Ängs- och betesmarkers betydelse för fastighetsvärden

- Närhet till ängs- och betesmarker har en statistiskt säker positiv betydelse för priser på bostadsfastigheter på landsbygden.
- Studien bekräftar att det finns kollektiva värden som kan härledas till jordbrukslandskapets kvalitet.
- Närhet till en ängs- och betesmark kan antas betyda 30 000-40 000 kronor för ett fastighetsvärde på landsbygden, sannolikt mer om fastigheten finns i ett område med många ängs- och betesmarker i närområdet.

Rapport 2010:5

Förord

Jordbruksverket är förvaltningsmyndighet för det svenska landsbygdsprogrammet som har som övergripande målsättning att bidra till en ekonomisk, ekologisk och socialt hållbar utveckling av landsbygden. Politiken på området inriktas bland annat mot att ge stöd för kollektiva nyttigheter som finns på landsbygden och som många gånger är beroende av ett aktivt lantbruk. De svenska ängs- och betesmarkerna är ett sådant exempel på kollektiva nyttigheter som kan komma många till del, inte endast ägaren av marken. Syftet med denna studie är att analysera frågan om huruvida värden av dessa kollektiva nyttigheter går att spåra i priser på fastigheter som har närhet till ängs- och betesmarker. Studien är en s.k. förstudie och har genomförts av Pia Nilsson som är forskare vid Internationella Handelshögskolan i Jönköping. Studien har genomförts på uppdrag av Jordbruksverket. Författaren till studien ansvarar själv för dess innehåll.

Kontaktperson på Jordbruksverket är Lars Pettersson, Samordningsenheten, Landsbygdsavdelningen.

Abstract

I denna studie tillämpas en hedonisk model för att analysera hur priser på bostads- och fritidsfastigheter kan förklaras med avseende på närhet, eller tillgänglighet, till ängs- och betesmarker med höga naturvärden. Studien utgår från antagandet om att fastighetspriser kan spegla hur attribut kopplade till byggnader och land kan förklara variationer i fastighetspriser. Studien analyserar också hur tillgänglighet till kollektiva nyttigheter, i form av ängs- och betesmarker, påverkar priset. I den empiriska analysen används data för 7565 fastighetsförsäljningar från perioden 1977-2007 i ett avgränsat landsbygdsområde i Vätterbygden och delar av Östergötland. Den empiriska analysen visar att en fastighet som var lokaliserad i närheten av (inom 500 meter) en ängs- och betesmark i den aktuella regionen var omkring 2.6 procent dyrare jämfört med fastigheter som var lokaliserade på längre avstånd från dessa marker. Detta motsvarade omkring 33 000 kronor för en genomsnittlig fastighet i studien.

Författare: Pia Nilsson

Abstract

This paper uses the hedonic housing model to assess economic values to high value meadows and grazings located in rural settings. The hypothesis is that residential purchase prices include premiums for properties located in the surrounding areas of such environments. The dataset consist of 7565 property transactions sold during the period 1977-2007. The main findings are that houses located in the immediate surrounding area of these lands were on average 2.6 per cent more expensive which implies that the size of the premium approximately equals €3200 for these properties.

Keywords: Hedonic housing, Geographic information systems, Meadows and Grazings

JEL classification codes: Q1, Q5

Pia Nilsson

Sammanfattning

I denna rapport presenteras en förstudie som är inriktad mot frågan om vilken påverkande effekt som närhet till ängs- och betesmarker har för fastighetspriser på landsbygden. Studien utnyttjar ett geografiskt urval av fastighetsförsäljningar som omfattar områden kring Vätterbygden (omkring Jönköping) och delar av Östergötland och kombinerar denna data med Jordbruksverkets databas för ängs- och betesmarker som kallas TUVA. Sammanlagt omfattar dataunderlaget ca 7500 fastighetsförsäljningar (bostads- och fritidsfastigheter) från åren 1997-2007.

I analysen förklaras variationer av fastighetspriser med olika egenskaper (attribut) som kännetecknar respektive fastighet. Storlek på fastigheten, antal rum, närhet till städer mm används för att kontrollera för hur olika egenskaper som, förutom närhet till ängs- och betesmarker, kan påverka priserna. När dessa kontrollvariabler används återstår sedan en priseffekt som kan kopplas till närhet till ängs- och betesmarker som motsvarar omkring 3 procent av fastighetspriserna. Detta innebär att i genomsnitt för det aktuella urvalet betyder närhet till ängs- och betesmarker (att det finns minst en ängs- och betesmark inom 500 meter från fastigheten) en positiv effekt som motsvarar omkring 30 000 kronor.

Om vi utgår från underlaget som studien bygger på (urvalet av sålda fastigheter) så hade ungefär 1000 fastigheter av de ca 7500 ett avstånd som var max 500 meter till en (eller flera) ängs- och betesmarker. Värdet av närheten till dessa kollektiva nyttigheter motsvarar uppskattningsvis mellan 30 000 000 och 35 000 000 kronor för de ca 1000 fastigheterna som hade en jämförelsevis god tillgänglighet till ängs- och betesmarkerna. Detta kan tolkas som en monetärvärdering av de egenskaper som överspiller från de kollektiva nyttigheterna till det närliggande omlandet. Detta värde kan för övrigt jämföras med motsvarande värden som andra studier som inriktats mot vilket värde som sjöutsikt mm kunnat påvisa.

Contents

1 Introduction

Land use in Sweden is highly characterized by agriculture and forestry where approximately 40 percent of the cultivated land consist of meadows and grazings. Much of the biodiversity of the cultivated landscape is found in meadows and grazings and they are often more species rich than most other types of land in Sweden. The purpose of this paper is to test the hedonic housing approach analyzing the relation between vicinity to high value meadows and grazings and neighboring property prices. High value in this case, refers to value indicators of both natural and cultural type where no difference has been made between the two. Meadows or grazings characterized as having high natural value implies a high level of biodiversity, a Natura 2000 classification or the holding of key biotopes. Whereas cultural value refers to different types of cultural heritage assets found in the agrarian environment. The paper does not make any distinction concerning different flora or fauna type an can in that sense be regarded as a pilot. As an example the paper does not analyze the impact of environments classified as Natura 2000 separately, nor the explicitly effects of cultural assets to rural areas. In a sense this paper can be regarded as a first step in the assessment of value indicators to rural green space and recreation areas from a Swedish regional perspective.

There is a large body of hedonic valuation studies including hedonic housing models combined with a GIS approach to test the positive effects of non market goods such as environmental amenities, greenspace, urban parks, urban forests and wooded recreation areas on property values. Most often they conclude that the impact of different environmental amenities on property prices equals somewhere around 4-7 per cent. (see for example Luttik, 2000, Tyrväinen & Miettinen 2000 or Shultz et. al. 2001). The purpose of this paper is however, to estimate economic values of non market goods that tend to be located in rural rather than in urban settings. Such an approach would be interesting considering that a sustainable use of natural and cultural resources are discussed from a landscape perspective. Moreover it would be interesting to compare the results with similar value assessments from an urban perspective.

In general, hedonic housing models relate the market value of a house to a very large set of characteristics or housing attributes where the total value is measured by the sales price (Harsman & Quigley, 1991). The models are usually constructed to control for different structural, accessibility and neighborhood characteristics with the purpose to isolate the impact of local amenities on housing prices (see for example Baranzini & Schaerer, 2007). The purpose of this paper is to estimate the effects of both accessibility to, as well as the size of high value meadows and grazings on neighboring property prices. The paper utilizes data from the Swedish land survey covering 7565 property transactions and 9 housing attributes combined with georeferenced data covering the spatial distribution of high value meadows and grazings in one Swedish region . The studied region is situated in the south central part of Sweden and belongs to one of the top ten regions considering meadows and grazing as a percentage share of the total land area.

In the years between 2002-2004, the Swedish Board of Agriculture and the County Administrative Boards assigned biologists to inspect over 3000 km^2 of land to find the total area of meadows and grazing lands with high natural and cultural significance in

Sweden. The purpose was to classify them by their quality and type in accordance to a large number of natural and cultural characteristics. Approximately 2650 km^2 of land were defined as high value environments where 350 km^2 was defined as being in need of restoration in order to preserve their values. The collected data is available in a database called Tuva and this paper is the first attempt to assess values to these environments by the use of hedonic housing and GIS.

There are several reasons to assume a causal relationship between accessibility to high value meadows and grazings and property values. First, it has been shown that structure and variety of landscapes has a significant impact on how they are perceived as recreational and aesthetic assets. Forests, mountains, lakes and cultural landscape are important for recreation activities and tourism as well as for the local living environment Second, grazing areas and the surrounding landscape gives opportunities for outdoor activities and recreation and are positively related to the size and quality of the landscape as well as the vicinity and accessibility to them (Lindborg, 2006).

It has been shown that many people choose to work in the city and live in the country, seeking a lifestyle with rural scenery, open spaces, forests and farmland as components (Brueckner, 2000). It has also been shown that people residing close to attractive natural environments visit them more often than people residing further away (Grahn & Stigsdotter, 2003). On the contrary the willingness to pay for a certain residential location is also strongly affected by accessibility and distance to urban city centers where labor supply, shops, schools and public utilities are often concentrated. This contrary force has however lost much of its dominant impact as technical progress in combination with infrastructural changes has made the workforce more mobile and as a result location choices for households and firms have become less dependent on supply of labor, and public service utilities. It has to a larger extent become possible for households and firms to base their residential choice on local residential and environmental quality characteristics. In addition workers with higher education produce goods and services that have a relatively high value-to-weight ratio which has increased flexibility in the choice of where to work and where to live.

The main finding in this paper is a positive and significant implicit price for accessibility to high value meadows and grazings in the studied region. The result shows that individuals are willing to pay on average 2.6 per cent more for properties located within a range of 500 meters from the environments than for properties located outside this range. The paper also tries to estimate weather the supply of meadows and grazings (measured in square kilometers) offered by each district has a significant impact on property prices but the result shows no significance. Further the estimates for structural, lot and accessibility characteristics pursue their expected path implying that the standard of the structure and the size of the house and its corresponding lot have a positive effect on the sales price.

2 Hedonic housing

In general, hedonic methods are based on that individuals can choose their level of consumption of local public goods either buy the choice of the residential location or buy their selection of a bundle of private goods or services (Rosen, 1974), (Lancaster, 1966). In cases where these prices or consumption levels are observable information of the demand for the public good can be revealed. One of the most important advantages with the hedonic housing approach is the possibility to assess economic values to non market goods whose consumption requires residence at a certain location as for example local land values (Cavailhès et al. 2005).

The microeconomic framework developed by Rosen (1974) is used to evaluate residential characteristics. The model makes the usual assumption of a housing market in equilibrium implying that all individuals have made their utility maximizing choices of what house to buy given the prices of alternative housing locations and that these prices just clear the market. This assumption implies that the sales price exactly equals what the individual is willing to pay for a property acting as a value indicator for the non market good.

The model consist of a private good denoted by a vector X representing the supply of properties $(X = x_1, \dots, x_n)$ in the studied region. Hence, the dependent variable is the price of the i:te house p_i.

Variations in housing prices can to a large extent be explained by structural attributes along with different accessibility and neighborhood attributes. Hence the explanatory variables consist of a vector S representing structural and lot characteristics, A representing accessibility characteristics, and finally N representing neighborhood characteristics.

The hedonic price function for any property x_i then becomes

$$p_i = p(s_{ij}, a_{il}, n_{ik}) \qquad (1)$$

Where $j=1,\dots,m$ represents a number of structural characteristics used to describe the standard of the house and its corresponding lot $l=1,\dots,t$ represents accessibilities to public utilities, local public goods and other environmental amenities, $k=1,\dots,r$ represents a number of neighborhood characteristics used to describe the local living environment.

3 Quality of structure and lot

Any type of house can be described using a very large number of structural attributes. Basically, all types of available describing features could be included in the estimations. Previous hedonic housing studies has however shown that including a large number of structural characteristics as explanatory variables tend to cause a high degree of multicollinearity (Gress, 2004). Such correlation typically occur when attributes included in the estimations are alike and exhibit similar features. Hence, collinieartity between dwelling size and number of rooms as residential standard measures would typically allow the usage of only one measure serving as a proxy for both. This paper has chosen to include 4 housing and lot characteristics

$$S = s_1 + s_2 + s_3 + s_4 \qquad (2)$$

Where s_1 represents dwelling size, s_2 represents lot size, and s_3, s_4 represent house and land values. The purpose of including both house and land values as explanatory variables is that property values are often expressed in terms of rateable value which, according to the Swedish system, is a fixed value corresponding to 75 percent of the residential market value. Rateable value can be divided in house and land values where this paper has chosen to separate the two in order to isolate the impact of accessibility to meadows and grazings on both.

3.1 Accessibility measures

Accessibility characteristics A, are estimates of how easy it is to get access to different public utilities and local public goods. This paper has chosen to include three such attributes as explanatory factors

$$A = a_1 + a_2 + a_3 \qquad (3)$$

Since, public utilities are often located in urban city centers the model controls for the distance between nearest city center and residential location, a_1. The estimates for accessibility to city center are assumed to be negative reflecting higher housing prices at a nearer distance from the city center. One important note is that distances between housing locations and nearest city center are measured in absolute terms and not by travel time by car implying that time sensitivity is excluded as an explanatory factor. The method used (here) for calculating distances between properties and the city center considers the distance between the absolute location of properties defined by coordinates and a central point in the nearest city center. The loss in explanatory power of measuring accessibility in absolute terms is however expected to be quite low since the paper analyzes accessibility between local districts within regions and not in between municipalities or regions where time sensitivity is expected to be the largest (Johansson et al. 2005).

The model has also chosen to include accessibility to lake, a_2, as one of the explanatory factors. Accessibility to lake expects to have a positive impact on residential prices as previous studies confirms that views of ocean, lake and mountain have a significant positive impact on willingness to pay for property, where ocean views are found to increase the market price of an otherwise comparable house by almost 60 percent (Benson, 1998)

Accessibility to meadows and grazings - GIS

One common problem of applying the hedonic housing model to value non market goods is to obtain quantitative variables to enter in the hedonic price equation

(Chavaillhès et al., 2005 or Sheppard et al., 2006). Such difficulties typically occur when defining the accessibility between properties and local public goods. Time sensitivity by car would typically not reflect a true measure of accessibility since it is reasonable to assume that people have chosen their residential location due to other types of accessibilities such as accessibility to pleasant view or accessibility in terms of walking distances. Such accessibilities are strongly affected by the structure of the environment and its terrain and it is normally difficult to obtain quantitative measures for these types of accessibilities. This paper uses a GIS based approach assuming that the local living environment of any property can be enclosed by a distance of 500 meters.

This definition implies that the third accessibility characteristic, a_3 consist of a dummy variable for properties having high value meadows and grazings within a distance of 500 meters from their house. The definition of 500 meters implies direct access to the environments, not necessarily access to view, but most likely access by walking. By the use of geographic information systems a buffer zone of 500 meters is created to enclose meadows and grazings. Hence, accessibilities between high value meadow and grazings and properties are defined so that a properties located within the enclosed area of 500 meters is scored 1 otherwise 0. The hypothesis implies that properties located within the enclosed area are expected to influence property prices.

3.2 Spatial heterogeneity and local markets

Finally the model is constructed to control for neighborhood characteristics where the vector N consist of

$$N = n_1 + n_2 \qquad (4)$$

Housing markets are to a large extent local markets implying that housing characteristics are very rarely constant but varies dependent on the location at which they are being estimated (Gress, 2004). There are different ways of controlling for spatial heterogeneity. The most common method is the use of dummy variables to control for local markets within the studied region. Such markets are often defined using different neighborhood delimitations such as zip codes or school districts (Anselin, 2002). This paper uses dummy variables to disaggregate the studied region into local districts implying that for each property a relevant neighborhood is defined for its location. The defined neighborhoods are thus expected to influence the observed values at the data point. This implies that the first neighborhood characteristic, n_1 is constructed so that properties can either be located in central or sub-central districts or in rural districts.

The second neighborhood characteristic, n_2 takes into account that housing prices are to a large extent dependent on the supply of local public goods at the location at which they are being estimated. As an extension of the ideas suggested by Tiebout (1954). This implies that for a spatial good such as housing, prices are likely to be spatially dependent if residents in one district benefit from the public goods supplied by the neighboring district. To avoid such spatial heterogeneity the model controls for the supply of meadows and grazings found in each district.

3.3 Variations in housing prices

Several difficulties arise when studying the housing market since besides individual preferences for structure, accessibility and neighborhood features different macroeconomic factors affect housing prices. The paper studies properties sold over a 30 year period and considerable changes to housing prices have occurred during the years 1977-2007. There are different methods to minimize the influence of time trends where one common approach is to only consider transactions data from within each year (Gress, 2004). This paper has chosen to adjust the sales price for each taxation year to control for changes in the price level.

3.4 Data and variables

In general, hedonic housing models require quite extensive datasets covering both sales price as well as a large number of housing attributes. This paper utilizes data from the Swedish land survey and covers property transactions realized during the time period 1977-2007 in the studied region. This implies a dataset of 7565 property transactions combined with 9 housing attributes specified in table 1.

Table 1. Description of variable

Characteristics/independent variables*	Denotation	Variable name	Definition	Expected result
Structural Characteristics (S)	s_1	Dwelling size	Total living area (square meters)	+
	s_2	Lot size	Total size of garden (square meters)	+
	s_3	House value	Total residential value, €	+
	s_4	Land value	Total land value, €	+
Accessibility characteristics (A)	a_1	Accessibility, city	Distance between house location and nearest city center (km)	-
	a_2	Accessibility, lake	Dummy for accessibility to lake	+
	a_3	Accessibility, meadows and grazings	Dummy for accessibility to meadows and grazings	+
Neighborhood Characteristics (N)	n_1	Supply of meadows and grazings by each district	Total supply measured in km^2	+
	n_2	Central districts	Dummy for central districts	+

*Dependent variable: sales price

4 Empirical model and results

The first econometric issue of hedonic housing models, in general, are that prices of the characteristics does not vary linearly with their quantity. Hence, the price of an additional unit of a characteristic will depend on the quantity already supplied as well as the quantities of the other characteristics (Rosen, 1974), (Goodman, 1998). This problem is often solved by different power transformations of variables such as the Box Cox (Goodman, 1978, Halvorsen & Pallakowski, 1981) or the logarithmic. In this model a semilogarithmic functional form is used since it allows the monetary value of any characteristic to vary with other characteristics in the bundle. The semilogarithmic model also corrects for heteroskedasticity between house value and the residual as they tend to be larger as house values increase (Gress, 2004).

The semilogarithmic form implies that monetary values are specified as logarithmic so that the estimated coefficients can be interpreted as elasticities. The estimates for different sizes (square meters, kilometers and km^2) are specified as semilogarithmic implying that if dwelling size, for example, increases by one square meter the sales price rises by [β_1×100]percent. This specification implies that dummy variables are specified as semilogarithmic as well.

The basic properties of this specification form are:

$$\ln P = \alpha\beta_1 S + \beta_2 A + \beta_3 N + \varepsilon \qquad (5)$$

Including all explanatory variables:

$$\begin{aligned} \ln P = \beta_0 &+ \beta_1 \text{Dwelling size} + \beta_2 \text{Lot size} + \beta_3 \ln\text{Housevalue} + \beta_4 \ln\text{Landvalue} \\ &+ \beta_5 \text{Accessibility city} + D_6 \text{Accessibility lake} \\ &+ D_7 \text{ Accessibility Meadows and Grazings} \\ &+ \beta_8 \text{Supply of meadows and grazings} + D_9 \text{Central district} \end{aligned} \qquad (6)$$

4.1 Descriptive statistics

The data set is described in table 2 and shows descriptive statistics for realized property transactions during the studied period. The least expensive house was sold for approximately €45 500 and the most expensive house for approximately €766 600. House values (comparing means) where approximately 42 per cent higher than land values among the sold properties. Further, the descriptive shows that for all transactions the nearest residential location to city center was 700 meters from the central point and the farthest location was 69.5 kilometers from the city center. Descriptive statistics also show that only 1 per cent of properties sold during the studied period where classified as close to lake and that 13 per cent where located within a range of 500 meters from high value meadows and grazings. Descriptive statistics are presented in table 2 where *N* equals the total number of realized property transactions in the region within the studied 30 year period.

Table 2. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Sales price*	7565	45500	766606	108840	56771.37
Dwelling size	7565	20	663	146	47.376
Lot size	7565	99	34800	1213	1670.171
House value*	7565	4823	655141	70126	387129.765
Land value*	7565	1183	176979	29337	10598.320
Accessibility, city	7565	0.709	69.5	9	8.462
Accessibility, lake	7565	0	1	0.008	0.9159
Accessibility Tuva	7565	0	1	0.130	0.339
Area Tuva	7565	11	411	56	91.375
Central districts	7565	0	1	0.4	0.490

*All monetary values in €

As discusses above hedonic housing studies that include a large number of structural characteristics tend to have a high degree of multicollinearity between the variables. Colliniearity statistics are found in appendix 1 and shows that no severe multicollinearity exists between the variables.

4.2 Regression results

The regression results shows that estimates for structural and lot characteristics pursue their expected path implying that the structure and the size of the house and its corresponding lot have positive and significant effects on the sales price. Increasing dwelling size by one square meter increases the average market price by 11.3% and increasing the lot size by one square meter increases the average market price by 6.5%. Further the result shows negative estimates for all accessibility measures, to city implies that for each kilometer increase in the distance between city center and property location the market price decreases by on average 3.1%. To lake implies that houses located close to lake were on average 3.4% more expensive than houses located further away. These results also follow their expected path considering the results of previous hedonic estimations (see for example Benson, 1998). Finally, the results reveal that houses that are located within 500 meters from meadows and grazings were on average 2.6 % more expensive than houses that were located further away. However, the supply of these lands offered by each community showed no significant effect on property prices.

Table 3. Regression results

Dependent lnsales $N = 7565$	Coefficient	Estimated effect on sales price
Dwelling size	0.113*** (7.679)	11.3
Lot size	0.065*** (6.007)	6.5
Ln House value	0.271*** (15.625)	27.1
Ln Land value	0.128*** (8.564)	12.8
Accessibility, city	-0.031** (-2.070)	-3.1
Accessibility, lake	-0.034** (3.224)	3.4
Accessibility, Tuva	-0.026** (2.537)	2.6
Supply of Tuva	0.001 (0.114)	n.s
Central district	0.089 (6.717)***	8.9

Interpreting the estimated impact of accessibility to meadows and grazings in monetary terms implies a total willingness to pay for residing at a neighboring distance from meadows and grazings equaling approximately €2900 000 in the studied region . Hence, the average willingness to pay equals approximately €2900 as can be calculated from table 4.

Table 4. Descriptive statistics sales price (for properties within the range of 500 meters from high value meadows and grazings).

	N (within 500 meters)	Minimum	Maximum	Total value	Std. Deviation
Sales price*	1004	45183	761341	110684123	78762.260

* Sales price in €

5 Conclusions

The purpose of this paper is to use the hedonic housing model combined with a GIS approach to assess economic values to high value meadows and grazings. The paper is the first attempt to utilize the extensive land database constructed by the Swedish board of agriculture and the county administrative boards. The hedonic housing model is constructed to control for as many structural, accessibility and neighbourhood attributes as possible to be able to isolate the impact of accessibility to meadows and grazing areas. The dataset consist of 7565 property transactions and 9 housing attributes combined with georeferenced data covering the spatial distribution of the studied environments.

The most important conclusions in this paper is a positive and significant estimate for accessibility to high value meadows and grazings located in rural rather than in urban settings. The estimated effect of 2.6 per cent is however slightly lower than the 4-7 per cent estimated effects for urban greenspace and recreation areas. A slightly lower estimate for rural greenspace and recreation areas than its urban equivalent is however expected considering that urban locations are, despite technological and infrastructural improvements far more attractive from a residential point of view.

Interpreting the willingness to pay in monetary terms implies that individuals in the studied region are prepared to pay an extra premium of €3200 for a property only because the property is located at a neighboring distance from high value meadows and grazings.

The results clearly motivate further research on the database and currently this paper is being expanded towards differentiating among the effects of different types of land categories on property prices. Current research is directed towards finding the effect of landscape types and landscape classification on residential values and towards developing the spatial approach in order to incorporate the existence of more and better specified neighborhood and accessibility affects.

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Appendix 1. Pearson correlation

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Log salesprice	1.00								
2. Dwelling size	0.370**	1.00							
3. Lot size	0.026*	0.105**	1.00						
4. Log House value	0.461**	0.699**	-0.114**	1.00					
5. Log Land value	0.383**	0.310**	-0.32**	0.563**	1.00				
6. Accessibility, city	-0.254**	-0.160**	0.253**	-0.423**	-0.527**	1.00			
7. Accessibility, lake	0.030**	-0.019	0.157**	-0.090**	0.146**	0.072**	1.00		
8. Accessibility Meadows, Grazings	-0.029*	-0.019	0.129**	-0.099**	-0.152**	0.198**	0.045**	1.00	
9. Supply, Meadows, Grazings	-0.124**	-0.077**	0.165**	-0.204**	-0.214**	0.591**	0.031**	0.131**	1.00
10. Central district	0.302**	0.194**	-0.191**	0.435**	0.579**	-0.524**	-0.055**	-0.116**	-0.341**

**Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

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