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Abstract

In this paper, we explore how national economic trends in a set of industries that compose local economies and growth in nearby metropolitan areas affect local employment growth in different tiers of the urban-rural hierarchy, paying close attention to the effects of urban proximity. The results of our county-level analyses reveal heterogeneous responses. Favorable economic changes due to a fast-growing local industry composition have the largest positive impact on self-employment growth in small metropolitan areas and the smallest positive impact in rural counties. Self-employment in rural counties is fostered by growth in nearby small MSAs and is hampered by growth in nearby large MSAs. In micropolitan counties, there are no significant negative effects, whereas positive (or spread) effects are detected originating only from small and medium MSAs but not from large MSAs. In urban counties, growth in a nearby large MSA is not related to local self-employment growth in the lower tiers of the urban hierarchy.

Key words: Urban-rural hierarchy, self-employment, wage and salary employment, urban-rural interdependence

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1. Introduction

The US has undergone substantial urbanization in recent decades, with less than 50 million of its more than 320 million people living in rural areas. This has occurred through both rural-to-urban migration and the expansion of urban areas annexing surrounding nonurban counties. “Bleeding” of urban ways of life and industrial structures into nonurban regions, accompanied by the shrinking of agriculture and mining, traditional dominant sectors in the rural areas, has blurred the borders between what we usually perceive as rural and urban in terms of social, economic and political settings. Instead of a sharp divide and separate analyses for urban and rural contexts, social scientists are increasingly examining processes at the fringe. Gradually arguments are made for more nuanced analyses to understand social, political, and economic phenomena occurring across the urban-rural hierarchy, as interdependencies replace urban dominance (Lichter and Brown 2011).

The empirical economic research is mostly based on the premise that metro centers dominate in their economic relationships with surrounding areas. Following a long-standing research tradition, such analyses often conclude that the economic fortunes of the nearby hinterlands are closely linked to the economic success of proximate urban areas, as urban growth “spreads” to the hinterlands via the so-called spread effects (Boarnet 1994). It is not surprising that US research and policymaking has mostly focused on explaining and stimulating urban growth. Rural issues have received much less attention and rural policy often aims to stimulate the natural resource sector rather than linking up with urban-led growth, despite a long-term decline in primary-sector employment.

An earlier strand of literature has discussed offsetting spread and backwash effects (Myrdar, 1963). Spread effects occur when urban growth spills over to nearby rural areas—e.g., through commuting, access to markets and inputs, and knowledge spillovers. Yet, spread effects may be dampened or eliminated when proximity to large urban areas drains resources from rural communities. Such forces (termed "backwash effects") are observable when financial resources and human capital move to metropolitan areas (Domina 2006, Lichter, McLaughlin, and Cornwell 1995) or when rural businesses cannot compete against larger firms that predominate in urban areas (Gereffi, Humphrey, and Kaplinsky 2001).

Although considerable scholarly attention has been paid to the urban-rural continuum in many social sciences (Lichter and Brown 2011), economists have mostly focused on urban phenomena and have been slow to consider variations across the broader urban-rural hierarchy. This paper fills this gap by studying how national economic changes or shocks in various industries produce different local self-employment and wage and salary employment responses and how job growth in various-sized metropolitan statistical areas (MSAs) affects growth across the urban hierarchy.

One aspect of rural/urban economic interdependencies of particular interest is the relationship between urban economic growth and rural "entrepreneurship". The importance of entrepreneurship for job creation and regional economic growth is well established (Audretsch and Keilbach 2004a, Glaeser, Kerr, and Kerr 2015, Audretsch and Keilbach 2004b, Malecki 1994, Carree et al. 2015, Praag and Versloot 2007). Self-employment is often used to approximate entrepreneurship in empirical studies and it is increasingly recognized as a key component to economic growth (Goetz, Fleming, and

Rupasingha 2012, Rupasingha and Goetz 2013) that uniquely contributes to economic wellbeing in remote and disadvantaged regions (Stephens and Partridge 2011, Stephens, Partridge, and Faggian 2013). Given the special role that self-employment is able to play in defining local economic wellbeing, we focus our analysis the factors that influence self-employment growth. We further expand our analysis to separately analyze the determinants of paid employment growth in order to assess differences in the dynamics behind these two important economic outcomes, which, we hope, will contribute to informed policy debate, as our work expands the understanding of “cross-border economic processes” and variations in job creation drivers across heterogeneous groups of counties.

We expect the effects of the dissimilar industry structures and of nearby MSA growth on rural entrepreneurship to differ depending on MSA size and proximity for many reasons. First, proximity to larger, more diverse, cities should allow local entrepreneurs to access workforce skills that they themselves lack (Helsley and Strange 2011). Denser cities also have more access to services or partnerships that can help bridge skill gaps. In smaller cities that tend to have less industry diversity (Henderson 1997), the dynamics are likely different, as entrepreneurs often strive to fulfill local demand and are less likely to be dependent on skills and services available in larger metro areas. However, more pressing competition in and around larger cities may reduce business start-ups and self-employment growth. Recent research has shown that small- and medium-sized cities have outperformed the largest cities in terms of job and population growth (Dijkstra, Garcilazo, and McCann 2013, 2015, Partridge 2010), supporting the hypothesis that economic performance may differ depending on MSA size. Additionally, Partridge et al. (2008, 2009) find positive spread effects of urban population and job growth to nearby nonmetro areas, but only when the urban centers have under 500,000 people.

Our results suggest that self-employment in nonmetro counties modestly increases in response to favorable economic changes, with the size of the effects in rural counties being less than half of the average effect size in micropolitan counties. In contrast, the influence of growth in a nearby small MSA is on average two times larger than the corresponding effect felt in micropolitan counties. Unlike rural counties, in addition to growth spread effects from a small-sized nearby MSA, micropolitan counties enjoy increased self-employment growth if a nearby medium-sized MSA grows. Growth in a large nearby MSA, on the other hand, suppresses rural self-employment growth, in line with the backwash hypothesis. In the metropolitan subsample, self-employment positively responds to exogenous economic changes due to differential growth of its industries, with the effects being more pronounced in counties within small MSAs, whereas job growth in a nearby large MSA has no statistical impact on self-employment growth.

The remainder of the paper is organized as follows. The next section briefly reviews the related literature on rural-urban interdependence. Section 3 presents the empirical approach, data and variables. Section 4 reports the results, whereas the concluding section summarizes our findings, discusses policy implications and avenues for future research.

2. Proximity and a distribution of growth

Building on the urban-hierarchy lattice of the Central Place Theory (CPT), the New Economic Geography (NEG) (Krugman 1991) explains the formation of agglomerations with the performance of firms – and by extension, regions. Together NEG and CPT explain the advantages of location close to agglomerated economies, but the associated fierce competition can suppress growth in nearby hinterlands due to a "growth shadow" from the larger urban center (Dobkins and Ioannides 2001). Yet, NEG and CPT frameworks alone cannot explain the spatial distribution of economic activity and the interdependence between cities and their nearby hinterlands (Partridge 2010). An alternative approach within traditional rural development literature has focused on spread and backwash effects from urban areas into rural areas (Henry, Barkley, and Bao 1997, Myrdar 1963, Partridge et al. 2007). It is possible that urban growth spreads into the countryside by creating job opportunities for commuters, market opportunities for rural businesses, and access to higher-level urban services for firms and households. In this framework, commuting helps rural businesses, as commuting households purchase services locally. On the other hand, it is also possible that growth shadows result, as urban growth pulls resources from rural areas by dominating markets, attracting human resources (e.g. braindrain), and drawing rural financial capital.

The US research that examines interdependences between rural and urban economic areas generally supports the spread effects hypothesis (Boarnet 1994, Henry et al. 1999, Henry, Schmitt, and Piguet 2001, Lichter and Brown 2011, Schmitt and Henry, 2000). A main conclusion is that growth in cities has net positive effects on population, employment, and several other measures of economic performance in surrounding rural regions—i.e., "spread" effects outweigh the "backwash" effects. However, US policymakers seem to be reluctant to rely on urban-led growth in certain rural settings.

As income inequality rises, not only among professional occupations, but perhaps more importantly in the largest US MSAs where considerable pockets of severe poverty can be found[i], the ability of cities to lift living standards in their own and surrounding counties may be questioned. Indeed, past US research has not fully examined whether net spread and backwash effects vary by metropolitan size. For example, the largest cities may be associated with relatively stronger backwash effects because their congestion limits the geographical range of rural commuting. Likewise, recent research on developing countries suggests that those who migrate to secondary cities, as opposed to mega-cities, find higher standards of living, ensuring more inclusive economic growth (Christiaensen, Weerdt, and Todo 2013). Others have found that small- and medium-sized cities in developing countries may play an important role in growth and poverty reduction (Berdegué et al. 2015), although such evidence is country-specific (Berdegué et al. 2015, Ferré, Ferreira, and Lanjouw 2012).

After a surge of interest in the 1960s and 1970s, US research has been slow in appraising the economic role of places other than central cities (Irwin et al., 2010). Partridge (2010) compares growth in four MSA population groups, finding that small and medium cities outperformed larger ones in both employment and population growth rates. With regard to the effects of proximity to urban centers of various sizes, Partridge et al. (2009) report positive population spillovers from MSAs of up to 500,000 people into smaller urban areas and nonmetro counties, with no additional spillovers from the largest metro areas.

3. Empirical model, data and variables

Our expectation of the important role played by distance to nearby MSAs and by sizes of these MSAs is motivated by a Central Place Theory framework, where firms and households desire various services that are offered by different-sized urban areas. Actors access goods and services available in the nearest city, but move on to progressively higher-level cities when the nearest city doesn't offer the products they demand[ii]. Each urban tier offers progressively higher levels of functions and services, implying that economic actors need to travel to successively higher-ordered urban areas, which imposes additional costs to acquire more advanced services.

We posit that the outcome variables (self-employment and wage and salary employment growth) are a function of a number of factors identified as employment growth determinants in the past literature. They include (1) the industry mix term (described in greater detail below and in the Appendix), which captures differences in local industry composition that lead to differing local growth rates (2) employment growth rate in the nearest MSA, (3) distance to this MSA, (4) an interaction term between MSA growth and distance to the MSA to account for indirect effects, and (5) a set of control variables that previous research has identified as important for local employment growth, which include the 1990 share of employment in agriculture, 1990 share of adults with high-school diploma and/or some college, 1990 share of adults with graduate or professional degree, and 1990 own county's population and 1990 population in nearby (or own for metropolitan counties) MSA. Equation (1) below presents our empirical specification.

$$\Delta Y_{ic} = \beta_0 + \beta_1 \Delta INDMIX_{ct} + \beta_2 \Delta MSAGR_{mt} + \beta_3 DIST_c + \beta_4 INTERACTIONS_{ct} + X_{c1990}\beta + \theta_t + \varepsilon_{ct} \quad (1)$$

where subscript *i* denotes employment type (SE or WS employment), *c* refers to a county, *m* to a nearby MSA and *t* indicates year. We estimate Equation (1) using OLS. Since our specification cannot capture all (fixed) county-specific growth factors that might influence self-employment and wage and salary employment[iii] growth, we use three-year differences of the dependent and main explanatory (industry mix and MSA growth) variables[iv]. For example, if a county's self-employment growth rate calculated with total county employment as the base was 0.5 percent between years 2004 and 2007 and the same measure was 0.1 percent between years 2001 and 2004, the value of the dependent variable in year 2007 is 0.4 percent. There are three observations for each county calculated in the same fashion and denoted by years 2007, 2010 and 2013. Our first differencing removes unobserved county characteristics that might relate to its employment growth and may potentially bias estimation results. First-differencing between three years should also remove some of potential measurement error that is more problematic in annual data. When estimating Equation (1), we cluster errors at the Bureau of Economic Analysis (BEA) Economic Area level (defined by the patterns of economic interdependence) because of the possibility that the error terms within the economic areas could be correlated and adjusting for this correlation improves the efficiency of our estimates. There are more than 170 BEA areas. We use 3,067 continental US counties as our observation units, separated into metropolitan (1,059)[v], micropolitan (679) and rural (1,329) subsamples using the 2003 Office of Management and Budget (OMB) definition.

Our main data source is a proprietary data set of county employment from Economic Modeling Specialists, Int. (EMSI)[vi]. The data are detailed by four-digit NAICS codes and broken down by class of worker[vii], which allows us to separate total county employment into self-employment and wage and salary employment. EMSI relies on a number of public data sources (the *Quarterly Census of Employment and Wages* (QCEW) from the Bureau of Labor Statistics, BEA's *Regional Economic Accounts*, *County Business Patterns* from the US Census Bureau) to help fill in values suppressed due to public confidentiality requirements. In deriving our variables, we exclude the agricultural sector to avoid difficult issues of measuring farm proprietors and employment, thus, our dependent and explanatory variables (industry mix term, growth in self-employment, paid employment, as well as job growth in nearby MSAs) reflect nonfarm employment only.

The EMSI self-employment totals are derived from the American Community Survey (ACS). The ACS only reports those individuals who consider self-employment as their *primary* employment. This is an important advantage over measures of self-employment provided by the BEA that count someone as self-employed if they engage in almost any self-employment activity, even if it is not their primary source of income. Thus, unlike numerous existing studies of self-employment, our analysis is based on estimates that avoid "double-counting" self-employed by placing those who have casual self-employment earnings in addition to primary income from a paid position into the wage and salary employment group. The differences between the two main sources of self-employment data (BEA and EMSI) are best illustrated by examining year-to-year averages. The BEA reports consistent yearly increases in mean proprietors count between 2001 and 2013. According to the EMSI data based on the ACS, however, mean proprietors number grew until 2006 and declined afterwards[viii]. These divergent patterns seem plausible, as full-time self-employed firms were more likely to close after the onset of the Great Recession, whereas worsening income conditions (Farber 2011) pushed paid employees to look for additional income through casual self-employment.

Our first explanatory variable in Equation (1) is industry mix. The industry mix term is a longtime workhorse in regional economics whose mathematical derivation is described in the Appendix. The industry mix term reflects how differing initial local industry compositions can lead to economic changes (or shocks) to local job growth due to various national factors differentially affecting national industry growth. Simply, the industry mix variable reflects the county's expected employment growth rate if all its industries grew at their corresponding national growth rates. Because the industry growth rates are based on national data, the local industry mix term is by construction exogenous to local growth, i.e. growth in industries of one county does not affect growth rates of these industries nationally. This eliminates the possibility of reverse causation or endogeneity that can bias the regression coefficients. Since the industry mix term greatly mitigates endogeneity concerns, it is widely used in regional and urban economics as an independent variable or as an exogenous instrument in studies that rely on instrumental variable estimation techniques (Bartik 1991, Betz et al. 2015, Blanchard et al. 1992).

The next group of explanatory variables is employment growth rates in nearby MSAs of various sizes over the same three-year periods. We employ slightly different empirical specifications for the counties in the nonmetropolitan sample (rural and micropolitan subsamples) and in metropolitan samples (counties within small and medium MSAs). For the nonmetropolitan sample, we interact nearby MSA growth rates with one of three dummy variables that indicate that MSA's size (population under 250,000, between 250,000 and 1 million, and above 1 million people in 1990). This allows us to specifically assess whether the impact of urban economic conditions have different spread and backwash effects depending on the size of the nearest urban area. *A priori*, it is unclear which size city has spread effects into rural areas. Close access to larger cities provides bigger markets and more services, but smaller urban areas may have less congestion creating more opportunities for commuters that support rural services. All models in the nonmetro sample include interactions of MSA employment growth/size dummy variables with distance to corresponding MSAs. For counties in the metropolitan sample, we include job growth in the nearest large MSA (more than 1 million residents in 1990) together with an interaction between job growth and distance.

Finally, all models include a set of distance variables that reflect remoteness or, alternatively in metro models, centrality of a county in the urban-rural hierarchy. This approach stems from the Central Place Theory, which delineates tiers in the urban system that have successively higher-ordered functions or services for households or businesses. In this vein, the four distance variables are distance to the nearest MSA and then incremental distances to MSAs with 1990 population of at least 250,000, 500,000 and 1.5 million people following Partridge et al. (2008) and Partridge et al. (2009).

Figure 1 shows an example of the distance calculation. Clearwater County is a rural county in Idaho. The nearest metropolitan area, Missoula, Montana, had a population of about 90,000 people in 1990 and lies 64 kilometers away, that is, the distance to the nearest MSA for this county observation is 64. The nearest MSA in the next tier of the urban hierarchy with greater than 250,000 residents is Spokane, Washington, with population slightly exceeding 360,000 residents in 1990. This MSA is 97 kilometers away from Clearwater County, which means the incremental distance to an MSA with a population of at least 250,000 is 33 kilometers (97 minus 64). The third closest MSA in the next tier of urban-rural hierarchy is Seattle-Tacoma-Bellevue MSA, Washington, which is 317 kilometers away and happens to fall in the highest tier (MSAs larger than 1.5 million residents in 1990). The incremental distance to a MSA of at least 500,000 residents is then 220 kilometers (317 minus 97) and zero to an MSA of at least 1.5 million people, because no further travel is required to get to a highest tier MSA.

Figure 1. An example of distance calculation

<Figure 1 about here>

For the metropolitan sample, incremental distances are measured similarly, except that the distance to the nearest urban area is measured from the population-weighted centroid of the county to the population-weighted centroid of its own MSA, accounting for the notion that more distant counties in an MSA are often growing faster with more land availability. All distances are measured as straight-line distances. We use straight-line distance since there are many proximity factors we are trying to measure, such as auto road-time, railroads, knowledge spillovers, job networks and public service delivery. An alternative intuitive measure, travel time, is not likely to offer sizeable improvement over our operationalization as road travel time can be affected by time of day with rush hour, for example, which would introduce a measurement error that would be more systematically severe in large metropolitan areas and potentially may bias our results. Therefore, we use a straight-line distance because the spillovers that are important for economic activity are likely to be highly correlated with distance. If our choice of an approximation introduces some measurement error, the only tangible effect would be that distance coefficients are biased to zero and the standard errors would be measured less precisely (see Partridge et al., 2008)[ix], so our results would represent conservative estimates. Because the first-difference approach removes all time-invariant county-specific fixed-effects, including proximity or remoteness from urban centers, the estimated distance coefficients show how the effects of urban hierarchy accessibility are changing over time—e.g., a significant positive coefficient would suggest that the role of distance in helping more remote areas to grow (for example, by "insulating" from urban competition) is increasing over time.

In addition to the explanatory variables described above, the vector ***X*** of other control variables includes a number of controls that are based on previous research into the employment growth determinants. Economic advantages from larger populations are captured by the 1990 values of logged county population and logged nearest MSA population (or own in the metropolitan sample). The share of adult population with a high school diploma (no Bachelor's degree) and the share of the adult population with a graduate or a professional degree are proxies for the level of human capital. The data source for these variables is the US Census Bureau. Finally, the models include the 1990 agriculture employment share using the EMSI data. Following a well-established economic literature, we use 1990 to lag the explanatory variables far-enough back in order to mitigate any endogeneity including reverse causality concerns. As with the distance variables, with the county fixed effects differenced out, the coefficients on the control variables reflect change in their importance over time. All models include time period dummies that account for business cycle effects such as the Great Recession. Table 1 shows summary statistics.

Table 1. Summary statistics for the variable by sample

<Table 1 around here>

Note: The table reports means that are not weighted by population

4. Estimation results and discussion

This section presents estimation results for both self-employment and wage and salary employment discussed below separately for the metro and nonmetro subsamples. Since the dependent variables, industry mix variable, and employment growth in nearby MSAs are calculated relative to total county employment, estimation coefficients on the main explanatory variables in each model are directly comparable. One should keep in mind that the industry mix variable is calculated using total employment that includes both self-employment and wage and salary employment, whereas the dependent variables separate these two employment groups. To meaningfully interpret the industry mix coefficients in Tables 3 and 4, we need to adjust for the share of self-employed (reported in Table 2) in the four subsamples we analyze.

Table 2. Shares of non-agricultural self-employment in four groups of counties

<Table 2 around here>

Source: Authors' calculations based on the EMSI data

4.1. Nonmetropolitan sample results

In this subsection, we discuss results for the nonmetro subsample broken down into rural and micropolitan groups.[x] Table 3 reveals clear differences in the effects of self-employment and wage and salary employment growth determinants. For self-employment, the industry mix term has a modest but positive impact on self-employment growth; however, the effect in micropolitan counties is twice as large. The gap is even larger if we account for the average nonfarm share of proprietors in the rural and micropolitan subsamples. Using Table 2, we can interpret the coefficient of 0.12 for rural counties as 0.03 percent spillovers. That is, a one percent increase in exogenous employment from having a favorable industry composition increases rural self-employment by 0.12 percent. Because rural self-employment averages 9.3 percent of total employment, this one percent of expected increase in total employment on average should consist of 0.09 percent of new self-employed jobs and 0.91 percent of new paid jobs suggesting that self-employment grows by additional 0.03 percent above what would be expected if the economic shocks created jobs in the same proportion as the share of self-employment. Likewise, the coefficient of 0.25 in the micropolitan subsample can be interpreted as 0.18 percent spillovers because micropolitan self-employment averages 7 percent of total employment. The spillover is six-times larger than the one in the rural subsample, indicating that micropolitan counties have advantage of creating more self-employment after a positive economic change.

Table 3. OLS estimation results for nonmetro counties

<Table 3 around here>

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; standard errors clustered at 177 BEA economic areas in parentheses.

Rural self-employment benefits from growth in the nearest small MSA. Every 100 new jobs in such metro areas on average are associated with 4.5 new self-employed jobs in rural surrounding counties, but only 2.7 new jobs in micropolitan surrounding counties, after three years. In addition to enjoying positive spread effects from small MSAs, micropolitan self-employment also benefits from growth in nearby medium-sized metros. Micropolitan self-employment is not affected by economic conditions in nearby large MSAs, whereas self-employment growth in rural areas is suppressed if the closest MSA grows and happens to be large. The magnitude of the corresponding coefficients shows that rural backwash effects from nearby large MSAs are almost three times larger than positive spread effects from small MSAs. Insignificant coefficients on the distance-MSA-size-growth interaction terms suggest that distance to a nearby MSA does not affect the magnitude of the estimated MSA growth effects.

Turning directly to the main distance variables, which reflect changes in the effects of proximity over time, the positive and significant distance to the nearest MSA coefficient suggests that greater distance provides proprietor businesses increasing protection from urban competitors. Yet as noted above, some of the adverse urban competition effects are mitigated for growing small and medium MSAs, which is consistent with Partridge et al.'s (2008) findings that medium and small MSAs have larger spillovers. Incremental distance to the nearest metro area of less than 250,000 also offers growing additional protection, but incremental distances to higher-tier cities are statistically insignificant. This might suggest that backwash is becoming more pronounced in the 21^{st} Century, which differs from the findings reported by Partridge et al. (2010).

Coefficients on the 1990 control variables tell several stories. First, the magnitude of the coefficients is very small, so that while some are statistically significant, we do not want to overstate their economic consequences. Next, the legacy of agricultural specialization in micropolitan counties appears to be associated with some growing reductions in self-employment. Relatively low levels of educational attainment have (modest) ever increasing effects in promoting self-employment in both rural and micropolitan counties, whereas greater shares of adults with a graduate or professional degrees have a growing impact on self-employment only in the micropolitan subsample. This may point to an increasing prevalence of necessity entrepreneurship in rural areas. In micropolitan counties the results seem to suggest increasing roles for both necessity and opportunity self-employment as follows from the positive and significant coefficients on both educational attainment measures. Larger rural counties, as measured by population in 1990, tend to have decreasing rates self-employment growth, which is a little surprising unless incorporated businesses are crowding-out self-employment, which mostly consists of partnerships and not limited-liability corporations.

We now briefly describe the wage and salary results shown in the rightmost panel of Table 3. They suggest that the dynamics behind nonmetro paid employment is different from that behind self-employment. In particular, a one percent exogenous change in employment due to local industry composition is associated with 1.8 percent more rural wage and salary employment (significant at the 5 percent level) but leads to a statistically insignificant 1.1 percent increase in micropolitan paid employment. One implication is that in sparsely-populated rural counties, favorable economic changes have, on average, larger impacts.

The spread effects from the nearby small and medium MSAs are consistent with the self-employment results. The only difference is that growth-spread effects from small MSAs are stronger in micropolitan counties. No backwash effects are detected for wage and salary employment. Likewise, distance to nearest MSA of any size is statistically unrelated to wage and salary employment growth. In rural counties, two distance-growth interaction terms are significant. Although the lack of statistical significance of the main effects complicates interpretation, one may conclude that the protective effect of distance from growing medium-sized MSAs is greater if they grow faster, whereas protective effects of distance from large MSAs is decreasing when these large metro areas experience faster growth. Incremental distance to the nearest medium-sized MSA has a growing negative effect on rural paid employment growth, indicating greater job creation closer to such urban centers. This may be due to greater access to markets and suppliers, which promotes wage and salary employment. In the micropolitan subsample, to the contrary, incremental distance to urban centers of 250,000-499,999 residents in 1990 offers additional protection from urban backwash effects. Overall, the results for variables that measure distances seem to point to the changing presence of both spread and backwash effects of varying intensity, making it hard to draw firm conclusions.

4.2. Metro sample results.

Table 4 presents the results for counties in small and medium MSAs. The table shows a wide variation in the effects of the main explanatory variables depending on employment type and the county's position in the urban hierarchy. With approximately equal six percent self-employment shares in small and medium metropolitan counties (from Table 2), economic growth driven by a favorable industry composition has stronger stimulating effects on self-employment in small MSAs—i.e., after subtracting 0.06 from the respective industry mix coefficients, there are 0.28 percent spillovers in small as opposed to 0.14 in medium MSAs, showing considerably greater self-employment growth than the expected growth based on its average six percent (0.06) share. Job growth in nearby large metro areas and distance to these areas do not affect self-employment in lower-tier MSAs, although there is evidence that possible distance protection is weaker if nearby large MSA growth is greater. Both education variables are positive and statistically significant, again in line with the necessity and opportunity entrepreneurship perspectives.

Table 4. OLS estimation results for metro counties

<Table 4 around here>

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; standard errors clustered at 164 BEA economic areas in parentheses.

In the wage and salary employment models, the industry mix term has differing effects in small and medium-sized metro areas. In small MSAs, industry composition effects suggest that an exogenous one percent increase in total employment leads to only 0.82 percent increase in wage and salary employment, which means that the growth displaces other paid employment. In medium-sized MSAs, the corresponding one percent change is associated with 2.5 percent more wage and salary jobs, suggesting high positive multiplier or spillover effects. Growth in MSAs of at least 1.5 million people appears to have strong positive effects on both small and medium-sized MSA paid employment growth, which is more pronounced in medium-sized MSAs.

The direct effect of distance from the own-MSA core (distance to the nearest MSA) is statistically insignificant. For smaller MSAs, the negative and significant incremental distance to MSAs greater than 500,000 and greater than 1.5million suggests that the effects of remoteness are declining in smaller cities. In other words, being closer to larger MSAs has increasing importance. The results are similar for medium-sized MSAs, though the incremental distance to MSAs of at least 1.5 million people is insignificant. Both results are consistent with growing spread effects from bigger cities to smaller cities because being closer to larger MSAs is positively related to paid employment growth.

5. Conclusion

Since Birch's (1979) work on the importance of small businesses, economists and policymakers have championed them as key economic drivers. At the same time, scholars are increasingly aware that entrepreneurship is not fostered inside a vacuum and that key environmental factors influence the probability of initial success and maturation of startups. Our study contributes to this discussion by investigating the relative local job growth effects from exogenous economic changes on self-employment and paid employment. We also investigate how these relationships change according to the locality's position within the urban-rural hierarchy.

Our analysis arrives at three important conclusions. First, we demonstrate that how local self-employment responds to exogenous changes due to different industry structures varies by the county's position within urban-rural hierarchy. Overall, self-employment in rural counties is the least responsive to the shocks. Rising rates of self-employment growth in rural counties with higher shares of those with only a high school diploma may indicate prevalence of necessity entrepreneurship. Whether the emergence of necessity entrepreneurship is a drag on local growth is a debated question, with the answer likely varying across the urban hierarchy too; however, the distinction between necessity and opportunity entrepreneurship often used in the literature (Low, Henderson, Weiler 2005) may be a misnomer, especially for lagging and remote regions (Stephens and Partridge 2011).

Second, we document the presence of both spread and backwash effects. Most likely, these effects work simultaneously via various channels whose intensities depend on a number of factors. This paper explores the role of two such factors—a position within the urban-rural hierarchy and a nearby MSA size — which indeed appear to play a role in what effect dominates. Overall, backwash effects are evident in the influence of large metro employment growth on self-employment growth in surrounding rural counties. In all other cases, either spread effects are predominant or no effects are detectable, most likely because their offsetting impacts.

Finally, depending on the relative positions of counties within urban-rural hierarchy and the type of employment considered, distance to nearby MSAs plays both protective (allowing faster self-employment growth in more remote nonmetro counties) and stimulating (promoting growth in counties closer to urban centers, in line with the view that access to markets and resources are important) roles, although the empirical evidence on the presence of the latter one is weaker. While distance is not something that can be directly affected by policy levers, local decision makers should exploit any advantages and realize limitations their jurisdictions may face that stem from the position on the urban-rural continuum. Future research may examine how exogenous changes in economic growth affect other outcomes such as income, poverty, and inequality to help better tailor policy design within the urban-rural hierarchy.

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Appendix

Industry mix variable is calculated as described in Equation (A1). To keep our specification consistent, we difference the industry mix term over three years.

$\Delta INDMIX_c = INDMIX_{ct} - INDMIX_{ct-3}$ and

$$INDMIX_{ct} = (\sum_i IndShare_{cit-3} NatGr_{it-3,t}) \quad \text{(A1)}$$

where subscripts *c* and *t* indicate county and year respectively and subscript *i* refers to an industry. For each industry (at 4-digit NAICS level) within a county, we calculate the share of total county employment in the beginning of a three-year period ($IndShare_{cit-3}$), multiply it by the national growth rate in corresponding industries over the three-year period ($NatGr_{it-3,t}$) and sum over all the county's industries. In Equation (1) the coefficient β_1 is the local employment multiplier associated with economic shocks due to having different industry composition, i.e. it shows how many jobs are created in a county for each job that is expected to be created exogenously. If the coefficient is, for instance, 1.5 it means that there are positive spillovers of 0.5 jobs because per each one job added as a direct result of the exogenous shock, 0.5 jobs are created by the county itself. In contrast, if the coefficient is 0.8, it indicates crowding out because one job that is created as a result of exogenous economic changes translates into only 0.8 jobs in a county, suggesting that 0.2 jobs were destroyed. In the analysis presented in the text of the paper, however, an average composition of the industry mix variable (self-employment vs. wage and salary employment) needs to be accounted for when interpreting estimation coefficients.

Endnotes

[i] http://www.pewresearch.org/fact-tank/2015/09/10/how-the-geography-of-u-s-poverty-has-shifted-since-1960/.

[ii] The New Economic Geography (NEG) models build upon the urban hierarchy conceptualization of CPT and emphasize the role of agglomeration in the formation of different tier cities. However, NEG models have not been particularly effective in explaining more recent evolutions of the US settlement patterns (Glaeser and Kohlhase 2004, Partridge 2010).

[iii] We use paid employment and wage and salary employment interchangeably.

[iv] In Equation (1), $\Delta Y_{ic} = Y_{ict} - Y_{ict-3}$ is a three-year difference in county self-employment or wage and salary employment growth calculated with total county employment serving as the base (subscripts have meaning identical to the one described following Equation (1) in the main body of the paper): $Y_{ict} = (Emp_{ict} - Emp_{ict-3})/TotEmp_{ct-3}$.

[v] Since we report estimation results for counties in small and medium MSAs only, the actual number of counties used to estimate our models in metropolitan subsample is 703.

[vi] http://www.economicmodeling.com

[vii] http://www.economicmodeling.com/2012/07/09/emsi-data-update-four-new-categories/

[viii] This is in line with the observation that self-employment formation rates are down after the Great Recession. See, for example, http://www.forbes.com/sites/jacquelynsmith/2014/02/06/self-employment-has-declined-since-the-recession-but-it-may-be-on-the-rise-again-soon/#19cc4d897e56

[ix] There is a high correlation between road travel time and straight-line distance in advanced economies with developed road systems. For instance, Combes and Lafourcade (2005) find that the correlation between straight-line distances and French transport costs is 0.97.

[x] A micropolitan area is a principal "city" of between 10,000-50,000 people along with the county(s) that include the principal city and any other counties with tight commuting links to this city.