

Region 2: Roanoke/New River/Lynchburg

*Update on Entrepreneurial Trends:  
Phase 1 Analysis of Startup Activity  
and Firm Dynamics*

August 13, 2021

# Data Sources used for Phase 1 Update of Entrepreneurial Trends of Startup Activity and Firm Dynamics in Your Region's Traded Industry Base

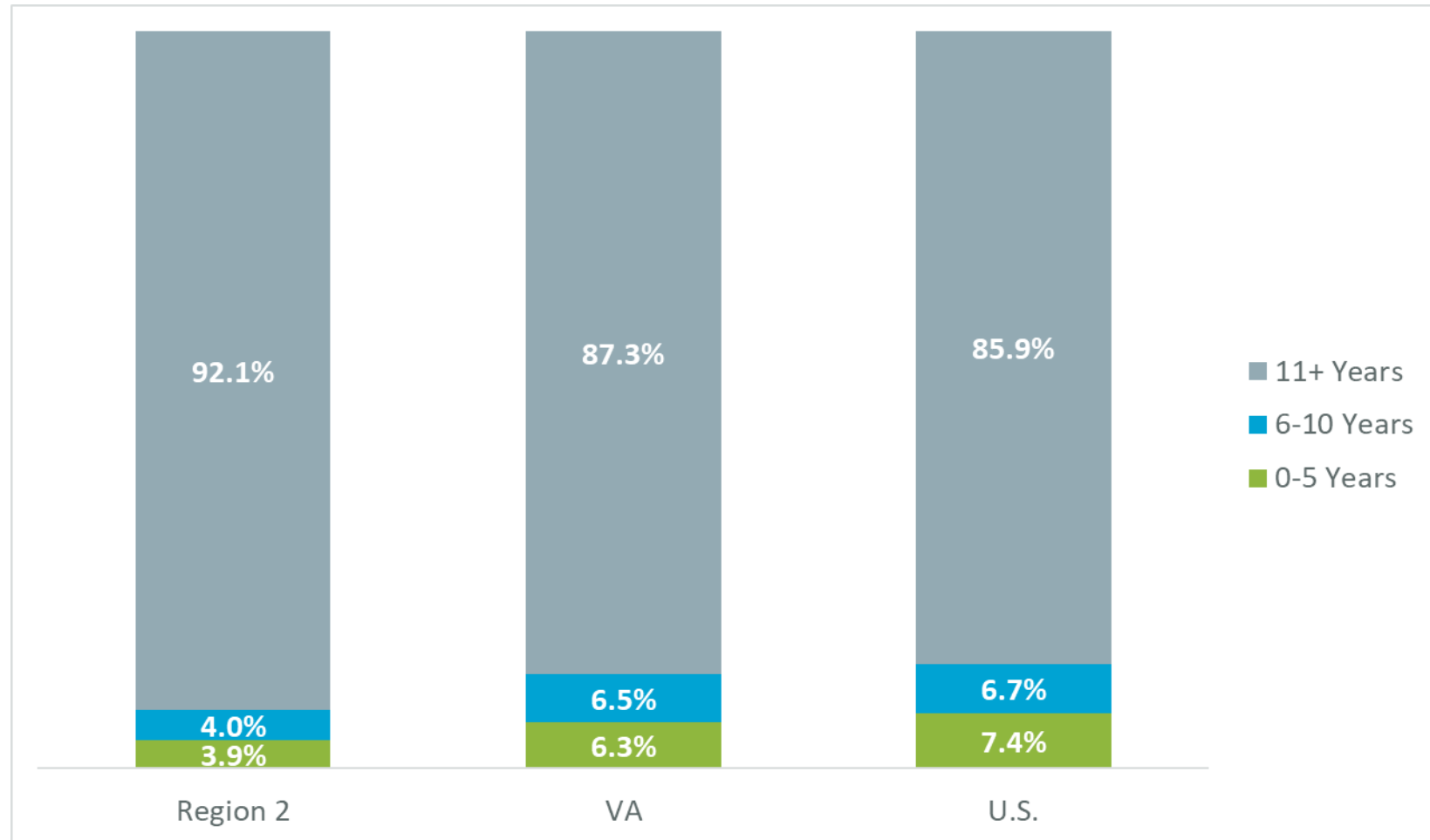
## Two data sources used to provide a full depiction of entrepreneurial dynamics:

- ***The Quarterly Workforce Indicators (QWI) from U.S. Census*** is a longitudinal database with detailed data related to the job creation and other characteristics of firms, including by age groupings.
  - ***Most Detailed Level of Geographic Coverage:*** County
  - ***Coverage:*** Covers over 95% of U.S. private sector jobs (does not cover ag jobs, self-employment)
  - ***Grouping of Employment by Age of Firms:*** 0-1 Years; 2-3 Years; 4-5 Years; 6-10 Years; 11+ Years
  - ***Industry Coverage:*** 2-digit industry, which can define at a high-level traded industries
  - But QWI does not track or provide information on individual firms
  - All data is on a quarterly basis
- **The Business Dynamics Research Consortium (BDRC) database** is a time-series dataset that catalogues individual establishments by location, employment, sales, and industry from 1997 to 2017. The BDRC It is maintained by the University of Wisconsin
  - Coverage: It compiles multiple data sets to track performance and growth for more than 144 million individual businesses across the United States.
  - Provides extensive firm level data
  - Able to identify firm by address
  - Detailed industry coverage

# Regional Employment Distribution by Age of Firm for Traded Industries

- **What is it?** A more “static” look at where current traded industry jobs are found by different firm ages across all traded industries
- **Why it matters?** Makes the point that job retention activities with existing firms are an important component of a region’s economic development strategy

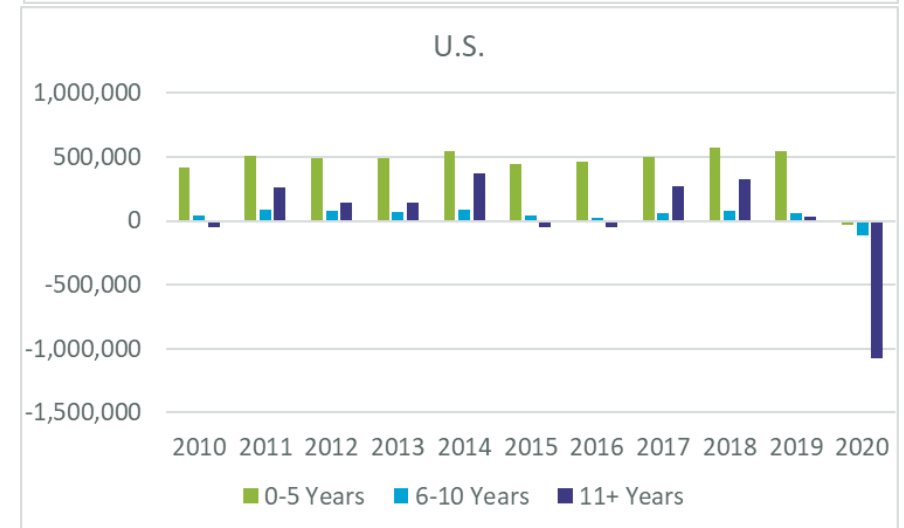
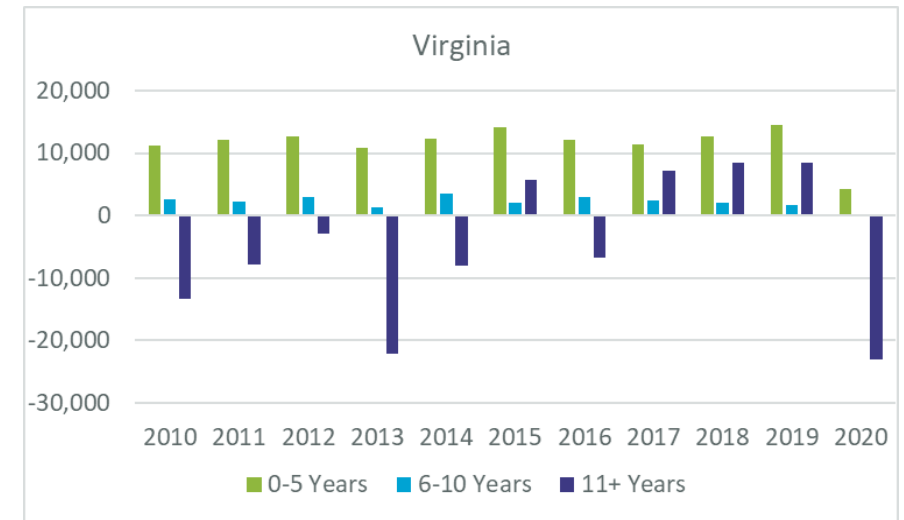
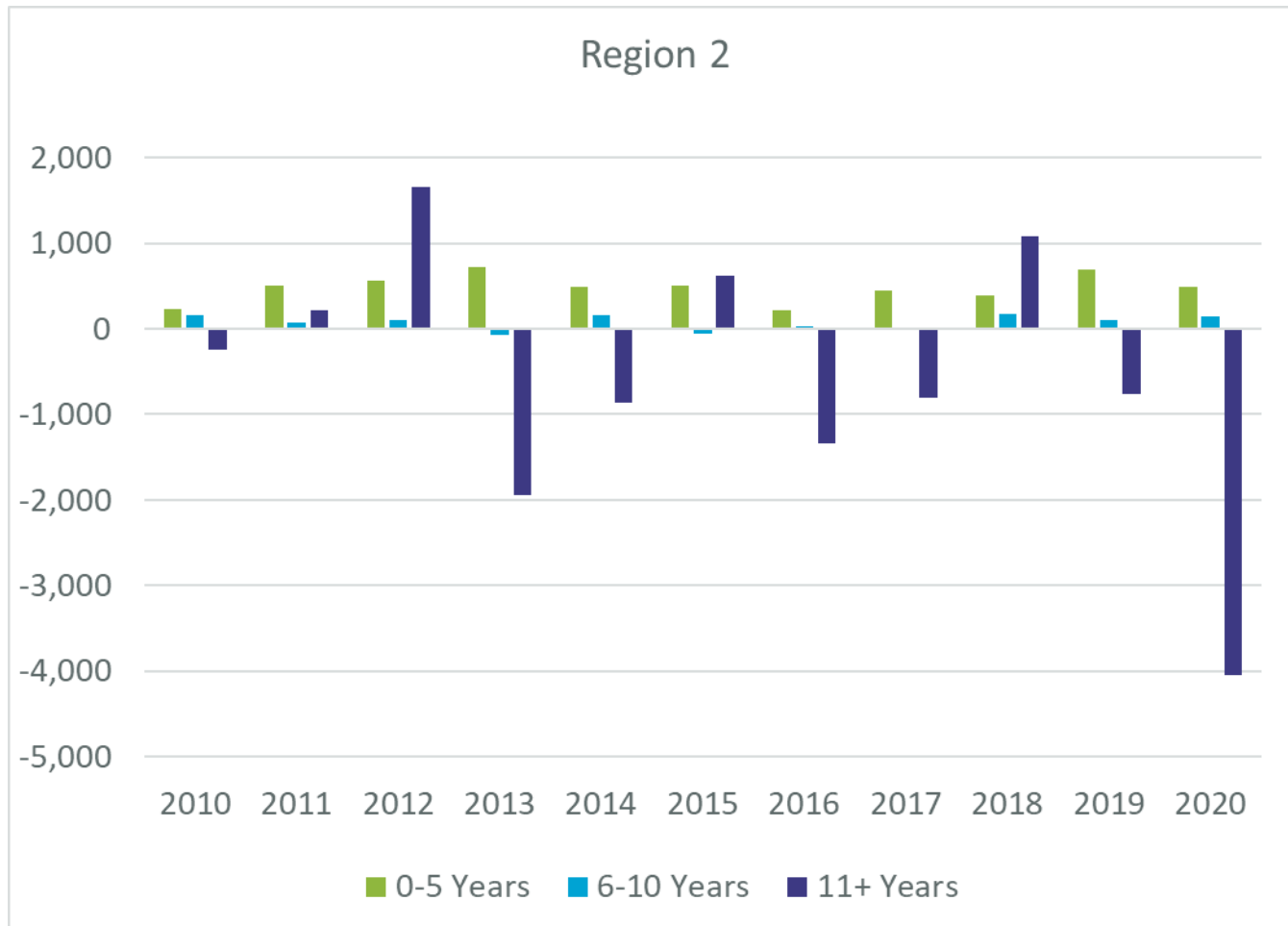
Traded Industry Employment Levels by Firm Age as a Percentage of Total Employment, Averaged 2010 Q1 through 2020 Q2



# Year-to-Year Job Change in Traded Industry Base by Age of Firm

- **What is it?** A more “dynamic” look at job changes by age of firm on a year-to-year basis in your region’s traded industry base
- **Why it matters?** Reveals that the presence of new and younger firms in any year are a critical driver of job growth in a region -- even’ as the previous slide shows’ that they do not employ most workers in traded industries

Traded Industry Job Change by Firm Age, 2010 Q1 through 2020 Q2

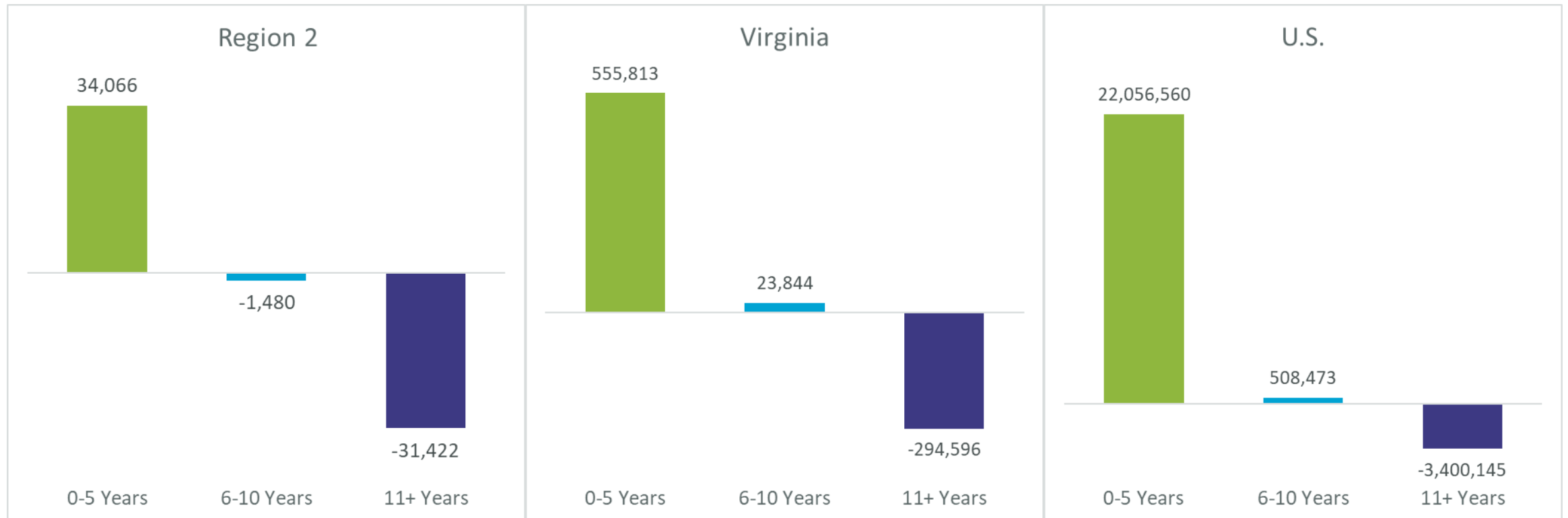


Source: U.S. Census Bureau Quarterly Workforce Indicators dataset.

# Employment Growth by Age of Firm over 2010-2020 Period

- **What is it?** Aggregates quarterly employment change from 2010/Q1 through 2020/Q2 for traded industries by age
- **Why it matters?** Offers a more consolidated view over a long period of time on sources of job growth by age of firm – confirming the importance of new and younger firms for job growth at the region, state and national level

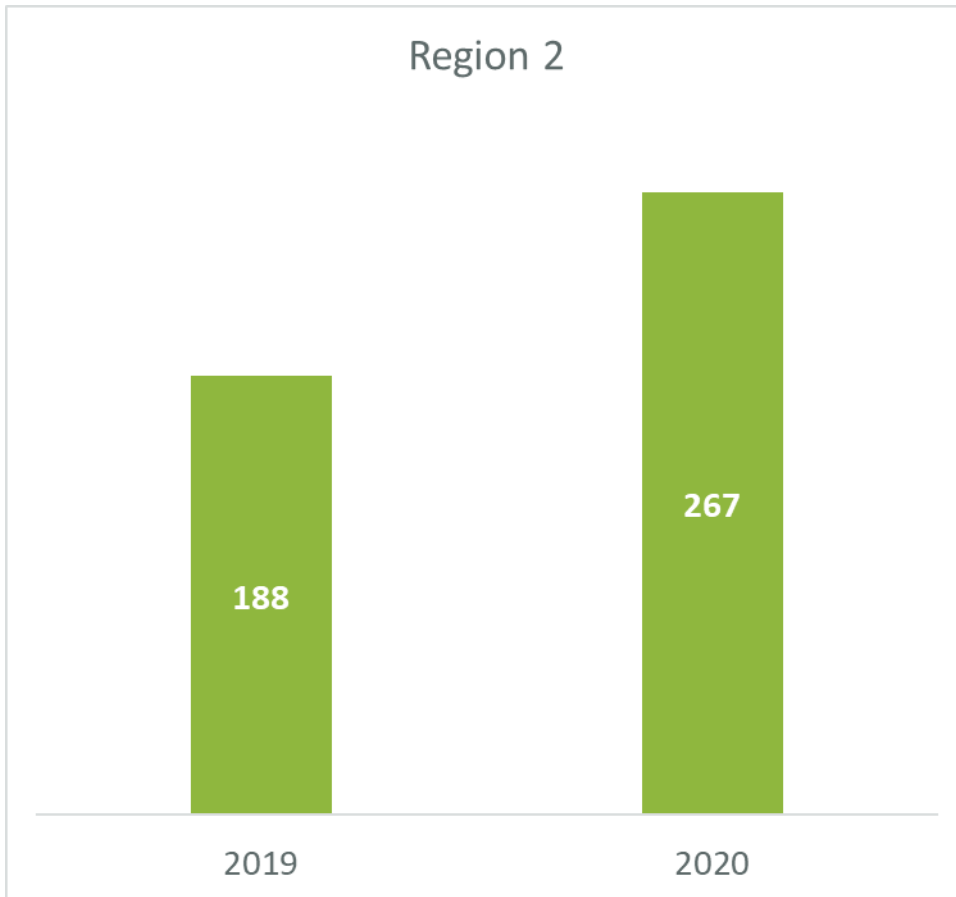
Traded Industry Job Change by Firm Age, Aggregated 2010 Q1 through 2020 Q2



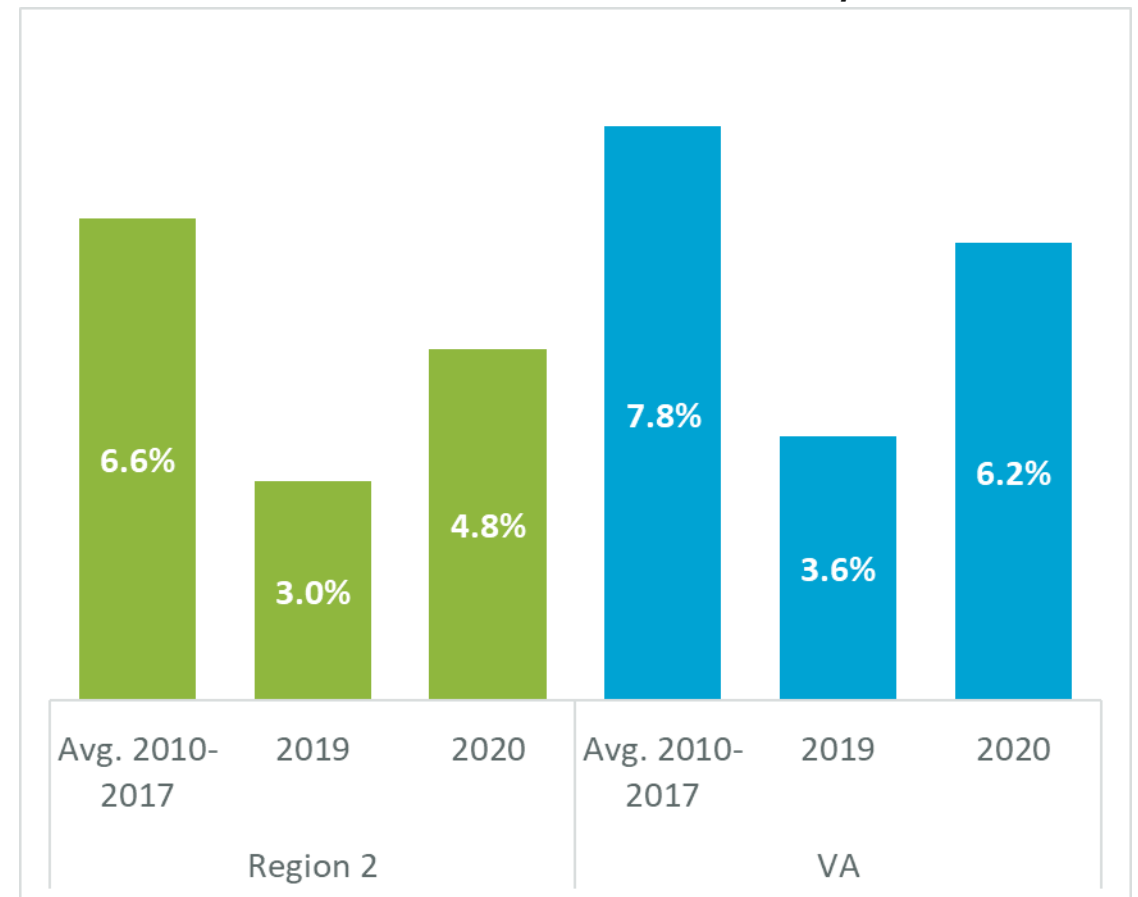
# BDRC Profile of Startup Activity and Business Formation Rates in Traded Industries

- **What is it?** Startups are all new non-branch firms in traded industries with their first recorded employment in a given year, while the Business Formation Rate compares the level of startups to the total number of all firms in traded industries.
- **Why it matters?** Together, the total number of Traded Industry Startups and Business Formation Rates allows a region to determine whether its startup activity is rising or declining, with the Business Formation Rates offering a normalized measure for a region to compare itself to other jurisdictions as well as within industries.

New Startups\* in Traded Industries, 2019 and 2020



New Business Formation Rate in Traded Industries, 2010-2020\*\*



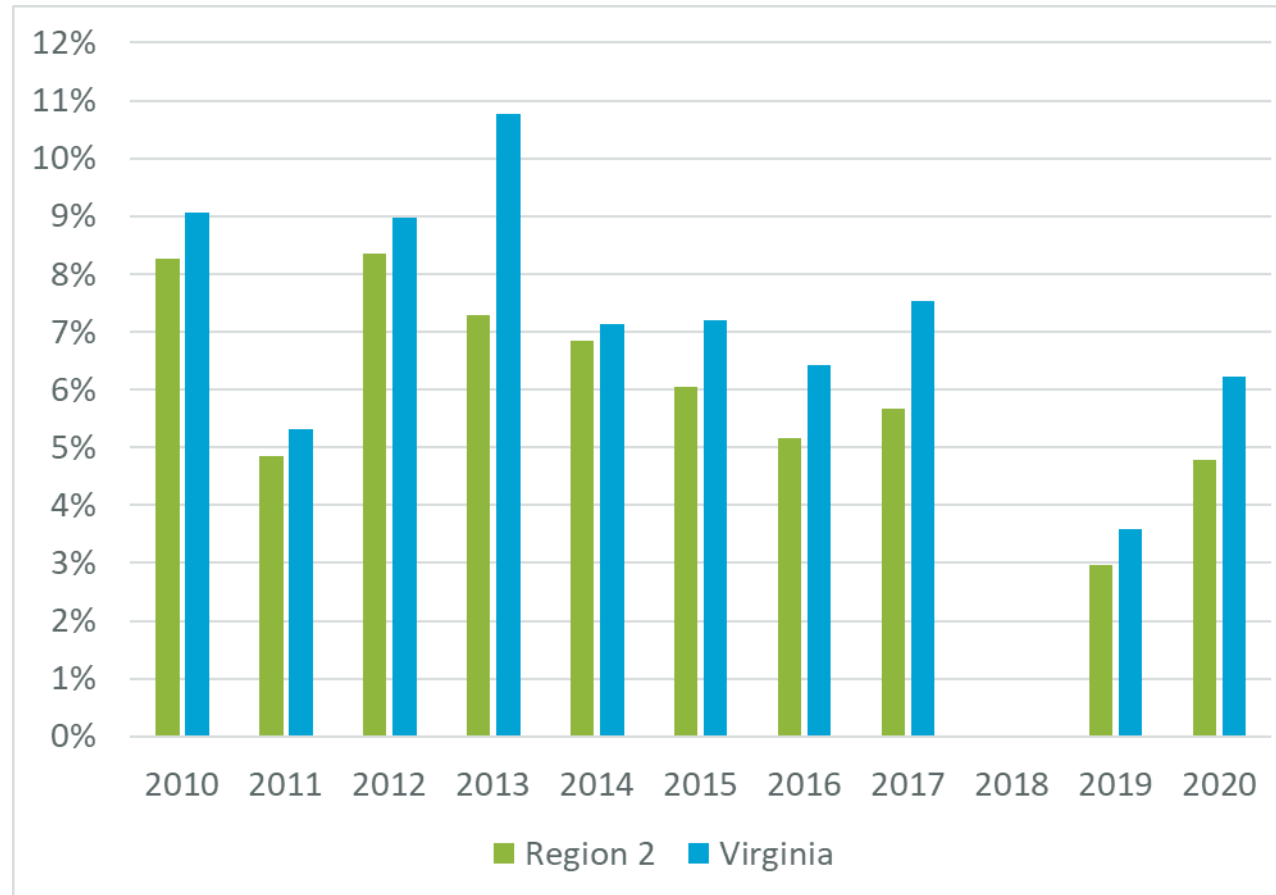
Note: 2018 excluded due to addition of a major source of firm data to underlying BDRC database that makes comparisons using 2018 not possible

Source: Business Dynamics Research Consortium, Your-economy Time Series (YTS); TEconomy analysis.

# Year-by-Year New Business Formation Rates in Traded Industries

- **What is it?** Annual Business Formation Rates compares the level of startups to the total number of all firms in traded industries for region compared to state.
- **Why it matters?** Depicts the longer-term pattern of Business Formation Rates for the region in traded industries and how it has generally fallen over the past decade at both the region and state level.

**New Business Formation Rate in Traded Industries, 2010-2020**

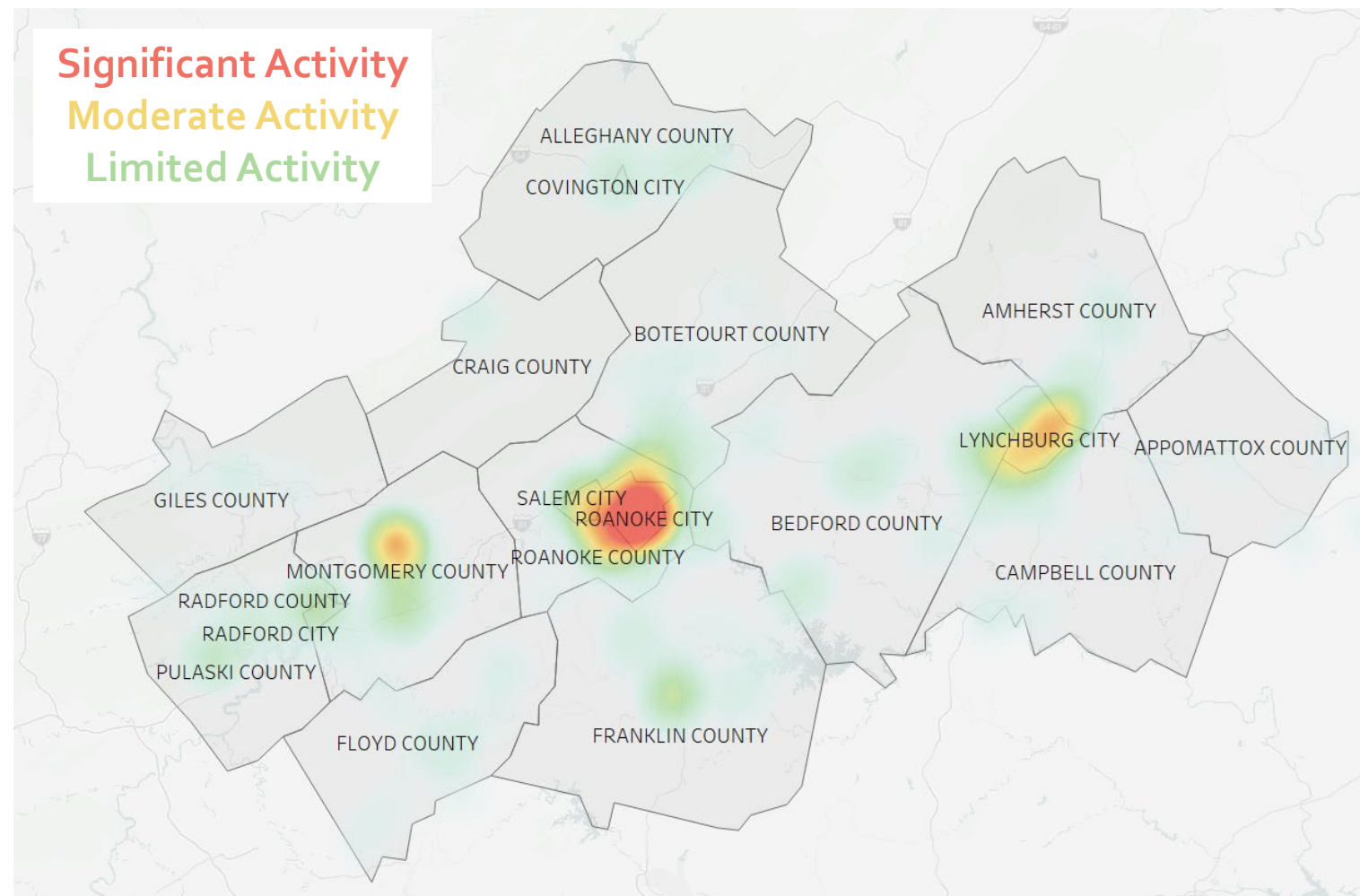


Note: 2018 excluded due to addition of a major source of firm data to underlying BDR database that makes comparisons using 2018 not possible

Source: Business Dynamics Research Consortium, Your-economy Time Series (YTS); TEconomy analysis.

# Startup Density\* Across Region 2

- **What is it?** A mapping of where traded industry startups are located within a region over the 2018-2020 period based on the specific geo-coordinates of the firm's address
- **Why it matters?** Reveals the areas within a region where startup activity is aggregating that can help inform how to advance place-based developments, such as incubators, accelerators, and co-working spaces, and other entrepreneurial services



Note: This map is based on geocoordinates of individual establishments, not an aggregation of establishment counts to a prescribed geography such as census tracts. The mapping software plots a visualization of startup spread by analyzing the clustering of coordinates in a multi-dimensional spatial context relative to each region. It is not possible to provide a numeric estimate of density (i.e. establishments per square mile) since calculation of spread is multi-dimensional and not fixed to a prescribed geographic boundary.

\*Startup density is relative to overall regional startup rates

Source: Business Dynamics Research Consortium, Your-economy Time Series (YTS); TEconomy analysis.



# Profile of Startup Activity Within Key Regional Industry Clusters

- **What is it?** Tracks number of Startups and Business Formation Rates across a standardized set of Traded Industry Clusters for the region and statewide average in 2019 and 2020. The standardized clusters were informed by priority clusters set out across all GO VA regions (see separate handout for NAICS industries included in each Traded Industry Cluster).
- **Why it matters?** Allows a region to determine the trends and competitiveness of its startup activity across Traded Industry Clusters in the region with comparison to the statewide average business formation rate for each Traded Industry Cluster.

Major Traded Industry Cluster***	Startups, 2019	New Business Formation Rate, 2019		Startups, 2020	New Business Formation Rate, 2020	
		Region	State		Region	State
Agriculture & Food Processing	7	2.4%	4.1%	10	3.9%	5.5%
Business Services	67	3.6%	4.4%	94	6.0%	7.6%
Energy, Natural Resources, & Finished Products	5	1.8%	2.5%	5	2.2%	3.9%
Engineering, R&D, Testing & Technical Services	11	5.3%	4.2%	12	6.7%	7.4%
Financial & Insurance Services	12	2.3%	3.5%	16	2.9%	4.0%
Health Care Services	5	3.8%	4.2%	24	15.4%	15.8%
Information Technology & Communications Services	6	2.8%	3.6%	12	6.4%	8.0%
Life Sciences	1	0.5%	2.7%	5	2.9%	6.1%
Manufacturing	8	1.3%	2.1%	17	3.2%	3.7%
Ship Building, Aerospace, & Defense			1.1%			0.9%
Transportation, Distribution and Logistics	22	2.4%	2.9%	26	3.2%	4.6%
All Other Traded Industries	44	4.1%	3.3%	46	4.9%	5.9%
<b>Traded Industry Total</b>	<b>188</b>	<b>3.0%</b>	<b>3.6%</b>	<b>267</b>	<b>4.8%</b>	<b>6.2%</b>

Source: Business Dynamics Research Consortium, Your-economy Time Series (YTS); TEconomy analysis.

# Additional Data Insights – Comparison of Region’s New Business Formation and Overall Economic Performance of its Traded Industry Clusters

- **What is it?** The regional position in new business formation compares the region to the state for 2019 and 2020 for each of the Traded Industry Clusters, while the overall economic performance uses employment data from EMSI based on the Quarterly Census of Employment and Wages to track regional economic measures to provide a summary view – see next slide for how summary assessments were determined.
- **Why it matters?** Puts into context the performance of a region in its standardized Traded Industry Clusters in both entrepreneurial activity and overall economic performance.

Major Traded Industry Cluster	Regional Position in New Business Formation Relative to State Average*	Summary of Economic Development Position in Region, 2018-2020	Measures of Regional Economic Performance for overall Traded Industry Cluster			
			2020 Employment	2020 Location Quotient	Regional 2018-20 Percentage Job Growth	U.S. 2018-20 Percentage Job Growth
Agriculture & Food Processing	<b>Below</b>	<b>Small, Declining</b>	4,441	0.64	-2.8%	0.4%
Business Services	<b>Below</b>	<b>Mid-sized, Emerging Opportunity</b>	14,692	0.83	0.3%	0.3%
Energy, Natural Resources, & Finished Products	<b>Below</b>	<b>Mid-sized, Declining Specialization</b>	8,391	1.52	-2.4%	-3.3%
Engineering, R&D, Testing & Technical Services	<b>Mixed</b>	<b>Small, Declining</b>	3,674	0.89	-5.5%	3.8%
Financial & Insurance Services	<b>Below</b>	<b>Small, Declining</b>	4,325	0.62	-1.7%	0.0%
Health Care Services	<b>Below</b>	<b>Mid-Sized, Declining Specialization</b>	15,870	1.41	-1.8%	0.8%
Information Technology & Communications Services	<b>Below</b>	<b>Small, Declining</b>	4,199	0.58	-2.3%	6.9%
Life Sciences	<b>Below</b>	<b>Small, Declining</b>	1,867	0.51	-3.8%	4.6%
Manufacturing	<b>Below</b>	<b>Large, Declining Specialization</b>	31,156	1.84	-2.2%	-3.1%
Ship Building, Aerospace, & Defense	n/a	<b>Small, Emerging Strength</b>	303	0.17	27.6%	4.7%
Transportation, Distribution and Logistics	<b>Below</b>	<b>Mid-sized, Emerging Opportunity</b>	13,235	0.86	1.5%	2.1%

\*See previous slide for data on new business formation by traded industry cluster  
 Source: Quarterly Census of Employment and Wages (QCEW) via Emsi; TEconomy analysis.

# Summary Assessment Typology

## Summary Assessment of Regional Position in New Business Formation

Summary Category	Comparison of Region to State Business Formation Rates for 2019 and 2020
Above	Region higher in business formation rate than state in both 2019 and 2020
On Par	Within 0.1-0.2 percentage points of state
Mixed	Region higher in business formation rate than state in one year and lower in another year
Below	Region lower in business formation rate than state

## Summary Assessment of Regional Economic Performance in Traded Industry Cluster

Summary Category by Size of Firm	Size of Traded Industry Cluster Employment Compared to Total Traded Industry Employment		
	Under 5%	Between 5%-15%	Over 15%
Large			✓
Mid-Sized		✓	
Small	✓		

Summary Category by Performance	Regional Economic Measures		
	Location Quotient Above 1.2	Positive Job Growth	Higher Job Growth Compared to National Average
Current Strength	✓	✓	✓
Growing Specialization	✓	✓	
Declining Specialization	✓		
Emerging Strength		✓	✓
Emerging Opportunity		✓	
Declining			

Region 2: Roanoke/New River/Lynchburg

*Update on Entrepreneurial Trends:  
Phase 2 Analysis of Broader  
Innovation Ecosystem Measures*

September 14, 2021

# Data Sources used for Phase 2 Update of Entrepreneurial Trends

- **Academic R&D** – annual research expenditures from all sources by university reported by the National Science Foundation’s Higher Education Research and Development Survey
- **Patent Activity of Inventors Residing in Region** – annual patents generated by residents in the region from U.S. Patent & Trademark Office data collected by Derwent Innovation
- **Venture Capital** – PitchBook database of private investor funding in emerging ventures, including pre-seed (accelerator and incubator funding), angel investor, seed and formal venture capital
- **Federal Small Business Innovation Research (SBIR) Awards** – SBIR funding by federal agencies to small businesses in the region as reported from SBIR.gov maintained by the U.S. Small Business Administration
- **SBA 7(a) Loan Activity** – Number of loans and loan amounts to small businesses in traded sector industries under SBA 7(a) financing vehicles as reported by the Small Business Administration

# R&D Expenditures

- **What is it?** A measure of annual research expenditures by colleges and universities in the region across all sources of funding, such federal government, state government, industry, philanthropies/individual gifts and own institutional resources.
- **Why it matters?** Provides a measure of the region’s academic institutions potential to drive innovation – the economic literature finds that proximity to academic research has strong spillovers to innovation by specific industry clusters in a region.

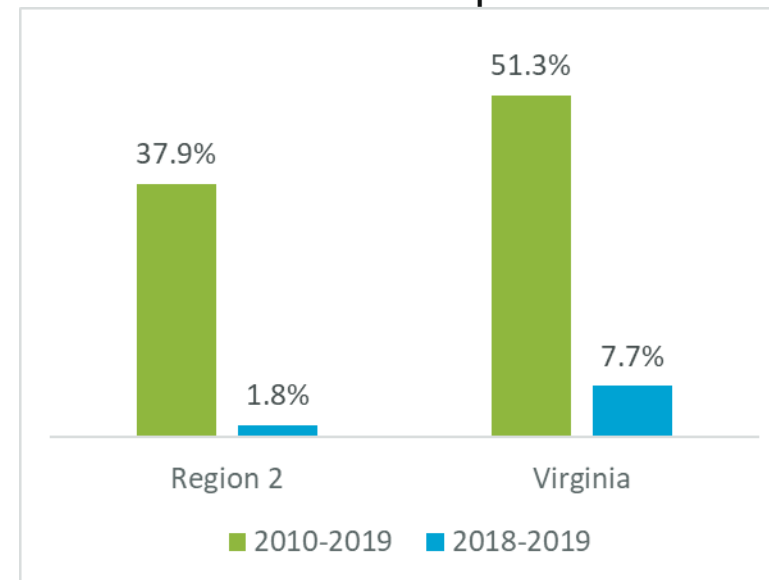
## Academic R&D Expenditures (Millions)

Region 2	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Virginia Polytechnic Institute and State University	\$398.2	\$450.1	\$454.4	\$496.2	\$513.1	\$504.3	\$521.8	\$522.4	\$531.6	\$542.0	\$4,934.0
Edward Via College of Osteopathic Medicine	\$0.0	\$2.5	\$2.6	\$5.0	\$2.6	\$2.2	\$5.7	\$8.1	\$7.6	\$7.2	\$43.5

## Academic R&D Expenditures, Top 5 Disciplines

Field	R&D Expenditures, 2010-19 (Mil)	% of Total
Agricultural Sciences	\$891.8	17.9%
Biological and Biomedical Sciences	\$589.1	14.4%
Civil Engineering	\$467.8	13.4%
Electrical, Electronic, and Communications Engineering	\$463.1	15.3%
Health Sciences	\$411.9	16.0%

## Growth in Academic R&D Expenditures



# Patents Invented in the Region

- **What is it?** Patents are a primary way in which inventors are able to protect their innovations in products from being replicated.
- **Why it matters?** By focusing on patents generated by residents we are able to more accurately gauge the region's capacity to generate technology innovations. The patent classes help identify specific areas of technology innovation taking place in a region.

## Total Patents, 2010-20

Region 2	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Patent Counts	200	232	222	271	321	337	288	305	317	337	361	3,191

Technology Class Area	Number of Patents, 2010-2020
electrical digital data processing	139
apparatus for conversion between ac and ac, between ac and dc, or between dc and dc, and for use with mains or similar power supply systems	120
transmission of digital information, e.g. telegraphic communication	113
spectacles; sunglasses or goggles insofar as they have the same features as spectacles; contact lenses	106
preparations for medical, dental, or toilet purposes	100
transmission (transmission systems for measured values, control or similar signals)	94
nuclear reactors	92
optical elements, systems, or apparatus	77
wireless communications networks	74
control or regulation of electric motors, electric generators or dynamo-electric converters; controlling transformers, reactors or choke coils	70

# Venture Capital Investments

- **What is it?** Venture capital represents equity investments made to emerging technology companies that offer high growth potential to generate sizable returns on that equity investment.
- **Why it matters?** Venture capital investments are a direct measure of innovation activity taking place in a region. Beyond the number of deals and investment taking place on an annual basis, it is important to also consider the stage at which investments are taking place to ensure a robust pipeline of emerging ventures being formed and gaining scale in a region.

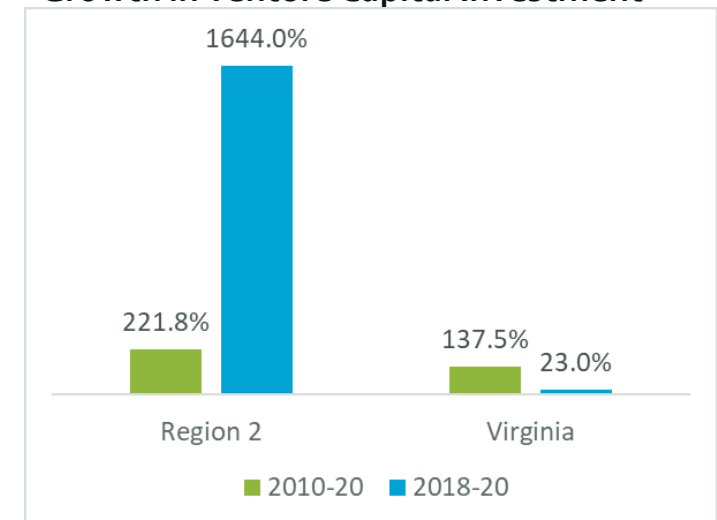
## Venture Capital Activity

Region 2	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Deal Counts	7	10	7	10	10	14	3	12	4	9	10	96
Investment Totals (Millions)	\$5.4	\$79.8	\$3.7	\$2.6	\$8.7	\$8.0	\$2.5	\$31.7	\$1.0	\$61.9	\$17.4	\$222.8

Region 2	Pre-Seed	Angel	Seed	Early Stage	Later Stage	Total
Deal Counts	15	34	6	24	17	96
Investment Totals (Mil)	\$2.1	\$26.2	\$4.3	\$125.0	\$65.2	\$222.8

Source: PitchBook Data, Inc.; TEconomy calculations.

## Growth in Venture Capital Investment





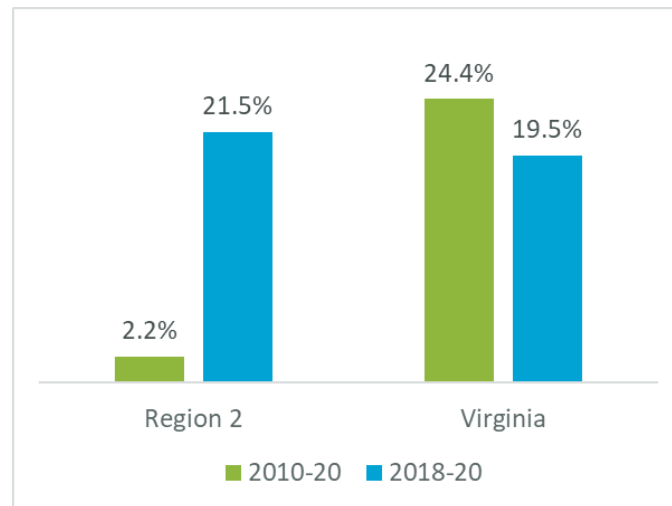
# Federal Small Business Innovation Research (SBIR) Grants

- **What is it?** The federal Small Business Innovation Research (SBIR) program is a source of innovation funding for emerging technology companies. The SBIR program encourages small businesses to undertake technology commercialization by requiring federal agencies with extramural R&D budgets that exceed \$100 million to allocate 2.5 percent of their R&D budgets to the SBIR program. Each federal agency involved in the SBIR program then issues requests for proposals on topics reflecting their technology needs and interests, and competitively awards SBIR grants based on the technical merits and commercialization potential in a phased approach.
- **Why it matters?** SBIR awards are another direct measure of innovation activity taking place in a region by small businesses.

## Small Business Innovation Research Awards

Region 2	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Award Counts	130	99	98	83	78	71	93	84	94	95	98	1,023
Award Amounts (Millions)	\$42.7	\$35.0	\$32.8	\$27.1	\$25.1	\$31.4	\$38.1	\$38.3	\$35.9	\$40.5	\$43.6	\$390.4

## Growth in SBIR Award Dollar Totals



Source: [www.SBIR.gov](http://www.SBIR.gov); TEconomy calculations.

# Regional Use of SBA Loans

- **What is it?** U.S. Small Business Administration (SBA) 7(a) loans are that federal agency's primary program for financial assistance to small businesses across the nation. These loans are typically issued by private lenders based on SBA guarantees of 75% to 85% with amounts not to exceed \$5 million. Small businesses must demonstrate good credit/mgmt./ability to repay. Proceeds can be used for a variety of purposes: startup costs, buying land/buildings/equipment, new construction, working capital, and seasonal lines of credit.
- **Why it matters?** SBA 7(a) loan activity is a measure of how active regional small businesses in traded sectors are in seeking to grow their operations. It also helps measures availability of capital to small businesses in the region since lending in the SBA 7(a) program often is through local lending sources.

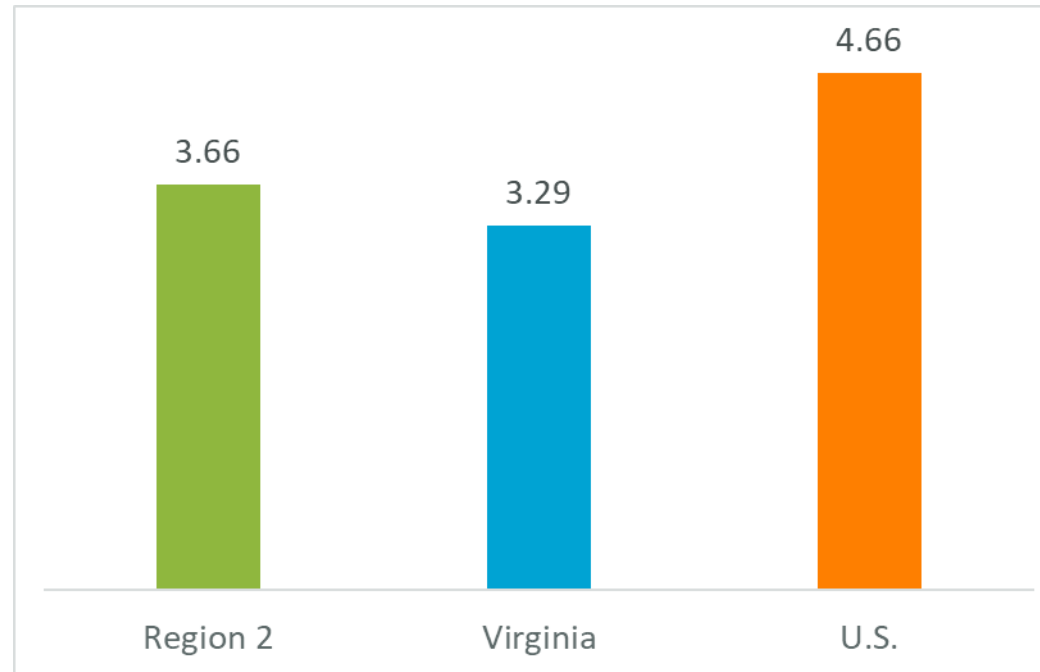
## Region 2: SBA 7(a) Loans and Loan Amounts, Cumulative Totals 2010-20

Industry Clusters	Co's Receiving Loans	Total No. of Loans	Total Loan Amounts (\$ Millions)	% of Total Loan Amounts
<b>Total, All Traded Sector Industries</b>	<b>169</b>	<b>197</b>	<b>\$102.3</b>	<b>100%</b>
Agriculture & Food Processing	16	20	\$7.4	7.2%
Business Services	31	36	\$8.5	8.3%
Energy, Natural Resources, & Finished Products	16	16	\$6.5	6.4%
Engineering, R&D, Testing & Technical Services	6	7	\$4.4	4.3%
Financial & Insurance Services	5	5	\$3.4	3.3%
Health Care Services	2	2	\$0.2	0.2%
Information Technology & Communications Services	6	8	\$0.5	0.5%
Life Sciences	1	1	\$0.0	0.0%
Manufacturing	30	42	\$24.5	24.0%
Transportation, Distribution and Logistics	22	25	\$10.6	10.3%
All Other Traded Sectors	34	35	\$36.4	35.5%

# Regional Utilization of SBA Loans vs. State & U.S. Totals

- **What is it?** By normalizing SBA 7(a) loans to traded sector small businesses by the number of traded sector establishments, it is possible to compare the level of lending activity in a region to that of the state and nation.
- **Why it matters?** High utilization of SBA 7(a) loans in a region suggests that the region has a growth-oriented traded sector small business base and/or good access to capital, while low utilization suggests a region's small businesses are not seeking to grow and/or are having trouble accessing capital.

**SBA 7(a) Loan Counts, Traded Sector Companies  
Per 1,000 Establishments, Avg. 2018-2020**





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