Self-employment effects on regional growth: A bigger bang for a buck?

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23 December 2016

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Abstract

Economic development policies often revolve around supporting small businesses and new firm creation as they are locally grown and likely can be more influenced by state and local policy. Two prominent strands of current research—the regional economic growth and small business/entrepreneurship literatures—elucidate the importance of small, young firms for regional economic performance and the crucial role urban-rural proximity plays in the distribution of growth across space. Keeping these two research traditions in mind, we study the effects of self-employment on job growth in US counties. Our goal is to estimate the *net* employment spillovers from changes in self-employment (SE) and to compare them to spillovers from changes in wage and salary employment (WS). We ask the following research questions: Do exogenous net changes (shocks) in SE spur larger or smaller changes in employment than do equal changes in WS employment and do these effects vary across the rural-urban hierarchy? The answers to these questions are of paramount importance in devising economic development strategy across urban and rural settings. We use a differencing strategy and an exogenous measure of SE and WS employment shocks to estimate *net* multiplier effects and to investigate their relationship with proximity to differing-sized urban centers. The analysis uses US county-level data spanning the 2001-2013 period. The results confirm the importance of self-employment for job creation, supporting both more SE and WS employment. Distance from urban centers generally offers protection that promotes SE growth but hinders WS employment growth. In an austere fiscal environment, spending a dollar to stimulate SE is likely to have greater returns as opposed to stimulating WS employment.

Acknowledgements:

We appreciate the partial support of USDA AFRI grant #11400612 "Maximizing the Gains of Old and New Energy Development for America`s Rural Communities."

1. Introduction

Starting in 1979, David Birch published a series of what have become landmark studies providing empirical evidence that small businesses disproportionately contribute to US employment growth (Birch, 1979, 1987). His work has long been the basis on which policymakers champion support for small businesses. Birch's approach was later challenged by Davis, Haltiwanger, and Schuh (1996), who found no link between firm size and local employment growth after correcting for a statistical bias. More recent analyses using new data and updated methodologies find smaller—though still positive—estimates than Birch's (Neumark, Wall, & Zhang, 2011). Others, however, have concluded that firm age, which is often correlated with firm size, is the key driver for US employment (Haltiwanger, Jarmin, & Miranda, 2013). No clear consensus has emerged on the importance of small businesses with regard to job creation. Yet, the importance of entrepreneurs and small businesses to the economy remains deeply embedded in the American public's collective conscience.[1]

Despite the special place that entrepreneurship and small business occupy in US culture, its roles were previously downplayed in economic debates. Classical economics has mostly relied on capital, labor and, more recently, innovation or technological change as the main factors that drive growth (Becker, Murphy, & Tamura, 1994; Griliches, 1979; Romer, 1990; Solow, 1956) but omitting entrepreneurship. In the policy realm, although the Small Business Administration provided some federal support to small businesses, state-level economic development programs have usually been centered around business attraction, typically focused on large (predominantly manufacturing) companies (Deller & Goetz, 2009; Turner & Cassell, 2007). In recent years entrepreneurship is gaining traction in academic discourse and is explicitly included in new economic growth models (Acs & Sanders, 2013; Braunerhjelm, Acs, Audretsch, & Carlsson, 2010), while new "entrepreneurial" development policies have moved to the forefront in research and policy circles (Hart, 2008; Hofe & Chen, 2006; Palazuelos, 2005). These policies

[1] While the term entrepreneurship is broadly defined, its meaning is not always clear. Some people refer to entrepreneurship as a sort of radical innovation, generally, it relates to the notion of product market innovation for new products or process innovation that greatly reduces costs. In addition, risk-taking is another attribute of an entrepreneur. The overlap with self-employment is not complete, but even a necessity entrepreneur is taking on some risk, while other self-employed workers take on all dimensions of entrepreneurship. Thus, all self-employment captures entrepreneurship to some degree. We alert readers to not to totally conflate the two terms, even as we use the terms interchangeably.

champion regional economic growth that relies local companies. Proprietors businesses are well-positioned to play an important role in such growth especially in rural and lagging regions (Goetz, Fleming, & Rupasingha, 2012; Rupasingha & Goetz, 2013; Stephens & Partridge, 2011).

Plentiful empirical evidence suggests that entrepreneurship is positively related to productivity, innovation, and general economic growth (Acs & Armington, 2006; Acs, Audretsch, Braunerhjelm, & Carlsson, 2012; Agarwal, Audretsch, & Sarkar, 2007; Audretsch & Keilbach, 2004; Camp, 2005; Carree & Thurik, 2010; van Stel, Carree, & Thurik, 2005; Wennekers & Thurik, 1999; Wong, Ho, & Autio, 2005) but some of the evidence should be applied cautiously. Especially in analyses at a small regional scale, the endogenous relationship between entrepreneurship and regional economic performance is a challenging issue (Glaeser, Rosenthal, & Strange, 2010). Scholars have utilized various approaches, such as lagged or initial levels of entrepreneurship (Carree, Congregado, Golpe, & van Stel, 2015; Stephens & Partridge, 2011) or instrumental variables (Glaeser, Kerr, & Kerr, 2015) to mitigate the concerns associated with potential bias. We rely on an alternative methodology and use exogenous self-employment shocks to estimate county-level employment impacts.

Another place where more entrepreneurship research is needed is assessing whether small businesses development and entrepreneurship impacts vary across urban-rural hierarchy. The US economic research has traditionally focused on urban areas potentially overlooking important variation in the economic and social dynamics within the urban-rural continuum. Existing research both in developing and developed countries, for example, suggests that smaller cities and secondary towns are more likely to outperform mega cities in terms of economic growth and social inclusion (Christiaensen & Todo, 2014; Christiaensen, Weerdt & Todo 2013; Partridge, 2010).

In theory, impacts of entrepreneurship are likely to depend on the remoteness or centrality of a region for a number of reasons. Larger agglomerations provide start-ups more customers and access to a wider variety of public and private inputs. However, congestion effects may offset these advantages. Surviving in a city may also be more challenging, as cities tend to have more firm-level competition given that more productive firms sort to larger cities. The positive and negative effects of location within agglomerated urban areas extend outside urban centers into surrounding rural areas for certain distances through either positive spread effects that support rural growth or negative backwash effects, where entrepreneurial, financial, and human capital resources leave rural areas for urban areas (Myrdal, 1963; Gaile, 1980). It is possible for backwash effects to dominate in rural counties closer to urban areas, while in more remote areas, greater "distance protection" from urban competition may support some remote-rural entrepreneurship (Tsvetkova, Partridge & Betz, Forthcoming). This illustrates one way in which agglomeration and small business development may have heterogeneous effects on total employment. Henry et al. (1997) and Partridge et al. (2007) generally find that spread effects dominate in Canada and the US in terms of population and job growth, but because commuting patterns could underlie their findings, it is unclear how the spread and backwash effects affect self-employment business dynamics across the urban hierarchy.

When considering employment effects from small or new firms, previous studies have mainly estimated *direct* employment effects (i.e. net direct hiring by a company). While those studies provide insight about which firms directly create jobs, they stop short of capturing the *net* employment effects on the regional economy, which are of greater policy relevance. Beyond increased direct employment, firm growth can affect the regional economy through indirect and induced employment effects. Indirect job creation occurs when other businesses expand or are born to support newly created firms or fill entirely new niches. Indirect effects can be negative as well when new businesses crowd out existing ones, thereby destroying some jobs in the process. Also, self-employment could just represent a changing status of a person shifting from paid employment to a new self-employed job, with zero net total employment effects.[2] Finally, induced employment effects arise from income and consumption growth that is further stoked by direct and indirect job growth. Overall, the positive creative forces typically outweigh the destructive ones (Fritsch & Mueller, 2004).

This study contributes to the literature by presenting an analysis of the *net* effects of self-employment on total job growth including all of the offsetting effects described

[2] For example, if a driver shifts from a limo company to working for Uber, this would be one less wage and salary employee and one more self-employed person, yielding no net employment gain.

above. Using US county-level data over the 2001-2013 period, we utilize a differencing approach and exogenous measures of self-employment (SE) and wage and salary (WS) shocks to estimate how SE job and income effects compare to corresponding WS employment effects. This is an important distinction as it gives policymakers a more complete picture of the job-growth impacts of small/micro business entrepreneurship versus (usually larger) companies that either expand or contract through WS employment. Whereas past research has described why SE relates to regional economic growth (e.g. Carree et al., 2015), it has not addressed the expected employment differences between the effects of external shocks from SE and paid employment.[3]

We separately analyze nonmetro counties and three groups of metro counties divided by the size of the metropolitan statistical areas (MSAs) they belong to to probe into differences related to the location within the urban-rural hierarchy often linked to variations in the level of agglomeration, industrial structure and human capital. In addition to total employment broken into SE and WS components, we separately consider tradable and non-tradable sectors and supplement our analysis with investigation of the income response to exogenous shocks from SE and WS employment.

Our results suggest that the *marginal* effects from SE shocks are remarkably larger than those from WS employment shocks, with the difference particularly obvious for metropolitan counties. However, when our estimates are used to calculate the relative magnitude of the economic impacts, the contribution from WS employment is larger given its vastly dominant share in the US economy. Nevertheless, our findings indicate potential for greater *marginal* returns on investments in supporting SE compared to investments into paid employment. More generally, while our conclusions are based on the analysis of an advanced economy, our approach should be useful in examining small business development and understanding urban spillovers regardless of the level of economic development.

The rest of the paper is organized as follows. The next section overviews existing literature on job creation and economic development with special focus on the effects of entrepreneurship and SE and their relationship to the urban hierarchy. Section 3 presents our empirical model and data followed by our results in Section 4. In section 5 we

[3] Throughout the paper, we refer to WS employment and paid employment interchangeably.

describe further analyses that use income measures as dependent variables. Section 6 summarizes our findings, offers policy insights, and suggests avenues for future research.

2. Literature review

In this study, we assess whether entrepreneurship and small business development, and more specifically self-employment, promote local economic development in the form of jobs and income; how these effects from self-employment compare to those from paid employment; and do these economic impacts vary across the urban hierarchy? These research questions generally fall within the literatures that examine regional growth and the ability of entrepreneurs/small businesses/self-employed to promote employment and/or income growth. Since these literatures have developed along several important lines defined (among other factors) by the level of analysis–individual firm or region, including nations–the brief literature review below is organized around regional and firm-level evidence on job creation or overall growth. We do not cover international studies because of space concerns and the lack of comparability of entrepreneurship/self-employment measures across countries (Carree et al., 2015).

At the firm level, Birch (1979, 1987) estimated that between 66% and 82% of all net new US jobs were generated by companies with fewer than 20 employees. These findings were later challenged on econometric and conceptual grounds with researchers claiming that Birch's methodology resulted in an upward bias (Brown, Hamilton, & Medoff, 1990; Davis et al., 1996; Davis, Haltiwanger, & Schuh, 1998). Later work, most notably that by Neumark and co-authors using the National Establishment Time Series Database (Neumark et al., 2011), shows that small establishments indeed create a disproportional number of *net* new jobs, especially in services, although their estimates are considerably smaller than those found by Birch. Haltiwanger et al. (2013) further argue that new firms, which naturally tend to be small, are the ones that create more jobs and the positive relationship documented by previous studies is, in fact, between employment and new (not small) firms.

At a regional level, other studies have examined whether initial levels of entrepreneurship lead to faster subsequent job growth. These studies often use the initial share of SE, although some utilize alternative entrepreneurship proxies, such as new start-ups and small business share. The results of this scholarship are mixed, with some studies reporting positive effects (Bunten, Weiler, Thompson, & Zahran, 2015; Goetz et al., 2012; Komarek & Loveridge, 2015; Rupasingha & Goetz, 2013; Shrestha, Goetz, & Rupasingha, 2007; Stephens & Partridge, 2011; Stephens, Partridge, & Faggian, 2013) but others presenting negative or mixed evidence (Acs, 2006; Fritsch & Mueller, 2004; Mueller, Van Stel, & Storey, 2008). These differences can be partially explained by the prevalence of opportunity *vs.* necessity entrepreneurship. It is believed that opportunity entrepreneurs create more jobs and enhance regional economic growth and prosperity, whereas necessity entrepreneurs may mostly work for themselves in an absence of other work, without clear plans to grow or innovate (Acs, 2006; Shane, 2008). Stephens and Partridge (2011) argue that such a distinction is at least in part false—i.e., small firms generate jobs for the owners and other employees and change the local business culture, especially in lagging regions.

One important comparison that has not been made in the literature is whether SE growth is associated with more job creation compared to the effects of existing (or new corporate) firms hiring more WS workers. The conclusion here is not given *a* priori, as the offsetting net-positive and net–negative effects are likely to be present. On the one hand, when SE entrepreneurs start new businesses, they often hire additional WS employees. For example, in the US in 2014, on average, every self-employed worker had 3 paid employees.[4] Another reason is that the self-employed often operate small firms and there is some evidence showing that small firms buy more local inputs (Bartik, 1993) and tend to remain locally based (Fleming & Goetz, 2011). Sourcing inputs locally would result in greater indirect and induced income effects within the community, creating more local jobs and a higher job multiplier. Greater SE could also potentially foster a more entrepreneurial environment and signal better opportunities to other potential start-ups (Bunton et al., 2015), leading to more innovation and greater net job-creating effects.

On the other hand, self-employment growth may result in smaller net-total employment gains compared to WS employment. For example, workers might simply leave their paid jobs to become self-employed without hiring additional employees. This may be especially true in regions with high necessity entrepreneurship, where workers

[4] http://www.pewsocialtrends.org/2015/10/22/three-in-ten-u-s-jobs-are-held-by-the-self-employed-and-the-workers-they-hire.

have few options rather than to start their own business because of few employment opportunities. Necessity entrepreneurs may be better suited as paid workers and struggle to run their own business. In this case, less productive SE entrepreneurs may decrease the region's economic dynamism.

A location's position in the urban hierarchy can affect these dynamics. For example, spread and backwash from urban centers to rural areas may influence how small businesses develop (Mrydal, 1963; Henry et al., 1997). Similarly, these urban spillovers can vary across the urban hierarchy, as proximity to urban centers and the specific size of those urban centers matters because nearby and remote rural areas may be affected very differently (Partridge et al., 2008, 2009). For one, larger nearest urban centers may reduce the positive rural spillovers stemming from commuting due to congestion, while rural market access may also be limited. Industrial structure can greatly vary not just between rural and urban, but all across the urban hierarchy from small to mega cities, as well as urban-adjacent rural and remote rural areas (Henderson, 1997; Polèse and Shearmur, 2004). These differences affect many factors including local input-output linkages and relative multipliers. If broader rural regions are economically tied to nearby urban areas, then there is scope to employ "urban-led" growth into the nearby rural hinterlands, which has implications for governance structure for regional economic development (e.g., Fox and Kumar, 1965; Parr, 1987).

Our study is closest in spirit to Carree et al.'s (2015) assessment of self-employment effects on job growth. There are, however, significant differences. First, unlike Carree and coauthors who only focus on US MSAs over 1969-2009, our sample covers all continental US counties, providing evidence on metro and nonmetro (rural) areas. More importantly, we directly assess how rural-urban interactions manifest themselves across the urban system. Our study covers the surge in technology and declining migration that has arisen since 2000. Another important advantage is our use of a proprietary data set (described in detail below) that uses only "full-time" proprietors, avoiding the inclusion of anyone who reports some casual self-employment (1099 income), as is the case with the widely used Bureau of Economic Analysis (BEA) Regional Economic Information System (REIS) data that was employed by Carree et al. Additionally, we construct an exogenous measure of shocks from SE and from WS employment in our models to better control for causality and study their impacts on income and employment growth.

3. Empirical model and data

The key explanatory and dependent variables for this research are constructed using data purchased from Economic Modeling Specialists, Int. (EMSI)[5], which provide information on county-level employment by four-digit NAICS codes for all counties broken down by class of worker.[6] EMSI uses data from the Bureau of Labor Statistics' *Quarterly Census of Employment and Wages* (QCEW), the Bureau of Economic Analysis's (BEA) *Regional Economic Accounts*, and the US Census Bureau's *County Business Patterns* to fill in suppressed values in the publicly available economic data. These data allow us to construct more precise measures of the key variables.

One of the main advantages of EMSI data that is particularly important for this research is that the American Community Survey (ACS) is used to determine self-employment counts. This is a major improvement over previous studies that mostly rely on BEA data because only those who consider self-employment as their main source of income enter the ACS SE category, ensuring that our analysis focuses on those who are emphasized in small business development discussion. Conversely, BEA self-employment data reflect *any* income-generating SE activity, including part-time or occasional tasks—e.g., a professor receiving an honorarium for a conference speech would count as a SE worker in addition to being counted in paid employment as well, even if that honorarium is her only non-wage and salary income in a year.

Equation (1) below shows our main empirical model, which is estimated using OLS with errors clustered at the BEA economic area level. In defining our dependent variable, our empirical investigation begins with a general model that uses three-year employment growth rates. The three-year growth rates for the dependent and main explanatory variables are then first-differenced between the consecutive three-year growth rates in order to remove unmeasured county-specific fixed effects (in growth rates) that could bias the results. Using three-year differences has the economic advantage of allowing time for shocks to work through the system as well as to average

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

out noise and measurement error in annual data. We use data from 2001 to 2013 for 3,067 counties of which 1,059 belong to an MSA and 2,008 are nonmetro[7] as delineated by the 2003 Office of Management and Budget (OMB) definition.

$$\Delta Y_{ic} = \beta_0 + \beta_1 \Delta SEIM_{ct} + \beta_2 \Delta WSIM_{ct} + \beta_3 DIST_c + \beta_4 AGGLOM_{ct} + X_{c1990}\beta + \theta_t + \varepsilon_{ct} \quad (1)$$

where subscript *i* denotes employment type (SE or WS employment), *c* refers to a county and *t* indicates year.

In Equation (1), $\Delta Y_{ic} = Y_{ict} - Y_{ict-3}$ is the difference between the respective three-year growth rates over the two periods[8] where Y_{ict} is the three-year percent change in the employment outcome between period *t* and period *t-3*—i.e., $Y_{ict} = (Emp_{ict} - Emp_{ict-3})/Emp_{ict-3}$ and Y_{ict-3} is the corresponding three-year change over the *t-3* and *t-6* period (where the employment growth is either for SE or WS workers). We additionally estimate the Equation (1) above using changes in tradable and non-tradable industries (calculated separately for SE and WS employment) as dependent variables. The formula for these additional dependent variables is as follows: $Y_{sict} = (Emp_{sict} - Emp_{sict-3})/Emp_{ict-3}$[9], where subscript *s* stands for a sector (tradable or non-tradable), while other subscripts are identical to Equation (1).

Our main hypotheses revolve around whether supporting growth in SE or WS employment is the best avenue to generate net-gains in total employment through spillovers. Just incorporating WS employment growth in the SE growth equation (and vice versa), however, will lead to biased results due to reverse causality. Likewise, such a specification would not address our objective of understanding the relative employment-generating effects of each type of employment, which requires exogenous shocks to achieve unbiased estimates. Thus, we incorporate exogenous variables from shift-share

[7] We sometimes refer to nonmetro counties as rural

[8] For example, if county's SE 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 for this specific county in year 2007 is 0.4 percent. There are three observations for each county in the data set, calculated in the same fashion as above and denoted by years 2007 (i.e., 2004-2007 minus 2001-2004), 2010 (i.e., 2007-2010 minus 2004-2007) and 2013(i.e., 2010-2013 minus 2007-2010).

[9] The dependent variables for the sectors contained in the denominator are total SE or total WS employment respectively in order to keep the scaling consistent with the dependent and main explanatory variables.

analysis that are typically used by regional and urban economists as instruments. These instruments are akin to Bartik's total employment industry mix growth rate instrument for total employment growth. The industry mix term is often referred to as a demand shock variable or the Bartik instrument. It is exogenous by construction, relieving potential endogeneity concerns in OLS estimation, which is basically a regression of employment growth on an exogenous local demand-shock determined by national conditions.[10]

The explanatory variables are the self-employment industry mix term differenced over three years ($\Delta SEIM$) and the wage and salary employment industry mix term differenced over three years ($\Delta WSIM$). These variables capture expected growth rate in a county's SE and WS employment, respectively, if all industries in the county grow at their corresponding SE or WS *national* growth rates. Equation (2a) shows the formula for differenced three-year SE industry mix growth rate that is the explanatory variable in Equation (1) and Equation (2b) presents the derivation of the three-year SE industry mix growth rate over the *t-3* to t period, while $SEIM_{ct-3}$ in (2a) corresponds to the *t-6* to *t-3* period.

$$\Delta SEIM_c = SEIM_{ct} - SEIM_{ct-3} \text{ and} \tag{2a}$$

$$SEIM_{ct} = \left(\textstyle\sum_i SEshare_{cit-3} SENatGr_{it-3,t}\right) \tag{2b}$$

where subscripts *c* and *t* are identical to the above and subscript *i* refers to industry. For each county's industry, we calculate the share of self-employed in total county employment in the beginning of a three-year period ($SEshare_{cit-3}$), multiply it by the national SE growth rate in the corresponding industry over the period ($SENatGr_{it-3,t}$) and sum over all industries in a county to arrive at this county's SE industry mix term. The *SEIM* variable captures exogenous SE shocks due to common national patterns and whether the county has a composition of industries that are growing fast in terms of self-employment. Since national industry growth rates should be exogenous to a given county's industry growth rates, this is an exogenous instrument.

The industry mix term for WS employment (Eqn (3a)) is calculated similarly:

$$\Delta WSIM_c = WSIM_{ct} - WSIM_{ct-3} \text{ and} \tag{3a}$$

$$WSIM_{ct} = \left(\textstyle\sum_i WSshare_{cit-3} WSNatGr_{it-3,t}\right) \tag{3b}$$

[10]It is more standard to use the Bartik instrument in the first-stage of an IV model in which job growth is the endogenous variable in the second stage. Here, we are directly interested in how *exogenous demand shocks* affect employment growth and directly include industry mix term in the OLS specification.

which is the expected WS employment growth rate if all of the county's industries are growing at their respective WS national growth rates.

The next important group of explanatory variables is contained in the *DIST* vector and captures remoteness or, alternatively, centrality of a county in the urban-rural hierarchy. These variables reflect proximity to the nearest MSAs and incrementally larger MSAs. The differing variables are akin to Central Place Theory's notion that there is a hierarchy of cities, each with additional services and functions that are not provided in the lower tier(s). Cities at the very top of the hierarchy possess all or virtually all of the functions that are needed by economic actors—which Partridge et al. (2008) find are MSAs with at least 1.5 million residents in 1990. In this setting, households and businesses seek sufficiently higher levels of services that cannot be found in the next lower tier. For example, it may take a city of at least 250,000 to have good accounting services for a business, but an MSA of at least 500,000 to have sufficient legal services. In this case, a business can mitigate costs only by going to the nearest metro area of 250,000 for accounting, and assuming it is farther, only to the metropolitan area of at least 500,000 for legal services, implying that there are rising incremental costs from greater distance from successively higher-tiered MSAs.

All models include a set of four distance variables: the county's distance to the nearest MSA and then incremental distances to MSAs with 1990 population of at least 250 thousand, 500 thousand, and 1.5 million people, as described in Partridge, Rickman, Ali, and Olfert (2008) and Partridge, Rickman, Ali, and Olfert (2009).[11] For nonmetropolitan counties, all of the distance variables capture the effects associated with proximity to metro center(s) of different sizes. For metro counties, the interpretation is a little different. The distance to the nearest MSA is the distance from the population weighted-centroid of the county to the population-weighted center of their own MSA, to reflect whether proximity to the core of its own MSA affects employment growth through spillovers or (un)availability of land (e.g., it is usually the case that farther out counties are growing faster due to suburbanization). The impacts of additional incremental

[11] For example, if the nearest MSA is 150 kms from a nonmetro county, and that metropolitan area is 150,000 people and the nearest MSA of at least 250,000 residents is 225 kms away, then the distance to the nearest MSA is 150kms and the incremental distance to the nearest MSA of at least 250,000 is 75kms (225 kms – 75 kms). Incremental distances to MSAs of increasingly larger size are calculated in the same way.

distance should reflect the corresponding effects within Central Place Theory that describe how urban spillovers influence smaller cities.

The relative SEIM and WSIM employment shocks account for changes in demand shocks that alter changes in three-year employment growth rates. The county fixed effects (in growth rates) account for all persistent (time-invariant) effects, which are then differenced out in the first-difference estimation approach. When using panel approaches that directly rely on within estimation, any variables that are time invariant for the county including proximity or remoteness from urban centers (which are fixed over time) could not be used in the regression due to perfect collinearity, which removes all *time-invariant* county-specific characteristics. In our first-difference specification, the estimated coefficients on the distance (level) variables show disequilibrium movements, i.e., changes in the importance of urban-rural hierarchy position over time. For example, changing technologies and business practices may change the way proximity to successively larger MSAs affects the location of households and businesses (Duranton & Turner, 2012; Duranton, 2016).

In the same vein, the first-differencing approach allows us to directly include additional variables that potentially have long-term disequilibrium effects through path dependency, even after fixed effects are differenced out, which is an advantage of such an estimation strategy over fixed effects models. Thus, our models incorporate a number of lagged traditional factors suggested by the literature as important for local economic growth. These include measures that approximate lagged agglomerated economies, such as county population in 1990 and 1990 nearest (or own in the metropolitan sample) MSA population. All population variables are derived from the U.S. Census Bureau and are used in the models in the log form. The 1990 share of proprietors in a county captures the long-term entrepreneurial climate and historical concentration of self-employed entrepreneurs in a locality that may have persistent effects. This measure comes from the EMSI data. The level of human capital available for both SE and WS employment is measured by three 1990 educational attainment variables that include a percentage of the adult population (1) with only high school diploma and not a Bachelor's degree; (2) with a Bachelor's degree (or four years of college) but no graduate degree; and (3) with a professional/graduate degree. The data source for the human capital measures is the U.S.

Census Bureau. Finally, we account for a county's 1990 industrial structure by including the share of employment in manufacturing and the share of employment in agriculture using the EMSI data. All models include time period dummies to remove the impact of common national trends that uniformly affect nonmetro and metro counties. Table 1 shows summary statistics for the dependent and independent variables.

Table 1. Summary statistics for the variables by sample

Variable	Non-metro counties				Metro counties			
	Mean	**Std. Dev.**	**Min**	**Max**	**Mean**	**Std. Dev.**	**Min**	**Max**
ΔSE Total Emp Growth	-4.70	17.43	-179.58	196.42	-6.91	14.06	-260.97	89.10
ΔSE Tradable Growth	-0.08	3.32	-117.67	48.93	-0.12	1.27	-25.02	18.57
ΔSE Non-Tradable Growth	-4.62	16.99	-168.70	196.42	-6.79	13.81	-254.76	87.87
ΔWS Total Emp Growth	0.66	15.17	-263.97	199.45	0.35	12.39	-167.96	142.76
ΔWS Tradable Growth	0.76	5.74	-53.27	78.81	0.67	3.55	-33.50	39.47
ΔWS Non-Tradable Growth	-0.09	12.85	-263.97	201.29	-0.32	10.86	-161.55	145.08
ΔIndustry Mix SE	-0.57	0.75	-4.77	2.05	-0.50	0.69	-4.15	0.78
ΔIndustry Mix WS	1.09	7.24	-30.02	42.67	1.23	7.83	-17.45	25.02
Distance to nearest MSA	97.63	59.10	17.01	408.19	24.43	19.98	0.00	96.87
Incr distance to 250k MSA	68.66	109.47	0.00	621.43	36.81	74.11	0.00	621.56
Incr distance to 500k MSA	42.84	65.69	0.00	426.36	36.62	68.04	0.00	490.54
Incr distance to 1.5m MSA	88.76	110.97	0.00	557.70	91.15	131.05	0.00	599.21
Proprietors share, 1990	17.52	5.12	2.74	55.79	16.96	5.78	1.42	44.10
Manufacturing share, 1990	14.25	11.27	0.26	61.80	14.44	9.15	0.15	60.53
Agriculture share, 1990	14.59	9.35	0.08	63.53	7.27	7.31	0.01	40.90
Share of adults w HS, 1990	35.00	5.94	13.54	52.56	33.21	6.21	14.77	50.24
Share of adults w BA, 1990	8.00	3.34	0.00	40.32	10.79	4.90	2.51	28.90
Share of adults w prof/grad degree, 1990	3.75	1.89	0.34	29.67	5.72	3.32	1.15	23.97
Population (ln), 1990	9.58	0.99	4.65	12.07	11.21	1.36	7.39	16.00
Nearby MSA population (ln), 1990	12.12	0.78	10.61	15.23	13.19	1.33	10.61	16.64
Observations	6,024				3,177			

Note: Table 1 presents averages that are not weighted by county population size

Since one of our central questions is how economic conditions in a metropolitan area affect SE growth and WS employment growth as a function of that MSA's size (to capture different agglomeration effects and to assess whether net spillovers vary by metropolitan size), we use slightly different estimation strategies for nonmetro and metro samples. For the nonmetro sample, the models are estimated using all nonmetro counties, whereas for metro counties the models are estimated separately for three groups according to the population of the MSA to which a county belongs. Population thresholds for the three MSA groups are as follows: under 250 thousand, between 250 thousand and one million, and above one million people in 1990. Recent evidence suggests that there are important differences between mega cities and secondary cities in terms of their economic and social dynamics and impacts. For example, recently US small and medium-sized urban areas have been outperforming large urban centers in terms of employment and population growth (Partridge, 2010), while in the context of developing countries secondary cities and rural non-agricultural sector offer better prospects for poverty reduction and inclusive growth (Christiaensen & Todo, 2014; Christiaensen, Weerdt & Todo 2013).

4. Estimation results and discussion

We now present estimation results for the relative importance of SE and WS employment in generating job growth. We separately discuss results for nonmetro and metro samples, given the differences in modeling approaches. Empirically, our self-employment measure captures net-new self-employment startups, which are likely to have larger effects on county job growth compared to existing self-employment and directly assesses our question about the relative effectiveness of a business startup development strategy. Entrepreneurship is often defined in the empirical literature by new firm startups or by small businesses (Acs, Braunerhjelm, Audretsch, & Carlsson, 2009; Deller, 2010; Tsvetkova, 2015), so our approach allows us to compare our results to those obtained by other studies, with some reservations.

When interpreting the results, one should keep in mind that the dependent and main explanatory variables are differenced, which means that the presented coefficients show the effects net of time-invariant characteristics. In this light, statistical significance of the historical control variables shows the disequilibrium effects of agglomeration and other local characteristics that persistently influence job growth.

Table 2 shows the main estimation results for the nonmetro and metro samples. The SE and WS employment growth rate models are first estimated using the nonmetropolitan sample. Then we repeat the analysis for the three groups of metropolitan counties based on the MSA population groups.

Table 2. OLS estimation results for total SE and WS job growth

Explanatory variable	Non-metro		Metro					
			SE			W&S		
	SE	W&S	Small	Medium	Large	Small	Medium	Large
SE Industry mix	5.4*** (5.84)	2** (2.18)	5.1*** (4.37)	2.7 (1.56)	2.7 (1.52)	3.3*** (2.76)	3.6*** (2.89)	2.8** (2.53)
W&S Industry mix	.34*** (3.78)	1.5*** (10.00)	.044 (0.27)	.16 (0.49)	-.24 (-1.25)	1.4*** (7.94)	1.7*** (6.28)	1.2*** (5.89)
Distance to nearest MSA	5.9e-03** (2.10)	6.9e-03** (2.07)	.12* (1.67)	.044 (1.12)	-.016 (-1.12)	-.04 (-1.16)	5.5e-03 (0.19)	8.0e-03 (0.64)
Incremental distance to MSA of 250k	7.9e-03*** (3.47)	4.7e-03 (1.48)	5.9e-03** (2.12)	NA	NA	-7.7e-04 (-0.40)	NA	NA
Incremental distance to MSA of 500k	8.0e-04 (0.42)	-6.7e-03*** (-3.12)	7.6e-04 (0.20)	4.1e-03 (1.41)	NA	-5.0e-03** (-2.51)	-3.0e-03 (-1.01)	NA
Incremental distance to MSA of 1500k	-4.6e-04 (-0.31)	-1.7e-03 (-1.23)	-2.0e-03 (-0.93)	7.2e-04 (0.44)	-1.1e-04 (-0.06)	-2.8e-03** (-2.17)	-1.3e-03 (-0.81)	-6.9e-04 (-0.61)
Proprietors share, 1990	.048 (0.97)	.06 (1.32)	.1 (1.38)	-7.3e-03 (-0.09)	-.045 (-1.11)	.035 (0.75)	.099 (1.48)	.03 (0.86)
Manufacturing share, 1990	-6.9e-03 (-0.32)	-4.0e-03 (-0.26)	.035 (1.04)	-1.7e-04 (-0.00)	-.024 (-0.93)	-.016 (-0.62)	.035 (1.40)	.011 (0.47)
Agriculture share, 1990	.091*** (2.85)	.01 (0.25)	.044 (0.75)	.078 (0.99)	.14 (1.44)	.021 (0.58)	.06 (1.06)	.19** (2.70)
Share of adults with HS only, 1990	.054** (2.32)	-3.3e-04 (-0.01)	.062 (1.28)	.19*** (3.53)	.12* (1.82)	-.056 (-1.59)	-.03 (-0.68)	-.094* (-1.82)
Share of adults with BA, 1990	.19*** (2.63)	-.013 (-0.23)	.18 (1.63)	.072 (0.65)	-.017 (-0.18)	-.07 (-1.17)	-.073 (-0.93)	-.098 (-1.39)
Share of adults with prof/grad degree, 1990	-.063 (-0.63)	.012 (0.15)	.06 (0.51)	.31** (2.52)	.4*** (3.84)	-3.6e-03 (-0.07)	.048 (0.55)	.13* (1.87)
Population (ln), 1990	-.91** (-2.43)	-.4 (-1.43)	1.3 (1.22)	1.4* (1.69)	.72* (1.91)	-.78 (-1.33)	.26 (0.55)	.92*** (5.35)
Nearest/own MSA population (ln), 1990	-1.0e-03 (-0.01)	-6.2e-03 (-0.04)	-2.5* (-1.80)	-.16 (-0.19)	-.51 (-0.97)	.75 (1.11)	.26 (0.40)	-.37 (-1.55)
Constant	.051 (0.01)	1.6 (0.39)	1.8 (0.20)	-31** (-2.17)	-14 (-1.68)	2.6 (0.42)	-6.6 (-0.65)	-4 (-0.99)
R2	0.200	0.236	0.371	0.382	0.299	0.479	0.471	0.507
Observations	6,024	6,024	1,095	1,014	1,068	1,095	1,014	1,068
Time period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; t-stat in parentheses; standard errors clustered at 177 BEA economic areas in non-metro sample and 164 BEA economic areas in metro sample.

Non-metro sample results. The results presented in columns 2 and 3 of Table 2 show, in general, different responses of the SE and WS job growth in the nonmetropolitan self-employed and wage and salary segments (discussed in detail below). A striking similarity is that the marginal effects of self-employment external shocks are greater than the marginal effects of wage and salary external shocks in both SE and WS models. As follows from Table 2, after three years, each one percent of exogenous increase in SE is associated with a 5.4 percent total increase in nonmetro self-employment and two percent increase in WS jobs in that county, on average[12]. That is, an exogenous increase of one self-employment job not only creates a self-employment job, but also 4.4 new self-employment jobs that likely arise due to supply chain and income effects, as well as the creation of two more wage and salary jobs. Thus, we can rule out that increases in self-employment are a result of crowding out of WS employment or simply necessity self-employment that arises when people lose paid employment. By comparison, the marginal effect of a one percent increase in exogenously created wage and salary jobs creates an additional 0.5 percent increase in wage and salary jobs and a 0.34 percent increase in self-employment jobs. In other words, the multiplier effects are much larger for self-employment suggesting that self-employment has a greater stimulating effect on total employment than wage and salary employment at a margin.

The *marginal* effects described above, however, are different from the *magnitude* of the economic impacts that an average nonmetropolitan county may expect from exogenous SE shocks. Given the descriptive statistics reported in Table 1, a one standard deviation increase in the *SEIM* variable is associated with (0.75*5.4) or 4.05% growth in self-employment. Given the average SE share is about 6.64%, this translates to 0.27% growth in total employment in an average county (4.05%*6.64%=0.27%). For external shocks in WS employment, a one-standard deviation change in the *WSIM* variable suggests (7.24*0.34) or 2.46% growth in self-employment, which translates into additional 0.16% (2.46%*6.64%) growth in total employment. In the WS model, identical calculations suggest that a one-standard deviation increase in the SE industry mix variable translates into 1.5% growth in WS employment and thus 1.4% growth in total employment. A one-standard deviation increase in WS industry mix variable is

[12] In our empirical setup, a coefficient of 5.4 is interpreted as a self-employment employment multiplier, where one job is attributable to the exogenous shock in the self-employment sector and 4.4 jobs are endogenously created from the induced effects. Likewise, a SE industry mix coefficient of 2 in the WS equation suggests that a one percent increase in exogenous self-employment is associated with two percent more wage and salary jobs.

associated with 10.86% growth in WS employment or 10.14% growth in total employment. Taken together, these calculations imply an expected total employment effect of 1.67% (0.27%+1.4%) from a one-standard deviation increase in self-employment and 10.3% (0.16%+10.14%) increase from a one-standard deviation increase in WS employment.

These findings offer a policy-relevant perspective on the relative importance of self-employment and wage and salary employment and, in a sense, bridge two entrepreneurship research traditions. On the one hand, the estimated effects of self-employment, at the margin, are substantially larger than identical effects of paid employment. This supports the extensive literature that points to a special role played by small (or new) businesses in economic growth (Haltiwanger et al., 2013; Neumark et al., 2011). At the same time, the little attention given to SE as a potential engine of growth among policymakers and scholars (Goetz et al., 2012) can be explained, at least in part, by the relatively small total economic impact of self-employment, even as its marginal effects are larger than effects from WS employment. Another reason small businesses and SE may receive less attention is that state and local policymakers may believe they benefit politically more from announcing a large firm opening and would rather offer tax subsidies to large firms than the less-visible policy of stimulating new small business openings, even if the marginal effects may be larger for the latter. This common perception is beginning to change, though, with more studies pointing to the positive role of self-employment in income and job growth (Carree et al., 2015; Goetz et al., 2012; Rupasingha & Goetz, 2013; Stephens & Partridge, 2011). For policymakers who aim to prioritize resources in an austere environment, our findings suggest that a dollar spent on creating SE jobs is likely to produce better returns compared to a dollar spent on stimulating paid employment, assuming the costs of creating additional self-employment and wage and salary jobs are comparable.

Regarding the other control variables, two distinct patterns emerge for the SE and WS employment models: 1) differential responses to urban proximity and 2) divergent responses to historical levels of agglomeration, human capital, and industrial composition. In the nonmetro sample, all else equal, both SE and WS employment growth increase with distance to the nearest urban area, however the effect is larger for

WS employment. This implies a distance-protection effect in the sense that rural areas that are *farther* from metropolitan centers have *greater* job growth. This could arise if services that support small businesses and larger companies that would otherwise be purchased in the county are instead purchased in a *nearby* city. There is an additional buffer effect on self-employment for counties whose nearest MSA does not have at least 250k. This may suggest that distance is buffering counties from losing necessity entrepreneurs to metro areas or those who need protection from metro business competition. For WS workers, the positive distance effect is offset by a negative distance effect for distance from MSAs of at least 500,000 people in 1990. Medium-sized cities may provide the right scale for key production chain linkages that help grow WS employment in nonmetro areas, where increasing distance from such key resources puts a drag on paid employment growth. Likewise, as an MSA becomes more populated and congested, certain types of businesses in nearby nonmetro areas thrive as it becomes harder for nonmetro residents to travel into the core of the metro area.

Historical specialization in agriculture promotes self-employment a decade or two later. The 1990 agricultural employment share has a positive association with nonmetro SE growth, suggesting persistent effects. It is not clear whether this is due to demand effects, or because landowners have more capital and/or valuable skills that stimulate county job growth. SE growth is also positively associated with the 1990 share of adults with a high school diploma and the share of adults with four years of college within nonmetro counties. It is unsurprising that as education levels—often an indicator of innovation and ability—increase, self-employment rises. This shows that there are persistent positive effects from education, even as contemporaneous fixed effects are differenced out. In contrast, lagged county population is associated with decreased nonmetro SE. However, these controls—agriculture, education, and population—have no effect on nonmetropolitan WS job growth, suggesting its determinants are less persistent.

Metro sample results. As expected, the estimation results in the metropolitan sample differ depending on the size of the MSA to which a county belongs. However, the pattern of larger marginal effects for SE industry mix variables compared to WS industry mix variables holds in general. In the self-employment models, significant marginal effects of the SE industry mix variable are observed only in the small MSA sample. The marginal effect of 5.1 translates into additional 0.22% growth in total employment, with WS industry mix variable having no significant impact on SE growth. Self-employment in small MSAs grows faster in counties farther away from the center of their metro area, as suggested by the coefficients on the nearest MSA distance variable. This implies that, despite anecdotes of places like downtown Detroit (Conlin, 2011) reemerging as bastions of small business innovation, much of the new self-employed entrepreneurial activity is concentrated in the outlying regions of MSAs. This could be potentially a market-power story, as suburban and exurban population growth have outpaced core-city growth and small businesses seek to tap into those consumer bases. The results also suggest that small-business development would have its most positive effects in small MSAs and rural areas. The positive incremental distance coefficient for distance to a MSA of at least 250,000 people also points to the fact that small businesses in small MSAs prefer distance protection much like their rural counterparts.

Education does not appear to play any persistent role in SE growth in the counties within small MSAs. In medium and large MSAs, however, the share of adults with just a high school diploma and the share of adults with graduate or professional degrees are persistently positively related to self-employment, consistent with both necessity and opportunity entrepreneurship perspectives. There is also weak evidence of positive agglomeration effects in medium and large MSA counties, as reflected by the positive own-county population coefficient. The negative MSA population coefficient suggests that there are no persistent disequilibrium agglomeration effects in MSAs with less than 250,000 residents in 1990.

In the WS employment equations, the SE industry mix variable has larger marginal effects compared to the WS industry mix variables in all models. The estimation coefficients are 3.3 for counties in small MSAs (translates to a 2% growth in wage and salary employment as a result of a one standard deviation change); 3.6 for counties in medium MSAs (2.25% wage and salary employment growth as a result of one standard deviation change) and 2.8 for large MSAs (1.9% growth in wage and salary employment as a result of a one standard deviation change). Corresponding values for the WS industry mix variable are 1.4 (9.95% expected growth in wage and salary employment as a result of one standard deviation change); 1.7 (12.5% expected growth in wage and salary employment as a result of one standard deviation change) and 1.2 (8.96% expected growth in wage employment as a result of one standard deviation change). While the direct marginal effects of SE growth are smaller in metro areas, self-employment growth appears to promote more WS growth than in rural areas.

Similar to the WS estimation results for nonmetro counties, incremental distance to an MSA of half a million people is negatively related to WS employment in small MSAs, suggesting the presence of growth spread from medium-sized MSAs to urban areas down urban hierarchy. The same holds true for the spillovers from the largest MSAs into the smallest MSAs. In large MSAs, historic concentration of agriculture, higher educational attainment (post graduate degree), and agglomeration economies appear to stimulate WS jobs. The share of adults with only a high school diploma (no Bachelor's degree)—relatively low educational levels, especially in large urban areas—is negatively related to paid employment.

Results for non-tradable industries. The aggregate estimation results described above may not account for the potential heterogeneity across different sectors. As globalization and rapid development of information and communication systems expose tradable and non-tradable industries to competition from other regions and nations, the growth dynamics of local economies can change due to local industry composition.[13] Yet, more importantly, we ask whether exogenous shocks have greater stimulating effects on non-traded local sectors or on export-based sectors. As a natural first step in decomposing the total effects into those observed in various sectors, we estimate the base model separately for employment in non-tradable (Table 3) and tradable sectors (Table 4)[14].

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[13] Over the study period, the share of tradable industries in the U.S. steadily declined from about 8.6% in 2001 to 6.2% in 2013 with the share of non-tradable industries increasing accordingly. In terms of growth rates, the tradable sector has declined by more than quarter between years 2001 and 2013, whereas non-tradable sector has expanded by almost 6%.

[14]***Tradable industries*** include agriculture, mining, and manufacturing industries with distance adjustment elasticity above 0.8. ***Non-tradable industries*** include construction, retail, services, FIRE, government, transport and manufacturing industries with distance adjustment elasticity below 0.8. Distance adjustment elasticity of 0.8 as calculated in Holmes and Stevens (2014) corresponds to approximately 500 miles radius around an average manufacturing facility within which it sells its products. We follow Allcott and Keniston (2014) who define non-tradable manufacturing industries if their products sell within this radius and tradable manufacturing industries if their products are sold outside of 500-mile radius. Holmes and Stevens use 6-digit NAICS codes in their analysis. Since our data is at the 4-digit NAICS level, we calculate shares of tradable and non-tradable 6-digit NAICS industries in corresponding 4-digit NAICS industries using

Table 3. OLS estimation results for non-tradable SE and WS employment growth

Explanatory variable	**Nonmetro**		**Metro**					
			SE			**W&S**		
	SE	**W&S**	Small	Medium	Large	Small	Medium	Large
SE Industry mix	3.6***	2.1***	4.6***	2.4	2.4	2.5**	3***	1.9*
	(4.28)	(3.12)	(4.10)	(1.51)	(1.37)	(2.23)	(2.90)	(1.84)
W&S Industry mix	.28***	.89***	.02	.21	-.22	.89***	1.3***	.76***
	(2.91)	(6.64)	(0.13)	(0.64)	(-1.22)	(6.22)	(5.06)	(4.15)
Distance to nearest MSA	7.1e-03***	6.6e-03**	.11	.037	-.013	-.045	.011	-9.6e-04
	(2.65)	(2.16)	(1.55)	(1.04)	(-0.96)	(-1.54)	(0.46)	(-0.08)
Incremental distance to MSA of 250k	8.0e-03***	3.5e-03	6.1e-03**	NA	NA	4.3e-04	NA	NA
	(3.51)	(1.37)	(2.16)			(0.29)		
Incremental distance to MSA of 500k	1.0e-03	5.1e-03***	8.0e-04	3.7e-03	NA	-2.5e-03	-2.0e-03	NA
	(0.52)	(-2.63)	(0.21)	(1.30)		(-1.48)	(-0.87)	
Incremental distance to MSA of 1500k	-9.4e-04	-1.3e-03	-2.0e-03	3.4e-04	-1.7e-04	-2.4e-03**	-1.5e-03	-1.4e-04
	(-0.63)	(-1.30)	(-0.92)	(0.22)	(-0.09)	(-2.38)	(-1.12)	(-0.12)
Proprietors share, 1990	5.1e-03	.038	.098	-.02	-.048	.012	.084*	.011
	(0.10)	(1.31)	(1.30)	(-0.25)	(-1.17)	(0.29)	(1.71)	(0.34)
R2	0.192	0.146	0.370	0.386	0.299	0.369	0.395	0.448
Observations	6,024	6,024	1,095	1,014	1,068	1,095	1,014	1,068
Time period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; t-stat in parentheses; standard errors clustered at 177 BEA economic areas in non-metro sample and 164 BEA economic areas in metro sample; all models include a full set of controls as described in the text and displayed in Table 2 (omitted here for brevity but available from the authors upon request).

The analysis of the nonmetro sample reveals several interesting patterns. The results for non-tradable industries resemble those reported in Table 2 with only two exceptions. The coefficient of the SE industry mix in the self-employment equation and the coefficient of the WS industry mix in the wage and salary equation are both somewhat smaller, but very comparable to the base results. This suggests that most of the effects observed in the base results are due to patterns in nonmetro non-tradables. Perhaps the most notable change from the total SE employment results is that in addition to the positive effect of distance to the nearby MSA in both non-metro equations, incremental distances to both small (in SE model) and medium (in WS model) urban areas are positively associated with self-employment and WS employment growth respectively, implying that distance works as an insulator for the non-tradable sector.

2000 County Business Patterns tables from the U.S. Census Bureau. We use these shares to divide employment in manufacturing industries into tradable and non-tradable sectors.

In metropolitan counties, likewise, patterns of the relationships in non-tradable industries most closely resemble those reported in Table 2. The only tangible difference between total self-employment and the nontraded self-employment results is the insignificant distance to nearby MSA in counties within small urban areas. Unlike the results for total WS employment, the non-tradable wage and salary incremental distance to the MSA with at least half a million residents in 1990 is statistically insignificant.

Results for tradable industries. As follows from Table 4, the drivers of job growth in tradable industries are notably different from those of total employment and the non-tradable sector. Although the exogenous SE and WS employment shock variables remain statistically significant in the non-metro sample, the estimated coefficients are relatively small compared to those reported in Table 2, supporting the notion that exogenous shocks support local SE and WS employment. In self-employment models, proximity to urban centers does not play a role, aside from what is already in the county fixed effect. Thus, the links between traded SE and proximity measures are not statistically significant. Unique to SE in the tradable sector, a legacy of entrepreneurship approximated by the 1990 share of proprietors has a persistent positive effect more than a decade later. One possibility is that knowledge of external markets and products creates an environment for future start-ups. In the WS employment model, the SE industry mix is insignificant. Incremental distance to a medium-sized MSA has a negative relationship, suggesting that larger MSAs may be a growing market for rural manufacturers or transportation costs are increasingly important for just-in-time processes.

Table 4. OLS estimation results for tradable industries

Explanatory variable	Non-metro		Metro					
			SE			W&S		
	SE	W&S	Small	Medium	Large	Small	Medium	Large
SE Industry mix	1.8*** (2.62)	-.13 (-0.42)	.5* (1.67)	.3 (1.50)	.31*** (3.20)	.84 (1.62)	.59 (1.04)	.87* (1.97)
W&S Industry mix	.061** (2.53)	.61*** (13.49)	.024 (0.57)	-.048 (-1.06)	-.014 (-0.88)	.49*** (5.54)	.4*** (3.14)	.41*** (6.14)
Distance to nearest MSA	-1.2e-03 (-1.15)	2.1e-04 (0.23)	7.7e-03 (1.39)	6.7e-03 (1.44)	-2.8e-03** (-2.42)	5.1e-03 (0.41)	-5.4e-03 (-0.48)	9.0e-03** (2.28)
Incremental distance to MSA of 250k	-3.3e-05 (-0.07)	1.2e-03 (1.34)	-1.7e-04 (-0.56)	NA	NA	-1.2e-03 (-1.36)	NA	NA
Incremental distance to	-2.0e-04	-1.6e-03***	-3.8e-05	4.3e-04	NA	-2.5e-03***	-9.8e-04	NA

MSA of 500k	(-0.58)	(-2.73)	(-0.09)	(1.39)		(-3.38)	(-0.99)	
Incremental distance to MSA of 1500k	4.8e-04 (1.18)	-3.2e-04 (-0.52)	-3.8e-06 (-0.02)	3.8e-04* (1.88)	5.4e-05 (0.42)	-4.5e-04 (-0.78)	2.5e-04 (0.54)	-5.6e-04 (-1.54)
Proprietors share, 1990	.043*** (3.11)	.022 (0.82)	6.3e-03 (0.75)	.013* (1.72)	2.9e-03 (0.47)	.023 (1.13)	.016 (0.58)	.019 (1.54)
R2	0.049	0.199	0.028	0.026	0.075	0.255	0.249	0.298
Observations	6,024	6,024	1,095	1,014	1,068	1,098	1,014	1,068
Time period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; t-stat in parentheses; standard errors clustered at 177 BEA economic areas in the non-metro sample and 164 BEA economic areas in the metro sample; all models include a full set of controls as described in the text and displayed in Table 2 (omitted here for brevity but available from the authors upon request).

The effects of external SE shocks are felt sporadically in the metropolitan tradable sector. The SE industry mix variable positively affects self-employment only in small and large MSA counties. For WS employment, such an effect is detected in large MSA counties only. WS external shocks are positively linked to traded WS employment but not traded SE, with coefficients of approximately the same size across the three metro county groups. In the large MSA county subsample, proximity to the metropolitan center tends to promote self-employment and to hamper wage and salary employment, suggesting for large MSAs that exurban SE can thrive but WS employment lags. Incremental distance to large MSAs is positively linked to self-employment in medium MSAs, whereas incremental distance to medium MSAs is negatively associated with paid employment growth in counties within small MSAs, suggesting that "distance protection" plays different roles for SE and WS employment.

5. Sensitivity analysis and further findings

To further probe into the relative effects of SE and WS exogenous shocks on the economic wellbeing of US counties, we use the BEA data to calculate change in growth variables for the following income measures: per-capita personal income (PCPI), per-capita wage and salary income (PCWS) and per-capita nonfarm proprietor income (PCNFPI). We then use these measures as dependent variables in Equation (1). Table 5 presents estimation results for the nonmetro sample. In line with the general findings reported in Section 4, exogenous self-employment shocks have greater positive effects on income growth (measured in three different ways) compared to WS exogenous shocks. The last column of the table shows, in addition to a strong stimulating effect of favorable conditions in the SE sector of the national economy on the per-capita nonfarm proprietors' income, a negative and statistically significant effect of the WS exogenous shocks. Given that the BEA proprietorship data include all income from self-employed tasks (both full-time and occasional), the negative coefficient likely implies that during economic expansion, fewer people are seeking occasional earning opportunities outside of their regular paid employment. The negative coefficient may also indicate a switch from self-employment to wage and salary employment by necessity entrepreneurs.

Table 5. OLS estimation results for income variables, non-metro counties

	% growth (midpoint formula)		
	PCPI	PCWS	PCNFPI
SE Industry mix	2.4*** (4.60)	3.1*** (6.07)	5*** (2.92)
W&S Industry mix	.59*** (6.19)	1.4*** (11.11)	-.66** (-2.29)
Distance to nearest MSA	3.8e-03 (0.98)	-2.1e-04 (-0.07)	-3.1e-03 (-0.42)
Incremental distance to MSA of 250k	-2.5e-03 (-1.37)	2.5e-03 (1.26)	-1.9e-03 (-0.47)
Incremental distance to MSA of 500k	-5.9e-03*** (-4.55)	-5.2e-03*** (-2.99)	-4.6e-03 (-1.24)
Incremental distance to MSA of 1500k	7.9e-04 (0.67)	-2.4e-03 (-1.54)	2.8e-03 (0.93)
R2	0.204	0.348	0.243
Time period fixed effects	Yes	Yes	Yes

*** - significant at 0.01; ** - significant at 0.05; * - significant at 0.1; t-stat in parentheses; standard errors clustered at 177 BEA economic areas in non-metro sample and 164 BEA economic areas in metro sample; all models include a full set of controls as described in the text and displayed in Table 2 (omitted here for brevity but available from the authors upon request).

In the metropolitan sample, the relative effects of the SE and WS exogenous shocks are different for various measures of income and depend on the MSA size. Favorable economic conditions in the paid segment of the national economy tend to boost per-capita personal income and per-capita wage and salary income regardless of the metro size. *SEIM* exogenous shocks are relatively more important (have larger marginal effects) for the per-capita income growth in small MSAs and for the per-capita wage and salary growth in small and medium MSAs. The coefficients on *SEIM* are insignificant in other subsamples for these two income variables. For the per-capita nonfarm proprietor income growth, the SE shocks are the main defining factor with the coefficient ranging in magnitude between 8 and 10 (all significant at the 95% level); whereas WS shocks are statistically insignificant.

Table 6. OLS estimation results for income variables, metro counties

	PCPI			PCWS			PCNFPI		
	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
SE Industry mix	2.6***	.78	-.16	3.9**	3.2**	1.8	8***	8.8**	9.9***
	(3.32)	(0.80)	(-0.14)	(2.51)	(2.49)	(0.86)	(3.12)	(2.54)	(3.71)
W&S Industry mix	1***	1.1***	1.2***	1.8***	1.8***	1.6***	.14	2.6e-03	-.14
	(5.70)	(8.14)	(6.89)	(5.30)	(8.12)	(7.92)	(0.31)	(0.01)	(-0.22)
Distance to nearest MSA	.01	-6.7e-03	.022***	-.021	-9.4e-04	.042***	.068	-.029	-.1*
	(0.49)	(-0.49)	(3.25)	(-0.69)	(-0.03)	(3.98)	(0.70)	(-0.61)	(-2.01)
Incremental distance to MSA of 250k	-2.3e-03	NA	NA	-8.1e-05	NA	NA	4.1e-03	NA	NA
	(-1.30)			(-0.04)			(0.79)		
Incremental distance to MSA of 500k	-3.8e-03*	-3.6e-04	NA	-5.7e-03**	3.2e-03	NA	-4.0e-03	NA	NA
	(-1.87)	(-0.18)		(-2.19)	(0.89)		(-0.53)		
Incremental distance to MSA of 1500k	-3.3e-03***	-8.7e-04	-6.6e-04	-3.2e-03**	8.8e-04	-3.2e-03***	1.9e-03	1.3e-03	2.9e-03
	(-2.88)	(-0.72)	(-0.59)	(-2.02)	(0.61)	(-3.02)	(0.52)	(0.37)	(0.81)
# of observations	1095	1014	1068	1095	1014	1068	1095	1014	1068
R2	0.427	0.580	0.529	0.511	0.602	0.541	0.257	0.213	0.214
Time period fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The coefficients on the distance variables suggest that over time, outlying counties in large MSAs enjoyed greater growth in per-capita personal and wage and salary income, whereas there is weak evidence of greater per capita non-farm proprietor income growth closer to the population centroid of large metro areas. Overall, however, this latter measure of income is insensitive to the distance aside from what is captured by the differencing. For PCPI and PCWS growth, incremental distance to medium-sized and large MSAs has a negative coefficient for counties that belong to small MSAs. These income indicators in the small urban counties grow faster if the counties are proximate to a MSA of at least 500,000 in 1990.

6. Conclusions

Public policies that support small businesses are largely based on David Birch's (1979) seminal work on the topic but attracting large corporations as an economic development (ED) policy is more popular with policymakers, although there seems to be a recent shift away from this latter approach. These two types of ED policies have been instituted without comparing the net employment growth effects from self-employment and from wage and salary employment growth due to the lack of empirical evidence. Our study fills this gap in the literature, providing insight into the relative benefits of two different types of employment growth in the context of a developed economy. We further advance the understanding of how the job-inducing effects of SE versus WS employment vary across metro and nonmetro areas and within the tradable and non-tradable sectors. Additionally, we assess the effects of the SE and WS exogenous shocks on income growth.

Our work affirms the longstanding support for small businesses and entrepreneurs, suggesting that the marginal impact of SE growth on net total employment is larger than that of wage and salary employment. This result holds across nonmetro and metro areas and tradable and non-tradable industries, with the exception of tradable employment growth in medium sized MSAs. This implies that—assuming costs per job created are comparable and effects at the margin stay relatively constant as levels change—local managers are better served investing in policies that stimulate self-employment over WS jobs. The SE shocks also tend to be more important for per-capita income growth, at least in nonmetro and small metro counties.

Despite these general findings, the picture is quite nuanced. While SE has larger marginal effects per additional job, because WS constitutes such a large fraction of the overall labor market, WS employment growth has a larger impact on net job growth when comparing a one standard deviation increase in each of SE and WS employment. It is understandable then, that policymakers take aim at the drastically larger paid employment sector when considering avenues to spur employment growth through supporting or attracting existing firms. Our study, in concert with other recent work expounding the virtues of small business investment, provides further encouragement to those who champion entrepreneurship's positive spillover effects into the larger labor market. We add the caveat that while local small business creation is favorable, it is not the sole "savior" for economic development. Yet, these types of results should cool the enthusiasm to give large tax breaks to large firms, especially exporter (e.g., manufacturers) because the positive WS impact on net job growth is smaller, especially in the export sector.

Proximity to metro areas also plays a key role in these relationships. In general, being farther away from urban agglomerations increasingly protects nonmetro areas from potential urban backwash effects on both SE and WS employment. Distance to the MSA center has much less consistent effects across the urban hierarchy, only showing up as a significant predictor of either type of job growth in tradable industries. Further decomposing the distance effect into incremental distances to higher tier cities suggests that larger incremental distances between nonmetro counties and small- and medium-sized cities have additional protective effects on SE and WS employment growth in the total and non-tradable sectors, respectively.

What then do our findings suggest about policy approaches to job growth? Ultimately, policymakers are likely to get a better total employment "bang for their buck" by marginal investments in entrepreneurs and small business startups. While more work is necessary to examine the channels through which entrepreneurial employment spillovers flow through the economy, the evidence from this study finds investment in small business a clear winner—dollar for dollar—over investments in wage and salary employment in metro and nonmetro areas alike.

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