Video Transcripts

Introduction

Welcome to the Michigan Spatial Mismatch Tool!

The MSM Tool is an online data analysis and visualization platform that facilitates detailed analyses of spatial mismatches between housing and employment opportunities across the state of Michigan. The tool was developed with generous funding by the Institute for Public Policy and Social Research at Michigan State University.

The goal of the MSM Tool is to assist Michigan policymakers, public officials, and the public at large in addressing housing-employment mismatches through data-driven decision-making by allowing users to identify neighborhoods that are high-priority areas for housing development for Michigan's workforce or, conversely, high-priority areas for targeted economic development.

The MSM Tool provides a straightforward visual representation of two indicators of spatial mismatch – imbalance indices and disparity indices. Imbalance indices measure the discrepancy between the number of residents and the number of workers, while disparity indices measure differences in the characteristics of residents and workers.

For more information about the data and methods used to calculate these indices, visit the methodology section.

Mapping Imbalances

You can begin using the MSM Tool by searching for the county that you'd like to study, or by selecting the city you'd like to study from the list here at the top. This will pan to the selected area.

You can then select one of a series of indicators that measure spatial mismatches between housing and employment opportunities in the state. To begin, open the "Customize Data Visualization" tab on the left side.

Each indicator is measured at a variety of scales using the road network to create a series of commute shed areas, with distances ranging from one-half mile to four miles. We recommend beginning your analysis with the imbalance index, as measured within four-mile commute sheds. This index measures differences in the number of residents and the number of workers within a four-mile commute shed from the center of each neighborhood.

Once you've selected the criteria for the spatial mismatch indicator of interest, click "Load Map" to display your selection on the map. The map will then display imbalance indices for the region you have selected. Minimize any windows to view the full extent of the map. Zoom in or out to view a different area.

Areas with lighter shading have imbalance indices of less than 50. This means that in these areas, the number of residents is smaller than the number of workers. In other words, these are employment hubs. For example, an area with an four-mile imbalance index of 17 means that of the people who either reside or work within four miles of the center of this neighborhood, only 17% are residents; the rest are workers. You can see clearly that in Downtown and Midtown Detroit, which has lighter shading, workers outnumber residents, while in northwestern and northeastern Detroit, which have darker shading, residents outnumber workers.

This suggests that in order to achieve balanced numbers of housing and employment opportunities, the area around Downtown and Midtown needs more housing while the areas to the north and west need more places of employment.

Mapping Disparities

Users can also visualize a second measure of spatial mismatches: disparity indices. These disparity indices measure differences in the racial, income or educational composition of residents and workers in a specific area.

For example, the low-income disparity index compares the incomes of workers and residents in specific neighborhoods. Positive values of the index, shown with darker shading, indicate areas that are predominantly home to low-income residents but rely heavily on a higher-income workforce. As one can see on the map, much of the city of Detroit is composed predominantly of low-income residents but has relatively few low-income workers. On the other hand, cities such as Livonia and Garden City, to the west, have lighter shading, indicating that they have relatively few low-income residents but a substantial share of low-income workers.

For more information on how to interpret the disparity index, visit the Method tab.

Changing the Color Scheme

The MSM Tool provides a number of visualization options. You can choose a variety of ways to divide the indices into categories for visualization on the map. For example, although the default is a sequential yellow-to-brown color scheme, you can select from a variety of spectral options. These provide an intuitive mid-point that allows for easy identification of areas that have balanced numbers of housing and jobs. For example, areas shown in yellow on the map here have relative balance in housing and employment opportunities, while those with red shading are in need of housing and those with blue shading are in need of jobs.

You can also select the number of categories to use, ranging from 3 to 9, when visualizing these imbalances. Lastly, you can choose between three methods for selecting the categories themselves. Equal interval classifications divide the values of the index into equal-sized ranges; quantile classifications ensure that each category has the same number of neighborhoods; and the Jenks' method divides the index into naturally occurring categories.

Changing the Scale of Measurement

The MSM Tool measures patterns of spatial mismatch at a variety of spatial scales. For more information on various scales of measurement, visit the method tab.

To calculate the imbalance index within four-mile commute sheds, we identified the geographic center of each neighborhood, or census block group. We then used data from OpenStreetMap to build a road network across the entire state of Michigan and used ESRI's Network Analyst to create commute sheds of four miles from the center of each neighborhood outward while following the road network and obeying all restricted forms of travel such as one-way roads, bridges, and tunnels.

To visualize the imbalance and disparities indices for various commute sheds, return to the "Customize Data Visualization" tab where you can select the imbalance or disparity index at a variety of different scales.

For example, the imbalance index measured within half-mile commute sheds measures the balance between housing and employment opportunities within one-half mile of the geographic center of each neighborhood. This provides insight into whether the employment opportunities within the neighborhood are accessible within a half-mile commute.

As you examine variation in imbalances between housing and employment using the MSM Tool, you will likely notice that changing the scale of measurement often results in a notable change in the imbalance index. This is due to the fact that larger areas tend to have greater balance between housing and employment opportunities than do smaller areas. Thus, a specific neighborhood may have relatively few employment opportunities within a half-mile commute shed; however, within a two-mile or four-mile commute shed there may be many employment opportunities. The MSM Tool thus provides users the ability to examine imbalances at a variety of spatial scales.

We also provide two alternative options for visualizing patterns of spatial mismatch. For example, you can examine our imbalance and disparity indices for each specific neighborhood (or census block group) without making any

assumptions about the preferred commute shed. However, it is important to note that this method does not take into account the distribution of housing and employment opportunities in nearby neighborhoods. For example, someone who lives in one neighborhood may actually be relatively close to areas of employment located in neighborhood nearby. We therefore recommend proceeding with caution when using this scale of measurement.

One potential alternative option is to use our nearest neighbor indices. These indices measure imbalances and disparities by examining not only housing and employment opportunities in the target neighborhood but also in any contiguous neighborhood. Again, however, it is important to note that these indices do not take into account the structure of the road network along which commuters travel. If you are interested in examining patterns of spatial mismatch while accounting for workers' ability to travel along the road network, you can use our commute shed indices.

Data Visualization

The MSM Tool also allows users to examine the relationship between patterns of spatial mismatch and a variety of demographic, economic, and physical characteristics of neighborhoods. These are listed at the bottom of the "Customize Data Visualization" tab.

For example, you may be interested in examining whether the cost of housing is associated with differences in disparities in access to housing and employment opportunities for African American residents. To do so, first make sure you've selected the disparity index for African Americans and select your preferred spatial scale. Then select "Median Housing Values" from the Background variable drop-down tab. You can then visualize the relationship between the African American disparity index and median housing values in the Data Visualization tab.

You can visualize these variables in a couple of different ways. First, you can examine the histograms to get a sense of the distribution of the African American disparity index and the background variable you have selected, such as median housing values. As shown in the first histogram, most neighborhoods in the region have relative balance between the racial composition of workers and that of residents. This is indicated by a disparity index close to zero. A number of neighborhoods, however, have disparity indices of 10 or higher and some as high as 50. In these neighborhoods, African Americans make up a disproportionate share of residents when compared with the racial composition of the local workforce. You can also visualize median housing values via the second histogram. As is fairly clear, most neighborhoods in the study area have median housing values of less than $100,000.

The MSM Tool also allows users to examine potential relationships between these variables using scatter plots and bivariate regression. As is shown in the scatter plot, neighborhoods with higher housing costs tend to have lower African American disparity indices. This suggests that high housing costs may contribute to disparities between the racial composition of workers and residents in the Detroit metro area.