China Data Institute

A Comparative Study of Regional Dynamics of U.S. and China
中美区域动态比较研究

Shuming Bao

Topics

- Background
- Objectives
- Literature studies
- Data
- Three levels analysis with US and China Geo-Explorer
  - National Analysis
  - Regional Analysis
  - Local Analysis
- Findings from this study
- Topics for further studies

A Comparative Study of Regional Dynamics of U.S. and China

Both the U.S. and China have experienced significant socioeconomic dynamics within recent decades, including the spatial distribution and composition of population and industry. While some regions experienced spatial growth of population and industry, other regions experienced declining population and industry. Those trends may continue and will have significant impacts on regional development and reshape the future landscape.

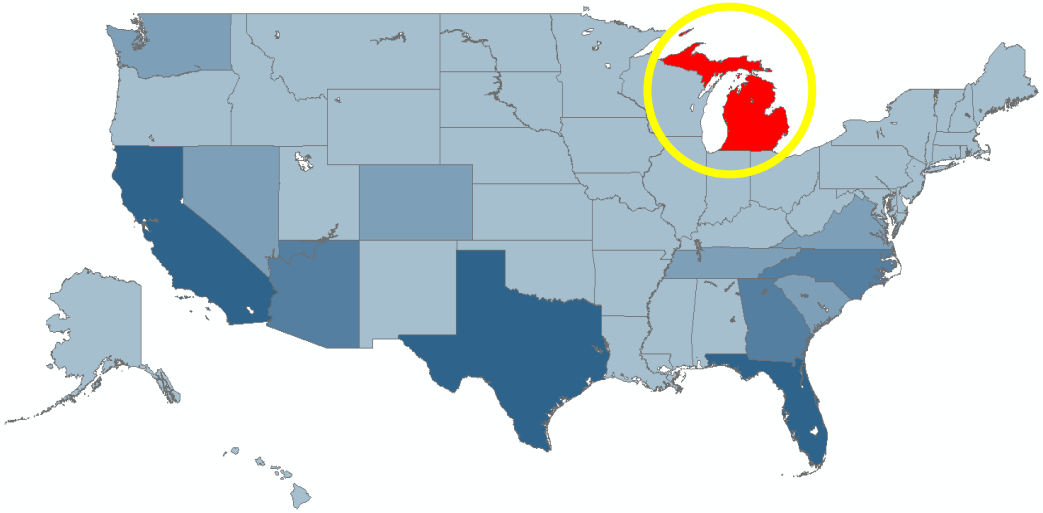
This talk will present a comparative study of regional dynamics of U.S. and China based on the US Geo-Explorer and China Geo-Explorer. It will demonstrate:

- how to identify those counties and cities with growing or declining population from 2000-2010 in the U.S. and China;
- how to identify the difference in the population and industry structure between growing and declining regions;
- how to identify primary changes in the population and industrial/business structure of declining regions.
- What are the further topics for future studies.

Population Loss (%) with States/Provinces in US and China
2000-2010

4 out of 31 provinces in mainland China experienced shrinking population from 2000 to 2010

Michigan is the only state experienced shrinking population from 2000 to 2010

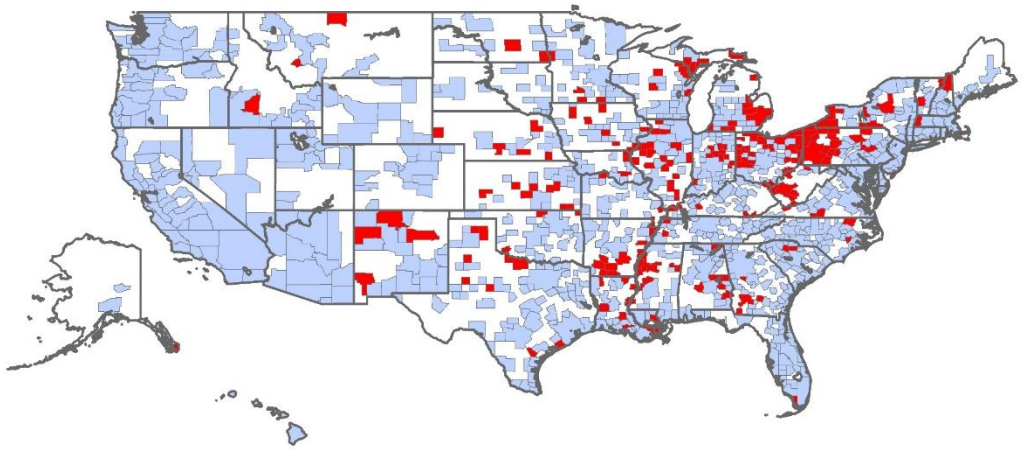


Population Loss with Metropolitans/Cities in US and China

2000 - 2010

97 out of 343 prefecture cities in mainland China experienced shrinking population from 2000 to 2010

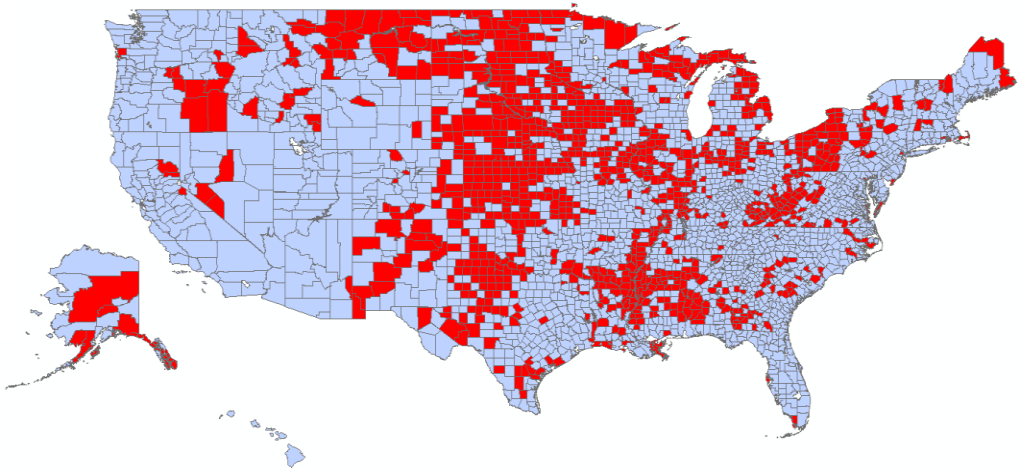
207 out of 942 metropolitans in the US experienced shrinking population from 2000 to 2010



Population Loss with Counties in US and China
2000 - 2010

1,031 out of 2,751 counties in mainland China experienced shrinking population from 2000 to 2010.

1,099 out of 3,143 counties in the US experienced shrinking population from 2000 to 2010.



A Spatial Study of Regional Dynamics of China and US

Aim: An exploratory analysis of declining population in the US and China with three levels analysis at **national**, **regional** and **local** levels.

Objectives:

- To identify those regions with declining population from 2000-2010 in China and US – **Where declining?**
- To identify the primary difference in the population and industry structure between regions with declining or growing population – **What difference?**
- To identify primary changes in the population and industrial structure of regions with declining population – **What changes?**

Literature Studies

- **Declining population growth** (Hansen, 1939; Barro, 1991)
- **People follow jobs** (Borts & Stein, 1964; Muth, 1971; Steinnes & Fisher, 1974).
- **Growth pole spillover and backwash effect** (Richardson, 1976; Gaile 1980; Guile, 2010)

Data Sources: http://china-data-online.com http://data-planet.com

Data Source	Description
Statistics	Yearly statistics, including general economy, population, employment, industrial production, investment,…
Census Data	Data from population census/economic census and business records aggregated at different levels.
Administrative boundary maps	Administrative boundary maps of states/provinces, metropolitans/cities and counties.

Challenges: Spatial and temporal comparability

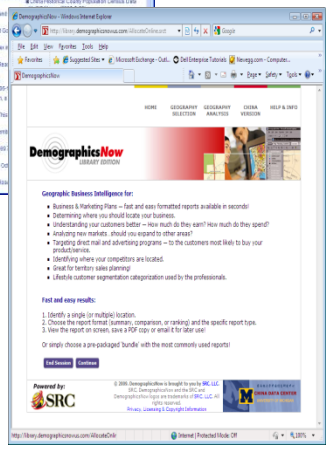
Census data: data are not comparable across different censuses due to changes in the census units (metropolitan/prefecture city/county/township; census tracts and blocks).

US & China Geo-Explorer

An Integration of Spatial Data and Analysis for Global Studies

Statistics

Census

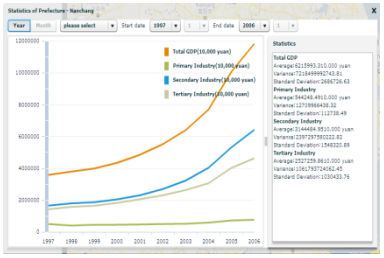


GIS

Data

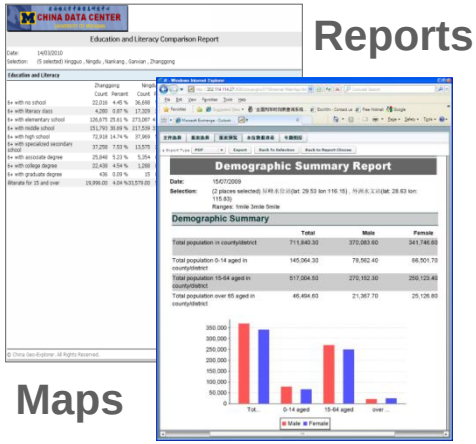
Output

Charts

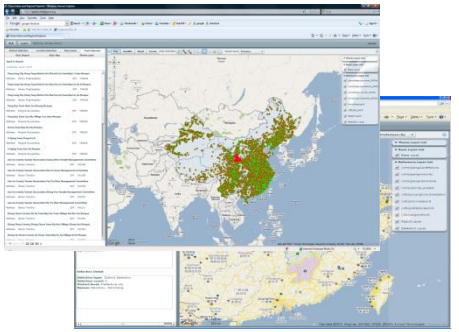


Tables

Reports



Maps



Data: China

- **Government Statistics**
  - Provincial Statistics (1949 -)
  - City Statistics (1996 -)
  - County Statistics (1997 -)
- **Population Census**
  - Census 1953
  - Census 1964
  - Census 1982
  - Census 1990
  - Census 2000/2010 (province, city, county, township, GRID)
- **Economic Census**
  - Industrial Census 1995 (province, city, county, ZIP)
  - Basic Unit Census 2001 (province, city, county, ZIP)
  - Economic Census 2004/2008 (province, city, county, ZIP)
- **Establishments** (more than 7 millions companies and organizations)
- **Geography and Environment**
  - Land Use data
  - Night-Time data

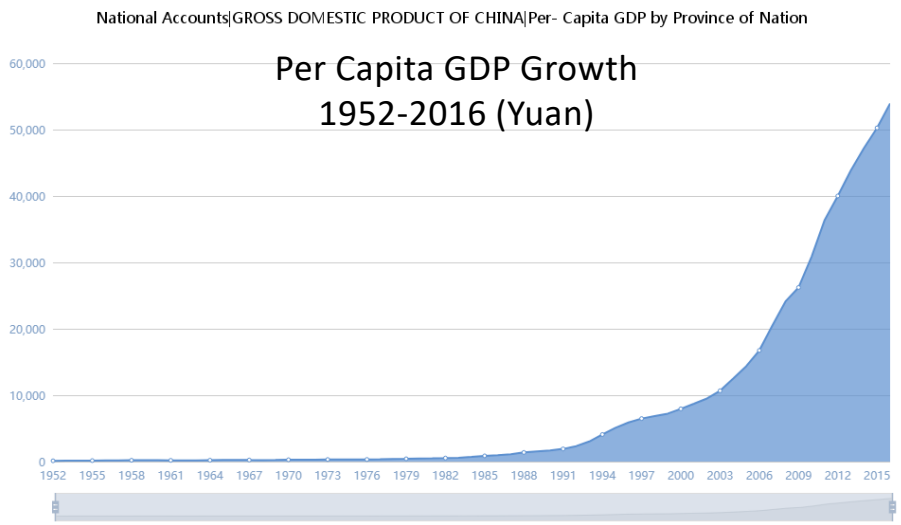
Data: US

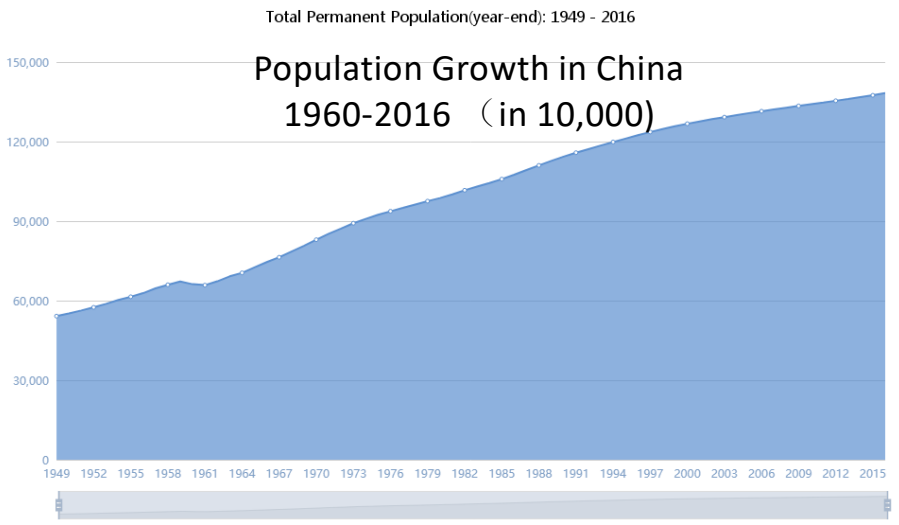
- **Population Census**
  (State, County, Tract, Block, Metropolitan, CCD, Place)
  - Population Census1970
  - Population Census1980
  - Population Census1990
  - Population Census2000
  - Population Census2010
  - American Community Survey
- **Business Patterns**
  (State, County, Metropolitan）
  - Yearly business patterns 1986 - 2013
- **Business Units**
  - Business Records 2013 (85 industries)
  - Aggregated reports 1997-2013
    (State, County, Metropolitan, CCD , ZIP）

National Level Analysis

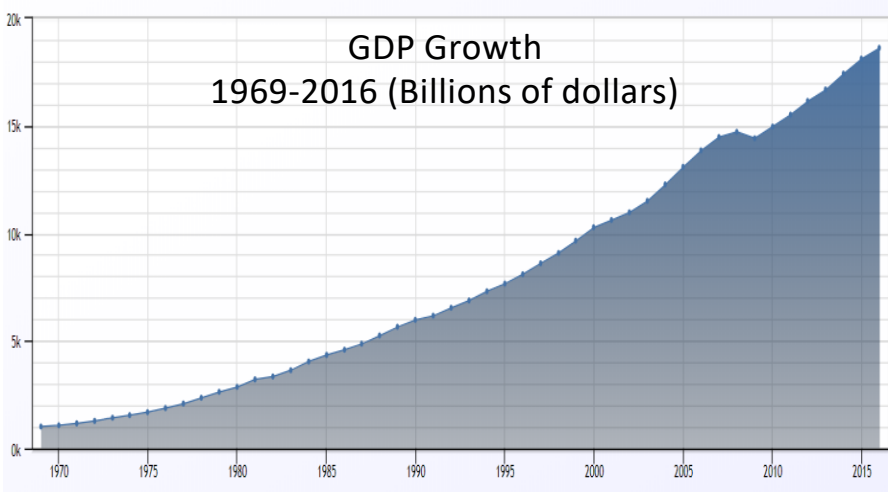
Declining Natural Population Growth

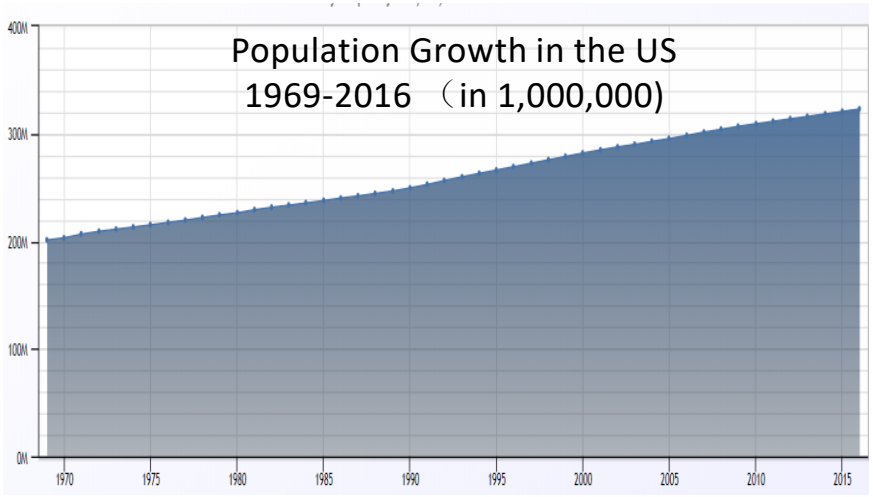
Slowing Population Growth with Economic Growth:
National Level Analysis





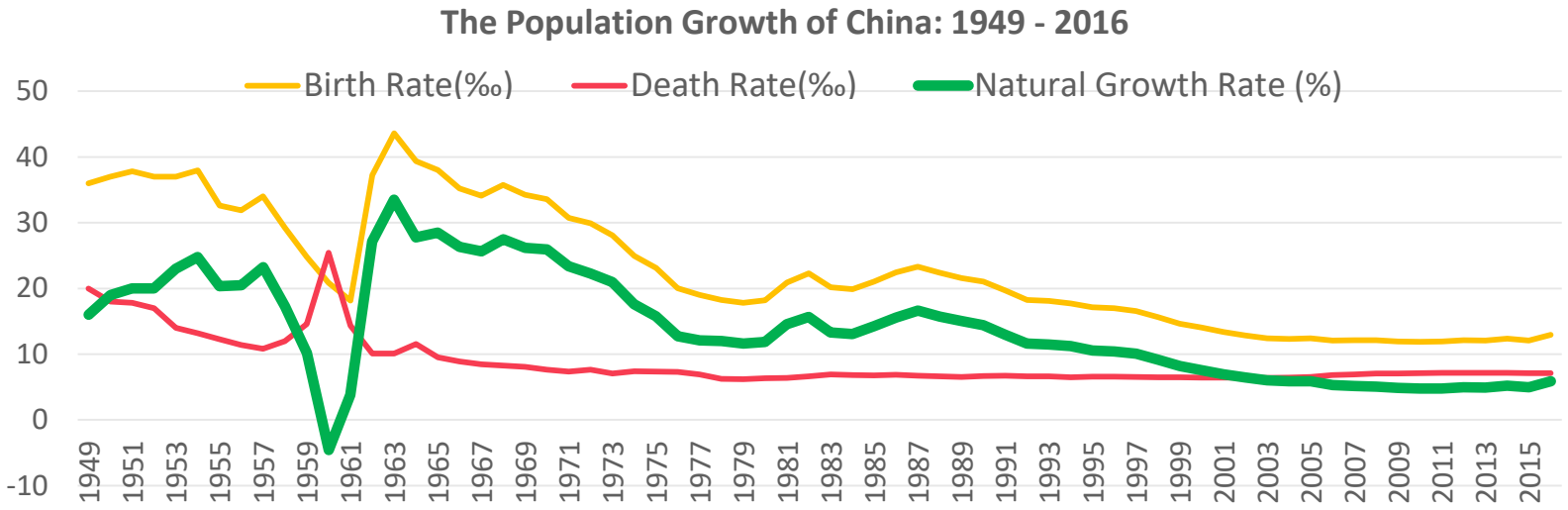
Data source: http://china-data-online.com/sdq/search.htm



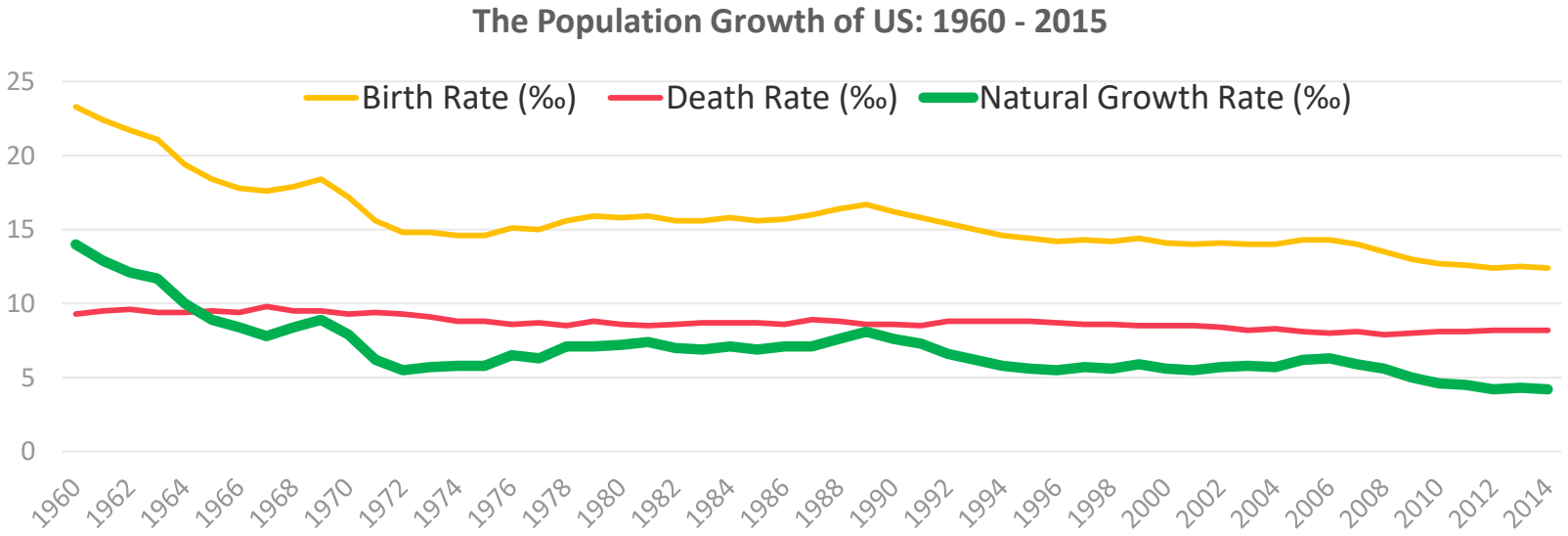


Data source: http://data-planet.com

Declining Natural Population Growth Rate with Economic Growth:
National Level Analysis



Data source: http://china-data-online.com/sdq/search.htm

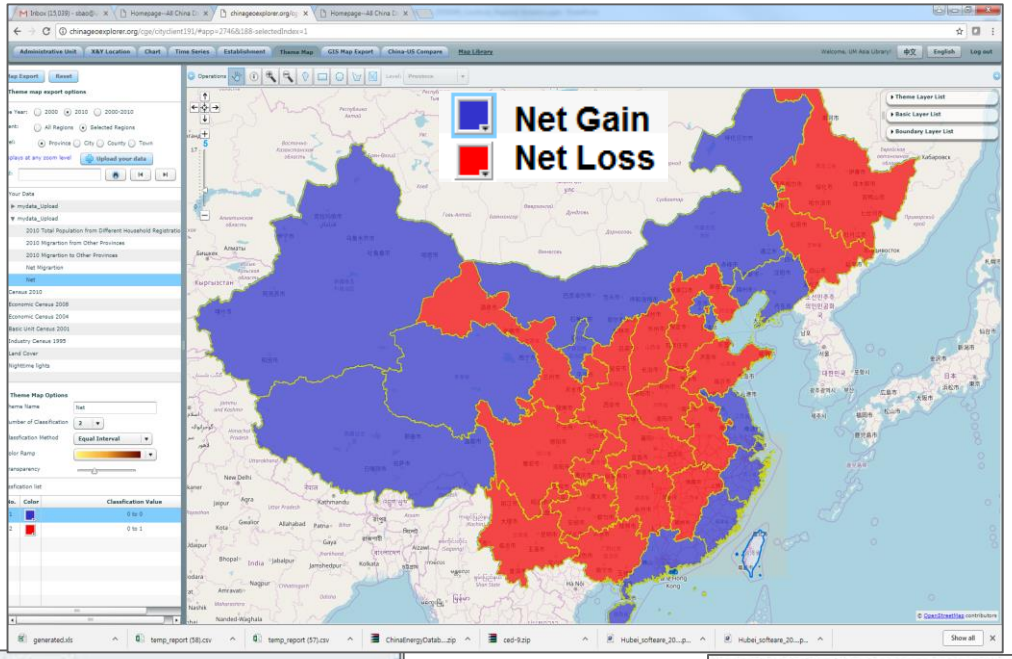


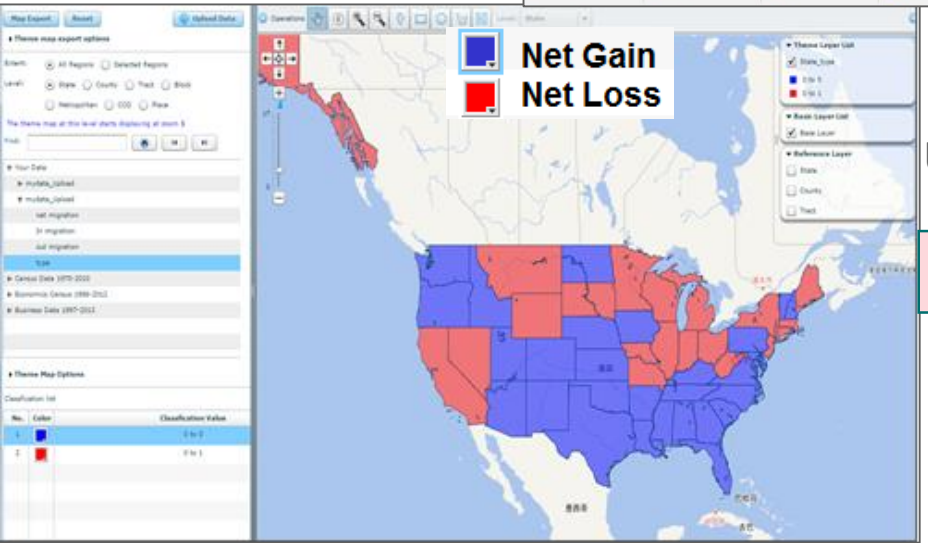
Data source: http://data-planet.com

Regional Migration

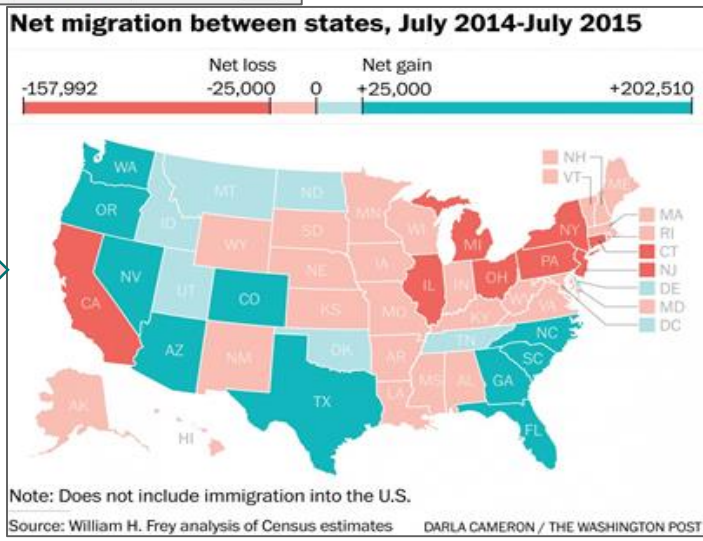
Net Migration by Provinces/States

China: Net Migration by Province from Census 2010





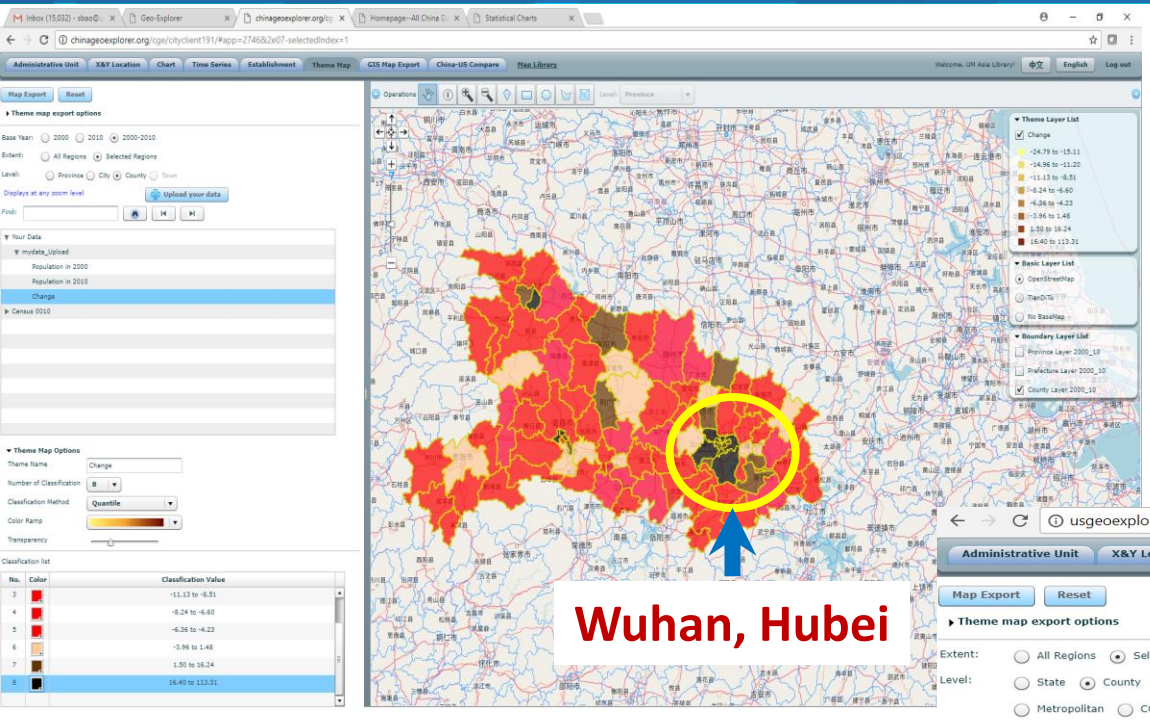
US: 2010-2015

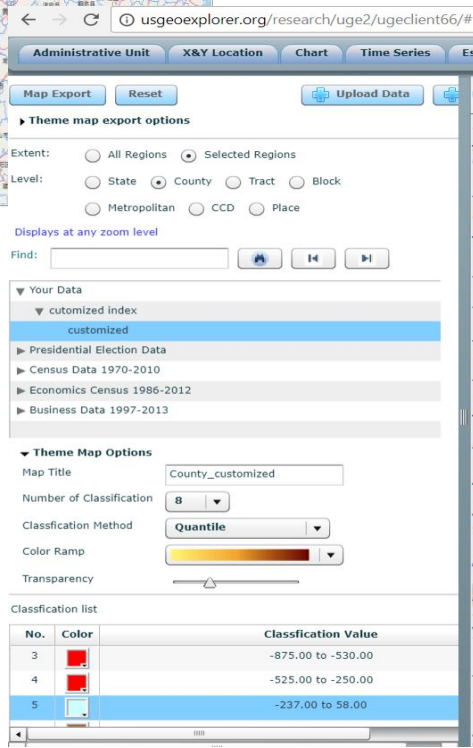


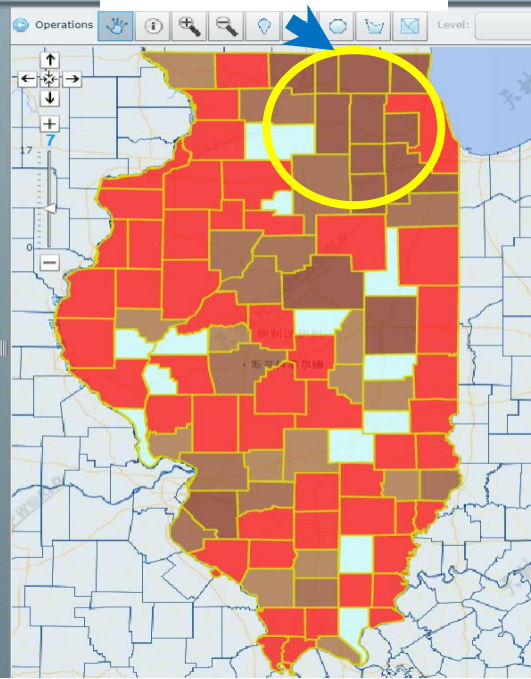
Local Level Analysis

Spatial Concentration

Growth Pole Spillover and Backwash Effect:
County Population Changes: 2000 - 2010



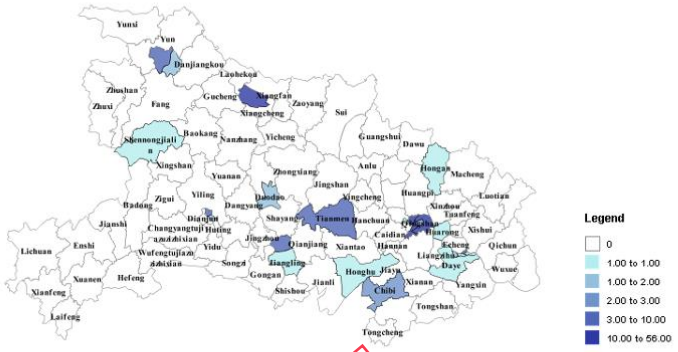




People Follow Jobs:
Spatial Concentration of Population and Industry

Software Development Consulting By County of Hubei, 2001

Software, 2001



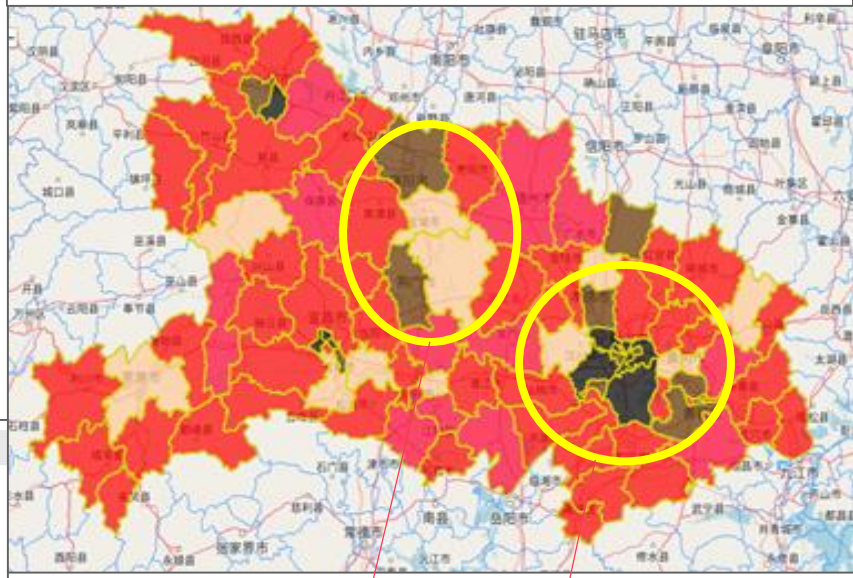
China Data Center & Spatial Data Center of University of Michiga
Development Consulting By County of Hubei. Statistical Map Lib
Hubei. Map-ID: 8620013in_8310_142

Application software services By County of Hubei, 2004

Software, 2004

China Data Center & Spatial Data Center of University of Michigan (2018). Economic Census 2004, Information Transmission, Computer S
Software, Software Industry, Application software services By County of Hubei. Statistical Map Library by China Data Center of University
Country: China. Region: Province - Hubei. Map-ID: 8620043in_6212_442

Population Change: 2000 - 2010



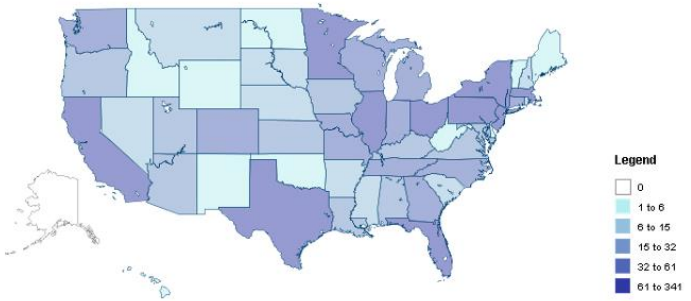
Application software services By County of Hubei, 2008

Software, 2008

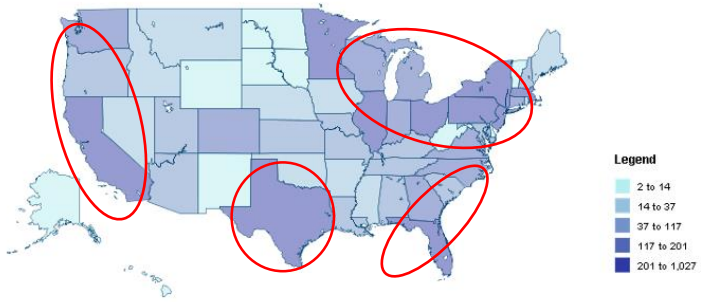
China Data Center & Spatial Data Center of University of Michigan (2018). Economic Census 2008, Information Transmission, Computer Services and Software, Software Industry, Application software services By County of Hubei. Statistical Map Library by China Data Center of University of Michigan.
Country: China. Region: Province - Hubei. Map-ID: 8620083in_6212_08_1042

Changing Industrial Landscape: US & China

US: SURGICAL AND MEDICAL INSTRUMENTS (1997 – 2013)

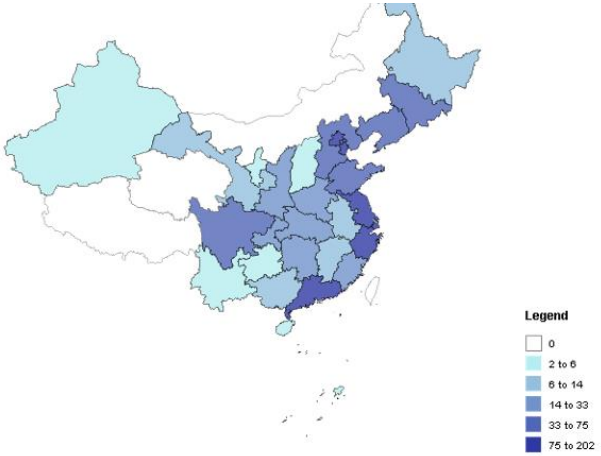


Spatial Data Center of University of Michigan (2017). Business Data 1997-2013, Firm Level Total 1997, 38: Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks, 3841: SURGICAL AND MEDICAL INSTRUMENTS_1997 By State. Statistical Map Library by Spatial Data Center of University of Michigan. Country: US. Region: Nation Map-ID: 11997lflot3841_1997

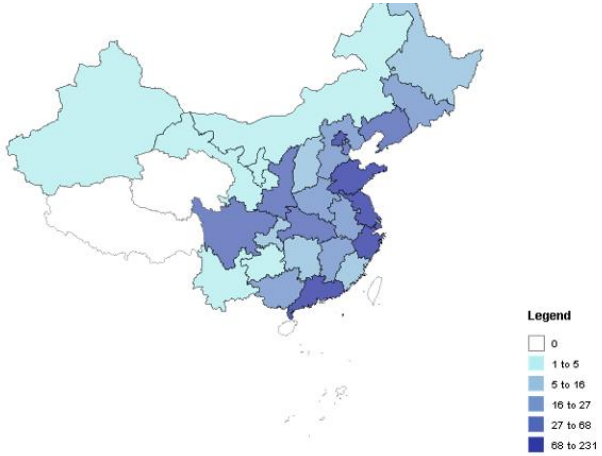


Spatial Data Center of University of Michigan (2017). Business Data 1997-2013, Firm Level Total 2013, 38: Measuring, Analyzing, And Controlling Instruments; Photographic, Medical And Optical Goods; Watches And Clocks, 3841: SURGICAL AND MEDICAL INSTRUMENTS_2013 By State. Statistical Map Library by Spatial Data Center of University of Michigan. Country: US. Region: Nation Map-ID: 12013lflot3841_2013

China: Medical Equipment (01-08)



China Data Center & Spatial Data Center of University of Michigan (2017). Basic Unit Census 2001, Number of Business Units By Industry, Medical Apparatus And Equipment By Province. Statistical Map Library by China Data Center of University of Michigan. Country: China. Region: Nation Map-ID: 862001in_3652_01



China Data Center & Spatial Data Center of University of Michigan (2017). Economic Census 2008, Manufacturing, Manufacture of Special Purpose Machinery, Medical diagnosis, care and treatment equipment manufacturing By Province. Statistical Map Library by China Data Center of University of Michigan. Country: China. Region: Nation Map-ID: 8620081in_3681_08_00

Spatial Difference of Population and Industry

Population Difference between Growing and Shrinking Counties in the US and China

G&S	China (%)	US (%)
Growing Counties	Urban Population	Population Hispanic or Latino
	Total Population from Different Household Registration Places	Class of Worker: Employee of private company workers
	Percentage of Female of Non-agricultural Population to Total Female	Population Age 14-24
	Percentage of Non-agricultural Population to Total Population	Hispanic White Alone
	Total Non-agricultural Population	Female: 18-34 years: Nonveteran
	Percentage of Male of Non-agricultural Population to Total Male	Race Some Other Race Alone
	Total Male from Different Household Registration Places	Population Age 15+: Never Married
Shrinking Counties	Dependency Ratio of The Aged	Non-Hispanic Householder
	Total Dependency Ratio	Population Non-Hispanic
	Total Agricultural Population	Non Hispanic White Alone
	Total Population Who Reside in the Township, Towns and Street Communities and Have Their Permanent household Registration There2000	Educational Attainment Age 25+ : High school graduate, GED
	Rural Population	Population age 65 or more
	Total Population with Household Registration by County	Household Language: English

Population Difference between Growing and Shrinking Counties in the US and China

For China:

- Counties with growing population are featured with higher % of urban population, non-agriculture population, and migration
- Counties with declining population are featured with higher % of rural population, agriculture population, dependency ratio, and aged ratio
- Data source: 2010 China Population Census.

For the US:

- Counties with growing population are featured with higher % of migration and young generation
- Counties with declining population are featured with higher % of traditional population, lower education, and aged ratio
- Data source: 2010 US Population Census.

Business Difference between Growing and Declining Counties in the US

Changes	China (Establishments Per 10,000 Persons)	US (Establishments Per 10,000 Persons)
Growing Counties	Other mechanical equipment and electronic products wholesale	Real Estate Agents And Managers
	Metal and metal ore wholesale	Single-family Housing Construction
	Building Decoration Industry	Lawn And Garden Services
	Real estate development and management	Miscellaneous Retail Stores, Nec
	The advertising industry	Building Maintenance Services, Nec
	Hardware and Interface wholesale	Miscellaneous Personal Services
	General Affairs Management Agencies	Management Consulting Services
	Building Materials Wholesale	Mortgage Bankers And Correspondents
Shrinking Counties	Primary School	Farm Supplies
	Timber processing	Executive Offices
	Corn Milling	Fire Protection
	Industrial organizations	Insurance Agents, Brokers, And Service
	Economic management	General Farms, Primarily Animals
	Technical extension services	U.S. Postal Service
	Clay brick and tile building block manufacturing	Elementary And Secondary Schools
	Hydraulic Power	General Farms, Primarily Crop
	Clinics Medical Treatment Activities	Religious Organizations
	Village autonomous organizations	Legislative Bodies

Business Difference between Growing and Shrinking Counties in the US and China

For China:

- Counties with growing population are featured with real estate and high-end services
- Counties with declining population are featured with farming related and low-tech business.

Data source: 2010 China Economic Census data.

For US:

- Counties with growing population are featured with real estate and high-end services
- Counties with declining population are featured with farming, religious organizations, and low-tech services.

Data source: 2010 US business data.

Findings from the Comparative Study

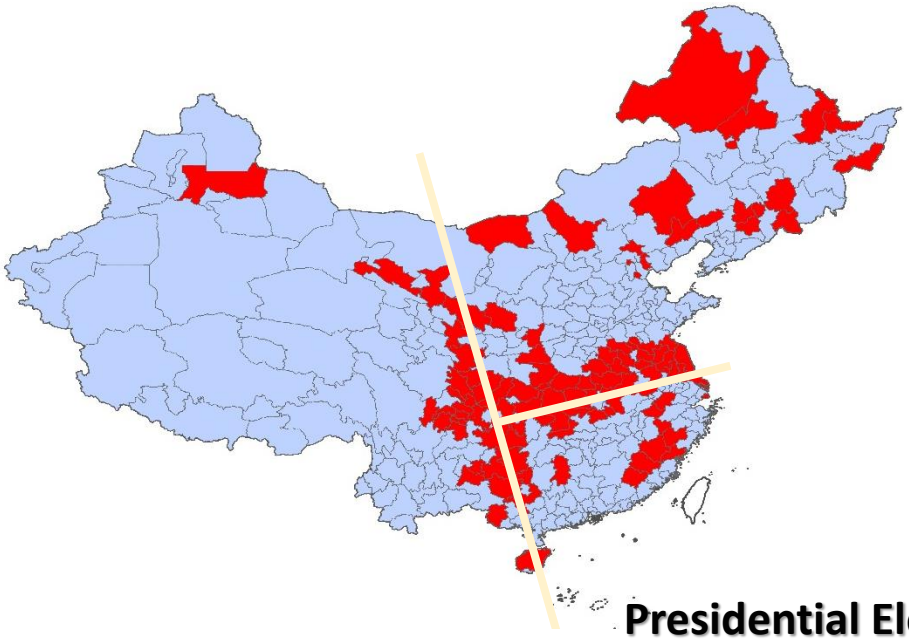
Similarity:

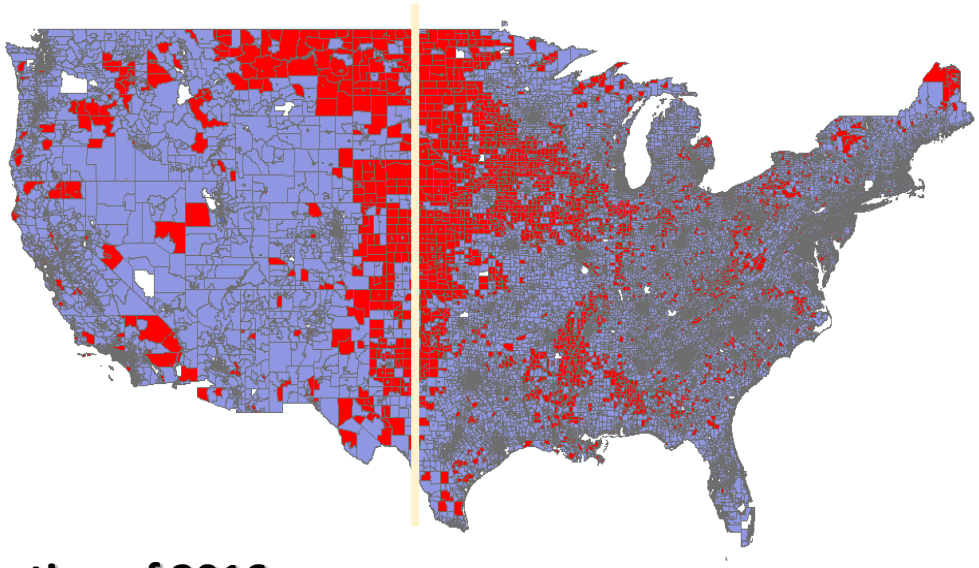
- Declining natural population growth.
- Most interior and northern regions experienced population loss while coast and southern regions experienced population gain.
- Co-existence of spatial concentration around urban centers and backwash effect of growth poles in remote areas.
- Counties with growing population are featured with higher % of migration while counties with declining population are featured with higher % of rural population and higher aged ratio.
- Counties with growing population are featured with high tech manufacturing and high-end services while counties with declining population are featured with farming related business and low tech business.

Differences:

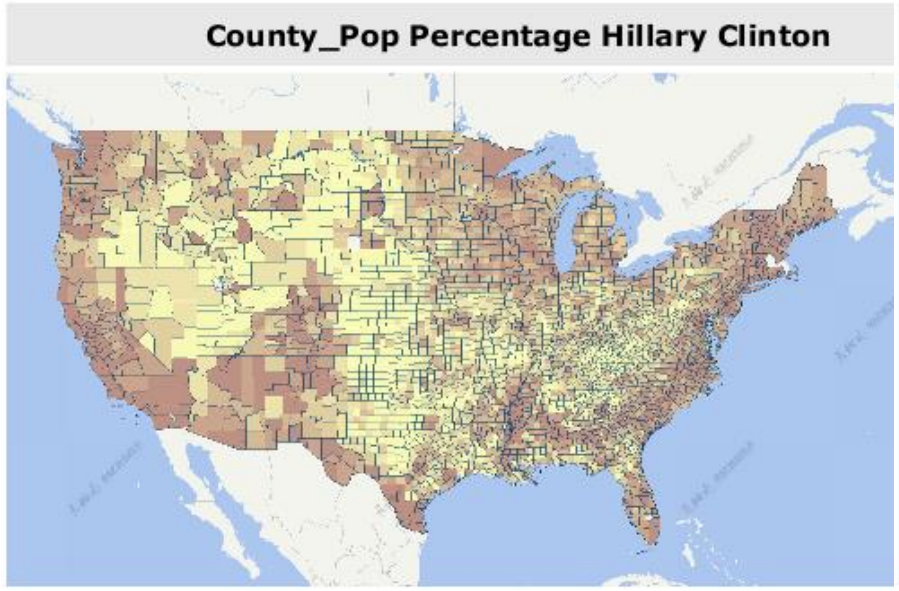
- China's counties with growing population are featured with higher % of urban population while counties with declining population are featured with higher % of rural population
- US's counties with growing population are featured with higher % of immigration while counties with declining population are featured with higher % of traditional population.

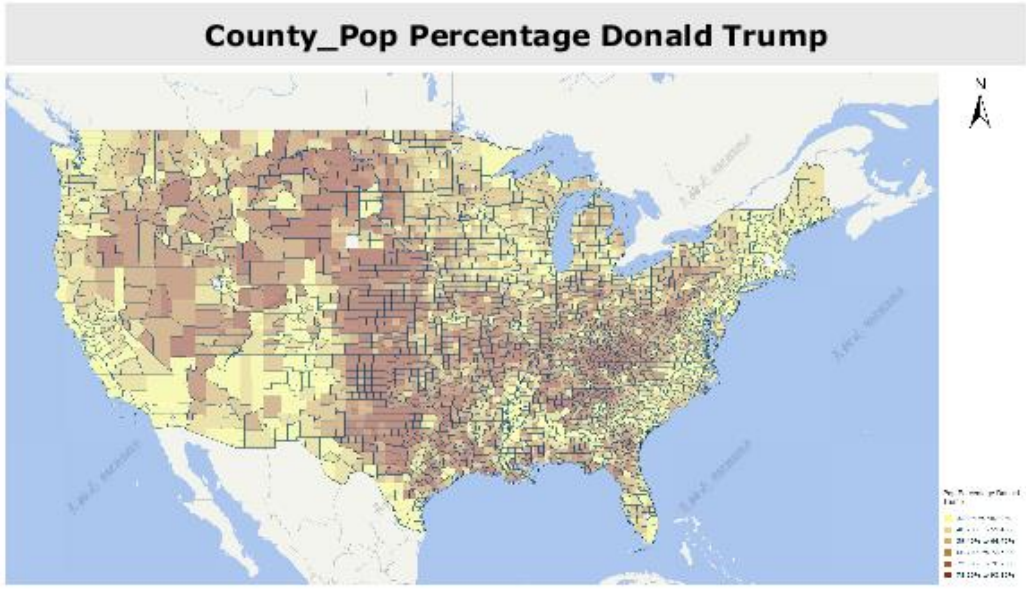
A Divided Landscape?





Presidential Election of 2016

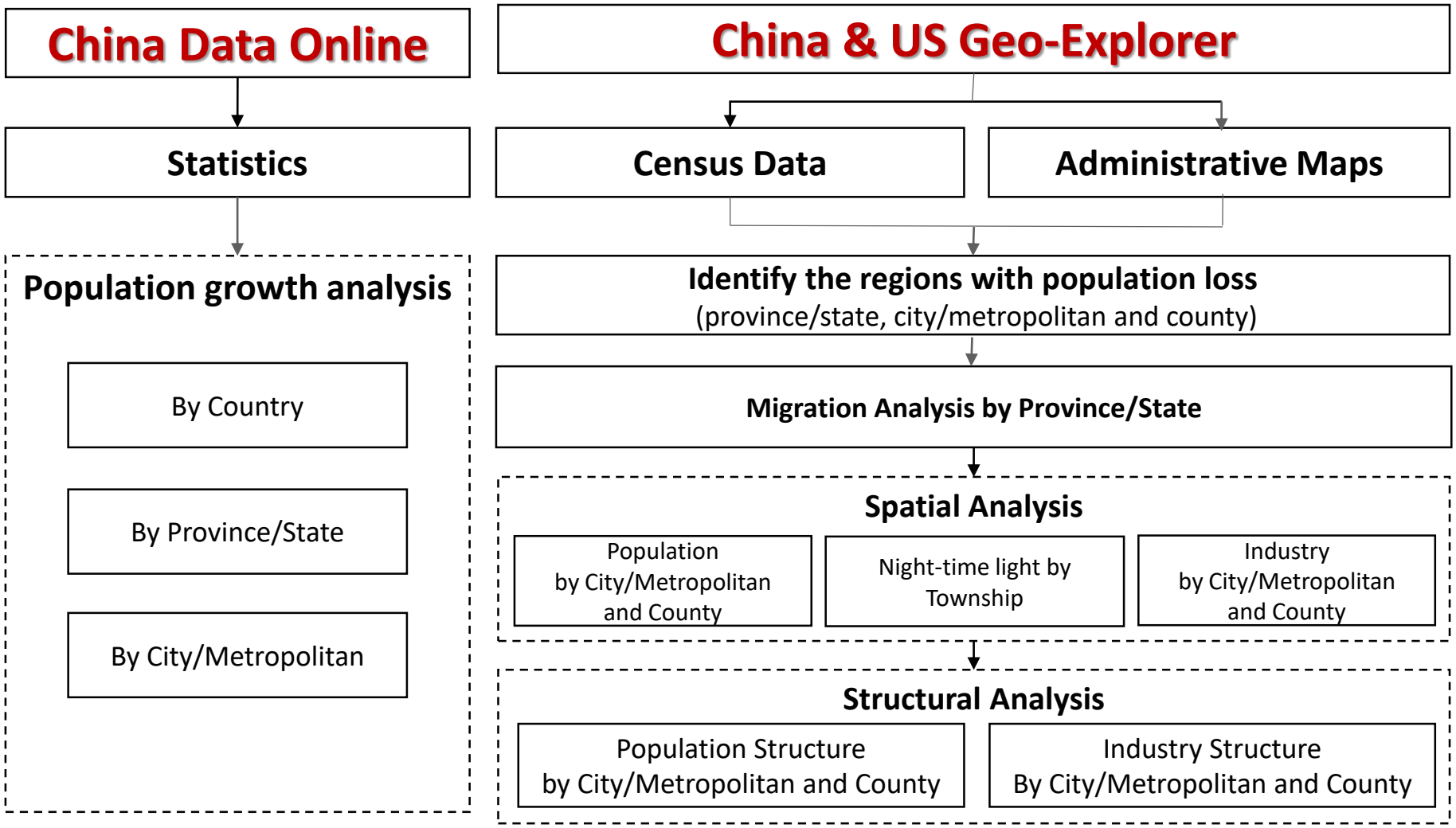




Topics for Further Studies

- What changes to the **population structure** of regions with population loss?
- What changes to the **industrial structure** of regions with population loss?
- What are the difference of **growth models** between those regions with population loss?
- What are the **driving forces** of demographic and industrial changes in shrinking regions?
- What will be the impact on **cultural preservation**?
- What will be the impact on ethnic and **religious and political landscape**?
- What will be the impact on **socioeconomic landscape**?
- What will be the Implications on the **regional policies**?
- ……

The Workflow of Data Analysis



Online Resources

China Statistics

https://china-data-online.com

US Statistics

https://data-planet.com

China and US Census and Business Data

https://chinageoexplorer.com

China Data Webinars

https://chinadatacenter.net/Learming/Seminars.aspx