

# Federal Reserve District County Shapefiles

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FEDERAL RESERVE BANK *of* KANSAS CITY



# Federal Reserve District County Shapefiles

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## **Abstract**

Federal Reserve District boundaries have been discussed many times since they were first defined and have been set for some time now. However, an easily accessible and accurate delineation of the boundaries does not currently exist in a central location. This may create challenges for Regional Banks of the Federal Reserve System, which attempt to provide an accurate picture of the economy in their region. Many times, state-level data are all that are available; however, when county-level data are available, FRS staff can produce more precise estimates of what is happening in a Federal Reserve District. This paper documents the current boundary information and the process used to create a new up-to-date and accurate visual representation of the Federal Reserve Districts. County-level shapefiles are created in ArcGIS for each Federal Reserve District, and access to these files is made available with the release of this paper.

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Federal Reserve District boundaries have been set for some time now, but an easily accessible and accurate delineation of these boundaries does not currently exist let alone in a central location. From our perspective, as a regional bank of the Federal Reserve System, it is important for us to provide an accurate picture of the economy of our region. Furthermore, every Federal Reserve District except the Twelfth District has partial states in their region, so constructing an accurate shapefile with border counties is useful for almost every district. Additionally, creating accurate district-level aggregates of economic variables can be challenging without identifying the specific boundaries of each district. Many times state-level data are all that is available, so the best option is to use a weighting schema to create an accurate representation for our district. Nevertheless, when county-level data are available—for example, when working with the Quarterly Census of Employment and Wages or the Current Population Survey—I should be able to get a more geographically-detailed estimate of what is happening in a Federal Reserve District. This paper describes a more up-to-date and accurate visual representation of the Federal Reserve Districts developed at FRBKC by using ArcGIS to create county-level shapefiles of each district.

Although the boundaries of Federal Reserve Districts have not changed in the last few decades, it is still important for researchers and central bankers to have a current and accessible geographic delineation of Federal Reserve Districts. Additionally, counties do change occasionally. The most frequent change is a county name change. However, when names of counties change, so do their Federal Information Processing Standards (FIPS) code, which are a unique identifier of the counties and the most frequently used unique identifier for counties.<sup>2</sup> On occasion, the legal

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<sup>2</sup> For example, in 2015, Shannon County, South Dakota changed its name to Oglala Lakota County, which resulted in a FIPS code change from 46113 to 46102 (Census 2018a).

boundary of a county will change as well.<sup>3</sup> For these reasons, it is important to have up-to-date and accurate representations of the boundaries of the Federal Reserve Districts.

Finding a correct list of counties by Federal Reserve District is not as straightforward or easy-to-use as one might think. The only easily discoverable official documentation of all counties of all Federal Reserve Districts is a historical document from the Board of Governors of the Federal Reserve System from 1996. However, this document only includes the county names, not a unique identifier, and the PDF format does not allow for a simple copy-and-paste into another more usable program. Additionally, there have been several changes to counties and their codes since 1996 (Census 2018a), which are not captured by the Board of Governors' document. However, these changes do not impact any of the counties that are on the boundary of a Federal Reserve District.

To confirm the continued accuracy of the 1996 documentation, knowing that there have been changes to counties since then, I reviewed additional content. For all Federal Reserve Districts, the Board of Governors only reports on the number of counties in each of the states (BOG 2017a). Additionally, the Board of Governors also reports all of the boundary counties for the First District, headquartered by the Federal Reserve Bank of Boston, which covers all of Connecticut except for Fairfield County<sup>4</sup>. The other Federal Reserve District that can be defined by the Board of Governors' website is the Twelfth District, headquartered by the Federal Reserve Bank of San Francisco, which only covers whole states and territories.

The next step in this process was to review each Federal Reserve Bank's individual website for information on the counties within their respective districts. Although each of the remaining 10 districts includes partial states, I could only find four that list the boundary counties of their district

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<sup>3</sup> An example of this happening recently is Broomfield County, Colorado, which was created from parts of Adams, Boulder, Jefferson, and Weld counties in Colorado in 2001 (Census 2018a).

<sup>4</sup> This boundary county is consistent with the 1996 documentation.

on their website.<sup>5</sup> All boundary counties in these four districts are consistent with the 1996 documentation. Although the document from the Board of Governors is from 1996, as mentioned earlier, there are no county changes that have occurred with boundary counties since then that affect the delineations. Therefore, I used this document for the remaining six districts: the Second, Third, Fifth, Sixth, Seventh, and Eighth Districts headquartered by the Federal Reserve Banks of New York, Philadelphia, Richmond, Atlanta, Chicago, and St. Louis, respectively. Based on the sources above, I remain confident in the accuracy of this document, because I was able to assign every county to a Federal Reserve District.

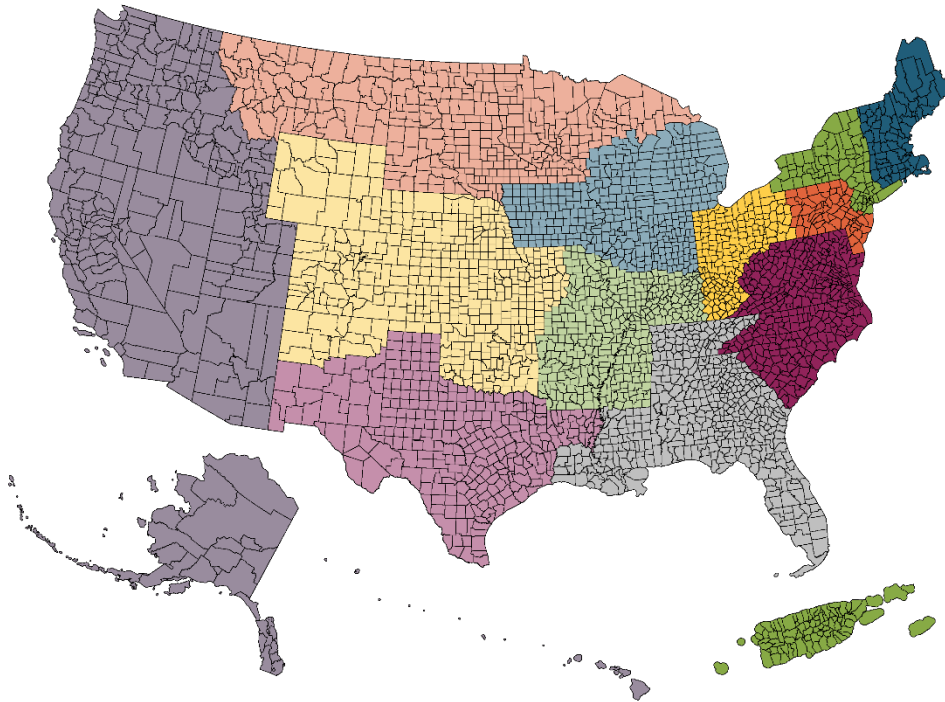
Before getting into how the shapefiles were created, I define some of the terms used in that procedure. First off, the work done in this technical briefing falls under the umbrella of a geographic information system (GIS). GIS is a “framework for gathering, managing, and analyzing data” based on spatial location and organizing the data into visualizations such as maps (Esri). The most common way of interacting with GIS data is through the use of shapefiles, which are a format for storing geographic location and attribute information of geographic features (Esri 2016). These shapefiles can be thought of in a way similar to data tables, where a field in a shapefile is the equivalent to a variable in a data table. Fields can contain information from the geographic location associated with the shapefile to socio-economic variables being used in analysis. To interact with GIS data, I use ArcGIS made by the Environmental Systems Research Institute (Esri). ArcGIS itself is actually a combination of software programs, including ArcMap, which is what is used to create the shapefiles here. ArcMap is the most commonly used program of ArcGIS, and many times people will refer to ArcMap as “ArcGIS”. The TIGER/Line® program is maintained by the United States Census Bureau and provides a publicly available and consistently updated source (Census

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<sup>5</sup> These four districts are the Fourth, Ninth, Tenth, and Eleventh Districts headquartered by the Federal Reserve Banks of Cleveland, Minneapolis, Kansas City, and Dallas, respectively (FRB Cleveland 2018, FRB Dallas, FRB KC 2015, FRB Minneapolis).

2018b). The TIGER/Line® name comes from the Census Bureau's Master Address File/Topologically Integrated Geographic Encoding and Referencing (MAF/TIGER) database (Census 2018c).

To create the Federal Reserve District shapefiles, I started with an accurately drawn county-level shapefile, which I drew from TIGER/Line®. The shapefiles used at the time of writing this paper were based on legal boundaries and names as of January 1, 2018. The Census Bureau releases new shapefiles each year that reflect any changes made as of January 1 of that year (Census 2018c). The shapefile provided by the Census Bureau contains all counties and equivalents for the United States, including territories such as Puerto Rico and Guam. As the Federal Reserve Districts include these territories, the shapefiles include all states and territories to accurately represent the whole Federal Reserve System. Because the TIGER/Line® shapefiles are based on legal boundaries, they draw over areas like the Great Lakes with the counties that have jurisdiction over those areas. Although these are not land areas that are generally thought of as part of counties, they are still jurisdictional areas that are shown on some Federal Reserve System maps (BOG 1999). I chose to use these shapefiles because they accurately represent the entire coverage of the Federal System, although they may not be viewed as the most standard visual representation of the United States.

**Figure 1: Federal Reserve District Boundaries<sup>6</sup>**

Sources: Author, United States Census Bureau

Once the list of counties by Federal Reserve District was identified and the starting shapefile was downloaded, creating the shapefiles for each of districts was straightforward. I loaded the TIGER/Line® shapefile into ArcMap and adjusted the projection of the shapefile to the “USA Contiguous Lambert Conformal Conic” coordinate system using the Project tool available in ArcToolbox. With this projected map, I exported the data as a new county-level shapefile so that it would maintain the projection. By using this projection, the map visually shows the curvature of the United States as it would look on a globe versus as it would look on a flat map. Using the newly created county shapefile, I worked through the list of counties for each Federal Reserve District one by one. I used the Select by Attributes tool to select out by state and county all counties that are within the boundaries of a Federal Reserve District. Based on the shapefile’s attribute table, I

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<sup>6</sup> This map includes the contiguous 48 states, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands. The rest of the U.S. territories are included in the shapefile, but are not show here due to their size.

selected the county by the “NAME” field and the state with the “STATEFP” field, which is the FIPS state code. Once I had a selection of all the counties for a district, I created a new layer from that selection. I then added a new numeric field, “District,” to the created district layer and used the field calculator to set the “District” field equal to the corresponding Federal Reserve District number (1–12). I repeated this process for each of the 12 districts and created an individual shapefile for each district. I used the Merge tool to combine each of the 12 district shapefiles into one county shapefile for the United States. This county shapefile is the same as the one I began with but now includes the “District” field indicating to which Federal Reserve District each county belongs (Figure 1).

The shapefiles created here provide a singular location to access new information on Federal Reserve District boundaries. Researchers interested in the counties by Federal Reserve District information for other purposes can use the Table to Excel tool in ArcMap to export the list of counties with district numbers to a Microsoft Excel file that can then be used as needed. Although these shapefiles were created with ArcMap, other programs and programming languages, such as QGIS, Python, and R, are free-to-use and can also load and interact with shapefiles. Going forward, these shapefiles can be updated each year using the new TIGER/Line® shapefiles to keep consistently up-to-date Federal Reserve District boundaries.



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