FEDERAL RESERVE BANK *of* ATLANTA | WORKING PAPER SERIES

High-Growth Firms in Georgia

Taelim Choi, John C. Robertson, and Anil Rupasingha

Working Paper 2013-20
December 2013

Abstract: This paper reports the results of a study of the characteristics and direct employment impact of high-growth firms operating in Georgia. The longitudinal data used in this study are from the National Establishment Time-Series (NETS) database. Using a standard definition of high employment growth to classify firms, we track the direct employment contribution of high-growth firms in the state from 1989 to 2009. We find that only a small fraction of firms satisfied the high-growth employment criteria in any year, but these rapidly growing firms made a disproportionately large contribution to overall job creation in the state. We discover that, as has been found for the United States as a whole, the number of high-growth firms and their average job creation has declined during last decade. We also find that the incidence of high growth and the resulting job creation differ significantly according to size, age, industry, type of organizational structure, and ownership as well as location. A separate analysis focusing on firms with rapid sales revenue growth reveals that firms with fast-growing revenue- are not necessarily firms with fast-growing employment.

JEL classification: R11, R12

Key words: high-growth firms, NETS data, job creation, firm age, firm size, industry, organizational structure, business dynamics, location

---

The research presented here is part of a joint research project between Professor Nancey Green Leigh of Georgia Tech and John C. Robertson and Anil Rupasingha of the Federal Reserve Bank of Atlanta. Taelim Choi, a postdoctoral researcher at Georgia Tech and a visiting scholar with the Federal Reserve Bank of Atlanta, is the principal data analyst for the project. The views expressed here are the authors' and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the authors' responsibility.

Please address questions regarding content to Taelim Choi, Research Department, Federal Reserve Bank of Atlanta, 1000 Peachtree Street, N.E., Atlanta, GA 30309-4470, 404-498-8780, tchoi3@gmail.com; John C. Robertson, Research Department, Federal Reserve Bank of Atlanta, 1000 Peachtree Street, N.E., Atlanta, GA 30309-4470, 404-498-8782, john.c.robertson@atl.frb.org; or Anil Rupasingha, Community and Economic Development, Federal Reserve Bank of Atlanta, 1000 Peachtree Street, N.E., Atlanta, GA 30309-4470, 404-498-7511, anil.rupasingha@atl.frb.org.

1. Introduction

Researchers and policy makers are paying increasing attention to the fact that rapidly growing businesses, often called high growth firms or gazelles, are only a small fraction of all firms yet are a significant source of job creation and productivity advances in the economy. Research suggests that high performing firms are successful for a variety of reasons. For example, the ability of a firm to capitalize business opportunities by matching own resource and opportunities (Mohr and Garnsey, 2011); leading industrial structural change (Bos and Stam, 2011); innovating and introducing new products and services (National Endowment for Science, Technology and the Arts [NESTA], 2009); and in adopting successful appropriate management strategies (Parker et al., 2010). Research on high growth firms is wide ranging. Some has focused on methods of identifying such firms and understanding the attributes of fast growing firms (for example, Clayton et al, 2013; Stangler, 2010; Acs et al, 2008; NESTA, 2009). Other research has focused on policy reform toward trying to foster a greater number of high growth potential fast growing firms (for example, Shane, 2009; Bosma and Stam, 2012; Mason and Brown, 2013).

The objective of this paper is to describe the properties of high growth firms in the state of Georgia. Specifically, the analysis will describe the relative employment contribution of high growth firms, and the characteristics of high growth firms in terms of age, size, industry, ownership, organizational structure and location.

A recent study by Clayton et al. (2013) studies some properties of high-growth firms using national establishment-level data from the Bureau of Labor Statistics. We use the definition of a high growth firm in Clayton et.al. (2013), applied to data on firms operating in the state of Georgia. We identify the pattern of high growth in Georgia over time compared to national data, and by firm age, size, and industry. We also examine the ownership and organizational structure of high growth firms. Finally, we consider location patterns and spatial distribution of high growth establishments.

Because we do not have comparable state-level data to those used in Clayton et al. (2013), we instead use establishment-level Georgia data from the National Establishment Time Series (NETS) database -- a commercial source of establishment-level data based on the Dun and Bradstreet (D&B) archival establishment data. The D&B data have been criticized because of inconsistencies in establishment counts over time and because it does not match comparable official government establishment-level statistics (Davis, 1996; Neumark et al., 2005). For Georgia, we find that counts of establishments in the NETS are significantly different from those of government statistics such as the Quarterly Census of Employment and Wage (QCEW) and the Business Dynamics Statistics (BDS). We investigate possible causes for these disparities between the NETS and government datasets. For example, data published from the Quarterly Census of Employment and Wage (QCEW) program primarily relies on the employer's reports subject to state Unemployment Insurance (UI) laws. To address the data issues associated with the NETS we applied a data filtering process, explained in detail below, before conducting the analysis of high growth firms. We believe that our adjustment method is reasonable, and applicable to NETS data for other states.

The remainder of the paper is organized as follows. In Section 2, we discuss the definition of high growth based on employment growth. In Section 3, we describe the steps in adjusting the NETS data to improve comparability with other establishment level data used to study high growth firms. In Section 4, we provide an account of high growth firms, including trends over time and characteristics by size, age, industry, ownership, and the ability to sustain high growth over time. The results using an alternative sales-based definition of high growth are discussed in Section 5. Section 6 presents a spatial analysis of high growth establishments, and Section 7 concludes the paper.

2. Definition of High Growth Firms (Employment Based)

The choice of an appropriate definition of high growth firms is important. The Organization for Economic Development and Cooperation (OECD) defines a high growth firm as a firm with 10 or more employees in the base year that experiences at least an average of 20 percent annualized employment growth over a three-year period (72.8 percent total increase). Note that a firm that increases employment by more than 72.8 percent in one year would be a HGF by this definition. The OECD suggested a threshold of 10 employees because the percentage growth criterion tends to favor very small firms. For example, a firm with one employee can meet the high growth firm criteria by hiring one additional employee over the three years. A firm with 10 employees would need to add 8 employees over the 3 years.

Clayton et al. (2013) suggested a modification of the OECD definition to include firms with less than 10 employees. Specifically, that a firm with less than 10 employees is a high growth firm (HGF) if it creates 8 or more jobs on net over a three-year period. This modification better captures the growth dynamics of firms that started at a smaller size but grow significantly both in relative and absolute terms. We use the Clayton et al. (2013) employment-based HGF definition of in our analysis.[1]

The unit of analysis is another key variable. The firm level has been a common unit of analysis in most previous studies. If a firm chose to create a new establishment which is large enough to satisfy the high growth criteria at the firm level, an establishment-level analysis would not identify any high growth activity in this firm because no existing establishment expanded sufficiently. In this case, firm-level analysis would be more appropriate because it reflects the internal dynamics of businesses. However, one disadvantage of firm-level analysis is its inability to account for locational dynamics. For example, branches of a multi-establishment firm may be located in different geographic areas impacted by different locational factors. In addition, because we only use data for firms operating in Georgia, some firms classified as high growth in Georgia will not be high growth in a national context. Firm-level analysis also needs to account for mergers and acquisitions. Firms that grow solely due to mergers and acquisitions and such firms do not reflect new job creation. Without controlling for mergers and acquisitions, the job creation of HGFs would be overestimated. We use the firm as our primary unit of

[1] In addition to a definition based on employment, some studies define growth in terms of measurements such as revenue, value added, and productivity (Acs et al., 2008; Daunfelt and Johansson, 2010). We explore one alternative definition based on sales revenue in Section 5.

analysis, and use establishment-level data to shed light on spatial patterns of high growth firms. Appendix 1 details the method used to control for mergers and acquisitions.

3. NETS Data and Adjustments

Our analysis uses annual data for Georgia from the National Establishment Time Series (NETS) database of businesses covering the years 1989 through 2009. The NETS is a longitudinal database constructed by Walls & Associates, using business -level data from Dun & Bradstreet (D&B). Walls & Associates linked the cross-section establishment data using the unique D&B identification number (the DUNS number), and use a specific estimation method to impute data for cases of missing values. The final product of Walls & Associates is the longitudinally linked establishment-level database. The database contains a variety of establishment-level information including employment, sales, current and previous location, industry classification, ownership structure, legal status, and first and last year of business operation and so forth. One major advantage of the NETS database is that it allows researchers to examine various attributes of businesses over time. The data can be used to answer numerous questions related to establishments such as how many new establishments were started in a certain year, when did those establishments end, how many jobs were created or lost during an establishment's operation, where did the establishments relocate to or from, and how they were connected to other establishments within firm's hierarchy. Although the NETS database provides an opportunity to research individual firm's evolution there are some apparent data quality issues that affect the consistency of the data over time. For this reason, we filter the NETS data to make its aggregate features more consistent with comparable data sets such as the Quarterly Census of Employment and Wage (QCEW) and the Business Dynamics Statistics (BDS).

Given the focus of our study, we use both establishment and employment counts reported in the NETS data to assess the reliability of the NETS data. A preliminary examination of the data shows that total number of establishments in the NETS is significantly different from that of the QCEW and the BDS (Figure 1). For example, the NETS had about 380,000 establishments located in Georgia in 2000 while the QCEW had only about 221,000 in the same year. The respective figures in 2009 were 781,000 and 261,000, indicating a huge disparity in the number of establishments reported in the NETS and the QCEW (Figure 1). The gap is even wider between the NETS and the BDS data. While there are some differences due to the methods of data collection and measurement errors, the unusually large and widening gap over time between the NETS and other two data sets is a cause for concern.

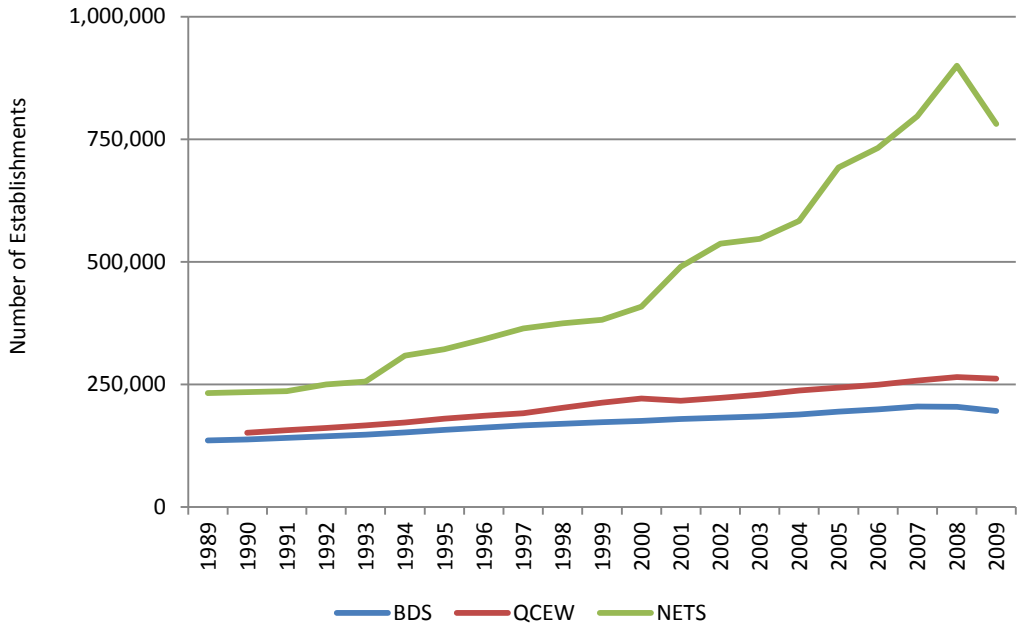


Figure 1: Number of Establishments in Georgia
(Source: NETS, Bureau of Labor Statistics, Census Bureau, and Authors' Calculation)

This disparity may be due to several interrelated reasons. One reason is that data sets such as the QCEW and the BDS exclude sole-proprietors and several other types of establishments that are not subject to state Unemployment Insurance (UI) programs. Another reason is due to the definition of employment. Data based on UI information defines employment as the number of employees on the payroll of the firm. However, the NETS data counts the owner of the business as an employee even if they are not on the businesses payroll for UI purposes. As a result, the NETS data may include many businesses without a payroll. Figure 2 depicts the distribution of establishments in the NETS database according the employment size of the establishment and shows that overwhelming majority of difference is accounted for by businesses are in the 1-4 employee category. One possible reason for the widening gap between the NETS and the two other datasets is changes in data collecting process by the D&B. For example, D&B began using telephone directories to identify new businesses in 1992 (Neumark et al., 2005).

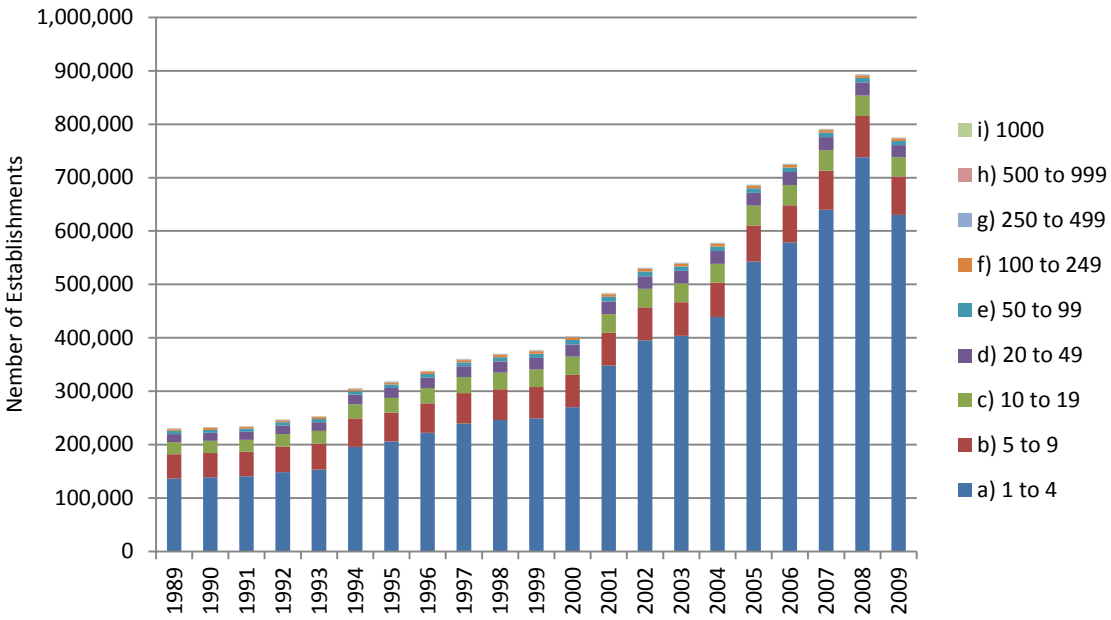


Figure 2: Number of Establishments by Size in Georgia (Excluding Government Sector)
(Source: NETS and Authors' Calculation)

To deal with this disparity we undertook several steps. First, we identified the types of businesses excluded from the QCEW and the BDS as described in Table 1 below, and then tabulated the total number of establishments in the NETS by excluding those specific types of businesses. The QCEW excludes proprietors, the unincorporated self-employed, unpaid family members, certain farm and domestic workers, members of the armed forces, and railroad workers covered by the railroad insurance system.[2] The BDS excludes self-employed, domestic service worker, railroad employee, agricultural production worker, and most government employees. We then compiled a list of industry groups (Table 1) not covered in the QCEW and the BDS using North American Industrial Classification System (NAICS). This is only a rough comparison since it is difficult to bridge exact categories excluded in the QCEW and BDS to the NAICS categories. For example, there is not a sole-proprietor category in the NAICS.

[2] Quarterly Census of Employment and Wages, Annual Bulletin of Employment and wage, http://www.bls.gov/cew/cewbultn11.htm#Employment

Table 1: List of Business Group Excluded in QCEW, BDS, and BED

Categories for exclusion	Exclusion status in the NETS
1. Government (Armed forces)	Exclude NAICS 92
2. Religious/charitable organization	Exclude NAICS 8131
3. Railroad employment	Exclude NAICS 4821
4. Private (Public) elementary and secondary School	Exclude NAICS 6111
5. Student employment in school	Not in NETS
6. Employment by a foreign government and international Organization	Part of NAICS 92
7. Employment in the commercial fish, shellfish and related sectors	Exclude NAICS 1141
8. Employment of nonresident alien persons	Not in NETS
9. Domestic Worker	Exclude NAICS 8141
10. Most agricultural workers on small farms	Exclude NAICS 11 and Size 1-2
11. Employees of certain nonprofit organizations	NETS legal status
12. Self-employed	NETS legal status

Source: Authors' calculations based on Stevens (2007), Census Bureau, Technical Paper No. TP-2007-04; BDS and BLS websites

By excluding the types of establishments not covered under UI (Table 1), we were able to narrow the gap somewhat between the NETS, and the QCEW and BDS in establishments (Figure 3) and employment (Figure 4) counts (solid purple line in both Figure 3 and Figure 4). However, the gap was still substantial for the latter part of the period. In principle, the legal status variable in the NETS database can distinguish sole-proprietors and partnerships. However, due to the large number (62 percent) of missing observations on this variable, this approach was insufficient. For that reason, we applied an additional refinement of the NETS data to try to separate out non-employer businesses.

Analysis of the NETS data excluding non-UI-covered businesses revealed that businesses with 1 to 2 employees were disproportionally concentrated in the Other Support Service (NAICS 5619), especially after the year 2000. For example, these establishments accounted for over 20 percent of all establishments in 2008 and 2009, but less than 1 percent of establishments in the QCEW. Assuming that these establishments were mostly non-employer sole-proprietors and partnerships, we excluded 1-2 employee establishments in the Other Support Service category. However, even after excluding (solid blue line in Figure 3) some gap remained. Therefore, we decided to exclude all non-UI-covered NETS businesses and those with 1 to 2 employees. Applying this final adjustment largely eliminated the remaining gap between the establishment counts in the NETS and the other two datasets (solid orange line in Figure 3).

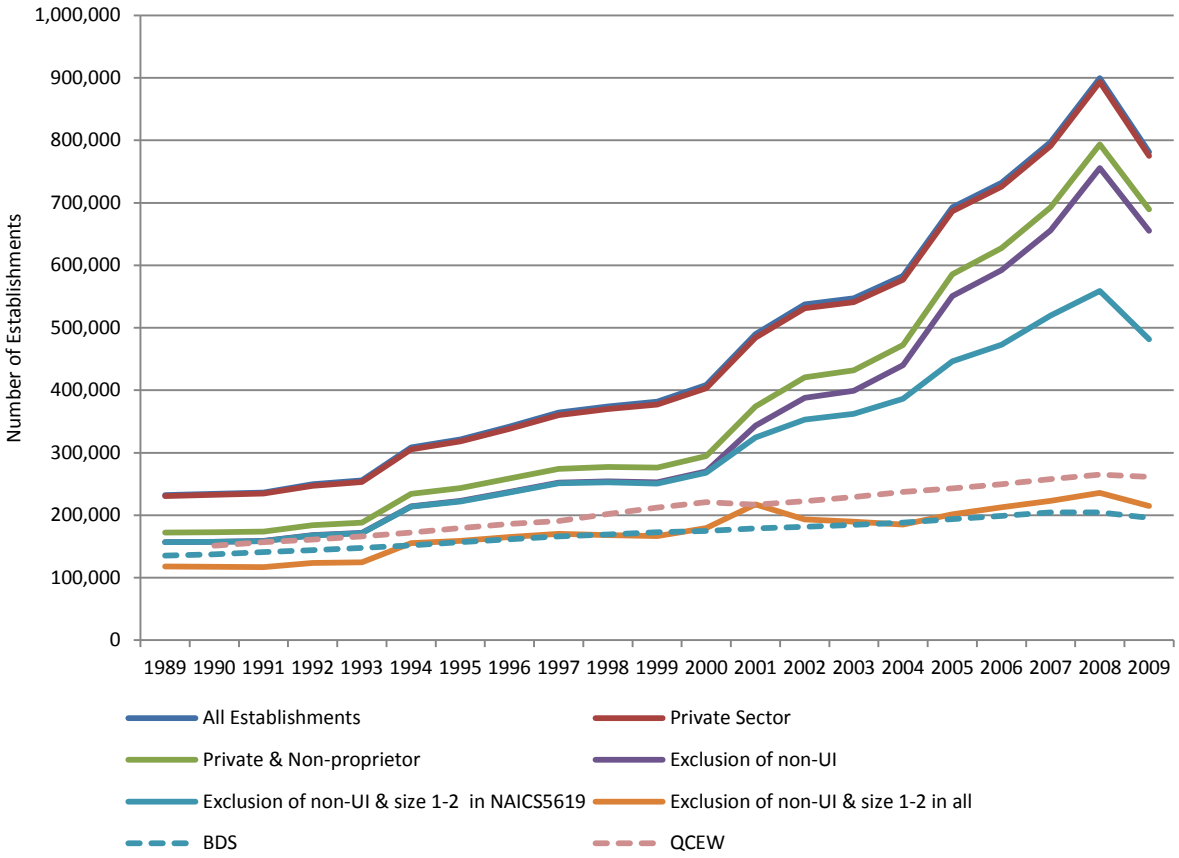


Figure 3: Adjust of Number of Establishment in Georgia
(Source: NETS, Bureau of Labor Statistics, Census Bureau, and Authors' Calculation)

With respect to aggregate employment counts, the overall adjusted patterns are similar (Figure 4) to the establishment count analysis conducted above. However, after excluding all establishments with 1 to 2 employees, the number of employees in the adjusted NETS dataset is still slightly higher than in the QCEW and BDS for most years.

Figure 5 shows the impact of eliminating non-UI covered and 1-2 employee NETS businesses from the dataset by establishment size for 2009. Comparing the top and bottom charts of Figure 5 shows that this adjustment significantly reduced the disparity of establishment and employment counts by establishment size. However, notice that even after excluding non-UI-covered NETS businesses and those with 1-2 employees, the adjusted NETS dataset slightly overestimates the number of employees at smaller firms relative to the QCEW and the BDS data.

Figure 6 shows the impact of the adjustments to the NETS dataset relative to establishment counts obtained from the Census County Business Patterns for 2009. As the top chart of Figure 6 shows, the unadjusted data do not correspond very well for some industry sectors including retail, administrative and support services, as well as health care and social assistance. The bottom chart of Figure 6 shows

that the adjusted NETS more closely aligns with the industry patterns with the County Business pattern data. The greatest remaining disparity appeared in the administrative service sector.

We will use the adjusted NETS dataset for most of the subsequent analysis of high growth firms in Georgia. However, because the exclusion of all businesses with 1-2 employees possibly results in under-counting the number of HGFs we conducted additional analysis for UI-covered NETS businesses with 1-2 employees in Appendix 2.

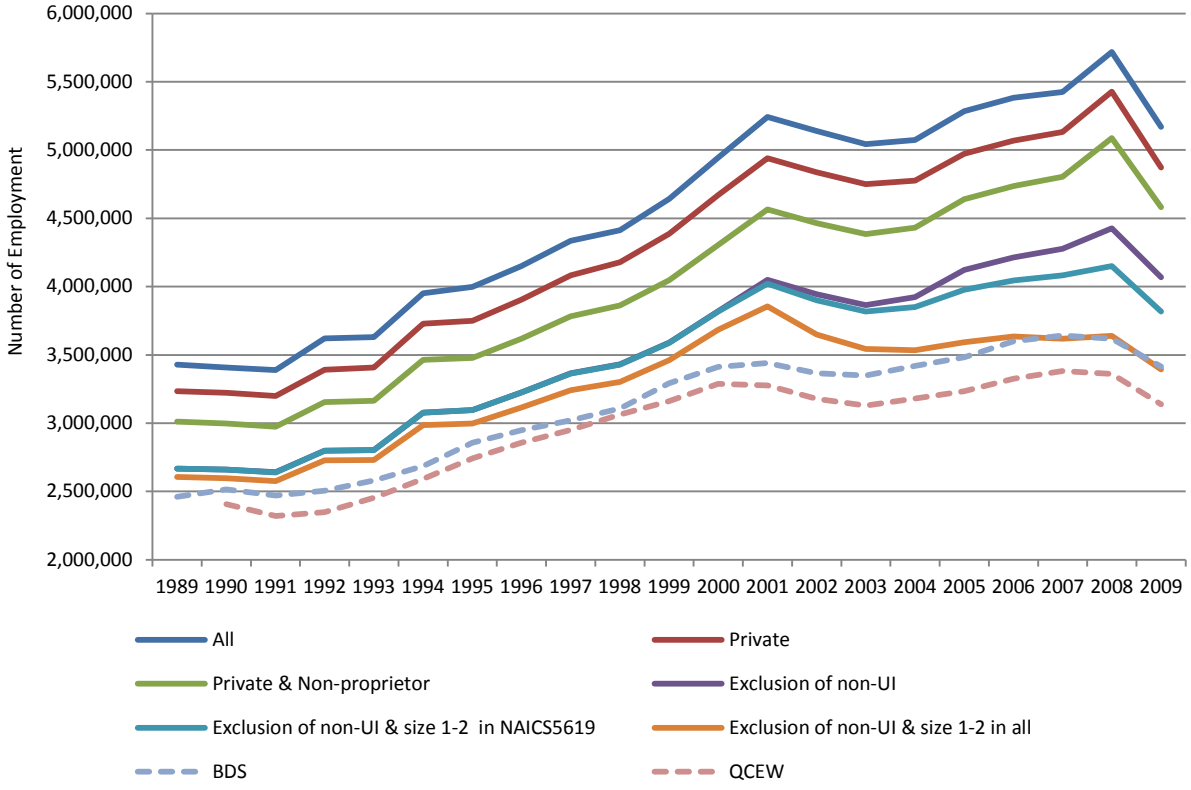
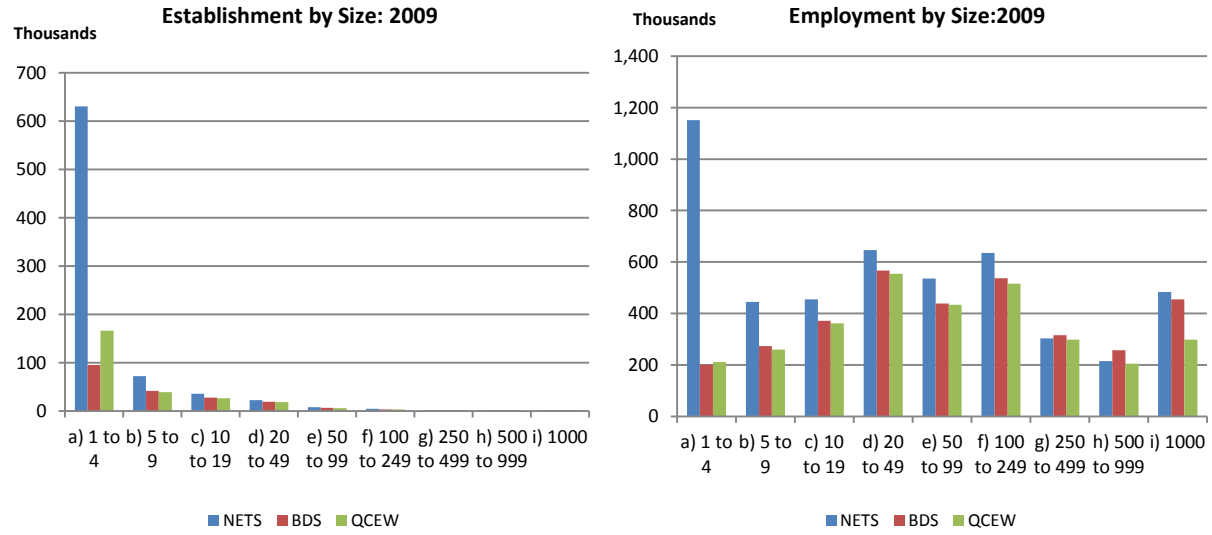


Figure 4: Adjust of Number of Employment in Georgia
(Source: NETS, Bureau of Labor Statistics, Census Bureau, and Authors' Calculation)

Before adjustment



After adjustment to UI coverage

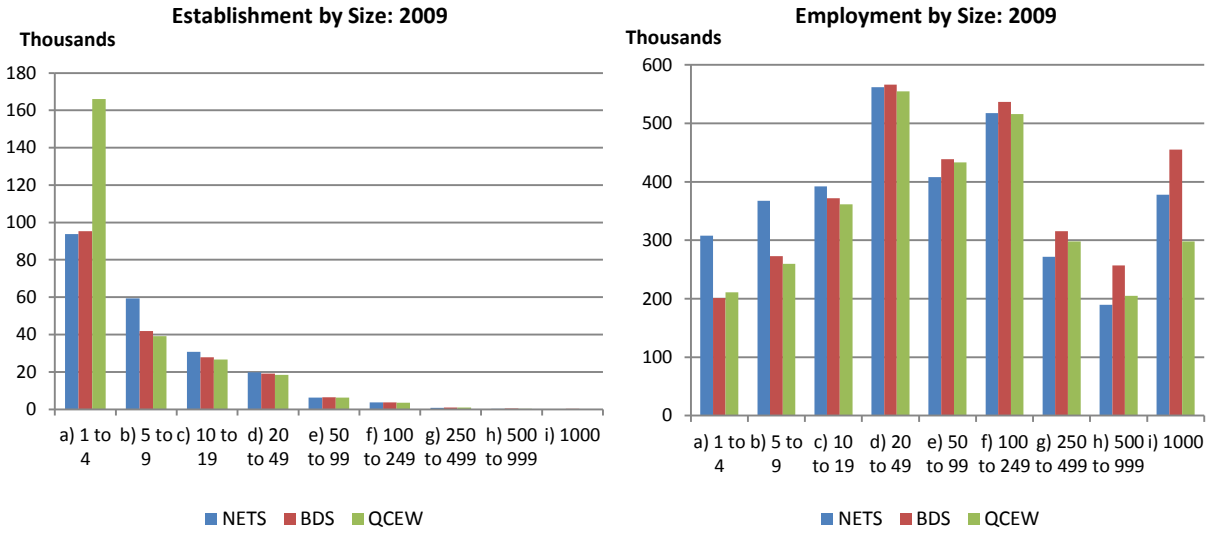
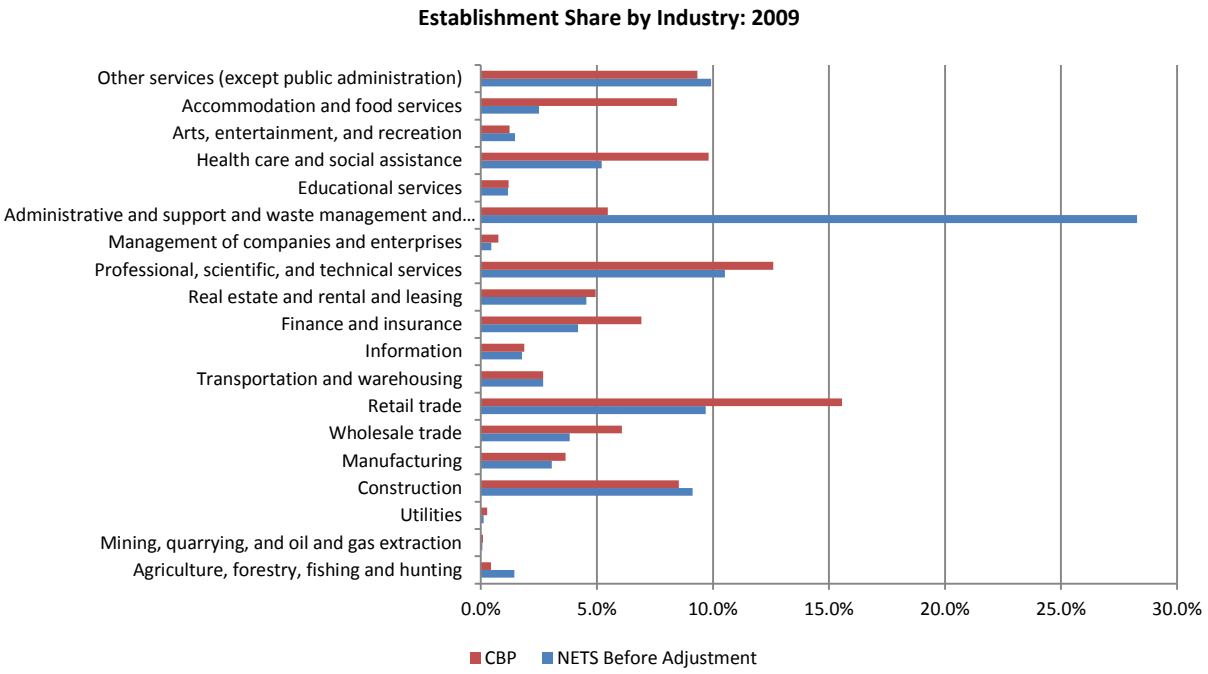


Figure 5: Comparison of Establishment and Employment by Size
(Source: NETS, Bureau of Labor Statistics, Census Bureau, and Authors' Calculation)

Before adjustment



After adjustment to UI coverage

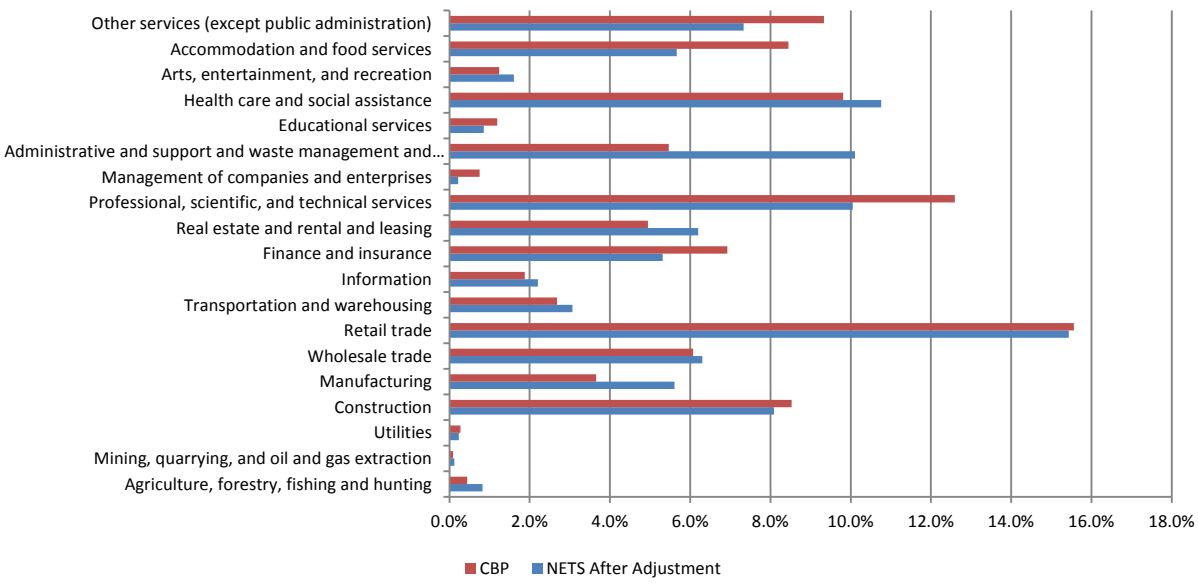


Figure 6: Comparison of Share Establishment by NAICS
(Source NETS, Census Bureau, and Authors' Calculation)

4. High Growth Firm Characteristics (Employment-based)

This section describes the characteristics of HGFs in Georgia using the employment-based definition of high growth. The NETS dataset covers the years 1989 to 2009, so we analyzed 18 three-year periods from 1989-1992 to 2006-2009. We summarize the general characteristics of HGF counts and job creation for all periods. We also summarize the age, size, industry type, firm structure, and persistence of high growth characteristics. Specifically, we address the following questions:

- How many HGFs are there in Georgia?
- How many jobs do HGFs directly create?
- What is the age distribution of HGFs?
- What is the size distribution of HGFs?
- What are the industry characteristics of HGFs?
- Does the distribution of HGFs vary by whether a firm is in a tradable sector?
- Does the distribution of HGFs vary by the type of organizational structures of the firm?
- What happen to HGFs in subsequent years?

Job Creation by High Growth Firms

Table 2 presents estimates of the number of HGFs. There were 2,424 firms classified as HGFs in the 1989-1992 period, representing 2.4 percent of all firms, and those HGFs created 189,813 jobs, representing 7.2 percent of total employment. In the most recent period (2006-2009), there were 2,113 firms classified as HGFs, accounting for 1.2 percent of firms in Georgia. These firms created 126,582 jobs, which was about 3.3 percent of total employment. In general, the number of HGFs increased steadily from 1989-1992 through the 1998-2001 period, but has steady declined since. At the peak, more than 4,000 firms, 3.1 percent of all firms, satisfied the employment criteria of HGFs. Figure 7 compares percentages of HGFs and their share of jobs in Georgia to comparable U.S. data.[3] Though fluctuated somewhat over time, the U.S. trend shows a decline in both the share of HGFs and the share of jobs created by those firms. For example, the percentage of HGFs in the U.S decline from 3.0 percent - 3.1 percent in late 1990s to 1.8 percent in 2006-2009. The trends in the Georgia data are similar in terms of the share of HGFs, although Georgia had a larger share of jobs created by HGFs during the mid-to-late 1990s, perhaps reflecting the outsized strength of the tech-boom in Georgia relative to the nation as a whole during that period.

[3] The data for the U.S. are available only from 1994-1997 period onward (see Clayton et al, 2013).

Table 2: High Growth Firms in Georgia

Time Period	Total number of firms in the base year	Total employment in the base year	Number of HGFs	Job creation from HGFs	Sales growth from HGFs ($M)	Share of HGFs in total firms	Share of HGF job creation in total employment
1989-1992	101,747	2,643,811	2,424	189,813	15,311	2.4%	7.2%
1990-1993	101,087	2,623,515	2,169	205,760	16,520	2.1%	7.8%
1991-1994	100,902	2,594,883	2,968	272,680	23,460	2.9%	10.5%
1992-1995	103,722	2,751,336	3,026	219,309	21,484	2.9%	8.0%
1993-1996	104,889	2,846,817	3,483	257,307	26,350	3.3%	9.0%
1994-1997	132,483	3,113,658	3,751	252,695	28,058	2.8%	8.1%
1995-1998	134,478	3,106,959	4,115	272,076	34,398	3.1%	8.8%
1996-1999	138,545	3,201,175	4,295	317,872	38,012	3.1%	9.9%
1997-2000	141,599	3,315,889	4,284	359,912	39,236	3.0%	10.9%
1998-2001	137,978	3,384,999	4,293	398,048	43,030	3.1%	11.8%
1999-2002	132,492	3,570,810	3,767	329,489	41,621	2.8%	9.2%
2000-2003	142,720	3,807,975	3,527	255,094	34,120	2.5%	6.7%
2001-2004	179,930	3,970,134	3,207	228,041	28,084	1.8%	5.7%
2002-2005	156,427	3,868,329	2,932	210,182	25,802	1.9%	5.4%
2003-2006	153,302	3,697,466	2,864	187,814	22,285	1.9%	5.1%
2004-2007	149,216	3,682,405	2,555	144,811	18,197	1.7%	3.9%
2005-2008	166,468	3,737,713	2,413	137,701	18,123	1.4%	3.7%
2006-2009	178,029	3,789,879	2,113	126,582	17,747	1.2%	3.3%

Source: NETS and Authors' Calculation

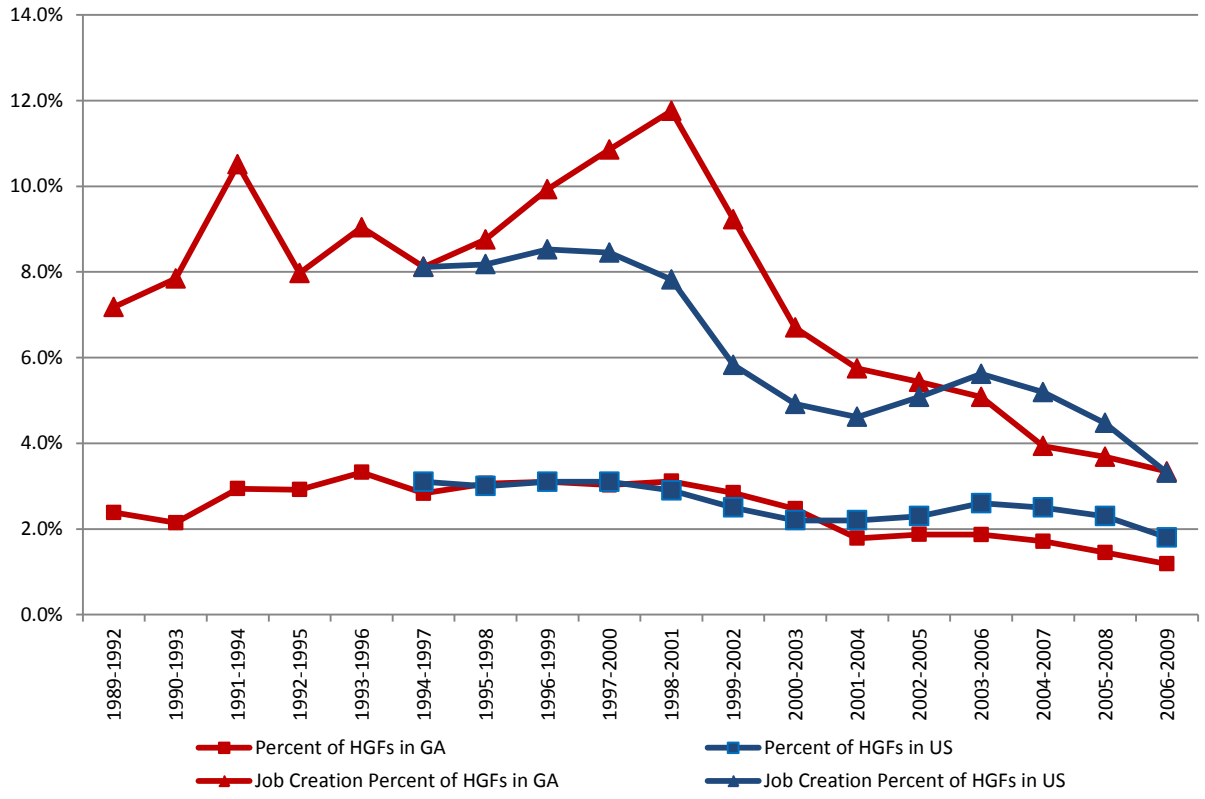


Figure 7: High Growth Firms and Job Creation in Georgia and U.S.
(Source: NETS, Bureau of Labor Statistics, and Authors' Calculation)

Part of the interest in HGFs rests on their ability to create jobs at a faster rate than does a typical firm. According to Clayton et al, (2013), 7.3 percent of expanding firms were HGFs in the U.S. while they accounted for 33.7 percent of job creations in all expanding firms over the 2008-2011 time-period. In addition, while the average job creation by HGFs in the U.S. in 2008-2011 time-period was 40.8 per firm, the same for expanding firms was only 8.8 per firm. Although the job creation percentage by HGFs in all expanding firms is a useful indicator, we do not report these figures for Georgia in this analysis. As discussed in the Appendix, the NETS data are less likely to capture small employment changes due to rounding and imputation. For this reason, if we used the number of expanding firms and their job creation as a denominator, it would exaggerate the contribution by HGFs.

Rather than reporting the HGF job creation share of job creation of all expanding firms we report the job creation percentage of HGFs in total employment (base year) and the average job creation per high growth firm in Georgia, shown in Figures 7 and 8. As mentioned earlier, the job creation share of HGFs as a percent of total employment peaked in 1998-2001 (at 11.8 percent) and has been gradually declining since then. The number of jobs created from HGFs during 2006-2009 was equal to 3.3

percentage of total employment in 2006 (Figure 7). Average job creation per HGF in Georgia was 93 per firm in 1998-2001 and 60 per firm in 2006-2009 (Figure 8).

The average job creation of Georgia HGFs is consistently higher than that of U.S. over time. This could be due to non-Georgia-headquartered multi-establishment firms located in Georgia. As we will specifically discuss in the later sections, average job creation varies according to type of ownership (Georgia vs. non-Georgia). The average job creation by non-Georgia-owned multi-establishment firms is significantly larger than that of Georgia-owned multi-establishment firms (Table 7). Georgia-owned HGFs created 42 jobs per firm on average in 2006-2009 while non-Georgia-owned HGFs created 182 jobs per firm. However, when a non-Georgia-owned firm opens a new division office, branch plant, or retail store in Georgia, that expansion may be high growth from Georgia's perspective, but might not be high growth at a national level. Since our NETS dataset is limited to firms located in Georgia, we are not able to confirm this.

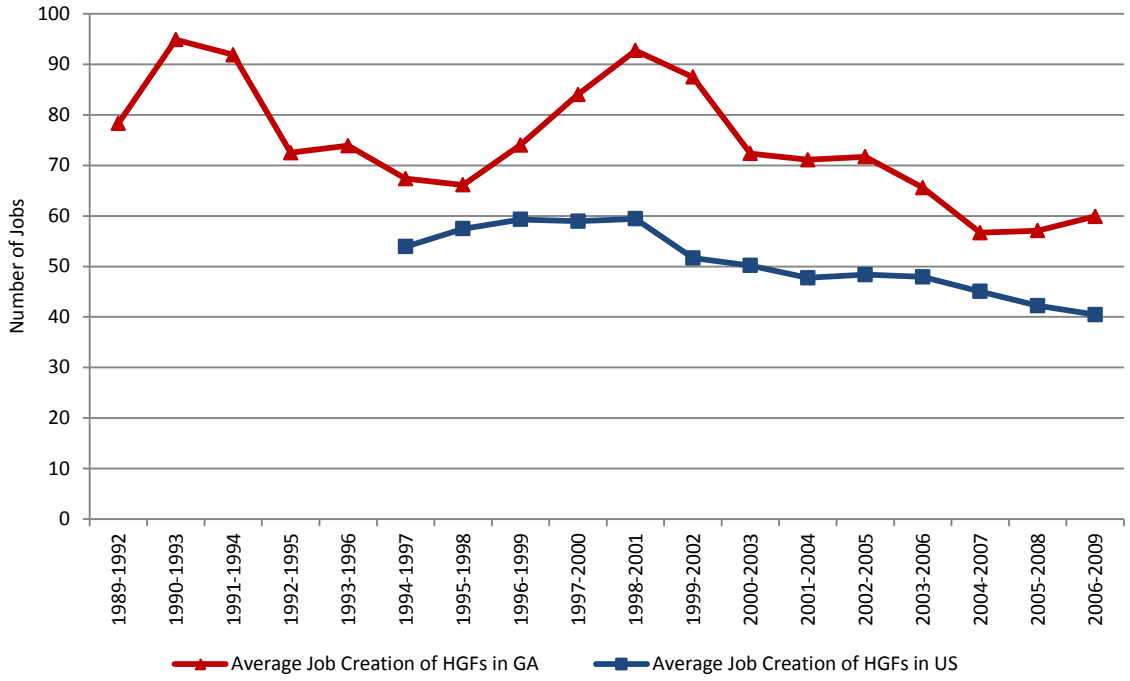


Figure 8: Average Job Creation of High Growth Firms in Georgia and U.S.
(Source: NETS and Bureau of Labor Statistics, and Authors' Calculation)

Age and Size of High Growth Firms

Prior research has suggested that young firms are more likely to grow at a faster pace and account for a large share of job creation (Henrekson and Johansson, 2010). We confirm that many HGFs in Georgia are young. About half (50.9 percent) of HGFs in Georgia in 2006-2009 were firms under 5 years old.

However, job creation of HGFs varies by age, and older HGFs have a greater contribution to job creation than the younger HGFs in Georgia. Table 3 shows that about 63 percent of jobs creation by HGFs came from older firms (more than 5 years old) in 2006-2009. The pattern is similar for average job creation. The average job creation by a young high growth firm was smaller (44) than that of an older high growth firm (77). Qualitatively, these results are not specific to the 2006-2009 period.

Table 3: High Growth Firm by Age in the period of 2006 – 2009

Age in the base year	Total number of firms in the base year	Number of HGFs	Job creation from HGFs	Sales growth from HGFs ($M)	Share of HGFs in total firms	Share of HGFs by age	Job Creation of HGFs by age	Sales Growth of HGFs by age	Average number of job creation by age	Average Sales Growth by age ($M)
0: Births	13,783	192	5,648	757	1.4%	9.1%	4.5%	4.3%	29.4	3.9
1 year old	21,911	277	10,179	867	1.3%	13.1%	8.0%	4.9%	36.7	3.1
2 year old	14,012	213	11,272	1,269	1.5%	10.1%	8.9%	7.2%	52.9	6.0
3 year old	8,423	134	4,893	759	1.6%	6.3%	3.9%	4.3%	36.5	5.7
4 year old	9,158	125	8,474	1,059	1.4%	5.9%	6.7%	6.0%	67.8	8.5
5 year old	15,916	135	6,456	832	0.8%	6.4%	5.1%	4.7%	47.8	6.2
6 year old	7,154	114	6,717	1,159	1.6%	5.4%	5.3%	6.5%	58.9	10.2
7 year old	5,679	106	10,073	1,269	1.9%	5.0%	8.0%	7.1%	95.0	12.0
8 year old	5,615	87	4,033	584	1.5%	4.1%	3.2%	3.3%	46.4	6.7
9 year old	5,614	77	4,207	556	1.4%	3.6%	3.3%	3.1%	54.6	7.2
10 or older	70,764	653	54,630	8,635	0.9%	30.9%	43.2%	48.7%	83.7	13.2
Young (5 or less)	83,203	1,076	46,922	5,543	1.3%	50.9%	37.1%	31.2%	43.6	5.2
Old (6 or more)	94,826	1,037	79,660	12,203	1.1%	49.1%	62.9%	68.8%	76.8	11.8
Total	178,029	2,113	126,582	17,747	1.2%	100.0%	100.0%	100.0%	59.9	8.4

(Source: NETS and Authors' Calculation)

In terms of size, most firms are either small (less than 20 employees) or medium-size firms (20 to 499 employees). In 2006, over 99 percent of firms operating in Georgia had less than 500 employees. A more disaggregated view shows that 85 percent of them were firms with less than 20 employees and 47 percent had fewer than four employees. HGFs follow a similar pattern. As shown Table 4, 99 percent of HGFs had less than 500 employees, of which 78 percent had less than 20 employees, and 26 percent

had less than four employees.[4] However, even though a large share of all HGFs are small firms, the likelihood of being a HGF appears to increase with firm size. Table 4 (column 6) shows the percentage of firms by size that are HGFs. We see that 1.1 percent of firms with fewer than 20 employees are HGFS, compared to 2.0 percent for firms with 20-499 employees, and 2.1 percent for larger firms. Furthermore, the percentage of HGFs is the lowest in the smallest size group (0.6 percent in 1 to 4 employees). It seems that it is difficult for firms with less than 10 employees to meet the high growth firm criteria by hiring eight additional employees during the three-year time period.

The share of job creation from small-sized HGFs is also less than proportional to their representation in the population of HGFs. For example, HGFs with fewer than 20 employees accounted for 78 percent of HGFs, but 35 percent (Table 4, column 8) of jobs created by all HGFs. In contrast, HGFs with 500 or more employees were only 0.8 percent of HGFs, but accounted for more than 20 percent of the job creation from HGFs.

Table 4: High Growth Firm by Size in the period of 2006 – 2009

Size in the base year	Total number of firms in the base year	Number of HGFs	Job creation from HGFs	Sales growth from HGFs ($M)	Share of HGFs in total firms	Share of HGFs by size	Job Creation of HGFs by size	Sales Growth of HGFs by size	Average number of job creation by size	Average Sales Growth by size ($M)
a) 1 to 4	83,431	538	11,655	1,343	0.6%	25.5%	9.2%	7.6%	21.7	2.5
b) 5 to 9	45,849	624	13,690	1,451	1.4%	29.5%	10.8%	8.2%	21.9	2.3
c) 10 to 19	24,838	482	18,275	2,818	1.9%	22.8%	14.4%	15.9%	37.9	5.8
d) 20 to 49	15,085	268	17,936	3,204	1.8%	12.7%	14.2%	18.1%	66.9	12.0
e) 50 to 99	4,747	99	12,161	1,896	2.1%	4.7%	9.6%	10.7%	122.8	19.2
f) 100 to 249	2,497	65	15,348	1,563	2.6%	3.1%	12.1%	8.8%	236.1	24.0
g) 250 to 499	791	20	11,896	870	2.5%	0.9%	9.4%	4.9%	594.8	43.5
h) 500 to 999	431	12	8,620	2,431	2.8%	0.6%	6.8%	13.7%	718.3	202.6
i) 1000	360	5	17,001	2,171	1.4%	0.2%	13.4%	12.2%	3400.2	434.2
Small (19 or less)	154,118	1,644	43,620	5,612	1.1%	77.8%	34.5%	31.6%	26.5	3.4
Medium (20-499)	23,120	452	57,341	7,532	2.0%	21.4%	45.3%	42.4%	126.9	16.7
Large (500 or more)	791	17	25,621	4,602	2.1%	0.8%	20.2%	25.9%	1507.1	270.7
Total	178,030	2,116	140,837	18,954	1.2%	100.0%	100.0%	100.0%	66.6	9.0

(Source: NETS and Authors' Calculation)

[4] These percentages should interpreted with some caution. Because we excluded all firms with 1 to 2 employees in our definition of HGF, it is possible that we excluded some genuine HGFs that may be in the category of 1-4 employees.

Industry Characteristics of High Growth Firms

Previous studies found HGFs are not concentrated in any particular industry (Henrekson and Johansson, 2010, Clayton et al., 2013). Our analysis (Table 5) confirms this finding for Georgia, although the proportions are somewhat different from comparable national data. In 2006-2009, industry shares of HGFs in Georgia were highest in construction (14.2 percent), professional services (13.4 percent), health care services (10.7 percent), retail (10.5 percent), manufacturing (9.5 percent), and wholesale trade (8.7 percent). The combined share of HGFs in these sectors was 67 percent in the period of 2006 -2009. This is larger than the share of all firms in these sectors (56 percent). The combined share of HGF job creation from HGFs in these industries was also 56 percent.

We also examined the share of HGFs in various sectors as a percent of all firms in Georgia (Table 5, Column 6). We found that there was relatively little variation across industries. Firms in construction (1.7 percent), manufacturing (1.8 percent), wholesale trade (1.6 percent), transportation and warehousing (1.4 percent), information (1.6 percent), management of companies (2.0 percent), and professional services (1.5 percent) have a slightly higher chance of becoming HGFs.

Next, we classified HGFs by whether or not they were in a sector that had a significant exposure to international trade.[5] The tradable industry group consists of a large segment of the manufacturing sector and some components of the retail, information, financial, and health care sectors. According to this classification, 24.5 percent of all firms in 2006 were in a tradable industry. As shown in Table 6, 21.8 percent of HGFs (461 in 2113 HGFs) were in the tradable industry in 2006-2009 period and 78.2 percent were in the non-tradable industry. There is not much difference between tradable and non-tradable industry groups when classified HGFs as a percent of total firms: 1.1 percent of tradable and 1.2 percent of non-tradable. While the share of jobs created by non-tradable HGFs is higher among HGFs, the average job creation by HGFs is somewhat higher in the tradable group. This may be due to that fact that the majority of manufacturing is allocated to tradable industry, and manufacturing firms are larger than average.

[5] Tradable industry includes agriculture, mining, most of manufacturing, and part of business services. The tradable industry classification is from Spence and Hlatshwayo (2011).

Table 5: High Growth Firm by NAICS in the period of 2006 – 2009

Industry	Total number of firms in base year	Number of HGFs	Job creation from HGFs	Sales growth from HGFs ($M)	Share of HGFs in total firms	Share of HGFs by NAICS	Job Creation of HGFs by NAICS	Sales Growth of HGFs by NAICS	Average number of job creation by NAICS	Average Sales Growth by NAICS ($M)
Agriculture	1,740	14	387	67	0.8%	0.7%	0.3%	0.4%	27.6	4.8
Mining	197	2	76	18	1.0%	0.1%	0.1%	0.1%	38.0	8.9
Utilities	273	5	207	80	1.8%	0.2%	0.2%	0.4%	41.4	16.0
Construction	17,247	300	10,030	2,239	1.7%	14.2%	7.9%	12.6%	33.4	7.5
Manufacturing	10,841	201	16,185	3,040	1.9%	9.5%	12.8%	17.1%	80.5	15.1
Wholesale trade	11,368	183	9,098	2,378	1.6%	8.7%	7.2%	13.4%	49.7	13.0
Retail trade	23,360	222	17,181	2,001	1.0%	10.5%	13.6%	11.3%	77.4	9.0
Transportation and warehousing	5,277	74	11,921	1,771	1.4%	3.5%	9.4%	10.0%	161.1	23.9
Information	4,157	67	3,178	340	1.6%	3.2%	2.5%	1.9%	47.4	5.1
Finance and insurance	8,368	81	6,290	1,000	1.0%	3.8%	5.0%	5.6%	77.7	12.3
Real estate	8,863	63	5,872	816	0.7%	3.0%	4.6%	4.6%	93.2	13.0
Professional services	19,067	284	12,504	1,548	1.5%	13.4%	9.9%	8.7%	44.0	5.4
Management of companies	254	5	667	62	2.0%	0.2%	0.5%	0.4%	133.4	12.5
Administrative services	17,265	155	12,836	1,429	0.9%	7.3%	10.1%	8.1%	82.8	9.2
Educational services	1,186	15	1,121	89	1.3%	0.7%	0.9%	0.5%	74.7	6.0
Health care and social assistance	17,625	226	6,345	397	1.3%	10.7%	5.0%	2.2%	28.1	1.8
Arts, entertainment, and recreation	3,266	41	1,934	91	1.3%	1.9%	1.5%	0.5%	47.2	2.2
Accommodation and food services	13,884	111	9,217	275	0.8%	5.3%	7.3%	1.6%	83.0	2.5
Other services (except public administration)	13,790	64	1,533	107	0.5%	3.0%	1.2%	0.6%	24.0	1.7
Total for all sectors	178,028	2,113	126,582	17,747	1.2%	100.0%	100.0%	100.0%	59.9	8.4

(Source: NETS and Authors' Calculation)

Table 6: High Growth Firms by Tradable and Non-Tradable Industry in the Period of 2006 – 2009

	Total number of firms in the base year	Number of HGFs	Job creation from HGFs	Share of HGFs in total firms	Share of HGFs by type	Job Creation of HGFs by type	Average Job Creation
Tradable	43,597	461	30,590	1.1%	21.8%	24.2%	66
Non-Tradable	134,431	1,652	95,992	1.2%	78.2%	75.8%	58

(Source: NETS and Authors' Calculation)

Organization and Ownership Characteristics

The organization and ownership is another important dimension in HGFs. For example, we can compare the difference in job creation between Georgia-headquartered and non-GA-headquartered HGFs. This distinction relates to the debate on whether regional economic development policy should focus on attracting outside firms or incubating new local firms. We examined HGFs in terms of whether their headquarters are located in Georgia or not, whether they are single- or multi-establishment firms, and whether they are foreign-owned or not.[6]

Table 7 shows that the vast majority (87 percent) of HGFs operating in Georgia have their corporate headquarters in Georgia. However, only 60 percent of the job creation by HGFs came from Georgia-based HGFs. Although non-Georgia-based HGFs are only 13 percent of all HGFs, their contribution to job creation is disproportionally large. We observe a similar pattern for average job creation. Non-Georgia-based HGFs created 182 on average, while the respective figure for Georgia-based HGFs was 42 jobs. This result appears to be attributable to the fact that 73 percent of non-Georgia-based HGFs were multi-establishment firms (within Georgia) and only 8 percent of Georgia-based HGFs were multi-establishment (within). In addition, non-Georgia-based firms are more likely to be HGFs. The share of non-Georgia-based HGFs in all non-Georgia-based firms operating in Georgia is 3.0 percent (273 in 9,083 firms) while the share of Georgia-based HGFs in all Georgia-based firms is 1.1 percent (1,840 in 168,945 firms).

Table 7: High Growth Firm by Organization Type and Ownership in the Period of 2006 - 2009

	Total Number of Firms in 2006	Total Number of Employment	Number of HGFs	Total Number of Job Creation	Share of HGFs in total firms (Base Year 2006)	Share of Job Creation in Total Employment (Base Year 2006)	Average Job Creation
All	178,029	3,789,879	2,113	126,582	1.2%	3.3%	60
Georgia-based	168,945	2,533,863	1,840	76,858	1.1%	3.0%	42
Non-GA-based	9,084	1,256,016	273	49,724	3.0%	4.0%	182
Multi-Establishment	8,846	1,980,217	349	65,973	3.9%	3.3%	189
Georgia-headquartered	5,914	916,652	150	19,837	2.5%	2.2%	132
Non-GA-headquartered	2,932	1,063,565	199	46,136	6.8%	4.3%	232
Single-Establishment	169,183	1,809,662	1,764	60,609	1.0%	3.3%	34
Georgia-based	163,031	1,617,211	1,690	57,021	1.0%	3.5%	34
Non-GA-based	6,152	192,451	74	3,588	1.2%	1.9%	48
Foreign-owned	1,566	223,604	83	12,245	5.3%	5.5%	148
Multi-Establishment	510	169,003	45	9,134	8.8%	5.4%	203
Single-Establishment	1,056	54,601	38	3,111	3.6%	5.7%	82

(Source: NETS and Authors' Calculation)

[6] The hierarchical structure of firms in NETS includes the relationship between headquarter and division office/branch plants as well as relationship of financial ownership. For the definitions relating to the structure of firms in the NETS data see http://youreconomy.org/downloads/HQsInNETSDatabase.pdf.

Even though only 17 percent of HGFs are multi-establishment firms (349 out of 2,113 HGFs), they accounted for 52 percent of the job creation by all HGFs (65,873 of 126,582 jobs). Moreover, we find that multi-establishment firms are more likely to be a HGF. The share of multi-establishment HGFs in all multi-establishment firms is 3.9 percent compared with 1.0 percent for single-establishment HGFs.[7]

In terms of domestic versus foreign ownership, we find that while less than 1 percent of all firms in Georgia were foreign owned in 2006, the foreign-owned HGFs were 4 percent of all HGFs in the period of 2006-2009 (83 in 2,113 HGFs). The share of foreign-owned HGFs in total foreign-owned firms was 5.3 percent and the share of multi-establishment foreign-owned HGFs in total multi-establishment foreign-owned firms was 8.8 percent. Foreign-owned HGFs created 148 jobs on average. To disaggregate further, foreign-owned multi-establishment HGF created 203 jobs on average and foreign-owned single-establishment HGF created 82 jobs.

In summary, this descriptive analysis reveals several characteristics of Georgia HGFs. These characteristics are broadly similar to those found in comparable analysis of national data. We found that the small number of HGFs disproportionally contributed to job creation in Georgia, but the number of HGFs declined during 2000s. Georgia HGFs tend to be young, and the majority of them are relatively small. However, average job creation generally increases with age and size. We also found that HGFs are located in every major industrial sector. The ownership and organizational structure was another important aspect. The majority of HGFs are Georgia-headquartered while the average job creation of non-Georgia-headquartered HGFs is significantly higher than that of Georgia-headquartered HGFs.

Persistence of High Growth

One obvious question about high growth is whether it lasts. Are firms classified as HGFs in one period also HGFs in the next period? To look at this, we categorize the subsequent status of HGFs into one of five groups by tracking the employment change in the next three-year period: persistent HGF, moderate growth (growing but at less than high growth rate), no growth, decline, and exit.[8] The results in Figure 9 show that only a small percentage HGFs met the high growth criteria in the next time-period and has declined over time. The percentage of HGFs that did not experience a decline in their employment or exit in the next three-year period ranged from 61-79 percent. This implies that many HGFs at least retained their employment base over the next three-year period. In contrast, 10-20 percent of HGFs lost employment and another 11-20 percent of HGFs exited over the time-period.

[7] There are 6,152 single establishments operating in Georgia whose headquarters are outside of Georgia. We believe those firms are not necessarily single establishment, and they can be part of multi-establishment firms. However, since only Georgia establishment information is available to us, we could not track the structure of those firms. Hence, we assign them in a category of non-Georgia-based single establishment.

[8] Exit includes three possible cases: the firm closes, the firm relocates out of state, or the firm is acquired.

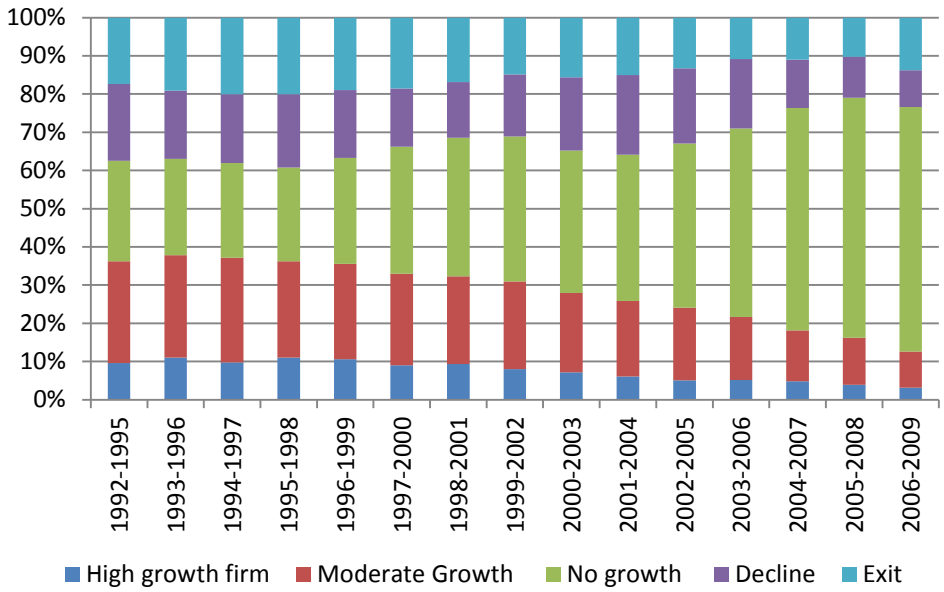


Figure 9: Status of High Growth Firms in a Next Three-year Period
(Source: NETS and Authors' Calculation)

Table 8 shows the average share of HGFs, by industry, that either had continued high growth or exited in the next three-year period. In general, the likelihood of exiting HGF is larger than likelihood of sustaining HGF status. For example, on average, 7.2 percent of manufacturing HFGs were also HGFs in the subsequent three-year period. In contrast, an average of 18 percent of manufacturing HGFs exited during the next three-year period. HGFs within agriculture, mining, education services, as well as healthcare and social assistance had the lowest rate of HGF persistence. Manufacturing, information, finance and insurance, professional, scientific, and technical services, education services had the greatest likelihood of exiting. This analysis suggests that it is high growth is largely a sporadic event, and it is very unusual to maintain high growth momentum.

Table 8: Persistence and Exit of High Growth Firms by Industry

Industry	Percentage of HGFs persisted	Percentage of HGFs exited
Agriculture, forestry, fishing and hunting	3.8%	10.4%
Mining, quarrying, and oil and gas extraction	4.0%	20.0%
Utilities	10.9%	13.4%
Construction	7.2%	12.2%
Manufacturing	7.2%	18.0%
Wholesale trade	7.6%	16.6%
Retail trade	8.5%	14.4%
Transportation and warehousing	7.6%	15.2%
Information	9.9%	22.4%
Finance and insurance	7.9%	19.5%
Real estate and rental and leasing	7.4%	12.6%
Professional, scientific, and technical services	9.0%	17.4%
Management of companies and enterprises	11.3%	13.2%
Administrative and support and waste management and remediation services	8.5%	16.6%
Educational services	5.7%	17.6%
Health care and social assistance	5.1%	13.1%
Arts, entertainment, and recreation	4.9%	15.7%
Accommodation and food services	6.6%	13.6%
Other services (except public administration)	5.3%	13.2%
Total	7.5%	15.6%

(Source: NETS and Authors' Calculation)

5. High Growth Firm Characteristics (Sales-based)

In this section, we look at high growth firms using a revenue growth criterion to classify firms whose revenues are growing rapidly. We then look at firms that meet both the employment and sales based HGF criteria, and those that meet only one of the two criteria.

In general, we would expect that sales and employment growth is positively correlated. However, it is possible that a firm would increase payrolls prior to generating sales growth, or have rising sales without adding to payrolls. Therefore, defining HGFs using both employment and sales dimensions may be a useful. The sales-based definition we propose uses the same percentages and thresholds as in the employment based definition. Specifically, we classify businesses as a sales-based high growth firm if sales at firms with 10 or more employees grow more than 72.8 percent over a three-year time-period. For firms with less than 10 employees, we calculate the average sales of all firms with 10 employees, and then use this average sales value as a threshold. That is, if the sales growth rate of firms with less

than 10 employees is greater than 72.8 percent of the average sales of all firms with 10 employees, then we classify them a HGF (sales-based). We deflate all the sales values by the Consumer Price Index.

As shown in Figure 10, the number of firms classified as a HGF (sales-based) was much larger than the number of HGFs (employment-based), especially during the late 1990s. The total number of HGFs (sales-based) was 2,921 in 1989-1992, 4,058 in 1992-1995, and 5,632 in 1995-1998. The corresponding numbers of HGFs (employment-based) were 2,424 in 1989-1992, 3,026 in 1992-1995, and 4,115 in 1995-1998.

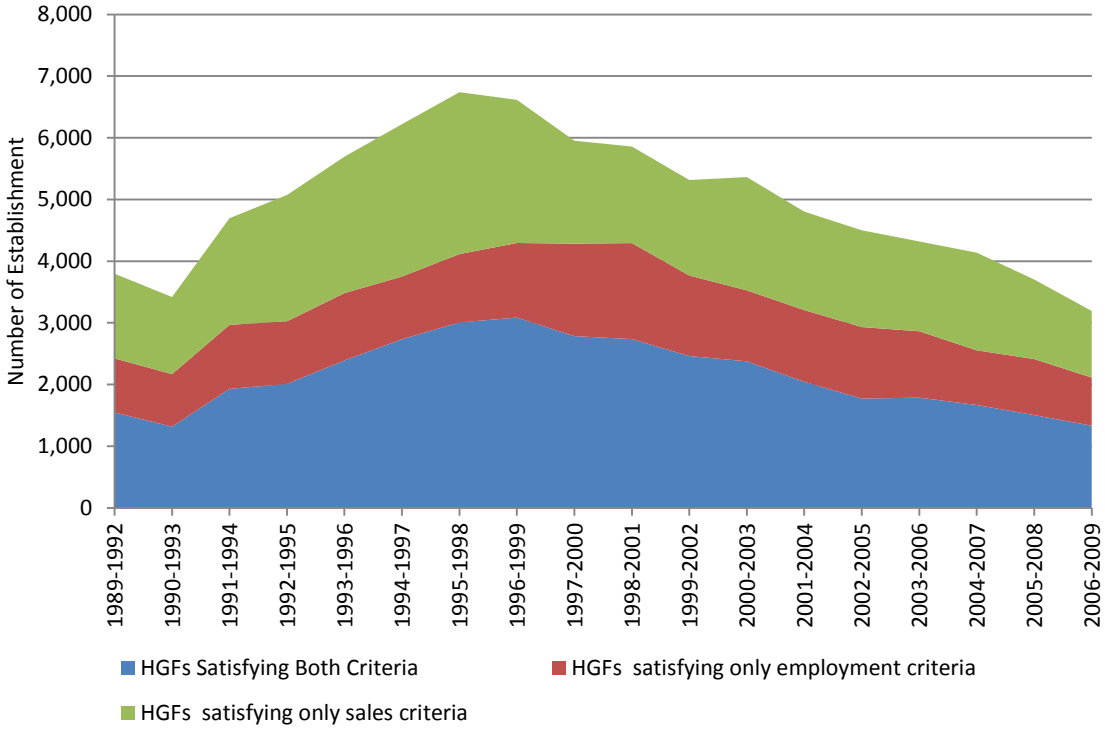


Figure 10: HGFs with Employment and Sales Criteria
(Source: NETS and Authors' Calculation)

Many HGFs (employment-based) were not HGFs (sales-based), and vice versa. For example, 780 of the HGFs (employment-based) were not HGF (sales-based) in 2006-2009. This is about 37 percent (780 in 2,113) of HGFs (employment-based). In contrast, 1,080 HGFs (sales-based) did not satisfy the employment criterion in the same period, about 45 percent (1,080 in 2,413) of HGFs (sales-based).

We also compared the average job creation by HGFs satisfying the different criteria (Table 9). The average job creation by HGFs (employment-based) is greater than for HGFs (sales-based). Over the

whole sample, the average job creation is 74 for HGFs (employment-based) and 56 for HGFs (sales-based). HGFs firms satisfying both criteria have the greatest impact on job creation with an average of 93 jobs per firm. The average job creation by HGFs satisfying only the employment criteria and those satisfying only sales criteria was 39 and 11 jobs, respectively.

Table 9: Average Job Creation of High Growth Firms with Different Criteria[9]

Period	Average Job creation by Criteria				
	From HGFs of employment criteria	From HGFs of sales criteria	From HGFs satisfying both criteria	From HGFs satisfying only employment criteria	From HGFs satisfying only sales criteria
1989-1992	78	58	98	44	13
1990-1993	95	73	130	40	13
1991-1994	92	65	115	50	10
1992-1995	72	49	87	44	12
1993-1996	74	51	91	37	9
1994-1997	67	48	82	29	11
1995-1998	66	48	80	28	11
1996-1999	74	56	88	39	14
1997-2000	84	69	105	45	9
1998-2001	93	83	123	40	13
1999-2002	87	73	105	55	23
2000-2003	72	55	89	38	10
2001-2004	71	55	90	37	10
2002-2005	72	54	96	34	6
2003-2006	66	47	81	40	4
2004-2007	57	37	68	36	5
2005-2008	57	43	69	37	12
2006-2009	60	46	78	30	7
Average	74	56	93	39	11

(Source: NETS and Authors' Calculation)

The differences in the average job creation by HGFs based on different classification criteria may be partly due to variation in the size distribution of HGFs within groups. As shown in Table 10, 45 percent

[9] The second column (from HGFs of employment criteria) in Table 9 represents a group of firms that satisfy employment criterion, so that some of them also satisfy the sales criterion. A subset of those firms is firms in the fifth column (from HGFs satisfying only employment criteria) which only satisfy the employment criterion, but do not satisfy sales criterion. The firms in the third column (from HGFs of sales criteria) are a group of firms that satisfy the sales criteria and the employment criteria. A subset of the third column is firms in the last column (from HGFs satisfying only sales criteria) which only satisfying sales criterion, but do not satisfy employment criteria.

of HGFs with less than 10 employees satisfy both criteria, but the percentage of those satisfying only the employment criterion was 71 percent. In addition, the average job creation of HGFs satisfying only the employment criteria is 14 jobs each for both size 1-4 and size 5-9 firms. In contrast, the average job creation of those satisfying both criteria is 30 jobs in size 1-4 and 29 jobs within size 5-9 firms. This suggests that small firms that have grown rapidly both in sales and employment have stronger job creation effect than other high growth small firms.

Table 10: Comparison of High Growth Firms with Different Criteria by Size in 2006 – 2009 Period

	HGFs: satisfying both employment & sales criteria				HGFs: satisfying only employment criteria				HGFs: satisfying only sales criteria			
Size	Number of HGFs	Job Creation	Share of HGFs by size	Average Job Creation	Number of HGFs	Job Creation	Share of HGFs by size	Average Job Creation	Number of HGFs	Job Creation	Share of HGFs by size	Average Job Creation
a) 1 to 4	271	8,027	20.3%	30	267	3,628	34.2%	14	177	468	16.4%	3
b) 5 to 9	333	9,690	25.0%	29	291	4,000	37.3%	14	295	629	27.3%	2
c) 10 to 19	376	15,907	28.2%	42	106	2,368	13.6%	22	271	425	25.1%	2
d) 20 to 49	202	15,726	15.2%	78	66	2,210	8.5%	33	189	537	17.5%	3
e) 50 to 99	77	10,477	5.8%	136	22	1,684	2.8%	77	78	458	7.2%	6
f) 100 to 249	45	11,601	3.4%	258	20	3,747	2.6%	187	43	1120	4.0%	26
g) 250 to 499	16	8,621	1.2%	539	4	3,275	0.5%	819	15	1089	1.4%	73
h) 500 to 999	8	6,409	0.6%	801	4	2,211	0.5%	553	4	631	0.4%	158
i) 1000	5	17,001	0.4%	3,400	0	0			8	1700	0.7%	213
Total	1,333	103,459	100.0%	78	780	23,123	100.0%	30	1,080	7057	100.0%	7

(Source: NETS and Authors' Calculation)

Overall, the application of sales criteria shows that fast revenue-growing firms are not necessarily fast employment-growing firms. Almost half of HGFs that satisfy the sales criteria do not meet employment criteria. Job creation contribution of firms only satisfying sales criteria is significantly lower than that of firms that satisfy both criteria.

6. High Growth Establishments (Employment-based)

In prior section, our unit of analysis was firm, comprising single or multiple establishments. Our firm-level analysis overlooks locational dimension of high growth by aggregating information of establishments of multi-establishment firms into a single unit. To look at the location pattern of high growth events, we changed the unit of analysis to the establishment. Not all of the establishments within a multi-establishment HGF are necessarily high growth establishments (HGEs). It is also possible that some multi-establishment firms that are not HGFs do have some HGEs.

Table 11 shows that the number and proportion of HGEs follows a broadly similar pattern over time to that of HGFs. In particular, the incidence of HGEs increased in the 1990s and declining over the 2000s.

As expected, job creation was lower in the establishment-level analysis than at the firm level. The average job creation ranged from 44-57 jobs per HGE, versus 60-93 jobs per HGF. The smaller total and average job creation at the establishment level is likely attributable to the fact that establishment level analysis does not consider the simultaneous expansion of multiple locations within a firm.

Table 11: High Growth Establishments in Georgia

Period	Total number of establishments in the base year	Total number of employment in the base year	Number of HGEs	Job creation by HGEs	Share of HGEs in total establishments	Share of job creation by HGEs in total employment	Average Job Creation by HGEs
1989-1992	117,924	2,605,190	2,293	114,125	1.9%	4.4%	50
1990-1993	117,522	2,582,014	1,797	91,109	1.5%	3.5%	51
1991-1994	117,077	2,559,811	2,313	112,832	2.0%	4.4%	49
1992-1995	123,577	2,713,393	2,696	128,581	2.2%	4.7%	48
1993-1996	124,931	2,724,712	2,974	132,996	2.4%	4.9%	45
1994-1997	155,498	2,981,199	3,651	174,038	2.3%	5.8%	48
1995-1998	158,843	2,997,493	4,084	204,856	2.6%	6.8%	50
1996-1999	165,184	3,115,341	4,276	228,020	2.6%	7.3%	53
1997-2000	170,086	3,238,671	4,124	232,064	2.4%	7.2%	56
1998-2001	168,117	3,298,582	4,090	228,070	2.4%	6.9%	56
1999-2002	166,685	3,458,137	3,800	211,707	2.3%	6.1%	56
2000-2003	179,494	3,672,745	3,795	196,781	2.1%	5.4%	52
2001-2004	217,347	3,832,805	3,719	210,901	1.7%	5.5%	57
2002-2005	193,337	3,633,665	3,349	189,026	1.7%	5.2%	56
2003-2006	189,548	3,528,332	3,285	182,863	1.7%	5.2%	56
2004-2007	185,075	3,508,722	2,861	146,016	1.5%	4.2%	51
2005-2008	201,658	3,563,940	2,631	134,229	1.3%	3.8%	51
2006-2009	212,997	3,616,154	2,144	94,136	1.0%	2.6%	44

(Source: NETS and Authors' Calculation)

We next compared the spatial distribution of HGEs between metro Atlanta and non-metro Atlanta counties.[10] The results summarized in Table 12 show that HGEs are disproportionally concentrated in metro Atlanta, even after controlling for population differences. Whereas between 43-45 percent of the total labor force in Georgia is located in metro Atlanta on average, the share of job creation by HGEs in metro Atlanta was between 61 -65 percent on average . The ratio of HGEs to the labor force as well as HGE job creation varied over time, peaking in the 1998-2001 period, and was uniformly higher in metro Atlanta than in the rest of the state.

Figure 11 shows the location patterns of high growth establishments and the associated job creation by county. The number of HGEs and HGE job creation is concentrated mostly in the Metro Atlanta region

[10] The definition of metro Atlanta we use here are the 10 counties: Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry and Rockdale.

as shown in two top rows of maps. The maps on the bottom two rows of the figure control for county size and show that HGEs and HGE job creation is largely concentrated in metropolitan areas in the state.

Table 12: High Growth Establishments in Metro Atlanta and Non-Metro Atlanta

	Metro Atlanta			Non-Metro Atlanta		
	1990-1993	1998-2001	2006-2009	1990-1993	1998-2001	2006-2009
Total Labor Force	1,432,341	1,825,508	2,134,227	1,867,817	2,203,740	2,588,110
Share of Labor Force in Georgia	43.4%	45.3%	45.2%	56.6%	54.7%	54.8%
Number of High Growth Establishments	1,078	2,494	1,324	719	1,596	820
Share of HGEs in Georgia	60.0%	61.0%	61.8%	40.0%	39.0%	38.2%
HGEs per thousand labor force	0.75	1.37	0.62	0.38	0.72	0.32
Share of Job Creation in Georgia	65.0%	61.1%	64.5%	35.0%	38.9%	35.5%
Job Creation by HGEs	59,194	139,298	60,737	31,915	88,772	33,399
Job Creation per thousand labor force	41	76	28	17	40	13

(Source: NETS, Bureau of Labor Statistics, and Authors' Calculation)

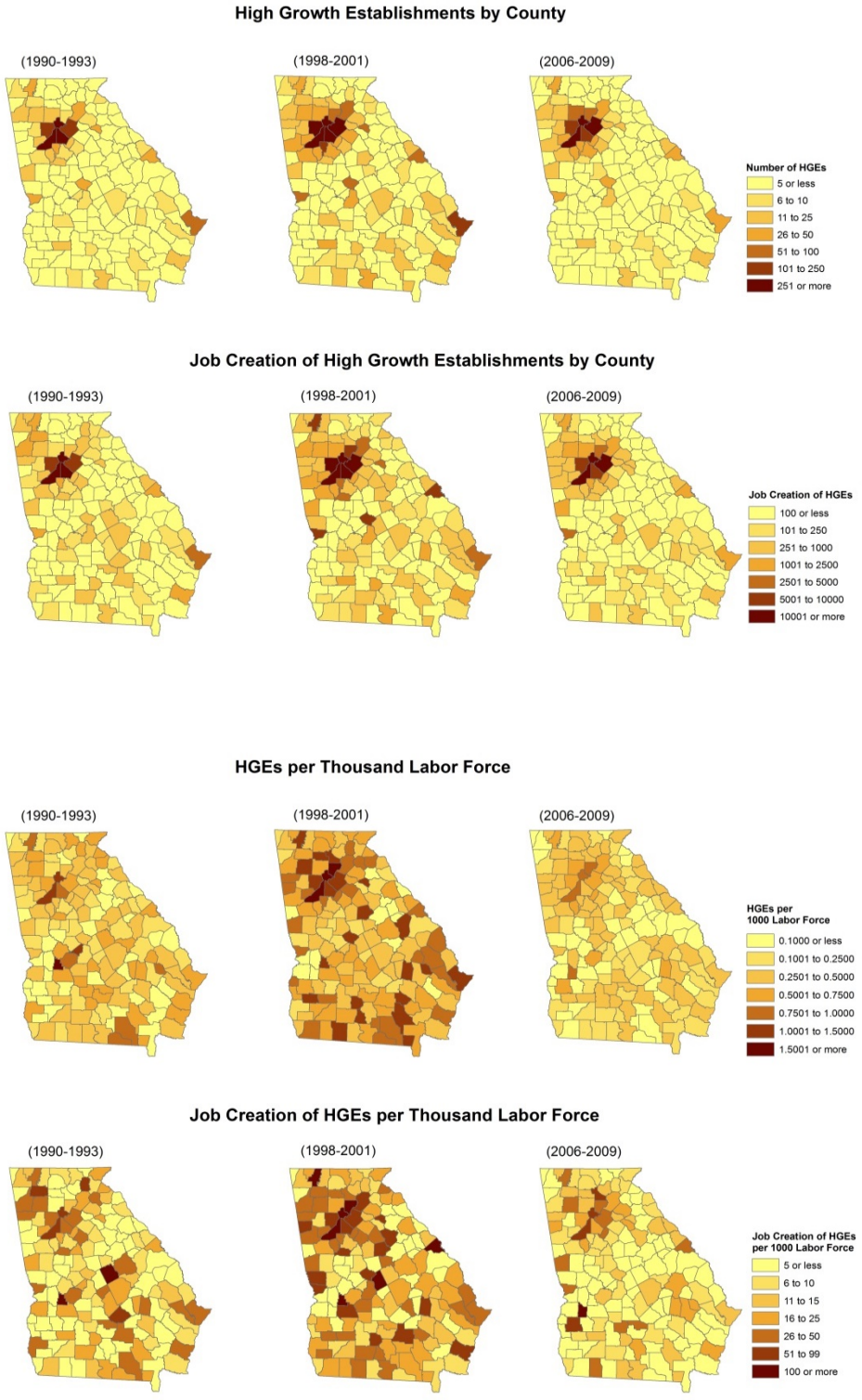


Figure 11: High Growth Establishment in Georgia

7. Conclusion

This study attempts to document the characteristics and impact of fast growing businesses in Georgia. Using a standard definition of high employment growth to classify firms as high growth, we identify and track the direct employment contribution of high growth firms in Georgia over 20 years from 1989 to 2009 using longitudinal data from the National-Establishment Time-Series dataset.

We found that only a small fraction of firms satisfied the employment-based high growth criteria in any year, but these rapidly growing firms made a disproportionally large contribution to overall job creation in the state. We discovered that, as in the U.S. as a whole, the number of high growth firms and their average job creation has weakened during last decade in Georgia. High growth events have been occurring less frequently and the per-firm job creation has declined.

We found that high growth firms occur in every broad industry category, and that there are about as many young high growth firms (less than 5 years old) as older high growth firms. However, job creation is greater at older high growth firms. With respect to the size, over three-quarters of high growth firms have fewer than 20 employees. However, these small high growth firms also have smaller average job creation than their larger counterparts. Overall, these findings are consistent with the stylized patterns for high growth firms seen in studies such as Henrekson and Johansson (2010) and Clayton at al. (2013).

The organizational structure and type of ownership were important attributes of Georgia high growth firms. The multi-establishment, non-Georgia-headquartered, and foreign-owned firms are more likely to be high growth and to create relatively more jobs. We also found that the persistent of high growth is relatively rare, with high growth firms more likely on average to exit than experience a continuation of high growth. In terms of location, we found that high growth establishments are generally more concentrated in metropolitan areas of the state, even after controlling for population size.

An analysis focusing on firms with rapid sales revenue growth reveals that fast revenue-growing firms are not necessarily fast employment-growing firms. Almost half of the firms satisfying the sales criteria we use do not meet the corresponding employment criteria. Therefore, a focus on employment growth may not fully capture the economic impact of a fast growing firm.

The present study provides some stylized facts about high growth firms, but does not provide an analysis of the reasons for the variations found across size, age, industry, and over time. For example, we see a steady gradual decline of high growth events over time. The analysis revealed that the decline took place in almost every industry category. A further analysis would be required to identify the factors that can explain this apparent general loss of high growth momentum. Moreover, because high growth is generally not persistent over time, it would be important to know how a period of high growth affects the survival characteristics of a firm. Finally, we also noted that high growth is spatially not uniformly distributed. The spatial variation in the location of fast growing businesses may help explain variation in economic performance of a local economy. Although the direct employment impacts of high growth businesses are reasonably clear, it would be interesting to study the spillover effects of these types of businesses on aspects of the local economy, such as incomes and overall employment.

Appendix 1

Assessment of Employment Change in NETS

Since the primary focus of the study is employment growth, we investigated the accuracy of employment data in the NETS data. For assessment of the quality of employment change in the Georgia NETS data, we followed the assessment procedure of Neumark et al. (2005). They pointed out that the employment change caused by expansion and contraction is under-reported in the NETS data. The reporting practice of employment and the imputation of missing data are two potential sources of infrequent employment change in the NETS. According to the Walls & Associates description of the NETS data, an employment change is recorded when the change appeared to be significant or permanent.[11] The rounding of employment may also be associated with the infrequent change of employment. Many of the employment counts appear to be a rounded number. The number of cases of establishments with 10, 20, 50, 100, 150, 200, or 500 employees seems disproportionally high as Figure A1 shows. For example, the percentage of establishments with 20 employees is about 5 percent in the left graph of Figure A1 while the percentage of establishments with 19 and 21 employees drops down to about 1 percent. We conjecture that some businesses that have around 20 employees, report their employee count as 20. Imputation of missing values of employment data may be another reason of infrequent change of employment. The missing observations are replaced by estimates in the NETS data via simple straight line-fitting or using information of a medium-size relevant branch in a case of a multi-establishment firm, or a medium-size establishment of 8-digit industry sector in a case of a single establishment. In each year, D&B and Walls & Associates estimate between 28 and 54 percent of the employment counts. For those reasons, we believe that the NETS data is less likely to capture the year-to-year small incremental employment change in an establishment and therefore it may bring about an under-estimated measurement of employment change of expanding and contracting firms where the year-to-year employment change is relatively small.

[11] Walls & Associates, Understanding Data in the NETS Database, http://youreconomy.org/downloads/NETS_UnderstandingData2009.pdf

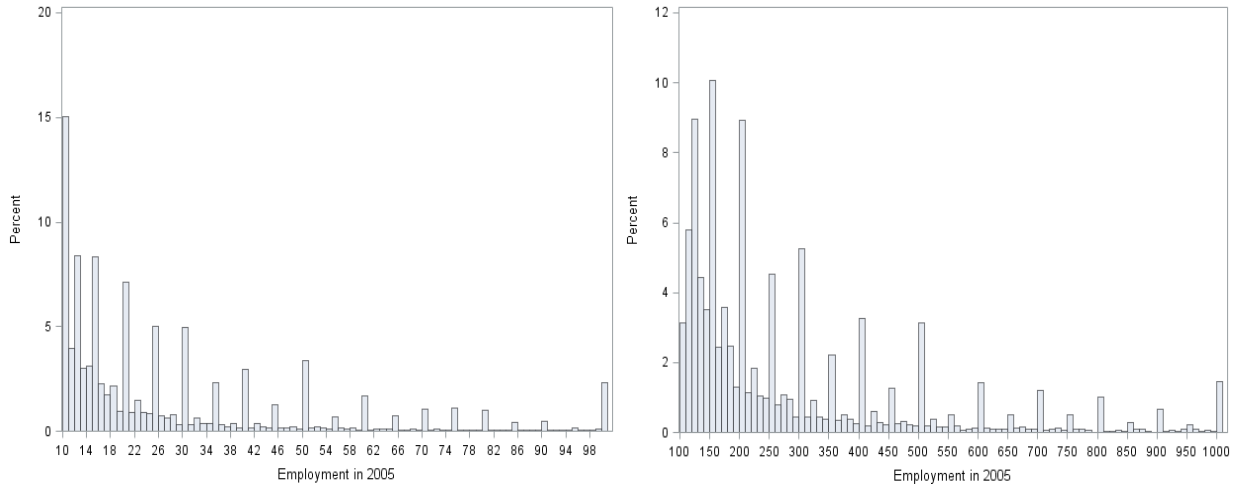


Figure A1: Percent of number of employees in 2005
(Source: NETS and Authors' Calculation)

With regard to the problem of infrequent employment change, we assess the reliability of the NETS data by testing both one-year-period and three-year-period employment changes. While the NETS data would be less likely to capture a year-to-year employment change, if we extend a measurement period of employment change, we expect a number of establishments that report the employment change would increase mainly because three-year employment change is more likely to avoid a problem of rounding and imputation. We compare county-level employment change of the NETS data and the QCEW for one-year and three-year time periods in order to examine the possibility that the NETS data do not compare well with other data sources. As shown in Figure A2, one-year employment changes of the NETS data and the QCEW data do not correspond very well. However, for a three-year period, the variation of employment change becomes larger in the NETS, improving the comparison. While the correlation of a one-year period employment change between the NETS and the QCEW is 0.46, the correlation of a three-year period is 0.71, indicating a significant improvement in correspondence between the two data sets when we use a three-year time period.

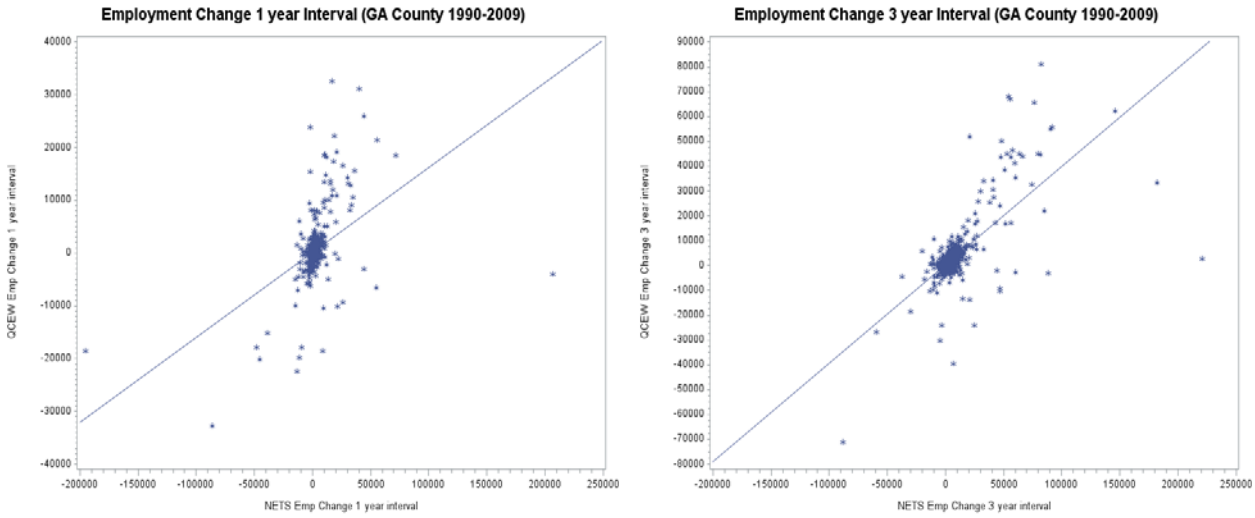


Figure A2: Employment Change in One-Year and Three-Year Period
(Source: NETS and Bureau of Labor Statistics, and Authors' Calculation)

We also checked for abnormal employment changes in the NETS data – a change of more than 1,000 employees in a year. For example, if an establishment reported 5 employees in one year, 1,500 in the next year, and then 5 again in the year after, we suspect it could be reporting error. Although they are a small number of abnormal employment changes in the Georgia NETS, this could bias our measurement of HGFs and some of our estimations. For those firms, we search employment information in other sources such as business directory and company websites. In cases that we were not able to find reasonable information for abrupt change of employment, we replaced outliers by average employment of previous and next years.

Method for Aggregation and Longitudinal Linkage of Establishment Data

The establishment is the basic unit in NETS database. Each establishment has a unique headquarter identification (HQ ID) for every year. We aggregated establishments with a same HQ ID into one firm, and created relevant firm-level variables as follows.

- Employment and sales: we aggregated a number of employees and sales values of establishments with a same HQ ID in each year. Some of establishments may relocate into or out of Georgia. For example, assuming one plant in a multi-establishment firm operated in Georgia during 1995-2000, relocated to other state in 2001, and operated there during 2001-2005, when we aggregated employment information of this multi-establishment firm, we excluded the number of employees of the relocated plant during 2001-2005. We only account for employment located in Georgia.
- Industry code: as a firm may produce multiple types of products in different location of their plants, the industry classification code would be different across establishments within a firm.

When there is different industry classification code in the aggregated establishments, we take an industry classification code of establishments with the largest number employees. Both the Standard Industrial Classification (SIC) and the North America Industry Classification Systems (NAICS) are available in the NETS. We used the 6-digit NAICS.

- Ownership: we distinguish single- and multi-establishment firms. We created a new variable that represents a number of establishments in a firm during aggregation. If this variable is greater than one, we assigned them as a multi-establishment firm. The others are single-establishment firms.
- Age: we assigned age 0 at a year when an establishment first has a positive number of employees in the NETS data. When we aggregate establishments with different beginning years, the age of the firm is the age of the oldest establishment.
- Headquarter location: the NETS data provides location information of the headquarters. When the address of headquarter is not in Georgia, we assigned them as a non-Georgia-headquartered firm.

Since the employment growth from mergers and acquisitions is not new job creation from a perspective of Georgia, we attempted to control firm's employment growth generated from mergers and acquisitions in the high growth analysis. The following is a brief description of the procedure we followed to try to control for mergers and acquisitions. Let us assume two establishments A and B with 10 employees respectively. Both these establishments started in 2001. Then A merged B in 2003, and there is no within establishment employment growth in both from 2001 and 2004. For 2001–2004, firm A would be classified as a high growth firm because the number employees increased from 10 in 2001 to 20 in 2004 due to merger. To avoid this, we count a hypothetical number of employees of firm A in 2001 as though firm B is already a part of firm A in 2001. Although firm B had not actually merged yet in 2001, a number of employees of firm A in 2001 is 20 if we treat firm B is part of firm A in 2001. In this hypothetical employment count of a base year, firm A is not classified as a high growth firm. More generally, we aggregated establishments using the headquarters ID information of the end year in the three-year period, instead of the base and end years. In other words, a number of employees in the base and end years are aggregated by the same end-year headquarters ID. Through this approach, we are more likely to be capturing the direct employment growth of a multi-establishment firm. The methodological issue of longitudinal linkage algorithms of establishment data is discussed in Pinkston and Spletzer (2002), for example.

Appendix 2

1-2 Employee Businesses

As discussed in the data section, we excluded firms with 1 to 2 employees from the analysis to improve comparability of the data over time. However, it is possible that some of these micro-businesses would meet the high growth criteria. The results in Table A1 show that a very small portion of businesses with 1-2 employees would have meet the high growth criteria. The percentage of firms with 1-2 employees in total firms with 1-2 employees that became HGFs ranged from 0.4 percent to 1.2 percent over the time-period considered. Their average job creation was about 20 to 35 in the 2000s. The share of job creation by these firms in total employment at 1-2 employee businesses grew to more than 30 percent of employment in the late 1990s, although it declined substantially during the 2000s.

Table A1: High Growth Businesses with 1-2 Employees in a Base Year

Period	Total number of businesses of size 1 -2 (base Year)	Total employment of size 1 -2 (base year)	Number of HGFs(1–2)	Job creation of HGFs(1–2)	Average Job creation	HGFs(1-2) share of all firms size 1-2	Share of HGF(1-2) job creation in total employment (of businesses of size 1 – 2)
1989-1992	37,218	58,893	329	8,242	25	0.9%	22.1%
1990-1993	38,186	60,152	198	8,887	45	0.5%	23.3%
1991-1994	39,724	62,103	297	6,617	22	0.7%	16.7%
1992-1995	41,904	65,199	349	8,011	23	0.8%	19.1%
1993-1996	43,977	68,068	515	11,074	22	1.2%	25.2%
1994-1997	55,622	85,908	562	11,608	21	1.0%	20.9%
1995-1998	60,120	92,100	658	16,993	26	1.1%	28.3%
1996-1999	67,791	102,514	681	18,346	27	1.0%	27.1%
1997-2000	77,299	115,718	761	21,229	28	1.0%	27.5%
1998-2001	80,840	120,370	794	25,685	32	1.0%	31.8%
1999-2002	79,533	119,017	759	26,089	34	1.0%	32.8%
2000-2003	83,545	125,651	794	28,065	35	1.0%	33.6%
2001-2004	118,823	182,467	779	21,664	28	0.7%	18.2%
2002-2005	187,264	285,367	1,229	29,473	24	0.7%	15.7%
2003-2006	202,450	309,153	1,349	31,633	23	0.7%	15.6%
2004-2007	247,856	377,836	1,708	36,284	21	0.7%	14.6%
2005-2008	342,537	520,448	1,789	35,452	20	0.5%	10.3%
2006-2009	372,697	567,569	1,367	32,632	24	0.4%	8.8%

(Source: NETS and Authors' Calculation)

References

Acs, Z. J., Parsons, W., & Tracy, S. (2008). *High-Impact Firms: Gazelles Revisited.* Small Business Administration. Washington, DC

Bos J. & Stam E. (2011). *Gazelles, Industry Growth and Structural Change.* Discussion Paper Series nr: 11-02: Tjalling C. Koopmans Research Institute.

Bosma N. & Stam E.(2012). *Local Policies for High-Employment Growth Enterprises.* OECD/DBA International Workshop, Copenhagen, March 28, 2012.

Clayton, R. L., Sadeghi, A., Talan, D. M., & Spletzer, J. R. (2013). *High-Employment-Growth Firms: Defining and Counting Them*. Monthly Labor Review.

Daunfeldt, S.-O., Elert, N., & Johansson, D. (2010). *The economic contribution of high-growth firms: Do definitions matter?* Ratio Working Paper 151: The Ratio Institute.

Davis, S., Haltiwanger, J., & Schuh, S. (1996). Small business and job creation: Dissecting the myth and reassessing the facts. *Small Business Economics, 8*(4), 297-315

Henrekson, M., & Johansson, D. (2010). Gazelles as job creators: a survey and interpretation of the evidence. *Small Business Economics, 35*(2), 227-244.

Mason, C., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics, 40*(2), 211-225.

Mohr, V., & Garnsey, E. (2011). How Do High-Growth Firms Grow? Evidence From Cambridge, UK. *Economics, Management, and Financial Markets, 6*(4), 29-59.

National Endowment for Science, Technology and the Arts. (2009). *The Vital 6 Percent.* London, UK.

Neumark, D., Zhang, J., & Wall, B. (2005). *Employment dynamics and business relocation: New evidence from the National Establishment Time Series*. IZA Discussion Papers No. 1774.

Parker, S., Storey, D., & Witteloostuijn, A. (2010). What happens to gazelles? The importance of dynamic management strategy. *Small Business Economics, 35*(2), 203-226.

Pinkston, J. C., & J. R. Spletzer. (2002). *Annual Measures of Job Creation and Job Destruction Created from Quarterly ES-2002 Microdata*. Washington: Bureau of Labor Statistics.

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics, 33*(2), 141-149.

Stangler, D. (2010). *High-Growth Firms and the Future of the American Economy*. Kauffman Foundation Research Series. Kansas City, US.