December 2, 2020

Demographics, On-Demand:

Visualizing Microeconomic Municipal-Level Data

Key Takeaways

- Microeconomic data from the Census Bureau's (CB) American Community Survey (ACS) was compiled and processed to produce a demographical map of population characteristics across the United States at the county and metropolitan level.

- The tool is useful for analysts who would like an easy-to-use way of drilling down into microeconomic data that they may see as valuable in the municipal securities selection process.

- The visual map can be used to harbor a wide variety of information, including coronavirus statistics. By mapping any datapoint to FIPS or CBSA codes, an analyst, regardless of their discipline, can see the geographic impact of underlying data.

- Improvements to the tool are expected, including adding less common official surveys and more frequent Zillow-based data, which is currently provided on a monthly basis. This will allow the investment professional to see changing housing valuations on a very regular basis.

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Municipal securities analysts use a variety of data when assessing the outlook for state and local budgets. Revenue sources, expense considerations, and fundamental demographic information are often synthesized in order to arrive at an actionable conclusion regarding the ability of state and local governments to make good on outstanding financial obligations. To assist these investment professionals in the process of selection, we have created a tool that allows them to easily visualize important demographic information and directly interact with the data at the county and metropolitan area level. By seeing how these various datapoints progress from year-to-year, municipal specialists may be better able to understand the demographic implications of state and local decisions, project potential impacts of demographical changes on state budgets, and visualize the influence microeconomic factors may be having on a given tax base.

Data Gathering and Tool Creation

Although there are a variety of surveys conducted by statistical authorities, the main one used in our model is known as the American Community Survey (ACS). The ACS is a yearly data collection initiative spearheaded by the U.S. Census Bureau (CB) which gathers information from residents across the country via a random sample of mailing addresses. The CB notes that the ACS provides "information...[which] generates data that help determine how more than $675 billion in federal and state funds are distributed each year." As such, results from the ACS have direct and concrete ramifications for financial matters at the state level, providing a meaningful foundation for use of the data in municipal securities analysis.

The ACS gathers demographic statistics by Federal Information Processing Standard (FIPS) code, the main numerical designation for counties at the federal level. We then take regional identification one step further by associating groups of FIPS codes with Core-based Statistical Area (CBSA) codes, which correspond to metropolitan areas that may overlap with multiple counties. This procedure inherently creates two different yet related demographical maps: one that covers virtually the entire United States by county and another that filters away non-metro areas. This procedure is useful for a variety of reasons, including the fact that a large percentage of municipal securities issuance covers ground that incorporates these CBSA

codes. After all, they represent the economic majority of the country.

The types of information collected in the ACS are rather broad and include population, income, public assistance, educational attainment, occupation, and even work commute statistics. Although the entire gamut of information collected could be used in some way by municipal securities specialists, we sought to extract the variables we saw as most pertinent to investment valuation considerations. We also cross-checked the data with a variety of other official sources, many from the federal government, to make sure that the information collected fell within a similar range. Lastly, publicly available data gathered from Zillow and other CB releases, such as New Residential Construction, have been incorporated into the visual model in order to compliment the demographic information provided by the ACS. This allows the analyst to more easily tie demographic results from the ACS with housing valuation metrics and residential construction data at a FIPS or CBSA code level.

Regarding research challenges, there were a variety of difficulties encountered when gathering data for purposes of the tool. One of the main issues was locating the ACS data itself. Although the data was present on a publicly available government website, coming upon the files was not as straightforward as it could have been. The challenge mostly stemmed from a CB interface that was not user-friendly and regularly crashed when anything beyond one or two data points were requested from their servers. In addition, the files downloaded were not easily replaceable with APIs, although the CB website indicated as much. Even when the files were downloaded, the data was not presented in an easily digestible way and had to be reformatted in order to make it workable. Much was done on the backend to make sure that the data was 1) properly extracted and 2) mapped to the correct FIPS and CBSA codes.

## Examples of Microeconomic Indicators

To show the model in action, we have provided four indicators below as examples. The map currently has about 70 indicators, but more are being added over time as information is gathered and processed. We have chosen these variables because they provide a meaningful cross section of the kind of factors found in the tool. Quickly touching on the indicators, household formation allows the analyst to see growth in one of the

major components of population composition at the economic level. Net migration shows the strength of movement in or out of a region with the least popular experiencing migratory outflows. Zillow home price as a percentage of annualized rent can give the municipal specialist a sense as to the extremity of housing valuations for any given county or metropolitan area. Theoretically, home values should be anchored to rents. Residential real estate values that extend beyond, or even below, fair rents may warrant further investigation. Finally, we provide county-level labor force participation data by showing the percentage of individuals who are no longer seeking work. Progress in this variable can give the analyst some information regarding the future strength of labor economics in the region.

Household Formation: Evident from the graphs below, household formation was nationally stronger in 2018 than it was in 2011, but not by much. Also seen, household formation rates were strongest in western states ex-California. There was also improvement in Florida and certain areas of the South, such as Tennessee, and the southeastern coast. Other geographical areas show either mixed growth rates relative to 2011 or have remained unchanged. Like the other maps below, the CBSA variants simply mimic the FIPS version, with the only difference being that they extract only those areas considered to be metropolitan by the code standard.

Figure 1a | 2011 (FIPS)
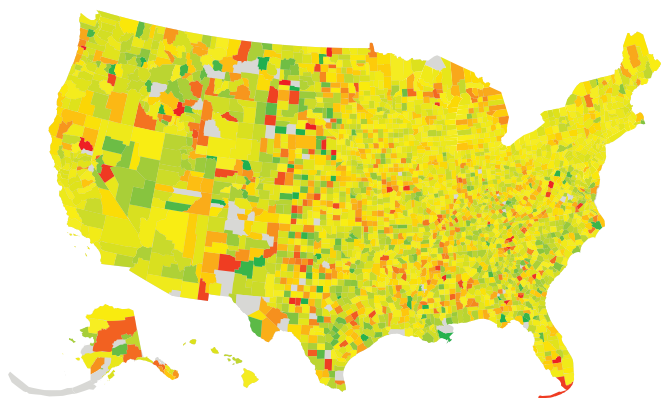
Figure 1b | 2018 (FIPS)
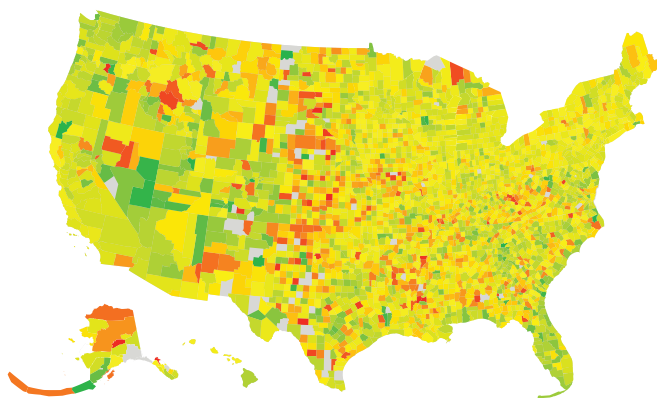
Figure 2a | 2011 (CBSA)

Figure 2b | 2018 (CBSA)

Sources: Census Bureau (CB), Bing, MetLife Investment Management (MIM)
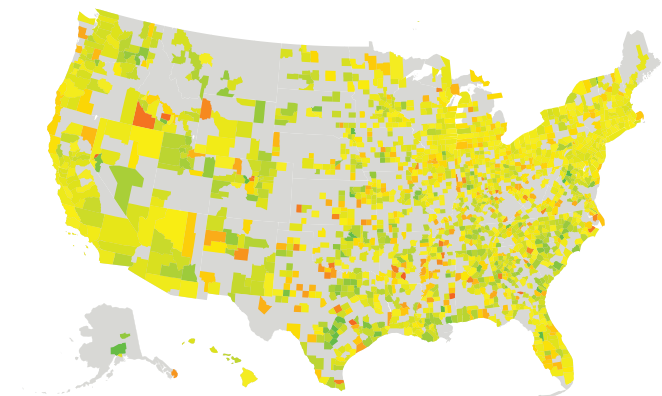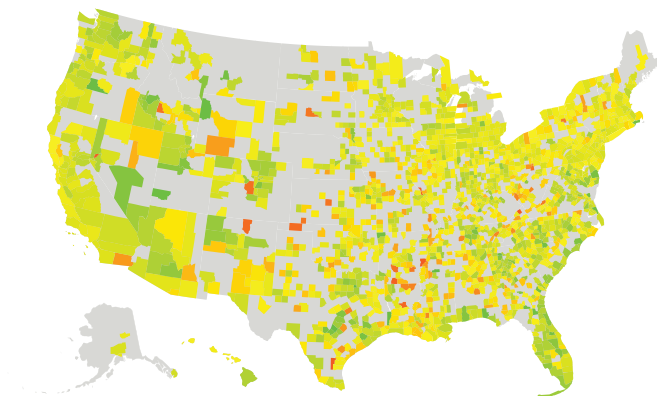
Net Migration % of Population: Relative to 2010, net migration as a percentage of the non-child population has seen some signification shifts. The West has seen a notable increase in net migration rates, with the exceptions being California and a couple of other smaller regions. There has also been a significant movement away from areas just east of the Rocky Mountains, showing as mostly red in 2018. A sign of positive demographic developments, much of Florida and some portions of the South have seen meaningful improvement in their net migration rates.

Figure 3a | 2010 (FIPS)
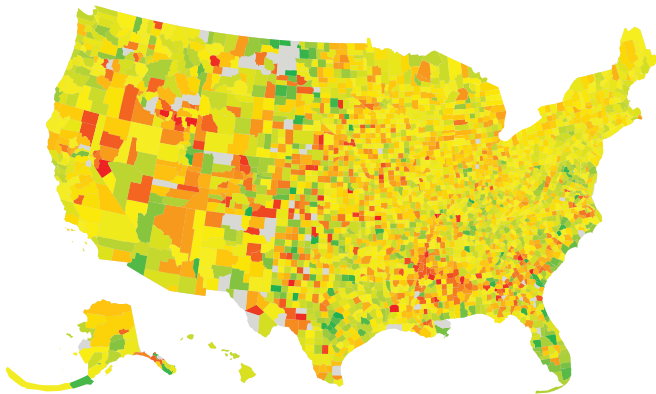
Figure 3b | 2018 (FIPS)
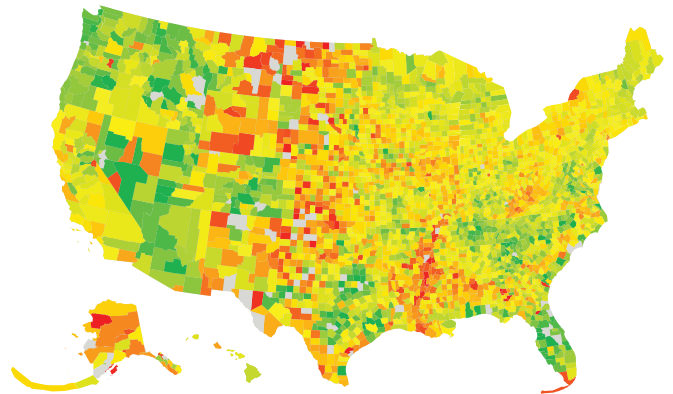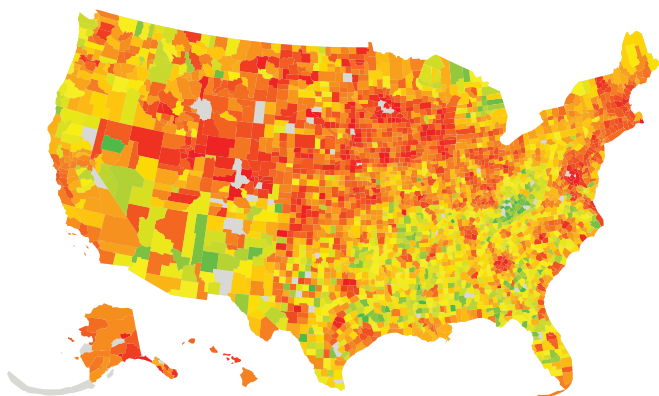
Figure 4a | 2010 (CBSA)
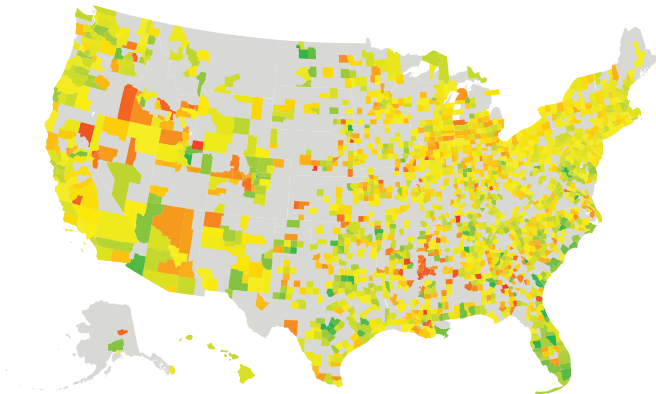
Figure 4b | 2018 (CBSA)
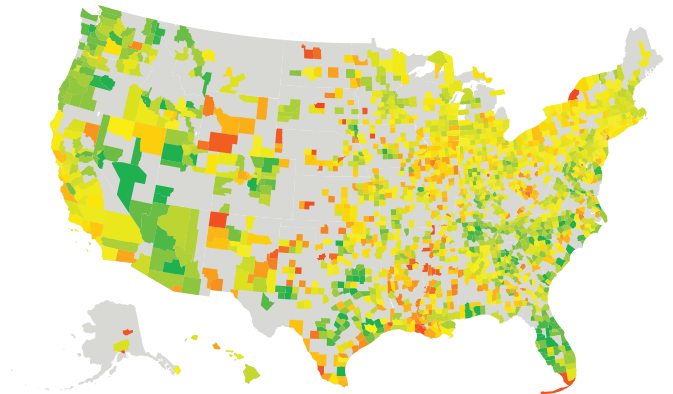
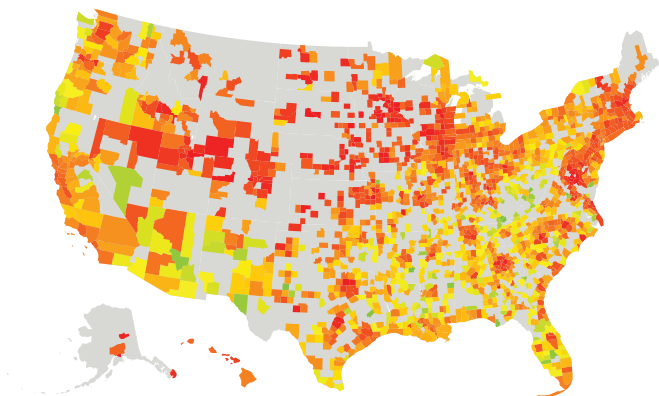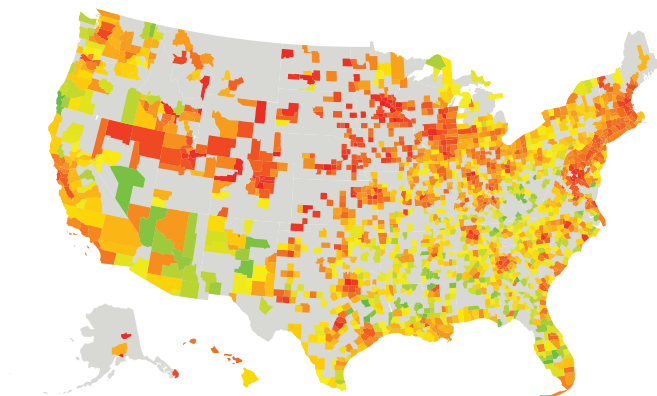*Sources: Census Bureau (CB), Bing, MetLife Investment Management (MIM)*

Zillow Home Price % Annualized Rent: Overall, the maps show a strengthening of home values as a percentage of annualized rent across much of the United States between 2015 and 2018. The Northeast, pockets of the South including Florida, portions of the Midwest and Texas, and certainly much of the West show improvements. By far, the hottest area in terms of rent-equivalent housing valuation has been the West, which has also seen broad improvement relative to 2015.

Figure 5a | 2015 (FIPS)
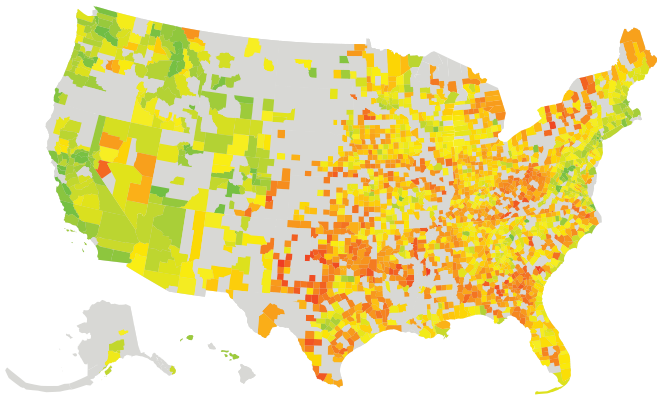
Figure 5b | 2018 (FIPS)
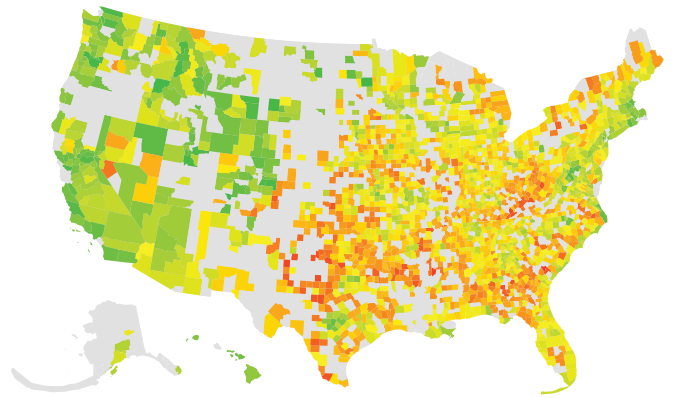
Figure 6a | 2015 (CBSA)
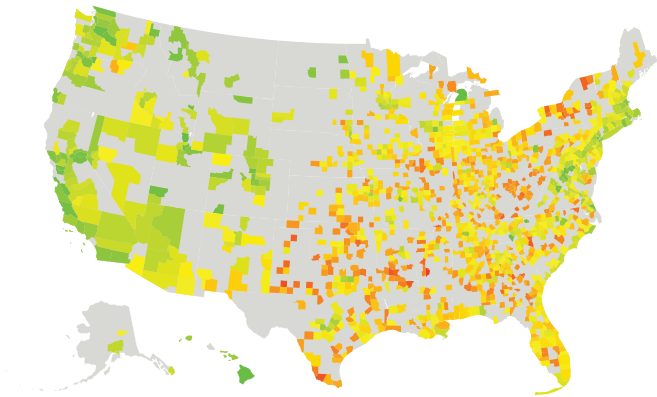
Figure 6b | 2018 (CBSA)
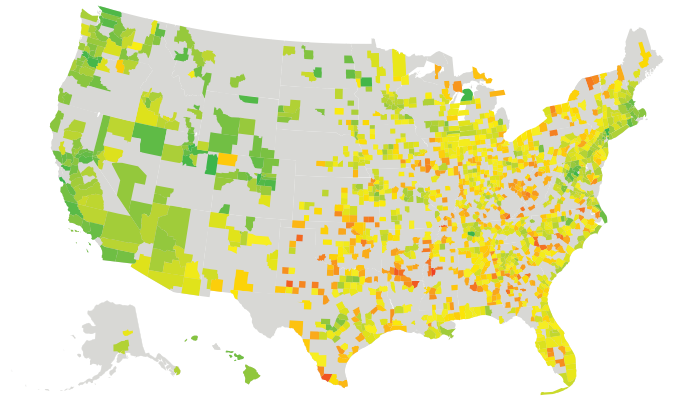
Sources: Census Bureau (CB), Zillow, Bing, MetLife Investment Management (MIM)

Percentage of Population Not in the Labor Force: In the maps shown below, the greener the shade, the larger percentage of the population that is to be considered not in the labor force. Across a variety of states and regions, greater percentages of the population have exited the labor force with many parts of the West, South, the Appalachians, and upper Midwest having the highest levels of non-participation. Overall, the United States has experienced a drop in its labor force participation rate over the last decade, which is what these maps seem to reinforce.

Figure 7a | 2010 (FIPS)

Figure 7b | 2018 (FIPS)
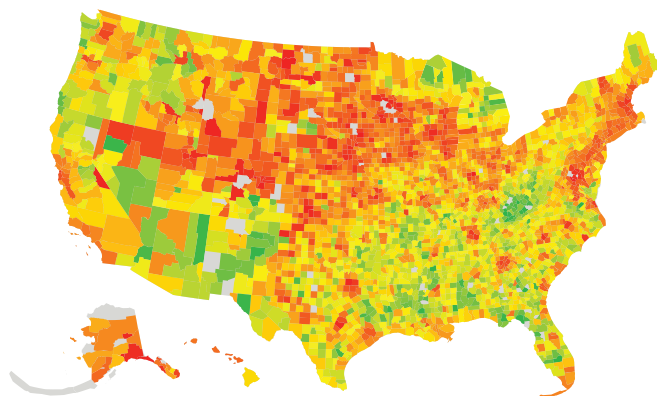
Figure 8a | 2010 (CBSA)

Figure 8b | 2018 (CBSA)

Sources: Census Bureau (CB), Bing, MetLife Investment Management (MIM)

Future Considerations for the Tool

Although much work has been done, but there is still room for improvement. More indicators and fields can be added to the tool once the data has been gathered and processed. Future fields may include information from other federal agencies, such as the Internal Revenue Service (IRS), and a further expansion of Zillow-based data. In addition, because Zillow provides much of its data on a monthly basis, it should be possible to create a map that is more short-term in nature. This is not possible with ACS data since much of it is released on a lagged, annualized basis. The model structure can also be used to map any information that is associated to a FIPS or CBSA code. For instance, earlier in the year when COVID-19 was making its way across the country, these maps were used to show the growth of coronavirus cases and deaths at the county level. There are certainly a variety of ways this tool can be used and expounded upon, but we feel that the foundation for a visually comprehensive view of data at a micro-level has been laid.

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Jun Jiang is a Market Strategist in Global Economic & Market Strategy team, where he helps to develop and communicate the firm's global macro-economic outlook and market views as well as assisting in the overall asset allocation and portfolio management process. Previously, Mr. Jiang was in the Global Portfolio Strategy unit, where he worked on portfolio strategy and portfolio analytics. Mr. Jiang joined MetLife in 2011. Prior to joining MetLife Investment Management, Mr. Jiang was a Credit & Portfolio Risk Management Analyst at Citigroup.

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Joseph joined MIM in 2018. Prior to his current role, Joseph was a municipal credit analyst covering tax-backed, project finance, and special situations at BlackRock. Previously, he worked in BlackRock's sales group engaging with a wide variety of clients. He has 16 years of industry experience.

Joseph received a Bachelor of Arts from Rutgers University and a Master of Public Administration from Columbia University. He is a CFA® charterholder.
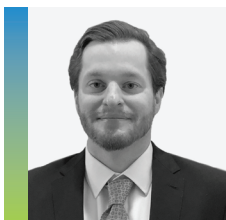
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About MetLife Investment Management

MetLife Investment Management (MIM),[1] MetLife, Inc.'s (MetLife's) institutional investment management business, serves institutional investors by combining a client-centric approach with deep and long-established asset class expertise. Focused on managing Public Fixed Income, Private Capital and Real Estate assets, we aim to deliver strong, risk-adjusted returns by building tailored portfolio solutions. We listen first, strategize second, and collaborate constantly as we strive to meet clients' long-term investment objectives. Leveraging the broader resources and 150-year history of the MetLife enterprise helps provide us with deep expertise in navigating ever changing markets. We are institutional, but far from typical.

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