
Colorado Innovation Report 2014

Keeping Colorado's Innovative Economy Dynamic

Colorado State University

Table of Contents

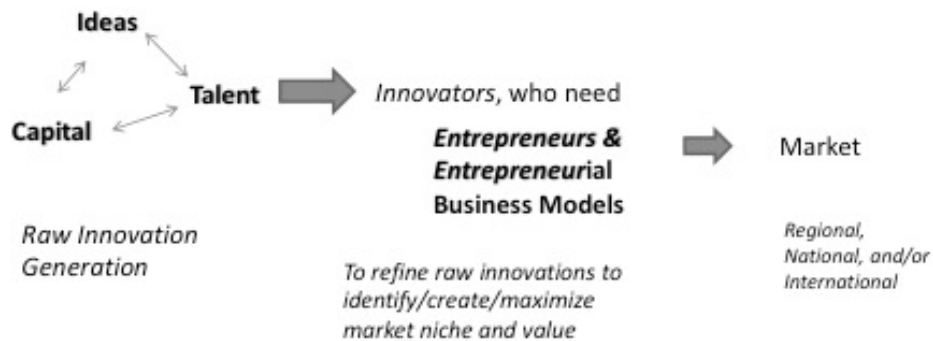
Colorado Innovation Report	1
Entrepreneurship	4
Job Creation through Innovative Young Businesses	
Talent	13
Colorado’s Baby Boomers and the Approaching Skills Gap	
Capital	21
Small Business Loan Trends: Evidence from Community Reinvestment Act (CRA) Data	

Colorado Innovation Report 2014

Each year the Colorado Innovation Report provides new insights on the status of innovation in Colorado; all reports are available at innovation.colostate.edu. The inaugural 2012 report uses baseline metrics to provide an initial understanding of innovation in Colorado alongside peer states and the nation. That 2012 index was the foundation for the more in-depth analyses in the 2013 and current report. Each report is structured on the four component parts of innovation: entrepreneurship, talent, capital, and ideas. Fresh ideas, a talented workforce, and early-stage capital represent the components necessary to generate raw innovation, while entrepreneurship links these raw components to the generation of new value in the marketplace. As shown in the figure below, these components and their interaction have been the framework for understanding and evaluating innovation in all reports.

Defining and Tracking *Innovation*

Product, process, or service that generates new value in the marketplace



This year's report is focused on the dynamism of the Colorado economy through in-depth analyses of entrepreneurship, talent, and capital. As in past years, we use U.S. performance as a baseline, then compare these national measures to those in Colorado and seven peer states. These states are either recognized innovation hotspots, such as California and Massachusetts, or regional neighbors with similar innovative aspirations, such as Utah and Arizona. We also use 2000 as a comparative temporal benchmark, as that year was the final year of a long growth phase, the final year prior to the seminal changes that occurred on Sept 11 2001, and arguably the turning point for a number of key industries, including telecommunications, transportation, tourism, and technology. We use the most recent year for which data is available for the more current observations, which can range from 2007 to 2013.

In Colorado, the pace of new business creation is especially high, but so is the rate of closure. This churn of businesses of course has implications for employment, as the state is constantly gaining jobs from new and young businesses and losing others from closures. The source of talent in Colorado is changing with each cohort of the labor force, and sheds light on the potential for a fresh class of skilled workers. The capital section highlights a new source of data on small business lending, which shows that Colorado's bank lending is consistently stronger than the national average.

Executive Summary

■ Entrepreneurship

- ◆ Job creation comes largely from nascent small businesses.
- ◆ In Colorado the business sector is highly dynamic, characterized by more job creation and destruction than most other states.
- ◆ Dynamism produces a long-term job growth advantage.

■ Talent

- ◆ Colorado is transitioning from a state where the skilled workforce was largely male to one which will become significantly more female, as male education attainment drops relative to that of women. Educated men are disproportionately older and retiring, while educated women are disproportionately younger.
- ◆ Hispanics and Latinos provide an additional opportunity to replace retiring educated white males with homegrown talent.

■ Capital

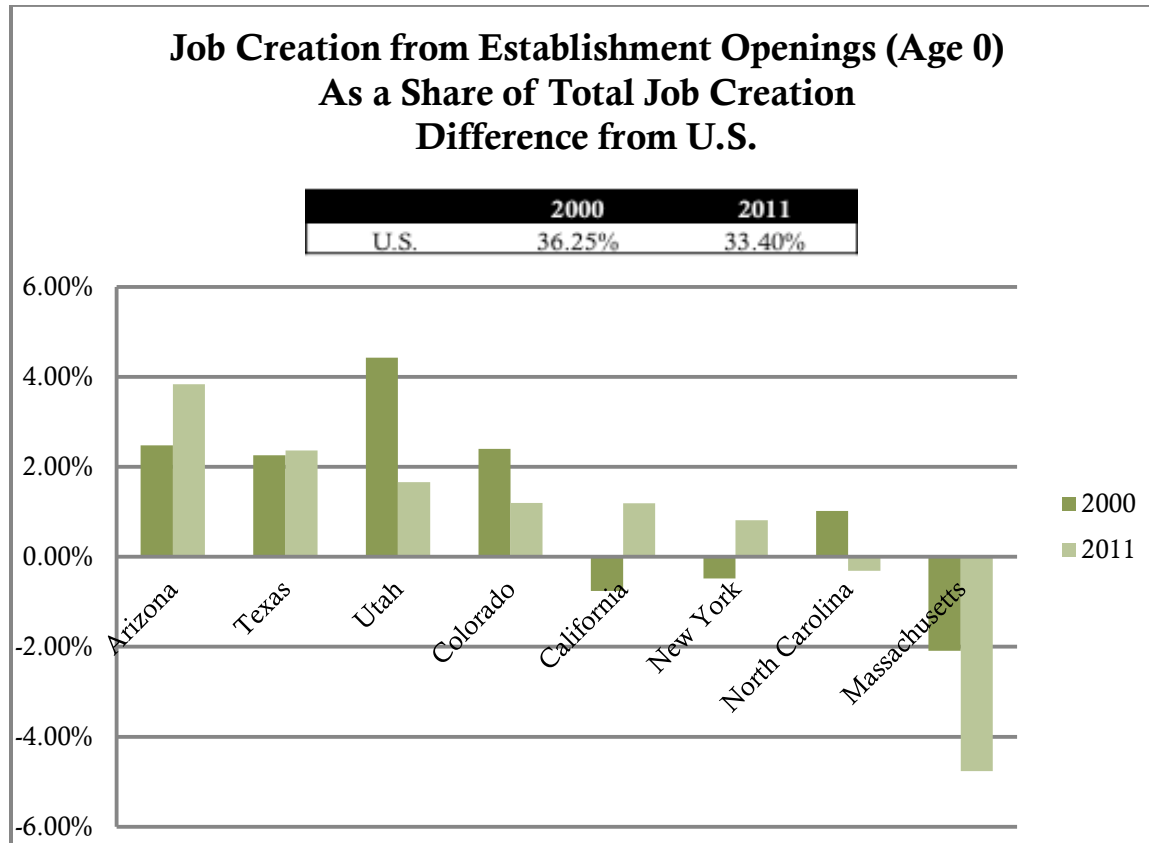
- ◆ Small business bank lending in Colorado is above the national average. Various measures of such capital flows rank Colorado consistently in the top third among its peer states.

Entrepreneurship

Job Creation through Innovative Young Businesses

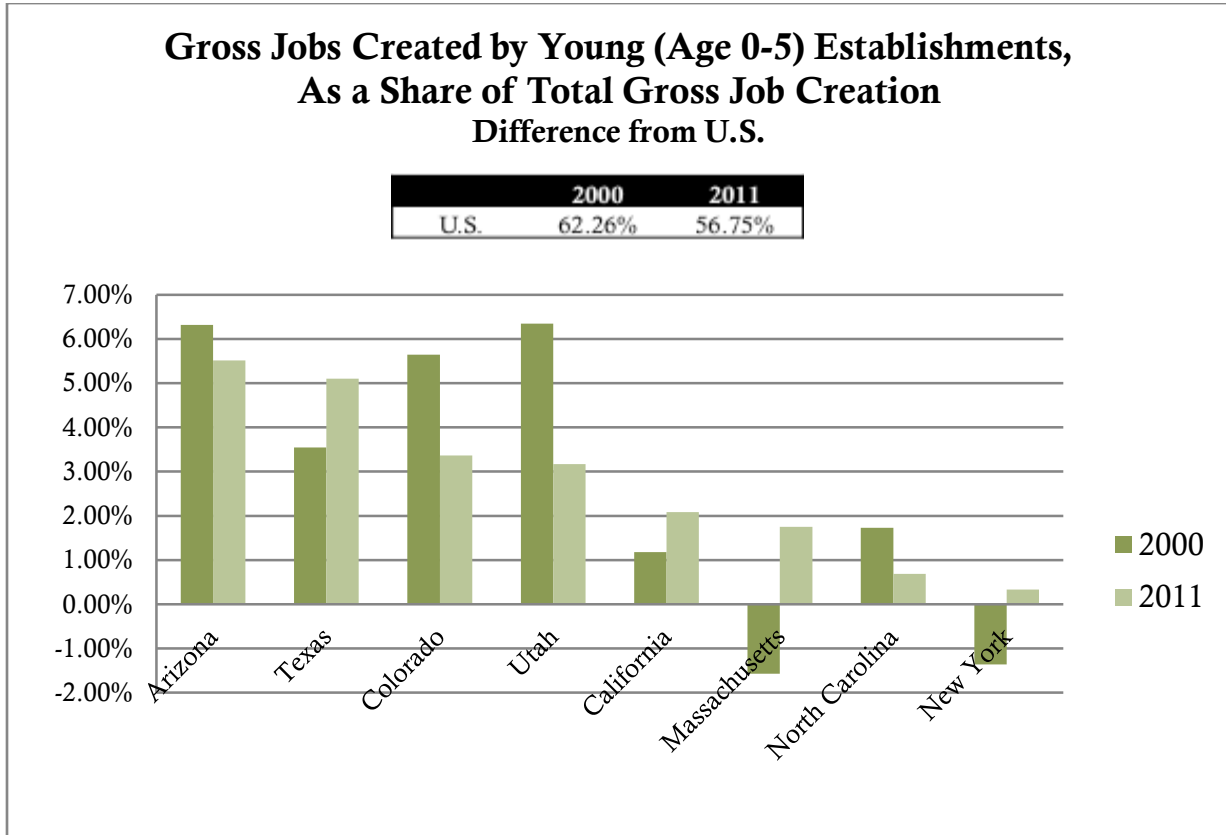
Nationally, new establishments have been a large and reliable source of job creation. Even during recessions, startups consistently created close to 3 million jobs every year since the late 1970s, a fact which is all the more remarkable given that each of these startups is almost always relatively small in size. Comparatively, net job creation by established businesses has been unstable, fluctuating between 2 million in peak years and -8 million in the most recent and deepest recession (Thompson, 2014).

Figure 1



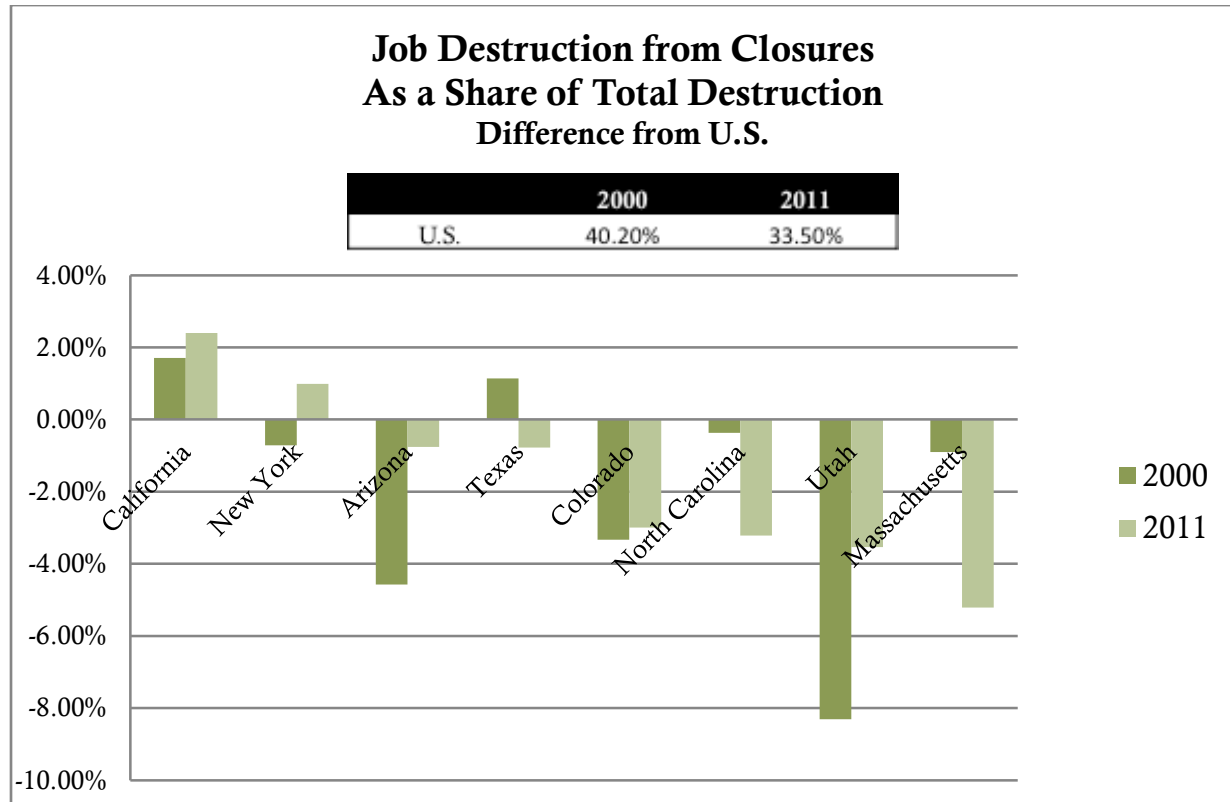
The most recent recession is unique in that it has stifled new establishments – and thus job creation – to an unusual degree (Haltiwanger, 2013). In the U.S., the share of job creation from new business openings decreased from 36% in 2000 to 33% in 2011. In Colorado, the share from startups has been consistently higher than the national average. In 2000, just over 38% of new jobs were from startups; by 2011 that share fell to 34%. However, Colorado’s share still exceeds that of other innovative states such as Massachusetts and California, where the share of job creation from establishment openings was as small as 29%.

Figure 2



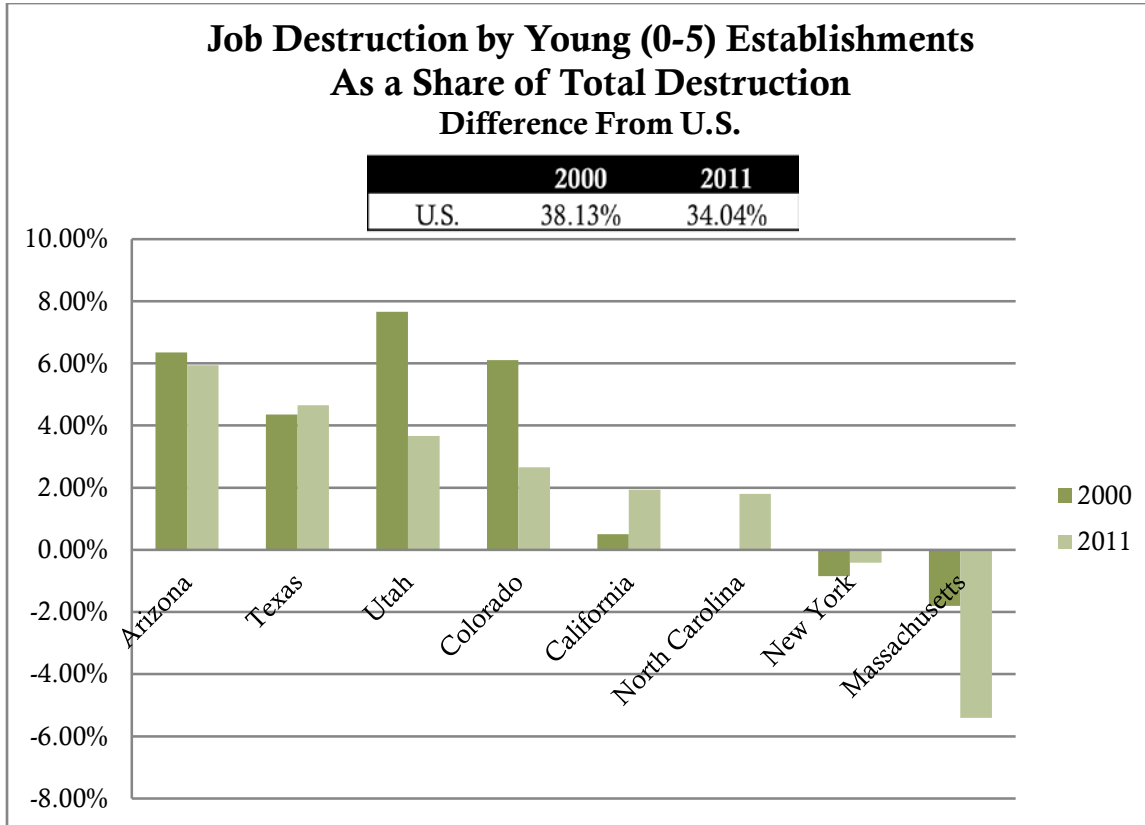
The downward trend in job creation from young establishments (aged 0-5 years, thus including new openings) parallels the same trend in startups. Nationally, young businesses created 62% of gross jobs in 2000, decreasing 5 percentage points to 57% in 2011. The decline was exaggerated in Colorado where young establishments created close to 68% of jobs in 2000, falling by eight percentage points to 60% in 2011.

Figure 3



Interestingly, job destruction dynamics closely track job creation evolutions. Just as the share of job creation from openings decreased in the United States in the recent recession, the share of job destruction from closures also decreased; a less dynamic national economy meant fewer openings and fewer closings. Job destruction occurs through closures and contractions. In 2000, 40% of job destruction was due to establishment closures and decreased to 34% in 2011. In Colorado, the share of job loss from closures was consistently lower than the national average at 37% in 2000 and 30% in 2011.

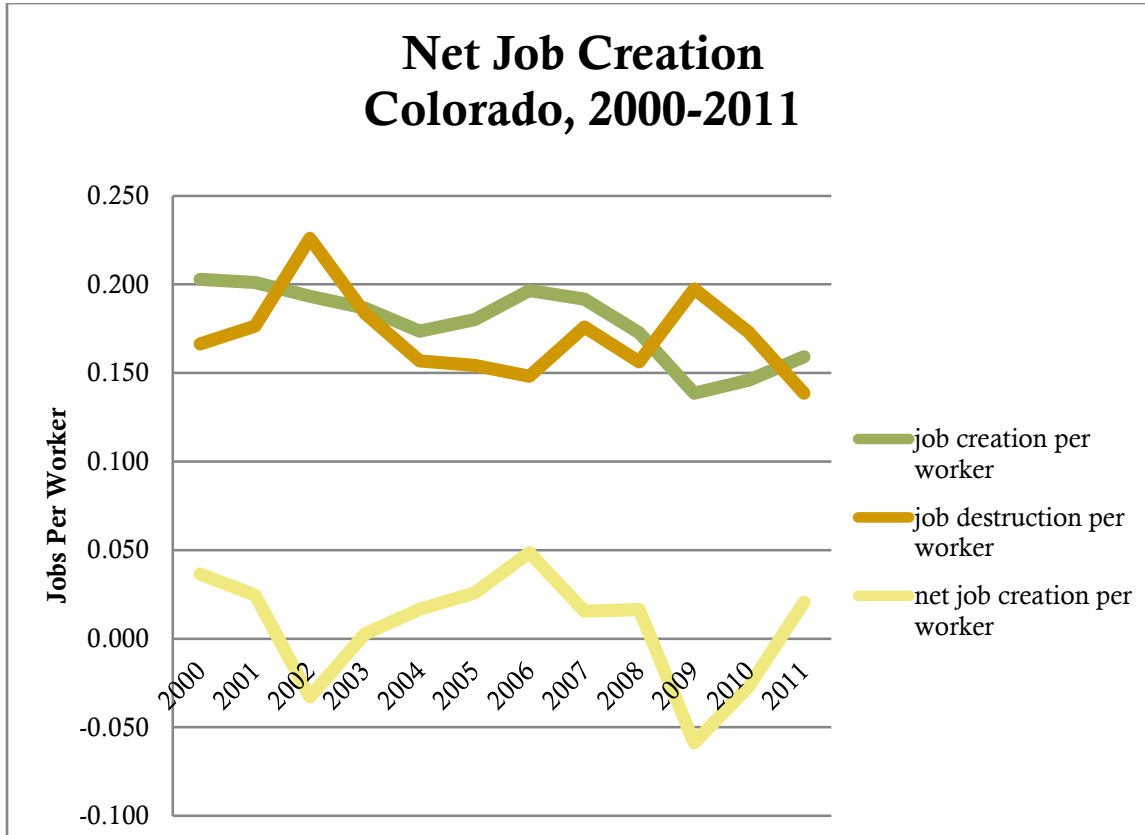
Figure 4



Jobs lost due to the combination of closures and contractions also decreased during the last decade. In the U.S., young businesses destroyed 38% of all jobs lost in 2000, falling four percentage points by 2011. In Colorado, job destruction by young firms declined even more dramatically from 44% in 2000, down to 36% in 2011, but remained consistently above the national average as well as many of its peers.

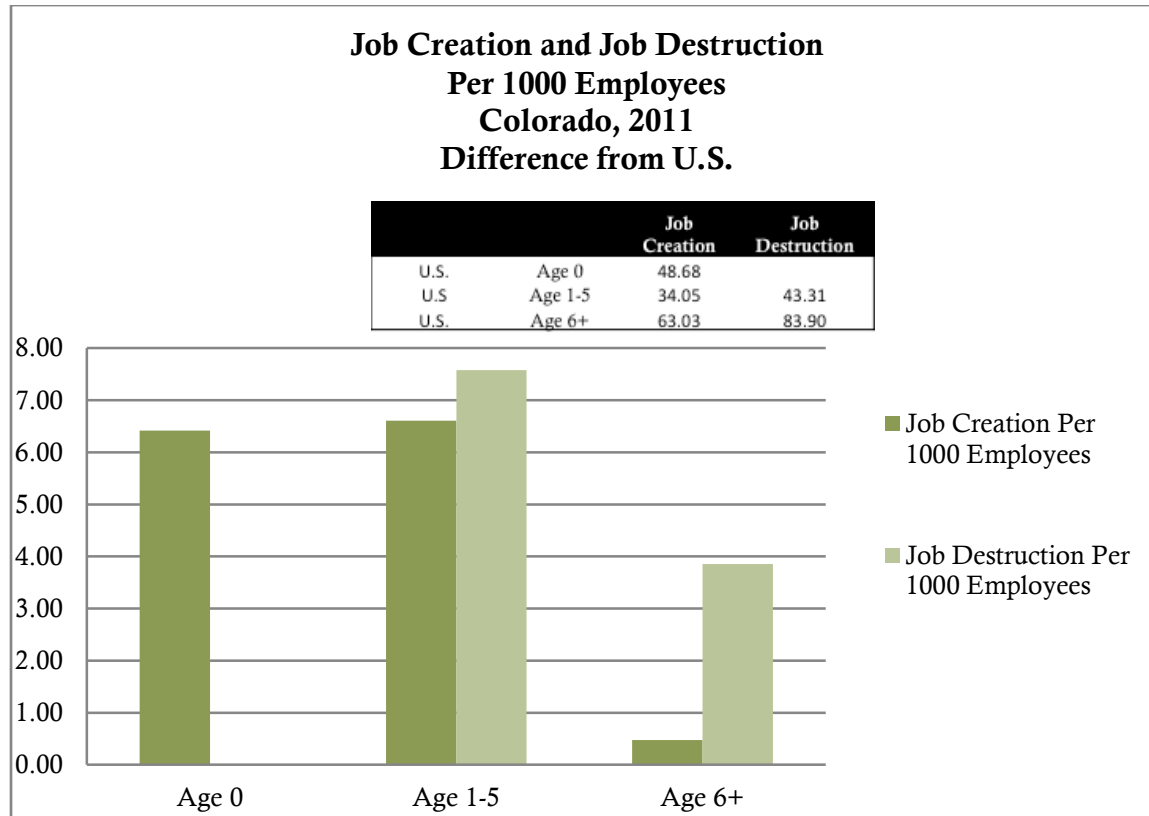
For Colorado, the parallel between high job destruction and high job creation by young establishments captures the effect of a highly dynamic economy. Much like the share of jobs created by young businesses is above the national average, the share of jobs destroyed by these businesses is also well above the national average. This entrepreneurial dynamism appears to be a key part of a vigorous innovative regional economy.

Figure 5



Every year businesses create a large number of jobs, but destroy nearly as many. Churn in the labor market results in a relatively narrow margin of net job creation. In Colorado, newly created jobs are equivalent to 16% of total employment in 2011 but 14% of jobs were destroyed for a net increase in jobs of just 2%.

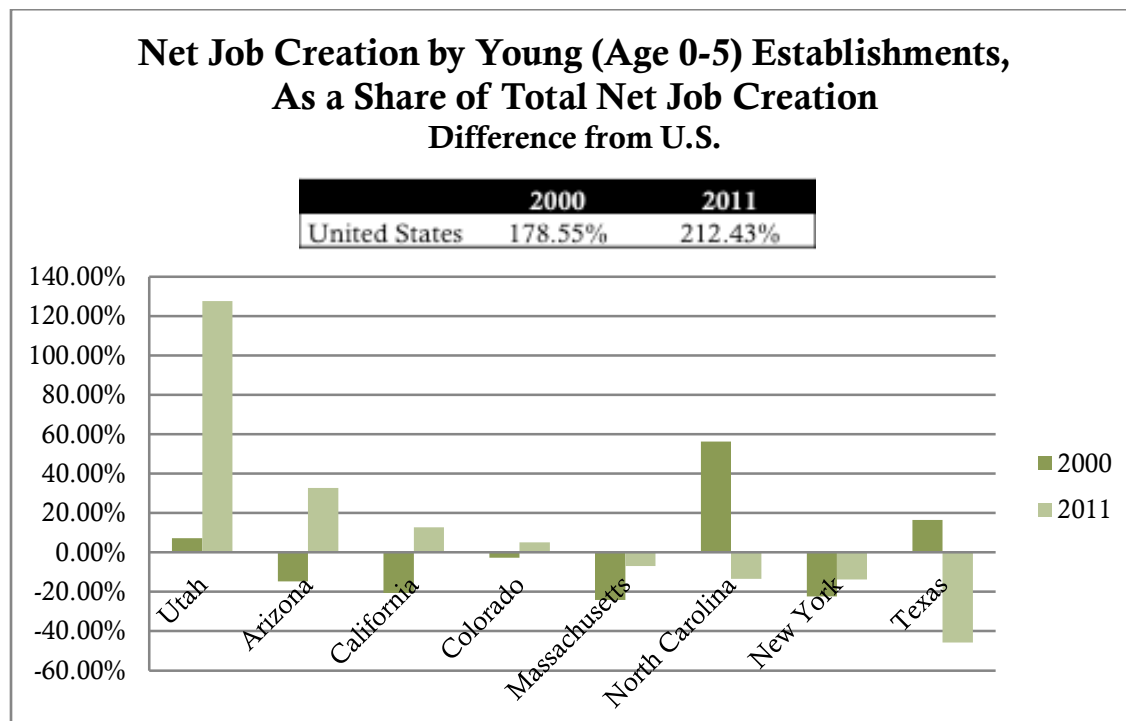
Figure 6



Net job creation is positive only among newly opened establishments. Destruction is greater than creation in every year following an establishment's opening as a result of closure and contractions, underscoring the critical job creation role of startups. In the U.S., young businesses created 83 jobs per 1000 employees while destroying only 43. In contrast, mature firms destroyed 84 jobs per 1000 employees but created just 63.

Young establishments are thus generally the major job creators, especially given the strong role of newly formed businesses. The exceptional national net job creation rates of these young upstarts in Figure 7 reflect exactly this reality, offsetting the net losses that occur among older establishments. In Colorado, the relatively high amount of job creation and job destruction results in net job creation by young businesses that is nearly even with the rest of the U.S. Despite the survival problem for young businesses noted in the 2013 report, the combination of job dynamics from startups and young establishments generate sufficient employment to maintain net job creation roughly commensurate with the national average.

Figure 7



As this section has repeatedly noted, job creation and destruction seem to occur together; economies with considerable job creation also have considerable job destruction. Startups themselves are responsible for about a third of gross job creation, while closures represent a parallel third of job destruction. Effectively, more startups inevitably mean more closures, as establishment survival rates over the first five years rarely exceed 50%. Some economies indeed have both more startups and closures together, creating a more dynamic, churning environment where firms consistently pioneer the frontiers of the marketplace.

Interestingly, despite the apparently offsetting effects of more startups alongside more closures, recent research clearly shows that such highly-dynamic economies actually have significantly higher job growth over the long-term (Bunten, Weiler, Thompson, and Zahran, 2015). The situation is analogous to seeding a plot; more seeds (startups) will inevitably also yield more duds (closures), but the chances of sprouting a few significantly stronger plants (e.g. Google) are also commensurately higher.

The mechanism at work appears to be the informational value that each and every opening and closure provides to following potential entrepreneurs (Weiler, 2000; Weiler, Hoag, and Fan, 2006). Each entrepreneurial project, whether successful or unsuccessful, sheds light on a particular combination of business strategies (e.g. location, niche, suppliers, etc.). The relative success of that particular strategy is relayed by the project's trajectory. Followers use the past track record of marketplace pioneers to shape their own plans, which are sharpened by the experience of those who came before them.

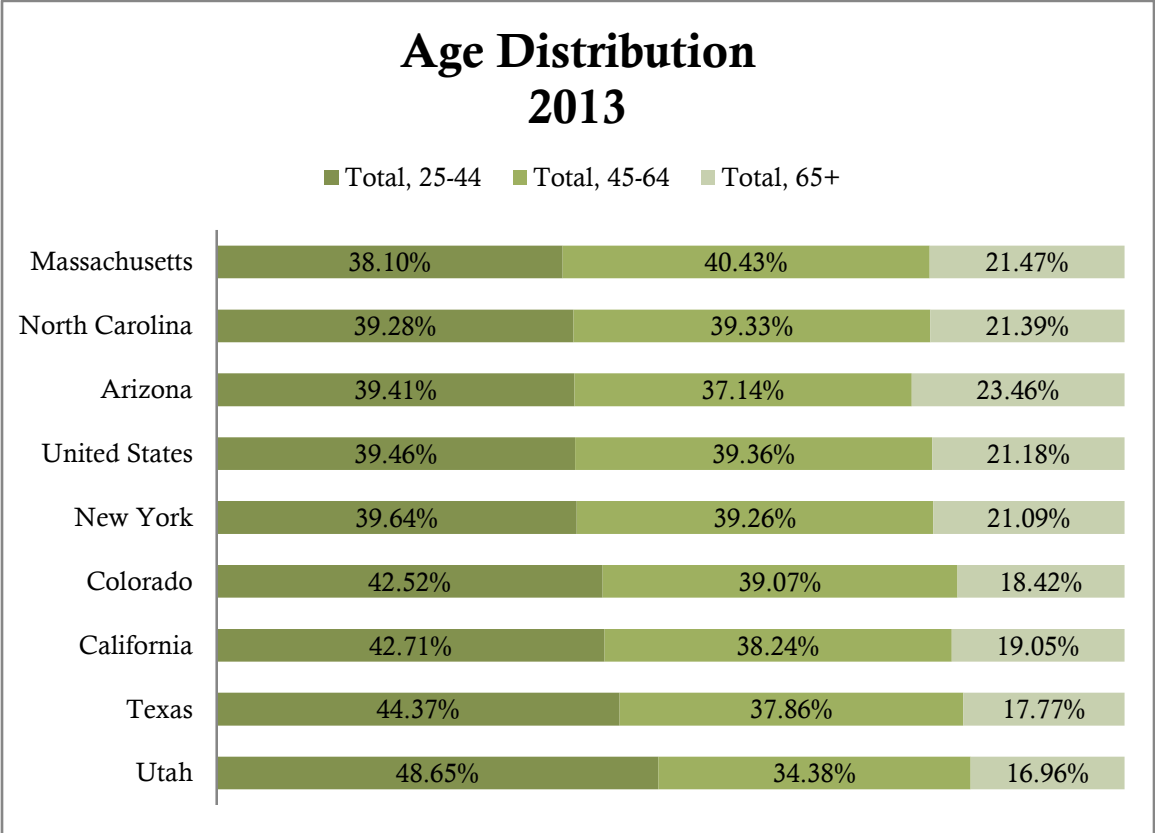
In this way, the noted thriving, dynamic economies with many startups (and closures) create a healthier regional economy, with an informationally-rich environment within which entrepreneurial pioneers can better succeed. The result is that job growth is substantially better in such economies, even if closures and job destruction are a consistent feature of the environment as well.

Talent

Colorado's Baby Boomers and the Approaching Skills Gap

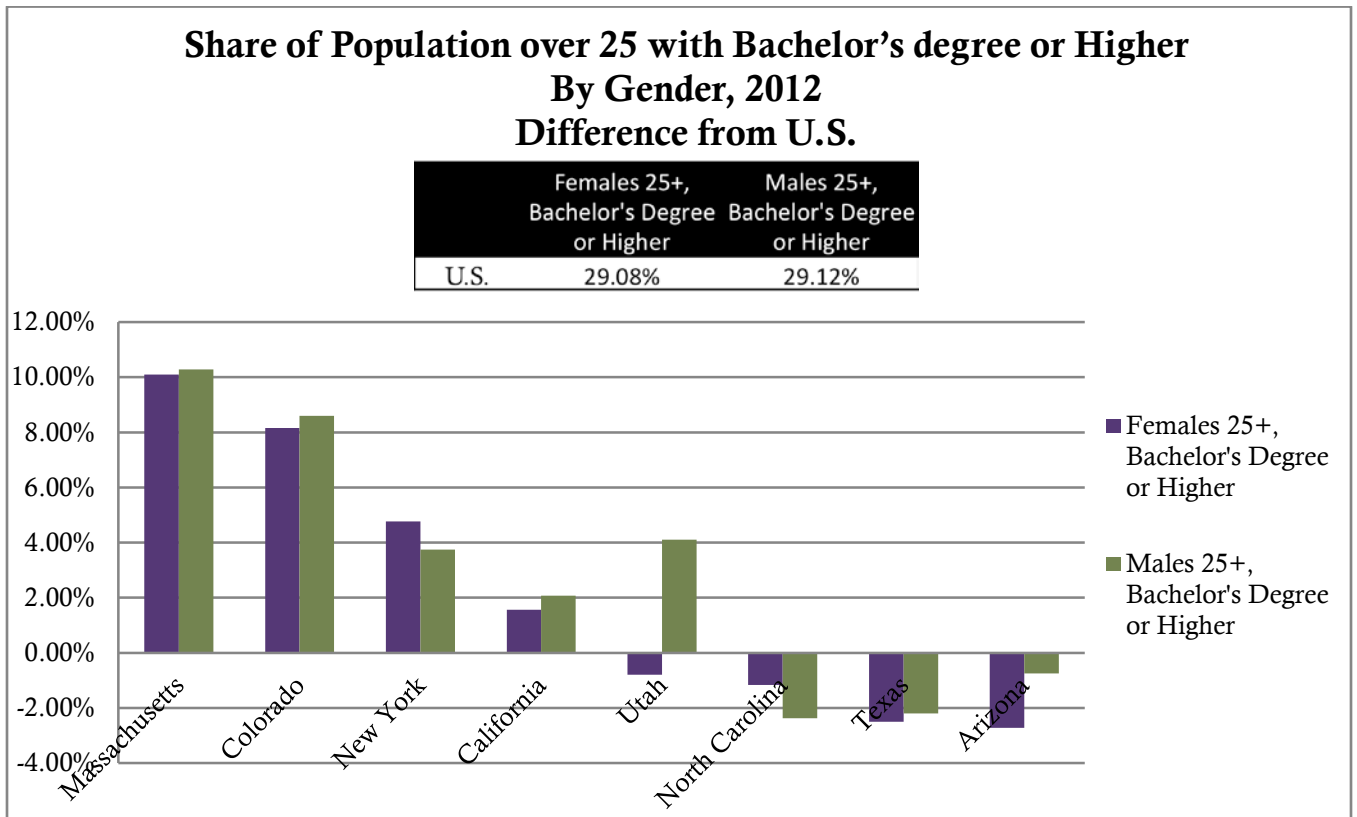
Colorado’s economic dynamism is largely attributable to the unusually high concentration of talent in the state’s workforce. As the skilled and experienced baby boomers transition into retirement, employers will need talented replacements to fill their positions. In the figure below, the population over age 25 is divided into three cohorts. The oldest cohort consists of those who are retired or eligible to retire, specifically age 65 or older. The next cohort consists mostly of late baby boomers (born between 1949 and 1968) who are about to retire, ages 45 to 64. Those ages 25 to 44 belong to the youngest cohort and they will replace the retired and the soon-to-retire.

Figure 8



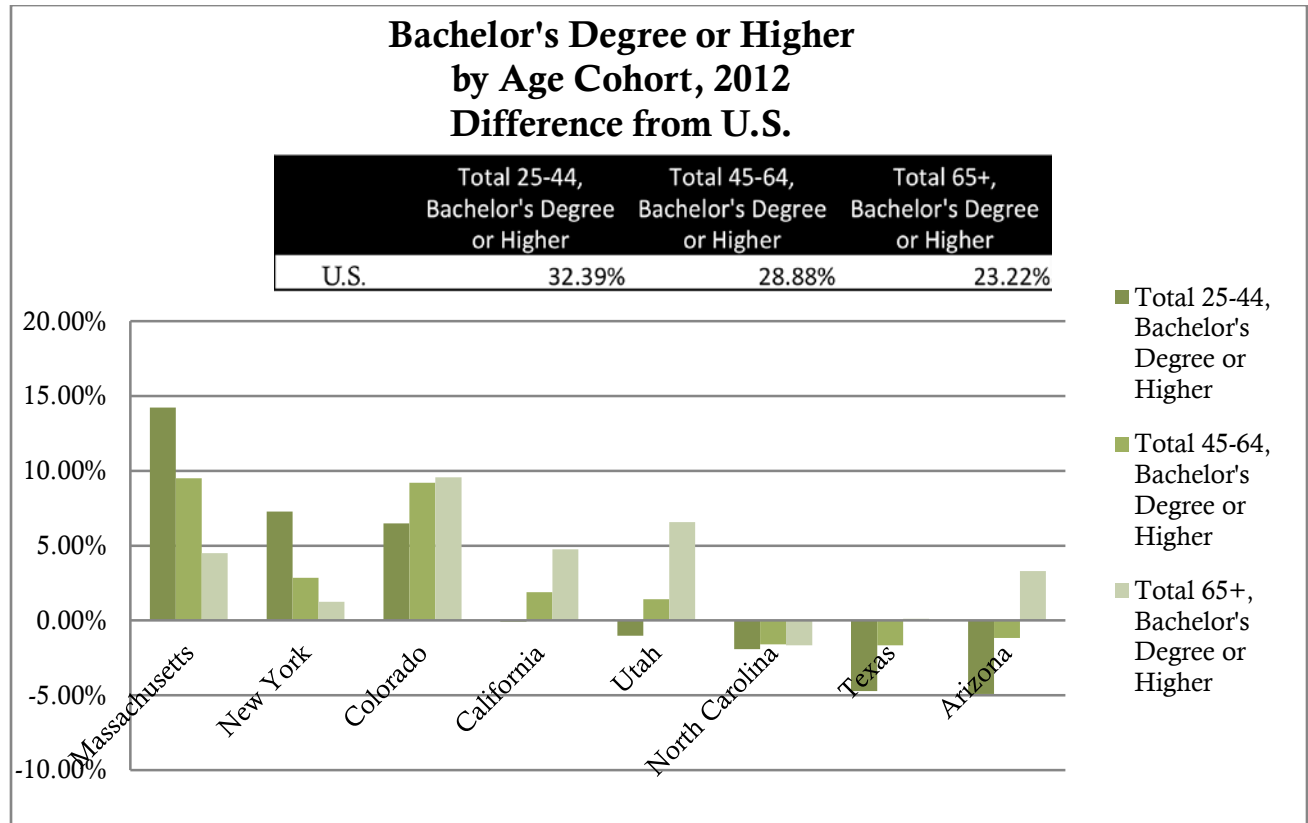
In the United States, the oldest cohort is roughly 21% of the population. In Colorado, a characteristically young state, the oldest cohort is just over 18% of the population. Colorado also has a relatively large share of young people at 42%, suggesting that though there are significant demographic changes due to an aging population, the changes are tempered by young migration into the state (Garner, 2014). Because Colorado is attractive to young, mobile people, the state consistently has an influx of workers to offset increases in the older population.

Figure 9



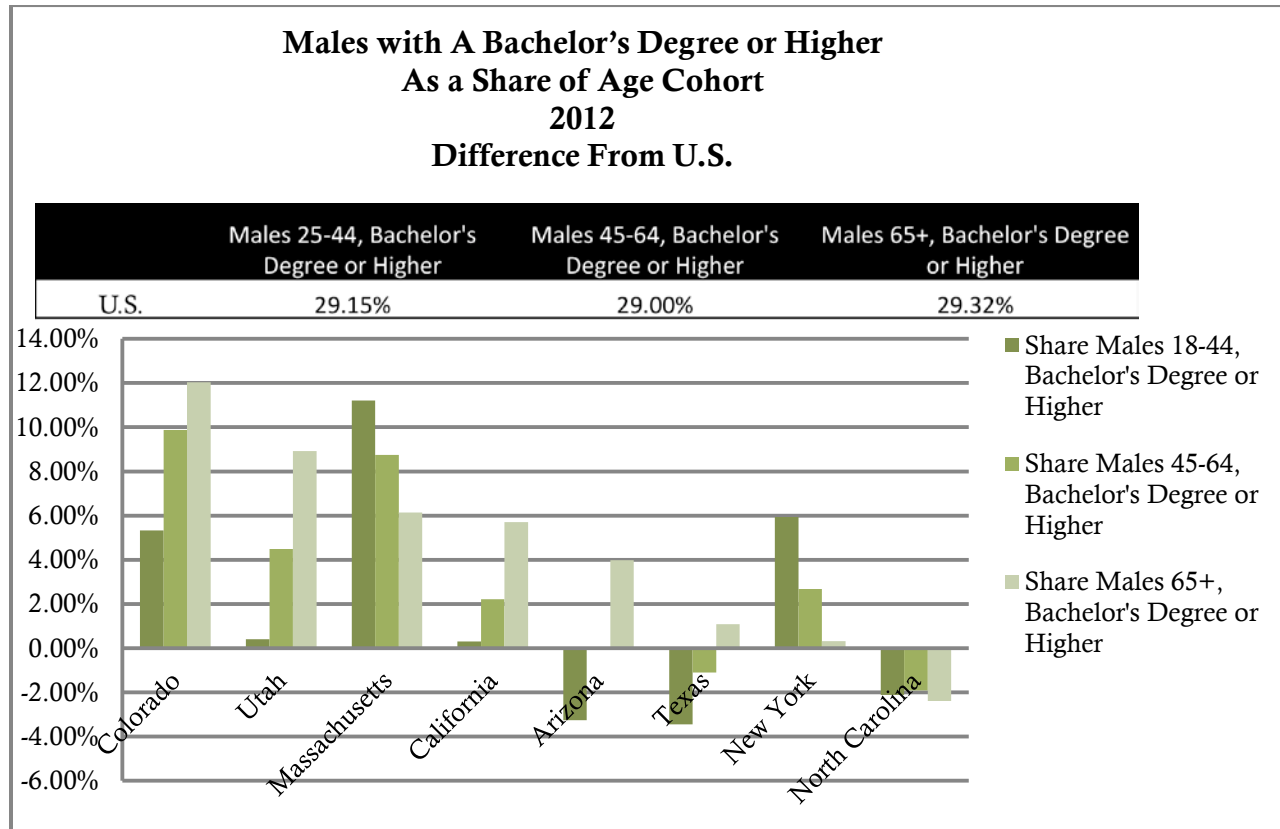
Superficially, it appears that Colorado is well above average in the share of population over 25 with a bachelor's degree or higher. Roughly 37% of men and women in Colorado are highly educated, more than eight percentage points higher than the U.S. on average.

Figure 10



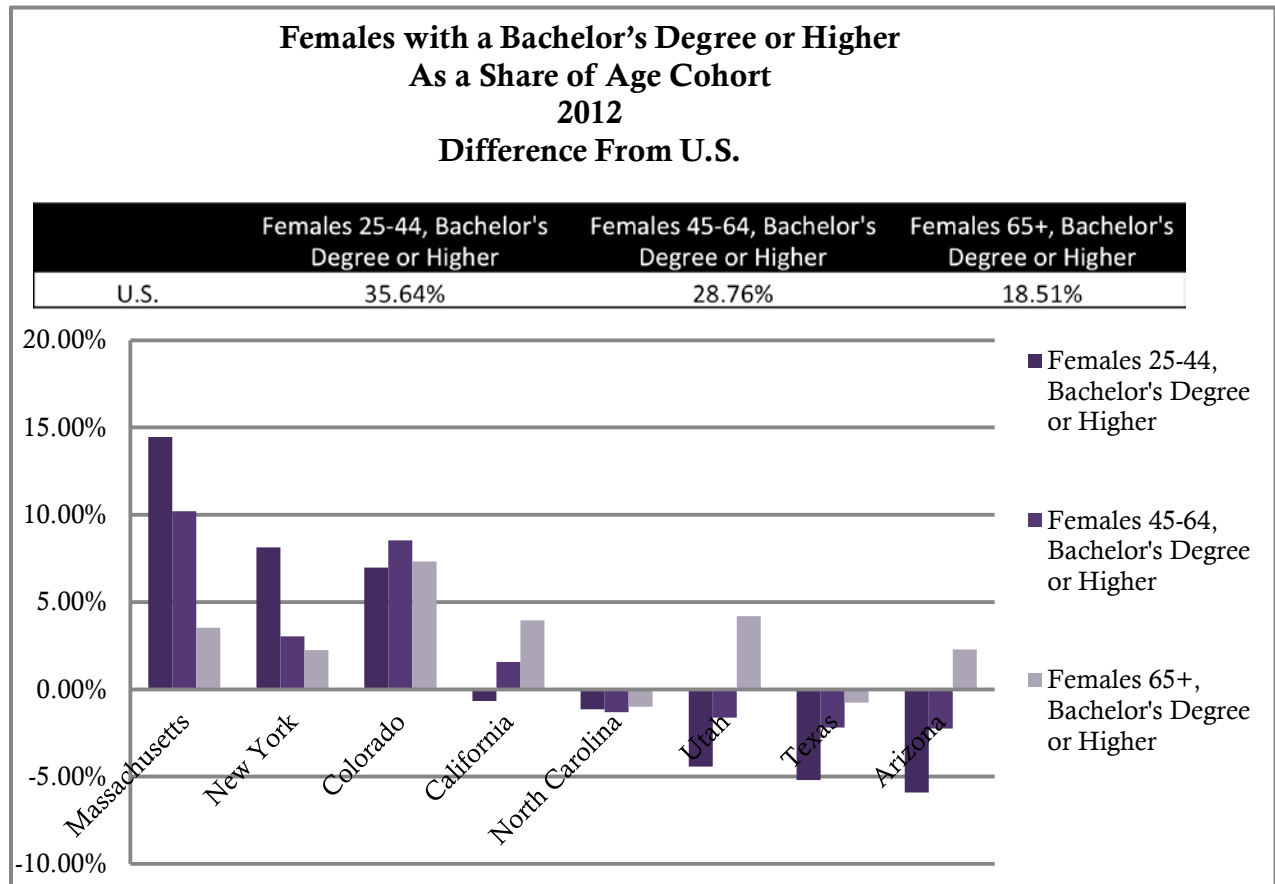
By age cohort, the share with a bachelor's degree or higher in the U.S. has grown larger from 23% among the oldest cohort to 32% among the youngest. In Colorado, the education advantage has become progressively smaller with each successive cohort but the state still remains well above the U.S. average.

Figure 11



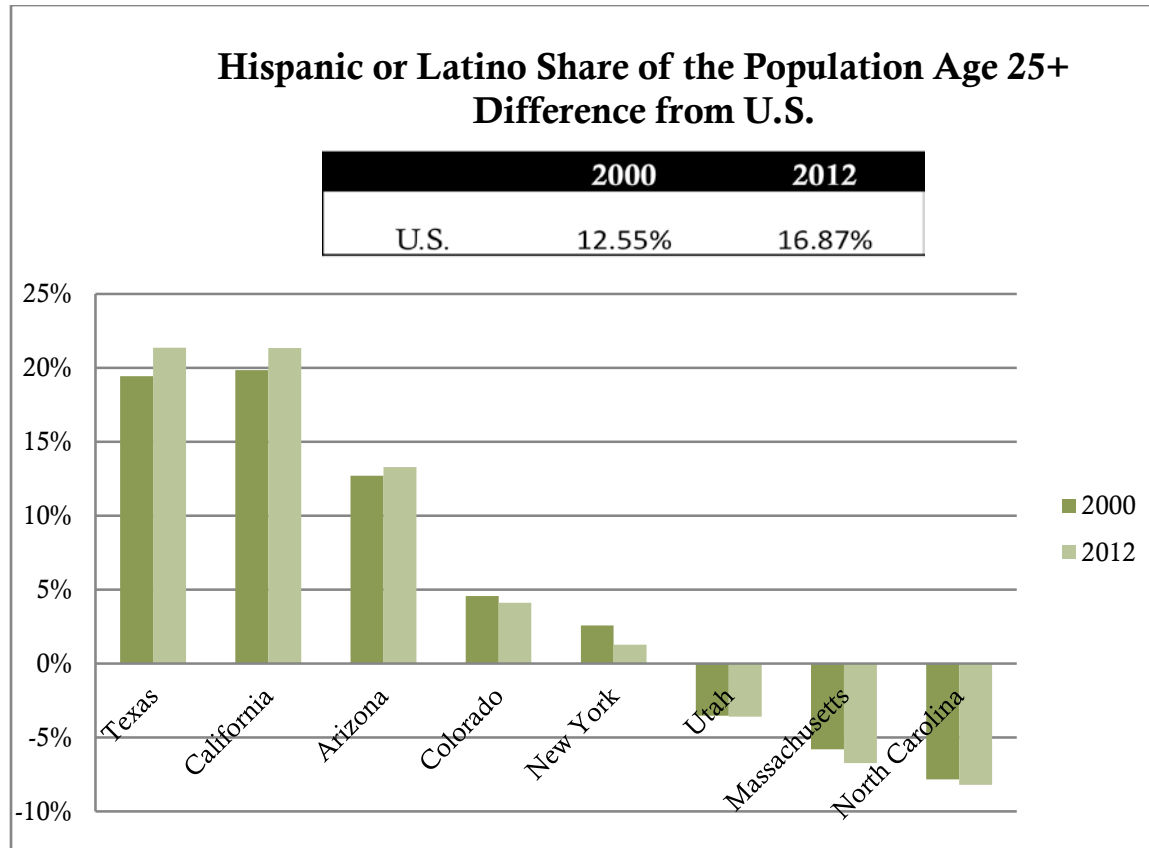
Pooling across all age groups for each gender can be misleading. The figure above shows the same measure of education attainment as before, but specifically for males. The national education attainment of men is remarkably flat across the three cohorts. Furthermore, education attainment of the male population in Colorado successively falls relative to the U.S. with each age cohort, revealing the changing composition of the state's educated workforce away from men – and towards women, as will be shown next. The highest educated cohort of men is the same cohort that has already left the labor force. Just over 41% of men ages 65 or older have a bachelor's degree or higher, 39% of men between ages 45 to 64, and just 34% of men ages 25 to 44.

Figure 12



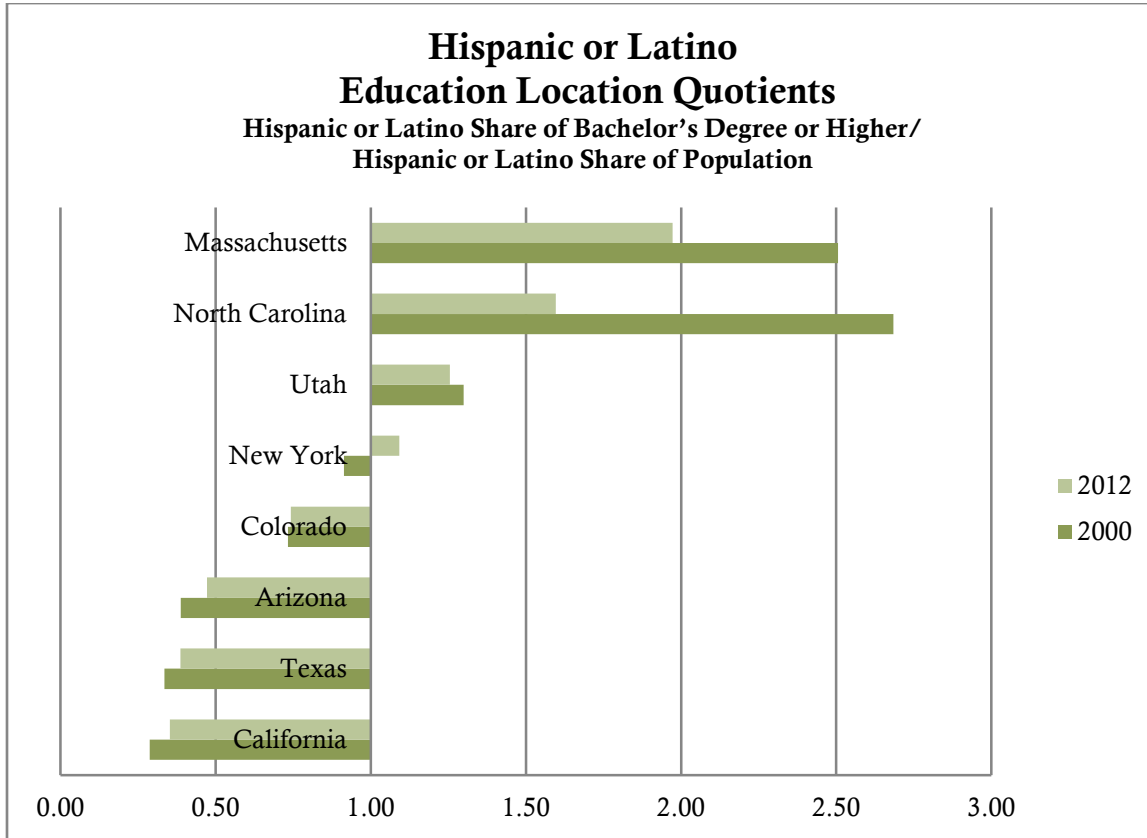
Women comprise an increasingly important share of the educated workforce, with women graduating from college now at higher rates than their male counterparts. This changing demographic environment suggests there may be significant changes in skilled workforce composition as well. Particularly in the younger cohorts, the share of women with a bachelor's degree or higher is increasing. Nationally, 19% of women age 65 or older have a college degree compared to 29% of those ages 45-64, and 36% of the youngest cohort. In Colorado, women's educational attainment over time has been consistently above than the national average. Among the oldest cohort 25% have a college degree, whereas 37% of the middle-aged cohort, and 42% of the youngest cohort have graduated from college.

Figure 13



Another natural subgroup with which to better understand trends in talent in addition to women, who after all comprise half the population, are Hispanics and Latinos who represent over 20% of Colorado’s adult population over age 25. Only the border states of Texas, California, and Arizona have a larger Hispanic/Latino share of the population. This significant component of Colorado’s population thus may also help provide skills to the state as older workers retire.

Figure 14



For each state, the figure above compares the college-educated share of Hispanics and Latinos relative to the U.S. average. Despite the relatively large Hispanic/Latino population, the share that holds a college degree is relatively low in Colorado. The silver lining is that this group represents a considerable opportunity to increase the skill level of the state's future workforce.

Capital

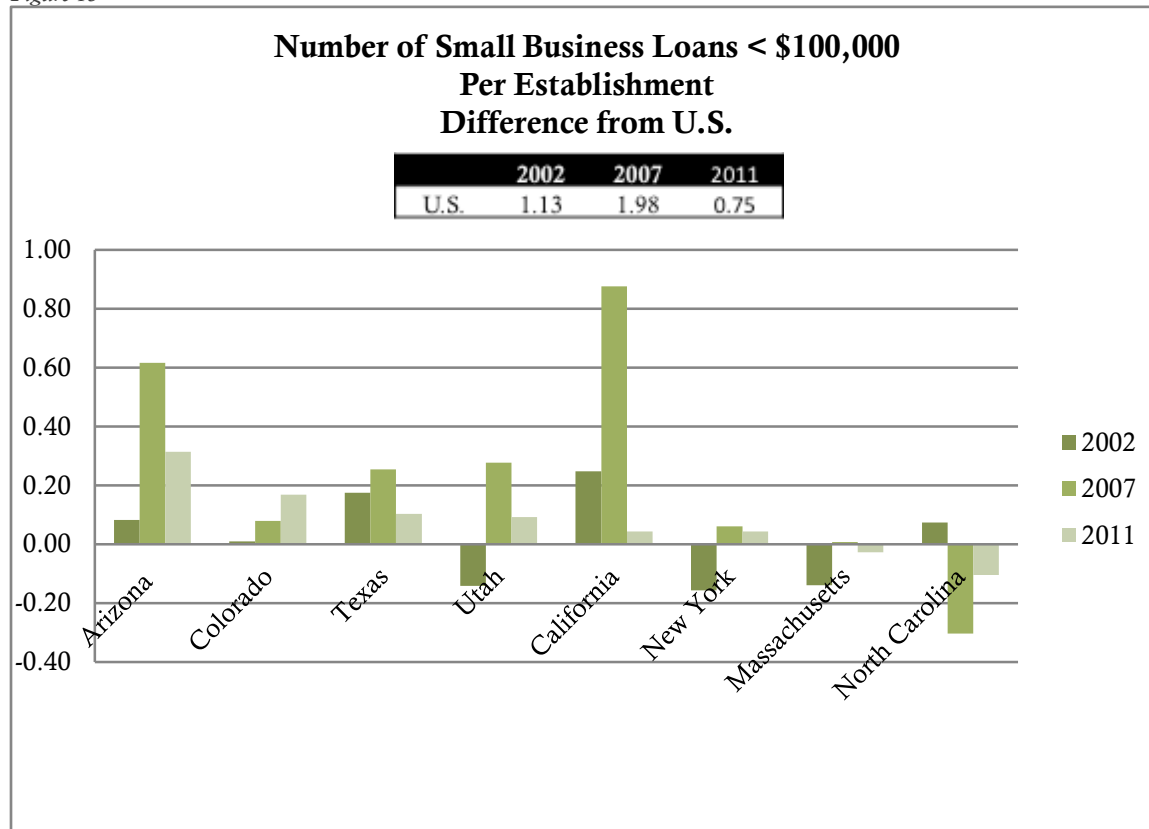
Small Business Loan Trends:

Evidence from Community Reinvestment Act (CRA) Data

The data for the following figures is based on small business bank loans made under the authority of the Community Reinvestment Act (CRA) of 1977. In previous reports, the capital section was based on small business bank lending data from the Small Business Administration (SBA), which is the conventional source. However, our finding that Colorado generally exceeded national averages in small business lending was met with some skepticism, although we continue to acknowledge that bank loans are themselves only one narrow type of small business financing. However, since bank loans are subject to policymaker oversight and regulation, information on the use of such financing mechanisms is of interest both to the public and government officials.

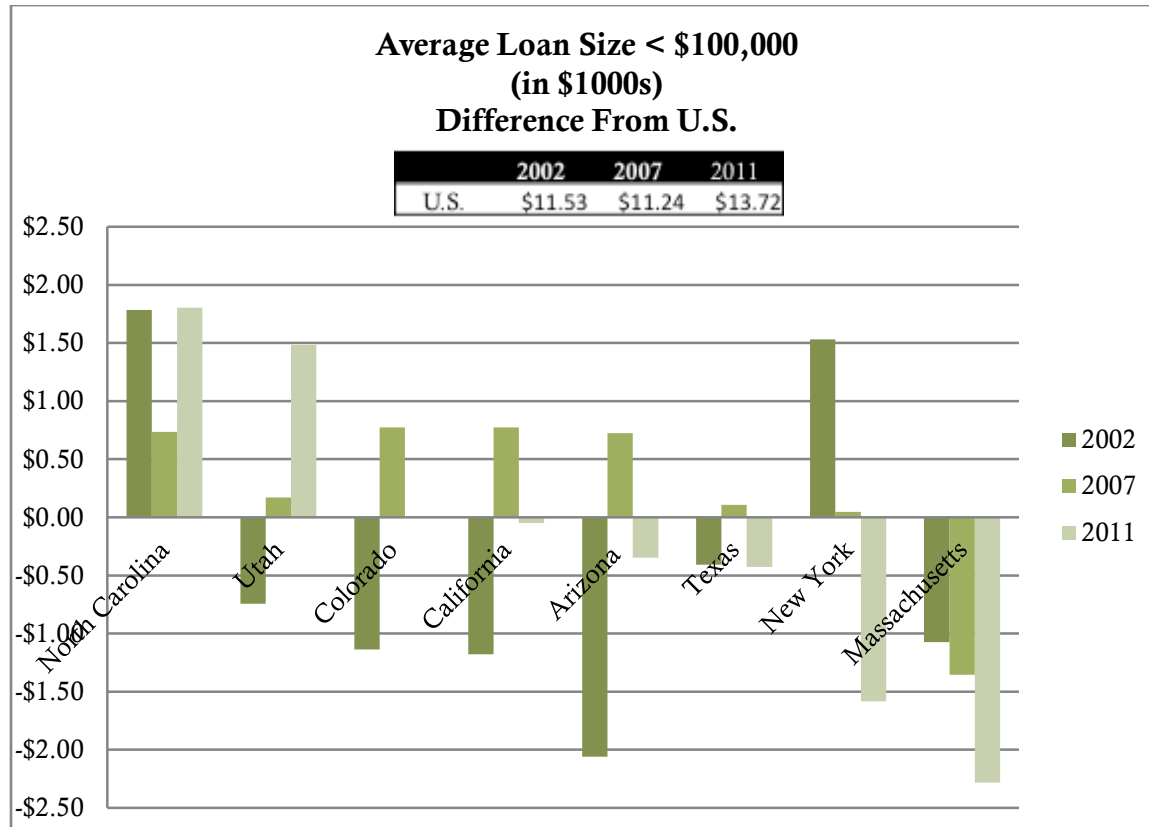
Therefore for this report, we analyzed the parallel data offered by CRA data. While the CRA data does not include data from all institutions that extend small business loans, Bostic and Canner (1998) report that the included institutions issue about two-thirds of all small business loans and that the data set is broadly indicative of overall small business lending patterns. Despite differences in the data, the results are substantively similar to results produced using data from the SBA, with the additional advantage that the CRA data is based on the location of the business receiving the loan rather than the location of the bank making the loan.

Figure 15



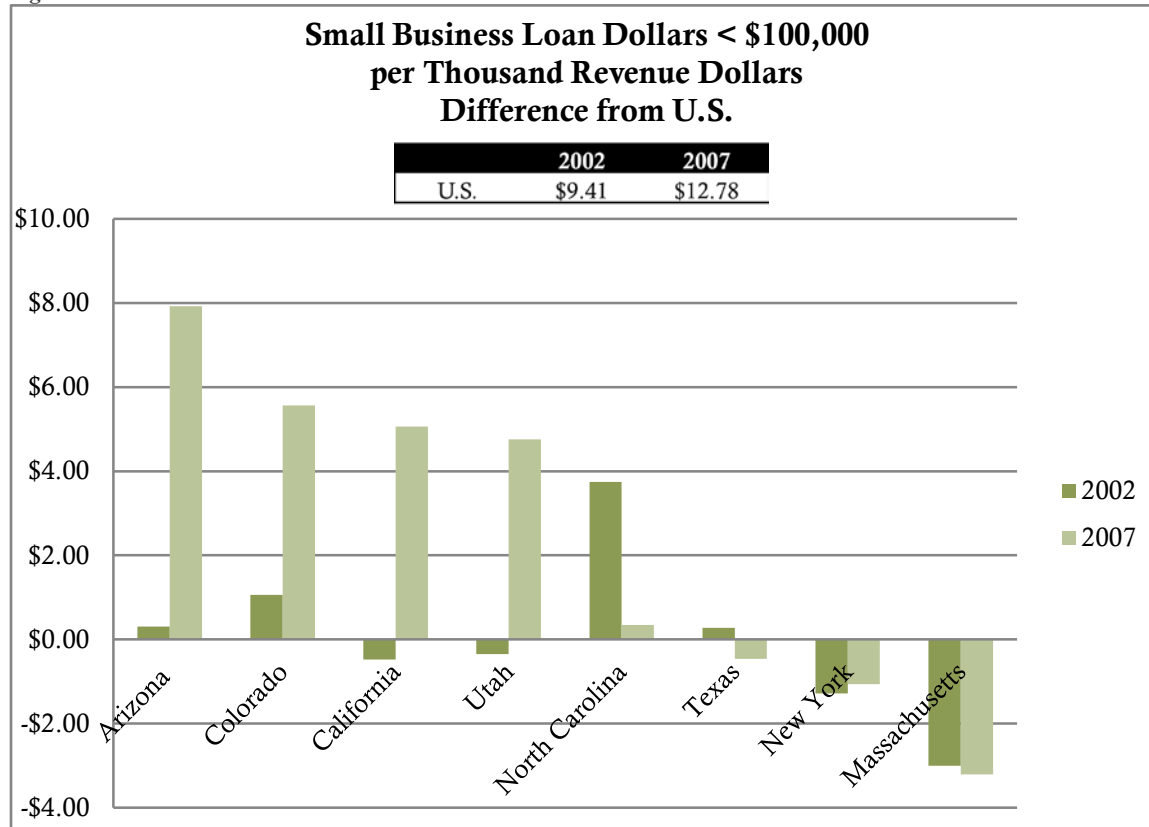
As of 2011, businesses in Colorado received the second highest number of loans per establishment among the peer states. However, since 2007 loans per establishment have declined by more than 50% nationally and in Colorado, reflecting the reverberations of the financial crisis. Small business lending was particularly affected, as banks retrenched to solidify their balance sheets (Cole, 2012). In the U.S., loans per establishment were still lower in 2011 than almost a decade earlier, although Colorado’s loan rates were much closer to the 2002 benchmark and generally more stable than peer states over this period. Since loans are often extended also to non-employer partnerships and sole proprietors, normalizing loan rates by only those establishments with employees exaggerates the likely rate of actual loans per establishment. However, such employer establishments are consistent and well-understood benchmarks which offer a useful baseline to assess relative loan rates across states and over time.

Figure 16



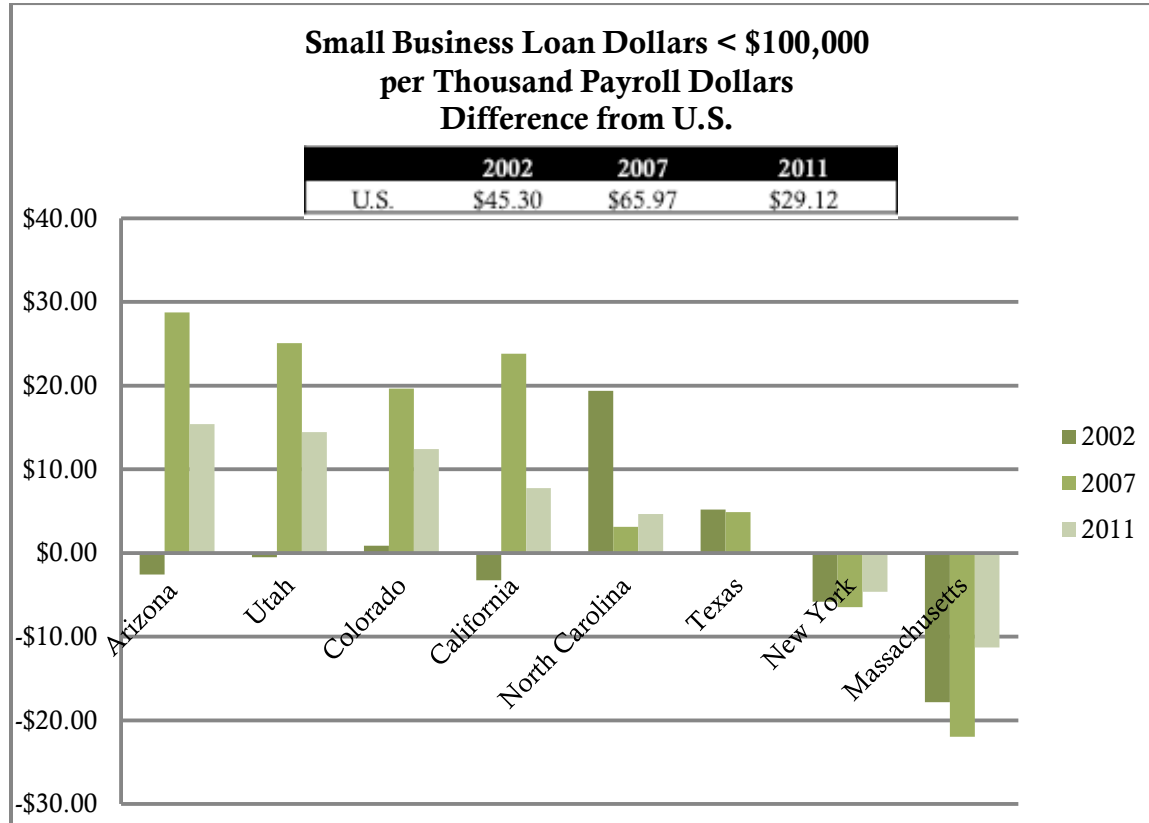
As shown above, the number of loans provides a sense of the relative breadth of distribution of capital that facilitates the flow of innovations through small businesses into the marketplace. The average size of the loans and their relative depth, in terms of either revenue or payroll, allows a view of the scale of these loans relative to the businesses they finance. In the U.S., average loan size remained relatively stable in the early 2000s. In Colorado there was a fairly dramatic increase from 2002 to 2007 going from well below the national average to significantly above. As of 2007, average loan size was \$12,000 in Colorado. By 2011, loan size increased to \$13,700 both in Colorado and the country.

Figure 17



Nationally, the average value of small business loans scaled by revenue increased by nearly one-third between 2002 and 2007. In Colorado, the increase was even larger from \$10,400 to \$18,250, indicating that the deepening loans were becoming a more important part of the state's small businesses' finances.

Figure 18



Since data for the revenue metric above is only available through 2007, we leverage a parallel scaling benchmark using payroll dollars to measure the depth of bank capital financing. The effect of both the boom and the recent recession is clear, with national rates jumping by nearly 50% from 2002 to 2007, then falling by over 50% between 2007 and 2011 to a level fully one-third lower than in 2002. While Colorado follows the same overall trend, especially in terms of pre-recession boom, its bank capital depth measured by payroll is consistent with the tale sketched by the revenue metric as well as the other analyses of this section, namely that Colorado-based small businesses generally benefit from stronger indicators of bank lending than the nation as a whole and many of its peers.

Conclusion

Prior reports show that Colorado has many innovative and entrepreneurial strengths. However, last year we also saw that young firms in Colorado struggle to survive the first five years. This year, the report aims to better understand the implications of a low survival rate for job creation. The analysis shows that the state's relatively high job loss from closures and contractions is coupled with relatively high job creation from establishment openings and expansions. The result of this high degree of job churn in Colorado is net job creation roughly on par with the rest of the nation in any given year. Furthermore, recent research indicates that the job churn inherent in dynamic economies like Colorado's leads to higher job growth over the long term.

Colorado faces an evolving pool of talented workers as the demographics of higher education change. Aggregate measures show that Coloradans are generally highly educated, a feature that has historically been driven by the inflow of male baby boomers who are now retired or soon-to-retire. The following generations of men are not attaining the education levels necessary to effectively replace these outgoing workers. However, the strong recent growth of Colorado women with higher education degrees is expanding the source of skilled workers and creating an opportunity to bridge the talent gap. The state's large Hispanic and Latino population also presents an opportunity to create a stronger flow of homegrown talent if this relatively underutilized population also makes gains in higher education achievement.

Previous reports demonstrate that Colorado banks are relatively generous with small business loans, contrary to public discourse and anecdotal evidence. This year we took advantage of an entirely new data set to reanalyze capital availability in Colorado. Again, we found that a relatively high number of bank loans are made to Colorado-based small businesses, and that those loans are typically larger and deeper than in the rest of the country.

The evolution of the state's business and demographic environments highlight the dynamism of the Colorado economy and its residents. Growing the talent pool with women, Hispanics, and Latinos and recovering small business lending that suffered during the recession are important components to an innovative future. Skilled workers and access to capital combined with the industriousness of entrepreneurs can solidify Colorado's economic dynamism, creating the potential for long-term growth for years to come.

Acknowledgements

Authors

Tessa Conroy
Doctor of Philosophy in Economics Graduate
Colorado State University

Stephan Weiler
Professor of Economics
Research Associate Dean
Colorado State University

We are grateful to Colorado State University for its generous sponsorship of our research team, led by Dr. Stephan Weiler. Special thanks to Sarah Belford, Devin Bunten, Elizabeth Garner, Alexandra Hall, Laura Jensen, Kari Koppes, Sarah Low, Grant Nülle, and CSU Ventures for their insight and expertise in reviewing the development of this report, as well as Daniel Biondi for his assistance with the Capital section.

Bibliography

- Bostic, Raphael W, and Glenn B Canner. 1998. "New Information on Lending to Small Businesses and Small Farms : The 1996 CRA Data." *Federal Reserve Bulletin*, 1–21.
- Bunten, Devin, Stephan Weiler, Eric C. Thompson, and Sammy Zahran. 2015. "Entrepreneurship, Information, and Growth." *Journal of Regional Science*, 1–32.
- Cole, Rebel A. 2012. *How Did the Financial Crisis Affect Small Business Lending in the United States?*
- Garner, Elizabeth. 2013. Conversations with Stephan Weiler.
- Haltiwanger, John, Ron S Jarmin, and Javier Miranda. 2013. "Who Creates Jobs? Small versus Large versus Young." *The Review of Economics and Statistics* XCV (2): 347–61.
- Haltiwanger, John, Javier Miranda, and Ron Jarmin. *Anemic Job Creation and Growth in the Aftermath of the Great Recession : Are Home Prices to Blame ?*
- Hathaway, Ian, and Robert E Litan. 2014. *Declining Business Dynamism in the United States : A Look at States and Metros. Economic Studies.*
- Thompson, Derek. 2014. "The Mysterious Death of Entrepreneurship in America." *The Atlantic*.
<http://www.theatlantic.com/business/archive/2014/05/entrepreneurship-in-america-is-dying-wait-what-does-that-actually-mean/362097/>.
- Weiler, Stephan. 2000. "Pioneers and Settlers in Lo-Do Denver: Private Risk and Public Benefits in Urban Redevelopment." *Urban Studies* 37 (1): 167–79. doi:10.1080/0042098002348.
- Weiler, Stephan, Dana Hoag, and Chuen-mei Fan. 2006. "Prospecting for Economic Returns to Research: Adding Informational Value at the Market Fringe." *Journal of Regional Science*, 46(2), 289-312.

Data

Figures 1-7: Derived using data from the U.S. Census Bureau (2014) Business Dynamics Statistics Data Tables. Establishment Characteristics. Retrieved from http://www.census.gov/ces/dataproducts/bds/data_estab.html.

Figure 8: Derived using the 2013 Population Estimates from U.S. Census Bureau (2014). Retrieved from American Fact Finder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. ID: PEPAGESEX. Title: Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2013

Figure 9-12: Derived using data from the American Community Survey (2014). Retrieved from American Fact Finder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. ID: B15001. Title: Sex by Age by Education Attainment

Figure 13: Year 2000 statistics derived from data from the 2000 Decennial Census. Retrieved from American Fact Finder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. ID: DP-1. Title: Profile of General Demographic Characteristics. Year 2012 statistics derived using data from the American Community Survey. ID: DP05. Title: ACS Demographic and Housing Estimates.

Figure 14: Year 2000 statistics derived using data from the 2000 Decennial Census. Retrieved from American Fact Finder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. ID: P148H. Title: Sex by Education Attainment for the Population 25 and over (Hispanic or Latino). Year 2012 statistics derived using data from the American Community Survey (2014). Retrieved from American Fact Finder at <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>. ID: B15002I. Title: Sex by Education Attainment for the Population 25 and over (Hispanic or Latino).

Figure 15-18: Derived from lending data collected under the authority of the Community Reinvestment Act retrieved from the Federal Financial Institutions Examination Council (FFIEC) at <http://www.ffiec.gov/cra/craflatfiles.htm>. The establishment data is from the U.S. Census Bureau's Statistics of U.S. Businesses. Retrieved from <http://www.census.gov/econ/susb/>.