in the CRAN package `PrevMap`[1] used for the analysis, the transformed covariance parameters

$$(\theta_1, \theta_2) = \left(\frac{log(\sigma^2)}{2}, log\left(\frac{\sigma^2}{\phi^{2\kappa}}\right)\right) \tag{4.8}$$

are instead independently updated with a Metropolis-Hastings algorithm (Hastings,

[1] Giorgi E., Diggle P. (2017). "PrevMap: An R Package for Prevalence Mapping". *Journal of Statistical Software*, 78. doi: 10.18637/jss.v078.i08 (URL: https://doi.org/10.18637/jss.v078.i08).

1970). Through this process a posterior distribution for the parameters of the probability of success is obtained for each pixel (i.e. the probability of being consumed) and a local estimated entropy value is computed as

$$\hat{H}(X)_{ij} = \hat{p}_{ij} log \left(\frac{1}{\hat{p}_{ij}} \right) + (1 - \hat{p}_{ij}) log \left(\frac{1}{1 - \hat{p}_{ij}} \right) \tag{4.9}$$

obtaining an entropy surface estimating the entropy process.

4.2 Results

Bayesian estimation for the geostatistical binary probit model (4.3) is performed using the function `binary.probit.Bayes` implemented in CRAN package `PrevMap`[2].

Data from the shapefile described in Section 3.2.1 was employed in the analysis. In particular, the variable `MUNICIPALITY` is used as municipality-level variable and no pixel-level variables are included in the model. The addition of further covariates to the model has also been considered. However, since the stochastic term $S(x_i)$ is a proxy for the combined effects of all unidentified explanatory variables that influence the outcome at location x, the lack of knowledge resulting from the absence of additional explanatory variables can be express by considering their combined effects as a realisation of $S(x)$.

In order to specify spatial random effects at municipality-level, a vector of spatial coordinates of municipality centroids is provided (`ID.coords`) along with the spatial coordinates of pixel centroids (`coords`). Uninformative uniform priors are chosen for the scale parameter ϕ and the variance σ^2 while the vector of regression coefficients $\boldsymbol{\beta}$ has a multivariate Gaussian prior with zero mean and covariance identity matrix I:

$$\boldsymbol{\beta} \sim MVN(0, I) \tag{4.10}$$

$$\phi \sim U(0, 10) \tag{4.11}$$

$$\sigma^2 \sim U(0, 100) \tag{4.12}$$

The shape parameter κ must instead be fixed by the researcher since not all of the three parameters σ, ϕ and κ can be consistently estimated under in-fill asymptotics, and in practice this translates to κ often being poorly identified (Zhang, 2004). When

[2]ibid.

$\kappa = 1/2 + p$ for $p \in \mathbb{N}$ then the Matérn has a simplified form and can be rewritten as product of an exponential and a polynomial of order p (Rasmussen & Williams, 2006). A value of $\kappa = 5/2$ is widely used in machine learning literature (e.g. Cornford et al., 2002) and for this reason adopted also in this work. Further details on the priors defined for the model parameters and on the different tuning parameter used in the MCMC algorithm for Bayesian inference are presented in Appendix D1.

For simplicity of exposition, only two small areas composed by few municipalities are analyzed. The first one contains the municipalities of Breganze, Colceresa, Fara Vicentino, Pianezze and Schiavon in the province of Vicenza. The second area examined is composed by three small municipalities in the province of Belluno, Cencenighe Agordino, S. Tomaso Agordino and Vallada Agordina. Data regarding land consumption of these two territories in 2019 are depicted in Figure 4.1 and Figure 4.2. These two scenarios are particularly suitable for assessing the performance of the proposed entropy estimator since they are characterized by very different spatial configurations and therefore by different levels of land fragmentation.

To the aim of obtaining the entropy surface for each scenario, a two-levels binary geostatistical probit model is fitted to obtain a posterior distribution for the parameters of the probability of success for each pixel. The outputs, autocorrelograms and trace-plots for the posterior samples of the model parameters and spatial random effects can be found in Appendix D. Then, an entropy value is computed over each pixel following Equation (4.9) producing a smooth spatial function. The results for the two scenarios are shown in Figure 4.3 and Figure 4.4, where values range from 0 (dark zones) to $log(2)$ (light zones).

Both figures show smoothly varying surfaces but, comparing the results for the territory in the province of Vicenza with the territory in the province of Belluno, it is possible to notice that the entropy surface takes low values in areas where pixels are of the same type. Moreover, in the areas where white and black pixels mix (i.e. in the areas with high level of fragmentation), the entropy surface tends to higher values (lighter areas). Therefore, the fitted model estimates satisfactorily the entropy of the underlying spatial process and the entropy surfaces can be used to visualize the phenomenon of land fragmentation.

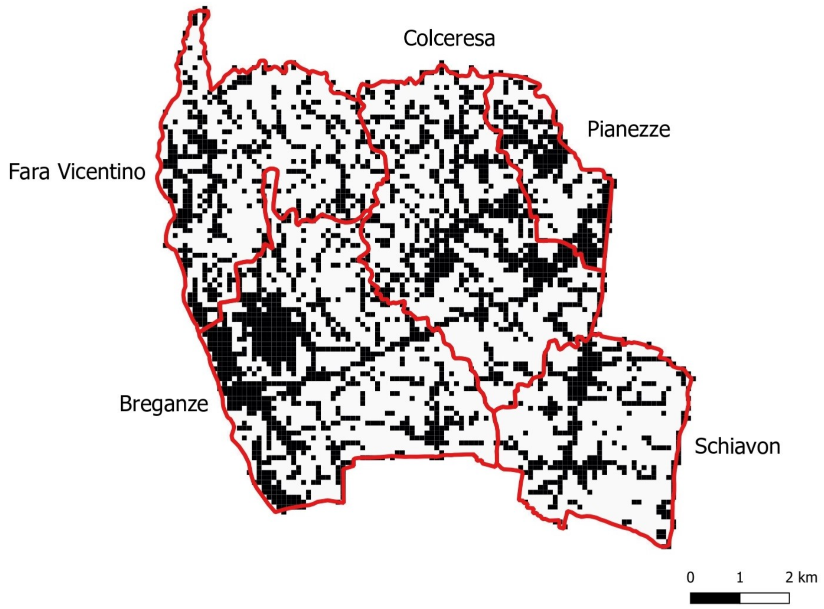


Figure 4.1: Pixel lattice with 100x100m resolution of consumed areas (black) in the municipalities of Breganze, Colceresa, Fara Vicentino, Pianezze and Schiavon (VI)

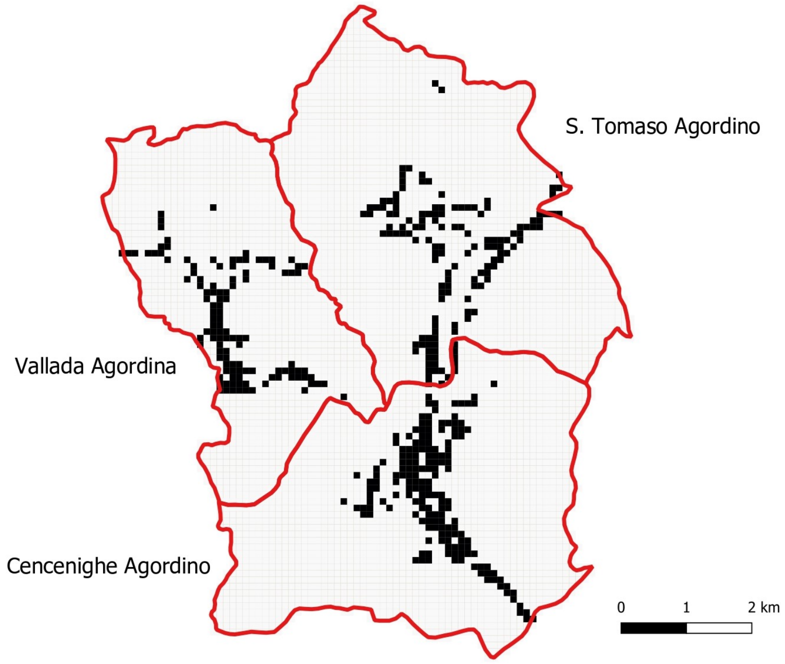


Figure 4.2: Pixel lattice with 100x100m resolution of consumed areas (black) in the municipalities of Cencenighe Agordino, S. Tomaso Agordino and Vallada Agordina (BL)

Figure 4.3: Estimated entropy surface for the municipalities of Breganze, Colceresa, Fara Vicentino, Pianezze and Schiavon (VI)

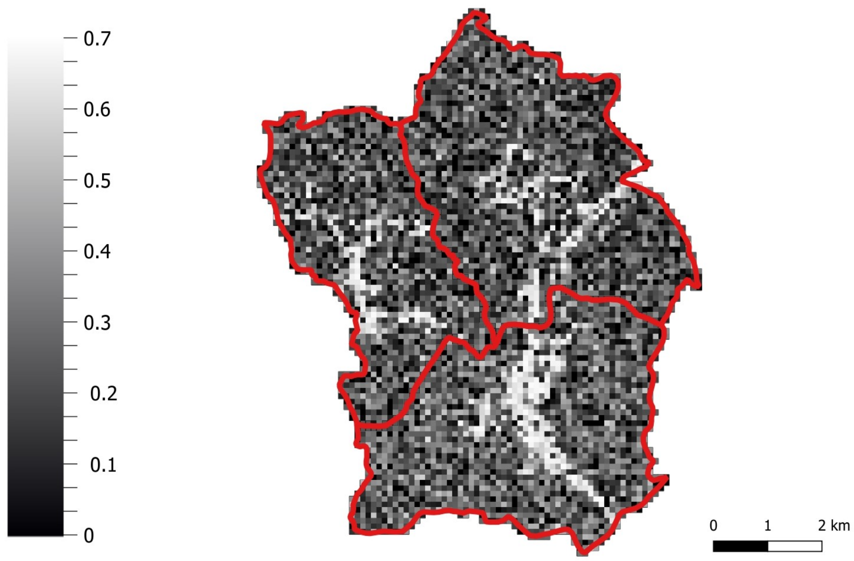


Figure 4.4: Estimated entropy surface for the municipalities of Cencenighe Agordino, S. Tomaso Agordino and Vallada Agordina (BL)

5 | Conclusions

This work, that has been possible thanks to an internship opportunity offered by the Italian National Institute of Statistics (Italian: Istituto Nazionale di Statistica, ISTAT), aims to quantify via spatial entropy the level of land fragmentation, i.e. the heterogeneity in landscape pattern. Entropy is usually applied to synthesize the observed data in a single, interpretable number but, in practical situations, spatial phenomena are not constant and therefore entropy can take different values also in areas belonging to the same analysis window. For this reason, two different methods are proposed in order to allow the quantification of land fragmentation both in studies where the objective is to describe and synthesize via spatial entropy what is observed, and in studies where the objective is to estimate the entropy of land fragmentation, i.e. to make inference on the phenomenon.

The first approach involves the estimation of spatial mutual information and spatial residual entropy (Altieri et al., 2017) in order to describe and synthesize the phenomenon of land fragmentation. Regardless several entropy measures have been considered, only spatial mutual information and spatial residual entropy have been deemed suitable for the purpose since they share all the desiderable features of entropy measures. Spatial mutual information and spatial residual entropy enjoy the additivity property and do not preserve pair ordering, which is reasonable since spatial phenomena are not usually assumed to have a direction. Information about the categories of the study variable are preserved and the bivariate properties of entropy can be exploited to decompose the entropy into a term accounting for the role of space and a noise term summarizing the residual information. Moreover, the global values and the partial terms of spatial mutual information and spatial residual entropy can be investigated jointly and the comparison between sites of different size is allowed, which is fundamental for planning polices.

The Italian region of Veneto is chosen as case study to test the validity of spatial mutual information and spatial residual entropy as measures of land fragmentation. For each of the 563 Venetian municipalities, the two measures are calculated at 8 different distance ranges in four years (2012, 2015, 2018 and 2019) using raster data released by ISPRA (Italian National Institute for Environmental Protection and Research, Italian: Istituto Superiore per la Protezione e la Ricerca Ambientale) regarding soil consumption in Italy. The results are next both compared between different municipalities and interpreted as increasing/decreasing trends in land fragmentation for each singular municipality using a proportional version of the two resulting measures that is calculated both globally that for each distance range by setting their sum equal to 1. The quantity of interest is therefore the global proportional mutual information $MI_{prop}(Z, W)$ because it quantifies the part of entropy of Z (categorical variable whose categories identify co-occurrences of the variable of interest over space) due to the spatial configuration W: the more Z depends on W, i.e. the more the realizations of the study variable are spatially associated, the higher the global proportional mutual information. Nevertheless, in this study, global proportional mutual information $MI_{prop}(Z, W)$ resulted inadequate to identify shapes and patterns of consumed land since municipalities with very different spatial configuration of their territories registered equal values of $MI_{prop}(Z, W)$. This can be explained taking into account that $MI_{prop}(Z, W)$ is often negatively influenced by what happens at large distances where usually scarce correlation is present and hence, $MI_{prop}(Z, W)$ may be low even when a clustered pattern occurs.

Partial information and partial residual entropy succeed instead in capturing the difference in land consumption patterns between municipalities with different spatial configuration. Partial information for municipality with low degree of land fragmentation is found to be high at small distances and lower as the distance considered increased, indicating a positive association between pixels of the same type which can be translated into "compactness" of the artificially covered zones, and hence in a low degree of fragmentation. Conversely, in municipalities with a high level of land fragmentation, partial information is found to be close to zero for all the 8 distance ranges considered. For all the municipalities, small distances resulted therefore the most informative to properly interpret the spatial phenomenon and in particular, the widespread low values of partial information disclosed a trend of inefficient urban expansion spread throughout the region. Moreover, higher degrees of land fragmentation were recorded in municipalities with high percentages of territory defaced by artificial covering revealing a natural relation between land fragmentation and land consumption. The integration of the two measures, in fact, also allows to take into account the relevant pattern effects generated by the dispersion of the settlements on the territory. As regards time comparisons, between 2012 and 2019, just under one-fourth of the 563 municipalities analyzed registered a decrease in the degree of fragmentation making even more clear the increasing trend in environmental degradation that is affecting the region. Splitting large agricultural or natural areas into smaller separate parts hinders or prevents the connections necessary for ecosystems and biodiversity conservation. According to 2019 data, land fragmentation is critical in peri-urban and urban areas, where a continuous and significant increase in artificial surfaces is registered. This involves a subsequent increase in the buildings density at the expense of agricultural and natural areas, together with a deterioration in the situation of the areas around the infrastructural system that become more fragmented and object of artificialization interventions due to their greater accessibility.

The second approach proposed in this work aims to extend the quantification of land fragmentation by allowing researchers to make inference on the phenomenon through the estimation of spatial entropy starting from rigorous posterior evaluation of its components, i.e. the probabilities. The basic hypothesis here is that land fragmentation is not a constant phenomenon but smoothly varies over space and therefore, spatial entropy should not be a single number, but rather it should be allowed to vary over space as a smooth function. In this spirit, entropy is framed within the theory of Bayesian models for spatial data and a two-levels geostatistical probit model is applied to provide good estimates for the distribution parameters and, consequently, for entropy. This procedure ensured realistic results: in the areas with high level of fragmentation, the entropy surface tends to higher values while in areas not affected by the phenomenon, the entropy surface tends to values close to zero. The fitted model estimates satisfactorily the entropy of the underlying spatial process and therefore the resulted entropy surfaces can be used to better visualize the phenomenon of land fragmentation.

Both approaches proposed in this work can be considered useful toolboxes for analyzing land consumption data to quantify the degree of land fragmentation.

Spatial mutual information and spatial residual entropy are helpful to grasp the spatial behavior of the phenomenon since distance plays an important role in determining the heterogeneity of land patches. In particular, partial information terms help to understand whether space plays a relevant role at each distance class, while spatial partial residual entropies focus on the heterogeneity of the study variable due to other sources.

The two-levels geostatistical probit model allows researchers to make inference on the phenomenon of land fragmentation and to obtain also entropy surfaces which describe the process in detail all over the study area rather than a single entropy value referred to the whole territory. The great advantage of this second approach is given by the flexibility of the model which may enable the addition of further variables (e.g. land cover and land cover change, Land Productivity Dynamics, and change in Soil Organic Carbon stocks) to extend the definition of land consumption. In this way, natural areas can be identified with greater accuracy and land fragmentation can therefore be better assessed to have a more complete picture of a phenomena that impact on land functionality and limit our ability to *"fight desertification, restore degraded land and soil, including land affected by desertification, drought and floods, to achieve the neutrality of land degradation* and to *"make cities more inclusive, safe, resilient and sustainable"* by 2030, as planned by the Sustainable Development Goals defined by the United Nations Global Agenda for Sustainable Development.

Appendix A : Data sets

A1 Soil consumption in Italy

All the following data sets regarding soil consumption in Italy belong to ISPRA - Istituto Superiore per la Protezione e la Ricerca Ambientale (www.isprambiente.gov.it) "Attribution License 3.0 Italy (CC BY SA 3.0 IT)"
http://creativecommons.org/licenses/by-sa/3.0/it/legalcode

- Carta nazionale del consumo di suolo 2012 [National soil consumption map 2012] (10m resolution) v.1.0 22/07/2020 available at http://groupware.sinanet.isprambiente.it/uso-copertura-e-consumo-di-suolo/library/consumo-di-suolo/carta-nazionale-consumo-suolo-2012
- Carta nazionale del consumo di suolo 2015 [National soil consumption map 2015] (10m resolution) v.1.0 22/07/2020 available at http://groupware.sinanet.isprambiente.it/uso-copertura-e-consumo-di-suolo/library/consumo-di-suolo/carta-nazionale-consumo-suolo-2015
- Carta nazionale del consumo di suolo 2018 [National soil consumption map 2018] (10m resolution) v.1.0 22/07/2020 available at http://groupware.sinanet.isprambiente.it/uso-copertura-e-consumo-di-suolo/library/consumo-di-suolo/carta-nazionale-consumo-suolo-2018
- Carta nazionale del consumo di suolo 2019 [National soil consumption map 2019] (10m resolution) v.1.0 22/07/2020 available at http://groupware.sinanet.isprambiente.it/uso-copertura-e-consumo-di-suolo/library/consumo-di-suolo/carta-nazionale-consumo-suolo-2019

The pixels of all data sets are classified according to the scheme defined in the Report SNPA n. 15/2020 (Table 2.1)

A2 Boundaries of Italian municipalities as of 1 January 2020

The shape file Com01012020_WGS84 contains data regarding boundaries of Italian municipalities as of 1 January 2020 and is characterized by WGS84 coordinate reference system and UTF-8 encoded attributes listed in the following table. It is available at http://www.istat.it/storage/cartografia/confini_amministrativi/non_generalizzati/Limiti01012020.zip.

Table A2: Attributes of Com01012020_WGS84 shapefile

Attribute	**Description**
COD_RIP	Numeric code of the geographical area: 1) Northwest, 2) Northeast, 3) Center, 4) South, 5) Islands
COD_REG	Numeric code that uniquely identifies the 20 Italian regions
COD_PROV	Numeric code that uniquely identifies the Italian provinces
COD_CM	ISTAT code of the metropolitan city (three characters in numeric format) obtained by adding 200 to the corresponding code of the province
PRO_COM	ISTAT statistical code of the municipality composed by 6 characters in numeric format obtained from the concatenation of the province code with the progressive municipal code
PRO_COM_T	ISTAT statistical code of the municipality composed by 6 characters in alphanumeric format obtained from the concatenation of the province code with the progressive municipal code
COMUNE	Name of the municipality
COMUNE_A	Name of the municipality in a language other than Italian
POP_CCCC (*)	Legal population at the date of the census
CC_P	Indication of the provincial capital municipality (1 = municipality is a provincial capital; 0 = municipality is not a provincial capital)
CC_P_CM	Indication of the provincial capital municipality or metropolitan city (1 = municipality is a provincial capital; 0 = municipality is not a provincial capital)
COD_UTS	Numerical code of the supra-municipal territorial units
CC_UTS	Indication of the provincial capital municipality, free consortium of municipalities and metropolitan city (1 = municipality is a provincial capital; 0 = municipality is not a provincial capital)

(*) CCCC referres to the census year (20 October 1991, 21 October 2001 and 9 October 2011)

A3 WISE large rivers and large lakes

The data set contains information on European hydrographic network and in particular on Large lakes, lakes that have a surface area larger than 500 km^2. The definitions are from the WISE GIS guidance document. The data set is available at https://www.eea.europa.eu/data-and-maps/data/wise-large-rivers-and-large-lakes/

Table A3: WISE Large rivers and large lakes metadata

Year	2009
Geographic accuracy	5000 m
Scale of the data set	1:10000000
Rights	EEA standard re-use policy: unless otherwise indicated, re-use of content on the EEA website for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged (https://www.eea.europa.eu/legal/copyright). Copyright holder: European Environment Agency (EEA)
Coordinate reference system	EPSG:3035
Data sources	Water Pattern Europe, scale 10 million, version 2, from EUROSTAT GISCO database; Water Framework Directive article 3 data on rivers and lakes from countries; Joint Research Centre catchment database CCM1
Owners	European Environment Agency (EEA)
Processors	European Topic Centre on Inland, Coastal and Marine waters (ICM)

A4 EEA coastline for analysis

The EEA coastline for analysis data set is created for highly detailed analysis using the line separating water from land as criteria for defining the coastline and is available at https://www.eea.europa.eu/data-and-maps/data/eea-coastline-for-analysis-1

Table A4: EEA coastline for analysis metadata

Year	2015
Scale of the data set	1:100000
Rights	EEA standard re-use policy: unless otherwise indicated, re-use of content on the EEA website for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged (https://www.eea.europa.eu/legal/copyright). Copyright holder: European Environment Agency (EEA)
Coordinate reference system	EPSG:3035
Data sources	EU-Hydro is a european-wide hydrological reference data set currently being developed under the Copernicus, http://www.copernicus.eu/, the European Earth Observation Programme GSHHG, "A Global Self-consistent, Hierarchical, High-resolution Geography Database", http://www.soest.hawaii.edu/pwessel/gshhg NGA coastline, Coastline features from the National Geospatial-Intelligency Agency (NGA)
Owners	European Environment Agency (EEA)
Processors	European Environment Agency (EEA)

Appendix B : Functions

B1 pair_count_IB

```
pair_count_IB = function(data, adj.mat, breaks,
        missing.cat = NULL) {
datavec = c(data)
split = as.integer(seq(1,length(datavec)+1,
        length.out = breaks))
output.table = data.frame(couple = factor(),
abs.frequency = integer(), proportion = numeric())
for(i in 1:(length(split)-1)) {
  couplevec = NULL
  for(j in split[i]:(split[i+1]-1)){
    ind = which(adj.mat[j,]==1)
    if (length(ind)>0) {
      assoc = datavec[ind]
      assoc.num = as.numeric(as.factor(datavec))[ind]
    couple = ifelse(as.numeric(as.factor(datavec))[j]
     <= assoc.num, paste(datavec[j], assoc, sep = ""),
      paste(assoc, datavec[j], sep = ""))
     } else couple = NULL
  couplevec = c(couplevec, couple)
   }
  if (is.numeric(c(data)))
  cat.names = sort(c(unique(c(data)), missing.cat))

  if (is.character(c(data))|is.factor(c(data)))
  cat.names = sort(as.factor(c(unique(c(data)),
```

```
        as.character(missing.cat))))
  couple.names = NULL
  for(i in 1:length(cat.names))
        couple.names = c(couple.names,
                paste(cat.names[i],
                cat.names[i:length(cat.names)], sep = ""))
  couple.n = choose(length(datavec[!is.na(datavec)]),2)

  # Build relative frequencies
  couple.list = sort(unique(couplevec))
  abs.freq = as.numeric(table(couplevec))
  abs.freq.complete = numeric(length(couple.names))
  for(cc in 1:length(couple.names)){
        which.ind = which(couple.list == couple.names[cc])
        if (length(which.ind) > 0)
                abs.freq.complete[cc] = abs.freq[which.ind]
        }
  rel.freq = abs.freq.complete/couple.n
  freq.table = data.frame(couple.names,
        abs.freq.complete, rel.freq)
  colnames(freq.table) = c("couple", "abs.frequency",
        "proportion")
  output.table = bind_rows(freq.table, output.table) %>%
  group_by(couple) %>%
  summarise_all(list(~sum(., na.rm = TRUE)))
  }
output.table$proportion =
        as.numeric(output.table$abs.frequency/
        sum(output.table$abs.frequency))
return(list(probabilities = output.table,
        Qk = sum(output.table$abs.frequency)))
}
```

B2 shannonZ_IB

```
shannonZ_IB = function(data, breaks, missing.cat = NULL){
if(!is.matrix(data) & !is.vector(data))
        print("Data must be a matrix or a vector")
datavec = c(data)
indx = c()
for(i in 1:(length(datavec)-1)){
        if(is.na(datavec[i]) & is.na(datavec[i+1])
        & is.na(datavec[i+1]==datavec[i]+1)){
                indx = c(indx,i)
        }
}
if(length(indx)!= 0) datavec = datavec[-indx]
if(is.na(datavec[1])) datavec = datavec[-1]
if(is.na(datavec[length(datavec)]))
        datavec = datavec[-length(datavec)]
indx = which(is.na(datavec))
adj.mat = matrix(NA, length(datavec), length(datavec))
for(j in 1:(length(datavec)-1))
        adj.mat[j, (j+1):length(datavec)] = 1
if(length(indx != 0)){
        for(j in 1:length(indx)) adj.mat[indx[j],
        (indx[j]+1):length(datavec)] = NA
}
output = pair_count_IB(datavec, adj.mat, breaks = breaks,
        missing.cat)
print("Computing entropy...")
prop = output$probabilities$proportion
                [output$probabilities$proportion > 0]
localH = sum(prop*log(1/prop))
return(list(probabilities = output$probabilities,
         shannon.Z = localH))
}
```

B3 spat_entropy_IB

```
spat_entropy_IB = function(data, dmat, dist.breaks, shannZ,
                breaks, missing.cat=NULL) {

#1) Z marginal frequencies
P.zr = shannZ$probabilities$proportion
names(P.zr) = shannZ$probabilities$couple
P.zr

#2) W marginal frequencies and Z|wk conditional frequencies
n.dist = length(dist.breaks)-1
QQ = sum(shannZ$probabilities$abs.frequency)
P.zr.cond.wk = vector("list", n.dist)
P.wk = numeric(n.dist)
datavec = c(data[!is.na(data)])

for (dd in 1:n.dist) {
   adj.mat = matrix(NA, length(datavec), length(datavec))
   indx = as.matrix(which(dmat > distbreaks[dd]
                & dmat <= distbreaks[dd+1], arr.ind = T))
   for(j in 1:nrow(indx))
        adj.mat[indx[[j,1]], indx[[j,2]]] = 1
   output = pair_count_IB(datavec, adj.mat,
                        breaks = breaks, missing.cat)
   P.zr.cond.wk[[dd]] = output$probabilities$proportion
   names(P.zr.cond.wk[[dd]]) = output$probabilities$couple
   P.wk[dd] = output$Qk/QQ

   adj.mat = NULL
   indx = NULL
}

# Partial terms
res.local = mut.local = numeric(n.dist)
```

```
for(dd in 1:n.dist) {
   cond.probs = as.numeric(P.zr.cond.wk[[dd]]
                        [P.zr.cond.wk[[dd]] > 0])
   marg.probs = as.numeric(P.zr[P.zr.cond.wk[[dd]] > 0])
   res.local[dd] = sum(cond.probs*log(1/cond.probs))
   mut.local[dd] = sum(cond.probs*log(cond.probs/marg.probs))
}
res.global = sum(P.wk*res.local)
mut.global = sum(P.wk*mut.local)

# Output
return(list(mut.global = mut.global, res.global = res.global,
   shannZ = shannZ$shannon.Z, mut.local = mut.local,
   res.local = res.local, pwk = P.wk,
   pzr.marg = P.zr, pzr.cond = P.zr.cond.wk,
   Q = QQ, Qk = P.wk*QQ))
}
```

Appendix C : Additional result tables

C1 Land consumption in Veneto at provincial level

Table C1.1 : Land consumption from 2012 to 2019 - Veneto

	Veneto							
	2012		2015		2018		2019	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	2058.60	11.22	2071.67	11.29	2050.39	11.18	2053.85	11.20
Reversible consumed land	66.66	0.36	67.01	0.37	113.57	0.62	117.92	0.64
Total consumed land	2125.26	11.58	2138.68	11.66	2163.96	11.80	2171.77	11.84
Permeable roofed land	6.14	0.03	6.45	0.04	34.19	0.19	34.64	0.19
Not consumed land	15497.72	84.48	15483.99	84.40	15430.97	84.11	15422.71	84.07
Total not consumed land	15503.86	84.51	15490.44	84.44	15465.16	84.30	15457.35	84.26
Sea and big lakes	716.25	3.90						
Total area	18345.37							

Table C1.2: Land consumption from 2012 to 2019 - Belluno

	Belluno							
	2012		**2015**		**2018**		**2019**	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	97.52	2.70	97.68	2.71	97.82	2.71	97.83	2.71
Reversible consumed land	2.85	0.08	2.92	0.08	3.60	0.10	3.65	0.10
Total consumed land	100.37	2.78	100.60	2.79	101.42	2.81	101.48	2.81
Permeable roofed land	0.17	0.00	0.17	0.00	0.21	0.01	0.21	0.01
Not consumed land	3509.44	97.21	3509.21	97.21	3508.35	97.18	3508.29	97.18
Total not consumed land	3509.61	97.22	3509.38	97.21	3508.56	97.19	3508.50	97.19
Sea and big lakes	-	-						
Total area	3609.98							

Table C1.3: Land consumption from 2012 to 2019 - Padova

	Padova							
	2012		**2015**		**2018**		**2019**	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	381.96	17.81	383.59	17.89	382.27	17.83	382.92	17.86
Reversible consumed land	9.35	0.44	9.39	0.44	14.49	0.68	14.86	0.69
Total consumed land	391.31	18.25	392.98	18.33	396.76	18.50	397.78	18.55
Permeable roofed land	0.83	0.04	0.88	0.04	2.48	0.12	2.52	0.12
Not consumed land	1728.41	80.61	1726.69	80.53	1721.31	80.28	1720.25	80.23
Total not consumed land	1729.24	80.65	1727.57	80.57	1723.79	80.40	1722.77	80.35
Sea and big lakes	23.57	1.10						
Total area	2144.12							

Table C1.4: Land consumption from 2012 to 2019 - Rovigo

	Rovigo							
	2012		**2015**		**2018**		**2019**	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	143.10	7.86	143.57	7.89	139.42	7.66	139.51	7.67
Reversible consumed land	8.06	0.44	7.96	0.44	12.99	0.71	13.23	0.73
Total consumed land	151.16	8.31	151.53	8.33	152.41	8.37	152.74	8.39
Permeable roofed land	0.97	0.05	1.05	0.06	3.74	0.21	3.74	0.21
Not consumed land	1553.07	85.34	1552.62	85.31	1549.05	85.12	1548.72	85.10
Total not consumed land	1554.04	85.39	1553.67	85.37	1552.79	85.32	1552.46	85.31
Sea and big lakes	114.68	6.30						
Total area	1819.88							

Table C1.5: Land consumption from 2012 to 2019 - Treviso

	Treviso							
	2012		**2015**		**2018**		**2019**	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	392.68	15.84	396.59	15.99	386.60	15.59	387.05	15.61
Reversible consumed land	10.15	0.41	10.26	0.41	26.09	1.05	27.36	1.10
Total consumed land	402.83	16.24	406.85	16.41	412.69	16.64	414.41	16.71
Permeable roofed land	0.57	0.02	0.60	0.02	2.37	0.10	2.38	0.10
Not consumed land	2076.38	83.73	2072.33	83.57	2064.72	83.26	2062.99	83.19
Total not consumed land	2076.95	83.76	2072.93	83.59	2067.09	83.36	2065.37	83.29
Sea and big lakes	-	-						
Total area	2479.78							

Table C1.6: Land consumption from 2012 to 2019 - Venicea

	Venice							
	2012		2015		2018		2019	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	337.22	13.64	340.12	13.75	335.66	13.57	336.27	13.60
Reversible consumed land	7.62	0.31	7.65	0.31	15.77	0.64	16.61	0.67
Total consumed land	344.84	13.94	347.77	14.06	351.43	14.21	352.88	14.27
Permeable roofed land	0.81	0.03	0.83	0.03	4.46	0.18	4.47	0.18
Not consumed land	1701.52	68.81	1698.57	68.69	1691.28	68.39	1689.82	68.33
Total not consumed land	1702.33	68.84	1699.40	68.72	1695.74	68.57	1694.29	68.52
Sea and big lakes	425.70	17.21						
Total area	2472.87							

Table C1.7: Land consumption from 2012 to 2019 - Verona

	Verona							
	2012		2015		2018		2019	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	381.98	12.34	383.66	12.39	381.79	12.33	382.95	12.37
Reversible consumed land	18.83	0.61	18.94	0.61	26.6	0.86	27.94	0.90
Total consumed land	400.81	12.94	402.60	13.00	408.39	13.19	410.89	13.27
Permeable roofed land	2.52	0.08	2.73	0.09	20.58	0.66	20.96	0.68
Not consumed land	2540.65	82.05	2538.65	81.99	2515.01	81.23	2512.13	81.13
Total not consumed land	2543.17	82.14	2541.38	82.08	2535.59	81.89	2533.09	81.81
Sea and big lakes	152.3	4.92						
Total area	3096.28							

Table C1.8: Land consumption from 2012 to 2019 - Vicenza

	Vicenza							
	2012		2015		2018		2019	
Land cover	km^2	%	km^2	%	km^2	%	km^2	%
Permanent consumed land	324.14	11.91	326.46	11.99	326.83	12.00	327.32	12.02
Reversible consumed land	9.80	0.36	9.89	0.36	14.03	0.52	14.27	0.52
Total consumed land	333.94	12.27	336.35	12.35	340.86	12.52	341.59	12.55
Permeable roofed land	0.27	0.01	0.19	0.01	0.35	0.01	0.36	0.01
Not consumed land	2388.25	87.72	2385.92	87.64	2381.25	87.47	2380.51	87.44
Total not consumed land	2388.52	87.73	2386.11	87.65	2381.60	87.48	2380.87	87.45
Sea and big lakes	-	-						
Total area	2722.46							

C2 Land consumption in Veneto at municipal level

Table C2: Land consumption in Veneto at municipal level from 2012 to 2019

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
BL	Agordo	23.74	-	0.01	0.04	0.02	0.08	-	-	0.03	0.13
BL	Alano di Piave	36.52	-	-	-	0.01	0.03	-	-	0.01	0.03
BL	Alleghe	29.71	-	-0.01	-0.03	0.03	0.10	-	-	0.02	0.07
BL	Alpago	80.34	-	-0.02	-0.02	0.03	0.04	-	-	0.01	0.01
BL	Arsiè	64.76	-	-	-	0.03	0.05	-	-	0.03	0.05
BL	Auronzo di Cadore	220.55	-	0.02	0.01	0.02	0.01	-	-	0.04	0.02
BL	Belluno	147.22	-	0.09	0.06	0.01	0.01	-	-	0.10	0.07
BL	Borca di Cadore	26.76	-	0.01	0.04	-	-	-	-	0.01	0.04
BL	Borgo Valbelluna	167.69	-	0.03	0.02	0.03	0.02	-	-	0.06	0.04
BL	Calalzo di Cadore	43.51	-	0.01	0.02	-	-	-	-	0.01	0.02
BL	Canale d'Agordo	45.96	-	-0.01	-0.02	0.02	0.04	-	-	0.01	0.02
BL	Cencenighe Agordino	18.13	-	-	-	-	-	-	-	-	-
BL	Cesiomaggiore	82.09	-	0.02	0.02	-0.01	-0.01	-	-	0.01	0.01
BL	Chies d'Alpago	44.97	-	-0.01	-0.02	0.01	0.02	-	-	-	-
BL	Cibiana di Cadore	21.59	-	-	-	-	-	-	-	-	-
BL	Colle Santa Lucia	15.34	-	-	-	-	-	-	-	-	-
BL	Comelico Superiore	96.09	-	-0.01	-0.01	0.01	0.01	-	-	-	-
BL	Cortina d'Ampezzo	252.80	-	0.01	-	0.32	0.13	0.06	0.02	0.39	0.15
BL	Danta di Cadore	7.95	-	-	-	-	-	-	-	-	-
BL	Domegge di Cadore	50.36	-	0.01	0.02	-0.01	-0.02	-	-	-	-
BL	Falcade	52.79	-	-	-	-	-	-	-	-	-
BL	Feltre	99.79	-	-	-	0.10	0.10	-	-	0.10	0.10

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
BL	Fonzaso	27.62	-	-	-	0.01	0.04	-	-	0.01	0.04
BL	Gosaldo	48.47	-	-	-	-	-	-	-	-	-
BL	La Valle Agordina	48.67	-	0.01	0.02	0.01	0.02	-	-	0.02	0.04
BL	Lamon	54.35	-	-	-	-0.01	-0.02	-	-	-0.01	-0.02
BL	Limana	39.12	-	0.01	0.03	0.02	0.05	-	-	0.03	0.08
BL	Livinallongo del Col di Lana	100.01	-	0.01	0.01	0.03	0.03	-	-	0.04	0.04
BL	Longarone	122.36	-	-0.02	-0.02	0.06	0.05	-	-	0.04	0.03
BL	Lorenzago di Cadore	27.35	-	0.01	0.04	-0.01	-0.04	-	-	-	-
BL	Lozzo di Cadore	30.40	-	0.01	0.03	-0.01	-0.03	-	-	-	-
BL	Ospitale di Cadore	39.78	-	0.01	0.03	-0.01	-0.03	-	-	-	-
BL	Pedavena	25.06	-	-0.05	-0.20	-	-	-	-	-0.05	-0.20
BL	Perarolo di Cadore	43.94	-	-	-	-	-	-	-	-	-
BL	Pieve di Cadore	67.17	-	-	-	0.01	0.01	-	-	0.01	0.01
BL	Ponte nelle Alpi	58.14	-	0.04	0.07	-0.01	-0.02	-	-	0.03	0.05
BL	Quero Vas	45.91	-	0.01	0.02	0.02	0.04	-	-	0.03	0.07
BL	Rivamonte Agordino	23.30	-	0.01	0.04	-0.01	-0.04	-	-	-	-
BL	Rocca Pietore	73.29	-	-0.01	-0.01	0.01	0.01	-	-	-	-
BL	San Gregorio nelle Alpi	19.12	-	-	-	0.01	0.05	-	-	0.01	0.05
BL	San Nicolò di Comelico	24.16	-	0.01	0.04	-0.01	-0.04	-	-	-	-
BL	San Pietro di Cadore	52.13	-	-0.02	-0.04	0.02	0.04	-	-	-	-
BL	San Tomaso Agordino	19.18	-	0.01	0.05	-0.01	-0.05	-	-	-	-

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
BL	San Vito di Cadore	61.62	-	0.01	0.02	0.06	0.10	-	-	0.07	0.11
BL	Santa Giustina	35.92	-	0.02	0.06	0.05	0.14	-	-	0.07	0.19
BL	Santo Stefano di Cadore	100.62	-	-0.01	-0.01	0.01	0.01	-	-	-	-
BL	Sedico	91.20	-	0.01	0.01	0.06	0.07	-	-	0.07	0.08
BL	Selva di Cadore	33.33	-	0.01	0.03	-0.01	-0.03	-	-	-	-
BL	Seren del Grappa	62.53	-	-	-	-	-	-	-	-	-
BL	Sospirolo	65.86	-	0.01	0.02	-0.11	-0.17	-	-	-0.10	-0.15
BL	Soverzene	14.79	-	-	-	-	-	-	-	-	-
BL	Sovramonte	50.54	-	0.01	0.02	-	-	-	-	0.01	0.02
BL	Taibon Agordino	90.06	-	0.01	0.01	-	-	-	-	0.01	0.01
BL	Tambre	45.28	-	-0.01	-0.02	0.01	0.02	-	-	-	-
BL	Val di Zoldo	141.65	-	-	-	0.01	0.01	-	-	0.01	0.01
BL	Vallada Agordina	13.00	-	-0.01	-0.08	0.02	0.15	-	-	0.01	0.08
BL	Valle di Cadore	40.64	-	-	-	-	-	-	-	-	-
BL	Vigo di Cadore	70.07	-	-0.01	-0.01	0.01	0.01	-	-	-	-
BL	Vodo Cadore	46.88	-	-	-	0.01	0.02	-	-	0.01	0.02
BL	Voltago Agordino	23.47	-	-	-	-	-	-	-	-	-
BL	Zoppè di Cadore	4.33	-	-	-	-	-	-	-	-	-
PD	Abano Terme	21.41	-	0.02	0.09	0.08	0.37	0.02	0.09	0.12	0.56
PD	Agna	18.80	-	0.01	0.05	-	-	-	-	0.01	0.05
PD	Albignasego	21.16	-	0.11	0.52	0.10	0.47	0.07	0.33	0.28	1.32
PD	Anguillara Veneta	21.66	-	0.01	0.05	0.02	0.09	-	-	0.03	0.14
PD	Arquà Petrarca	12.52	-	-0.01	-0.08	0.01	0.08	-	-	-	-
PD	Arre	12.34	-	0.04	0.32	0.01	0.08	0.01	0.08	0.06	0.49
PD	Arzergrande	13.64	-	0.01	0.07	-	-	-	-	0.01	0.07
PD	Bagnoli di Sopra	34.98	-	0.02	0.06	0.02	0.06	-	-	0.04	0.11
PD	Baone	24.42	-	0.01	0.04	-0.01	-0.04	-	-	-	-
PD	Barbona	8.59	-	0.01	0.12	0.03	0.35	-	-	0.04	0.47

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
PD	Battaglia Terme	6.23	-	-0.01	-0.16	0.01	0.16	-	-	-	-
PD	Boara Pisani	16.66	-	0.02	0.12	0.08	0.48	-	-	0.10	0.60
PD	Borgo Veneto	39.17	-	-	-	0.24	0.61	-	-	0.24	0.61
PD	Borgoricco	20.39	-	0.05	0.25	0.08	0.39	0.02	0.10	0.15	0.74
PD	Bovolenta	22.78	-	0.01	0.04	0.02	0.09	0.01	0.04	0.04	0.18
PD	Brugine	19.55	-	0.02	0.10	0.02	0.10	-	-	0.04	0.20
PD	Cadoneghe	12.92	-	-	-	0.05	0.39	-	-	0.05	0.39
PD	Campo San Martino	13.16	-	-	-	0.02	0.15	0.02	0.15	0.04	0.30
PD	Campodarsego	25.72	-	-	-	0.14	0.54	0.05	0.19	0.19	0.74
PD	Campodoro	11.22	-	0.02	0.18	-0.01	-0.09	-	-	0.01	0.09
PD	Camposampiero	21.12	-	0.04	0.19	0.08	0.38	0.02	0.09	0.14	0.66
PD	Candiana	22.27	-	0.01	0.04	0.02	0.09	-	-	0.03	0.13
PD	Carceri	9.81	-	-0.01	-0.10	0.03	0.31	-	-	0.02	0.20
PD	Carmignano di Brenta	14.68	-	0.02	0.14	0.08	0.54	0.01	0.07	0.11	0.75
PD	Cartura	16.28	-	-0.02	-0.12	0.03	0.18	-	-	0.01	0.06
PD	Casale di Scodosia	21.32	-	-	-	0.02	0.09	-	-	0.02	0.09
PD	Casalserugo	15.50	-	0.02	0.13	0.03	0.19	0.01	0.06	0.06	0.39
PD	Castelbaldo	15.17	-	-0.01	-0.07	0.02	0.13	-	-	0.01	0.07
PD	Cervarese Santa Croce	17.70	-	-0.01	-0.06	0.03	0.17	-	-	0.02	0.11
PD	Cinto Euganeo	19.76	-	0.01	0.05	-	-	-	-	0.01	0.05
PD	Cittadella	36.68	-	0.08	0.22	0.07	0.19	0.03	0.08	0.18	0.49
PD	Codevigo	70.02	23.57	-0.01	-0.02	0.03	0.06	0.01	0.02	0.03	0.06
PD	Conselve	24.29	-	-0.01	-0.04	0.07	0.29	0.03	0.12	0.09	0.37
PD	Correzzola	42.33	-	-0.02	-0.05	0.06	0.14	-0.01	-0.02	0.03	0.07
PD	Curtarolo	14.73	-	0.01	0.07	0.02	0.14	0.01	0.07	0.04	0.27
PD	Due Carrare	26.56	-	0.02	0.08	0.07	0.26	-	-	0.09	0.34

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
PD	Este	32.81	-	0.07	0.21	0.04	0.12	0.01	0.03	0.12	0.37
PD	Fontaniva	20.61	-	-0.01	-0.05	0.04	0.19	0.01	0.05	0.04	0.19
PD	Galliera Veneta	8.95	-	0.02	0.22	0.03	0.34	-	-	0.05	0.56
PD	Galzignano Terme	18.20	-	-0.01	-0.05	0.02	0.11	-	-	0.01	0.05
PD	Gazzo	22.71	-	-0.02	-0.09	0.03	0.13	0.01	0.04	0.02	0.09
PD	Grantorto	14.10	-	-0.02	-0.14	0.08	0.57	-	-	0.06	0.43
PD	Granze	11.47	-	0.01	0.09	-	-	-	-	0.01	0.09
PD	Legnaro	14.91	-	0.06	0.40	0.05	0.34	0.04	0.27	0.15	1.01
PD	Limena	15.16	-	0.02	0.13	0.02	0.13	0.02	0.13	0.06	0.40
PD	Loreggia	19.12	-	-	-	0.16	0.84	-	-	0.16	0.84
PD	Lozzo Atestino	24.07	-	0.01	0.04	-	-	0.01	0.04	0.02	0.08
PD	Maserà di Padova	17.58	-	0.01	0.06	0.03	0.17	0.02	0.11	0.06	0.34
PD	Masi	13.76	-	0.01	0.07	-	-	-	-	0.01	0.07
PD	Massanzago	13.22	-	0.01	0.08	0.02	0.15	0.01	0.08	0.04	0.30
PD	Megliadino San Vitale	15.25	-	0.02	0.13	0.05	0.33	-	-	0.07	0.46
PD	Merlara	21.35	-	0.02	0.09	0.03	0.14	-	-	0.05	0.23
PD	Mestrino	19.22	-	0.04	0.21	0.02	0.10	0.01	0.05	0.07	0.36
PD	Monselice	50.57	-	-0.01	-0.02	0.47	0.93	0.01	0.02	0.47	0.93
PD	Montagnana	45.03	-	0.03	0.07	0.37	0.82	0.01	0.02	0.41	0.91
PD	Montegrotto Terme	15.37	-	-0.01	-0.07	0.06	0.39	-	-	0.05	0.33
PD	Noventa Padovana	7.08	-	-0.01	-0.14	0.04	0.56	-0.01	-0.14	0.02	0.28
PD	Ospedaletto Euganeo	21.48	-	0.03	0.14	0.01	0.05	-	-	0.04	0.19
PD	Padova	93.03	-	0.31	0.33	0.39	0.42	0.28	0.30	0.98	1.05
PD	Pernumia	13.18	-	0.01	0.08	0.02	0.15	-	-	0.03	0.23
PD	Piacenza d'Adige	18.49	-	0.03	0.16	0.09	0.49	-	-	0.12	0.65

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Table C2 – continued from previous page

Prov.	Municipality	Total area km^2	Water surface km^2	2012-2015 km^2	2012-2015 %	2015-2018 km^2	2015-2018 %	2018-2019 km^2	2018-2019 %	2012-2019 km^2	2012-2019 %
PD	Piazzola sul Brenta	40.93	-	0.02	0.05	0.09	0.22	0.02	0.05	0.13	0.32
PD	Piombino Dese	29.62	-	0.06	0.20	0.11	0.37	0.01	0.03	0.18	0.61
PD	Piove di Sacco	35.73	-	0.01	0.03	0.09	0.25	0.02	0.06	0.12	0.34
PD	Polverara	9.84	-	0.05	0.51	-	-	-	-	0.05	0.51
PD	Ponso	10.85	-	-	-	0.01	0.09	-	-	0.01	0.09
PD	Ponte San Nicolò	13.52	-	0.03	0.22	0.02	0.15	-	-	0.05	0.37
PD	Pontelongo	10.89	-	-	-	0.03	0.28	-	-	0.03	0.28
PD	Pozzonovo	24.48	-	0.02	0.08	0.05	0.20	-	-	0.07	0.29
PD	Rovolon	27.69	-	0.02	0.07	0.01	0.04	-	-	0.03	0.11
PD	Rubano	14.51	-	0.01	0.07	0.02	0.14	-	-	0.03	0.21
PD	Saccolongo	13.80	-	-0.01	-0.07	0.04	0.29	0.01	0.07	0.04	0.29
PD	San Giorgio delle Pertiche	18.86	-	-0.01	-0.05	0.06	0.32	0.01	0.05	0.06	0.32
PD	San Giorgio in Bosco	28.35	-	0.01	0.04	0.05	0.18	-	-	0.06	0.21
PD	San Martino di Lupari	24.12	-	0.03	0.12	0.08	0.33	0.01	0.04	0.12	0.50
PD	San Pietro in Gu	17.90	-	-	-	0.05	0.28	0.02	0.11	0.07	0.39
PD	San Pietro Viminario	13.31	-	-	-	0.09	0.68	-	-	0.09	0.68
PD	Santa Giustina in Colle	17.97	-	0.02	0.11	0.06	0.33	-	-	0.08	0.45
PD	Sant'Angelo di Piove di Sacco	13.96	-	0.01	0.07	0.04	0.29	0.02	0.14	0.07	0.50
PD	Sant'Elena	8.92	-	-0.01	-0.11	0.01	0.11	-	-	-	-
PD	Sant'Urbano	31.92	-	0.02	0.06	0.02	0.06	-	-	0.04	0.13
PD	Saonara	13.54	-	0.02	0.15	0.04	0.30	0.03	0.22	0.09	0.66
PD	Selvazzano Dentro	19.52	-	-	-	0.11	0.56	0.01	0.05	0.12	0.61

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Table C2 – continued from previous page

Prov.	Municipality	Total area km^2	Water surface km^2	2012-2015 km^2	2012-2015 %	2015-2018 km^2	2015-2018 %	2018-2019 km^2	2018-2019 %	2012-2019 km^2	2012-2019 %
PD	Solesino	10.14	-	-	-	0.01	0.10	0.01	0.10	0.02	0.20
PD	Stanghella	19.81	-	0.04	0.20	0.04	0.20	-	-	0.08	0.40
PD	Teolo	31.20	-	0.02	0.06	0.01	0.03	0.01	0.03	0.04	0.13
PD	Terrassa Padovana	14.81	-	0.02	0.14	-0.01	-0.07	-	-	0.01	0.07
PD	Tombolo	11.02	-	-	-	0.06	0.54	-	-	0.06	0.54
PD	Torreglia	18.85	-	-0.01	-0.05	0.03	0.16	0.01	0.05	0.03	0.16
PD	Trebaseleghe	30.66	-	0.05	0.16	0.12	0.39	-	-	0.17	0.55
PD	Tribano	19.23	-	-	-	0.01	0.05	-	-	0.01	0.05
PD	Urbana	17.02	-	-0.01	-0.06	0.02	0.12	0.01	0.06	0.02	0.12
PD	Veggiano	16.41	-	0.03	0.18	0.01	0.06	-	-	0.04	0.24
PD	Vescovana	22.25	-	-	-	0.09	0.40	-	-	0.09	0.40
PD	Vighizzolo d'Este	17.08	-	0.02	0.12	-	-	-	-	0.02	0.12
PD	Vigodarzere	19.92	-	0.02	0.10	0.03	0.15	0.02	0.10	0.07	0.35
PD	Vigonza	33.32	-	0.10	0.30	0.08	0.24	0.02	0.06	0.20	0.60
PD	Villa del Conte	17.35	-	0.01	0.06	0.03	0.17	0.02	0.12	0.06	0.35
PD	Villa Estense	16.01	-	0.01	0.06	-	-	-	-	0.01	0.06
PD	Villafranca Padovana	23.95	-	0.02	0.08	0.06	0.25	0.03	0.13	0.11	0.46
PD	Villanova di Camposampiero	12.23	-	0.02	0.16	0.05	0.41	0.01	0.08	0.08	0.65
PD	Vo'	20.37	-	-	-	0.02	0.10	0.02	0.10	0.04	0.20
RO	Adria	113.39	-	0.05	0.04	-0.14	-0.12	0.01	0.01	-0.08	-0.07
RO	Ariano nel Polesine	81.46	-	0.05	0.06	-0.01	-0.01	0.02	0.02	0.06	0.07
RO	Arquà Polesine	19.93	-	-0.01	-0.05	0.07	0.35	-	-	0.06	0.30
RO	Badia Polesine	44.53	-	-0.02	-0.04	0.23	0.52	-	-	0.21	0.47
RO	Bagnolo di Po	21.36	-	0.02	0.09	-0.01	-0.05	-	-	0.01	0.05
RO	Bergantino	17.97	-	0.01	0.06	0.08	0.45	-	-	0.09	0.50
RO	Bosaro	6.12	-	-0.01	-0.16	0.02	0.33	-	-	0.01	0.16

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
RO	Calto	10.85	-	-	-	0.03	0.28	-	-	0.03	0.28
RO	Canaro	32.65	-	0.01	0.03	0.02	0.06	-	-	0.03	0.09
RO	Canda	14.37	-	-	-	0.09	0.63	-	-	0.09	0.63
RO	Castelguglielmo	22.13	-	-	-	0.05	0.23	0.14	0.63	0.19	0.86
RO	Castelmassa	11.84	-	0.01	0.08	0.05	0.42	-	-	0.06	0.51
RO	Castelnovo Bariano	37.91	-	-	-	0.26	0.69	0.02	0.05	0.28	0.74
RO	Ceneselli	28.62	-	0.01	0.03	-0.01	-0.03	-	-	-	-
RO	Ceregnano	30.17	-	0.02	0.07	-	-	-	-	0.02	0.07
RO	Corbola	18.55	-	-	-	0.05	0.27	0.01	0.05	0.06	0.32
RO	Costa di Rovigo	16.07	-	-	-	0.05	0.31	-	-	0.05	0.31
RO	Crespino	31.85	-	0.01	0.03	-0.01	-0.03	-	-	-	-
RO	Ficarolo	18.07	-	-	-	0.01	0.06	-	-	0.01	0.06
RO	Fiesso Umbertiano	27.54	-	-	-	0.08	0.29	-	-	0.08	0.29
RO	Frassinelle Polesine	21.98	-	-0.01	-0.05	0.01	0.05	-	-	-	-
RO	Fratta Polesine	20.97	-	0.01	0.05	0.10	0.48	-	-	0.11	0.52
RO	Gaiba	11.99	-	-0.02	-0.17	0.04	0.33	0.01	0.08	0.03	0.25
RO	Gavello	24.37	-	-	-	0.01	0.04	-	-	0.01	0.04
RO	Giacciano con Baruchella	18.42	-	-0.01	-0.05	0.07	0.38	-	-	0.06	0.33
RO	Guarda Veneta	17.21	-	-0.01	-0.06	0.03	0.17	-	-	0.02	0.12
RO	Lendinara	55.06	-	0.05	0.09	0.17	0.31	-	-	0.22	0.40
RO	Loreo	39.84	-	-0.01	-0.03	0.03	0.08	0.01	0.03	0.03	0.08
RO	Lusia	17.68	-	0.01	0.06	0.95	5.37	-	-	0.96	5.43
RO	Melara	17.58	-	-0.02	-0.11	0.10	0.57	-	-	0.08	0.46
RO	Occhiobello	32.33	-	0.03	0.09	0.08	0.25	-	-	0.11	0.34
RO	Papozze	21.49	-	-0.01	-0.05	0.01	0.05	-	-	-	-

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
RO	Pettorazza Grimani	21.45	-	-	-	0.01	0.05	-	-	0.01	0.05
RO	Pincara	17.51	-	-0.01	-0.06	0.07	0.40	-	-	0.06	0.34
RO	Polesella	16.41	-	0.03	0.18	-0.01	-0.06	-	-	0.02	0.12
RO	Pontecchio Polesine	11.53	-	0.01	0.09	0.01	0.09	-	-	0.02	0.17
RO	Porto Tolle	257.06	69.44	-	-	0.09	0.05	-	-	0.09	0.05
RO	Porto Viro	133.31	23.57	-0.01	-0.01	0.10	0.09	0.06	0.05	0.15	0.14
RO	Rosolina	74.69	21.67	0.03	0.06	0.07	0.13	-	-	0.10	0.19
RO	Rovigo	108.80	-	-	-	0.34	0.31	-	-	0.34	0.31
RO	Salara	14.16	-	0.02	0.14	-	-	-	-	0.02	0.14
RO	San Bellino	15.83	-	0.01	0.06	0.04	0.25	0.04	0.25	0.09	0.57
RO	San Martino di Venezze	31.05	-	0.01	0.03	-	-	-	-	0.01	0.03
RO	Stienta	24.02	-	0.03	0.12	0.02	0.08	-	-	0.05	0.21
RO	Taglio di Po	78.68	-	0.09	0.11	0.08	0.10	0.01	0.01	0.18	0.23
RO	Trecenta	35.08	-	-	-	0.07	0.20	-	-	0.07	0.20
RO	Villadose	32.07	-	0.03	0.09	0.01	0.03	-	-	0.04	0.12
RO	Villamarzana	14.15	-	0.04	0.28	0.13	0.92	-	-	0.17	1.20
RO	Villanova del Ghebbo	11.73	-	0.01	0.09	0.01	0.09	-	-	0.02	0.17
RO	Villanova Marchesana	18.05	-	-	-	0.02	0.11	-	-	0.02	0.11
TV	Altivole	21.95	-	0.10	0.46	0.36	1.64	-	-	0.46	2.10
TV	Arcade	8.27	-	0.04	0.48	-	-	0.01	0.12	0.05	0.60
TV	Asolo	25.37	-	0.05	0.20	0.05	0.20	0.01	0.04	0.11	0.43
TV	Borso del Grappa	33.14	-	0.02	0.06	0.02	0.06	-	-	0.04	0.12
TV	Breda di Piave	25.76	-	0.02	0.08	0.01	0.04	0.02	0.08	0.05	0.19
TV	Caerano di San Marco	12.09	-	0.01	0.08	0.03	0.25	0.03	0.25	0.07	0.58

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
TV	Cappella Maggiore	11.09	-	0.01	0.09	0.02	0.18	-	-	0.03	0.27
TV	Carbonera	19.88	-	0.02	0.10	0.10	0.50	-0.01	-0.05	0.11	0.55
TV	Casale sul Sile	26.92	-	0.03	0.11	0.20	0.74	0.01	0.04	0.24	0.89
TV	Casier	13.42	-	0.02	0.15	0.13	0.97	-	-	0.15	1.12
TV	Castelcucco	8.79	-	-	-	0.01	0.11	0.01	0.11	0.02	0.23
TV	Castelfranco Veneto	51.61	-	0.11	0.21	0.14	0.27	0.12	0.23	0.37	0.72
TV	Castello di Godego	18.13	-	0.01	0.06	0.08	0.44	-	-	0.09	0.50
TV	Cavaso del Tomba	18.97	-	-0.01	-0.05	0.02	0.11	-	-	0.01	0.05
TV	Cessalto	28.18	-	0.03	0.11	0.02	0.07	-	-	0.05	0.18
TV	Chiarano	19.92	-	0.02	0.10	-	-	-	-	0.02	0.10
TV	Cimadolmo	17.90	-	0.02	0.11	-	-	0.01	0.06	0.03	0.17
TV	Cison di Valmarino	28.81	-	-0.01	-0.03	0.04	0.14	-	-	0.03	0.10
TV	Codognè	21.75	-	0.05	0.23	-	-	0.02	0.09	0.07	0.32
TV	Colle Umberto	13.58	-	0.07	0.52	0.02	0.15	-	-	0.09	0.66
TV	Conegliano	36.40	-	0.10	0.27	0.08	0.22	0.05	0.14	0.23	0.63
TV	Cordignano	26.25	-	-0.01	-0.04	0.06	0.23	0.02	0.08	0.07	0.27
TV	Cornuda	12.51	-	0.02	0.16	0.01	0.08	0.01	0.08	0.04	0.32
TV	Crocetta del Montello	26.57	-	0.04	0.15	0.03	0.11	0.01	0.04	0.08	0.30
TV	Farra di Soligo	28.34	-	0.01	0.04	0.02	0.07	-	-	0.03	0.11
TV	Follina	24.08	-	0.02	0.08	-0.01	-0.04	-	-	0.01	0.04
TV	Fontanelle	35.35	-	0.02	0.06	0.09	0.25	-	-	0.11	0.31
TV	Fonte	14.60	-	0.03	0.21	0.02	0.14	-0.01	-0.07	0.04	0.27
TV	Fregona	42.72	-	-	-	0.01	0.02	-	-	0.01	0.02
TV	Gaiarine	28.78	-	0.03	0.10	0.05	0.17	0.01	0.03	0.09	0.31

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
TV	Giavera del Montello	20.19	-	0.08	0.40	0.05	0.25	0.06	0.30	0.19	0.94
TV	Godega di Sant'Urbano	24.34	-	-0.01	-0.04	0.09	0.37	0.01	0.04	0.09	0.37
TV	Gorgo al Monticano	27.09	-	-0.02	-0.07	0.03	0.11	0.01	0.04	0.02	0.07
TV	Istrana	26.48	-	-	-	0.15	0.57	0.08	0.30	0.23	0.87
TV	Loria	23.25	-	0.07	0.30	0.07	0.30	0.01	0.04	0.15	0.65
TV	Mansuè	27.09	-	0.05	0.18	0.11	0.41	0.04	0.15	0.20	0.74
TV	Mareno di Piave	27.77	-	0.03	0.11	0.05	0.18	0.01	0.04	0.09	0.32
TV	Maser	25.85	-	0.02	0.08	0.04	0.15	0.01	0.04	0.07	0.27
TV	Maserada sul Piave	28.77	-	-0.03	-0.10	0.08	0.28	0.01	0.03	0.06	0.21
TV	Meduna di Livenza	15.38	-	0.04	0.26	0.04	0.26	-	-	0.08	0.52
TV	Miane	30.88	-	0.04	0.13	0.01	0.03	-	-	0.05	0.16
TV	Mogliano Veneto	46.26	-	0.12	0.26	0.58	1.25	0.04	0.09	0.74	1.60
TV	Monastier di Treviso	25.26	-	0.05	0.20	0.04	0.16	0.01	0.04	0.10	0.40
TV	Monfumo	11.45	-	0.01	0.09	-	-	-0.03	-0.26	-0.02	-0.17
TV	Montebelluna	49.01	-	0.28	0.57	0.31	0.63	0.05	0.10	0.64	1.31
TV	Morgano	11.76	-	0.01	0.09	0.01	0.09	-	-	0.02	0.17
TV	Moriago della Battaglia	13.76	-	0.03	0.22	-0.01	-0.07	0.01	0.07	0.03	0.22
TV	Motta di Livenza	37.78	-	0.03	0.08	-	-	0.02	0.05	0.05	0.13
TV	Nervesa della Battaglia	34.97	-	0.20	0.57	0.11	0.31	0.03	0.09	0.34	0.97
TV	Oderzo	42.35	-	0.05	0.12	0.14	0.33	-0.02	-0.05	0.17	0.40
TV	Ormelle	18.83	-	0.04	0.21	0.02	0.11	-0.01	-0.05	0.05	0.27
TV	Orsago	10.71	-	0.02	0.19	0.02	0.19	0.02	0.19	0.06	0.56

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
TV	Paese	38.09	-	0.11	0.29	0.12	0.32	0.03	0.08	0.26	0.68
TV	Pederobba	27.32	-	-	-	0.08	0.29	0.01	0.04	0.09	0.33
TV	Pieve del Grappa	37.34	-	-	-	0.03	0.08	-0.01	-0.03	0.02	0.05
TV	Pieve di Soligo	19.02	-	-	-	0.06	0.32	0.01	0.05	0.07	0.37
TV	Ponte di Piave	32.44	-	0.05	0.15	0.04	0.12	0.01	0.03	0.10	0.31
TV	Ponzano Veneto	22.27	-	0.06	0.27	0.09	0.40	0.02	0.09	0.17	0.76
TV	Portobuffolè	5.08	-	0.01	0.20	0.13	2.56	-	-	0.14	2.76
TV	Possagno	12.11	-	-0.01	-0.08	0.01	0.08	-	-	-	-
TV	Povegliano	12.91	-	0.04	0.31	0.16	1.24	0.03	0.23	0.23	1.78
TV	Preganziol	23.11	-	0.03	0.13	0.07	0.30	-	-	0.10	0.43
TV	Quinto di Treviso	19.04	-	0.03	0.16	0.04	0.21	0.01	0.05	0.08	0.42
TV	Refrontolo	13.03	-	0.01	0.08	0.02	0.15	-	-	0.03	0.23
TV	Resana	24.89	-	0.02	0.08	0.17	0.68	0.01	0.04	0.20	0.80
TV	Revine Lago	18.79	-	0.01	0.05	-	-	-	-	0.01	0.05
TV	Riese Pio X	30.64	-	0.04	0.13	0.50	1.63	0.01	0.03	0.55	1.80
TV	Roncade	61.78	-	0.23	0.37	0.22	0.36	0.04	0.06	0.49	0.79
TV	Salgareda	27.55	-	0.06	0.22	0.01	0.04	0.05	0.18	0.12	0.44
TV	San Biagio di Callalta	48.50	-	0.03	0.06	0.08	0.16	0.04	0.08	0.15	0.31
TV	San Fior	17.82	-	0.04	0.22	0.05	0.28	-	-	0.09	0.51
TV	San Pietro di Feletto	19.25	-	0.01	0.05	0.02	0.10	-	-	0.03	0.16
TV	San Polo di Piave	20.98	-	0.04	0.19	0.03	0.14	0.01	0.05	0.08	0.38
TV	San Vendemiano	18.50	-	0.04	0.22	0.13	0.70	0.01	0.05	0.18	0.97
TV	San Zenone degli Ezzelini	19.97	-	0.05	0.25	0.13	0.65	0.01	0.05	0.19	0.95
TV	Santa Lucia di Piave	19.81	-	0.04	0.20	0.02	0.10	-	-	0.06	0.30
TV	Sarmede	18.01	-	0.01	0.06	0.01	0.06	-	-	0.02	0.11
TV	Segusino	18.23	-	-0.01	-0.05	0.02	0.11	-	-	0.01	0.05

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
TV	Sernaglia della Battaglia	20.15	-	0.04	0.20	0.03	0.15	0.01	0.05	0.08	0.40
TV	Silea	18.95	-	0.04	0.21	0.08	0.42	0.05	0.26	0.17	0.90
TV	Spresiano	25.72	-	0.10	0.39	0.08	0.31	0.09	0.35	0.27	1.05
TV	Susegana	44.10	-	0.08	0.18	0.09	0.20	0.04	0.09	0.21	0.48
TV	Tarzo	23.91	-	0.01	0.04	0.01	0.04	-	-	0.02	0.08
TV	Trevignano	26.49	-	0.10	0.38	0.25	0.94	0.01	0.04	0.36	1.36
TV	Treviso	55.58	-	0.12	0.22	0.21	0.38	0.07	0.13	0.40	0.72
TV	Valdobbiadene	62.89	-	0.07	0.11	0.04	0.06	0.01	0.02	0.12	0.19
TV	Vazzola	26.16	-	0.03	0.11	0.05	0.19	0.03	0.11	0.11	0.42
TV	Vedelago	61.85	-	0.14	0.23	0.36	0.58	0.05	0.08	0.55	0.89
TV	Vidor	13.43	-	0.02	0.15	-	-	-	-	0.02	0.15
TV	Villorba	30.53	-	0.07	0.23	0.23	0.75	0.09	0.29	0.39	1.28
TV	Vittorio Veneto	82.80	-	0.02	0.02	0.08	0.10	0.15	0.18	0.25	0.30
TV	Volpago del Montello	44.82	-	0.23	0.51	0.21	0.47	0.15	0.33	0.59	1.32
TV	Zenson di Piave	9.50	-	0.01	0.11	-	-	-	-	0.01	0.11
TV	Zero Branco	26.06	-	0.05	0.19	0.10	0.38	0.01	0.04	0.16	0.61
VE	Annone Veneto	25.93	-	0.01	0.04	0.01	0.04	0.01	0.04	0.03	0.12
VE	Campagna Lupia	87.59	58.72	0.04	0.14	0.05	0.17	0.05	0.17	0.14	0.48
VE	Campolongo Maggiore	23.61	-	0.05	0.21	-	-	0.02	0.08	0.07	0.30
VE	Camponogara	21.30	-	0.05	0.23	0.01	0.05	0.03	0.14	0.09	0.42
VE	Caorle	153.83	-	0.13	0.08	0.03	0.02	-	-	0.16	0.10
VE	Cavallino-Treporti	44.71	1.89	0.01	0.02	1.21	2.83	0.03	0.07	1.25	2.92
VE	Cavarzere	140.44	-	0.07	0.05	0.01	0.01	0.01	0.01	0.09	0.06
VE	Ceggia	22.10	-	-	-	0.02	0.09	-	-	0.02	0.09
VE	Chioggia	187.91	93.22	0.02	0.02	0.26	0.27	0.05	0.05	0.33	0.35

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
VE	Cinto Caomaggiore	21.32	-	0.01	0.05	0.04	0.19	-	-	0.05	0.23
VE	Cona	65.11	-	0.02	0.03	0.02	0.03	0.01	0.02	0.05	0.08
VE	Concordia Sagittaria	66.83	-	0.07	0.10	0.15	0.22	0.02	0.03	0.24	0.36
VE	Dolo	24.28	-	0.06	0.25	0.05	0.21	0.01	0.04	0.12	0.49
VE	Eraclea	95.45	-	0.07	0.07	0.11	0.12	0.01	0.01	0.19	0.20
VE	Fiesso d’Artico	6.31	-	-	-	0.02	0.32	0.01	0.16	0.03	0.48
VE	Fossalta di Piave	9.64	-	0.08	0.83	0.02	0.21	-	-	0.10	1.04
VE	Fossalta di Portogruaro	31.10	-	0.05	0.16	0.22	0.71	0.18	0.58	0.45	1.45
VE	Fossò	10.18	-	0.02	0.20	0.01	0.10	0.02	0.20	0.05	0.49
VE	Gruaro	17.49	-	0.01	0.06	0.06	0.34	-	-	0.07	0.40
VE	Jesolo	96.40	-	0.19	0.20	0.46	0.48	0.16	0.17	0.81	0.84
VE	Marcon	25.55	-	0.05	0.20	0.43	1.68	0.03	0.12	0.51	2.00
VE	Martellago	20.17	-	0.09	0.45	0.22	1.09	0.01	0.05	0.32	1.59
VE	Meolo	26.61	-	0.04	0.15	0.05	0.19	0.01	0.04	0.10	0.38
VE	Mira	99.13	35.37	0.10	0.16	0.19	0.30	-	-	0.29	0.45
VE	Mirano	45.63	-	0.03	0.07	0.14	0.31	0.03	0.07	0.20	0.44
VE	Musile di Piave	44.87	-	0.05	0.11	0.06	0.13	0.02	0.04	0.13	0.29
VE	Noale	24.69	-	0.06	0.24	0.24	0.97	-0.01	-0.04	0.29	1.17
VE	Noventa di Piave	18.00	-	0.06	0.33	0.16	0.89	0.02	0.11	0.24	1.33
VE	Pianiga	20.07	-	0.06	0.30	0.11	0.55	0.01	0.05	0.18	0.90
VE	Portogruaro	102.31	-	0.13	0.13	0.21	0.21	0.13	0.13	0.47	0.46
VE	Pramaggiore	24.22	-	0.04	0.17	0.04	0.17	-0.01	-0.04	0.07	0.29
VE	Quarto d’Altino	28.33	-	0.05	0.18	0.07	0.25	-	-	0.12	0.42
VE	Salzano	17.18	-	0.02	0.12	0.08	0.47	0.02	0.12	0.12	0.70
VE	San Donà di Piave	78.88	-	0.09	0.11	0.22	0.28	0.03	0.04	0.34	0.43
VE	San Michele al Tagliamento	114.41	-	0.06	0.05	0.56	0.49	0.04	0.03	0.66	0.58

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
VE	San Stino di Livenza	67.97	-	0.07	0.10	0.06	0.09	0.03	0.04	0.16	0.24
VE	Santa Maria di Sala	28.05	-	0.05	0.18	0.11	0.39	0.09	0.32	0.25	0.89
VE	Scorzè	33.29	-	0.14	0.42	0.34	1.02	-	-	0.48	1.44
VE	Spinea	14.96	-	0.07	0.47	0.08	0.53	0.01	0.07	0.16	1.07
VE	Stra	8.82	-	0.01	0.11	0.02	0.23	-	-	0.03	0.34
VE	Teglio Veneto	11.44	-	0.02	0.17	0.01	0.09	0.07	0.61	0.10	0.87
VE	Torre di Mosto	38.00	-	0.04	0.11	0.03	0.08	0.01	0.03	0.08	0.21
VE	Venezia	415.89	236.50	0.65	0.36	1.07	0.60	0.29	0.16	2.01	1.12
VE	Vigonovo	12.87	-	0.01	0.08	0.03	0.23	0.01	0.08	0.05	0.39
VI	Agugliaro	14.70	-	0.01	0.07	-	-	-	-	0.01	0.07
VI	Albettone	20.21	-	-	-	-0.08	-0.40	-	-	-0.08	-0.40
VI	Alonte	11.15	-	0.02	0.18	0.08	0.72	0.01	0.09	0.11	0.99
VI	Altavilla Vicentina	16.72	-	0.01	0.06	0.06	0.36	0.03	0.18	0.10	0.60
VI	Altissimo	15.09	-	-	-	0.01	0.07	-	-	0.01	0.07
VI	Arcugnano	41.57	-	-0.01	-0.02	0.03	0.07	0.01	0.02	0.03	0.07
VI	Arsiero	41.40	-	-0.01	-0.02	0.02	0.05	-	-	0.01	0.02
VI	Arzignano	34.19	-	-0.03	-0.09	0.13	0.38	0.05	0.15	0.15	0.44
VI	Asiago	162.93	-	-	-	0.01	0.01	-	-	0.01	0.01
VI	Asigliano Veneto	8.07	-	0.02	0.25	0.04	0.50	-	-	0.06	0.74
VI	Barbarano Mossano	33.49	-	-0.01	-0.03	0.02	0.06	0.01	0.03	0.02	0.06
VI	Bassano del Grappa	47.06	-	0.17	0.36	0.14	0.30	-0.02	-0.04	0.29	0.62
VI	Bolzano Vicentino	19.84	-	0.01	0.05	0.01	0.05	0.01	0.05	0.03	0.15
VI	Breganze	21.76	-	0.07	0.32	0.14	0.64	-	-	0.21	0.97
VI	Brendola	25.57	-	0.10	0.39	0.02	0.08	-	-	0.12	0.47
VI	Bressanvido	8.44	-	-	-	0.02	0.24	0.01	0.12	0.03	0.36

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
VI	Brogliano	12.16	-	0.01	0.08	0.09	0.74	0.01	0.08	0.11	0.90
VI	Caldogno	15.88	-	0.02	0.13	-0.04	-0.25	0.02	0.13	-	-
VI	Caltrano	22.71	-	-	-	-	-	0.01	0.04	0.01	0.04
VI	Calvene	11.47	-	0.01	0.09	-0.01	-0.09	-	-	-	-
VI	Camisano Vicentino	30.02	-	0.04	0.13	0.07	0.23	0.02	0.07	0.13	0.43
VI	Campiglia dei Berici	11.04	-	-	-	0.01	0.09	-	-	0.01	0.09
VI	Carrè	8.74	-	-	-	0.01	0.11	-	-	0.01	0.11
VI	Cartigliano	7.38	-	0.02	0.27	-0.01	-0.14	-	-	0.01	0.14
VI	Cassola	12.74	-	0.16	1.26	0.13	1.02	0.01	0.08	0.30	2.35
VI	Castegnero	11.62	-	-0.01	-0.09	0.02	0.17	0.02	0.17	0.03	0.26
VI	Castelgomberto	17.44	-	0.08	0.46	-	-	-	-	0.08	0.46
VI	Chiampo	22.60	-	0.02	0.09	0.06	0.27	0.04	0.18	0.12	0.53
VI	Chiuppano	4.71	-	0.01	0.21	-0.01	-0.21	0.01	0.21	0.01	0.21
VI	Cogollo del Cengio	36.22	-	0.01	0.03	-	-	-0.01	-0.03	-	-
VI	Colceresa	19.40	-	0.08	0.41	0.21	1.08	0.01	0.05	0.30	1.55
VI	Cornedo Vicentino	23.56	-	0.04	0.17	0.10	0.42	0.03	0.13	0.17	0.72
VI	Costabissara	13.13	-	0.01	0.08	0.04	0.30	0.03	0.23	0.08	0.61
VI	Creazzo	10.53	-	-0.01	-0.09	0.03	0.28	-	-	0.02	0.19
VI	Crespadoro	30.20	-	0.02	0.07	-0.01	-0.03	0.01	0.03	0.02	0.07
VI	Dueville	20.01	-	-0.01	-0.05	0.03	0.15	0.02	0.10	0.04	0.20
VI	Enego	52.60	-	0.01	0.02	0.01	0.02	-	-	0.02	0.04
VI	Fara Vicentino	15.17	-	-	-	-	-	0.01	0.07	0.01	0.07
VI	Foza	35.21	-	0.01	0.03	-0.01	-0.03	-	-	-	-
VI	Gallio	47.87	-	-0.01	-0.02	0.02	0.04	0.02	0.04	0.03	0.06
VI	Gambellara	13.00	-	-	-	0.02	0.15	0.01	0.08	0.03	0.23
VI	Gambugliano	7.95	-	-0.01	-0.13	0.02	0.25	-	-	0.01	0.13

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
VI	Grisignano di Zocco	17.02	-	0.01	0.06	0.02	0.12	-	-	0.03	0.18
VI	Grumolo delle Abbadesse	15.01	-	-	-	0.04	0.27	0.01	0.07	0.05	0.33
VI	Isola Vicentina	26.48	-	0.04	0.15	0.13	0.49	-0.07	-0.26	0.10	0.38
VI	Laghi	22.24	-	-	-	-	-	-	-	-	-
VI	Lastebasse	18.80	-	-	-	-	-	-0.04	-0.21	-0.04	-0.21
VI	Longare	22.77	-	0.01	0.04	0.04	0.18	-	-	0.05	0.22
VI	Lonigo	49.42	-	0.01	0.02	0.05	0.10	0.01	0.02	0.07	0.14
VI	Lugo di Vicenza	14.56	-	-0.01	-0.07	0.01	0.07	-	-	-	-
VI	Lusiana Conco	61.19	-	-0.01	-0.02	-0.18	-0.29	-0.03	-0.05	-0.22	-0.36
VI	Malo	30.53	-	0.04	0.13	0.25	0.82	-0.10	-0.33	0.19	0.62
VI	Marano Vicentino	12.73	-	-0.08	-0.63	0.02	0.16	0.01	0.08	-0.05	-0.39
VI	Marostica	36.53	-	0.14	0.38	0.11	0.30	-0.01	-0.03	0.24	0.66
VI	Monte di Malo	23.75	-	0.02	0.08	0.01	0.04	0.01	0.04	0.04	0.17
VI	Montebello Vicentino	21.48	-	0.02	0.09	0.02	0.09	-	-	0.04	0.19
VI	Montecchio Maggiore	30.54	-	0.10	0.33	0.49	1.60	0.08	0.26	0.67	2.19
VI	Montecchio Precalcino	14.42	-	0.10	0.69	-0.04	-0.28	-0.01	-0.07	0.05	0.35
VI	Montegalda	17.41	-	-	-	0.01	0.06	-0.02	-0.11	-0.01	-0.06
VI	Montegaldella	13.57	-	-0.01	-0.07	0.01	0.07	0.01	0.07	0.01	0.07
VI	Monteviale	8.44	-	-0.01	-0.12	0.02	0.24	0.01	0.12	0.02	0.24
VI	Monticello Conte Otto	10.24	-	-0.01	-0.10	0.04	0.39	-	-	0.03	0.29
VI	Montorso Vicentino	9.29	-	-	-	0.07	0.75	0.01	0.11	0.08	0.86
VI	Mussolente	15.43	-	0.09	0.58	0.11	0.71	-0.02	-0.13	0.18	1.17
VI	Nanto	14.35	-	-0.01	-0.07	0.02	0.14	-	-	0.01	0.07

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
VI	Nogarole Vicentino	9.09	-	-0.01	-0.11	0.03	0.33	-	-	0.02	0.22
VI	Nove	8.15	-	0.02	0.25	-	-	0.01	0.12	0.03	0.37
VI	Noventa Vicentina	22.88	-	0.05	0.22	0.02	0.09	0.01	0.04	0.08	0.35
VI	Orgiano	18.08	-	0.02	0.11	-	-	-	-	0.02	0.11
VI	Pedemonte	12.59	-	-	-	-0.06	-0.48	-	-	-0.06	-0.48
VI	Pianezze	5.02	-	0.07	1.39	0.06	1.20	-	-	0.13	2.59
VI	Piovene Rocchette	12.91	-	-0.01	-0.08	0.02	0.15	-0.01	-0.08	-	-
VI	Pojana Maggiore	28.62	-	0.01	0.03	0.06	0.21	-	-	0.07	0.24
VI	Posina	43.64	-	-0.01	-0.02	-	-	-	-	-0.01	-0.02
VI	Pove del Grappa	9.84	-	0.02	0.20	0.01	0.10	0.02	0.20	0.05	0.51
VI	Pozzoleone	11.25	-	0.01	0.09	0.05	0.44	0.02	0.18	0.08	0.71
VI	Quinto Vicentino	17.40	-	0.02	0.11	0.03	0.17	0.04	0.23	0.09	0.52
VI	Recoaro Terme	60.15	-	-0.01	-0.02	-0.01	-0.02	-	-	-0.02	-0.03
VI	Roana	78.13	-	-0.01	-0.01	-	-	-0.01	-0.01	-0.02	-0.03
VI	Romano d'Ezzelino	21.35	-	0.04	0.19	0.05	0.23	-	-	0.09	0.42
VI	Rosà	24.32	-	0.25	1.03	0.12	0.49	-0.01	-0.04	0.36	1.48
VI	Rossano Veneto	10.60	-	0.03	0.28	0.03	0.28	0.01	0.09	0.07	0.66
VI	Rotzo	28.25	-	-0.01	-0.04	0.01	0.04	-	-	-	-
VI	Salcedo	6.12	-	0.01	0.16	-0.01	-0.16	-	-	-	-
VI	San Pietro Mussolino	4.11	-	-	-	0.03	0.73	-	-	0.03	0.73
VI	San Vito di Leguzzano	6.13	-	-	-	0.01	0.16	-	-	0.01	0.16
VI	Sandrigo	27.99	-	-	-	0.06	0.21	-0.01	-0.04	0.05	0.18
VI	Santorso	13.21	-	-0.01	-0.08	0.05	0.38	-	-	0.04	0.30
VI	Sarcedo	13.85	-	0.14	1.01	-0.01	-0.07	-0.03	-0.22	0.10	0.72

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
VI	Sarego	23.92	-	0.02	0.08	0.08	0.33	-	-	0.10	0.42
VI	Schiavon	12.00	-	0.03	0.25	0.03	0.25	-	-	0.06	0.50
VI	Schio	66.21	-	-	-	0.09	0.14	0.03	0.05	0.12	0.18
VI	Solagna	15.81	-	0.01	0.06	-0.01	-0.06	-	-	-	-
VI	Sossano	20.90	-	-	-	0.02	0.10	-	-	0.02	0.10
VI	Sovizzo	15.66	-	0.03	0.19	0.02	0.13	-	-	0.05	0.32
VI	Tezze sul Brenta	17.93	-	0.13	0.73	0.03	0.17	0.04	0.22	0.20	1.12
VI	Thiene	19.70	-	0.04	0.20	0.10	0.51	-	-	0.14	0.71
VI	Tonezza del Cimone	13.94	-	0.01	0.07	-	-	-	-	0.01	0.07
VI	Torrebelvicino	20.74	-	-0.02	-0.10	0.03	0.14	-	-	0.01	0.05
VI	Torri di Quartesolo	18.67	-	0.02	0.11	0.05	0.27	0.02	0.11	0.09	0.48
VI	Trissino	21.96	-	0.05	0.23	0.66	3.01	0.02	0.09	0.73	3.32
VI	Val Liona	27.84	-	0.02	0.07	0.02	0.07	-	-	0.04	0.14
VI	Valbrenta	93.37	-	0.02	0.02	-0.04	-0.04	-0.02	-0.02	-0.04	-0.04
VI	Valdagno	50.22	-	0.01	0.02	-	-	-	-	0.01	0.02
VI	Valdastico	23.95	-	-	-	0.04	0.17	-	-	0.04	0.17
VI	Valli del Pasubio	49.34	-	-0.02	-0.04	0.02	0.04	-	-	-	-
VI	Velo d'Astico	21.90	-	-0.01	-0.05	0.01	0.05	-	-	-	-
VI	Vicenza	80.58	-	0.06	0.07	0.11	0.14	0.33	0.41	0.50	0.62
VI	Villaga	23.22	-	-	-	0.01	0.04	0.01	0.04	0.02	0.09
VI	Villaverla	15.79	-	0.02	0.13	0.10	0.63	0.03	0.19	0.15	0.95
VI	Zanè	7.64	-	-	-	0.04	0.52	-	-	0.04	0.52
VI	Zermeghedo	2.97	-	-	-	0.01	0.34	-	-	0.01	0.34
VI	Zovencedo	9.04	-	-	-	-	-	-	-	-	-
VI	Zugliano	13.73	-	-	-	0.02	0.15	0.01	0.07	0.03	0.22
VR	Affi	9.88	-	0.01	0.10	0.05	0.51	0.03	0.30	0.09	0.91
VR	Albaredo d'Adige	28.25	-	0.06	0.21	0.23	0.81	0.01	0.04	0.30	1.06
VR	Angiari	13.47	-	0.01	0.07	0.08	0.59	-	-	0.09	0.67

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	Municipality	km^2	km^2	km^2	%	km^2	%	km^2	%	km^2	%
VR	Arcole	18.87	-	0.01	0.05	0.12	0.64	0.01	0.05	0.14	0.74
VR	Badia Calavena	26.94	-	0.01	0.04	0.02	0.07	-	-	0.03	0.11
VR	Bardolino	57.32	39.92	-	-	0.11	0.63	0.03	0.17	0.14	0.80
VR	Belfiore	26.45	-	0.02	0.08	0.17	0.64	0.01	0.04	0.20	0.76
VR	Bevilacqua	12.20	-	0.01	0.08	0.24	1.97	-	-	0.25	2.05
VR	Bonavigo	17.99	-	0.01	0.06	0.32	1.78	0.06	0.33	0.39	2.17
VR	Boschi Sant'Anna	8.97	-	-	-	0.02	0.22	0.02	0.22	0.04	0.45
VR	Bosco Chiesanuova	64.80	-	0.01	0.02	0.09	0.14	-	-	0.10	0.15
VR	Bovolone	41.27	-	0.01	0.02	0.22	0.53	0.02	0.05	0.25	0.61
VR	Brentino Belluno	25.98	-	-	-	-	-	0.01	0.04	0.01	0.04
VR	Brenzone sul Garda	51.58	17.04	0.01	0.03	-	-	0.01	0.03	0.02	0.06
VR	Bussolengo	24.23	-	0.03	0.12	0.07	0.29	0.03	0.12	0.13	0.54
VR	Buttapietra	17.27	-	0.11	0.64	1.20	6.95	0.03	0.17	1.34	7.76
VR	Caldiero	10.37	-	0.01	0.10	0.05	0.48	0.02	0.19	0.08	0.77
VR	Caprino Veronese	47.32	-	-	-	0.09	0.19	0.03	0.06	0.12	0.25
VR	Casaleone	38.60	-	0.02	0.05	0.01	0.03	-	-	0.03	0.08
VR	Castagnaro	34.80	-	0.03	0.09	0.04	0.11	-	-	0.07	0.20
VR	Castel d'Azzano	9.72	-	0.05	0.51	0.36	3.70	0.04	0.41	0.45	4.63
VR	Castelnuovo del Garda	34.43	4.93	0.05	0.17	0.26	0.88	0.05	0.17	0.36	1.22
VR	Cavaion Veronese	12.91	-	-	-	0.09	0.70	0.01	0.08	0.10	0.77
VR	Cazzano di Tramigna	12.27	-	-	-	0.04	0.33	0.02	0.16	0.06	0.49
VR	Cerea	70.29	-	0.14	0.20	0.16	0.23	-	-	0.30	0.43
VR	Cerro Veronese	10.06	-	0.01	0.10	0.01	0.10	0.02	0.20	0.04	0.40
VR	Cologna Veneta	42.83	-	0.03	0.07	0.05	0.12	0.01	0.02	0.09	0.21
VR	Colognola ai Colli	20.90	-	0.01	0.05	0.08	0.38	0.05	0.24	0.14	0.67
VR	Concamarise	7.91	-	-	-	-0.04	-0.51	-	-	-0.04	-0.51

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
VR	Costermano sul Garda	16.74	-	-	-	0.11	0.66	0.06	0.36	0.17	1.02
VR	Dolcè	30.95	-	-	-	0.03	0.10	-0.04	-0.13	-0.01	-0.03
VR	Erbè	16.10	-	0.01	0.06	0.63	3.91	0.01	0.06	0.65	4.04
VR	Erbezzo	31.97	-	0.02	0.06	-0.01	-0.03	-	-	0.01	0.03
VR	Ferrara di Monte Baldo	26.89	-	-	-	-0.01	-0.04	-	-	-0.01	-0.04
VR	Fumane	34.21	-	-0.01	-0.03	0.06	0.18	0.01	0.03	0.06	0.18
VR	Garda	14.37	8.11	-0.01	-0.16	0.07	1.12	0.02	0.32	0.08	1.28
VR	Gazzo Veronese	56.65	-	0.05	0.09	0.16	0.28	-	-	0.21	0.37
VR	Grezzana	49.49	-	-0.01	-0.02	0.09	0.18	0.09	0.18	0.17	0.34
VR	Illasi	25.00	-	0.01	0.04	0.07	0.28	0.02	0.08	0.10	0.40
VR	Isola della Scala	69.83	-	0.13	0.19	1.18	1.69	0.05	0.07	1.36	1.95
VR	Isola Rizza	16.68	-	-	-	0.07	0.42	0.02	0.12	0.09	0.54
VR	Lavagno	14.64	-	0.04	0.27	0.07	0.48	0.07	0.48	0.18	1.23
VR	Lazise	63.15	35.76	-0.01	-0.04	0.20	0.73	0.09	0.33	0.28	1.02
VR	Legnago	79.27	-	0.03	0.04	0.20	0.25	0.01	0.01	0.24	0.30
VR	Malcesine	69.28	16.49	-	-	0.01	0.02	0.01	0.02	0.02	0.04
VR	Marano di Valpolicella	18.62	-	-0.01	-0.05	-0.05	-0.27	0.01	0.05	-0.05	-0.27
VR	Mezzane di Sotto	19.71	-	-0.01	-0.05	0.01	0.05	0.02	0.10	0.02	0.10
VR	Minerbe	29.65	-	0.03	0.10	1.17	3.95	0.03	0.10	1.23	4.15
VR	Montecchia di Crosara	21.06	-	0.01	0.05	0.05	0.24	-	-	0.06	0.28
VR	Monteforte d'Alpone	20.47	-	0.01	0.05	0.03	0.15	0.01	0.05	0.05	0.24
VR	Mozzecane	24.85	-	0.02	0.08	-0.03	-0.12	0.02	0.08	0.01	0.04
VR	Negrar di Valpolicella	40.42	-	0.01	0.02	0.08	0.20	0.01	0.02	0.10	0.25
VR	Nogara	38.78	-	0.02	0.05	0.51	1.32	0.01	0.03	0.54	1.39

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
VR	Nogarole Rocca	29.14	-	0.02	0.07	0.69	2.37	0.08	0.27	0.79	2.71
VR	Oppeano	46.73	-	0.07	0.15	1.50	3.21	0.20	0.43	1.77	3.79
VR	Palù	13.61	-	0.01	0.07	0.19	1.40	0.01	0.07	0.21	1.54
VR	Pastrengo	9.00	-	-0.01	-0.11	0.05	0.56	-	-	0.04	0.44
VR	Pescantina	19.73	-	0.03	0.15	0.07	0.35	0.05	0.25	0.15	0.76
VR	Peschiera del Garda	18.26	1.18	0.01	0.06	0.08	0.47	0.07	0.41	0.16	0.94
VR	Povegliano Veronese	18.53	-	-	-	0.15	0.81	-	-	0.15	0.81
VR	Pressana	17.39	-	0.01	0.06	0.08	0.46	-0.01	-0.06	0.08	0.46
VR	Rivoli Veronese	18.43	-	0.01	0.05	0.05	0.27	0.04	0.22	0.10	0.54
VR	Roncà	18.15	-	-	-	0.03	0.17	0.01	0.06	0.04	0.22
VR	Ronco all'Adige	42.81	-	-	-	0.33	0.77	0.05	0.12	0.38	0.89
VR	Roverchiara	19.65	-	0.03	0.15	0.04	0.20	0.01	0.05	0.08	0.41
VR	Roverè Veronese	36.55	-	-0.02	-0.05	0.08	0.22	0.01	0.03	0.07	0.19
VR	Roveredo di Guà	10.16	-	-	-	0.01	0.10	0.01	0.10	0.02	0.20
VR	Salizzole	30.70	-	0.07	0.23	0.23	0.75	0.02	0.07	0.32	1.04
VR	San Bonifacio	33.79	-	0.02	0.06	0.15	0.44	0.09	0.27	0.26	0.77
VR	San Giovanni Ilarione	25.40	-	0.01	0.04	0.01	0.04	0.05	0.20	0.07	0.28
VR	San Giovanni Lupatoto	19.01	-	0.08	0.42	1.59	8.36	-	-	1.67	8.78
VR	San Martino Buon Albergo	34.75	-	0.02	0.06	0.66	1.90	0.06	0.17	0.74	2.13
VR	San Mauro di Saline	11.24	-	-	-	0.01	0.09	0.03	0.27	0.04	0.36
VR	San Pietro di Morubio	16.12	-	-	-	0.09	0.56	-	-	0.09	0.56
VR	San Pietro in Cariano	20.24	-	-	-	0.04	0.20	0.02	0.10	0.06	0.30

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Table C2 – continued from previous page

		Total area	Water surface	2012-2015		2015-2018		2018-2019		2012-2019	
Prov.	**Municipality**	**km^2**	**km^2**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**	**km^2**	**%**
VR	San Zeno di Montagna	28.24	-	-	-	0.01	0.04	-	-	0.01	0.04
VR	Sanguinetto	13.51	-	0.02	0.15	-	-	-	-	0.02	0.15
VR	Sant'Ambrogio di Valpolicella	23.50	-	0.04	0.17	0.05	0.21	0.02	0.09	0.11	0.47
VR	Sant'Anna d'Alfaedo	43.43	-	-0.03	-0.07	0.06	0.14	0.01	0.02	0.04	0.09
VR	Selva di Progno	41.33	-	-	-	0.01	0.02	-	-	0.01	0.02
VR	Soave	22.72	-	-0.01	-0.04	0.12	0.53	0.02	0.09	0.13	0.57
VR	Sommacampagna	40.83	-	-0.01	-0.02	0.14	0.34	0.11	0.27	0.24	0.59
VR	Sona	41.14	-	-0.02	-0.05	0.09	0.22	0.07	0.17	0.14	0.34
VR	Sorgà	31.53	-	-	-	0.18	0.57	0.01	0.03	0.19	0.60
VR	Terrazzo	20.53	-	-	-	-	-	-	-	-	-
VR	Torri del Benaco	46.29	28.87	-0.01	-0.06	0.03	0.17	0.02	0.11	0.04	0.23
VR	Tregnago	37.35	-	0.01	0.03	0.05	0.13	0.03	0.08	0.09	0.24
VR	Trevenzuolo	26.94	-	0.02	0.07	0.65	2.41	0.02	0.07	0.69	2.56
VR	Valeggio sul Mincio	63.96	-	0.02	0.03	0.16	0.25	0.09	0.14	0.27	0.42
VR	Velo Veronese	18.90	-	0.01	0.05	0.07	0.37	-	-	0.08	0.42
VR	Verona	198.91	-	0.26	0.13	3.27	1.64	0.18	0.09	3.71	1.87
VR	Veronella	20.88	-	0.01	0.05	0.13	0.62	-	-	0.14	0.67
VR	Vestenanova	24.18	-	-0.01	-0.04	0.03	0.12	0.02	0.08	0.04	0.17
VR	Vigasio	30.76	-	0.01	0.03	0.71	2.31	0.17	0.55	0.89	2.89
VR	Villa Bartolomea	52.99	-	0.07	0.13	0.02	0.04	-	-	0.09	0.17
VR	Villafranca di Verona	57.34	-	0.14	0.24	0.76	1.33	0.08	0.14	0.98	1.71
VR	Zevio	54.87	-	0.11	0.20	2.07	3.77	0.17	0.31	2.35	4.28
VR	Zimella	20.10	-	0.02	0.10	0.06	0.30	0.01	0.05	0.09	0.45

C3 Land fragmentation in Veneto at municipal level

Table C3.1: Municipal global and partial proportional mutual information, 2012

Prov.	**Municipality**	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Agordo	0.015	0.152	0.116	0.086	0.063	0.046	0.021	0.005	0.009
BL	Alano di Piave	0.002	0.088	0.061	0.04	0.025	0.011	0.003	-	0.001
BL	Alleghe	0.003	0.093	0.066	0.04	0.025	0.014	0.007	0.003	0.001
BL	Alpago	0.001	0.089	0.061	0.03	0.015	0.007	0.003	0.003	-
BL	Arsiè	0.001	0.056	0.03	0.013	0.006	0.003	0.002	0.002	-
BL	Auronzo di Cadore	-	0.108	0.075	0.041	0.019	0.006	0.002	0.001	-
BL	Belluno	0.001	0.095	0.07	0.049	0.034	0.023	0.016	0.012	-
BL	Borca di Cadore	0.005	0.142	0.091	0.062	0.042	0.018	0.006	0.005	0.002
BL	Borgo Valbelluna	-	0.048	0.03	0.016	0.01	0.006	0.003	0.002	-
BL	Calalzo di Cadore	0.012	0.208	0.175	0.131	0.089	0.051	0.046	0.077	0.003
BL	Canale d'Agordo	0.001	0.102	0.068	0.033	0.014	0.005	0.003	0.002	-
BL	Cencenighe Agordino	0.016	0.131	0.088	0.056	0.033	0.014	0.015	0.02	0.012
BL	Cesiomaggiore	0.002	0.074	0.054	0.036	0.024	0.02	0.015	0.013	-
BL	Chies d'Alpago	0.002	0.048	0.033	0.019	0.012	0.012	0.008	0.005	0.001
BL	Cibiana di Cadore	0.001	0.1	0.064	0.019	0.006	0.001	-	-	-
BL	Colle Santa Lucia	0.001	0.041	0.018	0.012	0.005	0.001	-	-	0.001
BL	Comelico Superiore	0.001	0.082	0.06	0.038	0.024	0.012	0.003	0.001	-
BL	Cortina d'Ampezzo	0.001	0.121	0.088	0.062	0.046	0.03	0.017	0.01	-
BL	Danta di Cadore	0.003	0.049	0.043	0.022	0.006	-	0.001	0.001	0.001
BL	Domegge di Cadore	0.004	0.123	0.102	0.07	0.046	0.021	0.009	0.008	0.001
BL	Falcade	0.003	0.136	0.096	0.061	0.033	0.015	0.008	0.003	0.001
BL	Feltre	0.002	0.09	0.064	0.043	0.03	0.022	0.017	0.013	-
BL	Fonzaso	0.005	0.089	0.059	0.032	0.016	0.009	0.008	0.01	0.002
BL	Gosaldo	0.002	0.072	0.043	0.028	0.012	0.005	0.005	0.007	-
BL	La Valle Agordina	0.002	0.101	0.056	0.036	0.017	0.007	0.006	0.007	-
BL	Lamon	0.002	0.068	0.046	0.027	0.02	0.013	0.007	0.003	-
BL	Limana	0.001	0.049	0.03	0.016	0.009	0.005	0.003	0.003	-
BL	Livinallongo del Col di Lana	-	0.064	0.038	0.019	0.01	0.004	0.001	0.001	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Longarone	0.002	0.156	0.112	0.067	0.042	0.027	0.018	0.01	-
BL	Lorenzago di Cadore	0.004	0.11	0.067	0.04	0.022	0.01	0.005	0.008	0.001
BL	Lozzo di Cadore	0.004	0.117	0.085	0.058	0.027	0.012	0.007	0.006	0.001
BL	Ospitale di Cadore	0.001	0.136	0.078	0.033	0.012	0.005	0.002	0.002	-
BL	Pedavena	0.005	0.067	0.049	0.033	0.027	0.017	0.007	0.001	0.002
BL	Perarolo di Cadore	0.002	0.122	0.078	0.04	0.016	0.008	0.003	0.001	0.001
BL	Pieve di Cadore	0.006	0.17	0.131	0.096	0.064	0.041	0.026	0.015	0.002
BL	Ponte nelle Alpi	0.002	0.097	0.055	0.032	0.016	0.01	0.006	0.006	-
BL	Quero Vas	0.002	0.099	0.071	0.041	0.028	0.015	0.007	0.004	0.001
BL	Rivamonte Agordino	0.003	0.088	0.051	0.03	0.016	0.007	0.003	0.002	0.002
BL	Rocca Pietore	0.001	0.085	0.054	0.023	0.01	0.004	0.001	0.001	-
BL	San Gregorio nelle Alpi	0.005	0.06	0.045	0.027	0.017	0.012	0.005	0.002	0.003
BL	San Nicolò di Comelico	0.007	0.099	0.064	0.04	0.026	0.018	0.014	0.011	0.003
BL	San Pietro di Cadore	0.003	0.084	0.068	0.041	0.027	0.018	0.015	0.012	0.001
BL	San Tomaso Agordino	0.01	0.101	0.05	0.023	0.016	0.009	0.011	0.016	0.007
BL	San Vito di Cadore	0.004	0.158	0.119	0.08	0.053	0.029	0.014	0.011	0.001
BL	Santa Giustina	0.006	0.095	0.067	0.043	0.034	0.025	0.018	0.017	0.002
BL	Santo Stefano di Cadore	0.001	0.087	0.066	0.041	0.019	0.01	0.004	0.002	-
BL	Sedico	0.004	0.121	0.092	0.068	0.05	0.039	0.031	0.03	0.001
BL	Selva di Cadore	0.001	0.078	0.042	0.022	0.01	0.001	0.001	0.003	-
BL	Seren del Grappa	0.001	0.062	0.04	0.024	0.012	0.008	0.004	0.001	-
BL	Sospirolo	0.003	0.089	0.058	0.039	0.029	0.021	0.015	0.01	0.001
BL	Soverzene	0.004	0.104	0.05	0.022	0.01	0.007	0.003	0.003	0.003
BL	Sovramonte	0.001	0.056	0.035	0.019	0.011	0.007	0.004	0.003	-
BL	Taibon Agordino	0.001	0.119	0.08	0.051	0.031	0.013	0.005	0.001	-
BL	Tambre	0.002	0.076	0.045	0.024	0.012	0.008	0.005	0.003	-
BL	Val di Zoldo	0.001	0.107	0.064	0.033	0.016	0.007	0.003	0.004	-
BL	Vallada Agordina	0.011	0.093	0.057	0.028	0.01	0.005	0.009	0.012	0.012
BL	Valle di Cadore	0.003	0.12	0.089	0.05	0.027	0.011	0.005	0.006	0.001
BL	Vigo di Cadore	0.001	0.085	0.052	0.03	0.017	0.007	0.004	0.002	-
BL	Vodo Cadore	0.001	0.121	0.083	0.039	0.016	0.005	0.003	0.001	-
BL	Voltago Agordino	0.002	0.109	0.068	0.029	0.007	0.004	0.001	-	0.001

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Zoppè di Cadore	0.006	0.026	0.032	0.011	0.005	0.001	0.004	0.007	0.015
PD	Abano Terme	0.002	0.066	0.036	0.015	0.005	0.003	0.003	0.004	0.001
PD	Agna	0.003	0.072	0.034	0.013	0.008	0.005	0.003	0.006	0.001
PD	Albignasego	0.001	0.069	0.027	0.012	0.007	0.002	0.001	0.001	-
PD	Anguillara Veneta	0.002	0.067	0.03	0.012	0.005	0.003	0.003	0.002	-
PD	Arquà Petrarca	0.002	0.037	0.015	0.005	0.002	0.001	0.003	0.002	0.002
PD	Arre	0.004	0.067	0.029	0.013	0.006	0.003	0.003	0.001	0.003
PD	Arzergrande	0.002	0.069	0.035	0.018	0.01	0.003	0.001	-	0.001
PD	Bagnoli di Sopra	0.001	0.087	0.04	0.015	0.005	0.001	-	0.001	-
PD	Baone	-	0.036	0.014	0.003	-	-	-	-	-
PD	Barbona	0.006	0.047	0.01	0.003	0.006	0.007	0.005	0.001	0.006
PD	Battaglia Terme	0.008	0.081	0.059	0.03	0.019	0.005	-	0.009	0.004
PD	Boara Pisani	0.002	0.07	0.033	0.017	0.006	0.002	0.002	0.001	0.001
PD	Borgo Veneto	0.001	0.064	0.022	0.009	0.005	0.003	0.004	0.005	-
PD	Borgoricco	-	0.063	0.02	0.002	-	0.001	0.001	-	-
PD	Bovolenta	0.002	0.064	0.024	0.009	0.003	0.003	0.004	0.003	0.001
PD	Brugine	0.001	0.054	0.02	0.005	0.001	0.001	0.001	0.001	-
PD	Cadoneghe	0.003	0.053	0.022	0.012	0.006	0.003	0.002	0.001	0.002
PD	Campo San Martino	0.001	0.046	0.019	0.007	0.003	0.001	0.001	0.001	0.001
PD	Campodarsego	-	0.05	0.014	0.002	-	-	-	-	-
PD	Campodoro	-	0.044	0.014	0.002	-	-	-	-	-
PD	Camposampiero	0.003	0.074	0.028	0.009	0.007	0.006	0.005	0.005	0.001
PD	Candiana	0.001	0.055	0.014	0.003	0.001	0.002	0.003	0.003	0.001
PD	Carceri	0.001	0.032	0.009	0.002	-	-	-	0.001	-
PD	Carmignano di Brenta	0.002	0.068	0.033	0.012	0.003	0.003	0.002	0.001	0.001
PD	Cartura	0.001	0.041	0.014	0.003	0.002	0.002	0.001	0.001	0.001
PD	Casale di Scodosia	0.005	0.09	0.054	0.028	0.018	0.01	0.005	0.004	0.002
PD	Casalserugo	0.003	0.069	0.03	0.008	0.003	0.004	0.004	0.002	0.002
PD	Castelbaldo	-	0.034	0.01	0.004	0.001	-	0.001	-	-
PD	Cervarese Santa Croce	-	0.051	0.021	0.006	0.003	-	-	-	-
PD	Cinto Euganeo	-	0.023	0.007	0.002	-	0.001	0.001	0.001	-
PD	Cittadella	0.002	0.064	0.028	0.013	0.007	0.005	0.005	0.005	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Codevigo	-	0.011	0.002	-	-	-	-	-	-
PD	Conselve	0.002	0.073	0.037	0.021	0.011	0.004	0.002	0.004	0.001
PD	Correzzola	-	0.054	0.018	0.003	-	-	-	-	-
PD	Curtarolo	0.001	0.037	0.013	0.007	0.005	0.003	0.001	-	0.001
PD	Due Carrare	-	0.057	0.023	0.007	0.002	0.001	-	0.001	-
PD	Este	0.003	0.072	0.045	0.025	0.014	0.008	0.006	0.007	0.001
PD	Fontaniva	0.003	0.077	0.041	0.018	0.01	0.005	0.004	0.003	0.001
PD	Galliera Veneta	0.008	0.069	0.032	0.013	0.007	0.01	0.008	0.002	0.008
PD	Galzignano Terme	0.001	0.059	0.031	0.013	0.004	0.001	-	0.002	-
PD	Gazzo	-	0.046	0.013	0.002	0.001	0.001	0.001	-	-
PD	Grantorto	0.001	0.041	0.014	0.003	-	-	0.001	0.002	0.001
PD	Granze	0.002	0.058	0.027	0.009	0.002	0.001	0.002	0.001	0.001
PD	Legnaro	0.002	0.062	0.026	0.009	0.004	0.002	0.003	0.001	0.001
PD	Limena	0.003	0.071	0.04	0.023	0.016	0.005	0.001	0.002	0.001
PD	Loreggia	0.002	0.051	0.015	0.003	0.002	0.002	0.003	0.003	0.001
PD	Lozzo Atestino	0.001	0.058	0.034	0.017	0.008	0.002	0.001	0.003	-
PD	Maserà di Padova	0.001	0.066	0.031	0.007	0.001	0.002	0.002	0.002	0.001
PD	Masi	0.001	0.058	0.022	0.012	0.006	0.002	0.001	-	-
PD	Massanzago	0.001	0.045	0.01	0.001	0.001	0.001	0.001	-	0.001
PD	Megliadino San Vitale	0.001	0.053	0.026	0.009	0.003	0.001	-	0.001	0.001
PD	Merlara	0.001	0.049	0.018	0.006	0.002	0.002	0.002	0.002	0.001
PD	Mestrino	0.003	0.075	0.044	0.02	0.013	0.007	0.004	0.002	0.001
PD	Monselice	0.001	0.059	0.03	0.015	0.009	0.005	0.004	0.006	-
PD	Montagnana	0.001	0.062	0.029	0.013	0.007	0.002	0.002	0.003	-
PD	Montegrotto Terme	0.003	0.072	0.042	0.023	0.011	0.004	0.002	0.002	0.002
PD	Noventa Padovana	0.005	0.051	0.015	0.005	0.001	0.001	0.004	0.005	0.005
PD	Ospedaletto Euganeo	0.001	0.076	0.039	0.016	0.007	0.002	0.001	-	-
PD	Padova	0.001	0.072	0.041	0.023	0.013	0.01	0.01	0.012	-
PD	Pernumia	0.001	0.043	0.018	0.005	0.003	-	0.001	0.001	-
PD	Piacenza d'Adige	0.001	0.056	0.019	0.005	0.002	0.001	-	-	-
PD	Piazzola sul Brenta	-	0.037	0.013	0.006	0.003	0.002	0.001	0.001	-
PD	Piombino Dese	0.001	0.061	0.024	0.01	0.005	0.004	0.003	0.002	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Piove di Sacco	0.002	0.062	0.029	0.012	0.007	0.007	0.006	0.005	-
PD	Polverara	0.001	0.052	0.015	0.002	-	0.001	0.001	-	-
PD	Ponso	0.003	0.077	0.032	0.008	0.004	0.004	0.003	0.002	0.003
PD	Ponte San Nicolò	0.002	0.082	0.042	0.012	0.002	0.002	0.002	-	0.001
PD	Pontelongo	0.006	0.082	0.046	0.023	0.013	0.01	0.006	0.005	0.004
PD	Pozzonovo	0.003	0.102	0.051	0.028	0.017	0.007	0.003	0.003	0.001
PD	Rovolon	0.001	0.036	0.015	0.004	0.001	0.001	0.002	0.001	-
PD	Rubano	0.002	0.072	0.034	0.016	0.006	0.002	0.001	0.001	0.001
PD	Saccolongo	0.001	0.041	0.013	0.002	0.001	0.001	-	-	-
PD	San Giorgio delle Pertiche	-	0.044	0.011	0.002	0.001	0.001	-	-	-
PD	San Giorgio in Bosco	-	0.046	0.011	0.002	0.001	-	0.001	0.001	-
PD	San Martino di Lupari	0.002	0.065	0.028	0.011	0.005	0.004	0.003	0.002	0.001
PD	San Pietro in Gu	0.003	0.057	0.021	0.006	0.003	0.003	0.004	0.006	0.002
PD	San Pietro Viminario	0.001	0.045	0.016	0.004	0.001	0.001	0.001	0.001	0.001
PD	Sant'Angelo di Piove di Sacco	-	0.039	0.012	0.004	0.001	0.001	-	-	-
PD	Sant'Elena	0.006	0.064	0.037	0.015	0.007	0.003	0.005	0.002	0.007
PD	Sant'Urbano	-	0.063	0.026	0.008	0.001	-	-	-	-
PD	Santa Giustina in Colle	-	0.038	0.009	0.001	-	-	-	-	-
PD	Saonara	0.001	0.067	0.035	0.013	0.005	0.001	-	-	-
PD	Selvazzano Dentro	0.002	0.084	0.05	0.028	0.013	0.003	0.001	0.001	0.001
PD	Solesino	0.016	0.118	0.072	0.033	0.017	0.019	0.016	0.008	0.015
PD	Stanghella	0.002	0.091	0.036	0.012	0.005	0.003	0.003	0.002	0.001
PD	Teolo	-	0.04	0.017	0.004	0.001	-	-	-	-
PD	Terrassa Padovana	0.001	0.064	0.023	0.004	0.001	0.001	-	-	-
PD	Tombolo	0.003	0.075	0.031	0.013	0.007	0.005	0.002	-	0.002
PD	Torreglia	0.002	0.041	0.014	0.004	0.003	0.003	0.003	0.002	0.001
PD	Trebaseleghe	0.001	0.06	0.021	0.006	0.004	0.003	0.003	0.003	-
PD	Tribano	0.004	0.065	0.028	0.014	0.01	0.006	0.007	0.006	0.002
PD	Urbana	0.001	0.042	0.015	0.006	0.001	0.001	-	-	-
PD	Veggiano	0.002	0.055	0.023	0.006	0.001	0.001	0.003	0.003	0.001
PD	Vescovana	0.002	0.08	0.037	0.014	0.006	0.004	0.003	0.002	0.001

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Vighizzolo d'Este	0.001	0.068	0.029	0.012	0.005	0.002	-	-	-
PD	Vigodarzere	0.001	0.034	0.012	0.004	0.002	0.001	0.001	0.001	-
PD	Vigonza	0.001	0.067	0.029	0.012	0.005	0.002	0.001	0.001	-
PD	Villa del Conte	0.001	0.043	0.01	0.002	0.001	0.001	0.001	0.001	-
PD	Villa Estense	0.005	0.051	0.026	0.008	0.006	0.006	0.007	0.005	0.003
PD	Villafranca Padovana	-	0.053	0.022	0.011	0.004	0.001	-	-	-
PD	Villanova di Camposampiero	-	0.055	0.012	-	0.001	-	-	-	-
PD	Vo'	0.002	0.034	0.011	0.002	0.001	0.002	0.003	0.003	0.001
RO	Adria	0.001	0.094	0.055	0.029	0.016	0.009	0.004	0.001	-
RO	Ariano nel Polesine	-	0.052	0.025	0.01	0.005	0.002	0.001	0.001	-
RO	Arquà Polesine	0.001	0.064	0.031	0.012	0.004	0.001	0.001	0.002	-
RO	Badia Polesine	0.001	0.067	0.032	0.014	0.007	0.004	0.004	0.004	-
RO	Bagnolo di Po	0.001	0.072	0.029	0.009	0.002	0.001	-	-	-
RO	Bergantino	0.003	0.074	0.036	0.014	0.008	0.004	0.003	0.004	0.002
RO	Bosaro	0.002	0.084	0.049	0.017	0.001	0.001	-	0.002	-
RO	Calto	0.005	0.037	0.029	0.011	0.007	0.006	0.006	0.002	0.004
RO	Canaro	0.001	0.089	0.05	0.022	0.005	0.001	0.002	0.001	-
RO	Canda	0.002	0.058	0.028	0.011	0.004	0.002	0.002	0.001	0.001
RO	Castelguglielmo	0.002	0.102	0.06	0.03	0.014	0.006	0.003	0.001	0.001
RO	Castelmassa	0.008	0.072	0.044	0.021	0.015	0.011	0.006	0.004	0.008
RO	Castelnovo Bariano	-	0.042	0.016	0.008	0.004	0.001	-	-	-
RO	Ceneselli	-	0.048	0.021	0.008	0.003	0.001	-	-	-
RO	Ceregnano	0.001	0.091	0.044	0.02	0.007	-	0.001	-	-
RO	Corbola	0.001	0.06	0.023	0.01	0.003	-	0.001	0.001	-
RO	Costa di Rovigo	0.004	0.042	0.024	0.01	0.006	0.005	0.006	0.004	0.003
RO	Crespino	-	0.065	0.021	0.004	0.001	-	-	-	-
RO	Ficarolo	0.003	0.048	0.017	0.007	0.004	0.004	0.003	0.003	0.002
RO	Fiesso Umbertiano	0.001	0.068	0.033	0.013	0.003	-	0.001	0.001	-
RO	Frassinelle Polesine	0.001	0.066	0.033	0.016	0.007	0.004	0.002	-	-
RO	Fratta Polesine	0.002	0.095	0.05	0.024	0.01	0.003	0.001	0.003	-
RO	Gaiba	0.004	0.04	0.02	0.009	0.004	0.003	0.007	0.001	0.003

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
RO	Gavello	0.001	0.054	0.023	0.01	0.004	0.001	0.001	-	-
RO	Giacciano con Baruchella	0.001	0.057	0.033	0.01	0.002	0.001	-	0.001	-
RO	Guarda Veneta	0.001	0.069	0.02	0.004	-	-	-	0.001	-
RO	Lendinara	0.001	0.065	0.035	0.017	0.011	0.005	0.002	0.001	-
RO	Loreo	0.001	0.069	0.034	0.016	0.007	0.003	-	-	-
RO	Lusia	0.001	0.062	0.025	0.007	0.002	-	0.001	0.003	-
RO	Melara	0.003	0.063	0.027	0.013	0.006	0.004	0.003	0.003	0.002
RO	Occhiobello	0.002	0.1	0.063	0.032	0.019	0.01	0.003	-	0.001
RO	Papozze	-	0.049	0.021	0.008	0.003	-	-	-	-
RO	Pettorazza Grimani	0.005	0.096	0.054	0.028	0.014	0.009	0.008	0.005	0.002
RO	Pincara	0.001	0.05	0.021	0.009	0.004	0.002	0.001	-	-
RO	Polesella	0.003	0.105	0.061	0.032	0.017	0.004	0.001	0.004	0.001
RO	Pontecchio Polesine	0.005	0.114	0.054	0.02	0.007	0.005	0.004	0.002	0.003
RO	Porto Tolle	-	0.014	0.002	0.001	-	-	-	-	-
RO	Porto Viro	0.001	0.043	0.021	0.015	0.014	0.015	0.014	0.014	-
RO	Rosolina	0.001	0.046	0.018	0.012	0.008	0.006	0.006	0.006	-
RO	Rovigo	0.001	0.109	0.069	0.041	0.024	0.013	0.008	0.006	-
RO	Salara	0.002	0.054	0.024	0.007	0.002	0.001	0.001	0.002	0.001
RO	San Bellino	0.002	0.094	0.057	0.024	0.007	0.001	0.001	0.002	-
RO	San Martino di Venezze	0.001	0.109	0.061	0.026	0.01	0.003	0.001	0.001	-
RO	Stienta	0.001	0.058	0.026	0.009	0.002	0.001	-	-	-
RO	Taglio di Po	-	0.067	0.031	0.015	0.009	0.007	0.003	0.001	-
RO	Trecenta	0.002	0.063	0.031	0.016	0.008	0.004	0.005	0.004	-
RO	Villadose	0.002	0.138	0.073	0.033	0.012	0.003	0.001	0.002	-
RO	Villamarzana	0.003	0.056	0.023	0.01	0.004	0.001	0.004	0.003	0.002
RO	Villanova del Ghebbo	0.005	0.072	0.043	0.02	0.012	0.009	0.004	0.001	0.004
RO	Villanova Marchesana	0.001	0.034	0.012	0.004	0.002	0.001	0.001	-	-
TV	Altivole	-	0.049	0.012	0.002	0.001	0.001	0.001	-	-
TV	Arcade	0.008	0.054	0.026	0.009	0.004	0.006	0.006	0.001	0.011
TV	Asolo	0.001	0.036	0.011	0.003	0.001	0.002	0.003	0.004	0.001
TV	Borso del Grappa	0.004	0.085	0.053	0.037	0.028	0.016	0.007	0.003	0.001
TV	Breda di Piave	0.001	0.064	0.027	0.011	0.005	0.002	0.001	0.001	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Caerano di San Marco	0.003	0.068	0.025	0.009	0.004	0.003	0.004	0.002	0.002
TV	Cappella Maggiore	0.002	0.027	0.013	0.004	0.003	0.003	0.002	-	0.001
TV	Carbonera	-	0.058	0.019	0.004	0.001	-	-	-	-
TV	Casale sul Sile	0.001	0.051	0.023	0.005	0.001	0.001	0.001	0.001	-
TV	Casier	0.001	0.069	0.03	0.01	0.002	-	0.001	0.002	-
TV	Castelcucco	0.003	0.036	0.024	0.008	0.004	0.004	0.003	0.001	0.003
TV	Castelfranco Veneto	0.002	0.073	0.034	0.015	0.01	0.008	0.009	0.009	-
TV	Castello di Godego	0.002	0.045	0.013	0.004	0.004	0.003	0.003	0.003	0.001
TV	Cavaso del Tomba	0.002	0.044	0.023	0.015	0.009	0.004	0.001	0.002	0.001
TV	Cessalto	0.001	0.057	0.034	0.015	0.008	0.004	0.002	0.002	-
TV	Chiarano	0.002	0.054	0.024	0.007	0.004	0.002	0.004	0.005	0.001
TV	Cimadolmo	0.003	0.082	0.059	0.033	0.018	0.007	0.002	0.001	0.001
TV	Cison di Valmarino	0.001	0.068	0.043	0.022	0.01	0.003	-	-	-
TV	Codognè	0.001	0.058	0.026	0.009	0.003	0.002	0.001	0.001	-
TV	Colle Umberto	0.002	0.027	0.012	0.003	0.002	0.001	0.002	0.001	0.001
TV	Conegliano	0.004	0.082	0.055	0.037	0.027	0.019	0.011	0.004	0.001
TV	Cordignano	0.002	0.052	0.029	0.015	0.006	0.003	0.003	0.007	-
TV	Cornuda	0.008	0.106	0.078	0.05	0.028	0.012	0.005	0.001	0.006
TV	Crocetta del Montello	0.004	0.065	0.043	0.025	0.019	0.011	0.006	0.004	0.002
TV	Farra di Soligo	0.002	0.062	0.039	0.027	0.016	0.007	0.003	0.003	0.001
TV	Follina	0.002	0.1	0.067	0.041	0.019	0.006	0.001	-	-
TV	Fontanelle	-	0.041	0.014	0.002	0.001	0.001	0.001	0.001	-
TV	Fonte	0.002	0.041	0.015	0.007	0.003	0.003	0.002	0.001	0.001
TV	Fregona	0.002	0.065	0.042	0.023	0.014	0.008	0.007	0.004	-
TV	Gaiarine	0.001	0.05	0.027	0.01	0.004	0.001	0.001	0.001	-
TV	Giavera del Montello	0.001	0.044	0.022	0.008	0.003	0.002	0.003	0.002	0.001
TV	Godega di Sant'Urbano	0.001	0.047	0.026	0.01	0.003	0.001	0.001	-	-
TV	Gorgo al Monticano	0.001	0.054	0.022	0.007	0.003	0.003	0.002	0.002	-
TV	Istrana	0.002	0.056	0.029	0.01	0.004	0.004	0.004	0.003	0.001
TV	Loria	-	0.042	0.013	0.002	-	-	-	-	-
TV	Mansuè	0.002	0.06	0.025	0.01	0.006	0.004	0.003	0.003	0.001
TV	Mareno di Piave	0.001	0.049	0.024	0.011	0.005	0.003	0.003	0.003	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Maser	0.002	0.056	0.022	0.011	0.006	0.004	0.004	0.004	0.001
TV	Maserada sul Piave	0.002	0.073	0.048	0.024	0.013	0.007	0.004	0.002	0.001
TV	Meduna di Livenza	0.001	0.054	0.031	0.01	0.003	0.001	0.001	0.001	-
TV	Miane	0.001	0.06	0.044	0.021	0.007	0.001	-	0.001	-
TV	Mogliano Veneto	0.001	0.067	0.028	0.013	0.007	0.003	0.002	0.004	-
TV	Monastier di Treviso	0.001	0.074	0.028	0.01	0.004	0.002	0.001	0.001	-
TV	Monfumo	-	0.012	0.008	0.001	-	-	-	-	-
TV	Montebelluna	0.001	0.057	0.027	0.014	0.01	0.007	0.005	0.004	-
TV	Morgano	0.001	0.04	0.013	0.002	0.001	0.001	-	-	-
TV	Moriago della Battaglia	0.006	0.069	0.038	0.018	0.008	0.006	0.007	0.004	0.005
TV	Motta di Livenza	0.001	0.058	0.03	0.017	0.01	0.004	0.003	0.003	-
TV	Nervesa della Battaglia	0.001	0.039	0.016	0.008	0.005	0.003	0.002	0.001	-
TV	Oderzo	0.002	0.064	0.034	0.017	0.011	0.008	0.005	0.003	-
TV	Ormelle	0.002	0.062	0.031	0.011	0.006	0.004	0.003	0.004	0.001
TV	Orsago	0.004	0.047	0.029	0.016	0.009	0.004	0.003	0.001	0.004
TV	Paese	0.001	0.063	0.042	0.017	0.008	0.003	0.002	-	-
TV	Pederobba	0.001	0.064	0.036	0.019	0.007	0.002	0.001	-	-
TV	Pieve del Grappa	0.005	0.075	0.047	0.033	0.025	0.019	0.014	0.01	0.002
TV	Pieve di Soligo	0.01	0.08	0.052	0.034	0.028	0.02	0.015	0.009	0.006
TV	Ponte di Piave	0.002	0.063	0.033	0.014	0.008	0.004	0.004	0.004	-
TV	Ponzano Veneto	0.002	0.055	0.029	0.011	0.005	0.004	0.003	0.004	0.001
TV	Portobuffolè	0.006	0.077	0.036	0.01	0.002	-	0.005	0.004	0.007
TV	Possagno	0.014	0.102	0.074	0.05	0.036	0.027	0.011	0.001	0.011
TV	Povegliano	0.001	0.058	0.026	0.006	0.001	-	-	0.001	-
TV	Preganziol	0.001	0.087	0.041	0.016	0.006	0.001	-	-	-
TV	Quinto di Treviso	0.002	0.071	0.032	0.013	0.007	0.003	0.002	0.003	0.001
TV	Refrontolo	-	0.032	0.013	0.003	0.001	-	-	-	-
TV	Resana	0.001	0.052	0.018	0.004	0.002	0.001	0.001	0.001	-
TV	Revine Lago	0.003	0.089	0.056	0.029	0.012	0.003	0.002	0.003	0.001
TV	Riese Pio X	-	0.054	0.018	0.005	0.002	0.001	0.001	0.001	-
TV	Roncade	0.001	0.062	0.027	0.013	0.007	0.004	0.002	0.001	-
TV	Salgareda	-	0.06	0.022	0.004	-	0.001	0.001	0.001	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	San Biagio di Callalta	-	0.058	0.026	0.008	0.003	0.001	-	-	-
TV	San Fior	0.002	0.045	0.024	0.013	0.01	0.004	0.002	0.002	0.001
TV	San Pietro di Feletto	-	0.038	0.018	0.004	-	-	-	-	-
TV	San Polo di Piave	0.003	0.058	0.026	0.009	0.003	0.003	0.004	0.006	0.001
TV	San Vendemiano	0.003	0.07	0.041	0.018	0.011	0.006	0.004	0.002	0.002
TV	San Zenone degli Ezzelini	0.001	0.046	0.015	0.003	0.001	0.002	0.002	0.001	-
TV	Santa Lucia di Piave	0.002	0.074	0.036	0.016	0.005	0.002	0.003	0.004	0.001
TV	Sarmede	0.001	0.036	0.023	0.009	0.004	0.003	0.001	-	0.001
TV	Segusino	0.002	0.076	0.046	0.029	0.014	0.005	0.002	0.001	0.001
TV	Sernaglia della Battaglia	0.003	0.093	0.059	0.032	0.014	0.005	0.003	0.001	0.001
TV	Silea	0.002	0.065	0.037	0.017	0.01	0.006	0.002	-	0.001
TV	Spresiano	0.004	0.098	0.057	0.035	0.017	0.007	0.006	0.005	0.002
TV	Susegana	0.001	0.081	0.047	0.025	0.013	0.005	0.002	0.001	-
TV	Tarzo	0.001	0.043	0.024	0.009	0.002	0.001	0.001	0.001	-
TV	Trevignano	0.001	0.043	0.021	0.009	0.003	0.001	0.001	0.001	-
TV	Treviso	0.004	0.091	0.055	0.032	0.025	0.018	0.018	0.017	0.001
TV	Valdobbiadene	0.001	0.066	0.047	0.027	0.014	0.009	0.005	0.002	-
TV	Vazzola	0.001	0.052	0.023	0.008	0.003	0.001	0.001	-	-
TV	Vedelago	-	0.057	0.02	0.006	0.002	0.001	0.002	0.002	-
TV	Vidor	0.005	0.064	0.035	0.015	0.007	0.005	0.006	0.004	0.005
TV	Villorba	0.001	0.066	0.032	0.012	0.004	0.002	0.002	0.002	-
TV	Vittorio Veneto	0.002	0.096	0.073	0.051	0.036	0.023	0.013	0.009	-
TV	Volpago del Montello	0.001	0.049	0.027	0.013	0.007	0.004	0.002	-	-
TV	Zenson di Piave	0.007	0.085	0.038	0.015	0.006	0.003	0.003	0.004	0.01
TV	Zero Branco	0.001	0.063	0.022	0.007	0.004	0.004	0.003	0.002	-
VE	Annone Veneto	0.001	0.046	0.021	0.009	0.006	0.003	0.001	0.001	-
VE	Campagna Lupia	0.001	0.033	0.012	0.006	0.003	0.003	0.001	-	-
VE	Campolongo Maggiore	-	0.037	0.012	0.001	0.001	-	-	-	-
VE	Camponogara	0.002	0.072	0.022	0.007	0.003	0.002	0.003	0.005	0.001
VE	Caorle	0.001	0.095	0.064	0.04	0.027	0.016	0.01	0.008	-
VE	Cavallino-Treporti	-	0.022	0.006	0.003	0.002	0.002	0.001	0.001	-
VE	Cavarzere	0.001	0.079	0.05	0.025	0.015	0.008	0.005	0.003	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Ceggia	0.005	0.092	0.059	0.031	0.017	0.008	0.007	0.007	0.003
VE	Chioggia	-	0.025	0.008	0.004	0.003	0.003	0.002	0.003	-
VE	Cinto Caomaggiore	0.002	0.047	0.024	0.008	0.005	0.004	0.003	0.004	0.001
VE	Cona	-	0.068	0.031	0.013	0.005	0.001	0.001	0.001	-
VE	Concordia Sagittaria	0.001	0.068	0.041	0.024	0.016	0.01	0.006	0.004	-
VE	Dolo	0.001	0.087	0.046	0.018	0.005	0.002	0.001	0.001	-
VE	Eraclea	-	0.07	0.039	0.015	0.006	0.002	0.001	-	-
VE	Fiesso d'Artico	0.005	0.076	0.045	0.02	0.01	0.002	0.001	0.004	0.001
VE	Fossalta di Piave	0.01	0.065	0.034	0.013	0.011	0.008	0.008	0.007	0.012
VE	Fossalta di Portogruaro	0.002	0.071	0.033	0.013	0.006	0.005	0.007	0.008	0.001
VE	Fossò	0.002	0.07	0.031	0.011	0.006	0.003	-	-	0.001
VE	Gruaro	0.001	0.041	0.018	0.006	0.002	0.001	-	0.001	-
VE	Jesolo	0.002	0.12	0.083	0.054	0.037	0.023	0.011	0.004	-
VE	Marcon	0.012	0.143	0.098	0.063	0.045	0.028	0.022	0.016	0.005
VE	Martellago	0.002	0.074	0.038	0.014	0.006	0.004	0.003	0.001	-
VE	Meolo	0.001	0.078	0.035	0.015	0.004	0.001	0.001	0.001	-
VE	Mira	-	0.029	0.01	0.003	0.002	0.001	0.001	-	-
VE	Mirano	-	0.062	0.024	0.008	0.003	0.002	0.001	-	-
VE	Musile di Piave	0.001	0.069	0.036	0.02	0.01	0.005	0.002	0.001	-
VE	Noale	0.002	0.069	0.034	0.012	0.005	0.002	0.002	0.004	0.001
VE	Noventa di Piave	0.002	0.062	0.035	0.012	0.007	0.003	0.003	0.003	0.001
VE	Pianiga	0.001	0.076	0.03	0.008	0.001	0.001	-	-	-
VE	Portogruaro	0.001	0.074	0.047	0.026	0.017	0.01	0.007	0.006	-
VE	Pramaggiore	0.002	0.036	0.018	0.006	0.003	0.002	0.004	0.005	0.001
VE	Quarto d'Altino	0.004	0.098	0.066	0.04	0.025	0.014	0.008	0.004	0.001
VE	Salzano	0.001	0.056	0.017	0.004	0.001	0.001	0.001	0.001	-
VE	San Donà di Piave	0.002	0.09	0.057	0.036	0.026	0.018	0.013	0.008	-
VE	San Michele al Tagliamento	0.001	0.092	0.053	0.03	0.017	0.008	0.003	0.001	-
VE	San Stino di Livenza	0.001	0.068	0.048	0.028	0.019	0.012	0.009	0.005	-
VE	Santa Maria di Sala	-	0.069	0.021	0.003	0.001	0.001	0.001	-	-
VE	Scorzè	0.001	0.065	0.021	0.006	0.003	0.002	0.002	0.001	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Spinea	0.006	0.076	0.044	0.016	0.008	0.007	0.006	0.009	0.004
VE	Stra	0.001	0.053	0.016	0.007	0.002	0.002	-	-	0.001
VE	Teglio Veneto	0.003	0.054	0.023	0.012	0.005	0.002	0.001	0.002	0.002
VE	Torre di Mosto	-	0.058	0.031	0.014	0.006	0.002	-	-	-
VE	Venezia (*)									
VE	Vigonovo	0.003	0.039	0.021	0.007	0.002	0.002	0.005	0.003	0.002
VI	Agugliaro	0.001	0.037	0.013	0.003	-	-	-	0.001	-
VI	Albettone	-	0.036	0.013	0.001	-	-	-	-	-
VI	Alonte	0.001	0.028	0.014	0.003	-	-	0.001	0.001	0.001
VI	Altavilla Vicentina	0.006	0.074	0.05	0.032	0.024	0.015	0.004	0.001	0.004
VI	Altissimo	0.001	0.019	0.005	0.002	0.002	0.002	0.002	0.002	0.001
VI	Arcugnano	-	0.026	0.015	0.005	0.002	-	-	-	-
VI	Arsiero	0.003	0.061	0.039	0.028	0.02	0.012	0.009	0.01	-
VI	Arzignano	0.003	0.05	0.033	0.025	0.019	0.011	0.005	0.003	0.001
VI	Asiago	0.001	0.062	0.035	0.022	0.014	0.01	0.007	0.006	-
VI	Asigliano Veneto	0.001	0.014	0.006	0.001	0.001	-	-	-	0.002
VI	Barbarano Mossano	-	0.029	0.014	0.004	0.001	-	-	-	-
VI	Bassano del Grappa	0.004	0.066	0.044	0.031	0.022	0.019	0.016	0.011	0.001
VI	Bolzano Vicentino	-	0.046	0.018	0.003	-	-	-	-	-
VI	Breganze	0.001	0.036	0.014	0.005	0.003	0.002	0.001	-	-
VI	Brendola	0.001	0.047	0.031	0.017	0.008	0.002	0.001	-	-
VI	Bressanvido	0.001	0.035	0.009	0.004	0.001	-	0.001	0.001	-
VI	Brogliano	0.001	0.02	0.011	0.004	0.003	0.002	-	-	-
VI	Caldogno	-	0.034	0.016	0.004	0.001	-	-	-	-
VI	Caltrano	0.003	0.066	0.038	0.017	0.009	0.005	0.006	0.006	0.001
VI	Calvene	0.001	0.029	0.011	0.004	0.003	0.003	-	0.002	0.001
VI	Camisano Vicentino	0.002	0.045	0.027	0.013	0.008	0.005	0.005	0.006	0.001
VI	Campiglia dei Berici	-	0.031	0.008	0.003	0.001	-	-	-	-
VI	Carrè	0.002	0.036	0.024	0.012	0.004	0.001	-	-	0.003
VI	Cartigliano	0.007	0.048	0.024	0.01	0.008	0.008	0.004	0.001	0.008
VI	Cassola	0.001	0.029	0.007	0.003	0.002	-	0.001	0.003	0.001
VI	Castegnero	0.002	0.037	0.013	0.005	0.002	0.002	0.002	0.001	0.001

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Castelgomberto	0.001	0.042	0.019	0.006	0.002	0.001	-	-	-
VI	Chiampo	0.003	0.047	0.025	0.017	0.007	0.005	0.006	0.005	0.001
VI	Chiuppano	0.023	0.051	0.034	0.033	0.026	0.013	0.003	0.007	0.036
VI	Cogollo del Cengio	0.001	0.051	0.033	0.016	0.005	0.002	0.001	0.001	-
VI	Colceresa	-	0.015	0.003	-	-	-	-	-	-
VI	Cornedo Vicentino	0.001	0.036	0.017	0.007	0.003	0.002	0.001	0.001	-
VI	Costabissara	0.002	0.046	0.024	0.007	0.002	0.002	0.002	0.001	0.002
VI	Creazzo	0.006	0.059	0.039	0.022	0.013	0.004	0.003	0.004	0.006
VI	Crespadoro	0.001	0.031	0.017	0.007	0.004	0.002	0.001	-	-
VI	Dueville	0.001	0.035	0.023	0.01	0.003	0.002	0.001	0.001	0.001
VI	Enego	-	0.025	0.013	0.007	0.003	0.002	0.001	-	-
VI	Fara Vicentino	0.001	0.017	0.005	0.001	0.001	0.001	0.001	0.001	-
VI	Foza	0.001	0.05	0.027	0.013	0.007	0.004	0.002	0.003	-
VI	Gallio	0.001	0.064	0.039	0.018	0.013	0.006	0.003	0.001	-
VI	Gambellara	0.001	0.041	0.028	0.013	0.005	-	-	0.001	-
VI	Gambugliano	0.001	0.018	0.002	0.001	-	0.001	0.001	-	0.001
VI	Grisignano di Zocco	0.004	0.031	0.022	0.01	0.005	0.004	0.006	0.005	0.002
VI	Grumolo delle Abbadesse	0.001	0.028	0.014	0.003	0.002	0.002	0.002	0.001	0.001
VI	Isola Vicentina	0.001	0.03	0.014	0.007	0.002	0.001	0.001	0.002	-
VI	Laghi	0.003	0.062	0.034	0.027	0.014	0.004	0.002	0.002	0.001
VI	Lastebasse	0.003	0.054	0.049	0.03	0.022	0.011	0.005	0.001	0.001
VI	Longare	-	0.028	0.013	0.002	-	-	-	0.001	-
VI	Lonigo	0.001	0.042	0.021	0.012	0.007	0.003	0.002	0.002	-
VI	Lugo di Vicenza	0.003	0.055	0.03	0.02	0.011	0.005	0.002	0.002	0.002
VI	Lusiana Conco	-	0.032	0.012	0.004	0.001	0.001	0.001	0.001	-
VI	Malo	0.001	0.03	0.018	0.009	0.006	0.003	0.002	0.002	-
VI	Marano Vicentino	0.002	0.019	0.016	0.007	0.003	0.002	0.003	0.003	0.002
VI	Marostica	-	0.028	0.011	0.004	0.001	0.001	-	-	-
VI	Monte di Malo	-	0.021	0.007	0.002	0.001	0.001	0.001	0.001	-
VI	Montebello Vicentino	0.002	0.042	0.033	0.014	0.005	0.003	0.004	0.006	0.001
VI	Montecchio Maggiore	0.003	0.047	0.036	0.018	0.011	0.009	0.007	0.005	0.001
VI	Montecchio Precalcino	-	0.025	0.012	0.004	0.001	0.001	-	-	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Montegalda	-	0.018	0.007	0.001	-	-	-	-	-
VI	Montegaldella	-	0.035	0.014	0.004	0.001	-	-	0.001	-
VI	Monteviale	0.001	0.025	0.006	0.002	0.002	-	-	0.001	-
VI	Monticello Conte Otto	0.003	0.066	0.031	0.008	0.003	0.002	0.002	0.002	0.004
VI	Montorso Vicentino	0.003	0.021	0.006	0.002	0.002	0.002	0.003	0.002	0.004
VI	Mussolente	0.001	0.014	0.002	0.002	0.001	0.002	0.002	-	0.001
VI	Nanto	0.001	0.037	0.013	0.004	0.001	-	0.001	0.001	-
VI	Nogarole Vicentino	-	0.012	0.004	0.001	0.001	-	0.001	0.001	-
VI	Nove	0.004	0.045	0.023	0.011	0.008	0.008	0.003	0.001	0.001
VI	Noventa Vicentina	0.003	0.058	0.028	0.015	0.011	0.006	0.005	0.006	0.001
VI	Orgiano	0.001	0.038	0.021	0.008	0.002	0.001	0.001	0.001	0.001
VI	Pedemonte	0.004	0.098	0.086	0.039	0.019	0.013	0.003	0.001	0.001
VI	Pianezze	0.001	0.018	0.005	0.003	0.001	-	0.001	0.001	-
VI	Piovene Rocchette	0.008	0.085	0.058	0.039	0.023	0.014	0.005	-	0.007
VI	Pojana Maggiore	0.001	0.032	0.015	0.008	0.003	0.001	0.001	0.001	-
VI	Posina	0.001	0.041	0.019	0.01	0.004	0.004	0.003	0.003	-
VI	Pove del Grappa	0.005	0.049	0.043	0.031	0.021	0.011	0.002	0.008	0.001
VI	Pozzoleone	-	0.025	0.008	0.001	-	-	-	-	-
VI	Quinto Vicentino	-	0.03	0.008	0.002	-	-	-	-	-
VI	Recoaro Terme	0.001	0.043	0.02	0.011	0.005	0.003	0.002	0.002	-
VI	Roana	-	0.043	0.024	0.013	0.007	0.004	0.002	0.002	-
VI	Romano d'Ezzelino	0.003	0.038	0.02	0.012	0.005	0.004	0.006	0.007	0.001
VI	Rosà	-	0.041	0.017	0.006	0.002	-	-	-	-
VI	Rossano Veneto	-	0.027	0.004	0.001	-	-	0.001	-	-
VI	Rotzo	-	0.028	0.017	0.008	0.003	0.001	-	-	-
VI	Salcedo	-	0.014	0.001	-	-	-	-	-	-
VI	San Pietro Mussolino	0.008	0.05	0.032	0.016	0.006	0.001	0.002	0.003	0.023
VI	San Vito di Leguzzano	0.003	0.033	0.019	0.01	0.003	0.001	0.001	0.001	0.002
VI	Sandrigo	0.001	0.058	0.03	0.016	0.007	0.004	0.002	0.002	-
VI	Santorso	0.003	0.057	0.038	0.02	0.007	0.003	0.001	-	0.002
VI	Sarcedo	0.001	0.029	0.01	0.003	0.001	0.001	0.001	-	0.001
VI	Sarego	-	0.036	0.013	0.004	0.001	0.001	-	-	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Schiavon	-	0.042	0.009	0.001	0.001	-	-	-	-
VI	Schio	0.003	0.074	0.057	0.043	0.032	0.023	0.015	0.01	-
VI	Solagna	0.001	0.025	0.016	0.008	0.003	-	-	0.001	-
VI	Sossano	0.001	0.029	0.011	0.007	0.004	0.002	0.003	0.003	0.001
VI	Sovizzo	0.001	0.041	0.02	0.01	0.005	0.002	-	0.001	-
VI	Tezze sul Brenta	0.001	0.037	0.016	0.005	0.001	-	0.001	0.002	-
VI	Thiene	0.003	0.05	0.034	0.017	0.011	0.008	0.004	0.002	0.002
VI	Tonezza del Cimone	0.003	0.042	0.016	0.01	0.006	0.005	0.003	0.003	0.002
VI	Torrebelvicino	0.001	0.062	0.03	0.02	0.011	0.003	-	-	-
VI	Torri di Quartesolo	0.003	0.057	0.03	0.014	0.007	0.005	0.003	0.002	0.002
VI	Trissino	0.001	0.044	0.025	0.012	0.009	0.004	0.001	-	-
VI	Val Liona	-	0.014	0.006	0.001	0.001	0.001	0.001	0.001	-
VI	Valbrenta	-	0.051	0.037	0.018	0.007	0.002	0.001	0.002	-
VI	Valdagno	0.001	0.04	0.025	0.016	0.009	0.005	0.003	0.002	-
VI	Valdastico	0.001	0.059	0.035	0.02	0.011	0.004	0.001	0.001	-
VI	Valli del Pasubio	0.001	0.033	0.011	0.005	0.002	0.002	0.003	0.004	-
VI	Velo d'Astico	0.003	0.063	0.034	0.02	0.012	0.008	0.005	0.002	0.002
VI	Vicenza	0.001	0.075	0.049	0.029	0.019	0.012	0.008	0.005	-
VI	Villaga	-	0.021	0.007	0.001	0.001	-	-	-	-
VI	Villaverla	0.005	0.03	0.016	0.009	0.005	0.005	0.007	0.008	0.003
VI	Zanè	0.001	0.026	0.017	0.005	0.003	-	0.002	0.001	-
VI	Zermeghedo	0.01	0.029	0.014	0.007	0.007	0.005	0.001	0.012	0.053
VI	Zovencedo	0.002	0.018	0.013	0.003	-	0.001	0.002	0.002	0.003
VI	Zugliano	0.001	0.018	0.01	0.004	0.002	0.001	-	0.002	-
VR	Affi	0.002	0.055	0.03	0.017	0.008	0.001	-	-	-
VR	Albaredo d'Adige	0.001	0.073	0.034	0.011	0.003	0.002	0.001	-	-
VR	Angiari	0.002	0.066	0.03	0.015	0.005	-	0.001	0.001	0.001
VR	Arcole	0.004	0.082	0.04	0.019	0.01	0.003	0.004	0.007	0.002
VR	Badia Calavena	-	0.034	0.016	0.004	0.001	-	-	-	-
VR	Bardolino	-	0.005	0.001	-	-	-	-	0.001	-
VR	Belfiore	0.002	0.062	0.032	0.011	0.004	0.002	0.004	0.006	0.001
VR	Bevilacqua	0.002	0.072	0.031	0.012	0.004	0.001	0.002	0.006	0.001

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Bonavigo	-	0.043	0.011	0.002	-	-	-	-	-
VR	Boschi Sant'Anna	0.002	0.062	0.034	0.011	0.002	0.001	0.001	0.001	0.002
VR	Bosco Chiesanuova	0.001	0.056	0.029	0.016	0.011	0.007	0.005	0.004	-
VR	Bovolone	0.002	0.103	0.063	0.032	0.015	0.006	0.004	0.006	-
VR	Brentino Belluno	0.002	0.081	0.056	0.031	0.013	0.005	0.004	0.001	-
VR	Brenzone sul Garda	-	0.029	0.004	0.002	0.002	0.001	-	-	-
VR	Bussolengo	0.001	0.061	0.032	0.012	0.005	0.002	0.002	0.002	-
VR	Buttapietra	0.002	0.079	0.038	0.016	0.004	0.002	0.002	0.003	0.001
VR	Caldiero	0.003	0.072	0.031	0.02	0.01	0.003	0.001	-	0.002
VR	Caprino Veronese	0.002	0.065	0.041	0.025	0.015	0.009	0.004	0.003	-
VR	Casaleone	0.002	0.091	0.052	0.023	0.015	0.007	0.003	0.004	-
VR	Castagnaro	0.004	0.074	0.051	0.032	0.022	0.016	0.009	0.005	0.001
VR	Castel d'Azzano	0.001	0.081	0.029	0.005	-	0.001	-	-	-
VR	Castelnuovo del Garda	-	0.012	0.002	0.001	-	-	-	-	-
VR	Cavaion Veronese	0.001	0.036	0.022	0.01	0.003	0.002	-	0.001	-
VR	Cazzano di Tramigna	-	0.019	0.01	0.004	0.001	0.001	-	-	-
VR	Cerea	0.002	0.102	0.064	0.037	0.021	0.012	0.009	0.009	-
VR	Cerro Veronese	0.003	0.067	0.029	0.011	0.006	0.002	0.003	0.001	0.001
VR	Cologna Veneta	0.001	0.061	0.027	0.01	0.004	0.002	0.002	0.003	-
VR	Colognola ai Colli	0.001	0.068	0.034	0.015	0.005	0.001	-	-	-
VR	Concamarise	0.001	0.062	0.019	0.004	-	-	-	0.001	-
VR	Costermano sul Garda	0.001	0.04	0.023	0.008	0.004	0.002	0.001	-	-
VR	Dolcè	0.005	0.124	0.093	0.064	0.043	0.026	0.019	0.015	0.001
VR	Erbè	0.003	0.086	0.044	0.021	0.006	0.002	0.003	0.004	0.001
VR	Erbezzo	0.001	0.038	0.019	0.008	0.004	0.003	0.002	0.001	-
VR	Ferrara di Monte Baldo	0.001	0.052	0.034	0.011	0.005	0.003	0.002	0.002	-
VR	Fumane	-	0.04	0.019	0.008	0.003	0.001	-	-	-
VR	Garda	0.003	0.01	0.001	0.001	0.002	0.001	0.002	0.001	0.004
VR	Gazzo Veronese	0.001	0.064	0.033	0.012	0.004	0.002	0.002	0.002	-
VR	Grezzana	0.001	0.059	0.025	0.007	0.003	0.002	0.002	0.002	-
VR	Illasi	0.001	0.04	0.015	0.005	0.002	0.002	0.003	0.004	0.001
VR	Isola della Scala	0.001	0.079	0.042	0.019	0.01	0.005	0.002	0.001	-

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Isola Rizza	0.001	0.072	0.034	0.014	0.007	0.002	0.001	0.001	-
VR	Lavagno	0.001	0.073	0.035	0.01	0.003	0.002	0.001	-	0.001
VR	Lazise	-	0.01	0.001	-	-	-	-	-	-
VR	Legnago	0.002	0.089	0.054	0.033	0.021	0.013	0.009	0.007	-
VR	Malcesine	0.001	0.056	0.018	0.008	0.006	0.005	0.004	0.004	-
VR	Marano di Valpolicella	-	0.032	0.013	0.003	0.001	0.001	-	-	-
VR	Mezzane di Sotto	-	0.03	0.01	0.004	0.001	0.001	0.001	0.001	-
VR	Minerbe	0.001	0.071	0.037	0.016	0.006	0.002	0.001	0.001	-
VR	Montecchia di Crosara	0.003	0.023	0.013	0.007	0.004	0.004	0.008	0.01	0.001
VR	Monteforte d'Alpone	0.002	0.056	0.033	0.019	0.01	0.004	0.002	0.001	0.001
VR	Mozzecane	0.002	0.066	0.035	0.017	0.007	0.004	0.002	0.001	0.001
VR	Negrar di Valpolicella	-	0.054	0.023	0.009	0.003	0.001	-	-	-
VR	Nogara	0.002	0.088	0.044	0.017	0.007	0.005	0.004	0.005	-
VR	Nogarole Rocca	0.002	0.083	0.044	0.018	0.007	0.003	0.004	0.005	0.001
VR	Oppeano	0.001	0.097	0.056	0.024	0.008	0.002	-	-	-
VR	Palù	0.001	0.044	0.013	0.008	0.002	0.001	-	0.002	-
VR	Pastrengo	0.001	0.036	0.016	0.004	-	0.002	0.001	-	0.001
VR	Pescantina	0.001	0.037	0.017	0.006	0.003	0.002	0.001	-	-
VR	Peschiera del Garda	0.002	0.019	0.004	0.002	0.002	0.002	0.003	0.003	0.001
VR	Povegliano Veronese	0.004	0.078	0.038	0.018	0.01	0.007	0.006	0.003	0.003
VR	Pressana	-	0.05	0.016	0.003	0.001	0.001	-	-	-
VR	Rivoli Veronese	0.001	0.042	0.018	0.006	0.002	0.002	0.001	0.001	-
VR	Roncà	-	0.028	0.012	0.004	0.001	-	-	-	-
VR	Ronco all'Adige	0.001	0.1	0.045	0.014	0.004	0.002	0.003	0.003	-
VR	Roverchiara	0.001	0.057	0.018	0.003	0.001	0.002	0.002	0.001	0.001
VR	Roverè Veronese	-	0.031	0.01	0.003	0.002	0.001	0.001	0.001	-
VR	Roveredo di Guà	0.001	0.043	0.018	0.006	0.005	0.001	0.001	-	0.001
VR	Salizzole	0.001	0.069	0.027	0.011	0.004	0.001	0.001	0.001	-
VR	San Bonifacio	0.004	0.11	0.067	0.04	0.025	0.013	0.008	0.005	0.001
VR	San Giovanni Ilarione	0.001	0.034	0.012	0.004	0.002	0.002	0.003	0.004	0.001
VR	San Giovanni Lupatoto	0.007	0.127	0.094	0.063	0.04	0.018	0.006	0.004	0.002

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Table C3.1 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	San Martino Buon Albergo	0.002	0.085	0.049	0.027	0.016	0.01	0.005	0.003	0.001
VR	San Mauro di Saline	0.001	0.026	0.009	0.001	0.001	0.001	0.001	0.002	0.001
VR	San Pietro di Morubio	0.001	0.082	0.039	0.01	0.002	0.002	-	0.001	-
VR	San Pietro in Cariano	-	0.051	0.024	0.006	0.001	-	-	0.001	-
VR	San Zeno di Montagna	0.002	0.077	0.056	0.03	0.017	0.007	0.003	0.001	0.001
VR	Sanguinetto	0.002	0.116	0.061	0.024	0.01	0.002	-	-	0.001
VR	Sant'Ambrogio di Valpolicella	0.004	0.08	0.046	0.026	0.015	0.009	0.006	0.004	0.001
VR	Sant'Anna d'Alfaedo	0.001	0.044	0.015	0.006	0.002	0.002	0.002	0.002	-
VR	Selva di Progno	0.001	0.047	0.023	0.008	0.003	0.002	0.002	0.002	-
VR	Soave	0.001	0.056	0.033	0.015	0.009	0.003	0.001	0.001	-
VR	Sommacampagna	0.001	0.068	0.035	0.02	0.011	0.005	0.002	-	-
VR	Sona	0.001	0.051	0.022	0.01	0.005	0.002	0.001	0.002	-
VR	Sorgà	0.001	0.077	0.03	0.011	0.006	0.003	0.002	0.001	-
VR	Terrazzo	-	0.044	0.016	0.004	0.002	-	-	0.001	-
VR	Torri del Benaco	-	0.028	0.005	-	-	-	-	-	-
VR	Tregnago	0.001	0.047	0.024	0.01	0.005	0.001	0.001	0.001	-
VR	Trevenzuolo	0.003	0.087	0.047	0.021	0.006	0.002	0.005	0.007	0.001
VR	Valeggio sul Mincio	-	0.035	0.013	0.004	0.001	-	-	-	-
VR	Velo Veronese	-	0.029	0.011	0.003	0.001	0.001	-	-	-
VR	Verona	0.001	0.095	0.064	0.044	0.033	0.025	0.02	0.017	-
VR	Veronella	0.003	0.074	0.04	0.016	0.005	0.004	0.005	0.005	0.001
VR	Vestenanova	0.001	0.04	0.014	0.004	0.001	0.001	0.001	0.001	-
VR	Vigasio	0.002	0.092	0.041	0.021	0.01	0.004	0.003	0.008	0.001
VR	Villa Bartolomea	0.003	0.072	0.048	0.034	0.026	0.017	0.01	0.007	0.001
VR	Villafranca di Verona	-	0.044	0.028	0.014	0.007	0.003	0.001	0.001	-
VR	Zevio	-	0.068	0.033	0.016	0.009	0.003	0.001	-	-
VR	Zimella	0.001	0.078	0.034	0.011	0.003	0.001	-	-	-

(*) The estimation is not possible due to the insular nature of the municipality

Table C3.2: Municipal global and partial proportional mutual information, 2015

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Agordo	0.015	0.153	0.116	0.087	0.064	0.046	0.021	0.005	0.009
BL	Alano di Piave	0.002	0.088	0.061	0.04	0.025	0.011	0.003	-	0.001
BL	Alleghe	0.003	0.093	0.066	0.04	0.025	0.014	0.007	0.003	0.001
BL	Alpago	0.001	0.089	0.061	0.03	0.015	0.007	0.003	0.003	-
BL	Arsiè	0.001	0.056	0.03	0.013	0.006	0.003	0.002	0.002	-
BL	Auronzo di Cadore	-	0.108	0.075	0.041	0.019	0.006	0.002	0.001	-
BL	Belluno	0.001	0.095	0.071	0.049	0.034	0.023	0.016	0.012	-
BL	Borca di Cadore	0.006	0.146	0.094	0.063	0.042	0.018	0.006	0.005	0.002
BL	Borgo Valbelluna	-	0.048	0.03	0.016	0.01	0.006	0.003	0.002	-
BL	Calalzo di Cadore	0.012	0.211	0.176	0.132	0.09	0.052	0.047	0.078	0.003
BL	Canale d'Agordo	0.001	0.102	0.068	0.033	0.014	0.005	0.003	0.002	-
BL	Cencenighe Agordino	0.016	0.131	0.088	0.056	0.033	0.014	0.015	0.02	0.012
BL	Cesiomaggiore	0.002	0.074	0.054	0.036	0.024	0.02	0.016	0.013	-
BL	Chies d'Alpago	0.002	0.048	0.033	0.019	0.012	0.012	0.008	0.005	0.001
BL	Cibiana di Cadore	0.001	0.1	0.064	0.019	0.006	0.001	-	-	-
BL	Colle Santa Lucia	0.001	0.041	0.018	0.012	0.005	0.001	-	-	0.001
BL	Comelico Superiore	0.001	0.082	0.06	0.038	0.024	0.012	0.003	0.001	-
BL	Cortina d'Ampezzo	0.001	0.121	0.088	0.062	0.046	0.03	0.017	0.01	-
BL	Danta di Cadore	0.003	0.049	0.043	0.022	0.006	-	0.001	0.001	0.001
BL	Domegge di Cadore	0.004	0.123	0.102	0.07	0.046	0.021	0.009	0.008	0.001
BL	Falcade	0.003	0.136	0.096	0.061	0.033	0.015	0.008	0.003	0.001
BL	Feltre	0.002	0.09	0.064	0.043	0.03	0.022	0.017	0.013	-
BL	Fonzaso	0.005	0.089	0.059	0.032	0.016	0.009	0.008	0.01	0.002
BL	Gosaldo	0.002	0.072	0.043	0.028	0.012	0.005	0.005	0.007	-
BL	La Valle Agordina	0.002	0.101	0.056	0.036	0.017	0.007	0.006	0.007	-
BL	Lamon	0.002	0.068	0.046	0.027	0.02	0.013	0.007	0.003	-
BL	Limana	0.001	0.049	0.029	0.017	0.01	0.005	0.004	0.003	-
BL	Livinallongo del Col di Lana	-	0.063	0.038	0.019	0.01	0.004	0.001	0.001	-
BL	Longarone	0.002	0.157	0.113	0.068	0.043	0.027	0.018	0.01	-
BL	Lorenzago di Cadore	0.004	0.11	0.067	0.04	0.022	0.01	0.005	0.008	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Lozzo di Cadore	0.004	0.117	0.085	0.058	0.027	0.012	0.007	0.006	0.001
BL	Ospitale di Cadore	0.001	0.136	0.078	0.033	0.012	0.005	0.002	0.002	-
BL	Pedavena	0.004	0.066	0.049	0.033	0.026	0.016	0.006	0.001	0.002
BL	Perarolo di Cadore	0.002	0.122	0.078	0.04	0.016	0.008	0.003	0.001	0.001
BL	Pieve di Cadore	0.006	0.17	0.131	0.096	0.064	0.041	0.026	0.015	0.002
BL	Ponte nelle Alpi	0.002	0.098	0.056	0.032	0.017	0.01	0.006	0.006	-
BL	Quero Vas	0.002	0.1	0.071	0.041	0.028	0.015	0.007	0.004	0.001
BL	Rivamonte Agordino	0.003	0.088	0.051	0.03	0.016	0.007	0.003	0.002	0.002
BL	Rocca Pietore	0.001	0.085	0.054	0.023	0.01	0.004	0.001	0.001	-
BL	San Gregorio nelle Alpi	0.005	0.06	0.045	0.027	0.017	0.012	0.005	0.002	0.003
BL	San Nicolò di Comelico	0.007	0.099	0.064	0.04	0.026	0.018	0.014	0.011	0.003
BL	San Pietro di Cadore	0.003	0.084	0.068	0.041	0.027	0.018	0.015	0.012	0.001
BL	San Tomaso Agordino	0.01	0.101	0.05	0.023	0.016	0.009	0.011	0.016	0.007
BL	San Vito di Cadore	0.004	0.158	0.119	0.08	0.053	0.029	0.014	0.011	0.001
BL	Santa Giustina	0.006	0.096	0.068	0.043	0.034	0.026	0.018	0.017	0.002
BL	Santo Stefano di Cadore	0.001	0.087	0.066	0.041	0.019	0.01	0.004	0.002	-
BL	Sedico	0.004	0.121	0.092	0.068	0.05	0.039	0.031	0.03	0.001
BL	Selva di Cadore	0.001	0.079	0.043	0.023	0.01	0.001	0.001	0.003	-
BL	Seren del Grappa	0.001	0.062	0.04	0.024	0.012	0.008	0.004	0.001	-
BL	Sospirolo	0.003	0.089	0.058	0.039	0.029	0.021	0.015	0.01	0.001
BL	Soverzene	0.004	0.104	0.05	0.022	0.01	0.007	0.003	0.003	0.003
BL	Sovramonte	0.001	0.056	0.035	0.019	0.011	0.007	0.004	0.003	-
BL	Taibon Agordino	0.001	0.119	0.08	0.051	0.031	0.013	0.005	0.001	-
BL	Tambre	0.002	0.077	0.046	0.024	0.012	0.008	0.005	0.003	-
BL	Val di Zoldo	0.001	0.107	0.064	0.033	0.016	0.007	0.003	0.004	-
BL	Vallada Agordina	0.011	0.093	0.057	0.028	0.01	0.005	0.009	0.012	0.012
BL	Valle di Cadore	0.003	0.12	0.089	0.05	0.027	0.011	0.005	0.006	0.001
BL	Vigo di Cadore	0.001	0.085	0.052	0.03	0.017	0.007	0.004	0.002	-
BL	Vodo Cadore	0.001	0.121	0.083	0.039	0.016	0.005	0.003	0.001	-
BL	Voltago Agordino	0.002	0.109	0.068	0.029	0.007	0.004	0.001	-	0.001
BL	Zoppè di Cadore	0.006	0.026	0.032	0.011	0.005	0.001	0.004	0.007	0.015
PD	Abano Terme	0.002	0.066	0.036	0.015	0.005	0.003	0.003	0.004	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Agna	0.003	0.072	0.034	0.013	0.008	0.005	0.004	0.006	0.001
PD	Albignasego	0.001	0.071	0.029	0.012	0.006	0.001	0.001	0.001	-
PD	Anguillara Veneta	0.002	0.067	0.03	0.012	0.005	0.003	0.003	0.002	-
PD	Arquà Petrarca	0.002	0.037	0.015	0.005	0.002	0.001	0.003	0.002	0.002
PD	Arre	0.004	0.07	0.03	0.014	0.006	0.003	0.003	0.001	0.003
PD	Arzergrande	0.002	0.069	0.035	0.018	0.01	0.003	0.001	-	0.001
PD	Bagnoli di Sopra	0.001	0.087	0.04	0.015	0.005	0.001	-	0.001	-
PD	Baone	-	0.036	0.014	0.003	-	-	-	-	-
PD	Barbona	0.006	0.047	0.01	0.003	0.006	0.007	0.005	0.001	0.006
PD	Battaglia Terme	0.008	0.081	0.059	0.03	0.019	0.005	-	0.009	0.004
PD	Boara Pisani	0.002	0.07	0.033	0.017	0.006	0.002	0.002	0.001	0.001
PD	Borgo Veneto	0.001	0.064	0.021	0.009	0.005	0.003	0.004	0.005	-
PD	Borgoricco	-	0.063	0.02	0.002	-	0.001	0.001	-	-
PD	Bovolenta	0.002	0.064	0.024	0.01	0.003	0.003	0.004	0.003	0.001
PD	Brugine	0.001	0.054	0.02	0.005	0.001	0.001	0.001	0.001	-
PD	Cadoneghe	0.003	0.054	0.022	0.012	0.006	0.003	0.002	0.001	0.002
PD	Campo San Martino	0.001	0.046	0.019	0.007	0.003	0.001	0.001	0.001	0.001
PD	Campodarsego	-	0.05	0.014	0.002	-	-	-	-	-
PD	Campodoro	-	0.044	0.014	0.002	-	-	-	-	-
PD	Camposampiero	0.003	0.074	0.029	0.009	0.007	0.006	0.005	0.005	0.001
PD	Candiana	0.001	0.055	0.014	0.003	0.001	0.002	0.003	0.003	0.001
PD	Carceri	0.001	0.032	0.009	0.002	-	-	-	0.001	-
PD	Carmignano di Brenta	0.002	0.068	0.034	0.012	0.004	0.003	0.002	0.001	0.001
PD	Cartura	0.001	0.041	0.014	0.004	0.002	0.002	0.001	0.001	0.001
PD	Casale di Scodosia	0.005	0.09	0.054	0.028	0.018	0.01	0.005	0.004	0.002
PD	Casalserugo	0.003	0.07	0.031	0.009	0.004	0.004	0.004	0.002	0.002
PD	Castelbaldo	-	0.034	0.01	0.004	0.001	-	0.001	-	-
PD	Cervarese Santa Croce	-	0.051	0.021	0.006	0.003	-	-	-	-
PD	Cinto Euganeo	-	0.023	0.007	0.002	-	0.001	0.001	0.001	-
PD	Cittadella	0.002	0.065	0.028	0.013	0.007	0.005	0.005	0.005	-
PD	Codevigo	-	0.037	0.014	0.006	0.003	0.002	0.001	0.001	-
PD	Conselve	0.002	0.074	0.037	0.021	0.011	0.004	0.003	0.004	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Correzzola	-	0.055	0.018	0.003	-	-	-	-	-
PD	Curtarolo	0.001	0.038	0.013	0.007	0.005	0.003	0.001	-	0.001
PD	Due Carrare	0.001	0.057	0.023	0.007	0.002	0.001	-	0.001	-
PD	Este	0.003	0.074	0.046	0.025	0.013	0.008	0.006	0.007	0.001
PD	Fontaniva	0.003	0.077	0.041	0.018	0.01	0.005	0.004	0.003	0.001
PD	Galliera Veneta	0.008	0.071	0.033	0.014	0.007	0.01	0.008	0.002	0.008
PD	Galzignano Terme	0.001	0.059	0.031	0.013	0.004	0.001	-	0.002	-
PD	Gazzo	-	0.046	0.013	0.002	0.001	0.001	0.001	-	-
PD	Grantorto	0.001	0.041	0.014	0.003	-	-	0.001	0.002	0.001
PD	Granze	0.002	0.058	0.027	0.009	0.002	0.001	0.002	0.001	0.001
PD	Legnaro	0.002	0.062	0.026	0.009	0.004	0.002	0.003	0.001	0.001
PD	Limena	0.003	0.073	0.041	0.023	0.016	0.005	0.001	0.002	0.001
PD	Loreggia	0.002	0.051	0.015	0.003	0.002	0.002	0.003	0.003	0.001
PD	Lozzo Atestino	0.001	0.058	0.034	0.017	0.008	0.002	0.001	0.003	-
PD	Maserà di Padova	0.001	0.066	0.031	0.007	0.001	0.002	0.002	0.002	0.001
PD	Masi	0.001	0.058	0.022	0.012	0.006	0.002	0.001	-	-
PD	Massanzago	0.001	0.046	0.011	0.001	0.001	0.001	0.001	-	0.001
PD	Megliadino San Vitale	0.001	0.052	0.025	0.009	0.003	0.001	-	0.001	0.001
PD	Merlara	0.001	0.049	0.018	0.006	0.002	0.002	0.002	0.002	0.001
PD	Mestrino	0.003	0.076	0.044	0.02	0.013	0.007	0.004	0.002	0.001
PD	Monselice	0.001	0.059	0.03	0.015	0.009	0.005	0.004	0.006	-
PD	Montagnana	0.001	0.062	0.029	0.013	0.007	0.002	0.001	0.003	-
PD	Montegrotto Terme	0.004	0.075	0.046	0.025	0.013	0.005	0.002	0.002	0.002
PD	Noventa Padovana	0.005	0.051	0.015	0.005	0.001	0.001	0.004	0.005	0.005
PD	Ospedaletto Euganeo	0.001	0.076	0.039	0.016	0.007	0.002	0.001	-	-
PD	Padova	0.001	0.072	0.041	0.023	0.014	0.011	0.011	0.012	-
PD	Pernumia	0.001	0.043	0.018	0.005	0.003	-	0.001	0.001	-
PD	Piacenza d'Adige	0.001	0.057	0.018	0.005	0.002	0.001	-	-	-
PD	Piazzola sul Brenta	-	0.037	0.012	0.005	0.003	0.002	0.001	0.001	-
PD	Piombino Dese	0.001	0.063	0.025	0.01	0.005	0.004	0.003	0.002	-
PD	Piove di Sacco	0.002	0.062	0.029	0.012	0.007	0.007	0.006	0.005	-
PD	Polverara	0.001	0.054	0.016	0.003	-	0.001	0.002	0.001	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Ponso	0.003	0.077	0.032	0.008	0.004	0.004	0.003	0.002	0.003
PD	Ponte San Nicolò	0.002	0.082	0.043	0.012	0.002	0.002	0.002	-	0.001
PD	Pontelongo	0.006	0.082	0.046	0.023	0.013	0.01	0.006	0.005	0.004
PD	Pozzonovo	0.003	0.103	0.051	0.028	0.017	0.007	0.003	0.003	0.001
PD	Rovolon	0.001	0.037	0.015	0.004	0.001	0.001	0.002	0.001	-
PD	Rubano	0.002	0.072	0.035	0.016	0.006	0.002	0.001	0.001	0.001
PD	Saccolongo	0.001	0.041	0.013	0.002	0.001	0.001	-	-	-
PD	San Giorgio delle Pertiche	-	0.044	0.011	0.002	0.001	0.001	-	-	-
PD	San Giorgio in Bosco	-	0.045	0.011	0.002	0.001	-	0.001	0.001	-
PD	San Martino di Lupari	0.002	0.066	0.029	0.011	0.006	0.004	0.004	0.002	0.001
PD	San Pietro in Gu	0.003	0.058	0.021	0.006	0.003	0.003	0.004	0.006	0.002
PD	San Pietro Viminario	0.001	0.045	0.016	0.004	0.001	0.001	0.001	0.001	0.001
PD	Sant'Angelo di Piove di Sacco	-	0.039	0.012	0.004	0.001	0.001	-	-	-
PD	Sant'Elena	0.006	0.064	0.037	0.015	0.007	0.003	0.005	0.002	0.007
PD	Sant'Urbano	-	0.064	0.026	0.008	0.001	-	-	-	-
PD	Santa Giustina in Colle	-	0.038	0.009	0.001	-	-	-	-	-
PD	Saonara	0.001	0.068	0.035	0.014	0.005	0.001	-	-	-
PD	Selvazzano Dentro	0.002	0.084	0.05	0.028	0.013	0.003	0.001	0.001	0.001
PD	Solesino	0.016	0.118	0.072	0.033	0.017	0.019	0.016	0.008	0.015
PD	Stanghella	0.002	0.091	0.036	0.012	0.005	0.003	0.003	0.002	0.001
PD	Teolo	-	0.04	0.017	0.004	0.001	-	-	-	-
PD	Terrassa Padovana	0.001	0.064	0.023	0.004	0.001	0.001	-	-	-
PD	Tombolo	0.003	0.075	0.031	0.013	0.006	0.005	0.002	-	0.002
PD	Torreglia	0.002	0.041	0.014	0.004	0.003	0.003	0.003	0.002	0.001
PD	Trebaseleghe	0.001	0.06	0.021	0.006	0.004	0.003	0.003	0.003	-
PD	Tribano	0.004	0.066	0.028	0.014	0.01	0.006	0.007	0.006	0.002
PD	Urbana	0.001	0.042	0.015	0.006	0.001	0.001	-	-	-
PD	Veggiano	0.002	0.055	0.024	0.006	0.001	0.001	0.002	0.003	0.001
PD	Vescovana	0.002	0.08	0.037	0.014	0.006	0.004	0.003	0.002	0.001
PD	Vighizzolo d'Este	0.001	0.068	0.03	0.013	0.007	0.002	-	-	-
PD	Vigodarzere	0.001	0.034	0.012	0.004	0.002	0.001	0.001	0.001	-

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Vigonza	0.001	0.067	0.029	0.012	0.005	0.002	0.001	0.001	-
PD	Villa del Conte	0.001	0.044	0.01	0.002	0.001	0.001	0.001	0.001	-
PD	Villa Estense	0.005	0.051	0.026	0.008	0.006	0.006	0.007	0.005	0.003
PD	Villafranca Padovana	0.001	0.055	0.023	0.011	0.005	0.001	-	-	-
PD	Villanova di Camposampiero	-	0.055	0.012	-	0.001	-	-	-	-
PD	Vo'	0.002	0.034	0.011	0.002	0.001	0.002	0.003	0.003	0.001
RO	Adria	0.001	0.095	0.056	0.03	0.016	0.009	0.004	0.001	-
RO	Ariano nel Polesine	-	0.052	0.025	0.01	0.005	0.002	0.001	0.001	-
RO	Arquà Polesine	0.001	0.064	0.032	0.012	0.004	0.001	0.001	0.002	-
RO	Badia Polesine	0.001	0.067	0.033	0.014	0.007	0.004	0.003	0.004	-
RO	Bagnolo di Po	0.001	0.072	0.029	0.009	0.002	0.001	-	-	-
RO	Bergantino	0.003	0.074	0.036	0.014	0.008	0.004	0.003	0.004	0.002
RO	Bosaro	0.002	0.084	0.049	0.017	0.001	0.001	-	0.002	-
RO	Calto	0.005	0.037	0.029	0.011	0.007	0.006	0.006	0.002	0.004
RO	Canaro	0.001	0.089	0.05	0.022	0.005	0.001	0.002	0.001	-
RO	Canda	0.002	0.058	0.028	0.011	0.004	0.002	0.002	0.001	0.001
RO	Castelguglielmo	0.002	0.102	0.06	0.03	0.014	0.006	0.003	0.001	0.001
RO	Castelmassa	0.008	0.072	0.044	0.021	0.015	0.011	0.006	0.004	0.008
RO	Castelnovo Bariano	-	0.042	0.016	0.008	0.004	0.001	-	-	-
RO	Ceneselli	-	0.048	0.021	0.008	0.003	0.001	-	-	-
RO	Ceregnano	0.001	0.091	0.044	0.02	0.007	-	0.001	-	-
RO	Corbola	0.001	0.06	0.023	0.01	0.003	-	0.001	0.001	-
RO	Costa di Rovigo	0.004	0.042	0.024	0.01	0.006	0.005	0.006	0.004	0.003
RO	Crespino	-	0.065	0.021	0.004	0.001	-	-	-	-
RO	Ficarolo	0.003	0.048	0.017	0.007	0.004	0.004	0.003	0.003	0.002
RO	Fiesso Umbertiano	0.001	0.068	0.033	0.013	0.003	-	0.001	0.001	-
RO	Frassinelle Polesine	0.001	0.066	0.033	0.016	0.007	0.004	0.002	-	-
RO	Fratta Polesine	0.002	0.095	0.05	0.024	0.011	0.003	0.001	0.003	-
RO	Gaiba	0.004	0.04	0.02	0.009	0.004	0.003	0.007	0.001	0.003
RO	Gavello	0.001	0.054	0.023	0.01	0.004	0.001	0.001	-	-
RO	Giacciano con Baruchella	0.001	0.059	0.034	0.01	0.002	0.001	-	0.001	-

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
RO	Guarda Veneta	0.001	0.069	0.02	0.004	-	-	-	0.001	-
RO	Lendinara	0.001	0.066	0.035	0.017	0.01	0.005	0.002	0.001	-
RO	Loreo	0.001	0.069	0.034	0.016	0.007	0.003	-	-	-
RO	Lusia	0.001	0.062	0.025	0.007	0.002	-	0.001	0.003	-
RO	Melara	0.003	0.063	0.027	0.013	0.006	0.004	0.003	0.003	0.002
RO	Occhiobello	0.002	0.1	0.063	0.032	0.019	0.01	0.003	-	0.001
RO	Papozze	-	0.049	0.021	0.008	0.003	-	-	-	-
RO	Pettorazza Grimani	0.005	0.096	0.054	0.028	0.014	0.009	0.008	0.005	0.002
RO	Pincara	0.001	0.05	0.021	0.009	0.004	0.002	0.001	-	-
RO	Polesella	0.003	0.105	0.061	0.032	0.017	0.004	0.001	0.004	0.001
RO	Pontecchio Polesine	0.005	0.114	0.054	0.02	0.007	0.005	0.004	0.002	0.003
RO	Porto Tolle	-	0.057	0.026	0.01	0.004	0.002	0.001	-	-
RO	Porto Viro	0.002	0.099	0.072	0.047	0.033	0.026	0.017	0.011	-
RO	Rosolina	0.003	0.113	0.08	0.061	0.041	0.024	0.011	0.009	-
RO	Rovigo	0.001	0.109	0.069	0.041	0.024	0.013	0.008	0.006	-
RO	Salara	0.002	0.055	0.024	0.007	0.002	0.001	0.001	0.002	0.001
RO	San Bellino	0.002	0.094	0.057	0.024	0.007	0.001	0.001	0.002	-
RO	San Martino di Venezze	0.001	0.109	0.061	0.026	0.01	0.003	0.001	0.001	-
RO	Stienta	0.001	0.058	0.026	0.009	0.002	0.001	-	-	-
RO	Taglio di Po	0.001	0.067	0.032	0.015	0.009	0.008	0.003	0.001	-
RO	Trecenta	0.002	0.063	0.031	0.016	0.008	0.004	0.005	0.004	-
RO	Villadose	0.002	0.139	0.074	0.033	0.012	0.003	0.001	0.002	-
RO	Villamarzana	0.003	0.056	0.023	0.01	0.004	0.001	0.004	0.003	0.002
RO	Villanova del Ghebbo	0.005	0.072	0.043	0.02	0.012	0.009	0.004	0.001	0.004
RO	Villanova Marchesana	0.001	0.034	0.012	0.004	0.002	0.001	0.001	-	-
TV	Altivole	-	0.049	0.012	0.002	0.001	0.001	0.001	-	-
TV	Arcade	0.008	0.055	0.027	0.009	0.005	0.006	0.007	0.001	0.011
TV	Asolo	0.001	0.037	0.011	0.003	0.002	0.002	0.003	0.004	0.001
TV	Borso del Grappa	0.004	0.085	0.054	0.037	0.029	0.016	0.007	0.003	0.001
TV	Breda di Piave	0.001	0.065	0.028	0.011	0.005	0.002	0.001	0.001	-
TV	Caerano di San Marco	0.003	0.067	0.025	0.009	0.004	0.002	0.004	0.002	0.002
TV	Cappella Maggiore	0.002	0.028	0.013	0.005	0.003	0.003	0.002	-	0.002

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Carbonera	-	0.059	0.02	0.004	0.001	-	-	-	-
TV	Casale sul Sile	0.001	0.052	0.024	0.005	0.001	0.001	0.001	0.001	-
TV	Casier	0.001	0.069	0.03	0.01	0.002	-	0.001	0.002	-
TV	Castelcucco	0.003	0.036	0.024	0.008	0.004	0.004	0.003	0.001	0.003
TV	Castelfranco Veneto	0.002	0.073	0.034	0.015	0.01	0.008	0.009	0.009	-
TV	Castello di Godego	0.002	0.047	0.014	0.004	0.004	0.003	0.003	0.003	0.001
TV	Cavaso del Tomba	0.002	0.044	0.023	0.015	0.009	0.004	0.001	0.002	0.001
TV	Cessalto	0.001	0.057	0.034	0.015	0.008	0.004	0.002	0.002	-
TV	Chiarano	0.002	0.054	0.024	0.007	0.004	0.002	0.004	0.005	0.001
TV	Cimadolmo	0.003	0.082	0.059	0.034	0.019	0.007	0.002	0.001	0.001
TV	Cison di Valmarino	0.001	0.068	0.043	0.022	0.01	0.003	-	-	-
TV	Codognè	0.001	0.058	0.026	0.009	0.003	0.002	0.001	0.001	-
TV	Colle Umberto	0.002	0.029	0.012	0.004	0.002	0.001	0.002	0.001	0.001
TV	Conegliano	0.004	0.083	0.056	0.037	0.028	0.019	0.011	0.004	0.001
TV	Cordignano	0.002	0.052	0.029	0.015	0.006	0.003	0.003	0.007	-
TV	Cornuda	0.008	0.107	0.078	0.051	0.028	0.012	0.005	0.001	0.006
TV	Crocetta del Montello	0.004	0.068	0.044	0.025	0.019	0.012	0.007	0.004	0.002
TV	Farra di Soligo	0.002	0.063	0.039	0.027	0.016	0.007	0.003	0.003	0.001
TV	Follina	0.002	0.1	0.067	0.041	0.019	0.006	0.001	-	-
TV	Fontanelle	-	0.041	0.014	0.002	0.001	0.001	0.001	0.001	-
TV	Fonte	0.002	0.042	0.015	0.007	0.003	0.003	0.002	0.001	0.001
TV	Fregona	0.002	0.065	0.042	0.023	0.014	0.008	0.007	0.004	-
TV	Gaiarine	0.001	0.051	0.028	0.011	0.004	0.001	0.001	0.001	-
TV	Giavera del Montello	0.001	0.047	0.024	0.008	0.003	0.002	0.003	0.002	0.001
TV	Godega di Sant'Urbano	0.001	0.047	0.026	0.01	0.003	0.001	0.001	-	-
TV	Gorgo al Monticano	0.001	0.054	0.021	0.007	0.003	0.003	0.002	0.002	-
TV	Istrana	0.002	0.056	0.029	0.01	0.004	0.004	0.004	0.003	0.001
TV	Loria	-	0.041	0.013	0.002	-	-	-	-	-
TV	Mansuè	0.002	0.061	0.025	0.01	0.006	0.004	0.003	0.003	0.001
TV	Mareno di Piave	0.001	0.05	0.024	0.011	0.005	0.003	0.003	0.003	-
TV	Maser	0.002	0.056	0.022	0.011	0.006	0.004	0.004	0.005	0.001
TV	Maserada sul Piave	0.002	0.073	0.047	0.024	0.014	0.007	0.004	0.002	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Meduna di Livenza	0.001	0.056	0.032	0.01	0.003	0.001	0.001	0.001	-
TV	Miane	0.001	0.06	0.044	0.02	0.006	0.001	-	0.001	-
TV	Mogliano Veneto	0.001	0.067	0.028	0.013	0.006	0.003	0.003	0.005	-
TV	Monastier di Treviso	0.001	0.076	0.029	0.011	0.005	0.002	0.001	0.001	-
TV	Monfumo	-	0.011	0.009	0.001	-	-	-	-	-
TV	Montebelluna	0.001	0.058	0.028	0.014	0.01	0.007	0.005	0.004	-
TV	Morgano	0.001	0.04	0.013	0.002	0.001	0.001	-	-	-
TV	Moriago della Battaglia	0.006	0.069	0.038	0.018	0.008	0.006	0.007	0.004	0.005
TV	Motta di Livenza	0.001	0.058	0.03	0.017	0.01	0.004	0.003	0.003	-
TV	Nervesa della Battaglia	0.001	0.04	0.016	0.008	0.005	0.003	0.002	0.001	-
TV	Oderzo	0.002	0.064	0.035	0.017	0.011	0.008	0.005	0.003	-
TV	Ormelle	0.002	0.063	0.032	0.012	0.007	0.004	0.003	0.004	0.001
TV	Orsago	0.004	0.049	0.03	0.017	0.009	0.005	0.003	0.001	0.004
TV	Paese	0.001	0.063	0.042	0.017	0.008	0.003	0.002	0.001	-
TV	Pederobba	0.001	0.064	0.036	0.019	0.007	0.002	0.001	-	-
TV	Pieve del Grappa	0.005	0.076	0.047	0.033	0.025	0.019	0.014	0.01	0.002
TV	Pieve di Soligo	0.01	0.079	0.052	0.034	0.027	0.02	0.015	0.008	0.006
TV	Ponte di Piave	0.002	0.063	0.033	0.014	0.008	0.004	0.004	0.004	-
TV	Ponzano Veneto	0.002	0.056	0.029	0.012	0.005	0.004	0.004	0.004	0.001
TV	Portobuffolè	0.006	0.077	0.036	0.01	0.002	-	0.005	0.004	0.007
TV	Possagno	0.014	0.102	0.074	0.05	0.036	0.027	0.011	0.001	0.011
TV	Povegliano	0.001	0.058	0.027	0.006	0.001	-	-	0.001	-
TV	Preganziol	0.001	0.087	0.042	0.017	0.006	0.001	-	-	-
TV	Quinto di Treviso	0.002	0.072	0.032	0.013	0.007	0.003	0.002	0.003	0.001
TV	Refrontolo	-	0.032	0.013	0.003	0.001	-	-	-	-
TV	Resana	0.001	0.052	0.018	0.004	0.002	0.001	0.001	0.001	-
TV	Revine Lago	0.003	0.089	0.057	0.029	0.013	0.003	0.002	0.003	0.001
TV	Riese Pio X	0.001	0.054	0.018	0.006	0.002	0.001	0.001	0.001	-
TV	Roncade	0.001	0.064	0.028	0.013	0.008	0.004	0.002	0.001	-
TV	Salgareda	-	0.06	0.022	0.005	-	0.001	0.001	0.001	-
TV	San Biagio di Callalta	-	0.058	0.026	0.008	0.003	0.001	-	-	-
TV	San Fior	0.002	0.044	0.025	0.013	0.01	0.004	0.002	0.002	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	San Pietro di Feletto	-	0.038	0.019	0.004	-	-	-	-	-
TV	San Polo di Piave	0.003	0.058	0.026	0.009	0.003	0.003	0.004	0.006	0.001
TV	San Vendemiano	0.003	0.07	0.041	0.018	0.011	0.006	0.004	0.002	0.002
TV	San Zenone degli Ezzelini	0.001	0.046	0.015	0.003	0.001	0.002	0.002	0.001	-
TV	Santa Lucia di Piave	0.002	0.074	0.037	0.016	0.005	0.002	0.003	0.004	0.001
TV	Sarmede	0.001	0.037	0.023	0.009	0.004	0.003	0.001	-	0.001
TV	Segusino	0.002	0.076	0.046	0.029	0.014	0.005	0.002	0.001	0.001
TV	Sernaglia della Battaglia	0.003	0.093	0.059	0.032	0.014	0.005	0.003	0.001	0.001
TV	Silea	0.002	0.066	0.036	0.017	0.009	0.006	0.002	-	0.001
TV	Spresiano	0.004	0.099	0.058	0.035	0.018	0.007	0.006	0.005	0.002
TV	Susegana	0.001	0.083	0.048	0.026	0.013	0.005	0.002	0.001	-
TV	Tarzo	0.001	0.044	0.024	0.009	0.002	0.001	0.001	0.001	-
TV	Trevignano	0.001	0.042	0.021	0.008	0.003	0.001	0.001	0.001	-
TV	Treviso	0.004	0.092	0.055	0.032	0.025	0.018	0.018	0.017	0.001
TV	Valdobbiadene	0.001	0.067	0.047	0.028	0.015	0.009	0.005	0.002	-
TV	Vazzola	0.001	0.053	0.023	0.008	0.003	0.001	0.001	-	-
TV	Vedelago	-	0.058	0.02	0.006	0.002	0.001	0.002	0.002	-
TV	Vidor	0.005	0.064	0.035	0.015	0.007	0.005	0.006	0.004	0.005
TV	Villorba	0.001	0.068	0.033	0.012	0.004	0.002	0.002	0.002	-
TV	Vittorio Veneto	0.002	0.096	0.073	0.051	0.036	0.023	0.013	0.009	-
TV	Volpago del Montello	0.001	0.051	0.028	0.013	0.008	0.004	0.002	0.001	-
TV	Zenson di Piave	0.007	0.085	0.038	0.015	0.006	0.003	0.003	0.004	0.01
TV	Zero Branco	0.001	0.063	0.022	0.007	0.004	0.004	0.003	0.002	-
VE	Annone Veneto	0.001	0.046	0.021	0.009	0.006	0.003	0.001	0.001	-
VE	Campagna Lupia	0.001	0.096	0.045	0.02	0.012	0.006	0.001	0.001	-
VE	Campolongo Maggiore	-	0.038	0.012	0.001	0.001	-	-	-	-
VE	Camponogara	0.002	0.072	0.022	0.007	0.003	0.002	0.003	0.005	0.001
VE	Caorle	0.001	0.096	0.065	0.04	0.027	0.016	0.011	0.008	-
VE	Cavallino-Treporti	0.003	0.092	0.058	0.038	0.025	0.017	0.011	0.007	0.001
VE	Cavarzere	0.001	0.079	0.05	0.025	0.015	0.008	0.005	0.003	-
VE	Ceggia	0.005	0.091	0.059	0.031	0.017	0.008	0.007	0.007	0.003
VE	Chioggia	0.001	0.081	0.054	0.032	0.019	0.011	0.006	0.005	-

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Cinto Caomaggiore	0.002	0.047	0.024	0.008	0.005	0.004	0.003	0.004	0.001
VE	Cona	-	0.068	0.031	0.013	0.005	0.001	0.001	0.001	-
VE	Concordia Sagittaria	0.001	0.069	0.042	0.024	0.017	0.01	0.006	0.004	-
VE	Dolo	0.001	0.086	0.045	0.018	0.005	0.001	0.001	0.001	-
VE	Eraclea	-	0.07	0.039	0.016	0.006	0.003	0.001	-	-
VE	Fiesso d'Artico	0.005	0.079	0.047	0.02	0.01	0.002	0.001	0.004	0.001
VE	Fossalta di Piave	0.01	0.063	0.033	0.012	0.011	0.008	0.008	0.006	0.012
VE	Fossalta di Portogruaro	0.002	0.072	0.034	0.013	0.006	0.005	0.007	0.008	0.001
VE	Fossò	0.002	0.069	0.031	0.011	0.006	0.003	-	-	0.001
VE	Gruaro	0.001	0.041	0.018	0.006	0.002	0.001	-	0.001	-
VE	Jesolo	0.002	0.12	0.083	0.054	0.037	0.023	0.011	0.004	-
VE	Marcon	0.012	0.144	0.099	0.063	0.046	0.028	0.022	0.016	0.005
VE	Martellago	0.002	0.074	0.037	0.013	0.005	0.004	0.003	0.001	-
VE	Meolo	0.001	0.078	0.035	0.015	0.004	0.001	0.001	-	-
VE	Mira	0.003	0.102	0.06	0.033	0.02	0.015	0.013	0.016	-
VE	Mirano	-	0.062	0.024	0.008	0.003	0.002	0.001	-	-
VE	Musile di Piave	0.001	0.07	0.037	0.02	0.011	0.005	0.002	0.001	-
VE	Noale	0.002	0.069	0.034	0.012	0.006	0.002	0.002	0.005	0.001
VE	Noventa di Piave	0.002	0.063	0.036	0.013	0.007	0.003	0.003	0.003	0.001
VE	Pianiga	-	0.074	0.028	0.008	0.001	0.001	-	-	-
VE	Portogruaro	0.001	0.075	0.047	0.026	0.017	0.011	0.008	0.006	-
VE	Pramaggiore	0.002	0.037	0.019	0.007	0.003	0.002	0.004	0.005	0.001
VE	Quarto d'Altino	0.004	0.099	0.066	0.04	0.025	0.014	0.008	0.004	0.001
VE	Salzano	0.001	0.056	0.017	0.004	0.002	0.001	0.001	0.001	-
VE	San Donà di Piave	0.002	0.091	0.057	0.036	0.025	0.018	0.013	0.008	-
VE	San Michele al Tagliamento	0.001	0.092	0.053	0.03	0.017	0.008	0.003	0.001	-
VE	San Stino di Livenza	0.001	0.068	0.048	0.028	0.019	0.012	0.009	0.005	-
VE	Santa Maria di Sala	-	0.069	0.021	0.003	0.001	0.001	0.001	-	-
VE	Scorzè	0.001	0.066	0.021	0.005	0.003	0.002	0.002	0.001	-
VE	Spinea	0.006	0.076	0.044	0.016	0.008	0.007	0.006	0.009	0.004
VE	Stra	0.001	0.053	0.017	0.007	0.003	0.002	-	-	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Teglio Veneto	0.003	0.053	0.023	0.012	0.005	0.003	0.001	0.002	0.002
VE	Torre di Mosto	0.001	0.059	0.032	0.014	0.006	0.002	-	-	-
VE	Venezia (*)									
VE	Vigonovo	0.003	0.038	0.021	0.007	0.002	0.002	0.005	0.003	0.002
VI	Agugliaro	0.001	0.057	0.018	0.003	-	-	-	0.001	-
VI	Albettone	-	0.045	0.014	0.001	-	-	-	-	-
VI	Alonte	0.001	0.032	0.014	0.002	-	-	0.001	0.001	0.001
VI	Altavilla Vicentina	0.007	0.101	0.067	0.044	0.032	0.017	0.004	-	0.004
VI	Altissimo	0.002	0.033	0.009	0.003	0.002	0.003	0.003	0.003	0.001
VI	Arcugnano	-	0.035	0.018	0.006	0.002	-	-	-	-
VI	Arsiero	0.002	0.088	0.057	0.036	0.023	0.011	0.007	0.007	-
VI	Arzignano	0.004	0.073	0.043	0.031	0.024	0.016	0.009	0.005	0.001
VI	Asiago	0.001	0.085	0.053	0.031	0.021	0.017	0.013	0.01	-
VI	Asigliano Veneto	0.001	0.037	0.008	0.001	0.001	-	-	-	0.002
VI	Barbarano Mossano	-	0.044	0.02	0.006	0.001	-	-	-	-
VI	Bassano del Grappa	0.007	0.117	0.078	0.055	0.038	0.031	0.028	0.021	0.002
VI	Bolzano Vicentino	0.001	0.073	0.029	0.006	0.001	0.001	0.001	0.001	-
VI	Breganze	0.001	0.049	0.018	0.007	0.004	0.003	0.001	-	-
VI	Brendola	0.001	0.068	0.037	0.023	0.011	0.003	0.001	-	-
VI	Bressanvido	0.001	0.057	0.022	0.006	0.002	0.001	0.001	0.001	-
VI	Brogliano	0.003	0.041	0.028	0.012	0.008	0.006	0.001	0.001	0.002
VI	Caldogno	0.001	0.063	0.029	0.007	0.001	0.001	-	0.001	-
VI	Caltrano	0.005	0.083	0.055	0.03	0.017	0.009	0.008	0.008	0.002
VI	Calvene	0.003	0.058	0.03	0.01	0.007	0.004	-	0.003	0.001
VI	Camisano Vicentino	0.003	0.069	0.036	0.017	0.01	0.007	0.006	0.007	0.001
VI	Campiglia dei Berici	0.001	0.045	0.017	0.005	0.001	-	0.001	0.001	0.001
VI	Carrè	0.004	0.065	0.041	0.018	0.008	0.002	-	-	0.005
VI	Cartigliano	0.009	0.1	0.053	0.02	0.009	0.009	0.004	0.001	0.012
VI	Cassola	0.001	0.036	0.013	0.004	0.001	-	-	0.002	-
VI	Castegnero	0.002	0.048	0.018	0.006	0.002	0.002	0.002	0.002	0.002
VI	Castelgomberto	0.001	0.061	0.031	0.012	0.004	0.002	-	0.001	-
VI	Chiampo	0.003	0.055	0.03	0.018	0.009	0.007	0.007	0.005	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Chiuppano	0.049	0.129	0.103	0.08	0.054	0.033	0.005	0.015	0.077
VI	Cogollo del Cengio	0.002	0.09	0.059	0.032	0.014	0.005	0.003	0.001	-
VI	Colceresa	-	0.028	0.007	0.001	0.001	-	0.001	0.001	-
VI	Cornedo Vicentino	0.002	0.056	0.032	0.015	0.008	0.004	0.003	0.002	0.001
VI	Costabissara	0.003	0.078	0.036	0.012	0.003	0.002	0.004	0.002	0.003
VI	Creazzo	0.004	0.074	0.034	0.019	0.008	0.003	0.001	0.002	0.004
VI	Crespadoro	0.001	0.052	0.026	0.011	0.007	0.003	0.001	0.001	-
VI	Dueville	0.002	0.065	0.035	0.014	0.006	0.004	0.002	0.002	0.001
VI	Enego	0.001	0.044	0.024	0.014	0.007	0.003	0.002	0.001	-
VI	Fara Vicentino	-	0.018	0.005	-	-	-	-	-	-
VI	Foza	0.002	0.065	0.036	0.014	0.008	0.004	0.003	0.003	0.001
VI	Gallio	0.002	0.092	0.056	0.034	0.022	0.012	0.005	0.001	-
VI	Gambellara	0.002	0.071	0.05	0.025	0.01	0.001	-	0.003	-
VI	Gambugliano	0.001	0.024	0.007	0.001	-	0.001	0.001	-	0.001
VI	Grisignano di Zocco	0.004	0.056	0.03	0.013	0.005	0.005	0.006	0.005	0.002
VI	Grumolo delle Abbadesse	0.001	0.051	0.02	0.004	0.002	0.002	0.002	0.001	0.001
VI	Isola Vicentina	0.001	0.057	0.03	0.013	0.004	0.002	0.001	0.002	-
VI	Laghi	0.002	0.067	0.037	0.025	0.012	0.003	0.001	0.002	0.001
VI	Lastebasse	0.003	0.069	0.043	0.024	0.018	0.011	0.006	0.001	0.001
VI	Longare	-	0.048	0.02	0.003	-	-	-	0.001	-
VI	Lonigo	0.001	0.064	0.033	0.019	0.012	0.006	0.003	0.003	-
VI	Lugo di Vicenza	0.006	0.074	0.047	0.031	0.019	0.011	0.006	0.003	0.004
VI	Lusiana Conco	-	0.046	0.017	0.005	0.002	0.001	0.001	0.001	-
VI	Malo	0.001	0.054	0.031	0.016	0.009	0.006	0.002	0.002	-
VI	Marano Vicentino	0.005	0.048	0.028	0.014	0.008	0.004	0.005	0.006	0.004
VI	Marostica	0.001	0.047	0.024	0.01	0.005	0.003	0.001	-	-
VI	Monte di Malo	0.001	0.032	0.011	0.002	0.001	0.001	0.001	-	-
VI	Montebello Vicentino	0.003	0.059	0.037	0.016	0.006	0.003	0.004	0.007	0.001
VI	Montecchio Maggiore	0.004	0.07	0.047	0.028	0.019	0.014	0.011	0.007	0.001
VI	Montecchio Precalcino	-	0.044	0.017	0.004	0.001	0.001	-	-	-
VI	Montegalda	-	0.035	0.013	0.002	0.001	-	-	-	-
VI	Montegaldella	0.001	0.047	0.016	0.005	0.001	0.001	-	0.001	-

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Monteviale	0.002	0.041	0.018	0.005	0.002	0.001	0.001	0.003	0.002
VI	Monticello Conte Otto	0.005	0.095	0.048	0.015	0.005	0.003	0.003	0.003	0.005
VI	Montorso Vicentino	0.006	0.037	0.013	0.005	0.004	0.005	0.005	0.003	0.008
VI	Mussolente	0.001	0.033	0.012	0.005	0.002	0.003	0.002	-	0.001
VI	Nanto	0.001	0.047	0.017	0.005	0.001	0.001	0.001	0.002	-
VI	Nogarole Vicentino	0.001	0.023	0.007	0.002	0.001	-	-	0.002	-
VI	Nove	0.006	0.084	0.042	0.024	0.011	0.009	0.003	0.003	0.002
VI	Noventa Vicentina	0.003	0.075	0.033	0.018	0.011	0.008	0.005	0.006	0.001
VI	Orgiano	0.001	0.043	0.021	0.006	0.002	0.001	0.002	0.001	0.001
VI	Pedemonte	0.005	0.119	0.097	0.049	0.022	0.013	0.004	0.001	0.002
VI	Pianezze	0.003	0.042	0.019	0.008	0.002	0.001	0.003	0.001	0.001
VI	Piovene Rocchette	0.016	0.14	0.112	0.076	0.049	0.027	0.01	-	0.014
VI	Pojana Maggiore	0.001	0.051	0.024	0.01	0.004	0.001	0.002	0.001	-
VI	Posina	0.001	0.059	0.027	0.013	0.006	0.004	0.004	0.004	-
VI	Pove del Grappa	0.012	0.113	0.094	0.076	0.056	0.027	0.004	0.013	0.003
VI	Pozzoleone	0.001	0.055	0.019	0.002	-	-	-	-	-
VI	Quinto Vicentino	-	0.049	0.017	0.006	-	0.001	-	-	-
VI	Recoaro Terme	0.001	0.065	0.034	0.019	0.01	0.006	0.003	0.003	-
VI	Roana	0.001	0.089	0.052	0.027	0.013	0.007	0.004	0.003	-
VI	Romano d'Ezzelino	0.005	0.066	0.038	0.022	0.013	0.009	0.01	0.011	0.002
VI	Rosà	0.001	0.069	0.033	0.012	0.003	-	-	-	-
VI	Rossano Veneto	0.002	0.043	0.012	0.003	0.001	0.001	0.002	0.001	0.002
VI	Rotzo	-	0.048	0.028	0.012	0.004	0.001	-	-	-
VI	Salcedo	0.001	0.024	0.004	0.001	-	-	0.001	-	0.001
VI	San Pietro Mussolino	0.016	0.104	0.066	0.035	0.012	0.003	0.002	0.006	0.044
VI	San Vito di Leguzzano	0.004	0.066	0.037	0.017	0.004	0.002	0.001	0.001	0.004
VI	Sandrigo	0.002	0.078	0.037	0.02	0.01	0.006	0.004	0.003	0.001
VI	Santorso	0.006	0.094	0.072	0.04	0.018	0.008	0.003	-	0.004
VI	Sarcedo	0.002	0.043	0.016	0.005	0.002	0.003	0.004	0.001	0.002
VI	Sarego	-	0.045	0.019	0.005	0.001	0.001	-	-	-
VI	Schiavon	0.001	0.057	0.018	0.004	0.001	-	0.001	-	-
VI	Schio	0.005	0.114	0.088	0.065	0.05	0.037	0.026	0.019	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Solagna	0.001	0.063	0.039	0.019	0.008	0.001	0.001	0.002	-
VI	Sossano	0.002	0.048	0.022	0.011	0.007	0.004	0.005	0.004	0.001
VI	Sovizzo	0.001	0.063	0.033	0.012	0.004	0.001	0.001	0.001	0.001
VI	Tezze sul Brenta	0.001	0.072	0.03	0.011	0.003	-	0.001	0.003	-
VI	Thiene	0.004	0.086	0.048	0.024	0.017	0.01	0.005	0.002	0.002
VI	Tonezza del Cimone	0.005	0.059	0.029	0.014	0.011	0.007	0.005	0.003	0.003
VI	Torrebelvicino	0.002	0.088	0.051	0.03	0.016	0.006	0.001	-	0.001
VI	Torri di Quartesolo	0.003	0.079	0.036	0.015	0.008	0.004	0.003	0.002	0.001
VI	Trissino	0.001	0.05	0.027	0.012	0.009	0.004	0.001	-	0.001
VI	Val Liona	0.001	0.025	0.009	0.003	0.001	0.001	0.001	0.001	-
VI	Valbrenta	-	0.077	0.056	0.027	0.011	0.003	0.001	0.001	-
VI	Valdagno	0.002	0.072	0.042	0.027	0.016	0.01	0.004	0.004	-
VI	Valdastico	0.002	0.088	0.054	0.032	0.016	0.005	0.001	0.003	-
VI	Valli del Pasubio	0.001	0.048	0.018	0.007	0.004	0.003	0.003	0.004	-
VI	Velo d'Astico	0.006	0.093	0.062	0.039	0.022	0.014	0.009	0.003	0.003
VI	Vicenza	0.002	0.108	0.068	0.036	0.023	0.014	0.009	0.007	-
VI	Villaga	-	0.032	0.015	0.004	0.001	-	-	-	-
VI	Villaverla	0.007	0.055	0.029	0.014	0.011	0.007	0.009	0.011	0.004
VI	Zanè	0.003	0.059	0.027	0.011	0.004	-	0.003	0.001	0.001
VI	Zermeghedo	0.019	0.05	0.024	0.013	0.01	0.008	0.004	0.022	0.091
VI	Zovencedo	0.002	0.029	0.013	0.004	-	0.001	0.002	0.002	0.003
VI	Zugliano	0.001	0.037	0.018	0.008	0.004	0.001	-	0.002	-
VR	Affi	0.002	0.055	0.03	0.016	0.008	0.001	-	-	-
VR	Albaredo d'Adige	0.001	0.074	0.035	0.012	0.003	0.002	0.001	-	-
VR	Angiari	0.002	0.065	0.031	0.015	0.005	-	0.001	0.001	-
VR	Arcole	0.004	0.083	0.04	0.019	0.01	0.003	0.004	0.007	0.002
VR	Badia Calavena	-	0.033	0.016	0.004	0.001	-	-	-	-
VR	Bardolino	0.001	0.035	0.012	0.005	0.003	0.002	0.002	0.002	0.001
VR	Belfiore	0.002	0.06	0.032	0.012	0.004	0.002	0.004	0.006	0.001
VR	Bevilacqua	0.002	0.072	0.031	0.012	0.004	0.001	0.002	0.006	0.001
VR	Bonavigo	-	0.043	0.011	0.002	-	-	-	-	-
VR	Boschi Sant'Anna	0.002	0.066	0.035	0.011	0.002	0.001	0.001	-	0.002

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Bosco Chiesanuova	0.001	0.056	0.029	0.016	0.011	0.007	0.005	0.004	-
VR	Bovolone	0.002	0.102	0.063	0.032	0.014	0.006	0.004	0.006	-
VR	Brentino Belluno	0.002	0.081	0.056	0.031	0.013	0.005	0.004	0.001	-
VR	Brenzone sul Garda	0.001	0.09	0.054	0.02	0.004	0.001	0.001	0.001	-
VR	Bussolengo	0.001	0.061	0.032	0.012	0.005	0.002	0.002	0.002	-
VR	Buttapietra	0.002	0.078	0.037	0.015	0.003	0.001	0.002	0.002	0.001
VR	Caldiero	0.003	0.072	0.031	0.02	0.01	0.003	0.001	-	0.002
VR	Caprino Veronese	0.002	0.065	0.041	0.025	0.015	0.009	0.004	0.003	-
VR	Casaleone	0.002	0.091	0.052	0.023	0.015	0.007	0.003	0.004	-
VR	Castagnaro	0.004	0.074	0.051	0.032	0.022	0.016	0.01	0.005	0.001
VR	Castel d'Azzano	0.001	0.08	0.029	0.005	-	0.001	-	-	-
VR	Castelnuovo del Garda	0.001	0.052	0.021	0.008	0.003	0.002	0.003	0.001	-
VR	Cavaion Veronese	0.001	0.037	0.022	0.009	0.003	0.002	-	0.001	-
VR	Cazzano di Tramigna	-	0.019	0.01	0.004	0.001	0.001	-	-	-
VR	Cerea	0.002	0.102	0.064	0.037	0.021	0.012	0.009	0.009	-
VR	Cerro Veronese	0.003	0.066	0.028	0.011	0.006	0.002	0.003	0.001	0.002
VR	Cologna Veneta	0.001	0.061	0.027	0.01	0.004	0.002	0.002	0.003	-
VR	Colognola ai Colli	0.001	0.069	0.035	0.016	0.006	0.001	-	-	-
VR	Concamarise	0.001	0.062	0.019	0.004	-	-	-	0.001	-
VR	Costermano sul Garda	0.001	0.042	0.023	0.008	0.004	0.002	0.001	-	-
VR	Dolcè	0.005	0.125	0.094	0.065	0.043	0.026	0.019	0.015	0.001
VR	Erbè	0.003	0.086	0.045	0.021	0.006	0.002	0.003	0.004	0.001
VR	Erbezzo	0.001	0.038	0.019	0.008	0.004	0.003	0.002	0.001	-
VR	Ferrara di Monte Baldo	0.001	0.053	0.035	0.012	0.005	0.003	0.002	0.002	-
VR	Fumane	-	0.04	0.019	0.008	0.003	0.001	-	-	-
VR	Garda	0.023	0.072	0.042	0.022	0.014	0.019	0.016	-	0.036
VR	Gazzo Veronese	0.001	0.064	0.032	0.012	0.004	0.002	0.002	0.002	-
VR	Grezzana	0.001	0.059	0.025	0.007	0.003	0.002	0.002	0.002	-
VR	Illasi	0.001	0.041	0.015	0.005	0.002	0.002	0.003	0.004	0.001
VR	Isola della Scala	0.001	0.08	0.042	0.02	0.01	0.005	0.002	0.001	-
VR	Isola Rizza	0.001	0.072	0.034	0.014	0.007	0.002	0.001	0.001	-
VR	Lavagno	0.001	0.074	0.036	0.01	0.003	0.002	0.001	-	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Lazise	0.001	0.044	0.018	0.008	0.004	0.002	-	-	-
VR	Legnago	0.002	0.09	0.055	0.033	0.021	0.013	0.009	0.007	-
VR	Malcesine	0.004	0.148	0.105	0.069	0.041	0.026	0.014	0.004	0.001
VR	Marano di Valpolicella	-	0.032	0.013	0.003	0.001	0.001	-	-	-
VR	Mezzane di Sotto	-	0.03	0.01	0.004	0.001	0.001	0.001	0.001	-
VR	Minerbe	0.001	0.072	0.038	0.016	0.006	0.002	0.001	0.001	-
VR	Montecchia di Crosara	0.003	0.023	0.013	0.007	0.004	0.004	0.008	0.01	0.001
VR	Monteforte d'Alpone	0.002	0.056	0.033	0.019	0.01	0.004	0.002	0.001	0.001
VR	Mozzecane	0.001	0.066	0.035	0.016	0.006	0.004	0.002	0.001	0.001
VR	Negrar di Valpolicella	-	0.054	0.024	0.009	0.003	0.001	-	-	-
VR	Nogara	0.002	0.088	0.043	0.017	0.007	0.005	0.004	0.005	-
VR	Nogarole Rocca	0.002	0.083	0.044	0.018	0.007	0.003	0.004	0.005	0.001
VR	Oppeano	0.001	0.098	0.056	0.024	0.008	0.002	-	-	-
VR	Palù	0.001	0.046	0.014	0.009	0.002	0.001	-	0.002	-
VR	Pastrengo	0.001	0.036	0.016	0.004	-	0.002	0.001	-	0.001
VR	Pescantina	0.001	0.037	0.017	0.006	0.003	0.002	0.001	-	-
VR	Peschiera del Garda	0.003	0.09	0.049	0.021	0.009	0.004	0.002	0.001	0.001
VR	Povegliano Veronese	0.004	0.078	0.038	0.018	0.01	0.007	0.006	0.003	0.003
VR	Pressana	-	0.051	0.017	0.003	0.001	0.001	-	-	-
VR	Rivoli Veronese	0.001	0.042	0.018	0.006	0.002	0.002	0.001	0.001	-
VR	Roncà	-	0.028	0.012	0.004	0.001	-	-	-	-
VR	Ronco all'Adige	0.001	0.1	0.045	0.014	0.004	0.002	0.003	0.003	-
VR	Roverchiara	0.001	0.057	0.018	0.003	0.001	0.002	0.002	0.001	0.001
VR	Roverè Veronese	-	0.031	0.01	0.003	0.002	0.001	0.001	0.001	-
VR	Roveredo di Guà	0.001	0.043	0.018	0.006	0.005	0.001	0.001	-	0.001
VR	Salizzole	0.001	0.069	0.027	0.011	0.004	0.001	0.001	0.001	-
VR	San Bonifacio	0.004	0.11	0.066	0.04	0.024	0.013	0.008	0.005	0.001
VR	San Giovanni Ilarione	0.001	0.034	0.012	0.004	0.002	0.002	0.003	0.004	0.001
VR	San Giovanni Lupatoto	0.007	0.127	0.096	0.064	0.041	0.018	0.006	0.004	0.002
VR	San Martino Buon Albergo	0.002	0.085	0.049	0.027	0.016	0.01	0.005	0.003	0.001
VR	San Mauro di Saline	0.001	0.027	0.009	0.001	0.001	0.001	0.001	0.002	0.001

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Table C3.2 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	San Pietro di Morubio	0.001	0.082	0.039	0.01	0.002	0.002	-	0.001	-
VR	San Pietro in Cariano	-	0.051	0.024	0.006	0.001	-	-	0.001	-
VR	San Zeno di Montagna	0.002	0.077	0.056	0.03	0.018	0.007	0.003	0.001	0.001
VR	Sanguinetto	0.002	0.117	0.061	0.024	0.009	0.002	-	-	0.001
VR	Sant'Ambrogio di Valpolicella	0.004	0.081	0.047	0.026	0.015	0.009	0.007	0.004	0.001
VR	Sant'Anna d'Alfaedo	0.001	0.044	0.015	0.006	0.002	0.002	0.002	0.002	-
VR	Selva di Progno	0.001	0.047	0.023	0.008	0.003	0.002	0.002	0.002	-
VR	Soave	0.001	0.056	0.033	0.015	0.009	0.003	0.001	0.001	-
VR	Sommacampagna	0.001	0.068	0.035	0.02	0.011	0.005	0.002	-	-
VR	Sona	0.001	0.051	0.022	0.01	0.005	0.002	0.001	0.002	-
VR	Sorgà	0.001	0.077	0.03	0.011	0.006	0.003	0.002	0.001	-
VR	Terrazzo	-	0.044	0.016	0.004	0.002	-	-	0.001	-
VR	Torri del Benaco	0.004	0.099	0.064	0.029	0.011	0.007	0.005	0.003	0.002
VR	Tregnago	0.001	0.047	0.024	0.01	0.004	0.001	0.001	0.001	-
VR	Trevenzuolo	0.003	0.088	0.047	0.021	0.006	0.002	0.005	0.007	0.001
VR	Valeggio sul Mincio	-	0.035	0.013	0.004	0.001	-	-	-	-
VR	Velo Veronese	-	0.029	0.011	0.003	0.001	0.001	-	-	-
VR	Verona	0.001	0.095	0.064	0.044	0.033	0.025	0.02	0.017	-
VR	Veronella	0.003	0.074	0.04	0.016	0.005	0.004	0.005	0.005	0.001
VR	Vestenanova	0.001	0.04	0.015	0.004	0.001	0.001	0.001	0.001	-
VR	Vigasio	0.002	0.09	0.041	0.02	0.01	0.004	0.003	0.008	0.001
VR	Villa Bartolomea	0.003	0.072	0.048	0.034	0.026	0.017	0.01	0.007	0.001
VR	Villafranca di Verona	-	0.044	0.028	0.014	0.007	0.003	0.001	0.001	-
VR	Zevio	-	0.068	0.033	0.016	0.009	0.002	0.001	-	-
VR	Zimella	0.001	0.079	0.033	0.01	0.003	0.001	-	-	-

(*) The estimation is not possible due to the insular nature of the municipality

Table C3.3: Municipal global and partial proportional mutual information, 2018

Prov.	**Municipality**	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Agordo	0.016	0.158	0.121	0.089	0.067	0.048	0.021	0.005	0.009
BL	Alano di Piave	0.002	0.089	0.061	0.04	0.025	0.011	0.003	-	0.001
BL	Alleghe	0.003	0.091	0.065	0.039	0.024	0.013	0.007	0.002	0.001
BL	Alpago	0.001	0.09	0.06	0.03	0.015	0.007	0.003	0.003	-
BL	Arsiè	0.001	0.056	0.03	0.013	0.006	0.003	0.002	0.002	-
BL	Auronzo di Cadore	-	0.109	0.076	0.041	0.02	0.006	0.002	0.001	-
BL	Belluno	0.001	0.094	0.071	0.049	0.034	0.023	0.016	0.012	-
BL	Borca di Cadore	0.006	0.147	0.095	0.063	0.043	0.018	0.006	0.006	0.002
BL	Borgo Valbelluna	-	0.048	0.03	0.016	0.01	0.005	0.003	0.002	-
BL	Calalzo di Cadore	0.012	0.211	0.176	0.132	0.09	0.052	0.047	0.077	0.003
BL	Canale d'Agordo	0.001	0.102	0.068	0.033	0.014	0.005	0.003	0.002	-
BL	Cencenighe Agordino	0.016	0.131	0.089	0.056	0.033	0.014	0.015	0.02	0.011
BL	Cesiomaggiore	0.002	0.075	0.054	0.037	0.024	0.021	0.016	0.013	-
BL	Chies d'Alpago	0.002	0.048	0.033	0.019	0.012	0.012	0.008	0.005	0.001
BL	Cibiana di Cadore	0.001	0.099	0.065	0.019	0.005	0.001	-	-	-
BL	Colle Santa Lucia	0.001	0.043	0.02	0.012	0.005	0.001	-	-	0.001
BL	Comelico Superiore	0.001	0.082	0.06	0.038	0.024	0.012	0.003	0.001	-
BL	Cortina d'Ampezzo	0.001	0.121	0.086	0.06	0.044	0.029	0.017	0.01	-
BL	Danta di Cadore	0.002	0.054	0.044	0.019	0.005	-	0.001	0.001	0.001
BL	Domegge di Cadore	0.004	0.126	0.102	0.07	0.046	0.021	0.009	0.008	0.001
BL	Falcade	0.003	0.135	0.097	0.062	0.034	0.015	0.008	0.003	0.001
BL	Feltre	0.002	0.09	0.064	0.044	0.03	0.022	0.017	0.013	-
BL	Fonzaso	0.005	0.088	0.058	0.032	0.016	0.009	0.008	0.01	0.002
BL	Gosaldo	0.002	0.071	0.043	0.028	0.012	0.005	0.005	0.007	-
BL	La Valle Agordina	0.002	0.101	0.056	0.036	0.017	0.008	0.006	0.007	-
BL	Lamon	0.002	0.067	0.045	0.027	0.02	0.013	0.007	0.003	-
BL	Limana	0.001	0.048	0.03	0.017	0.01	0.005	0.004	0.003	-
BL	Livinallongo del Col di Lana	-	0.064	0.039	0.019	0.011	0.004	0.001	0.001	-
BL	Longarone	0.002	0.157	0.113	0.069	0.043	0.028	0.018	0.01	-
BL	Lorenzago di Cadore	0.004	0.109	0.067	0.04	0.022	0.01	0.005	0.008	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Lozzo di Cadore	0.004	0.116	0.085	0.058	0.027	0.012	0.007	0.006	0.001
BL	Ospitale di Cadore	0.001	0.136	0.077	0.032	0.012	0.005	0.002	0.002	-
BL	Pedavena	0.005	0.067	0.048	0.033	0.027	0.017	0.006	0.001	0.002
BL	Perarolo di Cadore	0.002	0.126	0.079	0.04	0.016	0.008	0.003	0.001	0.001
BL	Pieve di Cadore	0.006	0.169	0.131	0.095	0.063	0.041	0.026	0.015	0.002
BL	Ponte nelle Alpi	0.002	0.099	0.057	0.033	0.017	0.01	0.006	0.006	-
BL	Quero Vas	0.003	0.102	0.074	0.043	0.029	0.016	0.007	0.004	0.001
BL	Rivamonte Agordino	0.003	0.087	0.051	0.03	0.016	0.007	0.003	0.002	0.002
BL	Rocca Pietore	0.001	0.086	0.054	0.023	0.01	0.004	0.001	0.001	-
BL	San Gregorio nelle Alpi	0.005	0.061	0.046	0.027	0.017	0.012	0.005	0.002	0.003
BL	San Nicolò di Comelico	0.007	0.1	0.063	0.04	0.026	0.018	0.014	0.011	0.003
BL	San Pietro di Cadore	0.003	0.084	0.067	0.041	0.026	0.018	0.015	0.011	0.001
BL	San Tomaso Agordino	0.01	0.102	0.05	0.023	0.016	0.008	0.01	0.015	0.007
BL	San Vito di Cadore	0.004	0.156	0.116	0.076	0.051	0.028	0.014	0.012	0.001
BL	Santa Giustina	0.006	0.095	0.068	0.045	0.036	0.026	0.018	0.017	0.002
BL	Santo Stefano di Cadore	0.001	0.086	0.065	0.041	0.02	0.01	0.004	0.002	-
BL	Sedico	0.004	0.122	0.094	0.069	0.051	0.04	0.031	0.03	0.001
BL	Selva di Cadore	0.001	0.081	0.044	0.023	0.01	0.001	0.001	0.003	-
BL	Seren del Grappa	0.001	0.063	0.04	0.025	0.012	0.008	0.004	0.001	-
BL	Sospirolo	0.003	0.086	0.055	0.037	0.027	0.02	0.014	0.009	0.001
BL	Soverzene	0.004	0.104	0.051	0.022	0.011	0.007	0.003	0.003	0.003
BL	Sovramonte	0.001	0.056	0.035	0.019	0.011	0.007	0.004	0.003	-
BL	Taibon Agordino	0.001	0.118	0.083	0.053	0.032	0.014	0.005	0.001	-
BL	Tambre	0.002	0.077	0.046	0.024	0.012	0.008	0.005	0.003	-
BL	Val di Zoldo	0.001	0.106	0.064	0.032	0.016	0.007	0.003	0.004	-
BL	Vallada Agordina	0.011	0.093	0.057	0.028	0.01	0.005	0.009	0.012	0.011
BL	Valle di Cadore	0.003	0.12	0.089	0.051	0.027	0.012	0.005	0.006	0.001
BL	Vigo di Cadore	0.001	0.085	0.052	0.03	0.017	0.007	0.004	0.002	-
BL	Vodo Cadore	0.001	0.124	0.085	0.04	0.017	0.005	0.003	0.001	-
BL	Voltago Agordino	0.002	0.109	0.068	0.029	0.007	0.004	0.001	-	0.001
BL	Zoppè di Cadore	0.007	0.027	0.033	0.012	0.005	0.001	0.004	0.007	0.017
PD	Abano Terme	0.002	0.066	0.036	0.015	0.006	0.003	0.003	0.004	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Agna	0.003	0.072	0.034	0.014	0.009	0.005	0.004	0.006	0.001
PD	Albignasego	0.001	0.071	0.029	0.013	0.007	0.001	0.001	0.001	-
PD	Anguillara Veneta	0.002	0.067	0.03	0.011	0.005	0.003	0.003	0.002	-
PD	Arquà Petrarca	0.002	0.037	0.015	0.005	0.002	0.001	0.003	0.002	0.002
PD	Arre	0.004	0.071	0.031	0.014	0.006	0.002	0.003	0.001	0.003
PD	Arzergrande	0.002	0.067	0.035	0.018	0.01	0.003	0.001	-	0.001
PD	Bagnoli di Sopra	0.001	0.088	0.04	0.015	0.005	0.001	-	0.001	-
PD	Baone	-	0.036	0.014	0.003	-	-	-	-	-
PD	Barbona	0.006	0.047	0.01	0.003	0.006	0.007	0.005	0.001	0.006
PD	Battaglia Terme	0.009	0.083	0.061	0.032	0.019	0.006	-	0.009	0.004
PD	Boara Pisani	0.002	0.068	0.032	0.016	0.006	0.002	0.002	0.001	0.001
PD	Borgo Veneto	0.001	0.065	0.022	0.01	0.005	0.003	0.004	0.006	-
PD	Borgoricco	-	0.064	0.021	0.002	-	0.001	0.001	-	-
PD	Bovolenta	0.002	0.064	0.024	0.01	0.003	0.003	0.004	0.003	0.001
PD	Brugine	0.001	0.055	0.02	0.005	0.001	0.001	0.001	0.001	-
PD	Cadoneghe	0.003	0.056	0.024	0.013	0.007	0.004	0.002	0.001	0.003
PD	Campo San Martino	0.001	0.048	0.018	0.007	0.003	0.001	0.001	0.001	0.001
PD	Campodarsego	-	0.052	0.015	0.002	0.001	-	-	-	-
PD	Campodoro	-	0.045	0.014	0.002	-	-	-	-	-
PD	Camposampiero	0.003	0.075	0.029	0.009	0.007	0.006	0.005	0.005	0.001
PD	Candiana	0.001	0.056	0.015	0.003	0.001	0.001	0.003	0.003	0.001
PD	Carceri	-	0.033	0.009	0.002	-	-	-	0.001	-
PD	Carmignano di Brenta	0.002	0.068	0.034	0.012	0.003	0.003	0.002	0.001	0.001
PD	Cartura	0.001	0.042	0.015	0.004	0.002	0.002	0.001	0.001	0.001
PD	Casale di Scodosia	0.005	0.09	0.053	0.027	0.018	0.01	0.005	0.004	0.002
PD	Casalserugo	0.003	0.071	0.032	0.009	0.004	0.004	0.004	0.002	0.002
PD	Castelbaldo	-	0.034	0.01	0.004	0.001	-	0.001	-	-
PD	Cervarese Santa Croce	-	0.052	0.02	0.006	0.002	-	-	-	-
PD	Cinto Euganeo	-	0.023	0.007	0.002	-	0.001	0.001	0.001	-
PD	Cittadella	0.002	0.066	0.029	0.013	0.008	0.005	0.005	0.005	-
PD	Codevigo	-	0.037	0.014	0.006	0.003	0.002	0.001	0.001	-
PD	Conselve	0.002	0.073	0.037	0.021	0.011	0.003	0.002	0.004	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Correzzola	-	0.056	0.019	0.003	-	-	-	-	-
PD	Curtarolo	0.001	0.039	0.014	0.007	0.005	0.003	0.001	-	0.001
PD	Due Carrare	-	0.058	0.023	0.006	0.002	0.001	-	0.001	-
PD	Este	0.003	0.074	0.046	0.024	0.013	0.008	0.006	0.007	0.001
PD	Fontaniva	0.003	0.077	0.041	0.017	0.009	0.005	0.003	0.003	0.001
PD	Galliera Veneta	0.008	0.068	0.031	0.014	0.008	0.01	0.008	0.002	0.008
PD	Galzignano Terme	0.001	0.059	0.031	0.013	0.004	0.001	-	0.002	-
PD	Gazzo	-	0.046	0.013	0.002	0.001	0.001	0.001	-	-
PD	Grantorto	0.001	0.041	0.013	0.004	-	-	0.001	0.002	0.001
PD	Granze	0.002	0.058	0.027	0.009	0.002	0.001	0.002	0.001	0.001
PD	Legnaro	0.002	0.064	0.028	0.01	0.005	0.003	0.003	0.001	0.001
PD	Limena	0.003	0.073	0.041	0.023	0.016	0.005	0.001	0.002	0.001
PD	Loreggia	0.002	0.053	0.016	0.004	0.002	0.002	0.003	0.003	0.001
PD	Lozzo Atestino	0.001	0.058	0.034	0.017	0.008	0.002	0.001	0.003	-
PD	Maserà di Padova	0.001	0.067	0.03	0.007	0.001	0.002	0.002	0.002	0.001
PD	Masi	0.001	0.058	0.022	0.012	0.006	0.002	0.001	-	-
PD	Massanzago	0.001	0.045	0.011	0.001	0.001	0.001	0.001	-	0.001
PD	Megliadino San Vitale	0.001	0.056	0.027	0.01	0.004	0.001	-	0.001	0.001
PD	Merlara	0.001	0.05	0.018	0.006	0.002	0.002	0.003	0.002	0.001
PD	Mestrino	0.003	0.076	0.044	0.02	0.013	0.007	0.004	0.002	0.001
PD	Monselice	0.001	0.06	0.03	0.016	0.009	0.006	0.005	0.006	-
PD	Montagnana	0.001	0.063	0.03	0.013	0.007	0.003	0.001	0.003	-
PD	Montegrotto Terme	0.004	0.075	0.046	0.025	0.012	0.004	0.002	0.002	0.002
PD	Noventa Padovana	0.005	0.052	0.015	0.005	0.002	0.001	0.005	0.006	0.005
PD	Ospedaletto Euganeo	0.001	0.076	0.04	0.017	0.007	0.002	0.001	-	-
PD	Padova	0.001	0.074	0.042	0.023	0.014	0.011	0.011	0.012	-
PD	Pernumia	0.001	0.045	0.018	0.005	0.003	0.001	0.001	0.001	0.001
PD	Piacenza d'Adige	0.001	0.056	0.018	0.005	0.002	0.001	-	-	-
PD	Piazzola sul Brenta	-	0.037	0.012	0.005	0.003	0.002	0.001	0.001	-
PD	Piombino Dese	0.001	0.064	0.026	0.011	0.005	0.004	0.003	0.002	-
PD	Piove di Sacco	0.002	0.063	0.03	0.012	0.007	0.007	0.006	0.005	-
PD	Polverara	0.001	0.055	0.016	0.002	-	0.001	0.002	0.001	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Ponso	0.003	0.078	0.032	0.008	0.004	0.004	0.003	0.001	0.003
PD	Ponte San Nicolò	0.002	0.082	0.043	0.013	0.002	0.002	0.002	-	0.001
PD	Pontelongo	0.006	0.082	0.046	0.023	0.012	0.01	0.006	0.005	0.004
PD	Pozzonovo	0.003	0.103	0.05	0.028	0.016	0.007	0.002	0.002	0.001
PD	Rovolon	0.001	0.037	0.015	0.004	0.001	0.001	0.002	0.001	-
PD	Rubano	0.002	0.072	0.034	0.016	0.006	0.002	0.001	0.001	0.001
PD	Saccolongo	0.001	0.041	0.013	0.002	0.001	0.001	-	-	-
PD	San Giorgio delle Pertiche	-	0.045	0.011	0.002	0.001	0.001	-	-	-
PD	San Giorgio in Bosco	-	0.046	0.011	0.002	0.001	-	-	0.001	-
PD	San Martino di Lupari	0.002	0.064	0.028	0.011	0.005	0.004	0.004	0.002	0.001
PD	San Pietro in Gu	0.003	0.06	0.022	0.006	0.003	0.003	0.005	0.006	0.002
PD	San Pietro Viminario	0.001	0.043	0.015	0.003	0.001	0.001	0.001	0.001	0.001
PD	Sant'Angelo di Piove di Sacco	-	0.04	0.012	0.003	0.001	0.001	-	-	-
PD	Sant'Elena	0.006	0.065	0.038	0.015	0.007	0.003	0.005	0.002	0.007
PD	Sant'Urbano	-	0.064	0.026	0.008	0.001	-	-	-	-
PD	Santa Giustina in Colle	-	0.038	0.009	0.001	-	-	-	0.001	-
PD	Saonara	0.001	0.069	0.035	0.013	0.005	0.001	-	-	-
PD	Selvazzano Dentro	0.002	0.084	0.049	0.027	0.012	0.003	0.001	0.001	0.001
PD	Solesino	0.016	0.119	0.072	0.034	0.018	0.019	0.016	0.008	0.015
PD	Stanghella	0.002	0.091	0.036	0.012	0.005	0.003	0.002	0.002	0.001
PD	Teolo	-	0.04	0.017	0.004	0.001	-	-	-	-
PD	Terrassa Padovana	0.001	0.064	0.024	0.004	0.001	0.001	-	-	-
PD	Tombolo	0.003	0.077	0.032	0.013	0.007	0.005	0.002	-	0.003
PD	Torreglia	0.002	0.041	0.014	0.004	0.003	0.003	0.003	0.002	0.001
PD	Trebaseleghe	0.001	0.061	0.022	0.006	0.004	0.003	0.003	0.003	-
PD	Tribano	0.004	0.066	0.028	0.014	0.01	0.006	0.007	0.006	0.002
PD	Urbana	0.001	0.042	0.015	0.006	0.001	0.001	-	-	-
PD	Veggiano	0.002	0.057	0.025	0.006	0.001	0.001	0.003	0.003	0.001
PD	Vescovana	0.002	0.081	0.038	0.015	0.007	0.004	0.004	0.002	0.001
PD	Vighizzolo d'Este	0.001	0.068	0.03	0.013	0.007	0.002	-	-	-
PD	Vigodarzere	0.001	0.036	0.013	0.005	0.002	0.001	0.001	0.001	-

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Vigonza	0.001	0.066	0.03	0.012	0.005	0.002	0.001	0.001	-
PD	Villa del Conte	0.001	0.045	0.01	0.002	0.001	0.001	0.001	0.001	-
PD	Villa Estense	0.005	0.051	0.026	0.008	0.006	0.006	0.007	0.005	0.003
PD	Villafranca Padovana	0.001	0.055	0.022	0.011	0.005	0.001	-	-	-
PD	Villanova di Camposampiero	-	0.055	0.011	-	0.001	-	-	-	-
PD	Vo’	0.002	0.034	0.011	0.003	0.001	0.002	0.003	0.003	0.001
RO	Adria	0.001	0.097	0.059	0.031	0.017	0.01	0.004	0.001	-
RO	Ariano nel Polesine	-	0.053	0.026	0.011	0.005	0.002	0.001	0.001	-
RO	Arquà Polesine	0.001	0.065	0.032	0.013	0.004	0.001	0.001	0.002	-
RO	Badia Polesine	0.001	0.068	0.033	0.014	0.006	0.004	0.003	0.003	-
RO	Bagnolo di Po	0.001	0.072	0.029	0.009	0.002	0.001	-	-	-
RO	Bergantino	0.003	0.074	0.034	0.013	0.007	0.004	0.003	0.004	0.001
RO	Bosaro	0.002	0.084	0.05	0.017	0.001	0.001	-	0.002	-
RO	Calto	0.005	0.037	0.029	0.011	0.007	0.006	0.006	0.002	0.004
RO	Canaro	0.001	0.089	0.05	0.022	0.005	0.001	0.002	0.001	-
RO	Canda	0.002	0.061	0.029	0.011	0.005	0.002	0.002	0.001	0.001
RO	Castelguglielmo	0.002	0.103	0.06	0.029	0.014	0.006	0.003	0.001	0.001
RO	Castelmassa	0.009	0.072	0.044	0.021	0.015	0.01	0.007	0.005	0.008
RO	Castelnovo Bariano	-	0.046	0.017	0.007	0.003	0.001	-	-	-
RO	Ceneselli	-	0.048	0.021	0.008	0.003	0.001	-	-	-
RO	Ceregnano	0.001	0.093	0.045	0.021	0.007	-	0.001	-	-
RO	Corbola	0.001	0.062	0.024	0.01	0.003	-	0.001	0.001	-
RO	Costa di Rovigo	0.004	0.043	0.024	0.01	0.006	0.005	0.006	0.004	0.003
RO	Crespino	-	0.065	0.021	0.004	0.001	-	-	-	-
RO	Ficarolo	0.003	0.048	0.017	0.007	0.004	0.004	0.003	0.003	0.002
RO	Fiesso Umbertiano	0.001	0.068	0.033	0.013	0.003	-	0.001	0.001	-
RO	Frassinelle Polesine	0.001	0.066	0.033	0.016	0.007	0.004	0.002	-	-
RO	Fratta Polesine	0.002	0.096	0.05	0.025	0.011	0.003	0.001	0.003	-
RO	Gaiba	0.005	0.042	0.022	0.01	0.004	0.004	0.008	0.002	0.004
RO	Gavello	0.001	0.054	0.023	0.01	0.004	0.001	0.001	-	-
RO	Giacciano con Baruchella	0.001	0.059	0.034	0.01	0.002	0.001	-	0.001	-

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
RO	Guarda Veneta	0.001	0.069	0.02	0.004	-	-	-	0.001	-
RO	Lendinara	0.001	0.066	0.035	0.017	0.01	0.005	0.002	0.001	-
RO	Loreo	0.001	0.069	0.034	0.016	0.007	0.002	-	-	-
RO	Lusia	0.002	0.072	0.03	0.008	0.002	-	0.002	0.004	0.001
RO	Melara	0.003	0.065	0.028	0.013	0.006	0.004	0.003	0.003	0.002
RO	Occhiobello	0.002	0.101	0.063	0.033	0.019	0.01	0.003	-	0.001
RO	Papozze	-	0.049	0.021	0.008	0.003	-	-	-	-
RO	Pettorazza Grimani	0.005	0.097	0.055	0.029	0.014	0.009	0.008	0.005	0.002
RO	Pincara	0.001	0.054	0.022	0.008	0.003	0.002	-	-	-
RO	Polesella	0.003	0.105	0.061	0.032	0.017	0.004	0.001	0.004	0.001
RO	Pontecchio Polesine	0.005	0.114	0.054	0.02	0.007	0.005	0.004	0.002	0.003
RO	Porto Tolle	-	0.058	0.027	0.011	0.004	0.002	0.001	-	-
RO	Porto Viro	0.002	0.1	0.072	0.046	0.033	0.025	0.017	0.011	-
RO	Rosolina	0.003	0.112	0.08	0.062	0.042	0.024	0.011	0.009	-
RO	Rovigo	0.001	0.11	0.07	0.041	0.024	0.013	0.008	0.006	-
RO	Salara	0.002	0.056	0.024	0.007	0.002	0.001	0.001	0.002	0.001
RO	San Bellino	0.002	0.096	0.056	0.023	0.007	-	0.001	0.001	-
RO	San Martino di Venezze	0.001	0.109	0.061	0.026	0.01	0.003	0.001	0.001	-
RO	Stienta	0.001	0.059	0.026	0.009	0.002	0.001	-	-	-
RO	Taglio di Po	0.001	0.067	0.032	0.015	0.009	0.008	0.003	0.001	-
RO	Trecenta	0.002	0.064	0.031	0.015	0.007	0.004	0.005	0.004	-
RO	Villadose	0.002	0.138	0.074	0.033	0.012	0.003	0.001	0.001	-
RO	Villamarzana	0.003	0.06	0.026	0.011	0.004	0.001	0.004	0.004	0.002
RO	Villanova del Ghebbo	0.005	0.076	0.045	0.02	0.013	0.009	0.004	0.001	0.004
RO	Villanova Marchesana	0.001	0.036	0.012	0.004	0.002	0.001	0.001	-	-
TV	Altivole	-	0.046	0.01	0.002	0.001	0.001	-	-	-
TV	Arcade	0.009	0.057	0.027	0.01	0.005	0.007	0.007	0.002	0.013
TV	Asolo	0.001	0.038	0.012	0.004	0.002	0.002	0.004	0.004	0.001
TV	Borso del Grappa	0.004	0.086	0.055	0.038	0.029	0.017	0.007	0.003	0.001
TV	Breda di Piave	0.001	0.065	0.028	0.011	0.005	0.002	0.001	0.001	-
TV	Caerano di San Marco	0.003	0.069	0.026	0.01	0.005	0.003	0.004	0.002	0.002
TV	Cappella Maggiore	0.002	0.028	0.013	0.005	0.003	0.003	0.002	-	0.002

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Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Carbonera	-	0.059	0.02	0.005	0.001	-	-	-	-
TV	Casale sul Sile	0.001	0.052	0.024	0.005	0.001	0.001	0.001	0.001	-
TV	Casier	0.002	0.068	0.03	0.01	0.002	0.001	0.001	0.002	0.001
TV	Castelcucco	0.004	0.036	0.024	0.008	0.004	0.004	0.003	0.001	0.003
TV	Castelfranco Veneto	0.002	0.072	0.033	0.015	0.009	0.008	0.009	0.01	-
TV	Castello di Godego	0.002	0.048	0.015	0.004	0.004	0.003	0.003	0.003	0.001
TV	Cavaso del Tomba	0.002	0.044	0.023	0.015	0.009	0.004	0.001	0.002	0.001
TV	Cessalto	0.001	0.058	0.034	0.015	0.008	0.004	0.002	0.002	-
TV	Chiarano	0.002	0.054	0.024	0.007	0.004	0.002	0.004	0.005	0.001
TV	Cimadolmo	0.003	0.083	0.061	0.035	0.019	0.007	0.002	0.001	0.001
TV	Cison di Valmarino	0.001	0.07	0.044	0.023	0.01	0.003	-	-	-
TV	Codognè	0.001	0.056	0.024	0.008	0.002	0.002	0.001	0.001	-
TV	Colle Umberto	0.002	0.029	0.012	0.004	0.002	0.001	0.002	0.001	0.001
TV	Conegliano	0.004	0.083	0.056	0.037	0.027	0.019	0.011	0.004	0.001
TV	Cordignano	0.002	0.052	0.031	0.016	0.007	0.004	0.004	0.007	-
TV	Cornuda	0.008	0.107	0.078	0.05	0.028	0.012	0.005	0.001	0.006
TV	Crocetta del Montello	0.004	0.069	0.044	0.025	0.019	0.012	0.007	0.004	0.002
TV	Farra di Soligo	0.002	0.063	0.039	0.027	0.016	0.007	0.003	0.003	0.001
TV	Follina	0.002	0.1	0.067	0.041	0.019	0.006	0.001	-	-
TV	Fontanelle	-	0.042	0.014	0.002	0.001	0.001	0.001	0.001	-
TV	Fonte	0.002	0.041	0.015	0.007	0.003	0.003	0.002	0.001	0.001
TV	Fregona	0.002	0.067	0.043	0.024	0.014	0.009	0.007	0.004	-
TV	Gaiarine	0.001	0.05	0.027	0.01	0.004	0.001	-	0.001	-
TV	Giavera del Montello	0.001	0.049	0.025	0.009	0.003	0.002	0.002	0.002	-
TV	Godega di Sant'Urbano	0.001	0.048	0.027	0.011	0.003	0.001	0.001	-	-
TV	Gorgo al Monticano	0.001	0.054	0.021	0.007	0.003	0.003	0.002	0.002	-
TV	Istrana	0.002	0.056	0.028	0.009	0.003	0.004	0.004	0.003	0.001
TV	Loria	-	0.04	0.013	0.002	-	-	-	-	-
TV	Mansuè	0.002	0.064	0.026	0.01	0.006	0.004	0.003	0.002	0.001
TV	Mareno di Piave	0.001	0.051	0.025	0.011	0.006	0.003	0.003	0.003	-
TV	Maser	0.002	0.057	0.022	0.012	0.006	0.004	0.004	0.004	0.001
TV	Maserada sul Piave	0.002	0.073	0.047	0.024	0.014	0.007	0.004	0.002	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Meduna di Livenza	0.001	0.057	0.034	0.011	0.003	0.001	0.001	0.001	-
TV	Miane	0.001	0.06	0.044	0.02	0.006	0.001	-	0.001	-
TV	Mogliano Veneto	0.001	0.07	0.03	0.014	0.007	0.003	0.002	0.004	-
TV	Monastier di Treviso	0.001	0.077	0.03	0.011	0.005	0.002	0.001	0.001	-
TV	Monfumo	-	0.011	0.009	0.001	-	-	-	-	-
TV	Montebelluna	0.001	0.056	0.027	0.014	0.01	0.007	0.004	0.004	-
TV	Morgano	0.001	0.04	0.013	0.002	0.001	0.001	-	-	-
TV	Moriago della Battaglia	0.006	0.07	0.039	0.018	0.008	0.006	0.007	0.004	0.005
TV	Motta di Livenza	0.001	0.058	0.03	0.017	0.01	0.004	0.003	0.003	-
TV	Nervesa della Battaglia	0.001	0.038	0.016	0.008	0.006	0.004	0.002	0.001	-
TV	Oderzo	0.002	0.066	0.035	0.017	0.011	0.008	0.005	0.003	-
TV	Ormelle	0.002	0.064	0.033	0.012	0.007	0.004	0.003	0.004	0.001
TV	Orsago	0.004	0.048	0.03	0.017	0.009	0.004	0.003	0.001	0.004
TV	Paese	0.001	0.065	0.041	0.017	0.008	0.003	0.002	0.001	-
TV	Pederobba	0.001	0.064	0.036	0.019	0.007	0.002	0.001	-	-
TV	Pieve del Grappa	0.005	0.075	0.047	0.033	0.025	0.019	0.015	0.01	0.002
TV	Pieve di Soligo	0.01	0.082	0.053	0.035	0.028	0.021	0.016	0.009	0.006
TV	Ponte di Piave	0.002	0.063	0.032	0.014	0.008	0.004	0.004	0.004	-
TV	Ponzano Veneto	0.002	0.056	0.03	0.012	0.005	0.004	0.004	0.004	0.001
TV	Portobuffolè	0.012	0.094	0.048	0.015	0.005	0.002	0.01	0.004	0.017
TV	Possagno	0.014	0.102	0.073	0.05	0.037	0.027	0.011	0.001	0.011
TV	Povegliano	0.001	0.052	0.023	0.005	0.001	0.001	-	0.001	-
TV	Preganziol	0.001	0.088	0.042	0.017	0.006	0.001	-	-	-
TV	Quinto di Treviso	0.002	0.072	0.032	0.013	0.007	0.003	0.002	0.003	0.001
TV	Refrontolo	-	0.032	0.013	0.003	0.001	-	-	-	-
TV	Resana	0.001	0.053	0.018	0.005	0.002	0.001	0.002	0.001	-
TV	Revine Lago	0.003	0.092	0.058	0.03	0.013	0.003	0.002	0.003	0.001
TV	Riese Pio X	-	0.051	0.016	0.005	0.001	-	-	-	-
TV	Roncade	0.001	0.065	0.029	0.014	0.008	0.004	0.003	0.001	-
TV	Salgareda	0.001	0.06	0.022	0.005	-	0.001	0.001	0.001	-
TV	San Biagio di Callalta	-	0.059	0.027	0.008	0.003	0.001	-	-	-
TV	San Fior	0.002	0.046	0.026	0.014	0.01	0.005	0.002	0.002	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	San Pietro di Feletto	-	0.038	0.018	0.004	-	-	-	-	-
TV	San Polo di Piave	0.003	0.059	0.026	0.009	0.003	0.003	0.005	0.006	0.001
TV	San Vendemiano	0.003	0.073	0.041	0.019	0.011	0.006	0.004	0.002	0.002
TV	San Zenone degli Ezzelini	0.001	0.045	0.014	0.003	0.001	0.001	0.002	0.001	-
TV	Santa Lucia di Piave	0.002	0.074	0.037	0.016	0.005	0.002	0.003	0.004	0.001
TV	Sarmede	0.001	0.038	0.024	0.009	0.004	0.003	0.001	-	0.001
TV	Segusino	0.002	0.076	0.046	0.029	0.014	0.005	0.002	0.001	0.001
TV	Sernaglia della Battaglia	0.003	0.093	0.059	0.032	0.014	0.005	0.003	0.001	0.001
TV	Silea	0.002	0.066	0.037	0.017	0.009	0.006	0.002	-	0.001
TV	Spresiano	0.004	0.098	0.059	0.035	0.018	0.008	0.006	0.005	0.002
TV	Susegana	0.001	0.083	0.047	0.026	0.014	0.006	0.002	0.001	-
TV	Tarzo	0.001	0.043	0.024	0.009	0.002	0.001	0.001	0.001	-
TV	Trevignano	0.001	0.041	0.019	0.008	0.003	0.001	0.001	-	-
TV	Treviso	0.004	0.093	0.056	0.033	0.026	0.019	0.018	0.018	0.001
TV	Valdobbiadene	0.001	0.066	0.047	0.027	0.014	0.009	0.005	0.002	-
TV	Vazzola	0.001	0.053	0.023	0.008	0.003	0.001	0.001	-	-
TV	Vedelago	-	0.058	0.019	0.006	0.002	0.001	0.001	0.001	-
TV	Vidor	0.006	0.065	0.035	0.015	0.007	0.005	0.006	0.004	0.005
TV	Villorba	0.001	0.066	0.031	0.01	0.003	0.002	0.002	0.002	-
TV	Vittorio Veneto	0.002	0.096	0.073	0.051	0.036	0.023	0.013	0.009	-
TV	Volpago del Montello	0.001	0.052	0.028	0.014	0.008	0.004	0.002	0.001	-
TV	Zenson di Piave	0.007	0.085	0.038	0.015	0.006	0.003	0.003	0.004	0.01
TV	Zero Branco	0.001	0.063	0.023	0.007	0.004	0.003	0.003	0.002	-
VE	Annone Veneto	0.001	0.046	0.021	0.009	0.006	0.003	0.001	0.001	-
VE	Campagna Lupia	0.001	0.094	0.044	0.02	0.011	0.006	0.001	0.001	-
VE	Campolongo Maggiore	-	0.038	0.012	0.001	0.001	-	-	-	-
VE	Camponogara	0.002	0.073	0.023	0.006	0.003	0.002	0.003	0.006	0.001
VE	Caorle	0.001	0.096	0.064	0.04	0.027	0.015	0.01	0.008	-
VE	Cavallino-Treporti	0.003	0.101	0.065	0.042	0.028	0.018	0.011	0.006	0.001
VE	Cavarzere	0.001	0.079	0.05	0.026	0.015	0.008	0.005	0.003	-
VE	Ceggia	0.005	0.092	0.059	0.032	0.017	0.008	0.007	0.007	0.003
VE	Chioggia	0.001	0.082	0.055	0.033	0.02	0.011	0.006	0.005	-

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Cinto Caomaggiore	0.002	0.048	0.025	0.008	0.005	0.004	0.003	0.004	0.001
VE	Cona	-	0.069	0.031	0.013	0.005	0.001	0.001	0.001	-
VE	Concordia Sagittaria	0.001	0.069	0.042	0.025	0.017	0.011	0.006	0.004	-
VE	Dolo	0.001	0.087	0.045	0.018	0.005	0.001	0.001	0.001	-
VE	Eraclea	-	0.07	0.039	0.016	0.006	0.003	0.001	-	-
VE	Fiesso d'Artico	0.005	0.079	0.047	0.02	0.011	0.003	0.001	0.004	0.001
VE	Fossalta di Piave	0.01	0.063	0.033	0.012	0.011	0.008	0.008	0.006	0.012
VE	Fossalta di Portogruaro	0.003	0.075	0.036	0.015	0.006	0.006	0.007	0.008	0.001
VE	Fossò	0.002	0.07	0.032	0.012	0.006	0.003	-	-	0.001
VE	Gruaro	0.001	0.042	0.018	0.006	0.002	-	-	0.001	-
VE	Jesolo	0.002	0.122	0.083	0.055	0.037	0.023	0.011	0.004	-
VE	Marcon	0.013	0.147	0.101	0.064	0.046	0.031	0.025	0.017	0.006
VE	Martellago	0.002	0.067	0.032	0.011	0.005	0.004	0.004	0.001	-
VE	Meolo	0.001	0.078	0.035	0.015	0.004	0.001	0.001	-	-
VE	Mira	0.003	0.102	0.06	0.033	0.02	0.016	0.014	0.016	-
VE	Mirano	-	0.062	0.024	0.009	0.004	0.002	0.001	0.001	-
VE	Musile di Piave	0.001	0.07	0.037	0.02	0.01	0.005	0.002	0.001	-
VE	Noale	0.002	0.07	0.036	0.013	0.006	0.002	0.002	0.005	0.001
VE	Noventa di Piave	0.002	0.067	0.04	0.014	0.008	0.004	0.003	0.003	0.001
VE	Pianiga	-	0.075	0.03	0.008	0.001	0.001	-	-	-
VE	Portogruaro	0.001	0.075	0.047	0.027	0.017	0.011	0.008	0.006	-
VE	Pramaggiore	0.002	0.037	0.019	0.007	0.003	0.002	0.004	0.006	0.001
VE	Quarto d'Altino	0.004	0.1	0.066	0.041	0.026	0.015	0.009	0.005	0.001
VE	Salzano	0.001	0.057	0.017	0.004	0.001	0.001	0.001	0.001	-
VE	San Donà di Piave	0.002	0.091	0.057	0.036	0.026	0.019	0.013	0.008	-
VE	San Michele al Tagliamento	0.001	0.094	0.055	0.031	0.017	0.008	0.003	0.002	-
VE	San Stino di Livenza	0.001	0.068	0.048	0.028	0.019	0.012	0.009	0.005	-
VE	Santa Maria di Sala	-	0.07	0.022	0.003	0.001	0.001	0.001	-	-
VE	Scorzè	0.001	0.068	0.023	0.006	0.003	0.002	0.001	-	-
VE	Spinea	0.006	0.078	0.045	0.017	0.009	0.007	0.006	0.009	0.004
VE	Stra	0.001	0.053	0.017	0.007	0.003	0.002	-	-	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Teglio Veneto	0.003	0.053	0.023	0.013	0.005	0.003	0.001	0.002	0.002
VE	Torre di Mosto	0.001	0.06	0.032	0.014	0.006	0.002	-	-	-
VE	Venezia (*)									
VE	Vigonovo	0.003	0.038	0.021	0.007	0.002	0.002	0.005	0.003	0.002
VI	Agugliaro	0.001	0.057	0.018	0.003	-	-	-	0.001	-
VI	Albettone	-	0.042	0.012	0.001	-	-	-	-	-
VI	Alonte	0.001	0.035	0.016	0.002	-	-	0.001	0.001	0.001
VI	Altavilla Vicentina	0.007	0.101	0.068	0.045	0.031	0.018	0.004	-	0.004
VI	Altissimo	0.002	0.032	0.009	0.003	0.002	0.002	0.003	0.003	0.001
VI	Arcugnano	-	0.035	0.018	0.006	0.002	-	-	-	-
VI	Arsiero	0.002	0.088	0.057	0.036	0.023	0.011	0.007	0.007	-
VI	Arzignano	0.004	0.073	0.043	0.031	0.024	0.016	0.009	0.005	0.001
VI	Asiago	0.001	0.085	0.052	0.031	0.021	0.017	0.013	0.01	-
VI	Asigliano Veneto	0.001	0.038	0.009	0.001	-	-	-	-	0.002
VI	Barbarano Mossano	-	0.044	0.02	0.006	0.001	-	-	-	-
VI	Bassano del Grappa	0.007	0.117	0.078	0.056	0.039	0.032	0.028	0.021	0.002
VI	Bolzano Vicentino	0.001	0.073	0.029	0.006	0.001	0.001	0.001	0.001	-
VI	Breganze	0.001	0.052	0.019	0.007	0.004	0.003	0.001	-	-
VI	Brendola	0.001	0.067	0.037	0.022	0.011	0.003	0.001	-	-
VI	Bressanvido	0.001	0.057	0.022	0.006	0.002	0.001	0.001	0.001	-
VI	Brogliano	0.004	0.05	0.034	0.015	0.01	0.008	0.002	0.002	0.002
VI	Caldogno	0.001	0.068	0.032	0.008	0.001	0.001	-	0.001	-
VI	Caltrano	0.005	0.083	0.055	0.03	0.017	0.009	0.008	0.008	0.002
VI	Calvene	0.003	0.058	0.03	0.01	0.007	0.004	-	0.003	0.001
VI	Camisano Vicentino	0.003	0.071	0.036	0.017	0.01	0.007	0.006	0.007	0.001
VI	Campiglia dei Berici	0.001	0.048	0.019	0.006	0.002	-	0.001	0.001	0.001
VI	Carrè	0.004	0.065	0.041	0.018	0.008	0.002	-	-	0.005
VI	Cartigliano	0.009	0.1	0.053	0.02	0.009	0.009	0.004	0.001	0.012
VI	Cassola	0.001	0.034	0.013	0.004	0.001	-	-	0.001	-
VI	Castegnero	0.002	0.049	0.018	0.006	0.002	0.002	0.002	0.002	0.001
VI	Castelgomberto	0.001	0.062	0.033	0.013	0.005	0.003	-	-	0.001
VI	Chiampo	0.003	0.056	0.03	0.018	0.01	0.007	0.007	0.005	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Chiuppano	0.049	0.129	0.103	0.08	0.054	0.033	0.005	0.015	0.077
VI	Cogollo del Cengio	0.002	0.09	0.059	0.032	0.014	0.005	0.003	0.001	-
VI	Colceresa	0.001	0.028	0.007	0.001	0.001	0.001	0.001	0.001	-
VI	Cornedo Vicentino	0.002	0.058	0.035	0.017	0.009	0.005	0.002	0.002	0.001
VI	Costabissara	0.004	0.078	0.035	0.012	0.003	0.002	0.004	0.002	0.003
VI	Creazzo	0.004	0.074	0.034	0.019	0.008	0.003	0.001	0.002	0.004
VI	Crespadoro	0.001	0.052	0.026	0.011	0.007	0.003	0.001	0.001	-
VI	Dueville	0.002	0.065	0.035	0.014	0.006	0.004	0.002	0.002	0.001
VI	Enego	0.001	0.044	0.024	0.013	0.007	0.003	0.002	0.001	-
VI	Fara Vicentino	-	0.018	0.005	-	-	-	-	-	-
VI	Foza	0.002	0.064	0.036	0.014	0.008	0.004	0.003	0.003	0.001
VI	Gallio	0.002	0.093	0.056	0.034	0.022	0.012	0.005	0.001	-
VI	Gambellara	0.002	0.071	0.05	0.025	0.01	0.001	-	0.003	-
VI	Gambugliano	0.001	0.024	0.007	0.001	-	0.001	0.001	-	0.001
VI	Grisignano di Zocco	0.004	0.056	0.029	0.013	0.005	0.004	0.005	0.004	0.002
VI	Grumolo delle Abbadesse	0.001	0.052	0.02	0.004	0.002	0.002	0.002	0.001	0.001
VI	Isola Vicentina	0.001	0.06	0.031	0.013	0.004	0.002	0.001	0.002	-
VI	Laghi	0.002	0.067	0.037	0.025	0.012	0.003	0.001	0.002	0.001
VI	Lastebasse	0.003	0.07	0.044	0.023	0.017	0.011	0.006	0.001	0.001
VI	Longare	-	0.049	0.02	0.003	-	-	-	0.001	-
VI	Lonigo	0.001	0.064	0.034	0.019	0.012	0.006	0.003	0.003	-
VI	Lugo di Vicenza	0.006	0.074	0.047	0.031	0.019	0.011	0.006	0.003	0.004
VI	Lusiana Conco	-	0.044	0.017	0.005	0.002	0.001	0.001	0.001	-
VI	Malo	0.001	0.056	0.032	0.016	0.01	0.006	0.002	0.002	-
VI	Marano Vicentino	0.005	0.048	0.028	0.014	0.008	0.004	0.005	0.006	0.004
VI	Marostica	0.001	0.048	0.025	0.01	0.005	0.003	0.001	0.001	-
VI	Monte di Malo	0.001	0.033	0.011	0.002	0.001	0.001	0.001	-	-
VI	Montebello Vicentino	0.003	0.06	0.037	0.017	0.006	0.003	0.004	0.007	0.001
VI	Montecchio Maggiore	0.004	0.073	0.049	0.029	0.02	0.015	0.011	0.007	0.001
VI	Montecchio Precalcino	-	0.042	0.016	0.003	0.001	-	-	-	-
VI	Montegalda	-	0.035	0.013	0.002	0.001	-	-	-	-
VI	Montegaldella	0.001	0.047	0.016	0.006	0.001	0.001	-	0.001	-

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Monteviale	0.002	0.04	0.018	0.004	0.002	0.001	0.001	0.003	0.002
VI	Monticello Conte Otto	0.006	0.096	0.05	0.016	0.006	0.004	0.004	0.004	0.006
VI	Montorso Vicentino	0.005	0.038	0.014	0.006	0.004	0.004	0.004	0.003	0.007
VI	Mussolente	0.001	0.033	0.013	0.005	0.002	0.003	0.002	-	0.001
VI	Nanto	0.001	0.048	0.017	0.005	0.001	0.001	0.001	0.002	-
VI	Nogarole Vicentino	0.001	0.023	0.007	0.002	0.001	-	-	0.002	-
VI	Nove	0.006	0.084	0.043	0.024	0.012	0.009	0.003	0.003	0.002
VI	Noventa Vicentina	0.003	0.075	0.033	0.019	0.012	0.008	0.005	0.006	0.001
VI	Orgiano	0.001	0.043	0.021	0.006	0.002	0.001	0.002	0.001	0.001
VI	Pedemonte	0.005	0.108	0.088	0.045	0.022	0.013	0.004	0.001	0.002
VI	Pianezze	0.002	0.041	0.02	0.008	0.002	0.001	0.002	0.001	0.001
VI	Piovene Rocchette	0.016	0.14	0.112	0.076	0.049	0.027	0.01	-	0.014
VI	Pojana Maggiore	0.001	0.052	0.025	0.01	0.004	0.001	0.002	0.001	-
VI	Posina	0.001	0.057	0.027	0.013	0.006	0.004	0.004	0.004	-
VI	Pove del Grappa	0.012	0.113	0.094	0.075	0.056	0.027	0.003	0.013	0.003
VI	Pozzoleone	0.001	0.055	0.019	0.002	-	-	-	-	-
VI	Quinto Vicentino	-	0.049	0.016	0.005	-	0.001	0.001	-	-
VI	Recoaro Terme	0.001	0.065	0.034	0.019	0.01	0.006	0.003	0.003	-
VI	Roana	0.001	0.09	0.052	0.027	0.013	0.007	0.004	0.003	-
VI	Romano d'Ezzelino	0.004	0.067	0.04	0.023	0.012	0.009	0.009	0.011	0.002
VI	Rosà	0.001	0.071	0.034	0.013	0.003	-	-	-	-
VI	Rossano Veneto	0.002	0.043	0.012	0.003	0.001	0.001	0.002	0.001	0.002
VI	Rotzo	-	0.048	0.028	0.012	0.004	0.001	-	-	-
VI	Salcedo	0.001	0.024	0.004	0.001	-	-	0.001	-	0.001
VI	San Pietro Mussolino	0.014	0.099	0.064	0.033	0.01	0.003	0.002	0.005	0.038
VI	San Vito di Leguzzano	0.004	0.066	0.037	0.017	0.004	0.002	0.001	0.001	0.004
VI	Sandrigo	0.002	0.078	0.037	0.019	0.01	0.006	0.004	0.003	0.001
VI	Santorso	0.006	0.096	0.071	0.041	0.018	0.008	0.003	-	0.004
VI	Sarcedo	0.002	0.042	0.016	0.005	0.002	0.003	0.004	0.001	0.002
VI	Sarego	-	0.045	0.019	0.005	0.001	0.001	-	-	-
VI	Schiavon	0.001	0.06	0.019	0.004	0.001	-	0.001	-	-
VI	Schio	0.005	0.115	0.088	0.066	0.05	0.037	0.027	0.019	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Solagna	0.001	0.063	0.039	0.019	0.008	0.001	0.001	0.002	-
VI	Sossano	0.002	0.049	0.023	0.012	0.007	0.004	0.005	0.004	0.001
VI	Sovizzo	0.001	0.062	0.033	0.012	0.004	0.001	0.001	0.001	0.001
VI	Tezze sul Brenta	0.001	0.072	0.03	0.011	0.003	-	0.001	0.003	-
VI	Thiene	0.004	0.085	0.048	0.024	0.018	0.01	0.005	0.002	0.002
VI	Tonezza del Cimone	0.005	0.06	0.029	0.014	0.01	0.007	0.005	0.004	0.003
VI	Torrebelvicino	0.002	0.088	0.051	0.03	0.016	0.006	0.001	-	0.001
VI	Torri di Quartesolo	0.003	0.079	0.036	0.016	0.008	0.004	0.003	0.002	0.001
VI	Trissino	0.003	0.058	0.031	0.014	0.012	0.008	0.004	0.001	0.001
VI	Val Liona	0.001	0.025	0.009	0.003	0.001	0.001	0.002	0.001	-
VI	Valbrenta	-	0.077	0.056	0.027	0.011	0.003	0.001	0.001	-
VI	Valdagno	0.002	0.072	0.042	0.027	0.016	0.01	0.004	0.004	-
VI	Valdastico	0.002	0.09	0.057	0.033	0.016	0.005	0.001	0.003	-
VI	Valli del Pasubio	0.001	0.048	0.018	0.007	0.004	0.003	0.003	0.004	-
VI	Velo d'Astico	0.006	0.093	0.063	0.04	0.022	0.015	0.009	0.003	0.003
VI	Vicenza	0.002	0.109	0.068	0.036	0.023	0.014	0.009	0.007	-
VI	Villaga	-	0.033	0.015	0.004	0.001	-	-	-	-
VI	Villaverla	0.007	0.058	0.031	0.015	0.012	0.007	0.009	0.011	0.004
VI	Zanè	0.002	0.057	0.026	0.01	0.004	-	0.003	0.001	0.001
VI	Zermeghedo	0.019	0.053	0.025	0.015	0.01	0.008	0.005	0.023	0.09
VI	Zovencedo	0.002	0.029	0.014	0.004	0.001	0.001	0.002	0.002	0.003
VI	Zugliano	0.001	0.038	0.018	0.008	0.004	0.001	-	0.002	-
VR	Affi	0.002	0.054	0.03	0.016	0.007	0.001	-	-	-
VR	Albaredo d'Adige	0.001	0.078	0.036	0.013	0.005	0.002	-	-	-
VR	Angiari	0.002	0.063	0.029	0.015	0.006	0.001	0.001	0.002	0.001
VR	Arcole	0.004	0.085	0.041	0.019	0.011	0.003	0.004	0.007	0.002
VR	Badia Calavena	-	0.033	0.016	0.004	0.001	-	-	-	-
VR	Bardolino	0.001	0.035	0.013	0.005	0.004	0.003	0.002	0.002	0.001
VR	Belfiore	0.002	0.062	0.032	0.011	0.004	0.002	0.004	0.006	0.001
VR	Bevilacqua	0.002	0.073	0.033	0.012	0.004	0.002	0.002	0.005	0.001
VR	Bonavigo	-	0.042	0.01	0.001	-	-	-	-	-
VR	Boschi Sant'Anna	0.003	0.068	0.035	0.01	0.002	0.002	0.001	-	0.002

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Bosco Chiesanuova	0.001	0.058	0.03	0.016	0.012	0.007	0.005	0.004	-
VR	Bovolone	0.002	0.108	0.065	0.032	0.015	0.007	0.005	0.007	-
VR	Brentino Belluno	0.002	0.081	0.056	0.031	0.013	0.005	0.004	0.001	-
VR	Brenzone sul Garda	0.001	0.089	0.054	0.02	0.004	0.001	0.001	0.001	-
VR	Bussolengo	0.001	0.06	0.032	0.012	0.005	0.002	0.002	0.002	-
VR	Buttapietra	0.002	0.094	0.045	0.018	0.007	0.003	0.003	0.001	0.001
VR	Caldiero	0.003	0.074	0.031	0.02	0.01	0.003	0.001	-	0.002
VR	Caprino Veronese	0.002	0.064	0.041	0.024	0.015	0.009	0.004	0.003	-
VR	Casaleone	0.002	0.09	0.052	0.023	0.015	0.007	0.003	0.004	-
VR	Castagnaro	0.004	0.075	0.051	0.032	0.022	0.016	0.01	0.005	0.001
VR	Castel d'Azzano	0.001	0.077	0.026	0.004	-	0.001	-	-	0.001
VR	Castelnuovo del Garda	0.001	0.054	0.022	0.008	0.003	0.002	0.002	0.001	-
VR	Cavaion Veronese	0.001	0.035	0.021	0.009	0.003	0.002	0.001	0.001	0.001
VR	Cazzano di Tramigna	-	0.021	0.01	0.004	0.001	0.001	-	-	-
VR	Cerea	0.002	0.102	0.063	0.037	0.021	0.012	0.009	0.009	-
VR	Cerro Veronese	0.003	0.066	0.028	0.011	0.006	0.002	0.003	0.001	0.002
VR	Cologna Veneta	0.001	0.061	0.027	0.01	0.004	0.003	0.002	0.003	-
VR	Colognola ai Colli	0.001	0.07	0.036	0.016	0.006	0.001	-	-	-
VR	Concamarise	0.001	0.067	0.023	0.003	-	-	-	0.001	-
VR	Costermano sul Garda	0.001	0.043	0.023	0.007	0.004	0.003	0.001	-	0.001
VR	Dolcè	0.005	0.126	0.095	0.065	0.044	0.026	0.019	0.015	0.001
VR	Erbè	0.002	0.094	0.049	0.023	0.007	0.001	0.003	0.003	0.001
VR	Erbezzo	0.001	0.039	0.019	0.008	0.004	0.003	0.002	0.001	-
VR	Ferrara di Monte Baldo	0.001	0.053	0.035	0.012	0.005	0.003	0.002	0.002	-
VR	Fumane	-	0.041	0.019	0.008	0.003	0.001	-	-	-
VR	Garda	0.025	0.076	0.045	0.023	0.016	0.02	0.017	-	0.041
VR	Gazzo Veronese	0.001	0.066	0.032	0.012	0.004	0.002	0.002	0.002	-
VR	Grezzana	0.001	0.058	0.025	0.007	0.003	0.002	0.002	0.002	-
VR	Illasi	0.001	0.04	0.015	0.005	0.002	0.002	0.003	0.004	0.001
VR	Isola della Scala	0.001	0.09	0.047	0.022	0.012	0.007	0.002	0.001	-
VR	Isola Rizza	0.001	0.072	0.033	0.013	0.006	0.001	0.001	0.001	-
VR	Lavagno	0.001	0.077	0.038	0.011	0.003	0.002	0.001	-	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Lazise	0.001	0.046	0.019	0.009	0.004	0.002	0.001	-	-
VR	Legnago	0.002	0.091	0.055	0.033	0.021	0.014	0.009	0.007	-
VR	Malcesine	0.004	0.147	0.104	0.069	0.041	0.026	0.014	0.004	0.001
VR	Marano di Valpolicella	-	0.031	0.013	0.004	0.001	0.001	-	-	-
VR	Mezzane di Sotto	0.001	0.031	0.011	0.004	0.001	0.001	0.001	0.001	-
VR	Minerbe	0.001	0.08	0.042	0.017	0.005	0.002	-	-	-
VR	Montecchia di Crosara	0.003	0.025	0.013	0.007	0.004	0.004	0.008	0.011	0.001
VR	Monteforte d'Alpone	0.002	0.056	0.033	0.019	0.01	0.004	0.002	0.001	0.001
VR	Mozzecane	0.001	0.065	0.035	0.015	0.006	0.004	0.002	0.001	0.001
VR	Negrar di Valpolicella	-	0.054	0.024	0.009	0.003	0.001	-	-	-
VR	Nogara	0.001	0.088	0.042	0.015	0.005	0.004	0.003	0.004	-
VR	Nogarole Rocca	0.003	0.093	0.052	0.02	0.008	0.004	0.005	0.007	0.001
VR	Oppeano	0.001	0.113	0.067	0.029	0.01	0.003	-	-	-
VR	Palù	0.001	0.058	0.021	0.01	0.002	0.001	-	0.001	-
VR	Pastrengo	0.001	0.036	0.016	0.004	-	0.002	0.001	-	0.001
VR	Pescantina	0.001	0.038	0.016	0.006	0.003	0.002	0.001	0.001	-
VR	Peschiera del Garda	0.003	0.092	0.05	0.021	0.009	0.004	0.002	0.001	0.001
VR	Povegliano Veronese	0.004	0.079	0.039	0.017	0.009	0.007	0.006	0.003	0.003
VR	Pressana	-	0.051	0.017	0.003	0.001	0.001	-	-	-
VR	Rivoli Veronese	0.001	0.043	0.018	0.006	0.002	0.002	0.001	0.001	-
VR	Roncà	-	0.029	0.012	0.004	0.001	-	-	-	-
VR	Ronco all'Adige	0.001	0.097	0.044	0.014	0.003	0.002	0.003	0.003	-
VR	Roverchiara	0.001	0.059	0.019	0.004	0.001	0.003	0.003	0.002	0.001
VR	Roverè Veronese	-	0.033	0.011	0.004	0.003	0.001	0.001	0.001	-
VR	Roveredo di Guà	0.001	0.043	0.018	0.006	0.005	0.001	0.001	-	0.001
VR	Salizzole	-	0.075	0.028	0.01	0.003	0.001	-	-	-
VR	San Bonifacio	0.004	0.113	0.068	0.04	0.024	0.013	0.008	0.005	0.001
VR	San Giovanni Ilarione	0.001	0.035	0.012	0.004	0.002	0.002	0.003	0.004	0.001
VR	San Giovanni Lupatoto	0.003	0.11	0.067	0.038	0.019	0.006	0.003	0.004	0.001
VR	San Martino Buon Albergo	0.002	0.084	0.047	0.025	0.015	0.009	0.003	0.003	-
VR	San Mauro di Saline	0.001	0.027	0.009	0.001	0.001	0.001	0.001	0.002	0.001

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Table C3.3 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	San Pietro di Morubio	0.001	0.082	0.038	0.011	0.003	0.002	0.001	0.001	-
VR	San Pietro in Cariano	-	0.051	0.024	0.006	0.001	-	-	0.001	-
VR	San Zeno di Montagna	0.002	0.076	0.056	0.03	0.018	0.007	0.003	0.001	0.001
VR	Sanguinetto	0.002	0.117	0.061	0.024	0.009	0.002	-	-	0.001
VR	Sant'Ambrogio di Valpolicella	0.004	0.082	0.049	0.026	0.015	0.01	0.007	0.004	0.002
VR	Sant'Anna d'Alfaedo	0.001	0.044	0.015	0.006	0.002	0.002	0.002	0.002	-
VR	Selva di Progno	0.001	0.047	0.023	0.009	0.003	0.002	0.002	0.002	-
VR	Soave	0.001	0.057	0.034	0.016	0.01	0.004	0.001	-	-
VR	Sommacampagna	0.001	0.068	0.036	0.021	0.012	0.006	0.002	0.001	-
VR	Sona	0.001	0.051	0.022	0.01	0.005	0.002	0.001	0.002	-
VR	Sorgà	0.001	0.079	0.03	0.01	0.005	0.003	0.002	0.001	-
VR	Terrazzo	-	0.043	0.015	0.004	0.001	-	-	0.001	-
VR	Torri del Benaco	0.004	0.102	0.064	0.029	0.011	0.007	0.005	0.003	0.002
VR	Tregnago	0.001	0.048	0.024	0.011	0.005	0.001	0.001	0.001	-
VR	Trevenzuolo	0.002	0.093	0.044	0.018	0.006	0.003	0.004	0.005	0.001
VR	Valeggio sul Mincio	-	0.035	0.013	0.004	0.001	0.001	-	-	-
VR	Velo Veronese	-	0.029	0.012	0.003	0.001	0.001	-	-	-
VR	Verona	0.001	0.094	0.062	0.043	0.032	0.025	0.02	0.016	-
VR	Veronella	0.002	0.073	0.039	0.015	0.005	0.004	0.005	0.005	0.001
VR	Vestenanova	0.001	0.041	0.015	0.004	0.001	0.001	0.001	0.001	-
VR	Vigasio	0.003	0.092	0.04	0.019	0.01	0.005	0.005	0.009	0.001
VR	Villa Bartolomea	0.003	0.072	0.048	0.034	0.025	0.017	0.01	0.007	0.001
VR	Villafranca di Verona	-	0.045	0.027	0.013	0.007	0.003	0.001	-	-
VR	Zevio	0.001	0.072	0.034	0.017	0.009	0.003	0.001	-	-
VR	Zimella	0.001	0.078	0.032	0.01	0.003	0.001	-	-	-

(*) The estimation is not possible due to the insular nature of the municipality

Table C3.4: Municipal global and partial proportional mutual information, 2019

Prov.	**Municipality**	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Agordo	0.017	0.15	0.12	0.089	0.07	0.051	0.024	0.006	0.01
BL	Alano di Piave	0.002	0.079	0.066	0.041	0.028	0.014	0.003	-	0.001
BL	Alleghe	0.004	0.11	0.084	0.044	0.028	0.017	0.009	0.004	0.001
BL	Alpago	0.001	0.093	0.061	0.034	0.017	0.007	0.003	0.003	-
BL	Arsiè	0.001	0.055	0.031	0.014	0.007	0.004	0.002	0.002	-
BL	Auronzo di Cadore	-	0.11	0.077	0.041	0.019	0.006	0.002	0.001	-
BL	Belluno	0.001	0.093	0.067	0.047	0.034	0.022	0.014	0.011	-
BL	Borca di Cadore	0.005	0.12	0.093	0.061	0.04	0.017	0.006	0.005	0.002
BL	Borgo Valbelluna	-	0.048	0.028	0.015	0.009	0.005	0.003	0.002	-
BL	Calalzo di Cadore	0.011	0.17	0.15	0.12	0.08	0.042	0.04	0.069	0.002
BL	Canale d'Agordo	0.002	0.12	0.071	0.034	0.017	0.009	0.004	0.002	-
BL	Cencenighe Agordino	0.016	0.15	0.095	0.057	0.035	0.014	0.014	0.02	0.011
BL	Cesiomaggiore	0.002	0.072	0.054	0.033	0.022	0.018	0.014	0.012	-
BL	Chies d'Alpago	0.002	0.05	0.038	0.019	0.012	0.011	0.008	0.005	0.001
BL	Cibiana di Cadore	0.002	0.12	0.061	0.024	0.007	0.002	0.001	0.001	0.001
BL	Colle Santa Lucia	0.001	0.043	0.015	0.009	0.003	-	-	-	-
BL	Comelico Superiore	0.001	0.09	0.063	0.04	0.024	0.012	0.003	-	-
BL	Cortina d'Ampezzo	0.001	0.12	0.086	0.055	0.04	0.025	0.015	0.01	-
BL	Danta di Cadore	0.003	0.062	0.053	0.022	0.004	-	-	0.001	0.001
BL	Domegge di Cadore	0.004	0.14	0.12	0.084	0.053	0.024	0.009	0.008	0.001
BL	Falcade	0.003	0.12	0.084	0.058	0.03	0.017	0.008	0.003	0.001
BL	Feltre	0.002	0.092	0.065	0.045	0.033	0.023	0.018	0.014	-
BL	Fonzaso	0.005	0.097	0.063	0.033	0.016	0.009	0.009	0.01	0.002
BL	Gosaldo	0.002	0.069	0.046	0.026	0.013	0.005	0.004	0.006	-
BL	La Valle Agordina	0.002	0.087	0.052	0.036	0.018	0.009	0.007	0.009	-
BL	Lamon	0.002	0.066	0.045	0.03	0.022	0.015	0.008	0.004	-
BL	Limana	0.002	0.049	0.036	0.02	0.013	0.008	0.005	0.003	-
BL	Livinallongo del Col di Lana	-	0.07	0.041	0.021	0.01	0.004	0.001	0.001	-
BL	Longarone	0.002	0.15	0.11	0.071	0.044	0.027	0.017	0.01	-
BL	Lorenzago di Cadore	0.003	0.086	0.053	0.036	0.016	0.007	0.004	0.007	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
BL	Lozzo di Cadore	0.004	0.11	0.08	0.056	0.031	0.012	0.008	0.005	0.001
BL	Ospitale di Cadore	0.002	0.13	0.081	0.035	0.014	0.006	0.002	0.002	-
BL	Pedavena	0.005	0.067	0.048	0.035	0.03	0.02	0.007	0.001	0.002
BL	Perarolo di Cadore	0.002	0.14	0.074	0.04	0.018	0.009	0.004	0.002	0.001
BL	Pieve di Cadore	0.006	0.17	0.13	0.097	0.062	0.039	0.024	0.014	0.002
BL	Ponte nelle Alpi	0.002	0.1	0.067	0.037	0.019	0.01	0.006	0.007	-
BL	Quero Vas	0.003	0.095	0.063	0.043	0.031	0.016	0.008	0.005	0.001
BL	Rivamonte Agordino	0.003	0.083	0.049	0.032	0.015	0.007	0.002	0.001	0.001
BL	Rocca Pietore	0.001	0.096	0.056	0.027	0.011	0.005	0.001	0.001	-
BL	San Gregorio nelle Alpi	0.004	0.061	0.044	0.026	0.015	0.009	0.004	0.001	0.002
BL	San Nicolò di Comelico	0.007	0.1	0.07	0.042	0.026	0.018	0.014	0.012	0.003
BL	San Pietro di Cadore	0.003	0.072	0.058	0.034	0.023	0.016	0.013	0.009	0.001
BL	San Tomaso Agordino	0.008	0.09	0.05	0.02	0.014	0.006	0.008	0.014	0.005
BL	San Vito di Cadore	0.004	0.14	0.11	0.07	0.043	0.026	0.013	0.012	0.001
BL	Santa Giustina	0.006	0.092	0.068	0.044	0.036	0.025	0.016	0.016	0.002
BL	Santo Stefano di Cadore	0.001	0.11	0.077	0.044	0.022	0.012	0.005	0.003	-
BL	Sedico	0.004	0.13	0.098	0.068	0.051	0.039	0.032	0.032	0.001
BL	Selva di Cadore	0.002	0.074	0.038	0.021	0.01	0.002	0.002	0.005	-
BL	Seren del Grappa	0.001	0.071	0.047	0.027	0.015	0.01	0.005	0.001	-
BL	Sospirolo	0.003	0.092	0.057	0.039	0.029	0.02	0.016	0.01	0.001
BL	Soverzene	0.007	0.12	0.062	0.024	0.013	0.013	0.005	0.005	0.005
BL	Sovramonte	0.001	0.055	0.031	0.02	0.01	0.006	0.004	0.003	-
BL	Taibon Agordino	0.001	0.12	0.077	0.053	0.032	0.014	0.005	0.002	-
BL	Tambre	0.002	0.073	0.044	0.022	0.012	0.007	0.005	0.004	-
BL	Val di Zoldo	0.001	0.11	0.067	0.036	0.017	0.007	0.003	0.003	-
BL	Vallada Agordina	0.011	0.11	0.058	0.025	0.008	0.006	0.009	0.011	0.011
BL	Valle di Cadore	0.003	0.12	0.094	0.054	0.026	0.011	0.004	0.005	0.001
BL	Vigo di Cadore	0.001	0.07	0.039	0.024	0.015	0.007	0.004	0.002	-
BL	Vodo Cadore	0.002	0.12	0.081	0.042	0.019	0.006	0.003	0.002	-
BL	Voltago Agordino	0.002	0.11	0.069	0.03	0.008	0.003	0.001	-	0.001
BL	Zoppè di Cadore	0.007	0.084	0.034	0.015	0.002	0.001	0.003	0.01	0.015
PD	Abano Terme	0.003	0.066	0.038	0.017	0.007	0.003	0.004	0.005	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Agna	0.003	0.072	0.038	0.013	0.009	0.005	0.004	0.006	0.001
PD	Albignasego	0.001	0.077	0.031	0.015	0.008	0.002	0.001	0.001	-
PD	Anguillara Veneta	0.002	0.08	0.04	0.015	0.006	0.004	0.004	0.003	0.001
PD	Arquà Petrarca	0.003	0.038	0.018	0.005	0.001	0.001	0.003	0.002	0.002
PD	Arre	0.004	0.06	0.029	0.008	0.004	0.003	0.004	0.002	0.004
PD	Arzergrande	0.002	0.068	0.03	0.015	0.009	0.003	-	0.001	0.001
PD	Bagnoli di Sopra	0.001	0.084	0.036	0.013	0.005	0.001	-	0.001	-
PD	Baone	-	0.03	0.011	0.002	-	-	-	-	-
PD	Barbona	0.004	0.04	0.012	0.005	0.007	0.007	0.004	0.001	0.004
PD	Battaglia Terme	0.009	0.1	0.061	0.037	0.02	0.006	-	0.007	0.006
PD	Boara Pisani	0.002	0.056	0.028	0.014	0.006	0.002	0.002	0.001	0.001
PD	Borgo Veneto	0.001	0.064	0.024	0.009	0.005	0.003	0.004	0.006	-
PD	Borgoricco	-	0.062	0.017	0.002	-	0.001	0.001	-	-
PD	Bovolenta	0.001	0.057	0.025	0.008	0.002	0.002	0.003	0.002	0.001
PD	Brugine	-	0.053	0.017	0.005	-	-	-	-	-
PD	Cadoneghe	0.003	0.057	0.028	0.014	0.008	0.004	0.002	0.001	0.003
PD	Campo San Martino	0.001	0.044	0.016	0.007	0.002	0.001	0.001	0.001	0.001
PD	Campodarsego	-	0.05	0.015	0.003	0.001	-	-	-	-
PD	Campodoro	-	0.045	0.017	0.003	-	-	-	-	-
PD	Camposampiero	0.004	0.082	0.034	0.014	0.011	0.008	0.007	0.006	0.001
PD	Candiana	0.001	0.054	0.014	0.002	0.001	0.001	0.002	0.002	-
PD	Carceri	0.001	0.03	0.01	0.002	-	-	-	0.001	-
PD	Carmignano di Brenta	0.002	0.055	0.028	0.012	0.004	0.003	0.002	0.001	0.002
PD	Cartura	0.001	0.041	0.014	0.004	0.002	0.002	0.001	0.001	0.001
PD	Casale di Scodosia	0.004	0.094	0.056	0.027	0.018	0.009	0.005	0.004	0.002
PD	Casalserugo	0.003	0.074	0.029	0.01	0.003	0.004	0.004	0.003	0.002
PD	Castelbaldo	0.001	0.036	0.015	0.006	0.001	0.001	0.001	-	-
PD	Cervarese Santa Croce	-	0.053	0.021	0.007	0.002	-	-	-	-
PD	Cinto Euganeo	-	0.018	0.007	0.001	-	0.001	0.001	0.001	-
PD	Cittadella	0.002	0.064	0.028	0.014	0.008	0.005	0.004	0.004	-
PD	Codevigo	-	0.009	0.002	0.001	-	-	-	-	-
PD	Conselve	0.002	0.073	0.037	0.022	0.011	0.004	0.002	0.004	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Correzzola	-	0.049	0.017	0.003	-	-	-	-	-
PD	Curtarolo	0.001	0.042	0.018	0.009	0.005	0.004	0.001	-	0.001
PD	Due Carrare	-	0.061	0.025	0.006	0.002	0.001	-	0.001	-
PD	Este	0.003	0.082	0.05	0.028	0.014	0.009	0.006	0.007	0.001
PD	Fontaniva	0.002	0.071	0.038	0.016	0.008	0.004	0.003	0.003	0.001
PD	Galliera Veneta	0.006	0.063	0.024	0.008	0.004	0.006	0.004	0.001	0.007
PD	Galzignano Terme	0.001	0.062	0.032	0.012	0.004	0.001	0.001	0.003	-
PD	Gazzo	-	0.05	0.014	0.003	0.002	0.002	0.001	-	-
PD	Grantorto	0.002	0.042	0.011	0.004	0.001	-	0.002	0.002	0.001
PD	Granze	0.002	0.07	0.03	0.009	0.002	0.001	0.002	0.002	0.002
PD	Legnaro	0.003	0.062	0.03	0.012	0.005	0.003	0.004	0.002	0.001
PD	Limena	0.003	0.08	0.046	0.026	0.017	0.005	0.001	0.002	0.001
PD	Loreggia	0.002	0.049	0.014	0.003	0.002	0.003	0.004	0.004	0.001
PD	Lozzo Atestino	0.002	0.069	0.037	0.018	0.009	0.002	0.001	0.003	-
PD	Maserà di Padova	0.001	0.068	0.026	0.005	0.001	0.002	0.002	0.002	0.001
PD	Masi	0.001	0.042	0.015	0.009	0.006	0.002	-	-	-
PD	Massanzago	0.002	0.047	0.01	0.003	0.001	0.002	0.002	0.001	0.001
PD	Megliadino San Vitale	0.001	0.064	0.026	0.009	0.004	0.001	-	0.001	0.001
PD	Merlara	0.001	0.049	0.013	0.004	0.002	0.002	0.003	0.002	0.001
PD	Mestrino	0.003	0.074	0.04	0.021	0.013	0.007	0.003	0.002	0.001
PD	Monselice	0.001	0.055	0.028	0.015	0.009	0.006	0.004	0.006	-
PD	Montagnana	0.001	0.066	0.031	0.012	0.007	0.003	0.002	0.003	-
PD	Montegrotto Terme	0.004	0.076	0.054	0.031	0.016	0.007	0.003	0.003	0.003
PD	Noventa Padovana	0.005	0.039	0.016	0.004	0.002	-	0.003	0.004	0.007
PD	Ospedaletto Euganeo	0.001	0.082	0.042	0.018	0.007	0.003	0.001	-	-
PD	Padova	0.001	0.076	0.044	0.024	0.015	0.011	0.011	0.012	-
PD	Pernumia	0.001	0.041	0.015	0.005	0.002	-	0.001	-	-
PD	Piacenza d'Adige	0.001	0.058	0.019	0.006	0.003	0.001	0.001	0.001	-
PD	Piazzola sul Brenta	-	0.036	0.014	0.005	0.003	0.002	0.001	0.001	-
PD	Piombino Dese	0.001	0.061	0.024	0.011	0.005	0.004	0.003	0.002	-
PD	Piove di Sacco	0.002	0.058	0.028	0.01	0.007	0.006	0.005	0.005	-
PD	Polverara	0.001	0.052	0.015	0.002	-	-	0.001	-	-

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Ponso	0.003	0.071	0.028	0.008	0.002	0.003	0.002	0.001	0.002
PD	Ponte San Nicolò	0.003	0.083	0.044	0.014	0.003	0.003	0.003	0.001	0.002
PD	Pontelongo	0.007	0.08	0.047	0.026	0.016	0.011	0.006	0.005	0.004
PD	Pozzonovo	0.003	0.1	0.052	0.028	0.017	0.009	0.003	0.002	0.001
PD	Rovolon	0.001	0.033	0.011	0.003	0.001	0.001	0.001	0.001	-
PD	Rubano	0.002	0.071	0.031	0.013	0.006	0.002	0.002	0.002	0.002
PD	Saccolongo	0.001	0.044	0.011	0.002	0.002	0.001	-	-	-
PD	San Giorgio delle Pertiche	0.001	0.046	0.013	0.003	0.001	0.002	0.001	-	-
PD	San Giorgio in Bosco	-	0.042	0.011	0.002	0.001	-	0.001	0.001	-
PD	San Martino di Lupari	0.002	0.066	0.025	0.009	0.004	0.004	0.003	0.002	0.001
PD	San Pietro in Gu	0.004	0.059	0.019	0.007	0.003	0.004	0.005	0.006	0.002
PD	San Pietro Viminario	0.002	0.048	0.02	0.006	0.002	0.002	0.001	0.001	0.002
PD	Sant'Angelo di Piove di Sacco	-	0.045	0.015	0.003	0.001	-	-	-	-
PD	Sant'Elena	0.006	0.075	0.035	0.016	0.007	0.003	0.005	0.002	0.007
PD	Sant'Urbano	-	0.065	0.029	0.009	0.001	-	-	-	-
PD	Santa Giustina in Colle	-	0.038	0.009	0.001	0.001	-	0.001	0.001	-
PD	Saonara	0.001	0.062	0.029	0.013	0.005	0.001	-	-	-
PD	Selvazzano Dentro	0.003	0.091	0.055	0.034	0.016	0.005	0.001	0.001	0.001
PD	Solesino	0.016	0.11	0.07	0.029	0.017	0.019	0.017	0.008	0.015
PD	Stanghella	0.002	0.09	0.034	0.012	0.005	0.003	0.002	0.002	0.001
PD	Teolo	-	0.042	0.016	0.003	-	-	-	-	-
PD	Terrassa Padovana	0.001	0.061	0.02	0.004	0.002	0.002	0.001	-	-
PD	Tombolo	0.003	0.057	0.026	0.01	0.005	0.004	0.002	-	0.003
PD	Torreglia	0.002	0.042	0.015	0.004	0.002	0.003	0.004	0.002	0.001
PD	Trebaseleghe	0.001	0.061	0.018	0.005	0.004	0.003	0.003	0.003	-
PD	Tribano	0.004	0.067	0.024	0.011	0.007	0.005	0.006	0.007	0.002
PD	Urbana	-	0.043	0.016	0.004	0.001	0.001	-	-	-
PD	Veggiano	0.001	0.058	0.021	0.005	-	0.001	0.002	0.002	0.001
PD	Vescovana	0.002	0.082	0.039	0.016	0.007	0.005	0.004	0.002	0.001
PD	Vighizzolo d'Este	0.001	0.081	0.035	0.017	0.01	0.004	-	-	-
PD	Vigodarzere	0.001	0.037	0.014	0.005	0.002	0.001	0.001	0.002	-

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
PD	Vigonza	0.001	0.067	0.03	0.012	0.006	0.003	0.001	0.001	-
PD	Villa del Conte	0.001	0.038	0.01	0.003	0.002	0.002	0.002	0.001	0.001
PD	Villa Estense	0.004	0.055	0.022	0.009	0.006	0.006	0.006	0.005	0.003
PD	Villafranca Padovana	0.001	0.061	0.025	0.012	0.004	0.001	-	-	-
PD	Villanova di Camposampiero	-	0.056	0.012	-	0.001	-	-	-	-
PD	Vo'	0.002	0.034	0.012	0.003	0.001	0.002	0.003	0.003	0.001
RO	Adria	0.001	0.097	0.059	0.031	0.017	0.01	0.004	0.001	-
RO	Ariano nel Polesine	-	0.053	0.026	0.011	0.005	0.002	0.001	0.001	-
RO	Arquà Polesine	0.001	0.065	0.032	0.012	0.004	0.001	0.001	0.002	-
RO	Badia Polesine	0.001	0.068	0.033	0.014	0.006	0.004	0.003	0.003	-
RO	Bagnolo di Po	0.001	0.072	0.029	0.009	0.002	0.001	-	-	-
RO	Bergantino	0.003	0.074	0.034	0.013	0.007	0.004	0.003	0.004	0.001
RO	Bosaro	0.002	0.084	0.05	0.017	0.001	0.001	-	0.002	-
RO	Calto	0.005	0.037	0.029	0.011	0.007	0.006	0.006	0.002	0.004
RO	Canaro	0.001	0.089	0.05	0.022	0.005	0.001	0.002	0.001	-
RO	Canda	0.002	0.061	0.029	0.011	0.005	0.002	0.002	0.001	0.001
RO	Castelguglielmo	0.003	0.11	0.066	0.034	0.017	0.008	0.003	0.001	0.001
RO	Castelmassa	0.009	0.072	0.044	0.021	0.014	0.01	0.007	0.005	0.008
RO	Castelnovo Bariano	-	0.046	0.017	0.007	0.003	0.001	-	-	-
RO	Ceneselli	-	0.048	0.021	0.008	0.003	0.001	-	-	-
RO	Ceregnano	0.001	0.092	0.046	0.021	0.007	-	0.001	-	-
RO	Corbola	0.001	0.062	0.024	0.01	0.003	-	0.001	0.001	-
RO	Costa di Rovigo	0.004	0.043	0.024	0.01	0.006	0.005	0.006	0.004	0.003
RO	Crespino	-	0.065	0.021	0.004	0.001	-	-	-	-
RO	Ficarolo	0.002	0.048	0.017	0.007	0.004	0.004	0.003	0.003	0.002
RO	Fiesso Umbertiano	0.001	0.068	0.033	0.013	0.003	-	0.001	0.001	-
RO	Frassinelle Polesine	0.002	0.066	0.033	0.016	0.007	0.004	0.002	-	-
RO	Fratta Polesine	0.002	0.096	0.05	0.025	0.011	0.003	0.001	0.003	-
RO	Gaiba	0.005	0.042	0.022	0.01	0.004	0.004	0.008	0.002	0.004
RO	Gavello	0.001	0.054	0.023	0.01	0.004	0.002	0.001	-	-
RO	Giacciano con Baruchella	0.001	0.059	0.034	0.01	0.002	0.001	-	0.001	-

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
RO	Guarda Veneta	0.001	0.069	0.02	0.004	-	-	-	0.001	-
RO	Lendinara	0.001	0.066	0.035	0.017	0.01	0.005	0.002	0.001	-
RO	Loreo	0.001	0.069	0.034	0.016	0.006	0.002	-	-	-
RO	Lusia	0.002	0.072	0.03	0.008	0.002	-	0.002	0.004	0.001
RO	Melara	0.003	0.065	0.028	0.013	0.006	0.004	0.003	0.003	0.002
RO	Occhiobello	0.002	0.1	0.063	0.033	0.019	0.01	0.003	-	0.001
RO	Papozze	-	0.049	0.021	0.008	0.003	-	-	-	-
RO	Pettorazza Grimani	0.005	0.097	0.055	0.029	0.014	0.009	0.008	0.005	0.002
RO	Pincara	0.001	0.054	0.022	0.008	0.004	0.002	-	-	-
RO	Polesella	0.003	0.1	0.061	0.032	0.017	0.004	0.001	0.004	0.001
RO	Pontecchio Polesine	0.005	0.11	0.054	0.02	0.007	0.005	0.004	0.002	0.003
RO	Porto Tolle	-	0.014	0.002	0.001	-	-	-	-	-
RO	Porto Viro	0.001	0.043	0.021	0.014	0.014	0.014	0.014	0.014	-
RO	Rosolina	0.001	0.045	0.018	0.012	0.008	0.006	0.006	0.006	-
RO	Rovigo	0.001	0.11	0.07	0.041	0.024	0.013	0.008	0.006	-
RO	Salara	0.002	0.056	0.024	0.007	0.002	0.001	0.001	0.002	0.001
RO	San Bellino	0.002	0.1	0.059	0.026	0.008	0.001	0.002	0.001	-
RO	San Martino di Venezze	0.001	0.11	0.061	0.026	0.01	0.003	0.001	0.001	-
RO	Stienta	0.001	0.059	0.026	0.009	0.002	0.001	-	-	-
RO	Taglio di Po	0.001	0.067	0.032	0.015	0.009	0.007	0.003	0.001	-
RO	Trecenta	0.002	0.064	0.031	0.015	0.007	0.004	0.005	0.004	-
RO	Villadose	0.002	0.14	0.074	0.033	0.012	0.003	0.001	0.001	-
RO	Villamarzana	0.003	0.06	0.026	0.011	0.004	0.001	0.004	0.004	0.002
RO	Villanova del Ghebbo	0.005	0.076	0.045	0.02	0.013	0.009	0.004	0.001	0.004
RO	Villanova Marchesana	0.001	0.036	0.012	0.004	0.002	0.001	0.001	-	-
TV	Altivole	-	0.046	0.01	0.002	-	0.001	-	-	-
TV	Arcade	0.009	0.057	0.027	0.01	0.005	0.007	0.007	0.002	0.013
TV	Asolo	0.002	0.038	0.012	0.004	0.002	0.002	0.004	0.004	0.001
TV	Borso del Grappa	0.004	0.086	0.055	0.038	0.029	0.017	0.007	0.003	0.001
TV	Breda di Piave	0.001	0.065	0.028	0.011	0.005	0.002	0.001	0.001	-
TV	Caerano di San Marco	0.003	0.069	0.026	0.01	0.004	0.002	0.004	0.002	0.002
TV	Cappella Maggiore	0.002	0.028	0.013	0.005	0.003	0.003	0.002	-	0.002

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Carbonera	-	0.059	0.02	0.005	0.001	-	-	-	-
TV	Casale sul Sile	0.001	0.052	0.024	0.005	0.001	0.001	0.001	0.001	-
TV	Casier	0.002	0.068	0.03	0.01	0.002	0.001	0.001	0.002	0.001
TV	Castelcucco	0.004	0.036	0.024	0.008	0.004	0.004	0.003	0.001	0.003
TV	Castelfranco Veneto	0.002	0.072	0.034	0.015	0.01	0.008	0.009	0.01	-
TV	Castello di Godego	0.002	0.049	0.015	0.004	0.004	0.003	0.003	0.004	0.001
TV	Cavaso del Tomba	0.002	0.044	0.023	0.015	0.009	0.004	0.001	0.002	0.001
TV	Cessalto	0.001	0.058	0.034	0.015	0.009	0.004	0.002	0.002	-
TV	Chiarano	0.002	0.054	0.024	0.007	0.004	0.002	0.004	0.005	0.001
TV	Cimadolmo	0.003	0.083	0.061	0.035	0.019	0.007	0.002	0.001	0.001
TV	Cison di Valmarino	0.001	0.071	0.044	0.023	0.01	0.003	-	-	-
TV	Codognè	0.001	0.058	0.025	0.009	0.002	0.002	0.001	0.001	-
TV	Colle Umberto	0.002	0.029	0.012	0.004	0.002	0.001	0.002	0.001	0.001
TV	Conegliano	0.004	0.084	0.056	0.037	0.027	0.018	0.011	0.004	0.001
TV	Cordignano	0.002	0.053	0.031	0.016	0.007	0.004	0.004	0.007	-
TV	Cornuda	0.009	0.11	0.078	0.05	0.028	0.012	0.005	0.001	0.006
TV	Crocetta del Montello	0.004	0.07	0.045	0.026	0.02	0.012	0.007	0.004	0.002
TV	Farra di Soligo	0.002	0.063	0.039	0.027	0.016	0.007	0.003	0.003	0.001
TV	Follina	0.002	0.1	0.067	0.041	0.019	0.006	0.001	-	-
TV	Fontanelle	-	0.042	0.014	0.002	0.001	0.001	0.001	0.001	-
TV	Fonte	0.002	0.041	0.015	0.007	0.003	0.003	0.002	0.001	0.001
TV	Fregona	0.002	0.067	0.043	0.024	0.014	0.009	0.007	0.004	-
TV	Gaiarine	0.001	0.05	0.027	0.01	0.004	0.001	-	0.001	-
TV	Giavera del Montello	0.001	0.048	0.024	0.009	0.003	0.002	0.002	0.002	-
TV	Godega di Sant'Urbano	0.001	0.048	0.027	0.011	0.003	0.001	0.001	-	-
TV	Gorgo al Monticano	0.001	0.054	0.022	0.007	0.004	0.003	0.002	0.002	-
TV	Istrana	0.002	0.057	0.028	0.009	0.003	0.004	0.004	0.003	0.001
TV	Loria	-	0.04	0.012	0.002	-	-	-	-	-
TV	Mansuè	0.002	0.064	0.027	0.011	0.007	0.004	0.003	0.003	0.001
TV	Mareno di Piave	0.002	0.051	0.025	0.011	0.006	0.003	0.003	0.003	-
TV	Maser	0.002	0.056	0.022	0.012	0.006	0.004	0.004	0.004	0.001
TV	Maserada sul Piave	0.002	0.073	0.048	0.025	0.014	0.007	0.004	0.002	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	Meduna di Livenza	0.001	0.057	0.034	0.011	0.003	0.001	0.001	0.001	-
TV	Miane	0.001	0.06	0.044	0.02	0.006	0.001	-	0.001	-
TV	Mogliano Veneto	0.001	0.07	0.03	0.014	0.007	0.003	0.002	0.004	-
TV	Monastier di Treviso	0.001	0.077	0.03	0.011	0.005	0.002	0.001	0.001	-
TV	Monfumo	-	0.01	0.008	0.001	-	-	-	-	-
TV	Montebelluna	0.001	0.057	0.027	0.014	0.01	0.007	0.005	0.004	-
TV	Morgano	0.001	0.04	0.012	0.002	0.001	0.001	-	-	-
TV	Moriago della Battaglia	0.006	0.07	0.039	0.018	0.009	0.006	0.007	0.004	0.005
TV	Motta di Livenza	0.001	0.058	0.03	0.017	0.01	0.004	0.003	0.003	-
TV	Nervesa della Battaglia	0.001	0.039	0.016	0.008	0.006	0.004	0.002	0.001	-
TV	Oderzo	0.002	0.066	0.035	0.017	0.011	0.008	0.005	0.003	-
TV	Ormelle	0.002	0.064	0.033	0.012	0.007	0.004	0.003	0.004	0.001
TV	Orsago	0.005	0.05	0.031	0.017	0.01	0.005	0.003	0.001	0.004
TV	Paese	0.001	0.065	0.042	0.018	0.008	0.004	0.002	0.001	-
TV	Pederobba	0.001	0.064	0.036	0.019	0.007	0.002	0.001	-	-
TV	Pieve del Grappa	0.005	0.075	0.047	0.033	0.025	0.019	0.014	0.01	0.002
TV	Pieve di Soligo	0.01	0.082	0.053	0.035	0.028	0.021	0.016	0.009	0.006
TV	Ponte di Piave	0.002	0.062	0.032	0.014	0.008	0.004	0.004	0.004	-
TV	Ponzano Veneto	0.002	0.057	0.03	0.012	0.005	0.004	0.004	0.004	0.001
TV	Portobuffolè	0.012	0.092	0.048	0.015	0.004	0.002	0.01	0.004	0.017
TV	Possagno	0.014	0.1	0.073	0.05	0.037	0.027	0.011	0.001	0.011
TV	Povegliano	0.001	0.055	0.024	0.005	0.001	0.001	-	0.001	-
TV	Preganziol	0.001	0.088	0.042	0.016	0.006	0.001	-	-	-
TV	Quinto di Treviso	0.002	0.072	0.032	0.013	0.007	0.003	0.002	0.003	0.001
TV	Refrontolo	-	0.032	0.013	0.003	0.001	-	-	-	-
TV	Resana	0.001	0.054	0.019	0.005	0.002	0.001	0.002	0.001	-
TV	Revine Lago	0.003	0.092	0.058	0.03	0.013	0.003	0.002	0.003	0.001
TV	Riese Pio X	-	0.051	0.016	0.005	0.001	-	-	-	-
TV	Roncade	0.001	0.065	0.029	0.014	0.008	0.004	0.003	0.001	-
TV	Salgareda	-	0.06	0.023	0.005	-	0.001	0.001	0.001	-
TV	San Biagio di Callalta	-	0.059	0.027	0.008	0.003	0.001	-	-	-
TV	San Fior	0.002	0.046	0.026	0.014	0.01	0.005	0.002	0.002	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
TV	San Pietro di Feletto	-	0.038	0.018	0.004	-	-	-	-	-
TV	San Polo di Piave	0.003	0.059	0.027	0.01	0.003	0.003	0.005	0.006	0.001
TV	San Vendemiano	0.003	0.073	0.04	0.019	0.011	0.006	0.004	0.002	0.002
TV	San Zenone degli Ezzelini	0.001	0.045	0.014	0.003	0.001	0.001	0.002	0.001	-
TV	Santa Lucia di Piave	0.002	0.074	0.037	0.016	0.005	0.002	0.003	0.004	0.001
TV	Sarmede	0.001	0.038	0.024	0.009	0.004	0.003	0.001	0.001	0.001
TV	Segusino	0.002	0.076	0.046	0.029	0.014	0.005	0.002	0.001	0.001
TV	Sernaglia della Battaglia	0.003	0.093	0.059	0.032	0.014	0.005	0.003	0.001	0.001
TV	Silea	0.002	0.067	0.037	0.017	0.009	0.006	0.002	-	0.001
TV	Spresiano	0.004	0.1	0.06	0.036	0.018	0.008	0.006	0.005	0.002
TV	Susegana	0.001	0.083	0.048	0.026	0.014	0.006	0.002	0.001	-
TV	Tarzo	0.001	0.043	0.024	0.009	0.002	0.001	0.001	0.001	-
TV	Trevignano	0.001	0.04	0.019	0.008	0.003	0.001	0.001	-	-
TV	Treviso	0.004	0.094	0.057	0.033	0.026	0.019	0.018	0.018	0.001
TV	Valdobbiadene	0.001	0.066	0.047	0.027	0.014	0.009	0.005	0.002	-
TV	Vazzola	0.001	0.053	0.023	0.009	0.003	0.001	0.001	-	-
TV	Vedelago	-	0.058	0.019	0.006	0.002	0.001	0.001	0.002	-
TV	Vidor	0.006	0.065	0.035	0.015	0.007	0.005	0.006	0.004	0.005
TV	Villorba	0.001	0.067	0.032	0.01	0.003	0.002	0.002	0.002	-
TV	Vittorio Veneto	0.002	0.096	0.073	0.051	0.035	0.022	0.013	0.009	-
TV	Volpago del Montello	0.001	0.053	0.028	0.014	0.008	0.004	0.002	0.001	-
TV	Zenson di Piave	0.007	0.085	0.038	0.015	0.006	0.003	0.003	0.004	0.01
TV	Zero Branco	0.001	0.064	0.023	0.007	0.004	0.004	0.003	0.002	-
VE	Annone Veneto	0.001	0.049	0.022	0.009	0.005	0.003	0.002	0.001	-
VE	Campagna Lupia	0.001	0.032	0.01	0.005	0.002	0.002	0.002	0.003	-
VE	Campolongo Maggiore	-	0.035	0.012	0.001	-	-	-	-	-
VE	Camponogara	0.002	0.075	0.025	0.008	0.003	0.002	0.003	0.005	0.001
VE	Caorle	0.001	0.093	0.063	0.04	0.027	0.016	0.01	0.008	-
VE	Cavallino-Treporti	-	0.027	0.007	0.002	0.001	0.001	-	-	-
VE	Cavarzere	0.001	0.084	0.05	0.028	0.016	0.009	0.005	0.003	-
VE	Ceggia	0.006	0.079	0.049	0.029	0.018	0.01	0.008	0.007	0.003
VE	Chioggia	-	0.027	0.009	0.004	0.003	0.002	0.002	0.002	-

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Cinto Caomaggiore	0.002	0.044	0.024	0.007	0.003	0.004	0.004	0.004	0.001
VE	Cona	-	0.073	0.036	0.016	0.005	0.001	0.001	0.001	-
VE	Concordia Sagittaria	0.002	0.072	0.042	0.025	0.018	0.012	0.007	0.005	-
VE	Dolo	0.001	0.09	0.047	0.019	0.006	0.002	0.001	0.001	-
VE	Eraclea	-	0.069	0.038	0.015	0.006	0.002	0.001	-	-
VE	Fiesso d'Artico	0.006	0.077	0.044	0.027	0.015	0.003	0.002	0.006	0.001
VE	Fossalta di Piave	0.009	0.052	0.033	0.014	0.01	0.008	0.006	0.007	0.011
VE	Fossalta di Portogruaro	0.002	0.081	0.041	0.015	0.007	0.005	0.007	0.008	0.001
VE	Fossò	0.003	0.083	0.039	0.016	0.008	0.004	0.001	0.001	0.001
VE	Gruaro	0.001	0.049	0.02	0.006	0.002	0.001	-	0.001	-
VE	Jesolo	0.002	0.13	0.092	0.059	0.039	0.024	0.012	0.005	-
VE	Marcon	0.011	0.15	0.099	0.062	0.041	0.027	0.022	0.014	0.005
VE	Martellago	0.002	0.069	0.032	0.013	0.005	0.004	0.004	0.001	-
VE	Meolo	0.001	0.077	0.037	0.013	0.003	0.001	0.001	0.001	-
VE	Mira	-	0.027	0.009	0.004	0.002	0.001	-	-	-
VE	Mirano	-	0.064	0.023	0.008	0.003	0.002	0.001	-	-
VE	Musile di Piave	0.001	0.075	0.038	0.018	0.011	0.006	0.003	0.002	-
VE	Noale	0.002	0.072	0.031	0.012	0.007	0.003	0.002	0.005	0.001
VE	Noventa di Piave	0.002	0.065	0.04	0.014	0.006	0.003	0.003	0.003	0.001
VE	Pianiga	-	0.08	0.029	0.008	0.001	0.001	-	-	-
VE	Portogruaro	0.001	0.078	0.048	0.028	0.018	0.011	0.008	0.006	-
VE	Pramaggiore	0.002	0.041	0.02	0.007	0.003	0.002	0.004	0.005	0.001
VE	Quarto d'Altino	0.004	0.096	0.06	0.04	0.027	0.015	0.009	0.004	0.001
VE	Salzano	0.001	0.056	0.019	0.004	0.001	-	-	0.001	-
VE	San Donà di Piave	0.002	0.087	0.06	0.037	0.027	0.02	0.014	0.009	-
VE	San Michele al Tagliamento	0.001	0.095	0.054	0.029	0.017	0.008	0.003	0.001	-
VE	San Stino di Livenza	0.001	0.066	0.045	0.026	0.017	0.011	0.007	0.004	-
VE	Santa Maria di Sala	-	0.064	0.022	0.002	0.001	0.001	0.001	-	-
VE	Scorzè	0.001	0.07	0.025	0.006	0.004	0.002	0.001	-	-
VE	Spinea	0.007	0.083	0.041	0.016	0.01	0.008	0.007	0.01	0.005
VE	Stra	0.002	0.043	0.023	0.009	0.003	0.002	0.001	-	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VE	Teglio Veneto	0.002	0.049	0.027	0.01	0.004	0.002	0.001	0.002	0.002
VE	Torre di Mosto	-	0.06	0.033	0.012	0.006	0.002	-	-	-
VE	Venezia (*)									
VE	Vigonovo	0.003	0.034	0.02	0.006	0.001	0.002	0.004	0.002	0.002
VI	Agugliaro	0.001	0.057	0.017	0.003	-	-	-	0.001	-
VI	Albettone	-	0.042	0.012	0.001	-	-	-	-	-
VI	Alonte	0.001	0.036	0.016	0.002	-	-	0.001	0.001	0.001
VI	Altavilla Vicentina	0.007	0.1	0.07	0.046	0.032	0.018	0.004	-	0.004
VI	Altissimo	0.002	0.032	0.009	0.003	0.002	0.002	0.003	0.003	0.001
VI	Arcugnano	-	0.035	0.018	0.006	0.002	-	-	-	-
VI	Arsiero	0.002	0.087	0.057	0.036	0.023	0.011	0.007	0.007	-
VI	Arzignano	0.004	0.073	0.043	0.031	0.024	0.016	0.009	0.005	0.001
VI	Asiago	0.001	0.086	0.053	0.031	0.021	0.017	0.013	0.01	-
VI	Asigliano Veneto	0.001	0.038	0.009	0.001	-	-	-	-	0.002
VI	Barbarano Mossano	-	0.044	0.021	0.006	0.001	-	-	-	-
VI	Bassano del Grappa	0.007	0.12	0.079	0.056	0.039	0.032	0.028	0.022	0.002
VI	Bolzano Vicentino	0.001	0.073	0.029	0.006	0.001	0.001	0.001	0.001	-
VI	Breganze	0.001	0.052	0.019	0.007	0.004	0.003	0.001	-	-
VI	Brendola	0.001	0.067	0.037	0.022	0.011	0.003	0.001	-	-
VI	Bressanvido	0.001	0.057	0.022	0.006	0.002	0.001	0.001	0.001	-
VI	Brogliano	0.004	0.05	0.034	0.015	0.01	0.008	0.002	0.002	0.002
VI	Caldogno	0.001	0.067	0.031	0.008	0.002	0.001	-	0.001	-
VI	Caltrano	0.005	0.086	0.057	0.031	0.017	0.009	0.008	0.008	0.002
VI	Calvene	0.003	0.058	0.03	0.01	0.007	0.004	-	0.003	0.001
VI	Camisano Vicentino	0.003	0.07	0.035	0.017	0.011	0.007	0.006	0.007	0.001
VI	Campiglia dei Berici	0.001	0.048	0.018	0.005	0.002	-	0.002	0.001	0.001
VI	Carrè	0.004	0.065	0.042	0.019	0.009	0.002	-	-	0.005
VI	Cartigliano	0.009	0.1	0.053	0.02	0.009	0.009	0.004	0.001	0.012
VI	Cassola	0.001	0.034	0.013	0.004	0.001	-	-	0.002	-
VI	Castegnero	0.002	0.05	0.018	0.006	0.002	0.002	0.002	0.002	0.002
VI	Castelgomberto	0.001	0.062	0.033	0.013	0.005	0.003	-	-	-
VI	Chiampo	0.003	0.056	0.031	0.018	0.009	0.006	0.007	0.005	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Chiuppano	0.05	0.13	0.1	0.081	0.055	0.034	0.005	0.015	0.079
VI	Cogollo del Cengio	0.002	0.089	0.059	0.031	0.014	0.005	0.003	0.001	-
VI	Colceresa	0.001	0.029	0.007	0.001	0.001	0.001	0.001	0.001	-
VI	Cornedo Vicentino	0.002	0.058	0.035	0.017	0.009	0.005	0.002	0.002	0.001
VI	Costabissara	0.003	0.076	0.035	0.013	0.003	0.002	0.003	0.002	0.002
VI	Creazzo	0.004	0.074	0.034	0.019	0.008	0.003	0.001	0.002	0.004
VI	Crespadoro	0.001	0.052	0.026	0.011	0.007	0.003	0.001	0.001	-
VI	Dueville	0.002	0.066	0.035	0.014	0.006	0.004	0.002	0.002	0.001
VI	Enego	0.001	0.044	0.025	0.014	0.007	0.003	0.002	0.001	-
VI	Fara Vicentino	-	0.018	0.005	-	-	-	-	-	-
VI	Foza	0.002	0.064	0.036	0.014	0.008	0.004	0.003	0.004	0.001
VI	Gallio	0.002	0.094	0.056	0.033	0.022	0.011	0.005	0.001	-
VI	Gambellara	0.002	0.071	0.05	0.025	0.01	0.001	-	0.002	-
VI	Gambugliano	0.001	0.024	0.007	0.001	-	0.001	0.001	-	0.001
VI	Grisignano di Zocco	0.004	0.056	0.029	0.013	0.005	0.004	0.005	0.004	0.002
VI	Grumolo delle Abbadesse	0.001	0.052	0.02	0.004	0.002	0.002	0.002	0.001	0.001
VI	Isola Vicentina	0.001	0.06	0.031	0.013	0.005	0.002	0.001	0.002	-
VI	Laghi	0.002	0.067	0.037	0.025	0.012	0.003	0.001	0.002	0.001
VI	Lastebasse	0.003	0.065	0.04	0.022	0.017	0.011	0.006	0.001	0.001
VI	Longare	-	0.049	0.02	0.003	-	-	-	0.001	-
VI	Lonigo	0.001	0.064	0.034	0.018	0.012	0.006	0.003	0.003	-
VI	Lugo di Vicenza	0.006	0.074	0.047	0.031	0.019	0.011	0.006	0.003	0.004
VI	Lusiana Conco	-	0.044	0.017	0.006	0.002	0.001	0.001	0.001	-
VI	Malo	0.002	0.057	0.032	0.016	0.009	0.006	0.002	0.002	-
VI	Marano Vicentino	0.005	0.049	0.028	0.015	0.008	0.004	0.005	0.006	0.004
VI	Marostica	0.001	0.048	0.025	0.01	0.005	0.003	0.001	0.001	-
VI	Monte di Malo	0.001	0.033	0.011	0.002	0.001	0.001	0.001	-	-
VI	Montebello Vicentino	0.003	0.06	0.037	0.017	0.006	0.003	0.004	0.007	0.001
VI	Montecchio Maggiore	0.004	0.074	0.049	0.029	0.02	0.014	0.011	0.006	0.001
VI	Montecchio Precalcino	-	0.041	0.016	0.003	0.001	-	-	-	-
VI	Montegalda	-	0.035	0.013	0.002	0.001	-	-	-	-
VI	Montegaldella	0.001	0.047	0.016	0.005	0.001	0.001	-	0.001	-

Continued on next page

Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Monteviale	0.002	0.042	0.019	0.004	0.002	0.001	0.001	0.003	0.002
VI	Monticello Conte Otto	0.006	0.097	0.05	0.016	0.006	0.004	0.004	0.004	0.006
VI	Montorso Vicentino	0.005	0.038	0.014	0.006	0.004	0.004	0.004	0.003	0.007
VI	Mussolente	0.001	0.033	0.012	0.005	0.002	0.003	0.002	-	0.001
VI	Nanto	0.001	0.048	0.017	0.005	0.001	0.001	0.001	0.002	-
VI	Nogarole Vicentino	0.001	0.023	0.007	0.002	0.001	-	-	0.002	-
VI	Nove	0.006	0.084	0.043	0.024	0.012	0.009	0.003	0.003	0.002
VI	Noventa Vicentina	0.003	0.075	0.033	0.018	0.012	0.008	0.005	0.006	0.001
VI	Orgiano	0.001	0.043	0.021	0.006	0.002	0.001	0.002	0.001	0.001
VI	Pedemonte	0.005	0.11	0.088	0.045	0.022	0.013	0.004	0.001	0.002
VI	Pianezze	0.002	0.045	0.021	0.009	0.002	0.001	0.002	0.001	0.001
VI	Piovene Rocchette	0.016	0.14	0.11	0.074	0.048	0.027	0.01	-	0.014
VI	Pojana Maggiore	0.001	0.052	0.025	0.011	0.004	0.001	0.002	0.001	-
VI	Posina	0.001	0.057	0.027	0.013	0.006	0.004	0.004	0.004	-
VI	Pove del Grappa	0.012	0.11	0.094	0.075	0.056	0.027	0.004	0.013	0.003
VI	Pozzoleone	0.001	0.056	0.02	0.003	-	-	-	-	-
VI	Quinto Vicentino	-	0.049	0.016	0.005	0.001	0.001	0.001	-	-
VI	Recoaro Terme	0.001	0.065	0.034	0.019	0.01	0.006	0.003	0.003	-
VI	Roana	0.001	0.089	0.052	0.027	0.013	0.007	0.004	0.003	-
VI	Romano d'Ezzelino	0.004	0.067	0.04	0.022	0.012	0.009	0.01	0.011	0.002
VI	Rosà	0.001	0.071	0.034	0.013	0.003	-	-	-	-
VI	Rossano Veneto	0.002	0.043	0.012	0.003	0.001	0.001	0.002	0.001	0.002
VI	Rotzo	-	0.048	0.028	0.012	0.004	0.001	-	-	-
VI	Salcedo	0.001	0.024	0.004	0.001	-	-	0.001	-	0.001
VI	San Pietro Mussolino	0.014	0.1	0.064	0.033	0.01	0.003	0.002	0.005	0.038
VI	San Vito di Leguzzano	0.004	0.066	0.037	0.017	0.004	0.002	0.001	0.001	0.004
VI	Sandrigo	0.002	0.079	0.038	0.02	0.01	0.006	0.004	0.003	0.001
VI	Santorso	0.006	0.097	0.072	0.04	0.018	0.008	0.003	-	0.004
VI	Sarcedo	0.002	0.042	0.015	0.005	0.002	0.003	0.004	0.001	0.002
VI	Sarego	-	0.045	0.019	0.005	0.002	0.001	-	-	-
VI	Schiavon	0.001	0.06	0.019	0.004	0.001	-	0.001	-	-
VI	Schio	0.005	0.12	0.089	0.066	0.051	0.037	0.027	0.019	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VI	Solagna	0.001	0.063	0.039	0.019	0.008	0.001	0.001	0.002	-
VI	Sossano	0.002	0.049	0.023	0.012	0.007	0.004	0.005	0.004	0.001
VI	Sovizzo	0.001	0.062	0.033	0.012	0.004	0.001	-	0.001	0.001
VI	Tezze sul Brenta	0.001	0.07	0.029	0.01	0.003	-	0.001	0.003	-
VI	Thiene	0.004	0.085	0.047	0.024	0.018	0.01	0.005	0.002	0.002
VI	Tonezza del Cimone	0.005	0.06	0.029	0.014	0.01	0.007	0.005	0.004	0.003
VI	Torrebelvicino	0.002	0.088	0.051	0.03	0.016	0.006	0.001	-	0.001
VI	Torri di Quartesolo	0.002	0.08	0.036	0.016	0.008	0.004	0.003	0.002	0.001
VI	Trissino	0.003	0.058	0.031	0.014	0.012	0.008	0.004	0.001	0.001
VI	Val Liona	0.001	0.026	0.009	0.003	0.001	0.001	0.002	0.001	-
VI	Valbrenta	-	0.077	0.056	0.028	0.011	0.004	0.001	0.001	-
VI	Valdagno	0.002	0.072	0.042	0.027	0.016	0.01	0.004	0.004	-
VI	Valdastico	0.002	0.09	0.057	0.033	0.016	0.005	0.001	0.003	-
VI	Valli del Pasubio	0.001	0.048	0.018	0.007	0.004	0.003	0.003	0.004	-
VI	Velo d'Astico	0.006	0.093	0.063	0.04	0.022	0.015	0.009	0.003	0.003
VI	Vicenza	0.002	0.11	0.066	0.035	0.022	0.014	0.009	0.007	-
VI	Villaga	-	0.033	0.015	0.004	0.001	-	-	-	-
VI	Villaverla	0.007	0.058	0.031	0.015	0.012	0.008	0.01	0.011	0.004
VI	Zanè	0.002	0.058	0.026	0.01	0.004	-	0.003	0.001	0.001
VI	Zermeghedo	0.019	0.053	0.025	0.015	0.01	0.008	0.005	0.023	0.09
VI	Zovencedo	0.002	0.029	0.014	0.004	-	0.001	0.002	0.002	0.003
VI	Zugliano	0.001	0.038	0.018	0.008	0.004	0.001	-	0.002	-
VR	Affi	0.002	0.056	0.031	0.018	0.008	0.002	-	-	0.001
VR	Albaredo d'Adige	0.001	0.078	0.036	0.013	0.005	0.002	-	-	-
VR	Angiari	0.002	0.062	0.029	0.015	0.006	0.001	0.002	0.002	0.001
VR	Arcole	0.004	0.087	0.042	0.02	0.011	0.003	0.004	0.007	0.002
VR	Badia Calavena	-	0.033	0.016	0.004	0.001	-	-	-	-
VR	Bardolino	-	0.005	0.001	-	-	-	-	0.001	-
VR	Belfiore	0.002	0.062	0.032	0.011	0.004	0.002	0.004	0.006	0.001
VR	Bevilacqua	0.002	0.073	0.033	0.012	0.004	0.002	0.002	0.004	0.001
VR	Bonavigo	-	0.04	0.009	0.001	-	-	-	-	-
VR	Boschi Sant'Anna	0.003	0.068	0.035	0.009	0.002	0.002	0.002	-	0.003

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Bosco Chiesanuova	0.001	0.057	0.03	0.016	0.012	0.007	0.005	0.004	-
VR	Bovolone	0.002	0.11	0.065	0.033	0.015	0.007	0.005	0.007	-
VR	Brentino Belluno	0.002	0.08	0.056	0.031	0.013	0.005	0.004	0.001	-
VR	Brenzone sul Garda	-	0.03	0.004	0.002	0.002	0.001	-	-	-
VR	Bussolengo	0.001	0.059	0.031	0.012	0.005	0.002	0.002	0.002	-
VR	Buttapietra	0.002	0.094	0.045	0.018	0.007	0.003	0.003	0.001	0.001
VR	Caldiero	0.003	0.074	0.032	0.021	0.01	0.003	0.001	-	0.002
VR	Caprino Veronese	0.002	0.064	0.041	0.025	0.016	0.009	0.004	0.003	-
VR	Casaleone	0.002	0.09	0.052	0.023	0.015	0.007	0.003	0.004	-
VR	Castagnaro	0.004	0.075	0.051	0.032	0.022	0.016	0.01	0.005	0.001
VR	Castel d’Azzano	0.001	0.084	0.03	0.005	0.001	0.001	-	-	0.001
VR	Castelnuovo del Garda	-	0.013	0.003	0.001	-	-	-	-	-
VR	Cavaion Veronese	0.001	0.036	0.022	0.009	0.003	0.002	0.001	0.001	0.001
VR	Cazzano di Tramigna	-	0.021	0.011	0.004	0.001	0.001	-	-	-
VR	Cerea	0.002	0.1	0.063	0.037	0.022	0.012	0.009	0.009	-
VR	Cerro Veronese	0.003	0.065	0.029	0.011	0.006	0.002	0.003	0.001	0.002
VR	Cologna Veneta	0.001	0.061	0.027	0.01	0.004	0.003	0.002	0.003	-
VR	Colognola ai Colli	0.001	0.07	0.036	0.016	0.006	0.001	-	-	-
VR	Concamarise	0.001	0.067	0.023	0.004	-	-	-	0.001	-
VR	Costermano sul Garda	0.001	0.044	0.023	0.008	0.004	0.003	0.001	-	0.001
VR	Dolcè	0.005	0.13	0.096	0.066	0.045	0.027	0.02	0.015	0.001
VR	Erbè	0.002	0.094	0.049	0.023	0.007	0.001	0.003	0.003	0.001
VR	Erbezzo	0.001	0.039	0.019	0.008	0.004	0.003	0.002	0.001	-
VR	Ferrara di Monte Baldo	0.001	0.053	0.035	0.012	0.005	0.002	0.002	0.002	-
VR	Fumane	-	0.041	0.019	0.008	0.003	0.001	-	-	-
VR	Garda	0.002	0.011	0.002	0.001	0.002	0.001	0.002	0.001	0.004
VR	Gazzo Veronese	0.001	0.066	0.032	0.012	0.004	0.002	0.002	0.002	-
VR	Grezzana	0.001	0.06	0.026	0.007	0.003	0.002	0.002	0.002	-
VR	Illasi	0.002	0.04	0.015	0.005	0.002	0.002	0.003	0.004	0.001
VR	Isola della Scala	0.001	0.09	0.048	0.023	0.013	0.007	0.002	0.001	-
VR	Isola Rizza	0.001	0.071	0.033	0.013	0.006	0.001	0.001	0.001	-
VR	Lavagno	0.001	0.077	0.036	0.009	0.003	0.002	0.001	-	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	Lazise	-	0.01	0.001	-	-	-	-	-	-
VR	Legnago	0.002	0.091	0.055	0.033	0.021	0.014	0.009	0.007	-
VR	Malcesine	0.001	0.055	0.018	0.008	0.006	0.005	0.004	0.004	-
VR	Marano di Valpolicella	-	0.031	0.013	0.004	0.001	0.001	-	-	-
VR	Mezzane di Sotto	-	0.03	0.01	0.004	0.001	0.001	0.001	0.001	-
VR	Minerbe	0.001	0.081	0.042	0.016	0.005	0.002	-	-	-
VR	Montecchia di Crosara	0.003	0.025	0.013	0.007	0.004	0.004	0.008	0.01	0.001
VR	Monteforte d'Alpone	0.002	0.057	0.034	0.02	0.01	0.004	0.002	0.001	0.001
VR	Mozzecane	0.002	0.064	0.035	0.015	0.006	0.004	0.002	0.002	0.001
VR	Negrar di Valpolicella	-	0.054	0.024	0.009	0.003	0.001	-	-	-
VR	Nogara	0.001	0.088	0.042	0.015	0.005	0.004	0.003	0.004	-
VR	Nogarole Rocca	0.003	0.093	0.053	0.02	0.009	0.004	0.006	0.007	0.001
VR	Oppeano	0.001	0.11	0.069	0.03	0.011	0.003	-	-	-
VR	Palù	0.001	0.058	0.021	0.01	0.002	0.001	-	0.001	-
VR	Pastrengo	0.001	0.037	0.016	0.004	-	0.002	0.001	-	0.001
VR	Pescantina	0.001	0.038	0.016	0.006	0.003	0.002	0.001	0.001	-
VR	Peschiera del Garda	0.002	0.02	0.004	0.002	0.002	0.002	0.003	0.003	0.001
VR	Povegliano Veronese	0.004	0.079	0.038	0.017	0.009	0.007	0.006	0.003	0.003
VR	Pressana	-	0.051	0.017	0.003	0.001	0.001	-	-	-
VR	Rivoli Veronese	0.001	0.043	0.018	0.006	0.002	0.002	0.001	0.001	-
VR	Roncà	-	0.029	0.012	0.004	0.001	-	-	-	-
VR	Ronco all'Adige	0.001	0.098	0.044	0.014	0.003	0.002	0.003	0.003	-
VR	Roverchiara	0.001	0.059	0.019	0.004	0.001	0.003	0.003	0.002	0.001
VR	Roverè Veronese	-	0.033	0.011	0.004	0.003	0.001	0.001	0.001	-
VR	Roveredo di Guà	0.001	0.043	0.018	0.006	0.005	0.001	0.001	-	0.001
VR	Salizzole	-	0.076	0.028	0.01	0.003	0.001	-	-	-
VR	San Bonifacio	0.004	0.11	0.069	0.041	0.025	0.014	0.008	0.005	0.001
VR	San Giovanni Ilarione	0.001	0.034	0.013	0.004	0.002	0.002	0.002	0.004	0.001
VR	San Giovanni Lupatoto	0.003	0.11	0.067	0.038	0.019	0.006	0.003	0.004	0.001
VR	San Martino Buon Albergo	0.002	0.084	0.048	0.026	0.016	0.009	0.004	0.002	-
VR	San Mauro di Saline	0.001	0.027	0.008	0.001	0.001	0.001	0.001	0.002	0.001

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Table C3.4 – continued from previous page

Prov.	Municipality	MI_{prop}	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8
VR	San Pietro di Morubio	0.001	0.082	0.038	0.011	0.002	0.002	0.001	0.001	-
VR	San Pietro in Cariano	-	0.051	0.023	0.006	0.001	-	-	0.001	-
VR	San Zeno di Montagna	0.002	0.076	0.056	0.03	0.018	0.007	0.003	0.001	0.001
VR	Sanguinetto	0.002	0.12	0.061	0.024	0.009	0.002	-	-	0.001
VR	Sant'Ambrogio di Valpolicella	0.004	0.083	0.049	0.027	0.015	0.01	0.007	0.004	0.002
VR	Sant'Anna d'Alfaedo	0.001	0.044	0.015	0.006	0.002	0.002	0.002	0.002	-
VR	Selva di Progno	0.001	0.047	0.023	0.009	0.003	0.002	0.002	0.002	-
VR	Soave	0.001	0.058	0.034	0.017	0.01	0.004	0.001	-	-
VR	Sommacampagna	0.001	0.068	0.035	0.02	0.012	0.006	0.002	0.001	-
VR	Sona	0.001	0.051	0.022	0.01	0.005	0.002	0.001	0.002	-
VR	Sorgà	0.001	0.079	0.03	0.01	0.005	0.003	0.002	0.001	-
VR	Terrazzo	-	0.043	0.015	0.004	0.002	-	-	0.001	-
VR	Torri del Benaco	-	0.028	0.005	-	-	-	-	-	-
VR	Tregnago	0.001	0.047	0.023	0.01	0.004	0.001	0.001	0.001	-
VR	Trevenzuolo	0.002	0.092	0.044	0.018	0.006	0.003	0.004	0.005	0.001
VR	Valeggio sul Mincio	-	0.035	0.013	0.004	0.002	0.001	-	-	-
VR	Velo Veronese	-	0.029	0.012	0.003	0.001	0.001	-	-	-
VR	Verona	0.001	0.094	0.062	0.042	0.032	0.025	0.02	0.016	-
VR	Veronella	0.002	0.073	0.039	0.015	0.005	0.004	0.005	0.005	0.001
VR	Vestenanova	0.001	0.042	0.015	0.004	0.001	0.001	0.001	0.001	-
VR	Vigasio	0.003	0.09	0.038	0.018	0.009	0.005	0.005	0.009	0.001
VR	Villa Bartolomea	0.003	0.072	0.048	0.034	0.025	0.017	0.01	0.007	0.001
VR	Villafranca di Verona	-	0.045	0.027	0.013	0.007	0.003	0.001	-	-
VR	Zevio	0.001	0.072	0.034	0.016	0.008	0.003	0.001	-	-
VR	Zimella	0.001	0.078	0.032	0.01	0.003	0.001	-	-	-

(*) The estimation is not possible due to the insular nature of the municipality

Appendix D :
Geostatistical binary probit model

D1 Implemented code

```
library(PrevMap)
library(geoR)

# number of observations
n = nrow(data)

# number of regression coefficients
n.mun = length(unique(data$MUNICIPALITY))

# priors specification
control.prior = control.prior(beta.mean = rep(0,n.mun),
                    beta.covar = diag(1,n.mun,n.mun),
                    uniform.phi = c(0,10),
                    uniform.sigma2 = c(0,100))

# tuning parameter used in the MCMC algorithm
control.mcmc = control.mcmc.Bayes(n.sim = 10,
                        burnin = 0, thin = 1,
                        h.theta1 = 0.05, h.theta2 = 0.05,
                        L.S.lim = c(1,50),
                        epsilon.S.lim = c(0.01,0.02),
                        start.beta = rep(0, n.mun),
                        start.sigma2 = 1, start.phi = 0.15,
```

```
                        start.S = rep(0,n),
                        start.nugget = NULL, binary = TRUE)

# two-levels geostatistical binary probit model
fit.Bayes = binary.probit.Bayes(
                        formula = frag~1+factor(COMUNE),
                        coords = ~x.pxl+y.pxl,
                        data = data,
                        ID.coords = ID.coords,
                        control.prior = control.prior,
                        control.mcmc = control.mcmc,
                        kappa = 5/2)
```

D2 Outputs

Table D3.1: Output of the Binary Geostatistical Probit Model (VI)

```
Bayesian binary geostatistical probit model
Call:
binary.probit.Bayes(formula = frag ~ 1 + factor(MUNICIPALITY),
        coords = ~x.pxl + y.pxl,
        data = data, ID.coords = ID.coords,
        control.prior = control.prior,
        control.mcmc = control.mcmc,
        kappa = 5/2)

                                                Mean      Median
(Intercept)                              -0.35465398 -0.37325355
factor(MUNICIPALITY)Colceresa            -0.06369059 -0.06092992
factor(MUNICIPALITY)Fara Vicentino       -0.21477834 -0.23279397
factor(MUNICIPALITY)Pianezze              0.22200545  0.21843342
factor(MUNICIPALITY)Schiavon             -0.35381798 -0.37098474
                                                Mode     StdErr
(Intercept)                              -0.38902041 0.08576611
factor(MUNICIPALITY)Colceresa            -0.03643933 0.04784600
factor(MUNICIPALITY)Fara Vicentino       -0.24153600 0.05365826
factor(MUNICIPALITY)Pianezze              0.20976400 0.09970869
factor(MUNICIPALITY)Schiavon             -0.42445038 0.10218890
                                           HPD 0.025   HPD 0.975
(Intercept)                              -0.44638831 -0.170591530
factor(MUNICIPALITY)Colceresa            -0.13216877  0.006709164
factor(MUNICIPALITY)Fara Vicentino       -0.28943728 -0.112720784
factor(MUNICIPALITY)Pianezze              0.03252426  0.367207040
factor(MUNICIPALITY)Schiavon             -0.47844300 -0.175506646

Covariance parameters Matern function (kappa=2.5)

             Mean    Median      Mode      StdErr
sigma^2 0.8008713 0.7836836 0.7830568 0.035379510
phi     0.1456476 0.1455469 0.1455645 0.001462013
        HPD 0.025 HPD 0.975
sigma^2 0.7730237 0.8666927
phi     0.1431338 0.1486638

Legend:
sigma^2 = variance of the Gaussian process
phi = scale of the spatial correlation
```

Table D3.2: Output of the Binary Geostatistical Probit Model (BL)

```
Bayesian binary geostatistical probit model
Call:
binary.probit.Bayes(formula = frag ~ 1 + factor(MUNICIPALITY),
        coords = ~x.pxl + y.pxl,
        data = data, ID.coords = ID.coords,
        control.prior = control.prior,
        control.mcmc = control.mcmc,
        kappa = 5/2)

                                                   Mean      Median
(Intercept)                                 -1.37705129 -1.48379534
factor(MUNICIPALITY)San Tomaso Agordino -0.11569994 -0.15172865
factor(MUNICIPALITY)Vallada Agordina    -0.07616215 -0.07767977
                                                   Mode      StdErr
(Intercept)                                 -1.56375763 0.31601851
factor(MUNICIPALITY)San Tomaso Agordino -0.17610151 0.09202310
factor(MUNICIPALITY)Vallada Agordina    -0.09184009 0.06161197
                                             HPD 0.025   HPD 0.975
(Intercept)                                 -1.6762332 -0.67708338
factor(MUNICIPALITY)San Tomaso Agordino -0.2222084  0.01568773
factor(MUNICIPALITY)Vallada Agordina    -0.1658725  0.02188220

Covariance parameters Matern function (kappa=2.5)

             Mean    Median      Mode      StdErr
sigma^2 0.8578924 0.8254964 0.7883291 0.099888487
phi     0.1460633 0.1452469 0.1443067 0.003333142
        HPD 0.025 HPD 0.975
sigma^2 0.7454591  1.000000
phi     0.1422731  0.152258

Legend:
sigma^2 = variance of the Gaussian process
phi = scale of the spatial correlation
```

D3 Autocorrelograms and trace-plots for the posterior samples of the model parameters and spatial random effects

Figure D3.1: Autocorrelograms and trace-plots for the posterior samples of the spatial random effects and intercept, first scenario

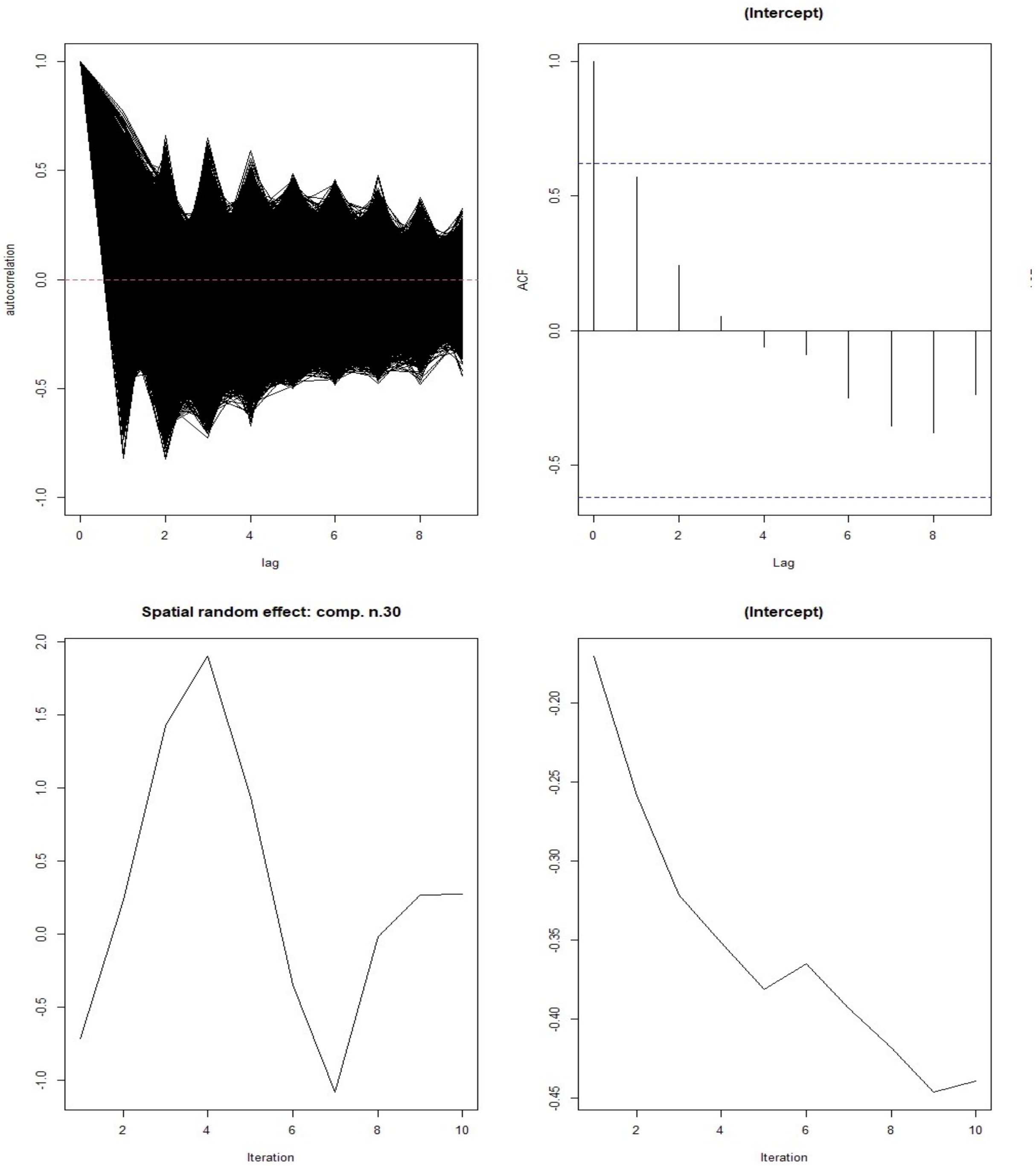


Figure D3.2: Autocorrelograms and trace-plots for the posterior samples of the parameters σ and ϕ, first scenario

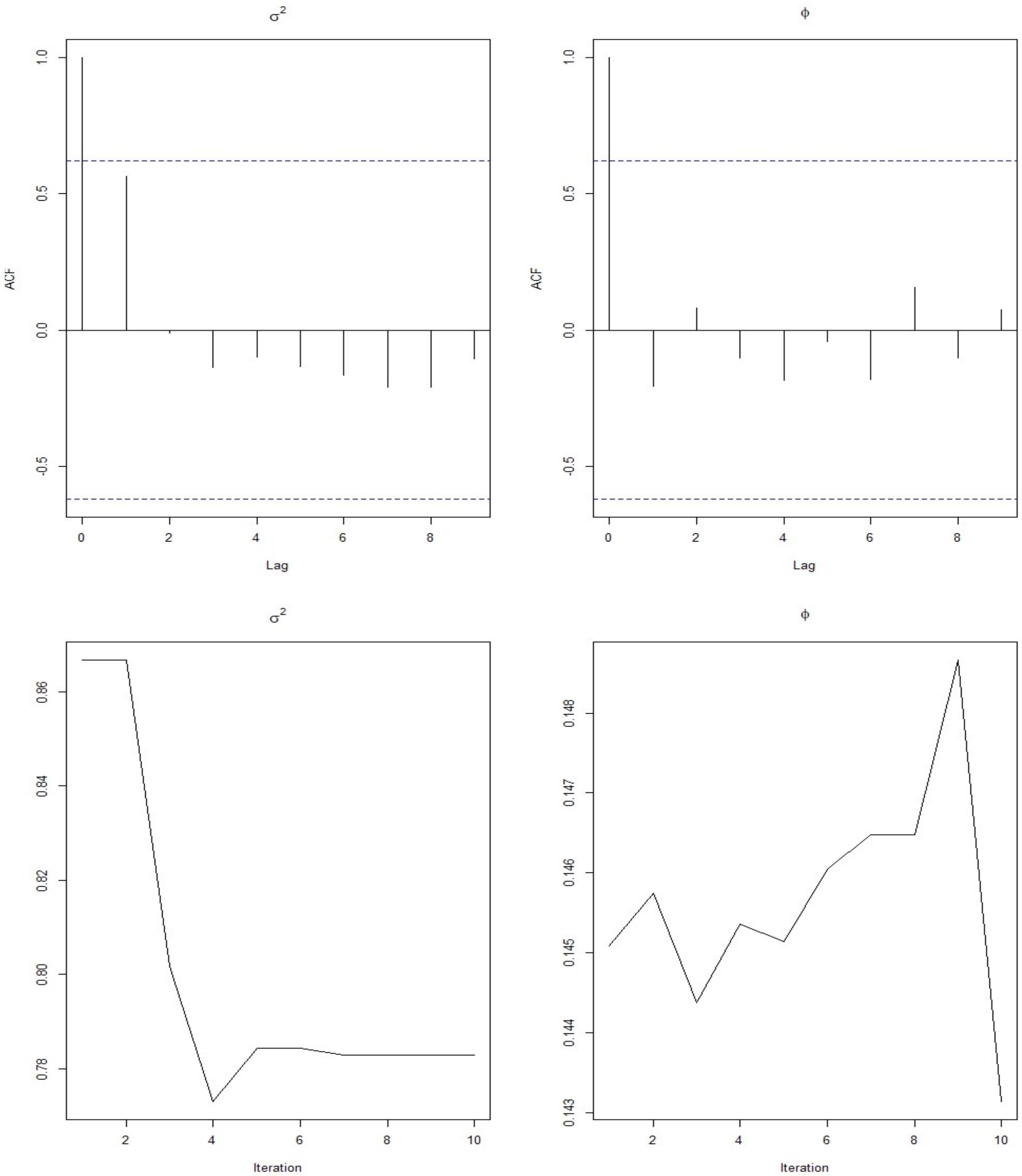


Figure D3.3: Autocorrelograms and trace-plots for the posterior samples of the spatial random effects and intercept, second scenario

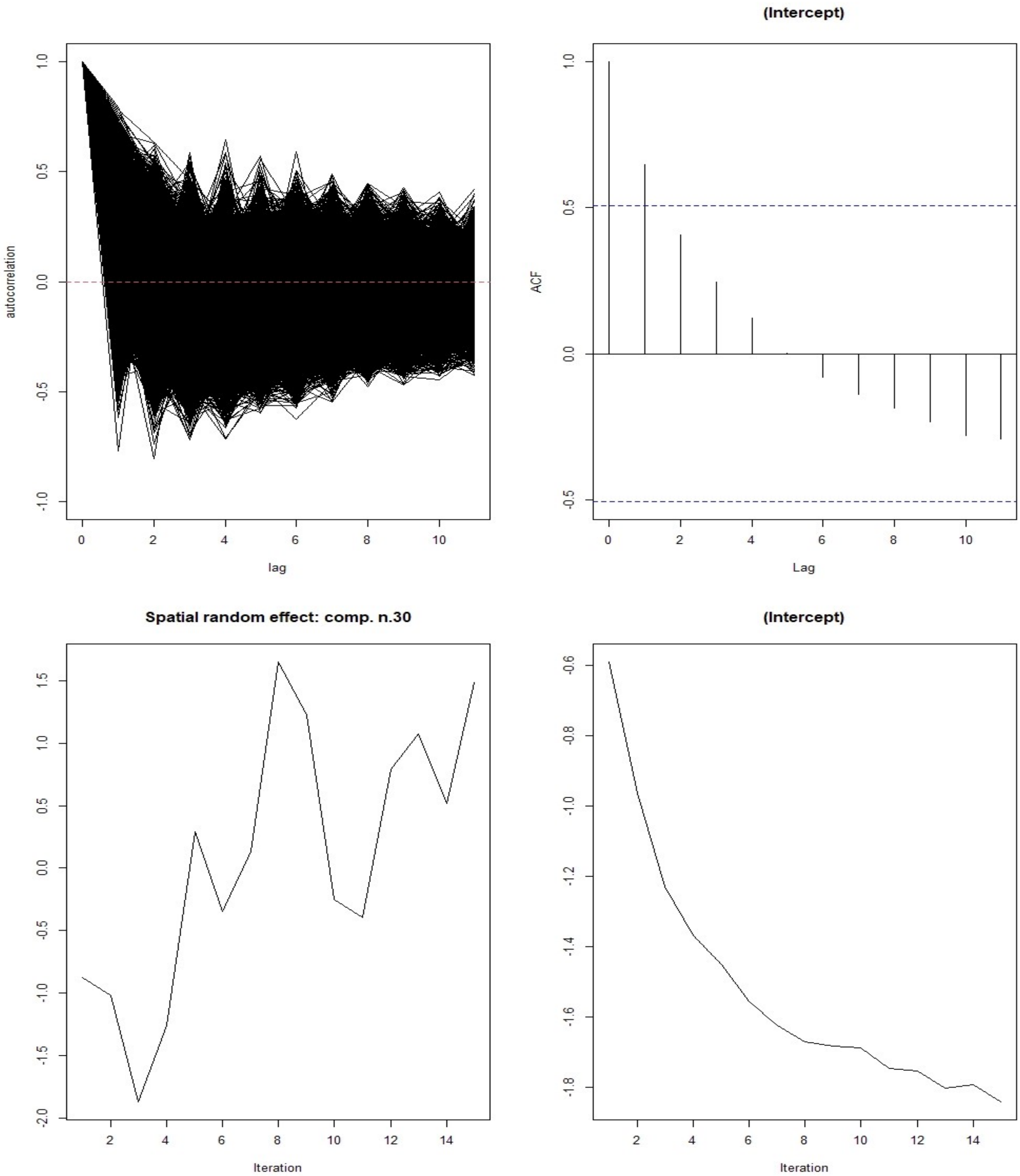
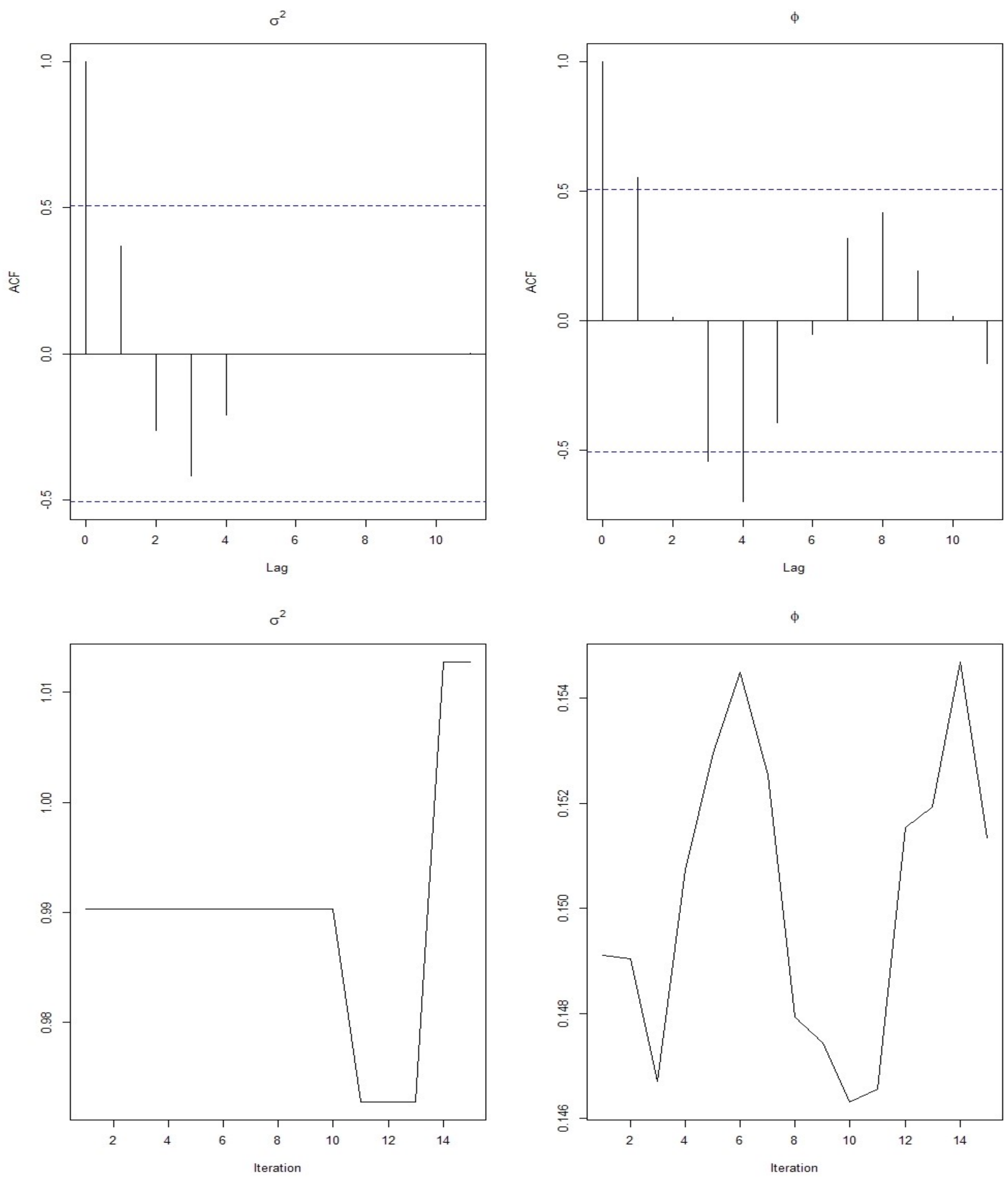


Figure D3.4: Autocorrelograms and trace-plots for the posterior samples of the parameters σ and ϕ, second scenario



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