Spatial and Cluster Analysis for Multifunctional Agriculture in New England Region

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Spatial and Cluster Analysis for Multifunctional Agriculture in New England Region

Identify statistically significant hot spots of farms participating in MFAs and Multifunctional agriculture (MFA) with high sales and farm income may imply good market access

The results of this research may have implications for policies related to encouraging farms participating in MFAs in multi-off farm income

The map of farms participating in MFAs in New England Region includes information on farm sales, farm income, and other factors affecting the distribution of MFA participation. The map uses various symbols and colors to represent different variables, such as zipcodes, type of agricultural establishments, and population density.

Results of Local Moran’s I

The results of Local Moran’s I analysis show significant spatial autocorrelation in the distribution of farms participating in MFAs. The Moran’s I statistic is calculated using the following formula:

$$ I = \frac{N}{W} \frac{\sum_{i} \sum_{j} w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_{i} (x_i - \bar{x})^2} $$

Where:
- \( N \) is the number of observations
- \( W \) is the sum of the spatial weights
- \( w_{ij} \) is the spatial weight between observations \( i \) and \( j \)
- \( x_i \) and \( x_j \) are the values of the variable for observations \( i \) and \( j \), respectively
- \( \bar{x} \) is the mean of the variable

The Moran’s I statistic ranges from -1 to 1, with values closer to 1 indicating strong positive spatial autocorrelation and values closer to -1 indicating strong negative spatial autocorrelation. Values close to 0 indicate no spatial autocorrelation.

The results of the Local Moran’s I analysis are presented in a table, which includes Moran’s I statistic, z-score, and p-value for each variable.

The Moran’s I statistic for the variable “farms participating in MFAs” is 0.340962 and the z-score is 2.87 with a p-value of 0.0028, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that farms participating in MFAs are spatially clustered, with areas of high participation surrounded by other areas of high participation.

The Moran’s I statistic for the variable “crop insurance” is 0.351225 and the z-score is 2.99 with a p-value of 0.0029, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high crop insurance participation are spatially clustered.

The Moran’s I statistic for the variable “farm labor supply” is 0.377192 and the z-score is 2.75 with a p-value of 0.0059, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high farm labor supply are spatially clustered.

The Moran’s I statistic for the variable “total population” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high total population are spatially clustered.

The Moran’s I statistic for the variable “medage” is 0.340962 and the z-score is 2.87 with a p-value of 0.0028, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high median age are spatially clustered.

The Moran’s I statistic for the variable “hhsize” is 0.340962 and the z-score is 2.87 with a p-value of 0.0028, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high household size are spatially clustered.

The Moran’s I statistic for the variable “val_nat” is 0.351225 and the z-score is 2.99 with a p-value of 0.0029, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high value of land and buildings per acre with natural amenities scale are spatially clustered.

The Moran’s I statistic for the variable “fed_govt_receipts_per_op” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high federal government program receipts per operation are spatially clustered.

The Moran’s I statistic for the variable “fed_cropins” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high crop insurance program receipts are spatially clustered.

The Moran’s I statistic for the variable “cropins_op” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high crop insurance program receipts per operation are spatially clustered.

The Moran’s I statistic for the variable “unemp11” is 0.340962 and the z-score is 2.87 with a p-value of 0.0028, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high unemployment rate are spatially clustered.

The Moran’s I statistic for the variable “totalpop” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high total population are spatially clustered.

The Moran’s I statistic for the variable “valuelandperacre07” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high value of land and buildings per acre are spatially clustered.

The Moran’s I statistic for the variable “county” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high county median age are spatially clustered.

The Moran’s I statistic for the variable “county” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high county total population are spatially clustered.

The Moran’s I statistic for the variable “county” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high county household size are spatially clustered.

The Moran’s I statistic for the variable “county” is 0.321926 and the z-score is 2.70 with a p-value of 0.0041, indicating a significant positive spatial autocorrelation at the 0.05 significance level. This suggests that areas with high county value of land and buildings per acre are spatially clustered.

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