Economic Integration of Rural Areas with Large Urban Centers

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MAINE AGRICULTURAL AND FOREST EXPERIMENT STATION

MOTIVATION

- ❑ The sizable economic activity in big cities suggests that economic conditions in rural areas may be influenced by places like New York, Los Angeles, and Chicago.
- ❑ Knowing a community's connectedness to urban areas will help policymakers better understand their local region and support a resilient economy.
- ❑ Unlike the USDA urban influence codes, our measure of econometric connectedness has a continuous scale and is based on the economic integration of US counties to metropolitan areas.

RESEARCH OBJECTIVE

Develop a continuous measure of urban influence using monthly employment data to quantify the connectedness of US counties to the largest metropolitan statistical areas.

DATA & METHODOLOGY

- o Employment for **New York, Los Angeles, Chicago**, Dallas, Houston, Washington DC, Philadelphia, Atlanta, and Miami MSAs, 3126 US counties, 50 states, and US overall from January 1990 - April 2023.
- o Data transformation: First seasonal difference of the first nonseasonal difference

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- o Construct a vector autoregression (VAR) model with the three (or nine) MSAs, the US overall, the county in question, and state of the county.
- o Run the VAR ~3000 times (once for each county)

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Joint Forecast Error Variance Decomposition (jFEVD)

$$\zeta_{i\mathbb{J}}^{jnt}(H) = \frac{\sum_{h=0}^{H-1} \boldsymbol{e}_i' \boldsymbol{A}_h \boldsymbol{\Sigma}_\epsilon \boldsymbol{e}_{\mathbb{J}} \left(\boldsymbol{e}_{\mathbb{J}}' \boldsymbol{\Sigma}_\epsilon \boldsymbol{e}_{\mathbb{J}}\right)^{-1} \boldsymbol{e}_{\mathbb{J}}' \boldsymbol{\Sigma}_\epsilon \boldsymbol{A}_h' \boldsymbol{e}_i}{\sum_{h=0}^{H-1} \boldsymbol{e}_i' \boldsymbol{A}_h \boldsymbol{\Sigma}_\epsilon \boldsymbol{A}_h' \boldsymbol{e}_i}$$

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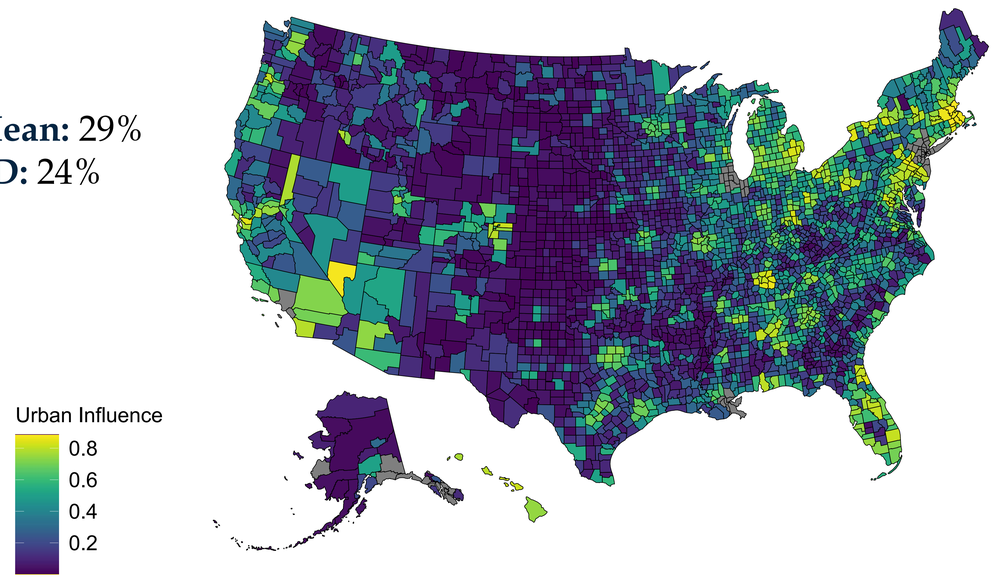
- o Utilize the jFEVD to obtain the urban influence scores, which quantifies the fraction of the forecast error variance of a county's economic activity that can be explained by jointly conditioning on the economic activity shocks of the MSAs.

EMPIRICAL ANALYSIS

Urban Influence of Top 3 MSAs

Fraction of a county's forecast error variance explained by the top 3 MSAs

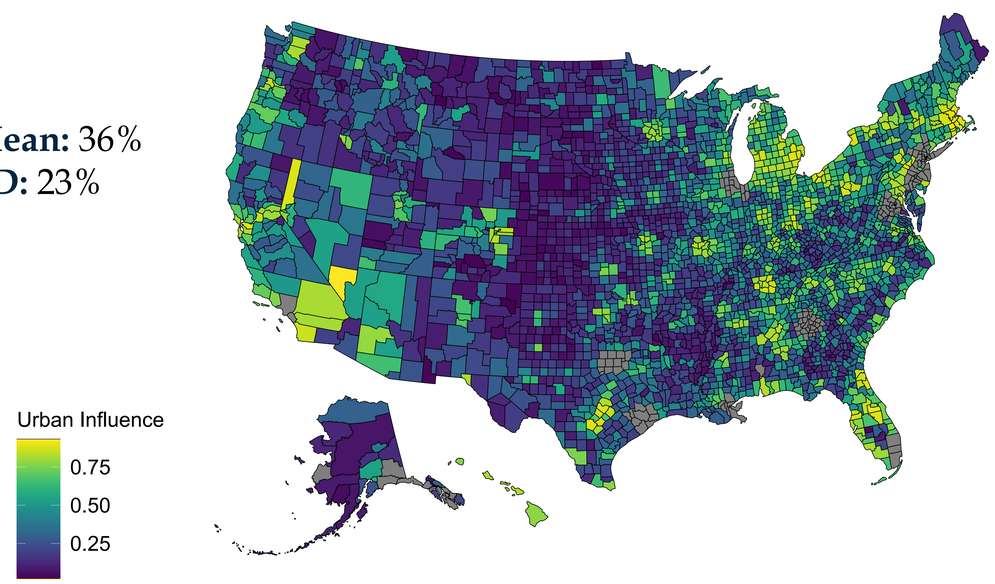
Mean: 29%
SD: 24%



Urban Influence of Top 9 MSAs

Fraction of a county's forecast error variance explained by the top 9 MSAs

Mean: 36%
SD: 23%



Values of urban influence that are close to zero indicate that the economic shocks of the largest metro areas are practically unrelated to employment change in the county, and very high values suggest that the county's employment dynamics are strongly connected to the economic fluctuations of the largest metro areas. Counties in grey are either the reference urban counties (top 3 or top 9 MSAs) or counties excluded from the analysis due to missing data.

RESULTS

Most & Least Integrated Counties (Top 3 MSAs)

County	State	Urban Influence
Most Integrated to Urban Areas		
Providence	Rhode Island	88.29
Middlesex	Massachusetts	88.21
Essex	Massachusetts	88.14
Clark	Nevada	87.05
Plymouth	Massachusetts	86.67
Least Integrated to Urban Areas		
Ness	Kansas	0.66
Hot Springs	Wyoming	0.62
Garfield	Washington	0.58
Pembina	North Dakota	0.47
Harding	New Mexico	0.21

- ❑ Remote counties are less connected to large metro areas.
- ❑ Urban influence scores vary widely.
- ❑ Urban influence scores closely mirror patterns of county population size.

URBAN INFLUENCE IN MAINE

York County	72.32
Cumberland County	68.98
Kennebec County	49.67
Penobscot County	49.51
Oxford County	48.03
Knox County	45.05
Lincoln County	36.60
Sagadahoc County	36.03
Androscoggin County	32.55
Somerset County	32.40
Hancock County	30.58
Franklin County	24.37
Waldo County	23.49
Piscataquis County	20.91
Aroostook County	10.57
Washington County	7.12

REFERENCES

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