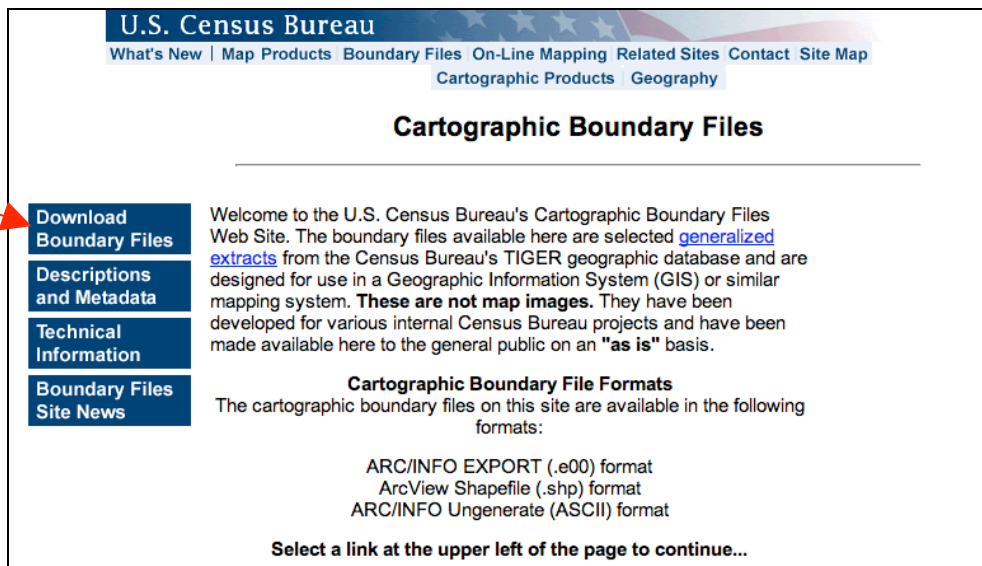


Getting started with GeoDa

One of the first hurdles in working with GeoDa is attaching your social science data to the geography file. This will allow you to map your construct variables in Excel or another software and the join them in GeoDa for mapping/analysis. It is a simple procedure and we lay out the steps below.

Step 1: Where can I find a geography file for my state?

A good place to start is the U.S. Census Bureau's Maps and Cartographic Resources website. One of the links from that site is the Cartographic Boundary Files webpage (<http://www.census.gov/geo/www/cob/index.html>) shown below.



U.S. Census Bureau

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Cartographic Products | Geography

Cartographic Boundary Files

Download Boundary Files

Descriptions and Metadata

Technical Information

Boundary Files Site News

Welcome to the U.S. Census Bureau's Cartographic Boundary Files Web Site. The boundary files available here are selected [generalized extracts](#) from the Census Bureau's TIGER geographic database and are designed for use in a Geographic Information System (GIS) or similar mapping system. **These are not map images.** They have been developed for various internal Census Bureau projects and have been made available here to the general public on an "as is" basis.

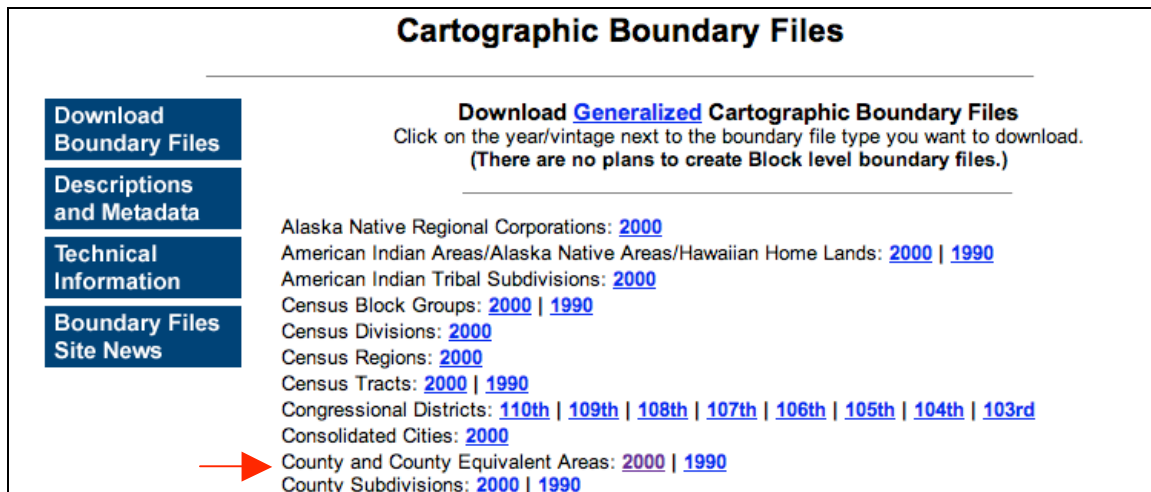
Cartographic Boundary File Formats

The cartographic boundary files on this site are available in the following formats:

- ARC/INFO EXPORT (.e00) format
- ArcView Shapefile (.shp) format
- ARC/INFO Ungenerate (ASCII) format

Select a link at the upper left of the page to continue...

>> Select **Download Boundary Files** and it will open a new page shown below. It will include a link to **County and County Equivalent Areas**. Click on the **2000** link.



Cartographic Boundary Files

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Download [Generalized](#) Cartographic Boundary Files

Click on the year/vintage next to the boundary file type you want to download.
(There are no plans to create Block level boundary files.)

- Alaska Native Regional Corporations: [2000](#)
- American Indian Areas/Alaska Native Areas/Hawaiian Home Lands: [2000](#) | [1990](#)
- American Indian Tribal Subdivisions: [2000](#)
- Census Block Groups: [2000](#) | [1990](#)
- Census Divisions: [2000](#)
- Census Regions: [2000](#)
- Census Tracts: [2000](#) | [1990](#)
- Congressional Districts: [110th](#) | [109th](#) | [108th](#) | [107th](#) | [106th](#) | [105th](#) | [104th](#) | [103rd](#)
- Consolidated Cities: [2000](#)
- County and County Equivalent Areas: [2000](#) | [1990](#)
- County Subdivisions: [2000](#) | [1990](#)

You should now see a window that looks like this,

Cartographic Boundary Files

Census 2000 County and County Equivalent Areas Cartographic Boundary Files

[ARC/INFO Export \(.e00\)](#) | [ArcView Shapefile \(.shp\)](#) | [ARC/INFO Ungenerate \(ASCII\)](#)

Click on a file below to begin downloading...

>> Click on the **ArcView Shapefile (.shp)** link and it will display a set of zipped county boundary files by state. Click on the state you want to download the file and then unzip it to your drive.

Census 2000 County and County Equivalent Areas in ArcView Shapefile (.shp) format	
Alabama - co01_d00_shp.zip	(154,345 bytes)
Alaska - co02_d00_shp.zip	(267,484 bytes)
Arizona - co04_d00_shp.zip	(80,924 bytes)
Arkansas - co05_d00_shp.zip	(187,942 bytes)
California - co06_d00_shp.zip	(273,328 bytes)
Colorado - co08_d00_shp.zip	(138,009 bytes)
Connecticut - co09_d00_shp.zip	(20,372 bytes)
Delaware - co10_d00_shp.zip	(9,594 bytes)
District of Columbia - co11_d00_shp.zip	(2,480 bytes)
Florida - co12_d00_shp.zip	(174,373 bytes)
Georgia - co13_d00_shp.zip	(311,162 bytes)
Hawaii - co15_d00_shp.zip	(20,415 bytes)
Idaho - co16_d00_shp.zip	(161,258 bytes)
Illinois - co17_d00_shp.zip	(161,083 bytes)
Indiana - co18_d00_shp.zip	(122,431 bytes)
Iowa - co19_d00_shp.zip	(108,941 bytes)

Step 2: Prepare the economic data for attachment to the geography file

After downloading the zipped geography file, use a decompression software (PKZIP) to expand the file directory (co17_d00_shp) into three files. New machines might already have decompression software installed. In that case just save the files from the zip folder into a new folder on your **C drive**. *Ensure you store all shape files in a folder on your C drive otherwise you might encounter technical errors.*

In total you should have these three files:

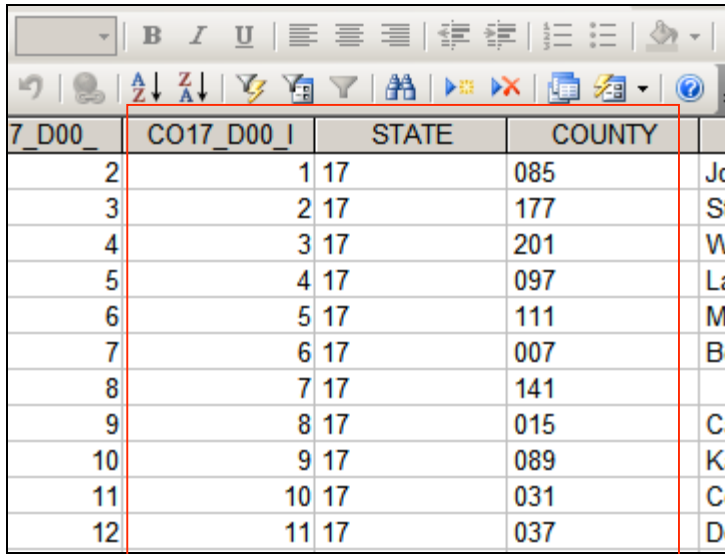
- **co17_d00.shp**
- **co17_d00.dbf**
- **co17_d00.shx**

The economic data included with this tutorial is in an Excel file, **Illinois.xls**. It is sorted with STCNTY FIPS 17001 first and 17203 last. When working with your own economic data you should use a database file, excel file, or access file with county level economic data. The economic data should include state and county FIPS fields and be sorted from low to high FIPS codes.

Now you are ready to begin combining your economic variables with the geography shapefile.

>> Open your (Illinois.xls) file in Excel, and open the dbf file (co17_d00.dbf) using Microsoft Access.

>> Copy the columns **CO17_D00_I**, **STATE**, and **COUNTY** from the (co17_d00.dbf) file and paste them as the last three variables in your economic variables data set in the (Illinois.xls) file.



7_D00_	CO17_D00_I	STATE	COUNTY
2	1	17	085
3	2	17	177
4	3	17	201
5	4	17	097
6	5	17	111
7	6	17	007
8	7	17	141
9	8	17	015
10	9	17	089
11	10	17	031
12	11	17	037

>> Next, highlight the *same three columns* (**CO17_D00_I**, **STATE**, and **COUNTY**) that are now in your economic variables spreadsheet (Illinois.xls).

>> Sort these three columns (Menu: **Data** → **Sort**) in ascending order by **STATE** and by **COUNTY** (If you only have one state you can just use county).

>> Visually confirm that the rows of **STATE** and **COUNTY** now match up with the state and county FIPS codes that were already in your spreadsheet.

>> Next, insert a new column next to the county FIPS in the **original** excel data and paste the correctly sorted ID column (**CO17_D00_I**) into your original data. Note that the **STATE** and **COUNTY** columns should be deleted if you are working from the same excel file.

>> Highlight all of the original economic variables and the newly included ID field **CO17_D00_I**. Then choose **File** → **Save As** and select a name (Illinois.dbf) and the file type **DBF 4 (DBASE IV)**. This will create a separate database file that includes the economic data that can be referenced to the geographic files.

If you did everything correctly, you will have sorted **CO17_D00_I** so that it will serve as a common numeric ID field for both the economic variables file and the geographic files.

Warning: *There are two obvious shortcuts to the above steps that will cause problems. First, why not just sort and attach the economic variables to the dBase file associated with the geography file? If you do this it is likely you will scramble internal indexing that matches data to areal units and you will end up with a random map. Second, why embed the ID column in the old data? If you don't, when you save the file as a .dbf it will not include the ID column. I'm not sure why but it works if you embed it and it fails when you don't.*

Step 3: Attach (“join”) the economic data to the geographic file

You are now ready to join the economic variables with the map.

>> Open GeoDa and then open the geography file (CO17_D00.shp) and select **CO17_D00_I** as the KEY field.



>> Next, click on the data icon in GeoDa to open the associated data file. Once there choose **Table → Join Tables using CO17_D00_I** as the KEY field.

Congratulations! You can now map, link, and brush to your heart's content.

OPTIONAL: EXTRACTING A SUB-REGION FROM THE STATE MAP

If you do not want to work with the entire set of state counties, you can extract a subset of the geography file. This is very simple with GIS software but I will assume you do not have access to it so this is the process to do it in GeoDa.

>> Start GeoDa, open the state geography file (CO17_D00.shp) and select **CO17_D00_I** as the KEY field. Click on the data icon to open the data associated with the geography file.

>> Choose **Table → Add Column** (name it **ID** in the dialog box), and then choose **Table → Field Calculation**. In the dialog box choose **ID** as the result. **SetRecord_ID** as the operation, click Apply. The **ID** field should now include numbers for the rows.

>> Select the map view and highlight the counties you want in your final map.

Tips:

- “Tile” the windows in the **Window** menu for a better view.
- Hold down the Shift key to select multiple counties.

>> In the data view select **Table → Promotion**. The selected counties will all rise to the top of the table;

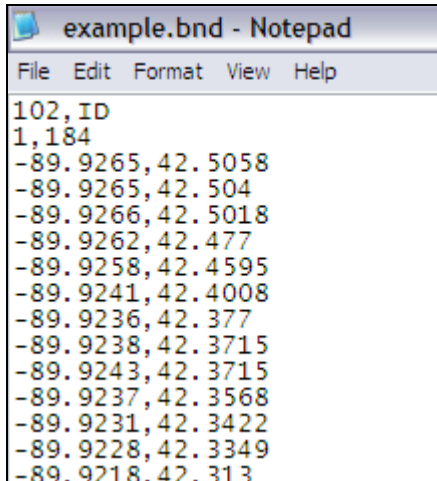
>> Record the **IDs** for those selected counties because you will need to have them later for editing.

>> Now save the new ID field by choosing, **Table → Save to Shapefile as...** and give it a new name, for example, Illinois.shp.

>> Now go to the **Tools** menu and select **Shape → To Boundary (.BND)**. For the input file, choose the map you just saved (Illinois.shp), for the output file choose another name

(ex. Central_Illini.bnd). Also check the buttons **Type 1a** and **bounding box**. Select **ID** as the KEY field.

>> Open the boundary file you just created using a **text editor (Microsoft Notepad)**



```
example.bnd - Notepad
File Edit Format View Help
102, ID
1, 184
-89.9265, 42.5058
-89.9265, 42.504
-89.9266, 42.5018
-89.9262, 42.477
-89.9258, 42.4595
-89.9241, 42.4008
-89.9236, 42.377
-89.9238, 42.3715
-89.9243, 42.3715
-89.9237, 42.3568
-89.9231, 42.3422
-89.9228, 42.3349
-89.9218, 42.313
```

Notice that the structure is as follows: The first line indicates there are 102 polygons (counties in this case) and that the KEY variable is ID. The next line begins with the first polygon with ID=1 which has 184 vertices. The next 184 lines are the vertices.

>> The next step is to edit the BND file to include only those IDs that you want to work with (refer back to the ID numbers you noted). Now delete all other IDs and all associated vertices.

>> You must also edit the first line to reflect the number of polygons that are remaining. In this example, if you only have two polygons (counties) in the first row you want to change 102 to 2.

>> After you finish, save changes to the file and then you can import it back into GeoDa using the Tools menu (Tools → Shape → Polygons from BND). Do this with a fresh GeoDa screen. For the Input file select the edited BND file. For the Output file create a new shape file. Click **Create**. Click **OK**. You can now open the new shape file you created using GeoDa.