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A MODEL OF MICROPOLITAN AREA SENSITIVITY TO THE BUSINESS CYCLE: EVIDENCE FROM THE PLAINS REGION

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ABSTRACT

Past literature has examined the responsiveness of various economies (region, state, and metropolitan area) to changes in the U.S. business cycle. The objective of this study is to determine if spatial disaggregation to the small core city provides further insights to the co-movement of local area conditions to national business swings. Earlier studies have underscored the importance of examining the role of small cities and the factors which influence their sensitivity to the national cycle. This study focuses on another spatially disaggregated level: the micropolitan statistical area which consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. It focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. The study estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (total employment, nonfarm employment, Gross Regional Product, and personal income) with respect to changes in US real GDP over the 1969-2017 period. There are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used.

JEL: R11, R12

KEYWORDS: Micropolitan, Business Cycle, Sensitivity

INTRODUCTION

Past empirical studies of economic development have traditionally focused on larger areas such as nations, regions, states, and metropolitan areas or large cities, primarily due to data constraints. As more demographic and economic data are gathered for small towns and rural areas, more analyses have been conducted to provide insights on rural-urban differences, local indicators, current trends, and policy targets. The focus of this paper is to examine the dependence of small communities on the overall macroeconomy. The co-movement of local area conditions to national business swings is analyzed for the case of another spatially disaggregated level: the micropolitan statistical area. By definition, a micropolitan area consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. This study focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. It estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (i.e., total employment, nonfarm employment, real Gross Regional Product, and real per capita personal income) with respect to changes in US real GDP over the 1969-2017 period.

A major finding of this study is that there are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used. Of the seven Plains states, North Dakota's micropolitan areas are the least sensitive to national business swings followed by Kansas. With the exception of a few cases, the micropolitan areas of the other five states follow closely

the ups and downs of the national business cycle. Given that the differences in local area sensitivity to national business cycle are highly dependent on the industry mix of the local area, this study further examines the responsiveness of micropolitan area employment in each of 23 two-digit NAICS industries to changes in US real GDP for 1969-2017. The goal is to determine the specific industry or industries whose employment changes are correlated with the national business cycle for identifying competitive advantages and local policy implications. The remainder of the paper is organized as follows. The next section presents some related past literature, followed by a discussion of the historical correlations of micropolitan area indicators with respect to the national business cycle. Analysis of this micropolitan area-business cycle co-movement is extended to the various industry levels. A simple theoretical model showing micropolitan responsiveness to changes in US GDP as a function of industry mix is then tested. Finally, a summary and conclusions are discussed.

LITERATURE REVIEW

The relationship between the growth of local economies and the national economy has been a subject of interest for a long time. The determination of this local conditions-national business cycle linkage as a co-movement or co-dependence or even as no relationship at all has been difficult given the realities of geography, differences in resource base or industrial composition, as well as policy targets and solutions. Earlier studies (Bell and Jayne (2009) and Peterson and Manson (1982)) have underscored the importance of examining the role of small cities and the factors which influence their sensitivity to the national cycle. As Peterson and Manson (1982) put it: "Understanding the reasons for recent changes in local cyclical sensitivity make for one of the most policy-relevant avenues of research." Past studies on the linkage between regional economies and the national economic cycle focus on states (Carlino and DeFina, 2003; Owyang, Rapach, and Wall, 2009, Gascon and Haas, 2019), metropolitan areas (Carlino, DeFina, and Sill, 2001; Arais, Gascon, and Rapach, 2016), and counties (Han and Goetz, 2015; Gascon and Reinbold, 2019). In particular, these studies underscore the relevance of industry mix as a major determinant of the responsiveness or sensitivity of local economies to changes in the national economy.

Although the U.S. national economy is an amalgam of its individual state economies, there is a good degree of heterogeneity in the responsiveness of state economies to the national business cycle. In an earlier state-level study, Carlino and DeFina (2003) find that the co-movement or "cohesion" of cycles for a specific industry across states is greater than that across various industries within a particular state. Thus, they assert that the effect of national shocks on industries within a state lessens over time. Owyang *et al* (2009) show that the "closeness" of states to the national economic cycle is related to differences in industrial composition, average establishment size, agglomeration economies, as well as the characteristics of a neighboring states. More recently, Gascon and Haas (2019) estimated correlations of the change in state employment and the change in US real GDP from 1990-2019; they find that differences in responsiveness of states to the business cycle can be explained by the mix of high and low-sensitive state industries as well as by other state-level attributes such as education, establishment size, housing supply, and urban density. This line of research has been extended to more disaggregated economic units such as metropolitan cities and counties. For example, in their 2016 study of metropolitan areas, Arias, Gascon, and Rapach state that national recessions in the 1990s and 2000s adversely affected some MSAs more severely than others; they also identify several large city-level factors which explain this differential impact including education level, housing supply, and spillover effects. More recently, at the county-level, Gascon and Reinbold (2019) conclude that rural area growth from 2012-15 is slower than urban areas due to the rural areas' "greater exposure to the government sector and lower exposure to private service-providing sector."

Given the extant literature, this current study further examines the line of inquiry by looking at a more disaggregated economic area: small cities called "micropolitan statistical areas." By definition, a micropolitan area consists of one or more counties with at least one city with more than 10,000 but less than 50,000 people. Research on micropolitan areas have been conducted by Davidsson and Rickman

(2011), Cortes, Davidsson, and McKinnis (2015), Cortes and Ooi (2017), and Davidsson and Cortes (2017), among others. The significant role of micropolitan areas in local economic development has recently been emphasized by Liu, Qian, and Haynes (2020). Thus, the objectives of this current study are twofold:

To analyze the sensitivity or correlation of micropolitan economic activity relative to national business cycles;

To identify and measure the effects of industry mix and other local area factors on differences in micropolitan areas' sensitivity to the business cycle.

DATA AND METHODOLOGY

This study focuses on 87 micropolitan statistical areas located in the seven states (Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota) of the Plains region. It estimates and analyzes the correlations of annual percentage changes in various micropolitan area economic measures (i.e., total employment, nonfarm employment, real Gross Regional Product, and real per capita personal income) with respect to changes in US real GDP over the 1969-2017 period. Annual data for 1969-2017 for 87 Plains Region micropolitan areas and their 23 respective industries are gathered from the Woods and Poole Economics database for all U.S. counties and micropolitan areas (see https://www.woodsandpoole.com/). For the seven Plains states, the number of micropolitan areas studied are Kansas (15), Iowa (13), Minnesota (17), Missouri (19), Nebraska (9), North Dakota (5), and South Dakota (9), for a total of 87 micropolitan statistical areas. To identify which micropolitan areas and their industries are affected by the national business cycle, a similar procedure following earlier studies by Bernan and Pfeeger (1997) and Gascon and Haas (2019) is applied. Historical correlations of annual percentage changes in various micropolitan area economic measures with respect to changes in US real GDP over the 1969-2017 period were first calculated. The four economic variables tested are total employment, total nonfarm employment, real Gross Regional Product (in 2012 $), and real per capita personal income (in 2012 $). Summary statistics for these four micropolitan area variables (panel data for 87 micropolitan areas and for 1969-2017) are presented in the Appendix A. The time-series correlations of each micropolitan area variable relative to national cyclical swings are evaluated for the magnitude (percentage change in response to a 1% change in US real GDP) as well as the statistical significance of the correlation (up to 10% level of significance). The objective is to see if there is consistency in the responsiveness or sensitivity of micropolitan areas and their various sectors to the national business cycle. The correlation coefficients are calculated using EViews software.

RESULTS

Table 1 shows the results of regressing each of the four micropolitan area economic variables on changes in real US GDP. The estimated correlation coefficients are tested for significance at the 10 percent level. Each micropolitan area is then checked for consistency in significant/insignificant coefficients. The asterisk (*) in Table 1 indicates that the estimated correlation is not statistically different from zero. Of the 87 Plains micropolitan areas: (a) 61 micropolitan areas (or 70%) had significant correlations with the national business cycle, and; (b) of the remaining micropolitan areas, eight had insignificant correlations for all four variables while 18 indicated mixed results. The overall mean responses of the four micropolitan economic variables to the national business cycle range from a high of 1.0147 for Gross Regional Product to a low of 0.4007 for total employment. These results indicate that checking the co-movement of a local economy with the national business conditions depends on what economic variable or indicator is used.More importantly, Table 1 indicates that there are wide variations in business cycle sensitivity of micropolitan areas across-states, within-states, and depending on the specific economic measure used. Of the micropolitan areas in each state, some showed no significant correlations; this means that the local area is not sensitive to or does not follow national cycles. Of the seven Plains states, North Dakota's micropolitan areas are the least sensitive to national business swings followed by Kansas. On the other hand, with the

exception of a very few cases, the micropolitan areas of the other five states follow closely the ups and downs of the national business cycle. For example, only one micropolitan area in Iowa and in South Dakota exhibited no sensitivity or correlation to the business cycle during the time period under study.

Table 1: Correlation Coefficients of Micropolitan Area Variables with Respect to National Cycle

State	Micropolitan Area	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Kansas	Atchison	0.7142	0.7942	0.8428	0.6805
	Coffeyville	0.6085	0.6470	1.0012	0.5750
	Dodge City	0.1853*	0.2203*	0.4149*	0.3608*
	Emporia	0.3804	0.4181	0.5923	0.3062*
	Garden City	-0.0113*	0.0318*	0.1479*	0.3353*
	Great Bend	0.1849*	0.1954*	0.1933*	0.3452*
	Hays	0.0892*	0.1238*	0.0638*	0.7181
	Hutchinson	0.2790	0.3066	0.6140	0.3886
	Liberal	0.0488*	0.0783*	0.2024*	0.4622*
	McPherson	0.5477	0.6340	0.8168	0.8037
	Ottawa	0.3730	0.4625	0.7814	0.3322*
	Parsons	0.6658	0.7273	0.7103	0.1837*
	Pittsburg	0.2660	0.2790	0.4760	0.3237
	Salina	0.2426	0.2661	0.3402*	0.4108
	Winfield	0.4027	0.4480	0.8551	0.6792
Iowa	Carroll	0.3183	0.3955	1.7148	1.6412
	Clinton	0.3813	0.3955	0.9186	0.8164
	Fairfield	0.9690	1.0762	2.5137	1.7719
	Ft. Dodge	0.3845	0.4137	1.1420	0.8655
	Marshalltown	0.2312	0.2558	0.5431	0.5590
	Mason City	0.3825	0.4157	1.0000	1.0401
	Muscatine	0.2678	0.2803	0.7952	0.6982
	Oskaloosa	0.7404	0.8841	1.8418	1.2559
	Ottumwa	0.5377	0.5598	1.0916	0.4485
	Pella	0.7111	0.7769	1.9724	0.9113
	Spencer	0.1892*	0.2135*	1.1221	1.4485
	Spirit Lake	0.4341	0.4849	2.0294	1.5853
	Storm Lake	0.4425	0.5454	1.7710	1.3166
Minnesota	Albert Lea	0.5396	0.6513	1.1405	1.0289
	Alexandria	0.5661	0.6772	1.5397	0.6527
	Austin	0.0413*	0.0709*	0.4827*	0.2725*
	Bemidji	0.5660	0.5924	1.0530	0.5730
	Brainard	0.5729	0.6105	1.1763	0.4727
	Fairmont	0.4632	0.6472	1.5730	1.5697
	Faribault-Northfield	0.3488	0.4062	0.9930	0.6308
	Fergus Falls	0.2825	0.4042	1.4534	0.6482
	Grand Rapids	0.6489	0.6705	0.9569	0.2735*
	Hutchinson	0.5197	0.6478	1.5875	0.9797
	Marshall	0.4027	0.5051	1.4450	1.3163
	New Ulm	0.3398	0.4154	1.3179	0.9896
	Owatonna	0.5810	0.6484	1.2016	0.7510
	Red Wing	0.4227	0.5352	1.2956	0.8419

Table 1: Correlation Coefficients (continued)

State	Micropolitan Area	Total Employment	Nonfarm Employment	Gross Regional Product	Personal Income Per Capita
Minnesota	Willmar	0.4619	0.5701	1.2853	0.9612
	Winona	0.6080	0.7033	1.4475	0.7737
	Worthington	0.2276	0.3554	0.9947	1.1969
Missouri	Branson	1.0247	1.0980	1.8421	0.1518*
	Farmington	0.5561	0.5813	0.7334	0.1832*
	Ft. Leonard Wood	-0.1695*	-0.1692*	-0.4431*	0.4142*
	Ft. Madison-Keokuk	0.6489	0.7338	1.3596	0.9074
	Hannibal	0.3861	0.4657	1.0133	0.7417
	Kennett	0.4541	0.5581	1.3377	0.6614
	Kirksville	0.2501	0.2937	0.8581	0.4553
	Lebanon	0.8614	0.9821	1.6441	0.1890*
	Marshall	0.4270	0.4892	1.0574	0.9357
	Maryville	0.5473	0.7026	1.3907	1.4636
	Mexico	0.6557	0.7460	1.4938	1.2259
	Moberly	0.7839	0.8360	1.1732	0.5329
	Poplar Bluff	0.6915	0.7572	1.1453	0.4374
	Quincy, IL-MO	0.3958	0.4295	0.7921	0.6063
	Rolla	0.5446	0.5727	0.7495	0.1725*
	Sedalia	0.7589	0.8418	1.3070	0.6370
	Sikeston	0.5331	0.6027	0.9818	0.8491
	Warrensburg	0.8374	0.9399	1.3076	0.5750
	West Plains	0.7124	0.8017	1.8183	0.5641
Nebraska	Beatrice	0.4301	0.4871	0.7328	0.2193*
	Columbus	0.5002	0.5590	1.1671	0.9290
	Fremont	0.4241	0.4615	0.5557	0.5703
	Hastings	0.3971	0.4305	0.7471	0.5309
	Kearney	0.5094	0.6117	1.0505	0.9361
	Lexington	-0.0767*	-0.0484*	0.7174*	0.8389
	Norfolk	0.3317	0.4032	1.0453	1.0997
	North Platte	0.5028	0.5558	1.2591	0.9761
	Scottsbluff	0.0850*	0.1248*	0.7230	0.4816*
North Dakota	Dickinson	-0.4147*	-0.4382*	-0.2081*	0.5603*
	Jamestown	0.1975	0.2430	1.1715	0.8298*
	Minot	-0.1098*	-0.1145*	0.2447*	0.6425*
	Wahpeton	0.1081*	0.1653*	1.8167	3.3031
	Williston	-0.8095*	-0.8666*	-1.0052*	0.6714*
South Dakota	Aberdeen	0.4071	0.4537	1.0231	1.0863
	Brookings	0.5336	0.5929	1.3517	0.7510
	Huron	0.2785	0.3160	0.9739	1.2799
	Mitchell	0.3011	0.3233	1.0453	0.9237
	Pierre	0.2608	0.2774	0.6973	0.6348
	Spearfish	0.1583*	0.1542*	0.5282*	0.8351
	Vermillion	0.5994	0.6750	1.4348	1.5994
	Watertown	0.4176	0.4533	1.2319	0.9605
	Yankton	0.3690	0.3967	0.9574	1.0095

Note: Data are the correlations of the change in micropolitan economic variable and the change in real U.S. GDP for 1969-2017.
**Indicates that the estimated correlation is not statistically different from zero.*

As discussed earlier, a major factor causing the differences in local area sensitivity to national business cycle is the "type of jobs" or the industry mix of the local area. For each of the 87 micropolitan areas, the author estimated the responsiveness of employment in each of 23 two-digit NAICS industries to changes in US real GDP for the 1969-2017 period. Employment data by 2-digit NAICS industry are gathered from Woods & Poole Economics. The objective is to determine the specific industry or industries whose employment changes are correlated with the national business cycle. To this end, the estimated regression

coefficients are tested for significance at the 10 percent level; the sign of each statistically significant coefficient indicates whether a particular sector is procyclical or countercyclical. A total of 2001 micropolitan industry regressions were calculated (using EViews); estimated coefficients are available from the author. Table 2 shows the number of significant business cycle-industry correlations for each state in the Plains region.

Table 2: Responsiveness of Micropolitan Area Industry to Changes in US GDP (Number of Statistically Significant Correlations)

Industry	Kansas	Iowa	Minnesota	Missouri	Nebraska	N. Dakota	S. Dakota	Total # of Significant Correlations by Sector
Farming	0	0	1	1	0	0	0	2
Forestry, etc.	3	0	4	6	0	1	2	16
Mining	1	0	2	5	0	1	0	9
Utilities	1	2	1	2	2	0	0	8
Construction	5	5	10	15	4	0	6	45
Manufacturing	8	10	12	16	5	1	5	57
Wholesale Trade	3	1	6	3	0	1	0	14
Retail Trade	4	10	13	11	3	0	5	46
Transportation	3	4	3	4	5	0	1	20
Information	5	9	9	11	6	1	7	48
Finance & Ins.	2	2	2	3	1	0	1	11
Real Estate	5	2	4	7	1	0	0	19
Professional	1	2	8	5	5	1	2	24
Management of companies	3	0	1	0	0	1	0	5
Administrative & support	2	4	4	5	4	0	3	22
Educational	1	1	2	1	1	1	1	8
Health Care	1	4	5	6	2	1	6	25
Arts & entertainment	1	7	11	5	1	1	4	30
Accommodation & food	3	9	11	10	5	1	5	44
Other services	5	4	10	13	6	2	6	46
Federal civilian	6	1	3	1	0	0	2	13
Federal military	0	3	0	1	0	1	1	6
State & local government	1	2	3	5	3	0	0	14
Total # of significant correlations by state	64	82	125	136	54	14	57	

Note: Data are the number of significant (at the 10% level) correlations of industry employment with respect to the national business cycle for 1969-2017, calculated for 23 industries of each of the 87 micropolitan areas of the Plains region.

Several results are notable from Table 2. First, based on total significant correlations by state, the micropolitan areas of Missouri and Minnesota are the most responsive to changes in the US GDP, followed by Iowa micropolitan areas, and then by the group comprising Kansas, South Dakota, and Nebraska. The least sensitive are the micropolitan areas in North Dakota. Although North Dakota has the least number of micropolitan areas in the Plains region, the economies of three of the five micropolitan areas (Dickinson, Minot, and Williston) grew dramatically during the oil exploration, drilling, and extraction boom of the early 2000s. The oil industry's rapid growth lead to an influx of new investment, infrastructure development, related industries, and, of course, jobs. The resulting local economic growth and development was strong and sustainable, even during the 2007-09 Great Recession. Second, in terms of specific industry, manufacturing has the greatest number of significant correlations between micropolitan area employment changes and changes in the national economy. Manufacturing is followed by information services, retail trade, other services, construction, and accommodation & food services. This finding mirrors the responsiveness of US industries at the national level. Examining industries at the 2-digit level not only

indicates the co-movement of micropolitan areas to national business swings but also shows the growing importance of different service sectors such as information and other services as well as highlights the traditional role of small cities or micropolitan area cores as local retail trade centers for food, lodging, and also arts and entertainment. The least responsive private sectors for micropolitan areas are farming, management of companies, educational services, utilities, and mining. Thus, there is significant sectoral heterogeneity among the micropolitan areas within a state and across states. The next step of the analysis is based on the findings from Table 2. For the five most sensitive industries (manufacturing, information, retail trade, other services, construction) and for the least responsive sectors (farming, management of companies, educational services, utilities, and mining) identified in Table 2, the percentage shares of total micropolitan area employment for 2017 are estimated and presented in Table 3 and Table 4, respectively. Table 3 below shows the percentage of micropolitan area employment accounted for by the five most sensitive sectors: manufacturing, information, retail trade, other services, construction. On average, manufacturing accounts for 10-16% of micropolitan employment for all Plains states' micropolitan areas except for North Dakota where manufacturing makes up for just over 6% of all employees. The retail trade sector accounts for the largest employment share in micropolitan areas located in Missouri and the Dakotas. Construction is found to be correlated with business cycle movements at the disaggregated level of the micropolitan area, similar to state-level and metropolitan areas. An interesting finding is the growing importance of the service sector, primarily information services and other services.

Table 3: Employment Shares (%) of Micropolitan Area Industries Most Responsive to the Business Cycle

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Kansas	Atchison	12.96	0.71	8.33	5.43	5.36
	Coffeyville	15.14	0.54	9.43	4.46	4.32
	Dodge City	27.83	2.42	9.56	4.62	3.65
	Emporia	15.22	1.51	10.49	4.6	3.12
	Garden City	15.48	0.54	12.2	4.72	4.89
	Great Bend	5.66	0.49	10.13	4.55	4.85
	Hays	3.78	1.63	10.71	5.01	4.11
	Hutchinson	8.81	1.29	10.11	5.34	4.84
	Liberal	23.25	0.66	10.82	4.9	3.49
	McPherson	20.79	0.64	8.24	5.08	5.49
	Ottawa	6.17	0.38	11.52	5.65	5.49
	Parsons	15.03	0.74	8.37	4.48	2.48
	Pittsburg	11.62	1.23	10.01	4.33	3.9
	Salina	12.4	0.53	11.59	5.21	4.46
	Winfield	19.56	0.7	9.15	4.87	3.3
	Average	14.25	0.93	10.04	4.88	4.25
Iowa	Carroll	8.49	1.15	11.77	5.3	5.29
	Clinton	16.42	1.85	11.55	4.9	4.81
	Fairfield	8.33	1.42	10.18	5.8	4.43
	Ft. Dodge	10.54	1.79	12.51	4.94	7.13

Table 3: Employment Shares (%) of Most Responsive Industries (continued)

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Iowa	Marshalltown	20.76	0.91	11.38	5.89	4.73
	Mason City	9.32	1.39	12.71	5.25	5.19
	Muscatine	27.71	0.48	9.02	4.99	4.38
	Oskaloosa	14.49	1.11	12.4	6.65	5.4
	Ottumwa	17.39	0.84	12.71	6.34	4.37
	Pella	29.02	0.66	9.03	4.18	4.81
	Spencer	5.65	2.06	14.24	4.88	5.6
	Spirit Lake	14.48	0.73	13.1	5.03	7.02
	Storm Lake	25.04	0.55	9.81	3.9	3.6
	Average	15.97	1.15	11.57	5.23	5.14
Minnesota	Albert Lea	15.65	0.84	13.57	6	4.68
	Alexandria	13.04	1.01	12.72	6.43	6.57
	Austin	17.48	1.13	10.34	5.95	4.02
	Bemidji	4.61	1.6	12.99	5.53	6.37
	Brainard	6.4	0.99	13.01	5.83	7.41
	Fairmont	9.68	0.79	13.06	5.74	4.84
	Faribault-Northfield	13.6	1.06	9.8	5.92	5.57
	Fergus Falls	12.7	1.15	10.56	6.05	6.89
	Grand Rapids	5.11	0.88	13.18	6.86	5.71
	Hutchinson	22.75	1.01	11.44	5.44	4.94
	Marshall	10.65	0.82	11	5.15	3.99
	New Ulm	15.82	1.64	10.82	4.92	6.03
	Owatonna	22.33	0.89	12.59	4.7	3.56
	Red Wing	15.18	0.76	9.78	5.73	4.85
	Willmar	13.52	0.85	11.32	5.27	6.02
	Winona	18.74	2.06	9.8	4.51	3.44
	Worthington	21.96	0.77	11.54	5.79	3.86
	Average	14.07	1.07	11.62	5.64	5.22
Missouri	Branson	1.8	1.23	14.8	5.71	4.12
	Farmington	6.29	0.73	12.78	5.83	5.71
	Ft. Leonard Wood	0.84	0.49	7.83	3.84	2.95
	Ft. Madison-Keokuk	15.77	0.55	11.05	6.11	6.27
	Hannibal	13.08	0.58	13.86	4.56	6.02
	Kennett	2.77	0.45	12.05	5.2	2.92
	Kirksville	6.96	0.95	12.2	6.05	4.29
	Lebanon	27.29	0.84	12.51	5.79	4.45
	Marshall	16.44	1.25	10.1	5.05	3.58
	Maryville	10.48	0.82	11.33	4.93	4.1

Table 3: Employment Shares (%) of Most Responsive Industries (continued)

State	Micropolitan Area	Manufacturing	Information	Retail Trade	Other Services	Construction
Missouri	Mexico	16.05	0.87	10.86	6.61	4.11
	Moberly	8.22	0.92	11.65	5.03	4.34
	Poplar Bluff	9.57	0.71	12.65	5.87	4.86
	Quincy, IL-MO	10.09	1.44	12.98	6.28	4.64
	Rolla	4.92	0.81	11.68	5.1	4.02
	Sedalia	17.74	1.51	11.23	6.29	3.87
	Sikeston	11.56	1.1	8.46	6.09	5.53
	Warrensburg	5.74	0.49	8.22	4.65	4.54
	West Plains	11.25	1.14	12.05	5.94	4.1
	Average	10.36	0.89	11.49	5.52	4.44
Nebraska	Beatrice	11.89	0.72	11.09	5.9	5.1
	Columbus	23.22	0.58	11.2	5.2	6.23
	Fremont	16.07	0.84	12.47	5.76	4.95
	Hastings	11.86	0.78	10.77	6.06	6.19
	Kearney	9.29	1.13	12.11	6.07	5.79
	Lexington	22.75	0.67	9.55	5.29	4.25
	Norfolk	11.4	0.97	11.52	5.62	5.91
	North Platte	1.64	0.99	11.76	5.85	5.42
	Scottsbluff	4.37	1.43	11.6	5.63	6.03
	Average	12.5	0.9	11.34	5.71	5.54
North Dakota	Dickinson	5.7	0.84	10.19	5.08	7.23
	Jamestown	8.29	0.96	11.57	5.22	4.68
	Minot	1.45	1	11.85	5.15	5.39
	Wahpeton	14	0.9	8.15	5.31	5.62
	Williston	1.48	0.55	7.94	3.52	9.5
	Average	6.18	0.85	9.94	4.86	6.48
South Dakota	Aberdeen	11.12	1.07	12.27	5.04	5.22
	Brookings	17.68	0.69	9.72	4.14	4.33
	Huron	16.16	0.83	9.76	5.25	4.88
	Mitchell	12.03	1.61	13.48	4.84	6.58
	Pierre	0.86	1.32	11.88	5.93	6.07
	Spearfish	3.27	1.06	10.7	5.13	6.79
	Vermillion	2.72	0.4	9.84	4.99	3.3
	Watertown	13.98	0.96	14.43	5.43	6.48
	Yankton	19.18	1.1	11.58	4.34	4.57
	Average	10.78	1	11.52	5.01	5.36

Note: Data are the percentage shares of micropolitan area employment accounted for by the five most business cycle-sensitive sectors in each of the 87 micropolitan areas.

Regarding the five low-sensitive industries of the micropolitan areas (see Table 4 below), a good deal of heterogeneity exists across the seven Plains states. For North Dakota, mining is the most dominant in terms of employment shares ranging from over 28% in Williston to approximately 4% in Minot. For the other states on average, the largest employment share is in the farm sector followed by educational service; however, farming averages only 4-6% of micropolitan employment and education accounts for 1-3%. Some micropolitan areas have a relatively high employment share in agriculture such as Beatrice (NE) and Fergus Falls (MN) at 9%, while a few have minimal employment shares (only 1%) in farming such as Branson (MO) and Spearfish (SD). The percentage of micropolitan area employment in education ranges from a low of 0.34% in Lebanon (MO) to a high of almost 10% in Faribault-Northfield (MN).

Table 4: Employment Shares (%) of Micropolitan Area Industries Least Responsive to the Business Cycle

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Kansas	Atchison	7.48	0.7	2.6	1.06	0.86
	Coffeyville	5.01	0.07	1.04	0.36	2.63
	Dodge City	3.36	0.45	1.31	0.55	0.42
	Emporia	5.34	0.08	0.77	0.75	1.7
	Garden City	4.58	0.36	0.55	1.45	3.21
	Great Bend	3.78	0.48	0.74	0.54	19.26
	Hays	2.38	1.35	1	0.05	17.19
	Hutchinson	4.25	2.17	0.7	0.96	2.62
	Liberal	3.16	0.2	0.38	0.61	5.14
	McPherson	5.14	1.2	2.98	0.23	5.28
	Ottawa	7.14	0.48	1.98	0.03	2.51
	Parsons	6.47	0.65	0.4	0.62	0.55
	Pittsburg	3.5	1.58	0.85	0.52	0.54
	Salina	2.78	1.44	1.53	0.57	2.16
	Winfield	4.77	0.18	3.33	0.71	4.37
	Average	4.61	0.76	1.34	0.6	4.56
Iowa	Carroll	6.65	0.33	4.29	0.37	0.56
	Clinton	4.26	0.25	2.06	0.38	0.24
	Fairfield	5.24	1.01	10.1	0.19	0.41
	Ft. Dodge	4.18	0.81	1.31	0.31	0.51
	Marshalltown	4.06	0.18	0.54	0.66	0.45
	Mason City	3.62	0.68	1.04	0.33	0.27
	Muscatine	2.5	2.54	0.17	0.63	0.23
	Oskaloosa	8.52	0.53	4.3	0.43	0.01
	Ottumwa	3.22	0.32	1.4	0.88	0.13
	Pella	4.41	0.35	5.03	0.23	0.27
	Spencer	5.91	0.84	0.74	0.47	0.64
	Spirit Lake	3.07	0.45	0.75	0.18	0.38
	Storm Lake	6.12	0.06	3.46	0.48	0.01
	Average	4.75	0.64	2.71	0.43	0.32

Table 4: Employment Shares (%) of Least Responsive Industries (continued)

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Minnesota	Albert Lea	6.83	0.16	0.54	0.58	0.16
	Alexandria	3.83	0.28	0.87	0.29	0.24
	Austin	5.26	2.74	1.14	0.09	0.19
	Bemidji	2.04	0.12	1.4	0.58	0.52
	Brainard	1.81	0.33	1.81	0.35	0.17
	Fairmont	7.44	0.4	1.11	0.51	0.23
	Faribault-Northfield	3.7	0.76	9.99	0.22	0.23
	Fergus Falls	8.85	0.52	0.91	0.41	0.35
	Grand Rapids	1.77	0.09	0.76	1.77	1.97
	Hutchinson	4.37	0.54	1.04	0.35	0.35
	Marshall	4.79	2.83	1.18	0.1	0.27
	New Ulm	5.87	1.56	2.37	0.22	0.16
	Owatonna	3.28	0.12	0.55	0.41	0.12
	Red Wing	5.63	1.04	1.02	2.31	0.14
	Willmar	4.78	0.69	0.9	0.26	0.45
	Winona	4.13	2.8	5.62	0.18	0.2
	Worthington	7.36	0.19	1.64	0.19	0.3
	Average	4.81	0.89	1.93	0.52	0.36
Missouri	Branson	1.01	0.29	2.09	0.4	0.57
	Farmington	2	0.49	0.71	0.28	0.41
	Ft. Leonard Wood	1.73	0.04	1.07	0.26	0.28
	Ft. Madison-Keokuk	8.38	0.17	1.99	0.37	0.26
	Hannibal	6	0.19	2.76	0.66	0.59
	Kennett	3.31	0.42	0.48	0.16	0
	Kirksville	7.94	0.52	3.24	0.58	0.01
	Lebanon	6.81	0.25	0.34	0.49	0.29
	Marshall	7.69	1.21	2.67	0.46	0.18
	Maryville	9.47	0.46	1.04	0.88	0.62
	Mexico	7.27	0.37	1.38	0.71	0.34
	Moberly	5.88	2.81	0.67	0.67	0.66
	Poplar Bluff	3.24	0.1	0.52	0.51	0.25
	Quincy, IL-MO	4.05	0.31	2.04	0.41	0.67
	Rolla	2.86	0.11	0.99	0.16	0.21
	Sedalia	4.9	0.57	0.86	0.31	0.27
	Sikeston	2.45	0.9	0.78	0.53	0.29
	Warrensburg	5.81	0.08	1.22	0.3	0.29
	West Plains	6.8	1.53	0.47	0.56	0.39
	Average	5.14	0.57	1.33	0.46	0.35

Table 4: Employment Shares (%) of Least Responsive Industries (continued)

State	Micropolitan Area	Farming	Management	Education	Utilities	Mining
Nebraska	Beatrice	9.13	0.51	0.67	0.05	0.56
	Columbus	4.42	0.26	1.15	0.7	0.17
	Fremont	3.49	0.18	3.21	0.24	0.2
	Hastings	2.83	0.9	3.33	0.03	0.19
	Kearney	3.96	2.19	0.74	0.16	0.22
	Lexington	8.14	0.61	0.59	0.13	0.5
	Norfolk	5.99	0.46	1.15	0.11	0.29
	North Platte	6.53	0.31	0.75	0.16	0.44
	Scottsbluff	6.6	0.51	0.63	0.26	0.29
	Average	5.68	0.66	1.36	0.2	0.32
North Dakota	Dickinson	3.6	0.45	1.15	0.34	14.65
	Jamestown	7.31	0.55	4.83	0.63	0.36
	Minot	3.93	0.24	0.69	0.32	3.76
	Wahpeton	9.8	0.43	0.55	0.47	2.12
	Williston	2.14	0.17	0.36	0.76	28.46
	Average	5.36	0.37	1.52	0.50	9.87
South Dakota	Aberdeen	4.86	0.95	2.2	0.48	0.16
	Brookings	4.31	1	1.1	0.29	0.64
	Huron	7.37	1.22	1.45	0.65	0.94
	Mitchell	4.27	0.5	2.72	0.37	0.23
	Pierre	3.39	0.21	1.08	0.31	0.27
	Spearfish	1.6	0.62	0.67	0.26	2.07
	Vermillion	4.68	0.19	1.14	0.33	0.24
	Watertown	5.09	0.75	1.25	0.24	0.17
	Yankton	3.72	0.36	2.87	0.3	0.49
	Average	4.37	0.64	1.61	0.36	0.58

Note: Data are the percentage shares of micropolitan area employment accounted for by the five least business cycle-sensitive sectors in each of the 87 micropolitan areas.

A Model of Micropolitan Area Sensitivity

After examining the responsiveness of micropolitan areas and their respective industries to changes in the macroeconomy, the next question is: what factors determine this linkage? To measure the effects of industry mix and other local area factors on differences in micropolitan areas' sensitivity to the business cycle, a simple economic model is estimated, following Gascon and Haas (2019):

$$MCORR = \alpha + \beta_1(HIGHS) + \beta_2(LOWS) + \varepsilon \quad (1)$$

where the dependent variable (MCORR) is the historical correlation between the annualized change in various economic measures (total employment, nonfarm employment, GRP, and personal income) of a micropolitan area with respect to changes in US real GDP over the 1969-2017 period. The independent variables indicate the initial or beginning industry mix for a micropolitan area: 1969 total employment shares of the five most-sensitive micropolitan sectors (HIGHS) and the 1969 combined employment shares of the five least-sensitive micropolitan sectors (LOWS); ε is the error term. There are 87 micropolitan areas in the sample. Ordinary least squares method was applied to the cross-sectional data set using EViews. The results are presented in Table 5. Consistent with past studies, the results in Table 5 indicate that a micropolitan area's industry mix generally has a positive and significant influence on how closely a micropolitan area's economy follows changes in the national economy. However, depending on the economic indicator, the combined differential impact of the employment shares of high- and low-sensitive micropolitan industries only explains 10-33% of the responsiveness of micropolitan economies to the national business cycle, as shown by the values of the adjusted R-squared. As such, other characteristics of, and across, micropolitan areas may be more important.

Table 5: Micropolitan Area Responsiveness as a Function of Industry Mix

	Total Employment	**Nonfarm Employment**	**Gross Regional Product**	**Personal Income Per Capita**
Constant	0.1529	0.1041	-0.1722	-0.0888
High-sensitive sectors share	0.0091 (2.8256)***	0.0103 (2.9114)***	0.0182 (2.9208)***	0.0013 (0.2861)
Low-sensitive sectors share	-0.0049 (-0.9215)	-0.0012 (-0.2057)	0.0313 (3.0294)***	0.0494 (6.4757)***
R-squared	0.1166	0.1022	0.1420	0.3454
Adjusted R-squared	0.0956	0.0808	0.1216	0.3298
F-statistic Prob(F-statistic)	5.5455 (0.0055)	4.7819 (0.0108)	6.9523 (0.0016)	22.1635 (0.0000)
No. of observations	87	87	87	87

Note: This table shows the OLS regression estimates for the model, with micropolitan-business cycle correlations as dependent variable and employment shares of the most-sensitive and least-sensitive micropolitan industries as explanatory variables. ***Significant at the 1% level.

To account for other micropolitan area economic attributes, an aggregate variable or index is added to the model. This variable is taken from POLICOM Corporation's Micropolitan Economic Strength Index (2020). The micropolitan strength index is a weighted composite of the growth of different economic variables such as wages, earnings, welfare payments, and medical aid to the poor. According to Fruth (2020): "The economic strength rankings are created so POLICOM can study the characteristics of strong and weak economies. The highest ranked areas have had rapid, consistent growth in both size and quality for an extended period. The lowest ranked areas have been in decline for an extended period." p. 3 The 2011 micropolitan rankings are added as an explanatory variable; this initial ranking represents the state of the micropolitan economy at the early part of the time period under study. Based on the Table 6 results, the initial micropolitan ranking has a negative and significant impact on the sensitivity of micropolitan performance, after accounting for industry mix. Thus, the higher the ranking number (i.e., the less prosperous the local area) of the micropolitan area, the less sensitive the area is to changes in the national business cycle. To check for robustness in the results, an alternative ranking variable was used: the difference in micropolitan ranking from 2011-2017.The empirical results indicated that the improvement in the ranking of a micropolitan area does not affect the responsiveness of the local area to national cyclical changes. This begs the question as to whether the vitality of a micropolitan area is more dependent on localized business cycles and inherent competitive advantages than on national business conditions.

Table 6: Micropolitan Area Responsiveness as a Function of Industry Mix and 2011 Ranking

	Total Employment	**Nonfarm Employment**	**Gross Regional Product**	**Personal Income Per Capita**
Constant	0.1801	0.1342	-0.1390	-0.0906
High-sensitive sectors share	0.0059 (1.9123)*	0.0069 (2.0006)**	0.0144 (2.2733)**	0.0015 (0.3174)
Low-sensitive sectors share	-0.0116 (-2.2121)**	-0.0086 (-1.4888)	0.0231 (2.1543)**	0.0499 (6.1123)***
2011 Ranking	-0.0007 (-3.7768)***	-0.0008 (-3.7808)***	-0.0009 (-2.2583)**	-0.0001 (-0.1615)
R-squared	0.2442	0.2329	0.1903	0.3459
Adjusted R-squared	0.2189	0.2064	0.1625	0.3220
F-statistic Prob(F-statistic)	9.0355 (0.0000)	8.4572 (0.0000)	6.5610 (0.0005)	14.6130 (0.0000)
No. of observations	87	87	87	87

*Note: This table shows the OLS regression estimates for the model, with micropolitan-business cycle correlations as dependent variable and employment shares of the most-sensitive and least-sensitive micropolitan industries and the 2011 micropolitan ranking as explanatory variables. *, **, ***Significant at the 10%, 5%,1% level respectively.*

CONCLUSIONS

There has recently been much interest in exploring the co-movement or sensitivity of local economic activity to the national business cycle. However, Peterson and Manson (1982) caution that: "These results suggest that there is little policy insight to be gained from simple time series analysis of city cycles in relation to national economic cycles. An extrapolation of past cyclical behavior into the future presumes a stability of city response that is unlikely to be observed. More valuable is the testing of hypotheses regarding the effect of industry mix, labor market characteristics, and age of capital on differences across cities in cyclical sensitivity and on changes over time in individual cities' cyclical exposure." p. 31 The current study extends this line of research by examining the case of the micropolitan statistical area. Its objectives are twofold: (1) to determine the degree of co-movement or "coupling" between business conditions at the micropolitan area level and the national business cycle, and; (2) to analyze the role of local industrial composition on the micropolitan area-business cycle relationship. The study focuses on the 87 micropolitan areas located in the seven Plains states of Kansas, Iowa, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota. Using annual data for the 1969-2017 period, historical correlations of changes in U.S. real GDP and changes in four economic indicators (total employment, nonfarm employment, Gross Regional Product, and personal income) for each micropolitan area are calculated.

The findings show that around 70% of the micropolitan areas have significant correlations with the national business cycle. There is a great deal of heterogeneity across states, however, with Missouri and Minnesota more sensitive to the business cycle and North Dakota the least responsive. This heterogeneity is further evidenced across the various industries of the seven Plains states. The mix of industries has been a critical determinant of how connected a local economy is to the national economic activity. Although as with previous research, this study finds the industrial composition of micropolitan areas to be a significant factor in explaining the link between micropolitan economic performance and the national business cycle, this "closeness" tends to be diminishing as the geographical unit of study becomes smaller, consistent with Carlino and DeFina (2003). Thus, the smaller cities, towns or micropolitan statistical areas may not be as tied to national business swings. Their "resilience," competitive strengths, and other attributes (ex., natural amenities, location, entrepreneurship, and social capital) may be more inherent; for example, see the "Most Dynamic Micropolitans" report by DeVol and Crews (2019). The relevant issue for local economic development policymakers in micropolitan areas is not how co-dependent their area economy is with the macroeconomy, but what incentives, policies, and strategies do they have to support existing firms, attract new investment, and promote overall quality of life. Directions for further research include a more detailed look at the natural and acquired competitive advantages and amenities of micropolitan areas and to extend the empirical approach to other regions of the U.S.

APPENDIX

Appendix A. Summary Statistics of Micropolitan Area Economic Variables

Variable	Mean	Standard Deviation	Minimum	Maximum	Number of Observations
Total Employment	19562	8367.38	5066	57761	4263
Nonfarm Employment	18121	8174.30	4193	56696	4263
Gross Regional Product (in 2012 $)	1.06E+09	6.38E+08	1.37E+08	1.01E+10	4263
Per Capita Personal Income (in 2012 $)	28055.65	8497.31	10953	100969	4263

Note: The table presents descriptive statistics of the four main economic variables (total employment, nonfarm employment, Gross Regional Product, and per capita personal income) used in estimating correlations with the national business cycle. The panel data consists of 87 Plains micropolitan areas and annual data for the 1969-2017 period, for a total of 4,263 observations.

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