

Appendix A. Innovation industries employment change, largest 100 metropolitan areas

Name	Innovation industries	
	Employment change, 2005-17	National employment share change, 2005-17
San Francisco-Oakland-Hayward, CA	77,192	2.0%
Seattle-Tacoma-Bellevue, WA	56,394	1.3%
San Jose-Sunnyvale-Santa Clara, CA	52,288	1.1%
Boston-Cambridge-Newton, MA-NH	26,066	0.4%
San Diego-Carlsbad, CA	19,949	0.4%
Madison, WI	12,190	0.3%
Raleigh, NC	12,238	0.3%
Denver-Aurora-Lakewood, CO	10,255	0.2%
Charleston-North Charleston, SC	7,193	0.2%
Provo-Orem, UT	7,050	0.2%
Salt Lake City, UT	7,671	0.2%
Albany-Schenectady-Troy, NY	4,227	0.1%
Grand Rapids-Wyoming, MI	3,475	0.1%
Atlanta-Sandy Springs-Roswell, GA	5,736	0.1%
Pittsburgh, PA	3,763	0.1%
Jacksonville, FL	2,530	0.1%
Columbus, OH	2,864	0.0%
Oklahoma City, OK	1,941	0.0%
Cincinnati, OH-KY-IN	3,221	0.0%
Winston-Salem, NC	1,239	0.0%
Greenville-Anderson-Mauldin, SC	1,305	0.0%
Akron, OH	1,097	0.0%
Knoxville, TN	1,223	0.0%
Portland-Vancouver-Hillsboro, OR-WA	4,472	0.0%
Miami-Fort Lauderdale-West Palm Beach, FL	2,830	0.0%
Nashville-Davidson--Murfreesboro--Franklin, TN	1,097	0.0%
Baton Rouge, LA	1,108	0.0%
Las Vegas-Henderson-Paradise, NV	905	0.0%
Kansas City, MO-KS	1,674	0.0%
Greensboro-High Point, NC	626	0.0%
Chattanooga, TN-GA	322	0.0%
Deltona-Daytona Beach-Ormond Beach, FL	341	0.0%
Jackson, MS	241	0.0%
Orlando-Kissimmee-Sanford, FL	1,724	0.0%

San Antonio-New Braunfels, TX	1,472	0.0%
Toledo, OH	313	0.0%
Tampa-St. Petersburg-Clearwater, FL	1,789	0.0%
Bakersfield, CA	179	0.0%
McAllen-Edinburg-Mission, TX	94	0.0%
Indianapolis-Carmel-Anderson, IN	2,245	0.0%
North Port-Sarasota-Bradenton, FL	156	0.0%
Cape Coral-Fort Myers, FL	45	0.0%
Des Moines-West Des Moines, IA	247	0.0%
Columbia, SC	163	0.0%
Stockton-Lodi, CA	-123	0.0%
Spokane-Spokane Valley, WA	-43	0.0%
Augusta-Richmond County, GA-SC	-266	0.0%
Memphis, TN-MS-AR	-79	0.0%
Louisville/Jefferson County, KY-IN	-51	0.0%
Ogden-Clearfield, UT	56	0.0%
Worcester, MA-CT	348	0.0%
Tulsa, OK	-83	0.0%
Virginia Beach-Norfolk-Newport News, VA-NC	-33	0.0%
Springfield, MA	-437	0.0%
Harrisburg-Carlisle, PA	-483	0.0%
Palm Bay-Melbourne-Titusville, FL	506	0.0%
Dayton, OH	142	0.0%
Little Rock-North Little Rock-Conway, AR	-490	0.0%
Birmingham-Hoover, AL	-634	0.0%
Rochester, NY	106	0.0%
El Paso, TX	-701	0.0%
Fresno, CA	-784	0.0%
Charlotte-Concord-Gastonia, NC-SC	420	0.0%
Cleveland-Elyria, OH	260	0.0%
Urban Honolulu, HI	-844	0.0%
Scranton--Wilkes-Barre--Hazleton, PA	-1,014	0.0%
Buffalo-Cheektowaga-Niagara Falls, NY	-175	0.0%
Hartford-West Hartford-East Hartford, CT	599	0.0%
Lakeland-Winter Haven, FL	-1,361	0.0%
Syracuse, NY	-1,305	-0.1%
Austin-Round Rock, TX	1,200	-0.1%
Bridgeport-Stamford-Norwalk, CT	-821	-0.1%
Baltimore-Columbia-Towson, MD	68	-0.1%
Omaha-Council Bluffs, NE-IA	-1,872	-0.1%
Tucson, AZ	-1,271	-0.1%
New Orleans-Metairie, LA	-2,513	-0.1%
St. Louis, MO-IL	-448	-0.1%
Richmond, VA	-2,808	-0.1%
Allentown-Bethlehem-Easton, PA-NJ	-2,911	-0.1%

Minneapolis-St. Paul-Bloomington, MN-WI	874	-0.1%
Boise City, ID	-3,059	-0.1%
Milwaukee-Waukesha-West Allis, WI	-2,773	-0.1%
Detroit-Warren-Dearborn, MI	-1,904	-0.1%
Phoenix-Mesa-Scottsdale, AZ	109	-0.1%
Riverside-San Bernardino-Ontario, CA	-4,234	-0.1%
New Haven-Milford, CT	-4,526	-0.2%
Providence-Warwick, RI-MA	-4,672	-0.2%
Sacramento--Roseville--Arden-Arcade, CA	-4,389	-0.2%
Oxnard-Thousand Oaks-Ventura, CA	-4,998	-0.2%
Colorado Springs, CO	-5,496	-0.2%
Albuquerque, NM	-5,014	-0.2%
Houston-The Woodlands-Sugar Land, TX	-3,281	-0.2%
New York-Newark-Jersey City, NY-NJ-PA	7,162	-0.2%
Durham-Chapel Hill, NC	-5,741	-0.2%
Wichita, KS	-7,729	-0.3%
Washington-Arlington-Alexandria, DC-VA-MD-WV	-6,569	-0.4%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	-9,178	-0.4%
Dallas-Fort Worth-Arlington, TX	-8,969	-0.5%
Chicago-Naperville-Elgin, IL-IN-WI	-12,582	-0.6%
Los Angeles-Long Beach-Anaheim, CA	-8,322	-0.7%

Source: Brookings analysis of Emsi data

Appendix B. Potential growth centers

Name	Population, 2018	Median home value, 2017	Share of workers with commutes over 1 hour, 2017	Eligibility criteria					Eligibility Index
				University STEM R&D per capita, 2017	Patents per 100,000, 2015	BA share, 2017	STEM doctoral degrees per 100,000, 2017	Innovation sector job share, 2018	
Madison, WI	660,422	\$247,000	3.6%	\$1,688.51	71.1	45.9%	80.8	5.9%	1.63
Minneapolis-St. Paul-Bloomington, MN-WI	3,629,190	\$254,800	5.7%	\$245.30	97.1	41.7%	11.3	3.2%	0.68
Albany-Schenectady-Troy, NY	883,169	\$216,400	3.6%	\$268.58	124.0	37.2%	19.5	4.3%	0.66
Lexington-Fayette, KY	516,697	\$184,700	3.4%	\$717.60	36.1	37.5%	29.3	1.8%	0.58
Rochester, NY	1,071,082	\$144,500	3.7%	\$370.93	113.0	34.1%	15.0	2.6%	0.53
Provo-Orem, UT	633,768	\$296,600	5.8%	\$59.56	67.9	41.3%	7.9	6.4%	0.47
Portland-Vancouver-Hillsboro, OR-WA	2,478,810	\$376,000	8.5%	\$14.90	90.8	40.3%	1.8	4.9%	0.47
Tucson, AZ	1,039,073	\$182,300	4.2%	\$593.64	63.5	33.6%	21.3	5.4%	0.45
Pittsburgh, PA	2,324,743	\$153,300	8.4%	\$539.74	38.1	35.1%	22.0	2.2%	0.40
Salt Lake City, UT	1,222,540	\$294,800	3.5%	\$264.64	55.2	35.5%	16.8	3.7%	0.34
Columbus, OH	2,106,541	\$182,300	4.1%	\$386.41	21.9	35.9%	20.1	1.7%	0.30
Chicago-Naperville-Elgin, IL-IN-WI	9,498,716	\$240,300	14.1%	\$166.67	40.9	37.7%	7.4	1.9%	0.29
Nashville-Davidson-Murfreesboro-Franklin, TN	1,930,961	\$242,900	8.9%	\$367.01	12.0	36.0%	11.2	1.0%	0.22
Akron, OH	704,845	\$146,800	3.9%	\$95.09	52.9	32.2%	24.0	1.7%	0.19
St. Louis, MO-IL	2,805,465	\$172,200	5.7%	\$286.57	27.7	34.6%	9.2	2.9%	0.19
Boise City, ID	730,426	\$228,800	4.3%	\$45.46	107.0	30.1%	2.0	3.8%	0.18

Milwaukee-Waukesha-West Allis, WI	1,576,113	\$213,800	4.2%	\$45.53	43.7	35.8%	6.2	2.1%	0.18
Cincinnati, OH-KY-IN	2,190,209	\$165,500	5.0%	\$195.99	48.6	33.2%	5.9	2.5%	0.16
Buffalo-Cheektowaga-Niagara Falls, NY	1,130,152	\$148,900	3.4%	\$342.04	22.4	32.5%	16.9	2.7%	0.15
Kansas City, MO-KS			3.5%	\$10.72	39.1	36.5%	0.0	1.9%	0.14
Des Moines-West Des Moines, IA	655,409	\$187,500	2.5%	\$0.00	35.0	36.6%	0.0	1.3%	0.13
Indianapolis-Carmel-Anderson, IN	2,048,703	\$162,200	5.0%	\$25.55	37.0	35.6%	3.7	2.8%	0.13
Detroit-Warren-Dearborn, MI	4,326,442	\$171,600	7.1%	\$53.90	76.7	31.1%	3.4	1.7%	0.12
Albuquerque, NM	915,927	\$191,700	4.8%	\$259.20	32.4	32.1%	11.6	5.0%	0.12
Palm Bay-Melbourne-Titusville, FL	596,849	\$195,400	5.2%	\$30.67	79.5	30.0%	7.3	8.6%	0.10
Syracuse, NY	650,502	\$139,400	3.2%	\$164.65	33.0	31.8%	15.8	3.0%	0.09
Cleveland-Elyria, OH	2,057,009	\$150,400	4.4%	\$234.98	44.7	30.8%	7.8	1.7%	0.09
Greenville-Anderson-Mauldin, SC	906,626	\$162,100	4.4%	\$161.63	54.9	28.6%	19.0	1.8%	0.07
Omaha-Council Bluffs, NE-IA	942,198	\$170,200	2.5%	\$11.41	19.5	36.3%	0.9	1.7%	0.07
Fayetteville-Springdale-Rogers, AR-MO	549,128	\$173,100	3.2%	\$252.46	15.5	31.8%	16.2	0.6%	0.06
Knoxville, TN	883,309	\$169,200	5.3%	\$307.77	25.3	28.8%	23.6	2.4%	0.05
Dayton, OH	806,548	\$133,400	4.2%	\$276.43	32.5	29.8%	13.3	3.4%	0.05
Charlotte-Concord-Gastonia, NC-SC	2,569,213	\$197,100	7.3%	\$9.58	18.6	35.5%	2.7	1.7%	0.05
Birmingham-Hoover, AL	1,151,801	\$161,400	7.1%	\$481.57	9.8	30.5%	8.0	0.6%	0.05
Columbia, SC	832,666	\$156,600	4.4%	\$218.31	11.6	31.9%	15.0	1.5%	0.04
All U.S. metros	281,128,123	\$229,000	8.7%	\$215.75	48.1	34.0%	10.6	2.8%	

Note: Eligibility Index calculated using a weighted average of normalized eligibility criteria for each metro.

Source: Brookings and ITIF analysis of Census-PEP, NSF, USPTO, Emsi, and ACS data

Appendix C. Growth centers program costs

While the following cost estimates are rough, we estimate that a program of the kind laid out in this paper would cost the federal government approximately \$100 billion over 10 years. However, this figure does not reflect dynamic scoring, and given the likely positive impact on GDP growth from these provisions, we believe the net cost to the federal treasury would be considerably lower. Only the items that we estimated costs for are included in the list below.

Direct funding. Elements included in our total cost estimate:

- *Research funding.* The federal government would provide an average of \$687 million to each region per year, totaling \$68.7 billion over 10 years if 10 growth centers are selected.
- *Graduate research fellowships.* FY2018 program funding was \$285 million. While we call for additional appropriations, for calculation purposes, we assume that only our geographic preference recommendation is adopted for new fellowships. Over 10 years, the total cost would be \$2.85 billion.
- *Other research.* The estimated combined cost of our other proposals with budgetary implications—expansion of Manufacturing USA network and the EDA’s Regional Innovation Strategies awards program—equals \$2.63 billion over 10 years.
- *Workforce development funding.* We call for the Department of Labor to make \$5 million grants every year for 10 years to each growth center, totaling \$500 million over 10 years.

Tax and regulatory preferences. Elements included in our total cost estimate:

- *Capital gains reductions.* Our recommendation of preferential capital gains treatment for young firms in growth centers presents a

total cost of \$674 billion over 10 years. This was estimated by multiplying the total cost of eliminating the capital gains tax on small businesses¹⁵⁷ over 10 years—\$14 billion—by the GDP share of the 10 highest-scoring metro areas on our Eligibility Index—4.7% in 2017.

- *Capital equipment expensing.* In 2022, 100% expensing of first-year capital equipment expenditures will expire. Assuming that our proposal takes effect in 2020, companies in designated growth centers will be eligible for eight years of full expensing. This tax expenditure was estimated to cost \$65.4 billion¹⁵⁸ in FY2020, meaning that if we continue to use 4.7% to proxy winning growth centers’ share of the capital investment, this provision would cost \$24.1 billion over eight years.
- *Sections 382 and 469.* The estimated cost of reforming Section 382 is \$600 million annually by 2022. If growth centers account for 4.7% of claims, that equals \$282 million dollars over 10 years.¹⁵⁹ For Section 469, our proposed reform is estimated to cost \$390 million annually, or \$183 million over 10 years for firms in winning cities. The combined cost of these changes is therefore \$465 million.
- *Collaborative R&D credits.* If each university receives approximately \$40 million on average per year in industry R&D funding,¹⁶⁰ and each growth center has an average of 1.5 research universities, the total support growth centers would receive over 10 years is \$6 billion. Raising the credit rate from 7% to 30%, as we propose, creates a tax expenditure of roughly \$1.4 billion.
- *Human capital tax credits.* In 2018, \$88 billion was spent on worker training.¹⁶¹ If firms in growth centers are assumed to account for 4.7% of this, the proposed credit would be applied to \$4.1 billion in spending. With a credit

of 14% on over half of base-year expenditures, this would amount to roughly \$288 million annually, or \$2.8 billion over 10 years.

Federal land, infrastructure, jobs, and placemaking. Elements included in our total cost estimate:

- *Infrastructure.* The FAA spends roughly \$840 million every year on airport improvement grants. If each growth center received at least one grant in a 10-year period with each grant worth \$50 million, the total cost of these investments in air transport infrastructure would be \$500 million.¹⁶² Each state receives on average \$1.28 billion annually for highway construction. If an additional \$50 million is spent on each growth center, this would amount to \$500 million of additional spending per year, or \$5 billion over ten.