

Visualizing Data: An Economists' Guide to Presenting Data

{ Jonathan A. Schwabish
jonathan.schwabish@cbo.gov
Congressional Budget Office

The views expressed in this presentation are those of the author and should not be considered those of the Congressional Budget Office.

Note: All images and logos in this presentation are linked.

Why Visualizations: Provide Information

- Misinformation about the budget and the economy is widespread
- Poll respondents consistently say that the U.S. spends about *10% of its budget on foreign aid*
 - The real answer is closer to 0.6%
- CBO provides accurate information about a lot of different subjects. But to discover that information, users must find the right report – or in some cases, multiple reports – and then read through a fair amount of text to find the relevant paragraphs

Why Visualizations: Data Overload

- We are also surrounded by more usable data and more usable information than ever before
- In one day, we create:

- 60 million Facebook updates



- 50 million Tweets



- 69,000 hours of video on YouTube



Infographics

- **What is an infographic?**
- Information graphics (or infographics) are graphic visual representations of information, data, and knowledge. They present information quickly and clearly, such as in signs, maps, charts, and text.
- **Who is using infographics?**
- The number of agencies (public and private), websites, blogs, and news organizations using infographics has exploded over the last few years.
 - In 2001, there were 61 infographics on the news site Digg.com
 - In 2010, there were over 2,700 infographics at Digg.com

Types of Infographics

- **Static**
 - Typically web-based
 - May not be suitable for printing
- **Dynamic**
 - May be animated
 - May or may not be interactive
- **What is best for your audience?**
 - CBO is working on both fronts

CBO's Infographic Demographic

- **Member of Congress**

- Wants to get specific information on a topic, a broad overview, quick facts, or bullet points



- **Congressional Staffer**

- Wants to get data quickly. Might be briefing Member on topics outside usual areas of responsibility.

Leaders in the Field

- Edward Tufte



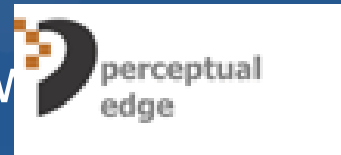
- Visualising Data (Andy Kirk)



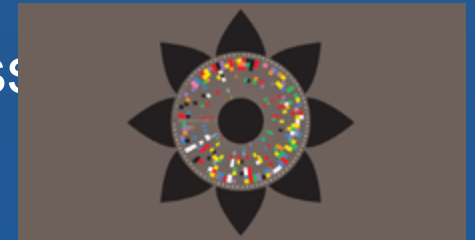
- FlowingData (Nathan Yau)



- Perceptual Edge (Stephen Few)



- Information is Beautiful (David McCandless)



TED Talks **TED** Ideas worth spreading



[Mike Matas, Push Pop Press: A next-generation digital book](#)

TED Talks **TED** Ideas worth spreading



[Aaron Koblin: Artfully visualizing our humanity](#)

Visualization Showcase Websites

- Visual.ly



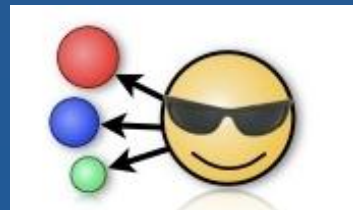
- Visualizing.org

- Good.is



- The Infographics Showcase

- Coolinfographics (Randy Krum)




Available Tools—Production Software

- There are a **lot** of tools available
 - Some software must be purchased, many are open source
- Microsoft Office (Excel, Visual Basic, NodeXL, Word)

- **Adobe Creative Suite** (Illustrator, InDesign, Photoshop)



- Adobe Edge (Beta version)
- Adobe  (for color)



More Visualization Tools

- **Programming Languages**

- HTML, HTML5, Flash, JavaScript, R, Processing, Protovis

- **Mapping**

- MapInfo, ArcGIS, StatPlanet, Stata

- **Word Clouds**

- Tagxedo & Wordle 

- **Software**

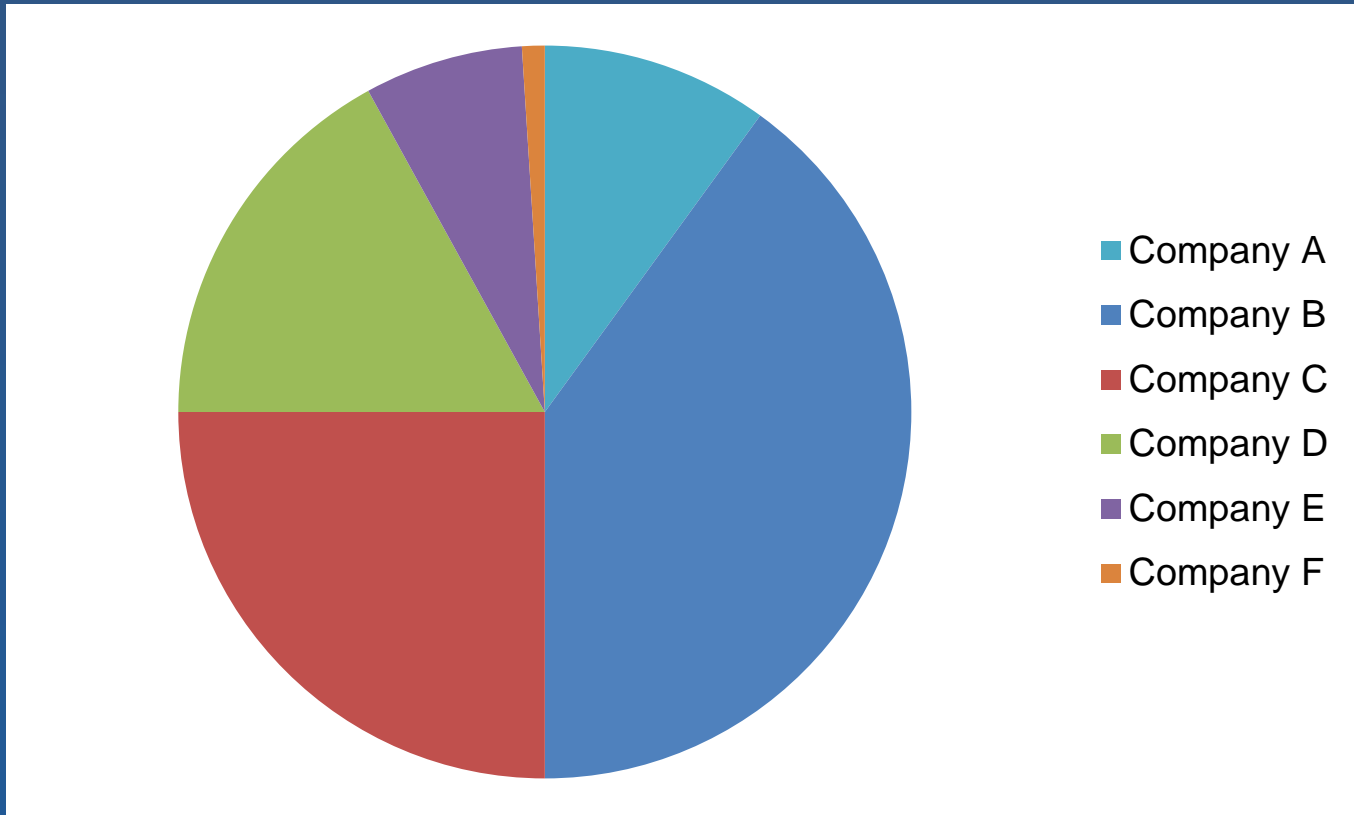
- Gapminder*, Tableau, Google Lab



My Strategies

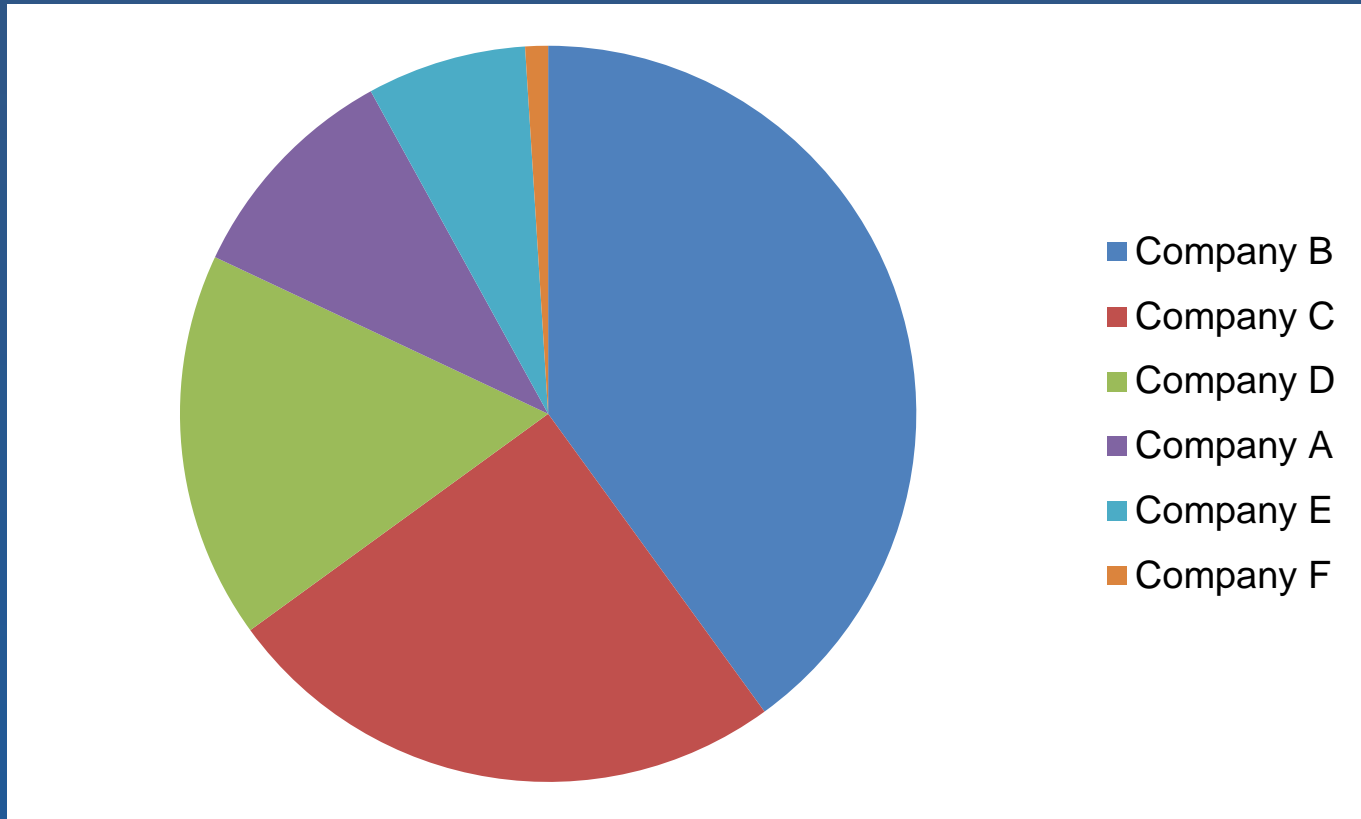
- First, I'm an economist, not a graphic designer
- What is the bottom line?
 - Tell the story concisely
- Simplify
 - But also try to use as many data elements as possible
- Reduce 'chartjunk'
 - No pie charts!*
- Find unique ways to present data
- Colors and fonts

No pie charts! (?)



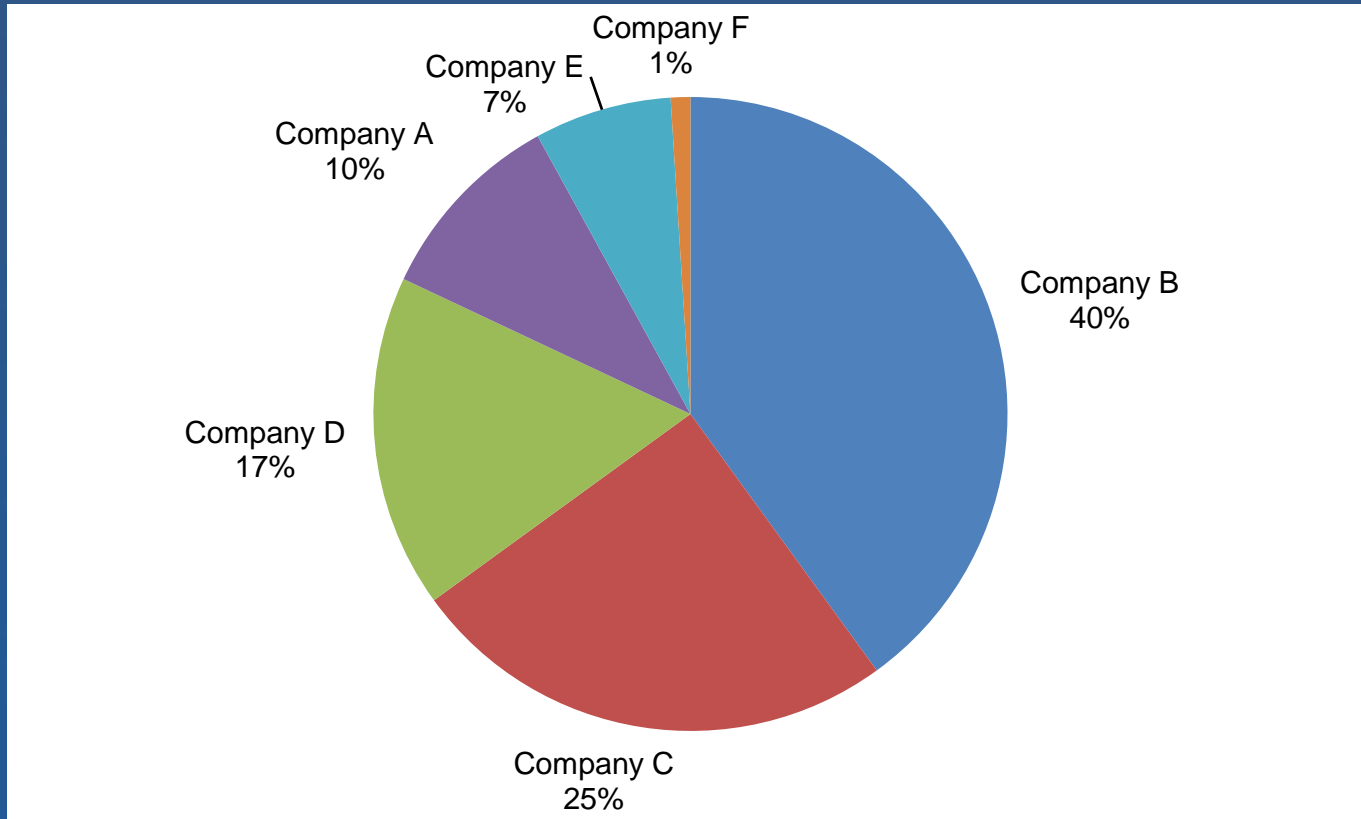
* Notice how easy it is to determine size of Company C

No pie charts! (?)



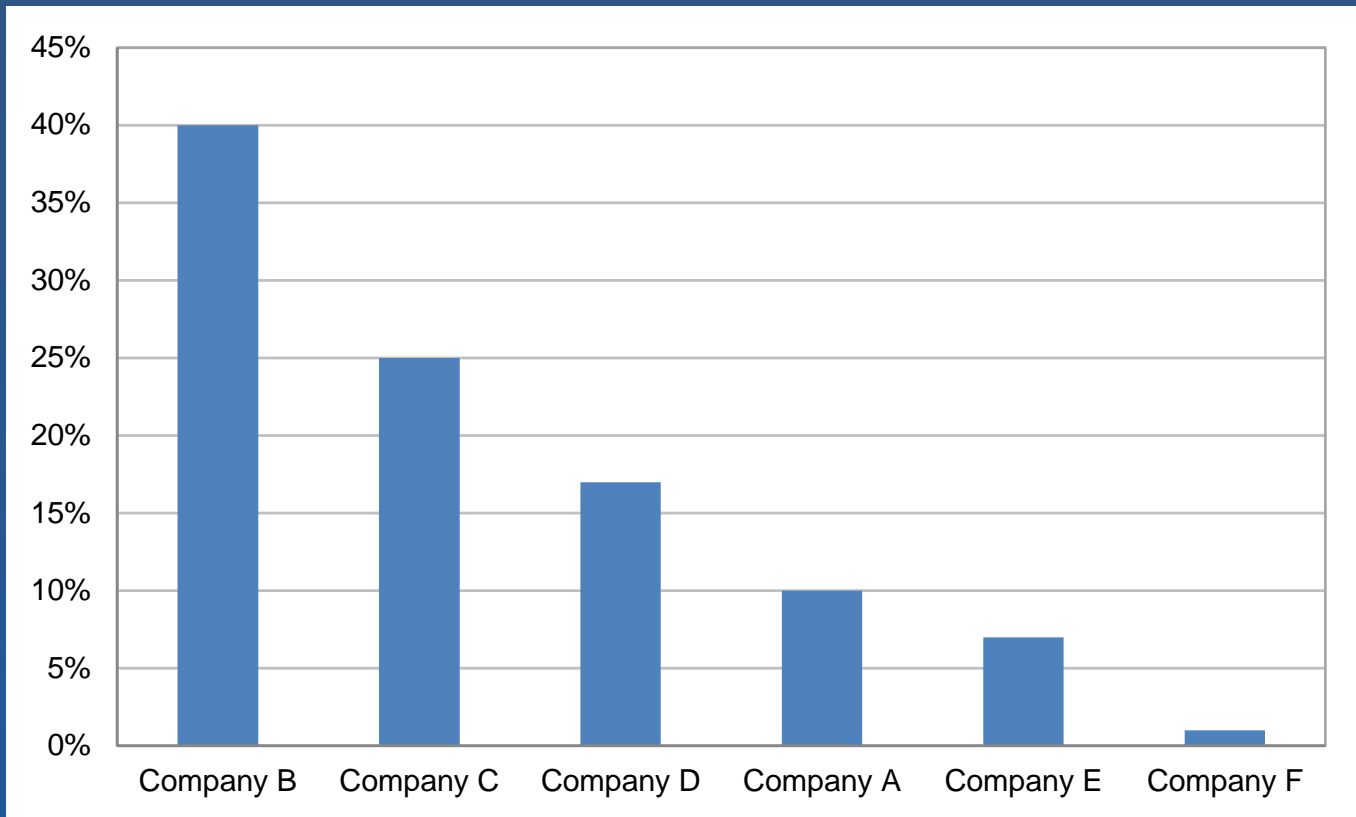
* But look what happens when pie is rotated

No pie charts! (?)



* We could add labels....but then we have a glorified table

No pie charts! (?)



* How about a simple chart instead?

Projects

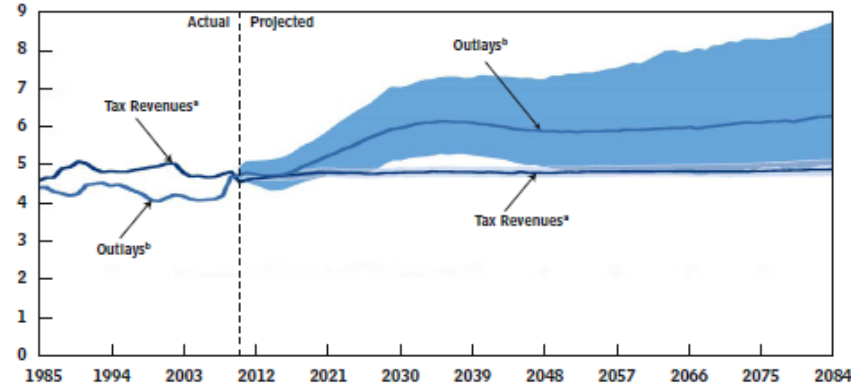
- Chartbooks
 - SlideShare
- New graphic elements in CBO publications
 - Immigration
 - Social Security and Budget & Economic Outlook
- Static Infographics
 - My personal showcase
 - CBO showcase
 - Social Security, Deforestation, TARP, Budget, SNAP (food stamps)
- Interactive Infographics: Maps

CBO's Chartbooks

Exhibit 1.

Social Security Tax Revenues and Outlays, with Scheduled Benefits

(Percentage of gross domestic product)



Source: Congressional Budget Office.

Note: The lines indicate CBO's projections of expected outcomes. The shaded areas indicate the 80 percent range of uncertainty.

- a. Includes payroll taxes and income taxes on benefits.
- b. Includes scheduled benefits and administrative costs.

In 2009, Social Security's total outlays (benefits plus administrative costs) equaled 4.8 percent of the country's gross domestic product (GDP); tax revenues equaled 4.9 percent of GDP. Most of the program's tax revenues come from Social Security payroll taxes, although a small portion comes from income taxes on benefits paid to higher-income beneficiaries. In addition to those tax revenues, the trust funds are credited with interest. Over the next few years, outlays will approximately equal tax revenues, CBO projects.

By 2034, as the baby-boom generation ages and the number of beneficiaries grows, scheduled spending will climb to 6.2 percent of GDP, CBO estimates. Over the ensuing two decades, spending will decline slightly, relative to the size of the economy, as people in the baby-boom generation die. Demographers generally predict that life expectancy will continue to rise and that birth rates will remain as they are now, so scheduled outlays are projected to resume their upward trajectory after 2050, reaching 6.4 percent of GDP in 2084.

The amount of tax revenues credited to the trust funds is likely to stay almost constant as a share of GDP over the next 75 years, edging up from 4.9 percent of GDP in 2009 to 5.0 percent in 2084. CBO projects that although people's total compensation will be nearly constant as a percentage of GDP, taxable earnings will decline relative to GDP. Revenues from payroll taxes thus will fall slightly as a share of GDP, from 4.8 percent in

(Continued)

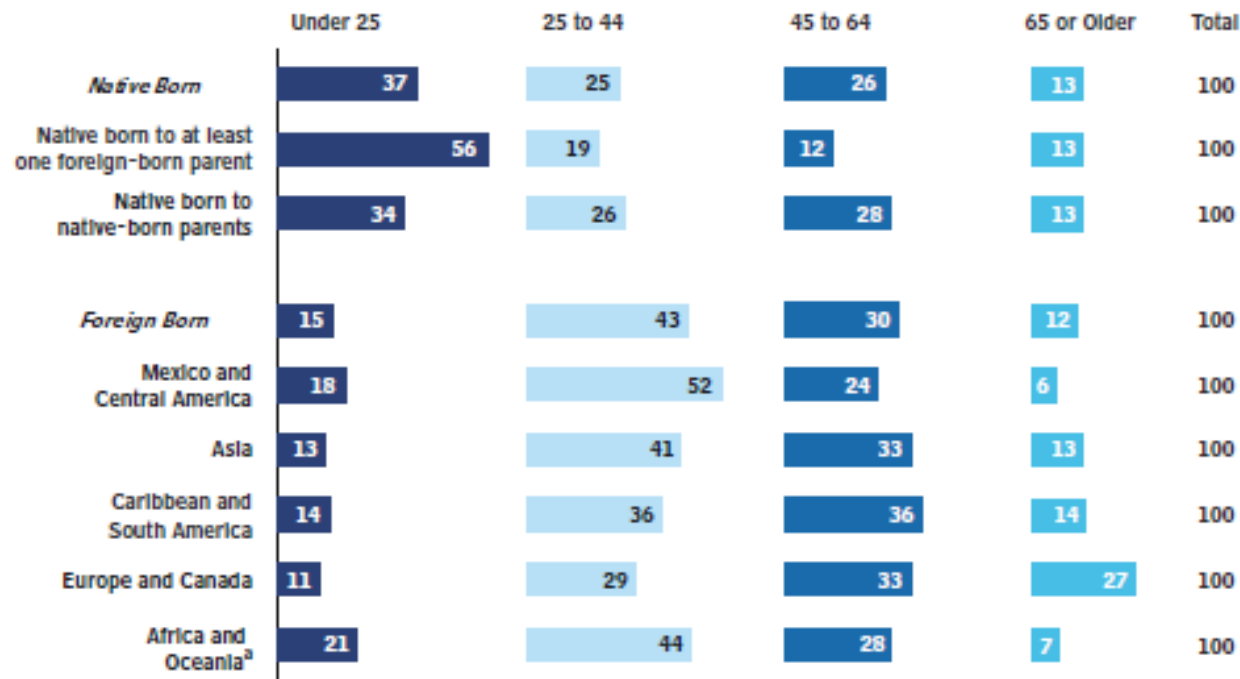
One graphic per page; maximum of 250-300 words per page.

Graphics don't have to be complicated...

Exhibit 9.

U.S. Population, by Age and Birthplace, 2009

(Percent)



Source: Congressional Budget Office based on monthly data from Census Bureau, Current Population Survey, Outgoing Rotation Groups, 2009.

a. Includes Australia, New Zealand, and the Pacific Islands.

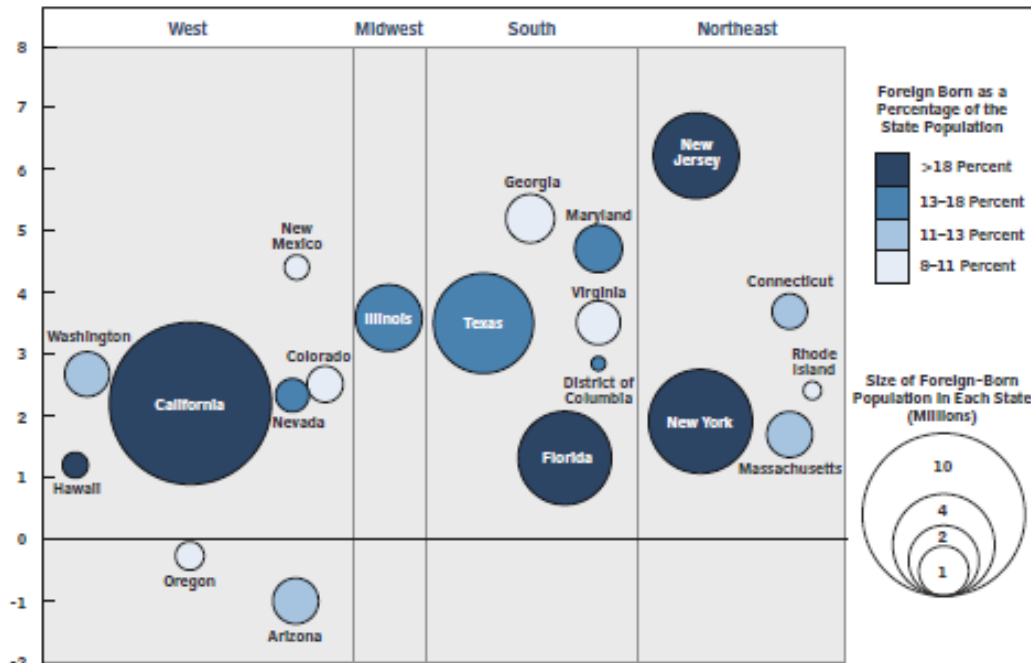
A different kind of bar chart

but they can be...

Exhibit 8.

Twenty States with the Highest Shares of Foreign-Born People, by Region, 2009

(Change in the percentage of foreign-born residents in the state population, 1999 to 2009)



Source: Congressional Budget Office based on monthly data from Census Bureau, Current Population Survey, Outgoing Rotation Groups, 1999 and 2009.

Note: The larger the circle, the greater the state's population in 2009. The higher the circle is on the scale, the more its foreign-born population increased (or the less it decreased) as a percentage of the state's total population from 1999 to 2009. The darker the circle, the greater the state's foreign-born population as a share of its total population in 2009.

Note how this graphic has 4 data elements:

1. Size of foreign-born population
2. Density of foreign-born population
3. Percentage change in foreign-born population
4. Region

This presentation is continued in
Visualizing Data: An Economists'
Guide to Presenting Data – PART 2
on the AABPA website.