A Cross-Regional Comparison of Fabricated Metals Manufacturing Resiliency Within the United States

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Abstract

Fabricated metals manufacturing employment in the U.S declined after the 2008 recession. Within a complex adaptive systems framework, this study compared job loss patterns and workforce composition for two geographic regions. Statistically significant differences in post-recession recovery patterns and workforce demographics pointed to targeted economic incentive developments for regional manufacturing sectors.

Problem

Fabricated metals' manufacturing employment in the United States declined after the 2008 recession.

- Premium compensation and benefits afforded to employees within the manufacturing sector amplified the negative effects of recessionary job losses.

- Selection of metals manufacturing sector stemmed from its affect upon national employment and intersection with diverse industries.

- Need to identify significant relationships between the regional resiliency and potential contributory agent adaptation within distinct regions as separate complex adaptive economic systems.

Purpose

The purpose of this study was to observe and compare the economic resilience and adaptive behavior of the East North Central (ENC) and South Atlantic (SA) regions of the US after the 2008 recession.

- Innovative, robust, and adaptive industries can contribute to the long-term viability of regional economies within the United States.

- Sustained labor force participation in relatively lucrative manufacturing employment increases the economic well-being of individuals and society

Relevant Literature

Theoretical Foundation - Resilient regional economies displayed characteristics of **complex adaptive systems** (CAS) (Beinhocker, 2007; Carbonara & Giannoccaro, 2011; Martin, 2012b; Simmie & Martin, 2010; Tonts, 2011)

Conceptual Framework – Regional industrial clusters represent economic complex adaptive systems (Brenner & Muhlig, 2013; Mizuki, 2014; Randelli & Boschma, 2012; Ter Wal & Boschma, 2011; Zheng & Jin, 2014)

Regional Resilience and Recovery - The nature of observed phenomena before and during the Great Recession lent support to applying non-classical explanatory models for the recession's cause and effects (Dinu, 2010; Florio, 2011; Kirman, 2010; Marien, 2009, Ohanian, 2010; Stiglitz, 2011; Sumner, 2013)

Comparative Research Designs – Evaluations of published secondary data analyzed cross-regional and intra-regional employment and job flow patterns (Abowd & Vilhuber, 2012; Andersson et al., 2012; Blau & Shvydko, 2011; Hyatt & McEntarfer, 2012)

Regional Resilience	Complex Adaptive Systems	Regional Clusters
Agents	Self-Organization	Geographic Concentration
Agility/Recovery/Evolution	Interaction/ Hierarchy	Horizontal and Vertical Linkages
Continuous Feedback	Adaptive	Innovation
Networks	Leverage Internal Resources	Leveraged Resources
Applied Technology	Technological Innovation	Internal and Imported Technology
Linkages and Connections	Hierarchy	Knowledge-based Labor
Diversity and Variety		Industry Diversification

Research Questions

RQ1: Were there regional differences in post-recession manufacturing sector unemployment rates within the United States?

RQ2: How did workforce gender and firm makeup affect post-recession regional manufacturing employment levels in the U.S.?

Procedures

- Data sources encompassed the United States Census Bureau Longitudinal Employment and Household Dynamics (LEHD) database Quarterly Workforce Indicators (QWI), and the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) database.

- Downloaded job, demographic and firm level databases for 1Q2008, 1Q2010, and 4Q2012 on secure system from internet website and applied cleaning and random sampling techniques.

- Sample included 50 randomly selected Metropolitan Statistical Areas (MSA) for each division – ENC and SA.

Data Analysis

Secondary data was subjected to quantitative tests within SPSS modules.

- **Independent sample t tests** compared average job level change rates for the tested regions for 1Q2008 v. 1Q2010 and 1Q2010 v. 4Q2012.

- **A multiple regression model** measured the relationship of the DV post-recession employment level changes between 1Q2008 and 4Q2012 with the IVs defined as workforce demographic changes and establishment level changes as indicators of adaptive behavior.

Findings

ENC and SA regions demonstrated statistically significant different patterns of resiliency after the Great Recession

- ENC rate of job loss and job recovery exceeded that of the SA within the test periods

- Demographic changes included accelerated hiring of males such that fraction of females fell in the post-recession workforce in both regions

- Firm levels did not demonstrate a relationship with employment losses or gains in both regions

Limitations

The study relied upon a public secondary database for which certain imputations built comparability in some instances among data sources.

- Absence of quarterly, MSA-level data to support potential confounding variables such as oil prices, utility prices, or interest rates.

- Masking of firm data for certain MSAs to protect privacy limited availability of data for certain areas.

Conclusions

Regional industrial economic subsystems in the US can behave and react differently in the presence of an external shock.

- A demographic shift appeared in the workforce composition in each region for unknown reasons.

- Regions exhibited divergent workforce loss patterns and recovery rates during the course of the recession but demonstrated similar workforce demographic changes.

Social Change Implications

Regional industry sectors displayed adaptive traits and resiliency in the presence of a recession:

- Individual workers within a specific industry could fare better from locational changes

- A demographic shift in the workforce composition appeared for unknown reasons in both regions and warrants additional inquiry.

- Accelerated recovery in ENC indicated additional study of firm level initiatives could expand understanding of regional resiliency.

- Availability of public longitudinal data allows for extension of study to additional subsectors and geographic divisions to determine applicability to remainder of US.

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