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## High-Growth Firms: Delineating Definitions, Industries, and Business Cycle Performance

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May 2016

**HIGH-GROWTH FIRMS:  
DELINEATING  
DEFINITIONS,  
INDUSTRIES, AND  
BUSINESS CYCLE  
PERFORMANCE**

**CENTER FOR  
ECONOMIC  
DEVELOPMENT**

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## EXECUTIVE SUMMARY

### INTRODUCTION

There are strong reasons to believe that public policy affects the prevalence and success of entrepreneurial firms, and there is consensus in the literature that high-growth firms (HGFs), a specific subset of entrepreneurial firms that have a propensity to be employment generators in the economy, contribute significantly to employment growth (see, for example, Acs & Mueller, 2008; Acs, Parsons, & Tracy, 2008; Birch & Medoff, 1994; Choi, Robertson, & Rupasingha, 2013; Clayton, Sadeghi, Spletzer, & Talan, 2013; Kirchhoff, 1994; Mason & Brown, 2013; Stangler, 2010; Thurik, 2009). Moreover, authors have called for policy makers to provide HGFs with the resources they need in order to grow (Mason & Brown, 2013; Shane, 2009). However, due to the lack of agreement in the literature on how to identify and classify HGFs, no reliable mechanism or guidance is available to promote or detect HGFs (Coad, Daunfeldt, Hözl, Johansson, & Nightingale, 2014). The confusion around defining HGFs provides an opportunity for comparative analysis in a time when public policy is looking to encourage HGFs.

This study focuses on three major sets of questions about HGFs: 1) How are HGFs defined?; 2) Where are HGFs located—geographically, in terms of industrial sectors, and within business cycles?; and 3) How are HGFs connected to their regional entrepreneurial ecosystem? This study, with support from the Ewing Marion Kauffman Foundation, seeks to answer these questions through a tri-pronged approach.<sup>1</sup> The research team conducted a literature review of HGF definitions, operationalized selected definitions into cohorts of companies, investigated these results, and disseminated and analyzed a survey of HGFs.

### LITERATURE REVIEW

The research team reviewed over one hundred studies with the goal of assembling a matrix of HGF definitions that could be operationalized and studied. Due to data limitations, there were restrictions placed on the literature reviewed. First, international studies were eliminated because of cross-country differences in regulatory, legal, and business start-up counts and dynamics. Second, studies were excluded if the data set was not replicable (i.e. based on a survey). Finally, the study was omitted if the definition was not operationalizable including those definitions that were vague or unclear. Table A shows the list of ten definitions offered by eight authors that we were able to replicate and operationalize. As shown in the table, we grouped definitions into three categories: 1) *sales based*; 2) *employment based*; and 3) *sales and employment based*.

The disagreement of how to classify and measure HGFs has spanned across several dimensions, variability in indicators used, time frame selected, and the method of computation. First, the literature showed variability as to what indicator was used in order to calculate high-growth. Second, HGF definitions vary based on their measurement techniques. Definitions can measure growth in terms of relative (percentage) or absolute terms, and choosing one measure over the other can vary the firms classified as high-growth. For example, smaller firms are more likely to be classified as high-growth when relative terms are used as a growth measure; conversely, using an absolute growth measure can result in the overrepresentation of larger firms (Delmar, Davidsson, & Gartner, 2003). Third, the way in which growth is calculated over time varies by author; some authors use an annual computation of

<sup>1</sup> This study was prepared with financial support from the Ewing Marion Kauffman Foundation. All contents of this study reflect the views of the Grantee and do not reflect the views of Ewing Marion Kauffman Foundation.

growth, while others use a multi-year approach (typically three to four years). Lastly, the disagreement of how to classify and measure HGFs can be seen in the way in which a firm can grow, either through adding employees (organic) or acquired growth (i.e. mergers and acquisitions).

As seen in Table A, from the many choices to calculate firm growth, HGFs can generally be defined in two major ways. First, high-growth as a percentage of growth over a given timeframe (i.e. 1%, 5%, or even 10% of firms with the highest growth rate). Second, firms that grow at or above a particular pace or threshold grow at or above a particular pace or threshold (either in absolute and/or relative), measured either as growth between the initial and final year, or as annualized growth over a certain number of years.

**Table A. High-Growth Firm Definitions**

	Authors	Label	Time Period	Definitions
Sales Based	Siegel, Siegel, & Macmillian (1993)	Siegel	3 years	Double sales growth
	Birch & Medoff (1994)	Birch & Medoff	4 years	Sales growth $\geq 20\%$ each year; base revenue $\geq \$100,000$ .
	Acs, Parsons, & Tracy (2008)	Acs I	4 years	Double sales growth
Employment Based	Kirchhoff (1994)	Kirchhoff	6 years	In the top 10% annual growth
	OECD (2007)	OECD	3 years	Average annualized growth $>20\%$ with 10 or more employees.
	Stangler (2010)	Stangler II	1 year	Top 5%
	Stangler (2010)	Stangler I	1 year	Top 1%
	Clayton, Sadeghi, Spletzer, & Talan (2013)	Clayton	3 years	Grow by 72.8% over 3 years with 10 or more employees. If $<10$ the number of employees must grow by 8 employees.
Sales & Employment Based	Acs, Parsons, & Tracy (2008)	Acs II	4 years	Doubled sales growth with an employment growth qualifier $\geq 2$ .
	Choi, Robertson, & Rupasingha (2013)	Choi	3 years	Average of 20% annualized sales growth w/ 10 or more employees

## OPERATIONALIZING HGF DEFINITIONS

In all, the research team was able to replicate 10 HGF definitions from eight authors (Table A).<sup>2</sup> All definitions were analyzed to determine: 1) performance of HGFs in relation to the business cycle; 2) the performance of HGFs across metropolitan areas (MSA); and 3) if the industry makeup of HGFs differed by geography (within Ohio).

<sup>2</sup> The research team operationalized the 10 definitions using the Quarterly Census of Employment and Wages (QCEW) microdata for the state of Ohio. For a detailed methodology of how definitions were operationalized, see pp. 7-8



Our first major finding from examining HGF data at the metropolitan level in Ohio showed that HGF firm counts were reflective of the definition selected. Overall, there were two distinct groupings of HGF counts. The definitional cohorts of Acs I, Acs II, Kirchhoff, Siegel, and Stangler I resulted in a larger count of HGFs than the number of HGFs defined according to Choi, Clayton, OECD, Stangler II, and Birch & Medoff.

Our second finding was that that MSA size may not influence the performance of HGFs. At the same time, the business cycle is an important factor, marking an influential change in the number of HGF counts during the recession of 2007-2009. Overall, we conclude that the business cycle is a more influential factor on HGF counts over time than MSA size. Moreover, the highest number of HGFs within each geography moved in the same direction as the business cycle. The definitional cohorts of Acs I, Acs II, Kirchhoff, Siegel, and Stangler I display a high volatility during the recession (these are the definitions that produced sizeable counts of HGFs). More importantly, they show a significant decrease in HGF counts during the recession and a growth of the counts during the recovery. Even more interesting is that this volatility is evident across MSA-size groupings; although it is apparent that certain geographic areas were hit by the recession harder than others.

The third finding is that the HGF industry shares (in total HGFs), based on the average of the 10 definitions, show differences across MSA sizes. Most MSAs show large shares of HGFs in professional and business services; trade, transportation, and utilities; and in education and health services for 2008 and 2014. This follows regional economic theory, which suggest professional services will cluster in metropolitan areas rather than rural areas.

A fourth finding, from the *HGF Specialization Index*, a modified location quotient,<sup>3</sup> showed that HGF industry concentrations changed between 2008 and 2014. In 2008, many regions had HGF concentrations in professional and business services and education and health services. In 2014, only one region had HGF concentration in professional and business services, while the industries of construction and leisure and hospitality HGF concentrations emerged in multiple regions.<sup>4</sup>

A fifth finding emerged from the analysis of the three selected definitions: Acs I, Stangler I, and Choi. The research team selected three definitions for further analysis identifying that it would be unreasonable to expect local policy makers to track HGFs within their regions using all of the definitions laid out in this report.<sup>5</sup> Examining the selected definitions of Acs I, Stangler I, and Choi, revealed that the industry concentration among them is different. Acs I displays a concentration of HGFs in a few industries, while Stangler I and Choi showed a concentration of HGFs in many different industries. The dispersion of HGF industry concentrations reinforces the message the method for calculating a HGF definition will impact the results of the firms selected (the number and industries in which they are selected).

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<sup>3</sup> Location Quotient measures the specialization of an industry in a region by comparing it to data in a larger region. For our analysis:

$$\frac{([\text{The number of HGFs in X industry in Z region}] / [\text{The number of total HGFs in Z region}])}{([\text{The number of all companies in X industry in Z region}] / [\text{The number of total companies in Z region}])}$$

<sup>4</sup> The construction phenomenon may be a reflection of the American Recovery and Reinvestment Act (ARRA) investment in construction projects, but there is no way of capturing this data for this study.

<sup>5</sup> For a methodology of how three definitions were selected see p. 21

## SURVEY OF HIGH-GROWTH FIRMS

The low-response rate of the Survey of High-Growth firms does not allow us to extrapolate these results to the entire state of Ohio. However, there are still valuable findings to be gleaned from it. Below are some highlights:

- ✓ Respondents from the Survey of High-Growth Firms demonstrated that *taking advantage of an opportunity or consumers' high demand for a product or service* was a primary reason for entrepreneurs to start their firms.
- ✓ The survey revealed that how HGFs financed their businesses varied by industry and phases of business. Service-providing firms mainly relied on *home equity* as a means of financing in launching the business through the first two years of their business. Goods-producing industries, on the other hand, used various means of financing such as *home equity, friends & family gifts or loans, equity financing, bank loan and other financing*. During the company's years of growth, service-providing industries mainly used *cash flow*, while goods-producing industries relied on *bank loans*. This is a reflection of the low-cost and low-barriers to entry in service-providing industries as opposed to manufacturing industries.
- ✓ A majority of respondents identified hiring more employees as a means of firm growth as opposed to merging or buying another firm.
- ✓ Respondents indicated that both *hard-work/attitude* and *good employees* were pivotal components of their success. This reinforces the academic literature that suggests that entrepreneurial traits such as the need for achievement, the need for control, and entrepreneurial values drive individuals to create firms.
- ✓ However, a majority of respondents indicated that they have no connection or ties to the entrepreneurial ecosystem.

## POLICY TAKEAWAYS

Overall, the project gleaned four major policy takeaways. The first is that how a HGF is defined matters. How high-growth is defined impacts the number of firms classified as high-growth. The lack of definitional consensus creates unclear expectations in the public policy discussion and outcomes. Moreover, public policy can vary dramatically depending on the criteria used to define and enumerate HGFs. Second, high-growth firm counts move in the same direction with the business cycle. In other words, high-growth firm counts are coincidental with the business cycle; in addition, this statement holds for all ten definitions examined by the research team. Therefore, policy makers should look to enhance policies that will buffer recessionary effects toward HGFs in order to encourage these firms. Third, HGFs exist in a variety of industries, not just technology-based growth industries; and for that reason, public policy should target a variety of industries to foster HGF development. Lastly, although this study acknowledges the low survey participation, it was surprising to find that very few HGF survey respondent reported a connection to the entrepreneurial ecosystem. Thus, connectivity of entrepreneurs to the regional entrepreneurial ecosystem is an important area for future study.

## INTRODUCTION

Economic growth is a complex process involving the generation and utilization of new ideas and fresh knowledge, and gives credence to the importance of entrepreneurship for the economic performance of a city, a region, or a nation. There are strong reasons to believe that public policy affects the prevalence and success of entrepreneurial firms (Mason & Brown, 2013; Thurik, 2009). Studies have assessed how public policy investment in venture capital fosters entrepreneurship (Lerner, 1999; Lerner, 2002; Lerner, 2009); how federal funding of science and technology commercialization grants via the Small Business Innovation Research (SBIR) program can spur innovation and entrepreneurship (Allen, Layson, & Link, 2012; Link & Scott, 2010; Link & Scott, 2012); and how entrepreneurship contributes to regional economic growth (Acs & Armington, 2004; Acs, Parsons, & Tracy, 2008; Mueller, 2007). These studies examine the scope of all entrepreneurs, regardless of their growth trajectory. The basis of this work is built upon the foundation that policy makers can influence the growth of firms through incentives, and public investment should be strategic in how it invests in firms. Shane (2009) argues that it is bad policy to encourage all individuals to become entrepreneurs; however, it is a productive use of public dollars to invest in high-growth firms. High-growth firms (HGF) are a

There is a consensus in the literature that HGFs contribute significantly to employment growth (see, for example, Acs & Mueller, 2008; Acs, Parsons, & Tracy, 2008; Birch & Medoff, 1994; Choi, Robertson, & Rupasingha, 2013; Clayton, Sadeghi, Spletzer, & Talan, 2013; Kirchhoff, 1994; Stangler, 2010, among others). Due to their importance to regional economies, there is an economic development policy interest in HGFs. Clearly, HGFs do not grow in a vacuum. Instead, these firms can only flourish in a robust entrepreneurial ecosystem. Policymakers – along with other stakeholders, such as investors, universities, and service providers--play a key role in the creation and sustainability of such an ecosystem. Mason & Brown (2013) and Shane (2009) called for the orientation of economic development policy around HGFs and for policy makers to provide these firms the tools they need in order to grow. However, for policy interventions to be not only justifiable, but also effective and efficient, definitions and measures for HGFs must be unambiguous. Due to the lack of agreement in the literature regarding how such firms are identified, no reliable mechanism or guidance is offered to detect and (if needed) promote HGFs (Coad, Daunfeldt, Hölzl, Johansson, & Nightingale, 2014). This is due to a definitional flexibility in the literature about how to quantify and classify HGFs.

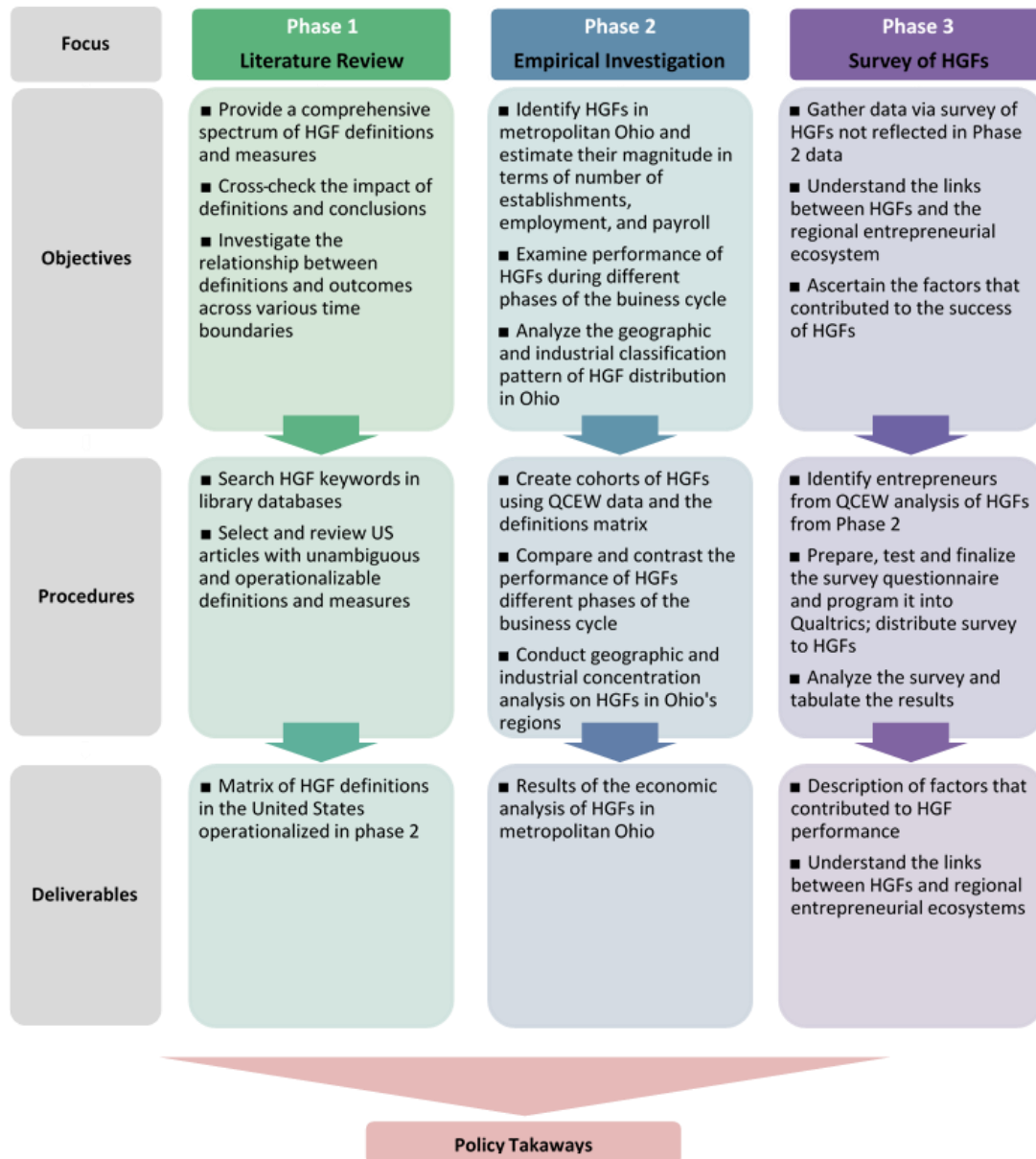
Examining HGF definitions is interesting and important for several reasons. First, the literature provides a wide array of HGF definitions, creating a confusion surrounding the concept and an opportunity for comparative analysis. Second, as the focus of economic development policy has shifted towards entrepreneurship in recent years, the issue of how to define and identify HGFs has become even more important for practitioners. Third, definitions may encourage public and private funding decisions based on high-growth classification. If firms classified as high-growth differ based on the definition used (a very likely outcome), serious concerns arise surrounding the validity and appropriateness of funding and policy decisions. This study, with support from the Ewing Marion Kauffman Foundation,<sup>6</sup> focuses on three major sets of questions about HGFs: 1) How are HGFs defined?; 2) Where are HGFs located—geographically, in terms of industrial sectors, and within business cycles?; and 3) How are HGFs connected to their regional entrepreneurial ecosystem?

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<sup>6</sup> This study was prepared with financial support from the Ewing Marion Kauffman Foundation. All contents of this study reflect the views of the Grantee and do not reflect the views of Ewing Marion Kauffman Foundation.

We seek to answer these questions through a tri-phased analysis that includes: 1) a review of the literature on HGF definitions which compiles theorists' various definitions; 2) the operationalization of collected HGF definitions into cohorts of companies using the Quarterly Census of Employment and Wages (QCEW) microdata<sup>7</sup> in the state of Ohio; and 3) a survey of HGFs focusing on the connectivity of HGFs to the regional entrepreneurial ecosystem. The results of the this tri-phased study will lead provide policy takeaways on how to facilitate HGF growth. Figure 1 illustrates the three phases and provides an explanation of goals and expected findings and contributions.

**Figure 1. Three Phases of Research**



<sup>7</sup> The Center for Economic Development at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University is deputized to use the QCEW for research purposes through a contract with the Ohio Department of Jobs and Family Services.

## PHASE I: LITERATURE REVIEW

### METHODOLOGY

We reviewed over one hundred studies in order to assemble a matrix of definitions of high-growth firms (Table 1). We were only able to operationalize ten definitions offered by eight authors or author groups due to several factors. First, international studies were eliminated because of cross-country differences in regulatory, legal, and business start-up counts and dynamics. Second, a group of studies were not included in our definitions matrix since we were unable to operationalize the definitions due to data unavailability. For instance, we could not operationalize the definitions used by Boston and Boston (2007) because the study focused on African American-owned business based upon a survey distributed by the authors, and it was impossible to replicate their sampling procedures using our database. There are many studies that classify high-growth through the *Inc. 5,000* firm listing (Motoyama & Danley, 2012a; Motoyama & Danley, 2012b; Eckhardt & Shane, 2011).<sup>8</sup> We excluded studies using the *Inc. 5,000* firm listing since we restricted our study to metropolitan Ohio and there were very few companies that fit this criterion. Third, we omitted studies that did not offer clear definitions or detailed operationalization considerations of the requirements of High Growth Firms (HGFs). For example, Friar and Mayer (2003) did not clearly specify how to operationalize their HGF definition, making replication impossible. Fourth, some authors were removed from the study since they replicated HGF definitions from other studies. For instance, Woodward, Guimãeres, and Watson (2001) studied high-impact firms in South Carolina, but used a modified Acs, Parsons, and Tracy (2008) definition.

### DEFINITIONS AND POLICY IMPLICATIONS

From a policy standpoint, HGFs are important because they are expected to contribute a large share of job creation and economic growth. However, the vague definitions offered by the literature – coupled with inconsistent findings and conclusions – have caused confusion and controversy in policy debates. More specifically, questions may arise such as: 1) if there is a change in the HGF definition, would the same firm be selected? 2) do differently-defined HGFs contribute equally to the growth in various economic output variables? and, 3) do these definitions have a relationship with the subsequent growth of selected firms?

There is evidence in the literature that a change in definitional delineation may result in a different cohort being selected. For example, Daunfeldt, Elert, and Johansson (2014) found that HGFs categorized in terms of employment or productivity are not the same and their economic contributions vary considerably. These findings are not surprising, especially because various growth indicators represent different growth phenomena. For instance, Delmar, Davidsson, and Gartner (2003) concluded that employment and sales are distinct because the first shows resource growth, whereas the second indicates acceptance of product or service in the market. This difference means that policymakers should take caution when using a certain definition to identify HGFs.

Another key policy concern is whether or not HGFs in one period continue their high-growth in future periods. The issue of consistent growth has received considerable attention in the past few years. Generally, recent studies suggest that HGFs are unlikely to remain high-growth over time and that growth persistence may be dependent upon the choice of growth measurement. For example,

<sup>8</sup> Firms on the *Inc. 5000* apply for the designation and are ranked by their annual revenues over a three-year period (Inc., 2015)

Daunfeldt and Halvarsson (2012) found that the probability of an HGF—as measured by percentage employment growth—in one period continued to be an HGF in the 3-year period, is the same probability that a random firm would remain in that growth category. Hölzl (2011) also used relative employment growth for high-growth classification and came to the same conclusion. Daunfeldt et al. (2014), on the other hand, found that whereas HGFs measured in relative terms have a very low probability of repeating their growth rates in the next period, the fastest growers in absolute terms had a higher degree of growth persistence. These findings complicate public policy decisions and ergo require a consistent and reliable method to define HGFs as well as a way to predict which companies are most likely to grow or continue to grow.

## DEFINING HIGH-GROWTH FIRMS

There is little agreement on the definition of HGFs in the literature. This is mainly because of the significant heterogeneity among studies in four aspects of defining growth: 1) the indicators used, 2) the measurement of growth, 3) the time span of growth calculated, and 4) the type of growth studied.

### Indicator

In our analysis of the literature, the most commonly used growth indicators were *Employment* and *Sales*; however, other growth indicators such as *Market Share*, *Physical Output*, *Revenue*, and *Wages* have also been used. We categorized the definitions into three major categories in terms of their growth indicator: 1) sales based; 2) employment based; and 3) sales and employment based.

### Measurement of Growth

Other than the differences in indicators of growth, HGF definitions vary based on their measurement techniques. Growth can generally be measured in *Relative* (percentage) or *Absolute* terms. When growth is measured in *Relative* terms, smaller firms are more likely to be selected as HGFs. Conversely, using an *Absolute* growth measure can result in the overrepresentation of larger firms among identified HGFs (Delmar et al., 2003). Therefore, a composite growth measure which considers both *Absolute* and *Relative* growth may be more appropriate and many studies used a combination to measure growth. The most well-known of these composite measures is the “Birch Index,” which measures employment growth as the combination and multiplication of *Absolute* and *Relative* growth measures (Birch 1981, 1987).

### Time Span

Additionally, firm growth can fluctuate over time. Thus, questions of how the rate of growth should be measured over time are important. Many studies use varying timeframes to construct their high-growth cohort. Some of these time periods are haphazard due to data availability, and others are premeditated for methodological reasons. Growth rates can be measured on an *Annual* or *Multi-year* basis. In our analysis of the literature, we found that both methods are common. *Multi-year* periods are typically three or four years. Another aspect of the multi-year study period that can potentially affect observed growth rates is whether growth is measured between the initial and final year of the data or as an average annualized growth rate calculated over a set number of years.

### Type of Growth

Ultimately, firm growth can be classified as *Organic* or *Acquired*. Organic growth occurs through hiring employees; whereas *Acquired* growth happens as a result of mergers & acquisitions. Because of the lack of data on the type of firm growth, *Total* growth (i.e. the sum of Organic and Acquired) is often used.



## HGF CALCULATION

Given these choices for firm growth measurement, HGFs can generally be defined in two major ways. The first technique is to define HGFs as the share of firms experiencing the highest growth (in a given measure) over a particular timeframe—for instance, the 1%, 5%, or even 10% of firms with the highest growth rate might be defined as HGFs (Stangler, 2010). The second technique is to define HGFs as entities that grow at or above a particular pace or threshold (either in absolute and/or relative), measured either as growth between the initial and final year, or as annualized growth over a certain number of years. For example, Birch & Medoff (1994) require a minimum sales growth of 20% per year for three consecutive years as the major requirement for a firm to be classified as high-growth.

Due to the relationships between firm size, age, and industry, many studies add certain employment or sales thresholds as a component of their HGF definitions. Another reason to include firm size as a requirement for HGF classification is that defining them based on total number of employees or percentage of employment growth can increase the chances for larger and smaller firms, respectively, to be classified as high-growth. A notable example of the first type is the Organisation for Economic Co-operation and Development (OECD, 2007) definition, which requires firms to have a minimum of ten employees at the beginning of the observation period and an annualized employment gain greater than 20% to be classified as high-growth. The problem with this definition is that it excludes a large proportion of potentially HGFs which have with less than 10 employees. To adjust for this, most researchers have made one of two decisions: 1) requiring HGFs to have a specified minimum number of employees as an employment qualifier; or 2) employing a “kink point” approach that defines a threshold in both levels and percentages to be used depending on the firm size (the threshold is set in percentage for larger firms and in levels for smaller firms). Clayton et al. (2013) introduced the “kink point” approach as a way to consider smaller firms without making them more likely to be classified as high-growth. In their study, the authors classified a firm with 10 or fewer employees as high-growth if it grew by 8 or more employees over a three-year period; whereas a firm with more than 10 employees had to grow at least 72.8%<sup>9</sup> over the three-year period to be considered an HGF.

Table 1 shows the list of ten definitions offered by eight authors that we were able to operationalize. As shown in the table, we grouped definitions into three categories: 1) *sales based*; 2) *employment based*; and 3) *sales and employment based*.

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<sup>9</sup> If a firm greater than 10 employees classified as high-growth firms if they grow by more than 72.8% over a 3-year time frame which is equivalent to the 20% average annualized growth. Therefore, a firm with less than 10 employees must grow by 7.28 employees over 3 years (For more information see Clayton, et al. (2013), p. 4).

**Table 2. High-Growth Firm Definitions**

	Authors	Label	Time Period	Definitions
Sales Based	Siegel, Siegel, & Macmillian (1993)	Siegel	3 years	Double sales growth
	Birch & Medoff (1994)	Birch & Medoff	4 years	Sales growth $\geq 20\%$ each year; base revenue $\geq \$100,000$ .
	Acs, Parsons, & Tracy (2008)	Acs I	4 years	Double sales growth
Employment Based	Kirchhoff (1994)	Kirchhoff	6 years	In the top 10% annual growth
	OECD (2007)	OECD	3 years	Average annualized growth $>20\%$ with 10 or more employees.
	Stangler (2010)	Stangler II	1 year	Top 5%
	Stangler (2010)	Stangler I	1 year	Top 1%
	Clayton, Sadeghi, Spletzer, & Talan (2013)	Clayton	3 years	Grow by 72.8% over 3 years with 10 or more employees. If $<10$ the number of employees must grow by 8 employees.
Sales & Employment Based	Acs, Parsons, & Tracy (2008)	Acs II	4 years	Doubled sales growth with an employment growth qualifier $\geq 2$ .
	Choi, Robertson, & Rupasingha (2013)	Choi	3 years	Average of 20% annualized sales growth w/ 10 or more employees

Throughout this report we refer to these definitions by the first author's name, as defined in the "Label" column in Table 1. Two authors each provided two definitions which we operationalized in Phase II. Stangler provided two definitions for high growth firms: firms which fell in the top 1% were labeled Stangler I while firms which fell in the top 5% were labeled Stangler II. The Acs, Parsons, & Tracy (2008) literature also provided two definitions which we used: Acs I refers to firms which double their sales growth across four years, while Acs II refers to firms which double sales growth and have an employment growth qualifier of at least two employees.



## PHASE II: OPERATIONALIZING HGF DEFINITIONS

This section illustrates how we operationalized high-growth firm (HGF) definitions chosen in Phase I, and reports the findings of how firms that were selected based on these definitions behave 1) throughout the business cycle, 2) over time, and 3) across geographic areas. The goal of this research is to better understand Ohio's metropolitan HGF environment and in order to achieve this, we look to answer several research questions regarding HGF performance in metropolitan Ohio:

- What is the performance of HGFs in relation to the business cycle?
- Does the performance of HGFs differ across metropolitan regions of different size?
- Which industries demonstrate the greatest number and most significant shares of HGFs in each of the ten geographies studied in Ohio?
- Are there recommended HGF definitions which policy makers can use to track high-growth firm performance in their own geographic areas?

### METHODOLOGY

We operationalized the 10 different definitions listed in Table 1 using Quarterly Census of Employment and Wages (QCEW) microdata from 2001 to 2014.<sup>10</sup> The QCEW database is a database constructed using the Unemployment Insurance tax data. Data is available for 97% of all establishments in the state of Ohio, with information on employment, wages, industry classification, and physical location address. Since this database does not contain sales, wages were substituted as a proxy for sales.

Since the focus of this analysis is the metropolitan areas of Ohio, we utilized 10 geographic areas for the state which are categorized into three groupings: large Metropolitan Statistical Areas (MSAs),<sup>11</sup> small MSAs, and non-MSA counties. The large MSA category includes Ohio's eight largest MSAs: Akron, Canton-Massillon, Cincinnati, Cleveland-Elyria, Columbus, Dayton, Toledo, and Youngstown-Warren-Boardman.<sup>12</sup> The small MSA category that includes a combination of Ohio counties which make up the remaining small MSAs in the state (Huntington-Ashland, Lima, Mansfield, Springfield, Weirton-Steubenville, and Wheeling), while the non-MSA category is an aggregation of HGFs in non-MSA/rural counties.<sup>13</sup> The unit of analysis is private sector firms<sup>14</sup> within these three groupings.

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<sup>10</sup> The Center for Economic Development at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University is deputized to use the QCEW for research purposes through a contract with the Ohio Department of Jobs and Family Services.

<sup>11</sup> Based upon the 2013 U.S. Office of Management and Budget definitions

<sup>12</sup> The QCEW microdata the Center maintains is only for the state of Ohio. Some MSAs cross state boundaries (i.e. Cincinnati and Youngstown), and the economic activity in other states was not able to be captured due to data limitations. MSAs are listed alphabetically.

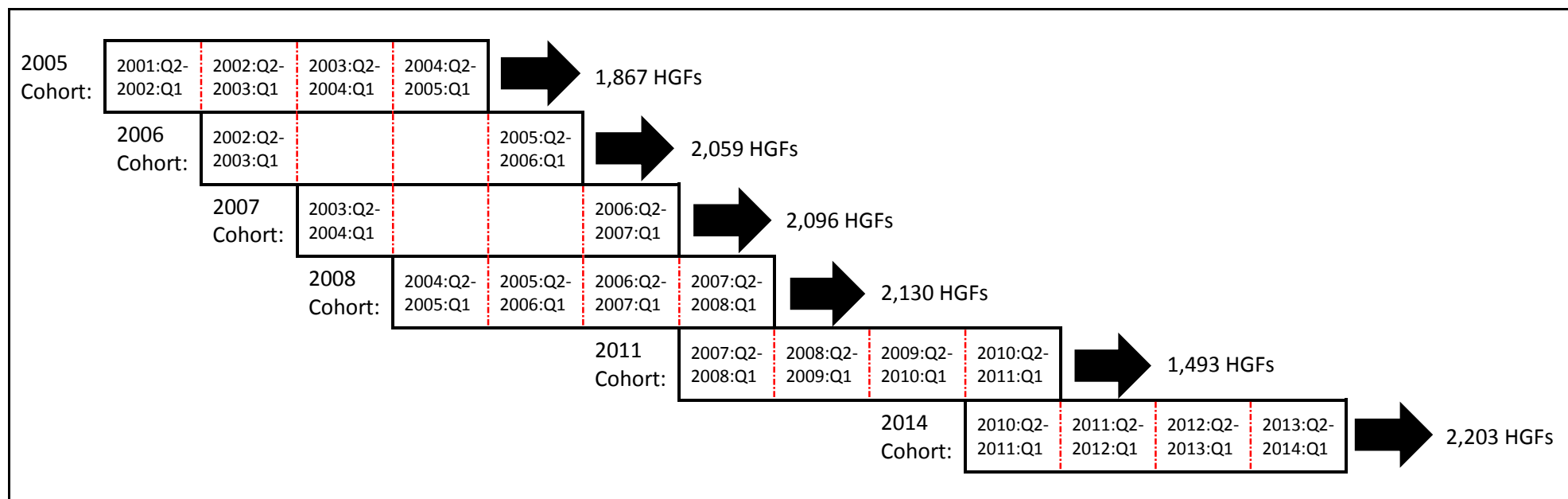
<sup>13</sup> For more information on a listing of counties included in each geographic region, see Appendices A and B.

<sup>14</sup> A firm refers to a business/corporation. A firm can be a single establishment or many establishments if the company has multiple locations. An establishment is a single physical location/worksites of a business. The summation of firms occurred within an MSA as an individual entity, not across the state.

Since the QCEW is a quarterly database, we constructed annual data from the second quarter (Q2) of one year to the first quarter of the next year. For example, the year referred to as 2006 (or as 2006:Q1) actually includes the time period from 2005:Q2 to 2006:Q1. Therefore, in order to see data which represents most of the year 2005, one would look at data for '2006' and '2006:Q1'. The research team assembled the data in this manner because the QCEW microdata registers a disproportionate share of establishment births and administrative industry code changes in the first quarter of the year (Elvery & Cyran, 2012; Knaup & Piazza, 2007).

We used a cohort model, the examination of a group over time, to study the different HGF definitions. In this instance, we assemble a grouping of firms at a given start time and follow their growth and/or decline based upon each HGF definition. For each definition, cohorts were constructed using the prescribed time period and repeated for subsequent cohorts. For example, Figure 2 displays how the Acs II definition was operationalized to determine HGF counts in each Acs II cohort for the Cleveland MSA, using the available years' data (2002:Q1 through 2014:Q1). Since the Acs II definition requires a 4-year cohort, the computation for the 2005:Q1 HGF count used the 2001:Q2 – 2005:Q1 time interval. For the subsequent cohort year of 2006 the years it would contain would be 2002:Q2 – 2006:Q1 time interval; and so on until the ending year 2014. The same cohort principle is applied to both the other definitions and their defined cohort time intervals. Therefore – when examining a data point for Stangler (2010) – since it is a one-year cohort, a data point for 2005:Q1 begins in 2004:Q2.

Figure 2. Cohort Construction Using Acs II Definition (4 year cohorts)



Note: The data contained in Figure 1 is for the Cleveland MSA HGF counts.

## PERFORMANCE OF HIGH-GROWTH FIRMS BY DEFINITION

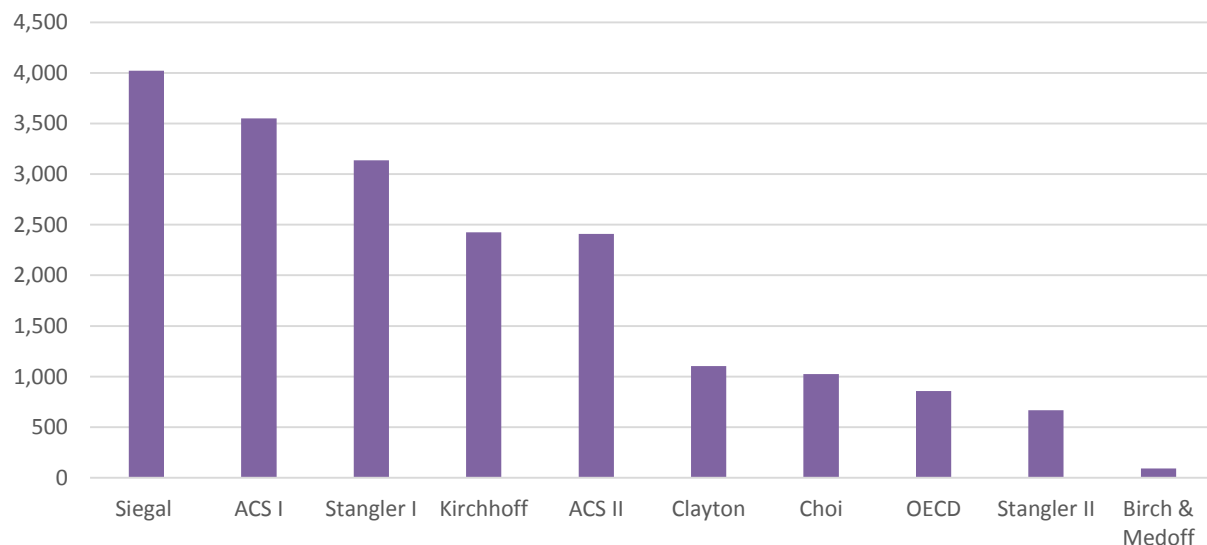
In order to understand how the 10 different HGF definitions perform over time in each of the geographic areas, the number of HGFs (listed by cohort end year) were analyzed. We tracked and graphed these counts by time series, and compared them visualizing their performance. The analysis of these graphs shows the differences between HGF definitions in both scale and variability, and additionally explains definitional cohort's performance over the business cycle. Each definition was tracked beginning with a cohort using data from year 2002 (2002Q1), and completed with a cohort using data from 2014, for all geographies.

### Definitional Analysis

Since we used a cohort model, it is possible for firms to enter a cohort and exit within multiple time periods; therefore, it is important to examine the unique HGF counts across all years. The number of unique HGFs counted for each definition was gathered, and ranked from highest to lowest in order to discover differences among the 10 definitions. Figure 3 displays the ranking for the unique counts of HGFs by definition, using the Toledo MSA as an example.

The definitions each identify unique sets of HGFs for every region. For example, each definition identified varying numbers of HGFs for the Toledo MSA. Over four-thousand (4,021) unique HGFs were identified using the Siegel definition, while 2,425 unique HGFs were identified under Kirchhoff, the fifth highest number of HGFs among the ten definitions. The lowest unique count identified for the Toledo MSA was from Birch & Medoff, which identified only 92 HGFs. The ten definitions show a wide variability in the number of unique HGFs that are classified as such within each region.

**Figure 3. Number of Unique HGF Counts by Definition for all cohorts (2002-2014), Ranked from Highest to Lowest, within the Toledo MSA**



Source: Quarterly Census of Employment and Wages

### Business Cycle Analysis

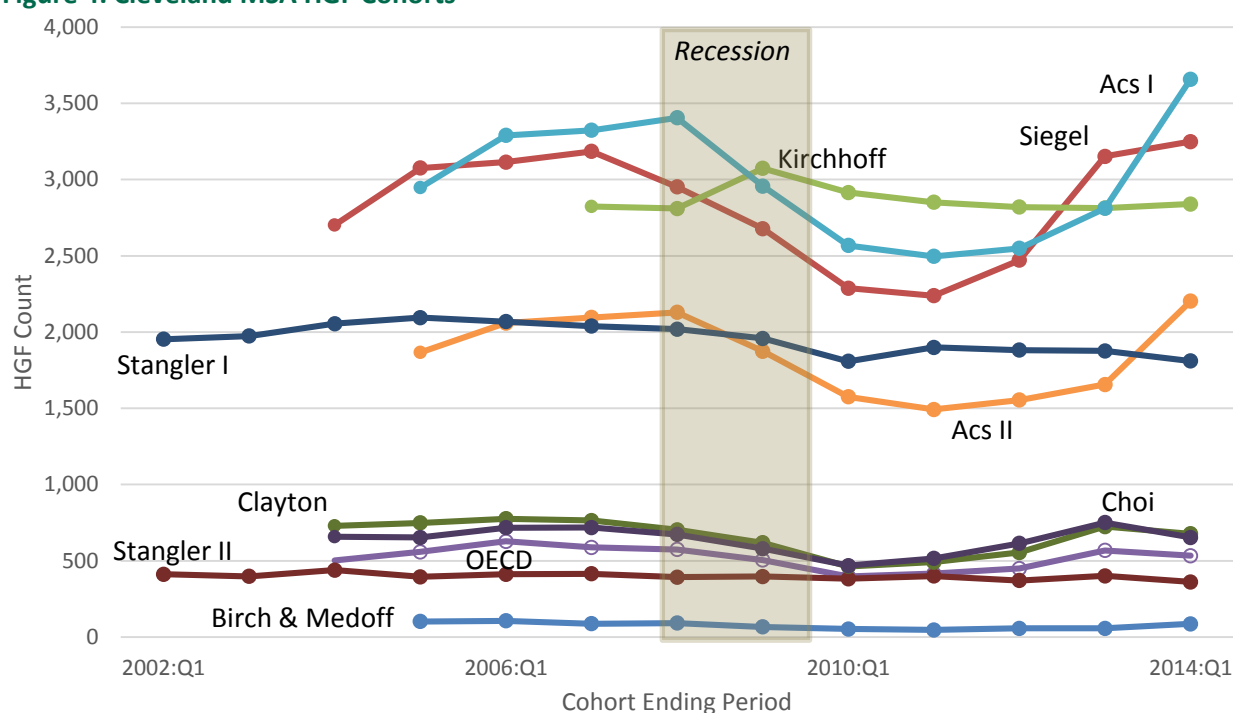
The analysis reveals that the highest number of HGFs within each geography was primarily in accordance with the business cycle. There was a peak in the number of HGFs in each region across definitions between 2006 and 2008, in correspondence with the peak of the business cycle. These figures also show declines in the number of HGFs through 2010 and point to the lowest number of HGFs in either 2010 or 2011, and correspond with the movements of the Great Recession.<sup>15</sup> From 2012 to 2014, HGF counts, according to most definitions, rose in sync with the economic recovery. By 2014, counts for several definitions surpassed their 2007 counts, while others remained below their pre-recession levels. Notably, the count of HGFs according to several definitions with sales-based growth criteria (Acs I, Acs II, and Siegel) was higher in 2014 than the pre-recession peak for many observed geographic areas. This shows that products within these areas are gaining acceptance in the market and it is reflected in these definitions (Delmar, et al., 2003).

Figure 4 examines in detail the Cleveland MSA HGF cohorts over time. Each line represents one definition, and each point represents a definitional cohort (as described previously). The figure reveals that in the Cleveland MSA, there are two distinct groupings of definitions: one group has a smaller count of HGFs and more stable HGF counts over time, and the other group has a higher HGF count with more volatility. It is interesting to note that of the five definitions that comprise the group of HGFs with smaller counts, three have an employment qualifier (excluding Stangler II and Birch & Medoff).

When observing the five definitions with higher counts of HGFs in Figure 4, the business cycle trend is quite apparent, with peaks in HGF counts in 2005 for Stangler I, 2007 for Siegel, 2008 for Acs I and Acs II, and 2009 for Kirchhoff. There is a significant drop in the number of HGFs across these definitions between 2008 and 2011. The definitional cohorts for Stangler I and Kirchhoff, which measure HGFs based on a percentage of all firms for one year and six years, respectively, are the only two of the upper five definitions that do not show an increase in HGF counts between 2011 and 2014. This may be due to the definitional construct of Stangler (I and II) and Kirchhoff which only require a certain numeric cutoff of the top percentage of growers each year.

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<sup>15</sup> The most recent recession – also known as the Great Recession – was officially dated by the National Bureau of Economic Research’s Business Cycle Dating Committee from December 2007 to June 2009. (National Bureau of Economic Research, 2010)

**Figure 4. Cleveland MSA HGF Cohorts**

Source: Quarterly Census of Employment and Wages

### Geographic Analysis

Figure 5 displays the three large geographic areas in the state of Ohio the Cleveland MSA, the Cincinnati MSA, the Columbus MSA, as well as the aggregated data from Non-MSA counties. The graphs are consistent with the takeaways described above, including the two groups of definitions and their HGF counts throughout the business cycle. Across all 10 definitions, there is always a bottom group of Choi, Clayton, OECD, Stangler II, and Birch & Medoff. These five definitions of smaller counts show less variability in comparison to the group of definitions with higher counts. The grouping with larger counts (Acs I, Acs II, Kirchhoff, Siegel, and Stangler) shows more variability across the years. Moreover, this group shows great volatility during the business cycle, showing a dip in HGF counts during the recession, or just following the recession (2009 to 2012). None of the definitions stand out as showing the most volatility from year to year. The cohorts as defined by Acs (I & II) and Siegel show the greatest rise in the number of HGFs between 2012 and 2014 across all large geographies.

There are clear differences in the performance of HGFs according to the different definitions across the business cycle in these four geographies. The Cleveland MSA shows a large loss in the number of high-growth firms during the recession and significant increases from 2012 to 2014 according to three of the definitions (the two Acs definitions and Siegel). This may be explained by the different industry mix, which will be discussed in detail in the next section. The Cincinnati and Columbus MSAs show less variability across the business cycle and appear to have weathered the recession better than the Cleveland MSA, as measured in terms of the number of HGFs. Like the Cleveland MSA, the Non-MSA counties grouping shows a large drop in the number of HGFs between 2008 and 2012. While the Cincinnati MSA, the Cleveland MSA, and the Columbus MSA show nearly a full recovery in HGF counts to pre-recession levels, the Non-MSA aggregate appears to be still struggling to recover.

The grouping of the Cleveland MSA, the Cincinnati MSA, the Columbus MSA, and the aggregated data from Non-MSA counties geographic areas shows more similarities than differences in their patterns over time and across definitions. The comparison does not answer the question of whether MSA size or regional industry mix affects HGF counts over time.

Figure 6 displays the HGF cohort counts of the medium-sized geographic areas: the Akron MSA, the Dayton MSA, and the Toledo MSA. These medium-sized areas show consistent changes across definitions, in line with the business cycle. The number of HGFs according to the Siegel and the Acs definitions rises significantly from 2012 to 2014, whereas the other definitions show a stabilization between 2012 and 2014. The three definitions that show significant increases in HGF counts during this period are all based on sales growth (payroll growth was substituted for sales growth, as explained in the methodology section). It should be noted that these three medium-sized geographic areas mirror the graphs of the Cincinnati, Cleveland, and Columbus MSAs. The trend across the definitions shows a rebound in the number of HGFs to pre-recession levels by 2014.

Figure 7 displays the HGF Cohorts of the small-sized geographic areas consisting of the Canton MSA, the Youngstown MSA, and the aggregated data from Small MSAs due to the similar scale of the graphs for easy comparability of HGF counts. These smaller areas display a larger decline in the number of HGFs during the recession (2007-2009). The Canton and Youngstown MSAs display a recovery in the number of HGFs between 2012 and 2014, with Acs I, Acs II, and Siegel cohorts reporting a growth of between 100 and 200 HGFs during this period. These increases greatly surpass pre-recession HGF counts in Canton, especially. Compared with the other nine geographic areas, the recovery in HGF counts is the lowest in the Small MSA aggregation.

When comparing the groupings of differently-sized geographic areas, there is little observable difference in variability or performance across the business cycle. ***Overall, we conclude that the business cycle is a more influential factor on HGF counts over time than MSA size.*** Individual geographic areas show slightly different trends, but these trends do not differ greatly across geographic groupings. It is interesting to note that there was no noticeable significant difference between Non-MSAs and Small MSAs, in comparison to larger MSAs. This is unexpected, since employment growth during recessions is expected to be stronger in urban areas than rural areas and small cities (Hertz, Kusmin, Marré, & Parker, 2014).

Other observations from these figures are region-specific. For example, all definitions show growth in the number of the Canton MSA's HGFs between 2012 and 2014. This may be explained by the recent Utica shale boom since 2012 in the Eastern Ohio region. ***When comparing the four areas with the highest levels of HGFs (Figure 5), the Cleveland MSA has a noticeably higher number of HGFs than the Columbus MSA and the Cincinnati MSA.*** This can be explained by the possibility that many of HGFs in the Cincinnati MSA are located outside Ohio in counties in Kentucky and Indiana, and are therefore not included in this analysis.<sup>16</sup> In addition, this comparison also may suggest that the Cleveland MSA has a higher number of private sector employers in HGFs than the Columbus MSA, since this analysis only includes private sector firms.

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<sup>16</sup> The QCEW microdata the Center maintains is only for the state of Ohio. Some MSAs cross state boundaries (i.e. Cincinnati and Youngstown), and the economic activity in other states was not able to be captured due to data limitations.

Figure 5. Large-Sized Geographic Areas: Number of HGFs by Area

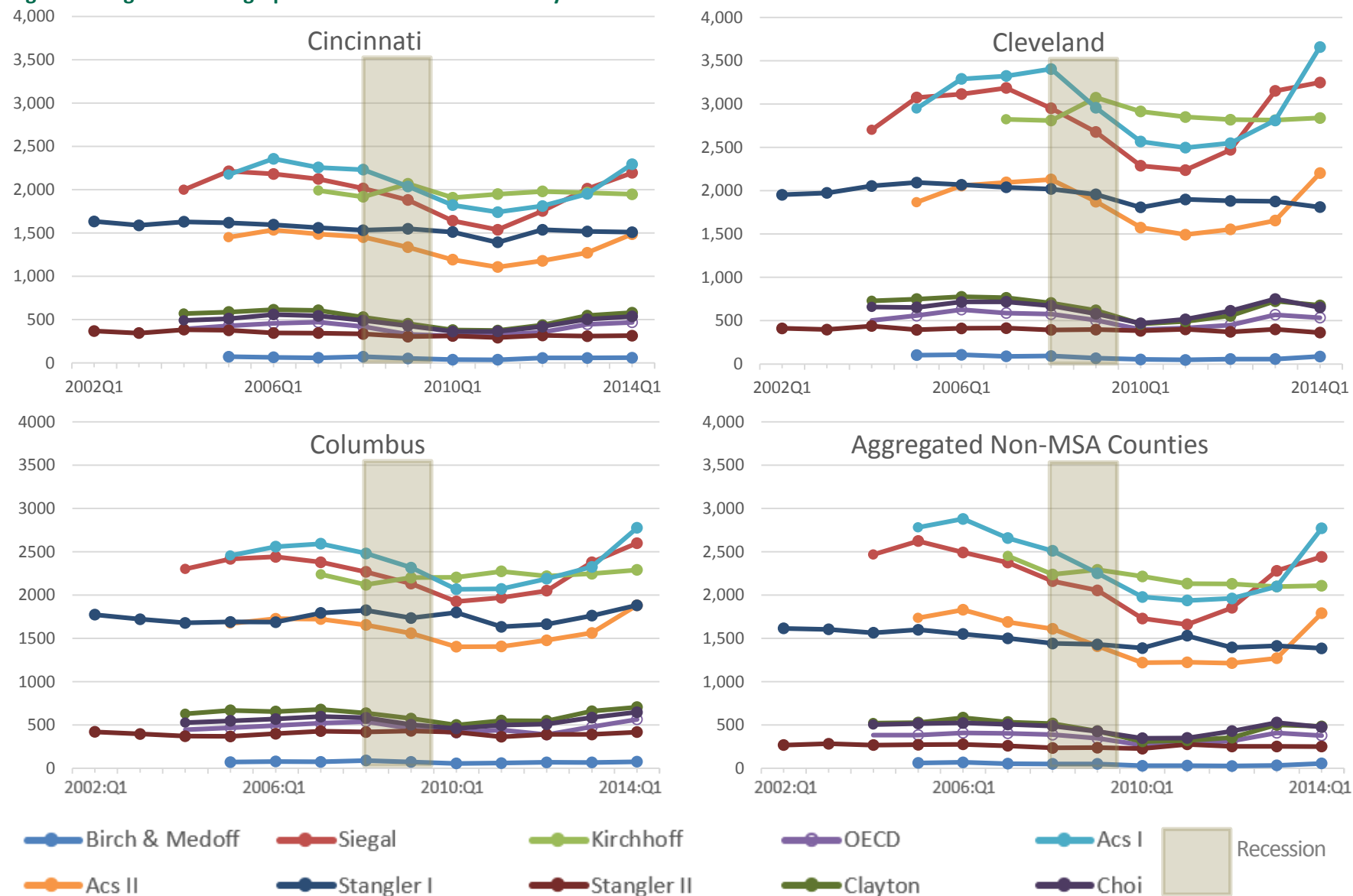




Figure 6. Medium-Sized Geographic Areas: Number of HGFs by Area

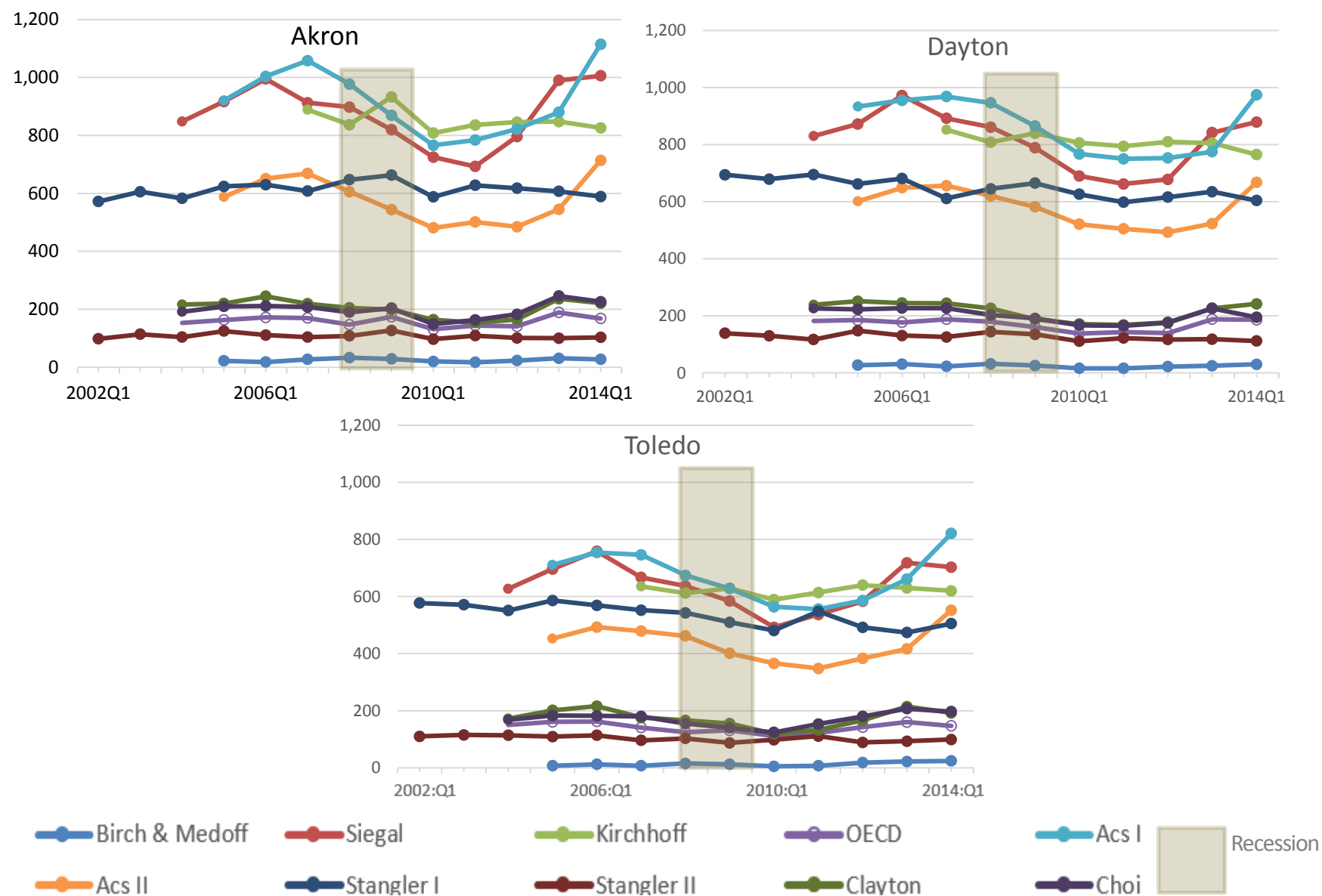
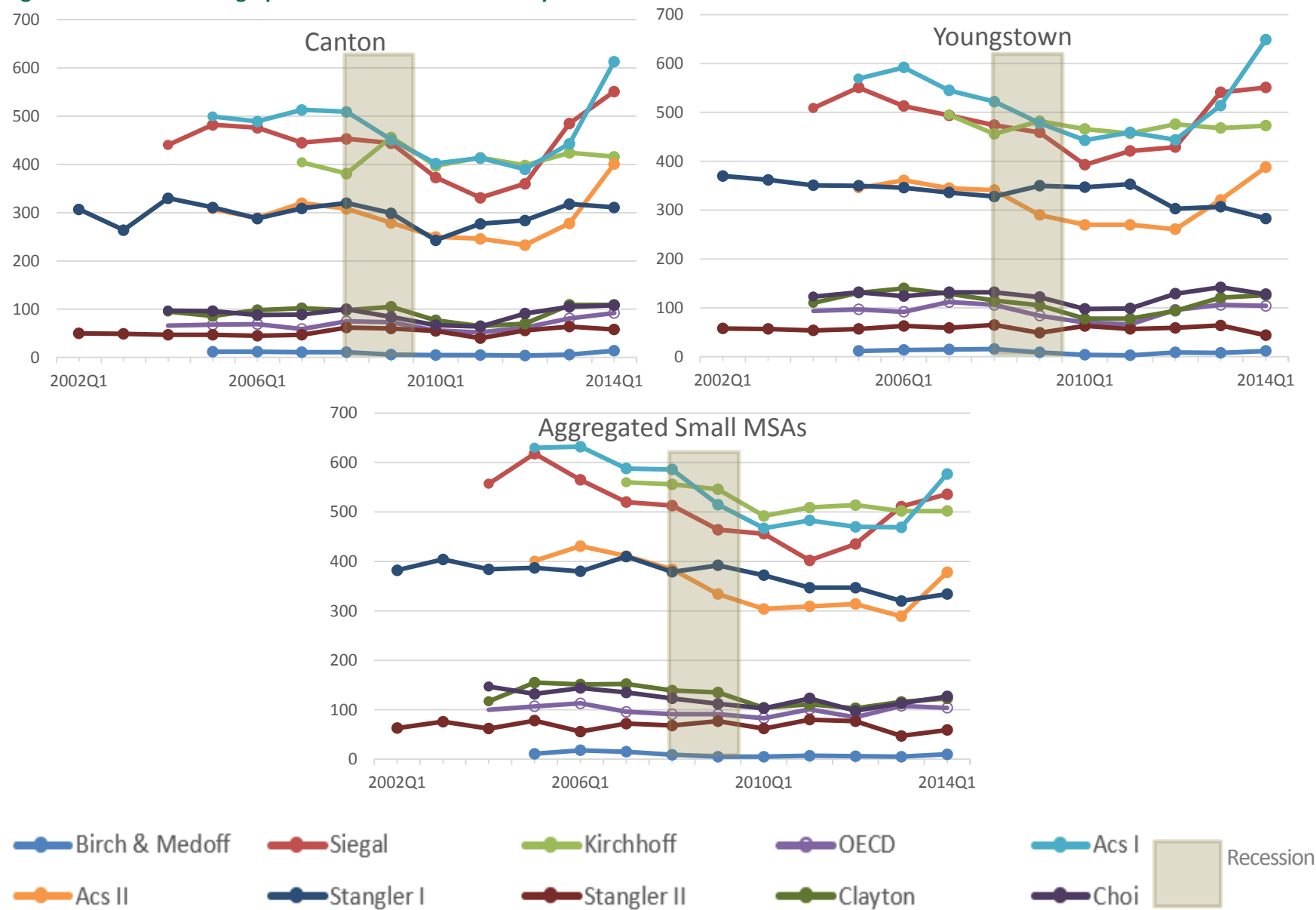


Figure 7. Small-Sized Geographic Areas: Number of HGFs by Area



## TOP THREE INDUSTRIES IN SHARES OF HGFs FOR EACH GEOGRAPHIC AREA

It is important not only to examine the number of HGFs by definition and by year, but to understand the industries that drive growth in the number of HGFs. The following section compares the top HGF industries by geographic region to the share of all firms within each region. Each definition is likely to show variations in the proportion of HGFs in any one industry in any given year, due to the varying growth qualifiers of the definitions. The shares of each industry were averaged across the ten definitions' shares for the years 2008 and 2014 in each geographic area. This average shows us the top industries across all ten definitions.<sup>17</sup> The 2008 and 2014 years were chosen to compare the pre-recession and recovery shares. The authors acknowledge averaging HGF definitions is not an ideal way to determine congruency amongst definitions, but this method allows us to compare different definitions across geographies and time periods.

Table 2 displays the three industries with the highest HGF shares by geographic region. Several consistent trends emerge. Overall, no matter the geographic region or the year (2008 or 2014), **the professional and business services (PBS) sector makes up the highest or second-highest share of HGFs.** Notable exceptions include Youngstown, the aggregate of Small MSAs, and the Aggregate of Non-MSA Counties in both years. Appendix C details the NAICS industry codes which fall under each category, as labeled throughout this report.

In general, the second-largest share of HGFs across geographic areas was in trade, transportation and utilities (TTU). The TTU sector is dominated by retail businesses, in comparison to the professional and business services industry, which includes law, accounting, consulting, engineering, architecture, and other service-oriented firms. This could be due to the low barrier costs and low costs of entry in these industries, which do not have high capital costs in industries like manufacturing. TTU dominates as the largest HGF industry in Youngstown, Small MSAs, and Non-MSA counties. Like PBS, its share of all HGFs in 2014 is typically lower than in 2008, indicating a shift in the industries where HGFs are most common in Ohio.

The third-largest industry share in 2008 for most geographic areas was in education and healthcare services (EHS) or construction. In 2014, the third-largest shares were mainly in EHS. Looking at the individual geographic areas shows this pattern of a rise in EHS shares, as well as in the leisure and hospitality (L&H) industry.

***Comparisons of HGF shares by MSA size shows that MSA size does not affect which industries are in the largest three share categories.*** PBS and TTU are the two industries with the largest HGF shares in the large MSAs of Cincinnati, Cleveland, and Columbus. HGFs in the mid-sized MSAs of Akron, Dayton, and Toledo also have the highest shares in these two industries. There is wide variation in the third-highest HGF share within the geographic regions in 2008, with EHS, construction, and manufacturing all making up large shares. In 2014, all MSAs have either the EHS or L&H industries as the third-highest share.

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<sup>17</sup> For more information on industry categories, see Appendix C.

**Table 3. Industries with the Highest HGF Shares by Geographic Area, 2008 & 2014**

Year		2008			2014		
	Rank	First	Second	Third	First	Second	Third
<b>Cincinnati</b>	<b>Industry</b>	PBS	TTU	Construction	PBS	TTU	EHS
	<b>Share</b>	25.8%	18.2%	12.4%	22.8%	19.4%	12.9%
<b>Cleveland</b>	<b>Industry</b>	PBS	TTU	Manufacturing	PBS	TTU	L&H
	<b>Share</b>	23.6%	19.6%	12.3%	23.8%	19.7%	11.9%
<b>Columbus</b>	<b>Industry</b>	PBS	TTU	EHS	PBS	TTU	EHS
	<b>Share</b>	28.3%	19.4%	11.7%	23.4%	17.6%	16.1%
<b>Akron</b>	<b>Industry</b>	TTU	PBS	EHS	PBS	TTU	EHS
	<b>Share</b>	23.5%	22.5%	11.9%	19.5%	18.5%	14.0%
<b>Dayton</b>	<b>Industry</b>	PBS	EHS	TTU	PBS	TTU	EHS
	<b>Share</b>	26.1%	14.3%	13.7%	24.9%	17.1%	13.9%
<b>Toledo</b>	<b>Industry</b>	PBS	TTU	Construction	PBS	TTU	EHS
	<b>Share</b>	21.2%	19.1%	12.8%	22.0%	18.8%	14.4%
<b>Canton</b>	<b>Industry</b>	PBS	EHS	TTU	PBS	TTU	L&H
	<b>Share</b>	19.2%	18.1%	16.2%	16.7%	16.3%	14.7%
<b>Youngstown</b>	<b>Industry</b>	TTU	EHS	PBS	TTU	Construction	PBS
	<b>Share</b>	19.1%	17.1%	15.0%	18.7%	18.0%	14.4%
<b>Aggregated Small MSAs</b>	<b>Industry</b>	TTU	EHS	Construction	TTU	PBS	Construction
	<b>Share</b>	20.5%	17.9%	14.6%	18.6%	16.1%	15.3%
<b>Aggregated Non-MSA Counties</b>	<b>Industry</b>	TTU	Manufacturing	Construction	Manufacturing	TTU	Construction
	<b>Share</b>	20.7%	18.7%	13.4%	21.0%	19.4%	13.0%

EHS = Education and Health Services  
 PBS = Professional and Business Services

L&H = Leisure and Hospitality  
 TTU = Trade, Transportation, and Utilities

Small MSAs, Non-MSAs, and the Youngstown MSA show different patterns in terms of the highest shares of HGFs, which may be influenced by their industry mix or geographic area. It is interesting to note that these three geographic areas did not have their highest share of HGFs in professional and business services like their larger MSA counterparts. In Youngstown, the top three shares of HGFs are in the TTU, construction, and PBS sectors in 2014. In Small MSAs (aggregations of the smaller MSAs in Ohio), the top three shares are TTU first, PBS second, and construction third. Non-MSA counties showed their highest numbers of HGFs in manufacturing, construction, and TTU. The Non-MSA HGF share is particularly noteworthy, since the top industries are very different than in MSAs. Manufacturing, for example, represents over 20% of Non-MSA counties' HGFs in 2014, while none of the MSAs, large or small, have a share of manufacturing HGFs above 13.1%.

These findings are consistent with the structure of regional economies. The larger regions specialize in industries such as PBS and TTU, serving the smaller regions or counties that surround them. Smaller regions are less economically diversified, and manufacturing plays a larger role for these economies in Ohio. It is not surprising that HGFs follow the same structure as the overall economy. This is reflected in the next section of the report, which compares the performance of HGFs by major industry to that industry's role in the overall economy.

## HGF Specialization Index

It is important to understand which industries produce significantly more HGFs than would be expected based on their regional share. Therefore, the *HGF Specialization Index* was created to determine the industries with a number of HGFs higher than the industry's share in the regional economy. The *HGF Specialization Index* is a modified location quotient – it produces a ratio of the share of HGFs in a certain industry, compared to the share of all firms in the region in the same industry. This analysis shows which industries are producing a higher number of HGFs based on regional industry mix.<sup>18</sup> An *HGF Specialization Index* quotient above 1.2 in a certain industry indicates a concentration of HGFs in that sector of the regional economy.<sup>19</sup>

The *HGF Specialization Index* represented in Figure 8 displays industries where HGFs have a specialization within their geographic area. The geographic areas were split into sub-groups based on size in order to compare geographic regions. The large-sized MSAs include Cincinnati, Cleveland, and Columbus, while the medium-sized MSAs include Akron, Dayton, and Toledo. The small-sized MSAs include Canton and Youngstown. The other two categories were kept separate since they are based on a combination of very small MSAs or non-MSA counties.

A major finding from analysis of the *Specialization Index* is that manufacturing has a significant specialization for all of the geographic areas in the state of Ohio. **This indicates that Ohio has a larger share of HGFs in manufacturing compared to the number of all manufacturing companies.** A second finding is that specializations changed over time. The professional and business services HGFs were specialized in four geographic areas in 2008, but were only specialized in one in 2014. Education and health services HGFs were specialized in five geographic areas in 2008, compared to only in two areas in 2014. Conversely, there were specializations of leisure and hospitality HGFs in zero areas in 2008, while there were specializations in six areas in 2014, most likely due to economic growth. Construction HGFs, likewise, were specialized in one area in 2008, and in four areas in 2014. The construction phenomenon may be a reflection of the American Recovery and Reinvestment Act (ARRA) investment in construction projects, but there is no way of capturing this data for this study. These trends reveal that, while manufacturing has remained significant across Ohio's geographic areas over time, there has been a shift from PBS and EHS HGF specializations into construction and L&H specializations post-recession.

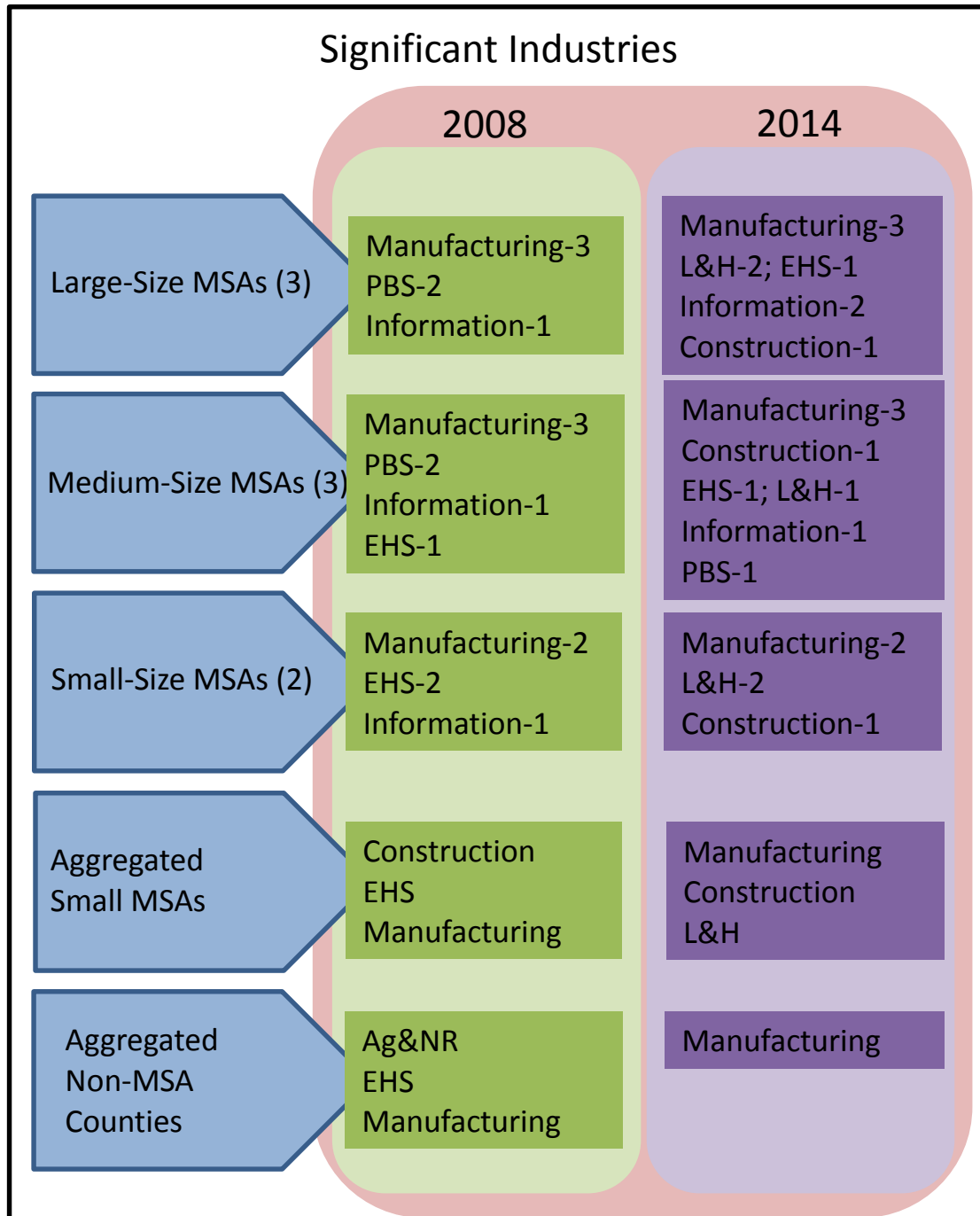
When comparing geographic areas by size, some differences emerge. Professional and business services and information HGFs are concentrated in the larger geographies, while HGFs in the agriculture and natural resources (Ag&NR) are concentrated only in the Non-MSA county category. Manufacturing HGFs have high concentration in all MSAs, indicating that the industry is producing more HGFs than expected, no matter the region in the state. These findings may be useful in determining industries with HGF growth potential in each region.

<sup>18</sup> Location Quotient measures the specialization of an industry in a region by comparing it to data in a larger region. For our analysis:

$$\frac{([\text{The number of HGFs in X industry in Z region}] / [\text{The number of total HGFs in Z region}])}{([\text{The number of all companies in X industry in Z region}] / [\text{The number of total companies in Z region}])}$$

<sup>19</sup> A location quotient > 1.2 indicates specialization in an industry.

Figure 8. HGF Specialization Index (Control for Definitional Difference), Greater than 1.2



Note: the number next to the industry abbreviation indicated the number of geographic areas in which this was a significant industry. For example: PBS = 2 in Large-Size MSAs, indicating that Professional and Business Services was a significant industry in all two Large-Size MSAs.

Ag&NR = Agriculture & Natural Resources      EHS = Education and Health Services  
 L&H = Leisure and Hospitality                      PBS = Professional and Business Services  
 TTU = Trade, Transportation, and Utilities

## EXPLORATION OF DEFINITION SELECTION FOR POLICY MAKERS

### Methodology

It would be unreasonable to expect local policy makers to track HGFs within their regions using all of the definitions laid out in this report, let alone to compute average of the 10 as we have done here.

We employed a three-step methodology to select different definitions for individual analyses. First, we removed any definition that was published earlier than 2000 (Birch & Medoff, Siegel, and Kirchhoff) since these older definitions were limited by data constraints. Second, we considered whether the definitions resulted in high, medium, or low unique counts of HGFs. For example, the cohort based on the definition of Acs I resulted in total unique HGF counts across geographic areas of above 15,000, thus falling into the ‘high’ category. HGF unique counts according to the Stangler I and Acs II definitions fell between 9,000 and 12,000, thus falling into a ‘medium’ count category. The HGF unique counts based on the Clayton, Choi, Stangler II, and OECD definitions fell below 4,000, thus grouping into the ‘low’ counts. The reasoning behind implementing this criterion is that some public policy makers may be inclined to use a definition that will have a larger number of HGFs, even if the measure is not the most appropriate. Third, we also considered whether the definitions’ growth criteria were sales-based, employment-based, or sales-based with an employment qualifier, desiring to have one of each represented.

Based on meeting two of the three criteria described above, we selected three definitions. We chose Acs I because it represented the only post-2000 definition with a high unique HGF count and because its growth criteria is based on sales. We chose Stangler I to represent medium counts and the use of growth criteria based on employment. We chose Choi because it has a low count of unique HGFs and its growth criteria is based on both sales and employment. Table 3 shows the selection criteria for each of the post-2000 HGF definitions.

**Table 4. Selection of “Three Definitions” Criteria**

Definition	Unique HGF Count	Growth Qualifier	Definition Selected
Acs I	High	Sales	√
Acs II	Medium	Employment & Sales	
Stangler I	Medium	Employment	√
OECD	Low	Employment	
Stangler II	Low	Employment	
Clayton	Low	Employment	
Choi	Low	Employment & Sales	√

### Three Definition Analysis

Having chosen three definitions for in-depth analysis, we applied the HGF Specialization Index methodology to the HGF counts generated by the Acs I, Choi, and Stangler I definitions for both 2008 and 2014. This analysis allows us to determine for each of the three definitions the industry concentration of HGF counts, whether definitions’ counts show differences across geographic area sizes, whether there are changes over time, and how the three definitions’ concentrations compare to each other.

The main finding of this analysis is that HGFs selected through Acs I definition are concentrated in few industries, and the industries are different from the other two definitions. The Stangler I and Choi counts show HGF concentrations in similar industries to each other, and show similar industry concentrations in both 2008 and 2014. The findings of this index are reported in Figure 9.

Comparison of HGF count concentrations across the three definitions reveals a few observations of note. The Acs I counts, for example, shift away from the concentrations in Ag&NR, PBS, and manufacturing in 2008, to mainly construction in 2014. This shift is consistent with our understanding of the economy and considering which industries HGFs would be expected to have double sales growth during the mid-2000s versus during the economic recovery. A second observation is that Acs I counts demonstrate fewer concentrations overall than the other two definitions' counts. A third observation is that Stangler I and Choi show concentrations in similar industries, although Ag&NR concentrations are more prevalent in Stangler I's counts than in Choi.



Figure 9. Significant Industries – Select Definitions

	2008			2014		
	Acs I	Stangler	Choi	Acs I	Stangler	Choi
<b>Large-Size MSAs (3)</b>	PBS-3 Information-1	Manufacturing-3 EHS-3 L&H-3 Information-1	Manufacturing-3 L&H-2 EHS-1 Information-1	Construction-3 PBS-1	Manufacturing-3 L&H-3 EHS-3 Information-3	L&H-3 Manufacturing-3 EHS-2 Information-1
<b>Medium-Size MSAs (3)</b>	PBS-3 Construction-2 Manufacturing-1	Manufacturing-3 Information-3 EHS-3 L&H-2	L&H-3 EHS-2 Construction-2 Manufacturing-2 PBS-1	Construction-2 Manufacturing-2	Manufacturing-3 EHS-3 L&H-3	Manufacturing-3 L&H-3 Construction-1 PBS-1 EHS-1
<b>Small-Size MSAs (2)</b>	Ag&NR-2 Manufacturing-2 PBS-1	Manufacturing-2 Information-2 EHS-1 L&H-1	Manufacturing-2 EHS-2 L&H-1 Construction-1	Construction-2 PBS-1	Manufacturing-2 EHS-2 L&H-2 Ag&NR-1	Manufacturing-2 L&H-2 EHS-1
<b>Aggregated Small MSAs</b>	Ag&NR PBS Manufacturing	Ag&NR Manufacturing EHS	Manufacturing Construction EHS	Construction	Manufacturing L&H Ag&NR	Construction L&H Manufacturing
<b>Aggregated Non-MSA Counties</b>	Ag&NR Manufacturing Construction	Ag&NR Manufacturing EHS L&H	Manufacturing L&H Information EHS	Construction Manufacturing	Manufacturing EHS Ag&NR L&H	Manufacturing L&H Ag&NR

Note: the number next to the industry abbreviation indicated the number of geographic areas in which this was a significant industry. For example: PBS = 3 in Large-Size MSAs, indicating that Professional and Business Services was a significant industry in all three Large-Size MSAs.

Ag&NR = Agriculture & Natural Resources    EHS = Education and Health Services    PBS = Professional and Business Services

TU = Trade, Transportation, and Utilities    L&H = Leisure and Hospitality

## CONCLUSIONS

The goal of this research is to better understand Ohio's metropolitan HGF environment and in order to achieve this, we looked to answer the performance of HGFs in relation to the business cycle, performance of HGFs across metropolitan areas, and analyze HGF industries. This section of the report operationalized the ten HGF definitions, as defined in Table 1 (p. 6), and analyzed them to determine whether there were differences in HGF counts during the business cycle, whether different HGF definitions produced similar counts of HGFs, whether HGF industry makeup is different depending upon geographic size, and whether HGF concentrations are different across geography and over time.

Examining HGF data reveals that at the metropolitan level HGF firm counts were reflective of the definition selected. Overall, there were two distinct groupings of HGF counts. The definitional cohorts of Acs I, Acs II, Kirchhoff, Siegel, and Stangler I resulted in a larger number of HGF firm count than the grouping of definitions which includes Choi, Clayton, OECD, Stangler II, and Birch & Medoff.

Beyond this, MSA size may not influence the performance of HGFs. However, the business cycle is an important factor, marking an influential change in the number of HGF counts during the recession of 2007-2009. ***Overall, we conclude that the business cycle is a more influential factor on HGF counts measured over time than MSA size.*** The Cleveland MSA emerges with the most HGFs in Ohio, more than the Columbus MSA and the Cincinnati MSA. However, it is important to note that not all economic activity may be captured from the Cincinnati MSA since our data is solely limited to counties within Ohio.<sup>20</sup>

In regards to the industry makeup of HGFs, most MSA geographies<sup>21</sup> show large shares of HGFs in professional and business services; trade, transportation, and utilities; and in education and health services for 2008 and 2014, when using the average of the 10 definitions. However, when examining three definitions by industry (Acs I, Stangler I, and Choi) We found that each definition's HGF counts concentrate in different industries, and at different levels of concentration. The definitional cohort of Acs I shows concentrations in few industries, while Stangler I and Choi show concentrations in many industries.

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<sup>20</sup> The QCEW microdata the Center maintains is only for the state of Ohio. Some MSAs cross state boundaries (i.e. Cincinnati and Youngstown), and the economic activity in other states was not able to be captured due to data limitations.

<sup>21</sup> MSA geographies include: the Akron MSA, the Canton-Massillon MSA, the Cincinnati MSA (Ohio counties only), the Cleveland-Elyria MSA, the Columbus MSA, the Dayton MSA, the Toledo MSA Youngstown-Warren-Boardman MSA (Ohio counties only), aggregated Small MSAs (Huntington-Ashland, Lima, Mansfield, Springfield, Weirton-Steubenville, Wheeling), and aggregated non non-MSA counties.

## PHASE III: SURVEY OF HIGH-GROWTH FIRMS

In order to gain further answers about high-growth firms not revealed in secondary data, the research team deployed an online survey to identify personal experiences from HGFs. Beyond this, the survey was targeted to inquire as to the connectivity of entrepreneur to the entrepreneurial ecosystem, and how HGFs connect to the ecosystem.

### METHODOLOGY

The Survey of High-Growth Firms questionnaire was designed by the Center to identify how and why HGFs achieve their success, their connectivity to the entrepreneurial ecosystems, and other salient details. Questions regarding motivations, financing, strategic decision-making, and ecosystem connectivity were incorporated to establish the typology of HGFs. The Survey of High-Growth Firms questionnaire was created and developed by the Center with advisement from Ray Leach, Founder and CEO of JumpStart Inc., and Deborah D. Hoover, President and CEO of the Burton D. Morgan Foundation. For a copy of the questionnaire, see Appendix D.

From all of the cohorts summed across time, there were 10,444 HGFs in Phase II; this served as our sampling frame for the survey. We selected a random sample of these firms for participation in the survey, totaling 1,089 (overestimating the sample needed by three times to get a required number for the analysis). The response targeted for this study was 363 in order to achieve a 95% confidence interval. The research team found contact information for each business via LexisNexus, websites, and other internet sources. From this search, the team was only able to find 728 (69% of total sample) email addresses for the random sample of HGFs.

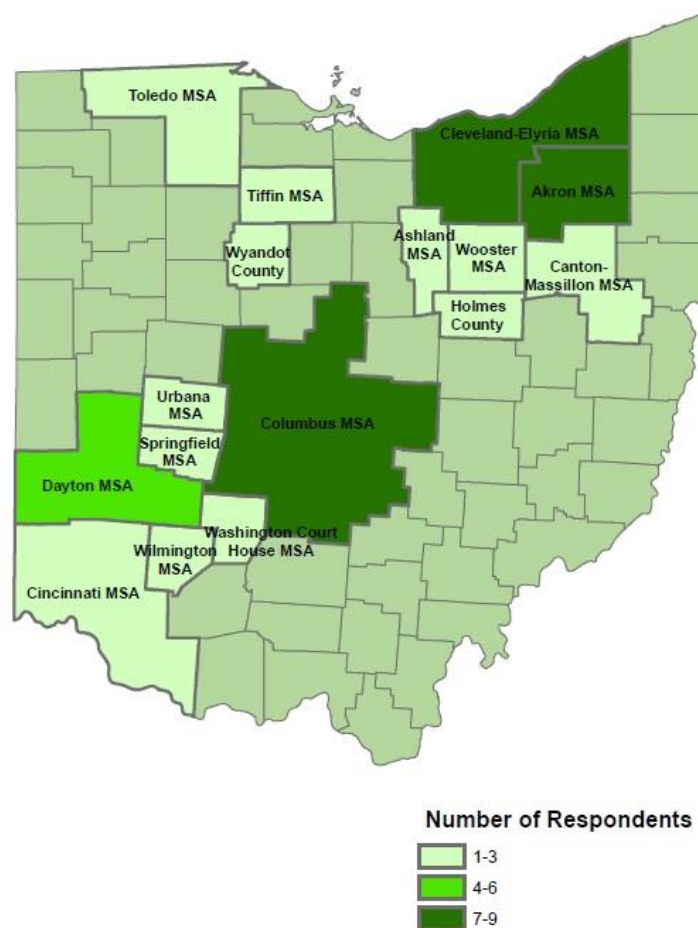
The survey was an Internet-based survey, deployed through the survey software *Qualtrics*. The survey was conducted over a four-week period starting January 12, 2016. Contacts were emailed on consecutive Tuesdays. In order to facilitate greater response rates, the Center contacted potential respondents via phone to verify email information and encourage participation.

In all, there were 42 respondents who completed the survey (6% response rate). This low response rate does not meet the 95% confidence interval needed to extrapolate findings from the sample to the population. Therefore, we will not consider responses from this survey a statistically significant sample, nor representative of the entire cohort in Phase II. While the sample size limits the conclusions of the survey, the results provide us with valuable information about those firms that participated in the survey.

## ABOUT HGF RESPONDENTS

The Survey of High Growth Firms (HGFs) was targeted towards owners or managers who operate high growth firms in metropolitan Ohio. There were 42 respondents who completed the survey from a variety of locations throughout the metropolitan areas of Ohio. Figure 10 is a thematic map of the state displaying the respondent count shaded by MSA.<sup>22</sup> The largest number of respondents was from *Cleveland-Elyria, OH MSA*. The largest grouping of respondents (52%) reported occupations in *CEO and President*. *COO and CFO* were the second-largest occupation (14%) that responded to the survey. The demographics of respondents mostly skewed toward *Ohio-born, Caucasian, males*. In response to a question about respondents' ethnicity or race, 95% self-identified as *white or Caucasian* and 5% identified as *black or African American*. All respondents were born in the *United States*, with over 70% of respondents were born in *Ohio*.

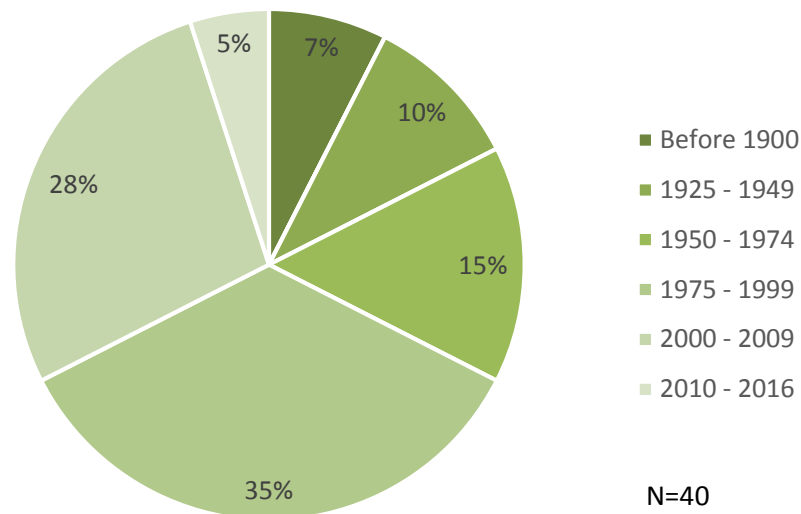
**Figure 10. Respondents by Geographic Location**



<sup>22</sup> Respondent count shading was used in order to ensure the confidentiality of respondents

Respondents represented firms of a wide *firm age range*, as displayed in Figure 11. Of the participants who identified the year established of their firm, 5% have been founded since 2010. Twenty-eight (28%) were founded between 2000 and 2009; 35% were founded between 1975 and 1999. Fifteen percent (15%) of firms were established between 1950 and 1974. There were a few even older firms surveyed, including 10% from the 1925 to 1949 period and 7% from before 1900. Moreover, respondents represented HGFs from a range of employment sizes. Few firms had *below 20 employees* (7%). A majority of respondents (56%) were from firms with *20 to 99 employees*. Those respondents from firms with more than 100 employees represented 37% of the respondents.

**Figure 11. Year of Firm Establishment**



## HGF FOUNDERS

One of the major delineations the survey made was to ascertain if the respondent was a founder of the firm. If an individual was a founder of the firm we asked a series of questions regarding how the firm started, financing in the beginning years, and initial employment. Over forty percent of respondents identified themselves as founders (n=17). The survey revealed that these firms mostly started off small: a majority of respondents (59%) started their firm with *1 to 4 employees*. Over 20% of respondents had *6 to 9 employees*. However, sixty percent the respondents, no matter their identity of being a founder, worked at a firm with less than 100 employees.

There is much discussion in the entrepreneurship literature as to why entrepreneurs start ventures. Some suggest that it related to the entrepreneur's motivation and drive and this is what makes them different from the average business.<sup>23</sup> However, to understand why founders started their business they were asked to identify the three primary reasons for starting their firm (Table 4). The primary reasons selected most frequently were "*take advantage of opportunity*" with four selections, "*high demand for products/business*" and "*new technology/product/service*" with three selections, and "*expansion of old/current business*" with two selections.

<sup>23</sup> For more literature on entrepreneurial motivation entrepreneurial traits see Aldrich & Zimmer, 1986; Brockhaus and Horwitz, 1986; Hurst and Pugsley, 2011; McClelland, 1961; Parker, 2009; Sexton & Bowman, 1985; Shane, Klovereid, & Westhead, 1991 – to name a few.

Table 5. Primary Reasons for Starting Firm

Reason	Primary Reason	Secondary Reason	Tertiary Reason	Total Selections
Take advantage of opportunity	4	2	0	6
High demand for products/business	3	1	3	7
New technology/product/service	3	1	1	5
Expansion of old/current business	2	1	1	4
Building on experience/training/education in field	1	5	1	7
Generate income	1	2	5	8
Build wealth	1	2	2	5
Be own boss	1	0	0	1
Try new career	1	0	0	1
Tackle a challenge	0	1	0	1
Social benefit	0	1	0	1
Other	0	0	2	2
<b>Total</b>	<b>17</b>	<b>16</b>	<b>15</b>	<b>48</b>

Founders responded to additional questions regarding the growth of their firms. Figure 12 illustrates initial financing used to start the company. Founders were asked, “How did you finance your company when you launched it (opening through first two years)?” The highest proportions of responses were *home equity* (48%).

Figure 12. Method of Financing Venture, through first 2 years

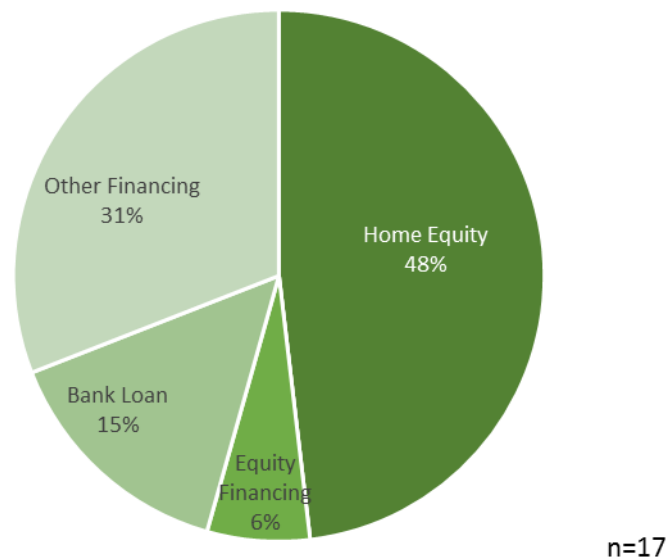
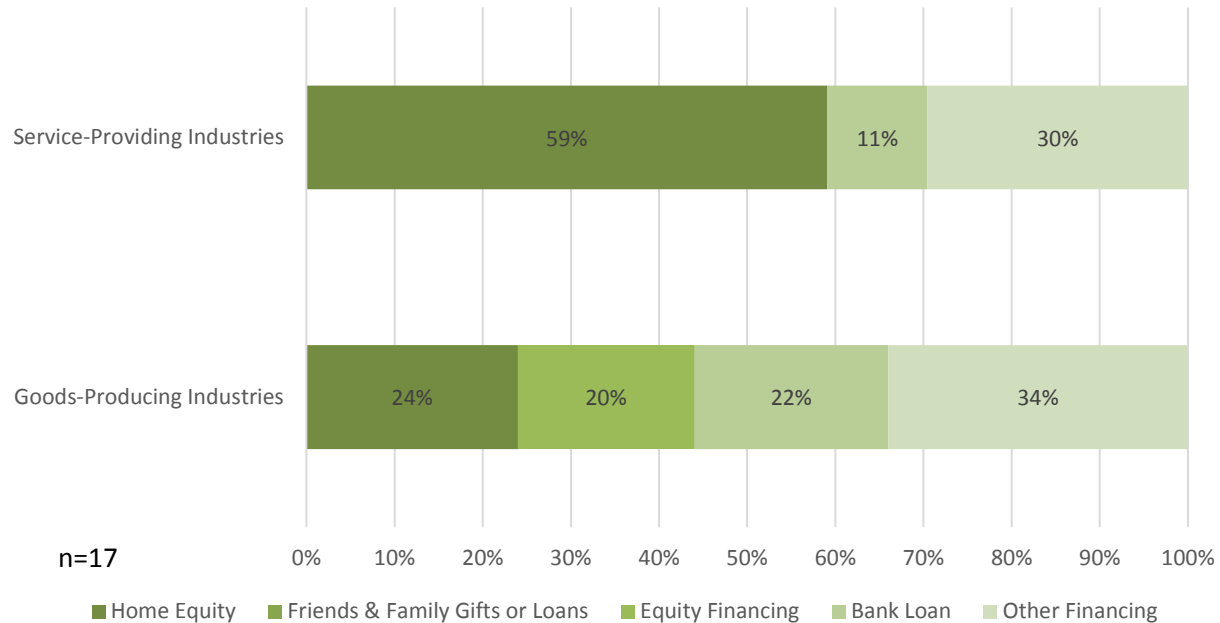


Figure 13, breaks out responses to the follow-up question by super sector. It is interesting to note that how respondents' choices were different by industry. Service-providing industries mostly relied on *home equity* (59%) than other type of financing.<sup>24</sup> However, responses of goods-producing industries fairly equally split amongst home equity (24%), equity financing (20%), bank loan (22%), and other financing (34%).

**Figure 13. Financing Type for Launching through first two years, Super Sector**

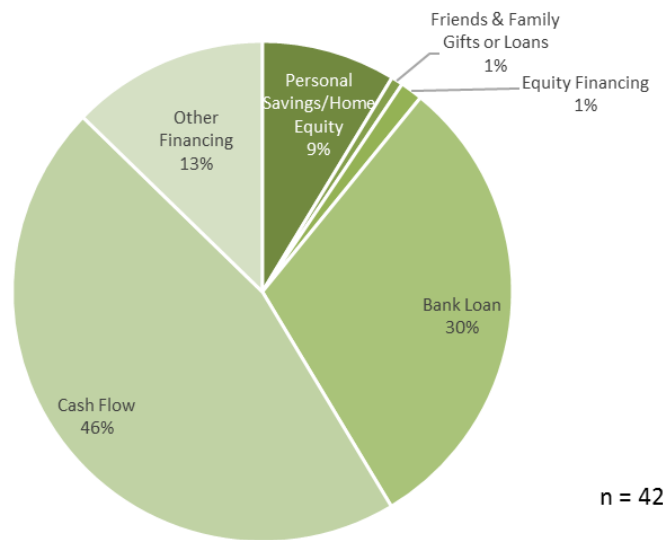


## ALL HGFs

All respondents were asked “How did you finance your company during its greatest years of growth?” in order to discover if HGFs financed their companies in specific way that lead to their success. As seen in Figure 14 the highest proportions of financing used in firm growth included *cash flow* (46%) and *bank loan* (30%) across all respondents.

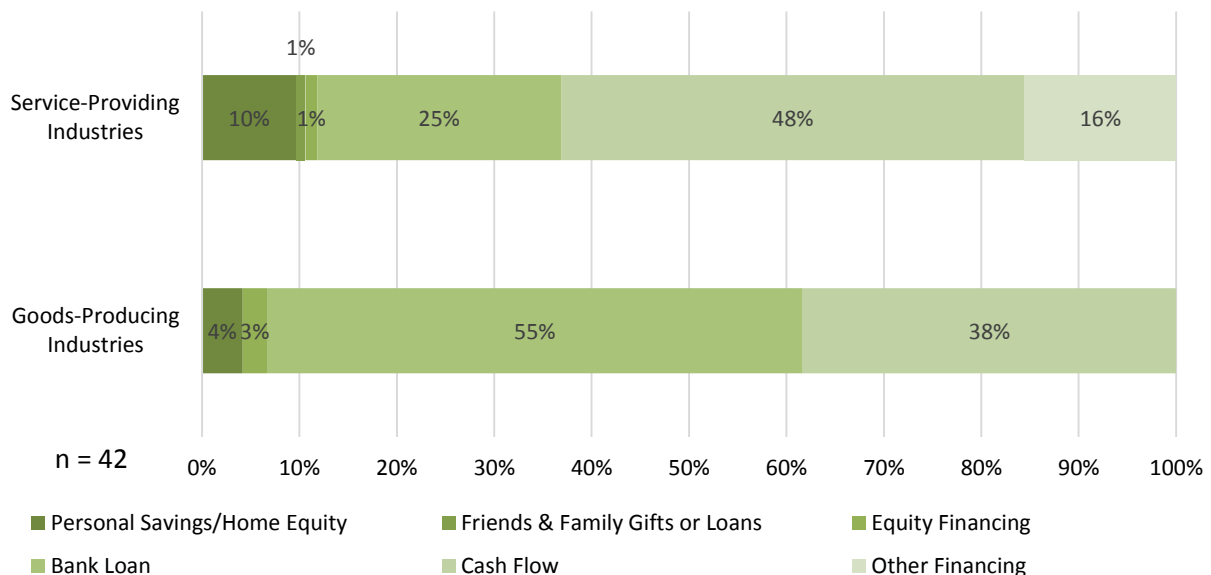
<sup>24</sup> Industries are identified by their North American Industry Classification System (NAICS) code. Goods producing includes Natural Resources and Mining (NAICS 11 & 21), Construction (NAICS 23), and Manufacturing (NAICS 31-33). Service providing industries include Trade, Transportation, and Utilities (NAICS 42, 44-45, 48-49, 22), Information (NAICS 51-53), Professional and Business Services (NAICS 54-56) Education and Health Services (NAICS 61 & 62), Leisure and Hospitality (NAICS 71 & 72) and Other Services (except Public Administration) (NAICS 81). For more information, see U.S. Bureau of Labor Statists [http://www.bls.gov/iag/tgs/iag\\_index\\_naics.htm](http://www.bls.gov/iag/tgs/iag_index_naics.htm)

Figure 14. Financing Type during Years of Growth



It is interesting to note that respondents' choices to how they financed their firm as different by industry (Figure 15). Firms that identified as goods-producing industries relied more on bank loans (30%) than those firms identified as service-providing industries. Service-providing industries used *cash flow* (48%) more than *bank loan* (25%) and goods-producing industries used *bank loan* (55%) more than *cash flow* (38%).

Figure 15. Financing Type during Years of Growth, Super Sector



Respondents were asked about the original products and services offered by their firm. Over 65% of respondents indicated the products and services offered by the firm changed since the company started. The primary factors in changing their portfolio of products included *better business models*, *adjusting to client base*, *growth opportunities*, *benefits from expanding scope of business*, and *customer demand*.

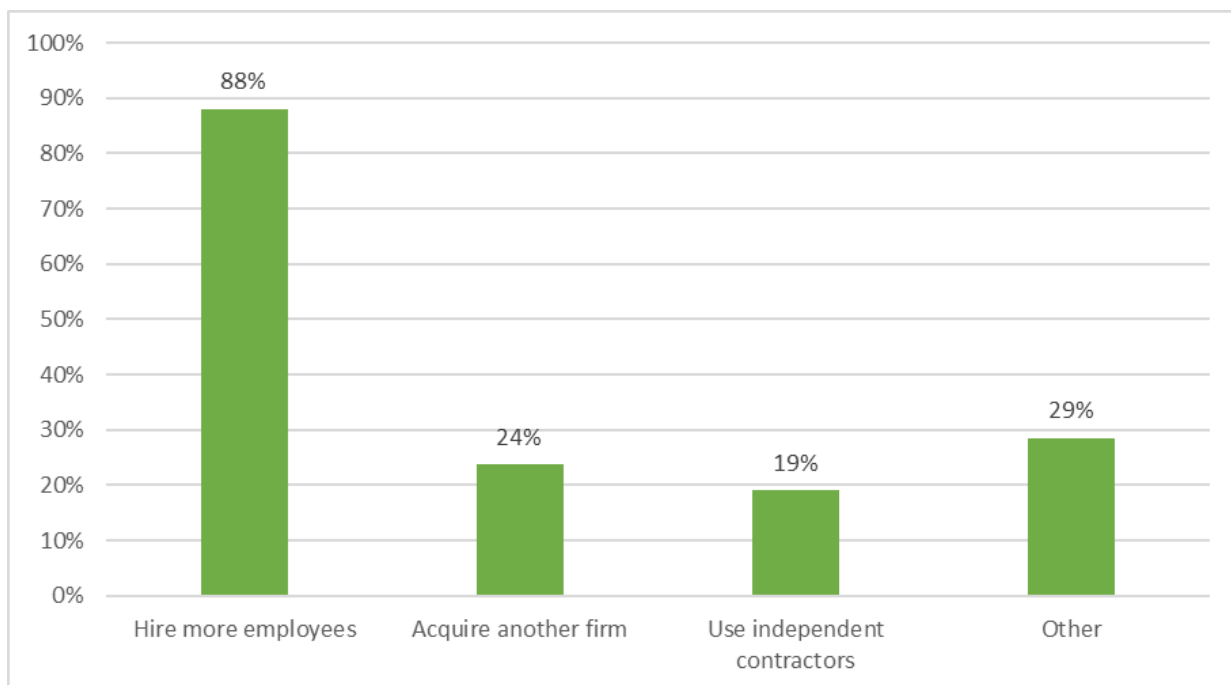


### Factors that Influence Growth

The next series of questions challenged respondents to define *what growth meant to their firm*, and the *primary factors influencing their growth*.

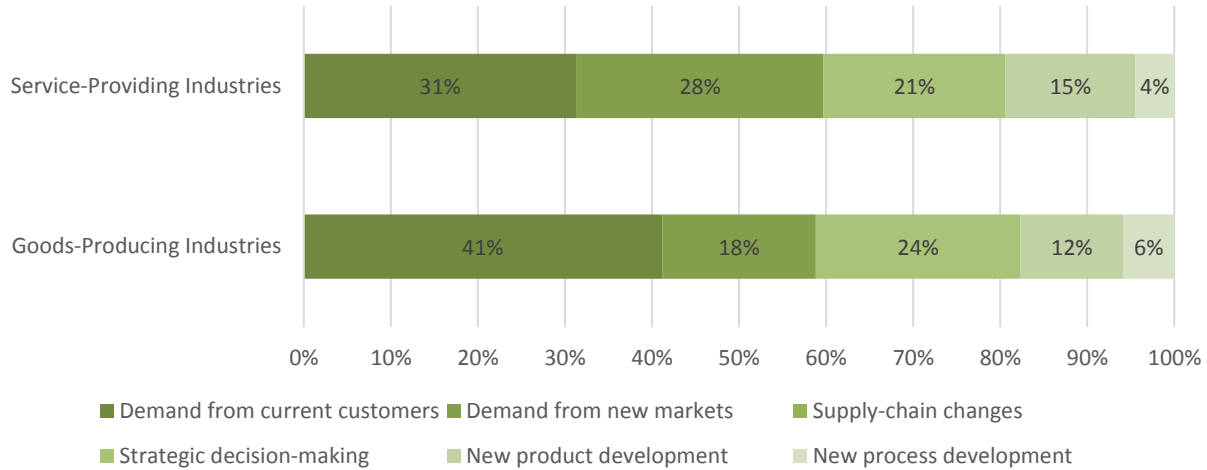
When asked, “*What means did you use to grow your firm?*” A vast majority of respondents identified (88%) meaning of growth as ‘*hire more employees*’ (Figure 16). Respondents had the options of selecting multiple responses, and half of the respondents who selected ‘*hire more employees*’ as a meaning of growth also selected ‘*acquire another firm*’ or ‘*use independent contractors*’. Only two of the respondents selected both of *acquired another firm* and *use independent contractors* with *hire more employees*. No matter the sector of the firm, *hiring more employees* was indicated as a method of growth by in goods-producing industries (67%) more than in service-providing industries (53%).

**Figure 16. Mechanisms of How Firms Grow**



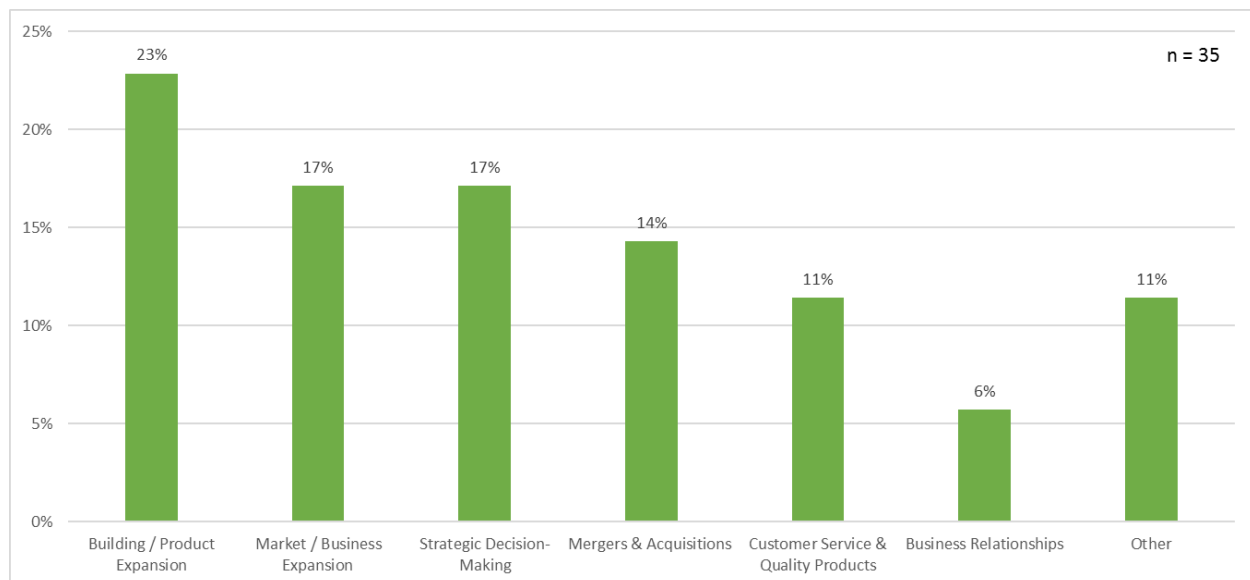
Respondents were asked, “*What means did you use to grow your firm?*” when respondents selected the meaning of growth, they were asked with this question. “*What was the primary force that lead you to the growth?*” Figure 17 displays the reason the HGF obtained its growth by super sector. In *service-providing industries*, the most frequent response is *demand from current customers* (34%) and second is *demand from new markets* (28%). Demand from current customers (41%) was selected as a primary force for growth in goods-producing industries, second is *strategic decision-making* (18%).

Figure 17. Mechanisms of How Firms Grow, Super Sector



Researchers wanted to identify the sole reason for these HGFs success without prompting. Respondents were asked, *“Looking back, was there a pivotal decision you feel was essential to your business growth?”* Responses were collected and then aggregated based upon common themes written in by respondents. Figure 18 displays that responses were fairly equally split amongst *building/product expansion* (23%), *market/business expansion* (17%), *strategic decision-making* (17%), *mergers & acquisitions* (14%), *customer service & quality products* (11%), and *others* (11%). A majority of these responses indicate that strategic decision making was a key component to firm growth. Moreover, identifying a business need and gap in the market allowed them to succeed – which makes them innovative firms.

Figure 18. Pivotal Decision for Business Growth



Beyond this, respondents were asked, “What were the top 3 reasons for your success?” Responses were collected and then aggregated based upon common themes written in by respondents. Overall, Figure 19 displays the most frequently selected reason was *hard work and attitude* (17%) – which is an indication that these respondents mirror what the traditional academic literature says about entrepreneurs. Beyond this, respondents said that talent attraction or *good employees* (17%) were pivotal for their success. Lastly, the research found that HGFs saw *vision, strategy and management* (14%) as a major factor in their success – reinforcing the importance of strategic management for entrepreneurs.<sup>25</sup>

Figure 19. Top 3 Reasons for Success



### Connections of High Growth Firms to the Entrepreneurship Ecosystem

Lastly, we asked HGFs about their connectivity to the entrepreneurial ecosystem in Ohio. These questions were intended to gauge the types of assistance provided by the entrepreneurial ecosystem in economic development, workforce development and connectivity to other entrepreneurs. Overall, only 12% of respondents answered “yes” to “Have you or your company contacted an entrepreneurship or business support organization? If a respondent answered yes to this question, then they were asked follow-on questions regarding these connections.

In addition, respondents were asked, “Through what activities, if any, do you connect with other business owners or entrepreneurs?” The largest category was *networking events* (62%), and the second most selected category was *social media* (43%). Examining this by industry, half of respondents in goods-producing industries connect with networking events (50%). Responses in service-providing industries relatively split among *networking events* (27%), *social media* (22%), *award events* (15%), and *mentoring* (14%).

<sup>25</sup> Strategic entrepreneurship is a vibrant topic in the management discipline which combines the concepts of strategic management and entrepreneurship. For more information, see Hitt, Ireland, Camp, & Sexton, 2001; Hitt, Ireland, Camp, & Sexton, 2002; Ireland, Hitt, Camp, & Sexton, 2001; Ireland, Hitt, & Sirmon, 2003, to name a few.

## SURVEY CONCLUSIONS

Although the low-response rate of this survey does not allow us to extrapolate these results to metropolitan Ohio, there are still valuable findings we can glean from it. Respondents demonstrated that taking advantage of an opportunity or consumers' high demand for a products/service was a primary reason for entrepreneurs to start their firms.

How firms financed their businesses varied by industry and phases of business; service-providing firms mainly relied on one type of financing which is home equity as a means of financing in launching the business through the first two years, while goods-producing industries used various means of financing such as home equity, friends & family gifts or loans, equity financing, bank loan and other financing. During the company's years of growth, service-providing industries mainly used cash flow, while goods-producing industries relied on bank loans. This is a reflection of the low-cost and low-barriers to entry in service-providing industries as opposed to manufacturing industries.

As a means of firm growth, a majority of respondents identified hiring more employees as a mechanism of expansion, as opposed to mergers and acquisitions. Respondents indicated that both hard-work/attitude and good employees were pivotal components of their success. This reinforces the academic literature that suggests that entrepreneurial traits such as the need for achievement, the need for control, and entrepreneurial values drive individuals to create firms. An interesting finding was that a majority of respondents indicated that they have no connection or ties to the entrepreneurial ecosystem.

## PHASE IV: POLICY TAKEAWAYS

✓ **Definitions Matter!**

- This research shows that how a high-growth firm is defined can determine the number of HGFs identified. How the definition is constructed, especially if an employment or sales qualifier is used, can impact the number of firms labeled as high-growth.
- The lack of a commonly accepted definition causes complex problems when working in the HGF space.
- HGF definitional consensus should align with efforts in the policy arena. Outcomes of public policy can vary dramatically depending on the criteria used to define and enumerate HGFs.

✓ **High-growth firm counts correspond with the movements of the business cycle.**

- This research shows that HGF counts, no matter the definition, perform primarily in accordance with the business cycle and the business cycle is a more influential factor on HGF counts over time than MSA size.
- Policy makers should look to enhance policies that will buffer recessionary effects toward HGFs in order to foster these firms.

✓ **Public policy should target a variety of industries to foster HGF development.**

- HGFs exist in a variety of industries, not just technology-based growth industries. This confirms findings from Clayton, et al. (2013) who found that HGFs as a percentage of all firms are scattered across all industries.
- Case studies have shown that public policy which focuses on entrepreneurship and innovation can change the trajectory of the economy (Audretsch, 2016; Link, 1995). However, this study examining HGF in Ohio shows that many of HGFs are not in the typical high-tech economy (i.e. medical devices, computer programming, etc.), instead there is a large presence in the professional and business services.
- Public policy widely supports technology and financing policy (Mason & Brown, 2013; Shane, 2009), but this study shows that broader support for HGFs in different sectors may be needed.

✓ **Connectivity of entrepreneurs to the regional entrepreneurial ecosystem is an important area for future study.**

- Recognizing low survey participation, it was still surprising to find that very few HGF survey respondents stated that they are connected to the entrepreneurial ecosystem.
- The literature points to the benefits of connecting entrepreneurs to the entrepreneurial ecosystem and cultivating the public policy ecosystem to fit the region (Feld, 2012; Isenberg, 2011).

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## ABOUT THE RESEARCH TEAM

### **Merissa C. Piazza**

Merissa is a Program Manager at the Center for Economic Development at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University. She was the co-principal investigator for this project and developed the overall framework and methodologies for research components of the project. Merissa managed the team of researchers and participated in each phase of the project. Merissa is an economist with 12 years of experience conducting applied economic research and analyzing regional and urban economic development. Her research portfolio includes projects on entrepreneurship, economic development, industry analyses, and regional metrics to benchmark performance. In addition to working full-time for the Center, Ms. Piazza is a doctoral candidate in Urban Studies and Public Affairs with a focus on entrepreneurship, high-growth firms, and public policy.

### **Ziona Austrian, Ph.D.**

Dr. Austrian is the former Director for the Center for Economic Development and co-principal investigator for this project. She retired from the Center in January 2016. She helped develop the overall framework and methodologies for research components of the project and was critical in operationalizing HGF definitions.

### **Iryna V. Lendel, Ph.D.**

Dr. Lendel is a Research Associate Professor of Economic Development and Interim Director of the Center for Economic Development. She provided guidance as a co-Principal Investigator after the retirement of Dr. Austrian.

### **Serena Alexander**

Serena is a graduate research assistant in the Center. She contributed to the literature review by collecting, reading, and synthesizing articles on high-growth firms. Serena is currently a Ph.D. candidate in Urban Studies at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University. Her dissertation focuses on the evaluation of state and regional climate action plans.

### **Ellen Cyran**

Ellen is the Center's senior programmer and analyst; she has extensive experience in analysis of demographic and economic data as well as strong programming skills. Ms. Cyran manages the Quarterly Census of Employment and Wages database, which played a significant role in the completion of this project. Ms. Cyran participated in quantitative analysis of operationalizing HGF definitions.

### **Deborah D. Hoover**

Deborah is the President & CEO of the Burton D. Morgan Foundation, which has a mission of championing the entrepreneurial spirit. In 2015, the foundation gifted over \$3.5 million dollars in grants to enhance entrepreneurship education at the youth, collegiate, and adult level; as well as an additional \$1.7 million in community grantmaking efforts. Deborah played a pivotal role in this research as an advisory council member. She assisted the research team in constructing and designing the Survey of High-Growth Firms, as well as formulating the policy recommendations.

**Kenneth Kalynchuk**

Kenneth is a graduate research assistant in the Center. He contributed to operationalizing the HGF definitions and the Survey of High-Growth Firms. He is currently a second-year Master of Urban Planning Design and Development candidate at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University. He also holds a Bachelor of Science degree in Urban and Regional Studies from Cornell University.

**Ray Leach**

Ray Leach is CEO of JumpStart Inc. an Ohio-based non-profit venture development organization. Ray's role as leader of JumpStart and his passion for building organizations, funds and programs that assist very-early stage entrepreneurs in Ohio and across the world, has given him the opportunity to advise multiple agencies in the U.S. government, and over 100 different cities, regions, states, and countries as well as to corporate, community, and family philanthropic organizations across the U.S who have a special interest in JumpStart's venture development business model. Ray played a pivotal role in this research as an advisory council member. He assisted the research team in constructing and designing the Survey of High-Growth Firms, as well as formulating the policy recommendations.

**Jinhee Yun**

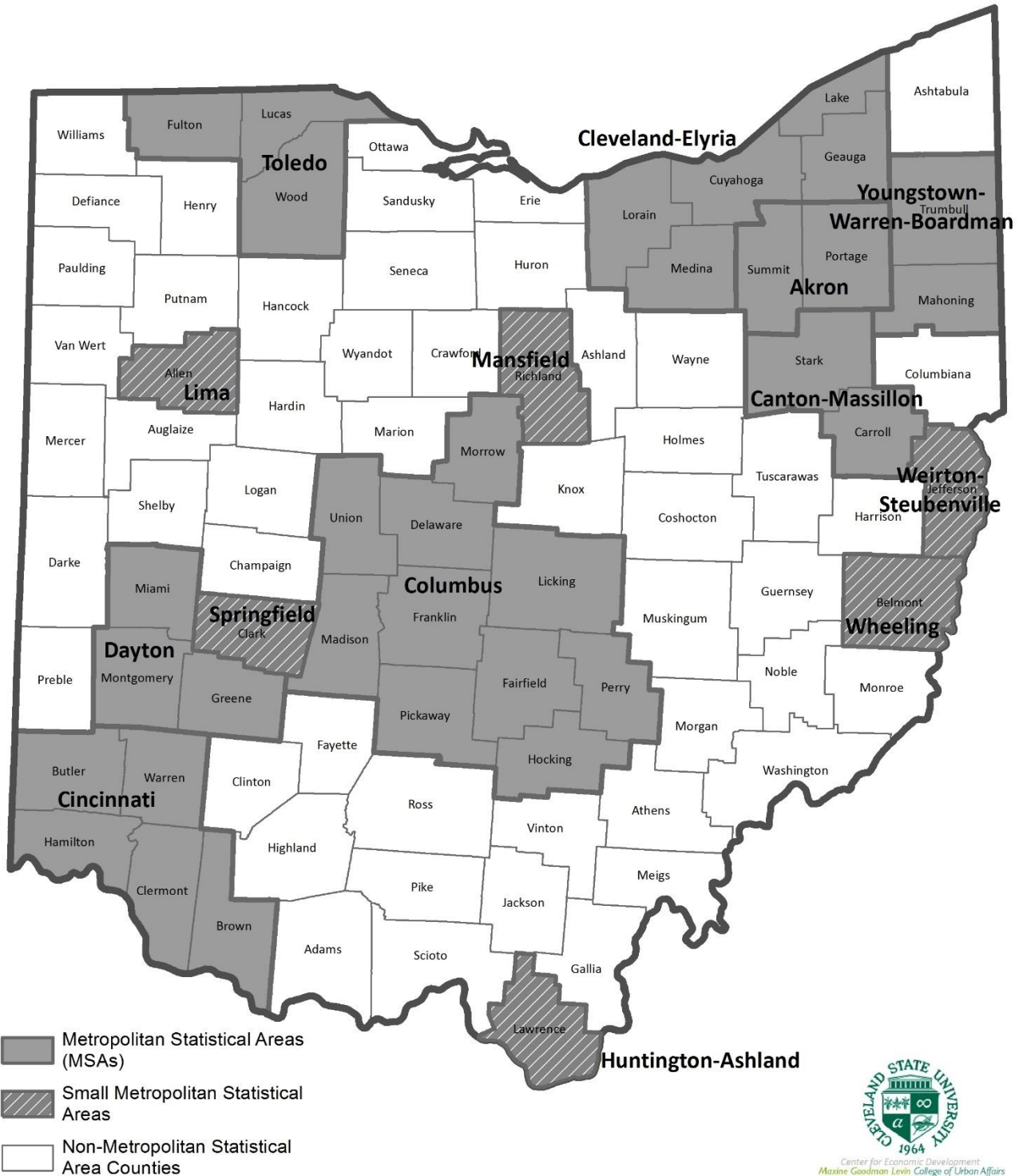
Jinhee is a graduate research assistant in the Center. She contributed to the operationalizing HGF definitions and the Survey of High-Growth Firms with data analysis and programming. Jinhee is a Ph.D. student in Urban Studies at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University.

## APPENDIX

### Appendix A. Ohio Counties Included in Each Geographic Region

Geography	Counties
Akron MSA	Summit, Portage
Canton-Massillon MSA	Carroll, Stark
Cincinnati MSA (Ohio counties only)	Brown, Butler, Clermont, Hamilton, Warren
Cleveland-Elyria MSA	Cuyahoga, Geauga, Lake, Lorain, Medina
Columbus MSA	Delaware, Fairfield, Franklin, Hocking, Licking, Madison, Morrow, Perry, Pickaway, Union
Dayton MSA	Greene, Miami, Montgomery
Toledo MSA	Fulton, Lucas, Wood
Youngstown-Warren-Boardman MSA (Ohio counties only)	Mahoning, Trumbull
Aggregated Small MSAs (Huntington-Ashland, Lima, Mansfield, Springfield, Weirton-Steubenville, Wheeling)	Allen, Belmont, Clark, Jefferson, Lawrence, Richland
Aggregated Non-MSA Counties	Adams, Ashland, Ashtabula, Athens, Auglaize, Champaign, Clinton, Columbiana, Coshocton, Crawford, Darke, Defiance, Erie, Fayette, Gallia, Guernsey, Hancock, Hardin, Harrison, Henry, Highland, Holmes, Huron, Jackson, Knox, Logan, Marion, Meigs, Mercer, Monroe, Morgan, Muskingum, Noble, Ottawa, Paulding, Pike, Preble, Putnam, Ross, Sandusky, Scioto, Seneca, Shelby, Tuscarawas, Van Wert, Vinton, Washington, Wayne, Williams, Wyandot

## Appendix B. Map of Geographic Areas in Study



## Appendix C. NAICS Super-Sector Listing

NAICS Code	Description
<b>Agriculture &amp; Natural</b>	
11	Agriculture, Forestry, Fishing, and Hunting
21	Mining, Quarrying, and Oil and Gas Extraction
<b>Construction</b>	
23	Construction
<b>Education and Health Services</b>	
61	Educational Services
62	Health Care and Social Assistance
<b>Financial Activities</b>	
52	Finance and Information
<b>Information</b>	
51	Information
<b>Leisure and Hospitality</b>	
71	Arts, Entertainment, and Recreation
72	Accommodation and Food Services
<b>Manufacturing</b>	
31-33	Manufacturing
<b>Not Elsewhere Classified</b>	
99	Suppressed or Unclassified Companies
<b>Other Services</b>	
81	Other Services (Except Public Administration)
<b>Professional and Business</b>	
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management
<b>Trade, Transportation &amp; Utilities</b>	
22	Utilities
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing

**Appendix D. Survey of High Growth Firms Questionnaire**

*Maxine Goodman Levin*  
*College of Urban Affairs*  
*Center for Economic Development*

Dear Entrepreneur/Business Owner/Manager:

The Center for Economic Development (The Center) at Cleveland State University's Levin College of Urban Affairs is conducting research on High Growth Firms in metropolitan areas in Ohio with funding provided by the Ewing Marion Kauffman Foundation. The survey responses will help us understand *how* and *why* some companies achieve high growth. On behalf of the Center and the Ewing Marion Kauffman, we are asking you to participate in this confidential survey.

The survey will take approximately 15-20 minutes of your time. All responses are strictly confidential and the data will be aggregated, so that no information can be attributed to any one individual.

If you have any questions regarding the study or this survey, please contact Merissa C. Piazza (216-687-2248; m.c.piazza83@csuohio.edu) at the Center for Economic Development, Levin College of Urban Affairs.

**Informed Consent**

You are a willing party to this survey may stop at any time. All individuals will remain confidential; no identified persons, business, or information will be made public without his/her written permission.

If you have any questions regarding your rights as a research subject, you may contact Cleveland State University's Institutional Review Board at 216-687-3630.

**I have read and understand the consent form and agree to participate**

Please provide an electronic signature by typing your name and date below.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Firm History

1. What year was the company established?

Enter year

2. What is your role at the company? (select all that apply)

- a. CEO/President
- b. COO/CFO
- c. HR
- d. Other \_\_\_\_\_

3. What is your race/ethnicity? (pull down will have generic Census categories + Other write-in)

4. Are you male or female?

- a. Male
- b. Female

5. Where were you born?

- a. City:
- b. State: (if applicable)
- c. Country:

6. Were you among the founders of the company?

- a. Yes
- b. No (skip to question 10)

7. At the end of the 1<sup>st</sup> year in business (XXXX) (pipe from Q1 answer), how many full-time employees did you have?

- a. 0
- b. 1 to 4
- c. 6 to 9
- d. 10 to 19
- e. 20 +

8. From the list below, what were your 3 primary reasons for starting the firm? Rank 1-3

1.
2.
3.

- a. Take advantage of opportunity
- b. High demand for products/business
- c. New technology/product/service
- d. Expansion of old/current business
- e. Building on experience/training/education in field
- f. Generate income
- g. Build wealth
- h. Cannot find employment elsewhere
- i. Disabled/injured/sick and cannot work elsewhere
- j. Retired
- k. Be own boss
- l. Flexibility
- m. Work from home
- n. Try new career

- o. Tackle a challenge
- p. Social benefit
- q. Other \_\_\_\_\_

9. How did you finance your company when you launched it (opening through first two years)?

Funding Source	Funding Percentage
a. Personal Savings/Home Equity	%
b. Friends & Family Gifts or Loans	%
c. Equity Financing (Friends & Family/Angles & VC)	%
d. Bank Loan	%
e. Other financing _____	%

10. How did you finance your company during its greatest years of growth?

Funding Source	Funding Percentage
a. Personal Savings/Home Equity	%
b. Friends & Family Gifts or Loan	%
c. Equity Financing (Friends & Family/Angles & VC)	%
d. Bank Loan	%
e. Cash Flow	%
f. Other financing _____	%

## Products & Services

11. When the company was initially formed, what products and/or services did the company offer? (open-ended)

12. Have these products and/or services changed since the company started?

- a. Yes
- b. No (skip to question 15)

13. What are your primary products and/or services today? (open-ended)

14. What was the primary factor in changing your portfolio of products and/or services since opening the company? (open-ended)

## Success & Resources

15. What means did you use to grow your firm? (select all that apply)

- a. Hire more employees
- b. Merge with another firm
- c. Acquire another firm
- d. Use independent contractors
- e. Other \_\_\_\_\_



16. What was the primary force that lead you to \_\_\_\_\_ (answer from 15)?
- Demand from current customers
  - Demand from new markets
  - Supply-chain changes
  - Strategic decision-making
  - New product development
  - New process development
  - Other \_\_\_\_\_
17. Looking back, was there a pivotal decision you feel was essential to your business growth? If so, please describe. (open-ended)
18. What were the top 3 reasons for your success? (open-ended)
1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_

### Networking

19. Through what activities, if any, do you connect with other business owners or entrepreneurs? (select all that apply)
- I don't connect with other business owners or entrepreneurs (skip to 21)
  - Networking events
  - Mentoring
  - Competitions
  - Incubators/Accelerators
  - Boot camps/Training
  - Universities/Colleges
  - Social Media
  - Award Events
  - Other \_\_\_\_\_
20. Please list the networking events that you find the most beneficial to your success
- \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_

### Economic Development & Workforce Development

21. Have you or your company contacted an entrepreneurship or business support organization? (i.e. Small Business Development Center (SBDC), JumpStart, CincyTech USA, etc.)
- Yes
  - No (skip to 24)

22. What types of services from these business support organizations were beneficial to your company's growth? (select all that apply)

- a. Technical Assistance/Business Assistance
- b. Funding
- c. Mentoring
- d. Talent Attraction
- e. Incubation
- f. Other \_\_\_\_\_

23. Please list the organizations that were helpful to your company's growth

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

### **Firm Information**

24. Name of Firm

25. Address of Firm, City, State

26. Approximately, how many full-time employees do you currently employ?

- a. 1 to 5
- b. 6 to 9
- c. 10 to 19
- d. 20 to 49
- e. 50 to 99
- f. 100 to 249
- g. 250 to 499
- h. 500 to 999
- i. 1,000 or more