

Measuring and Projecting Education and Employment Demand By Occupation and Industry

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Employment Projections

Employment projections started after WWII and follow similar methodologies.

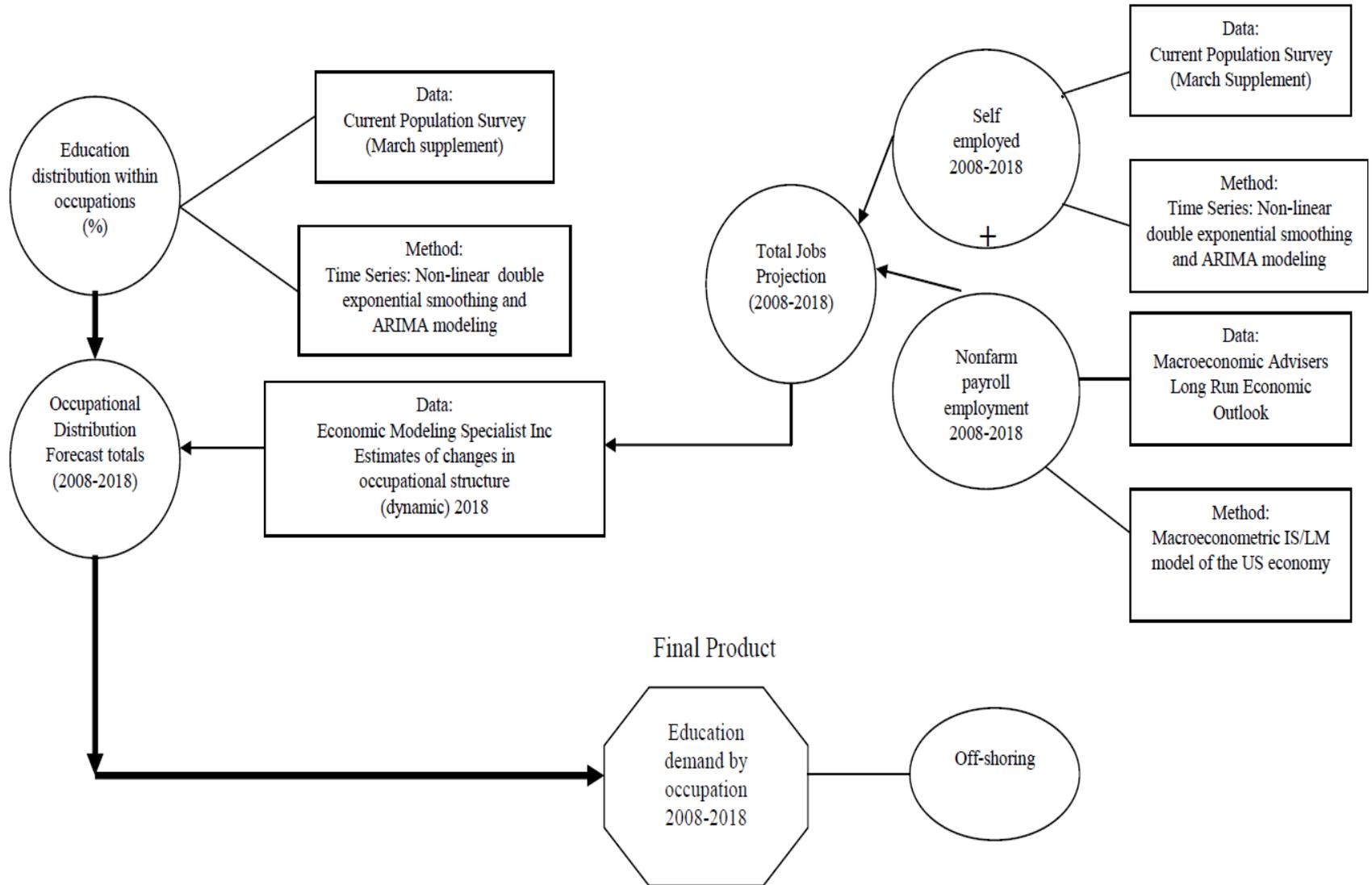
Projections can be complicated but when reduced to their essence they are simply extensions of past trend into the future with informed judgment aimed to predict things that might cause breaks in a time series or knock it off track



Projections Process: Demand

MICROECONOMY

MACROECONOMY



Employment Projections Industry and Occupations

The employment projections in the US are considered to be some of the best and the states follow the national methods. Our projections are similar on employment but tend to be slightly conservative relative to BEA projections in terms of when we estimate return to the long run growth path (true recovery)



Measuring education demand

Economists, of which I am one, will tend to turn to human capital theory which holds wages measure productivity; wage differentials give us insight on differences in productivity and demand; wage increases over time give us a sense of whether demand is being met (increasing wages signal increasing demand)



Measuring education demand

Simply stated, in a free market economy the fact employers are willing to hire workers with different skill levels at different wages is the best indicator of relative education demand.

This simple fact has us starting with actual employment and the distribution of education within employment as the standard measure of education demand

The trend with which employers have hired over time is the basis for our projections



Occupations embody education
because it is what we do.

Education demand within occupations is distributional because even detailed occupations are aggregations of numerous job titles. There are roughly 12,000 job titles reflecting differences in individual employer requirements which are boiled down to 1000 or less occupations for analysis



BLS perspective

Because of the variability of job functions within a given occupation, and because different employers have many different requirements of education and training, workers in the same occupation can have substantially different education and training backgrounds. [BLS, 2009]⁶



Our projections of education demand

Our projections of education are built on a historic time series of employment among prime age (25-54) workers from 1983-2007 (Help Wanted Report -2010) with more current period data being weighted more heavily. This allows more recent trends in employment to influence our projections more than older ones.

We apply various robustness tests to our data. The most intuitive is in-sample testing. Here we split the historic data, built a model on the data 1983-2002, and then projected to 2007. Our projections were within 4% of actual employment.



State Projections

Our state level projections are built using state employment projections data but

We do not have historic time series data on state employment to measure upskilling within occupations in Utah.

So we have to assume that the rate of change (gradient) of education demand in Utah jobs is similar to that nationally.

We apply these education requirements gradient to the baseline education distribution in Utah to project forward



Getting it right

We use this time series educational distributional approach to account for two key factors affecting present and future demand.

The mix of occupations change and with this so does education demand

Upskilling within occupations is a key driver of education demand.



The need to keep up with the quickly moving world sets the pace

Skill biased technological change is driving the national economy and is key to our Global competitiveness. 2/3rds of increased education demand reflects skill-bias technological change.

EXHIBIT A Distribution of education among auto mechanics in three eras.²

	1968–1971	1988–1991	2004–2007
High school dropouts	58%	29%	19%
High school graduates	34%	52%	47%
Some college/Associate's degree	6%	16%	30%
Bachelor's degree or better	1%	3%	4%

Author's analysis of March CPS data, various years



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Change in education demand with and without allowing for skill biased technological change.

EXHIBIT B Comparison of estimates holding education constant with real demand. ²

	(A) Educational demand, 1983	(B) 1983 education requirements applied to 2001 employment	(C) Educational demand 2001 labor force (reveals upskilling and change in occupational mix)
High school dropouts	15%	14%	9%
High school graduates	40%	38%	31%
Some college/ Associate's degree	19%	19%	29%
Bachelor's degree	25%	29%	31%

Author's analysis of March CPS data, various years



Why we do not use BLS education and training requirements data

The BLS entry education and training requirements data assign a single education level to each occupation. Employers don't seem to agree, at least when we look at employment.

BLS data in the forward years does not take into account skill biased technological change. It merely applies start year estimates to the end year.

BLS data commonly shows about 0.3 percent change in education requirements over 10 year periods while the economy changes much more quickly

BLS data in Utah and Nationally are 12-15 points low if used as a metric of post secondary education demand compared to employer revealed preference



Can a better job be done to measure and project education demand in Utah?

The short answer -Yep!!!

Access to state level data and better detail on state and substate use of education by employers is needed.

Policy efforts gum up the works and require tight cooperation between education, labor, and economic development to bring expected policy changes into the mix.

Our center has been working with Utah's education, labor, and the data mechanics to hash out how various scenarios play out.

Our work with Utah, its use of data, the coordination across silos, and the demand that theories be grounded in Utah specifics has left our group and others singularly impressed with the professionals that you have working for you.



Appendix A: :Detail on education and training requirements and comparisons with employer demand



Setting the PACE

The need to keep up with the quickly moving world sets the pace

	2008			
			ACS 25-64 Employed	
Grand Total	24.2%		37%	Difference (ACS-UTAH BLS)
First professional degree	1.3%	Professional	2%	0.2%
Doctoral degree	2.0%	Doctoral	1%	-0.9%
Master's degree	1.2%	Master's	6%	4.8%
BA TOTAL (not in original)	16.1%	Bachelor's	18%	1.9%
Associate degree	3.5%	Associate's	10%	6.4%
				12.4%
	%of labor market difference	12%		
	100%	161,176		
	20% mismatch	128,941		
	40% mismatch	96,706		
	60% mismatch	64,470		



TABLE 2 Subset of BLS table 1.11 allowing comparison of education and training categories and distribution among the employed.

Source: BLS table 1.11. Education and training requirements by detailed occupation. http://www.bls.gov/emp/ep_table_111.htm. Accessed May 26, 2010.

Occupation title	Most significant source of education or training	Educational attainment percent distributions						
		Less than high school diploma	High school diploma or equivalent	Some college, no degree	Associate's degree	Bachelor's degree	Master's degree	Doctoral or professional degree
Accountants and auditors	Bachelor's degree	0.3	5.3	8.9	10.5	55.6	17.0	2.4
Actors	Long-term on-the-job training	3.3	11.1	21.5	6.6	44.8	11.2	1.5
Actuaries	Bachelor's or higher degree, plus work experience	0.1	0.4	1.5	1.0	62.0	22.2	12.9
Administrative law judges, adjudicators, and hearing officers	Bachelor's or higher degree, plus work experience	0.1	0.5	0.8	0.3	2.5	3.0	92.8
Administrative services managers	Bachelor's or higher degree, plus work experience	2.2	19.3	28.6	12.2	27.5	8.6	1.6
Adult literacy, remedial education, and GED teachers and instructors	Bachelor's degree	2.1	12.2	19.2	8.0	35.0	20.1	3.4
Advertising and promotions managers	Bachelor's or higher degree, plus work experience	1.0	7.7	12.5	5.9	59.9	12.1	1.0
Advertising sales agents	Moderate-term on-the-job training	2.1	13.7	22.5	8.6	46.0	6.6	0.6
Aerospace engineering and operations technicians	Associate degree	3.7	23.5	33.1	22.7	14.1	2.3	0.5
Aerospace engineers	Bachelor's degree	0.1	2.5	7.4	6.8	49.2	28.2	5.8
Agents and business managers of artists, performers, and athletes	Bachelor's or higher degree, plus work experience	2.7	14.5	19.8	6.5	42.4	9.8	4.3
Agricultural and food science technicians	Associate degree	5.5	31.4	25.3	11.0	22.6	2.8	1.3
Agricultural engineers	Bachelor's degree	0.0	2.5	8.9	14.1	47.2	20.2	7.1
Agricultural inspectors	Work experience in a related occupation	8.1	29.1	25.0	8.1	24.1	4.2	1.4
Air traffic controllers	Long-term on-the-job training	0.4	16.2	36.6	15.2	27.7	3.2	0.6
Aircraft cargo handling supervisors	Work experience in a related occupation	8.5	35.5	29.8	9.1	14.5	2.3	0.3
Aircraft mechanics and service technicians	Postsecondary vocational award	2.9	28.6	35.3	21.2	10.6	1.0	0.4

TABLE 3 Average education distribution within each of BLS's education and training categories.

Source: Georgetown University Center on Education and the Workforce calculations using (http://www.bls.gov/emp/ep_table_111.htm) Table 1.11, Education and training measurements by detailed occupation

	Less than high school diploma	High school diploma or equivalent	Some college, no degree	Associate's degree	Bachelor's degree	Master's degree	Doctoral or professional degree
1st professional degree	0.1%	0.7%	0.7%	0.5%	5.2%	6.4%	86.5%
Doctoral degree	0.2%	1.6%	4.7%	3.3%	28.4%	29.3%	32.6%
Master's degree	0.6%	3.2%	6.7%	4.3%	30.8%	39.6%	14.9%
Bachelor's degree or better, with work experience	1.6%	8.7%	13.7%	5.8%	35.3%	21.2%	13.6%
Bachelor's degree	1.2%	8.1%	13.8%	7.8%	42.9%	20.9%	5.3%
Associate's degree	2.4%	16.3%	23.7%	24.0%	25.2%	5.9%	2.4%
Post 2nd vocational training	7.3%	29.6%	29.1%	14.3%	15.9%	2.9%	0.9%
Work experience in a related occupation	9.1%	27.5%	26.1%	9.9%	21.2%	5.3%	1.0%
Long-term on-the-job-training	13.8%	35.0%	23.9%	9.3%	14.1%	3.2%	0.7%
Moderate-term on-the-job-training	18.1%	41.9%	22.2%	7.0%	8.8%	1.6%	0.4%
Short-term on-the-job-training	17.8%	37.8%	23.5%	8.0%	10.4%	1.9%	0.5%



TABLE 1 Comparison of BLS education and training requirements and education among employed workers in 1996 and 2008.

Sources: Silvestri, G. (1997), "Occupational employment projections to 2006," Monthly Labor Review, Table 6, p. 82, Nov. 1997. BLS; CPS March Supplement, various years; Lacey, A. and B. Wright (2009), "Occupational employment projections to 2018," Monthly Labor Review, Table 3, p. 88, Nov. 2009

	BLS 1996		Labor Market 1996		BLS 2008		Labor Market 2008	
	%	#	%	#	%	#	%	#
Postsecondary degrees	25%	33,008	34.3%	45,397	25.1%	37,884	40.1%	60,524
1st professional degree	1.3%	1,707	1.6%	2,118	1.3%	2,001	1.7%	2,566
Doctoral degree	0.8%	1,016	1.1%	1,456	1.4%	2,085	1.4%	2,113
Master's degree	1%	1,371	5.9%	7,809	1.7%	2,531	7.3%	11,018
Bachelor's degree or better, with work experience	6.8%	8,971	NA	NA	4.3%	6,516	NA	NA
Bachelor's degree	12%	15,821	17.6%	23,294	12.3%	18,584	20.4%	30,790
Associate's degree	3.1%	4,122	8.1%	10,721	4.1%	6,129	9.3%	14,037
Post 2nd vocational training	6.1%	8,091	NA		5.8%	8,787		
Work experience in a related occupation	7.5%	9,966			9.6%	14,517		
Long-term on-the-job-training	9.3%	12,373			7.2%	10,815		
Moderate-term on-the-job-training	12.7%	16,792			16.3%	24,569		
Short-term on-the-job-training	39.4%	52,125			36%	54,396		

Note: BLS has 132.4 million jobs listed in 1996. A 9.3 percentage point difference between the BLS estimate and the actual labor force equates to 12.3 million workers. In 2008, employment is given as 150,932 and the 15 percentage point difference between the BLS estimate and the actual labor force equates to a 22.6 million difference. All calculations have used BLS employment numbers multiplied by shares calculated in the labor market.



Appendix 2: The importance of getting education demand right and the relevance to Utah

Our economy has fundamentally transformed from a high school to a post secondary economy.



Getting it right

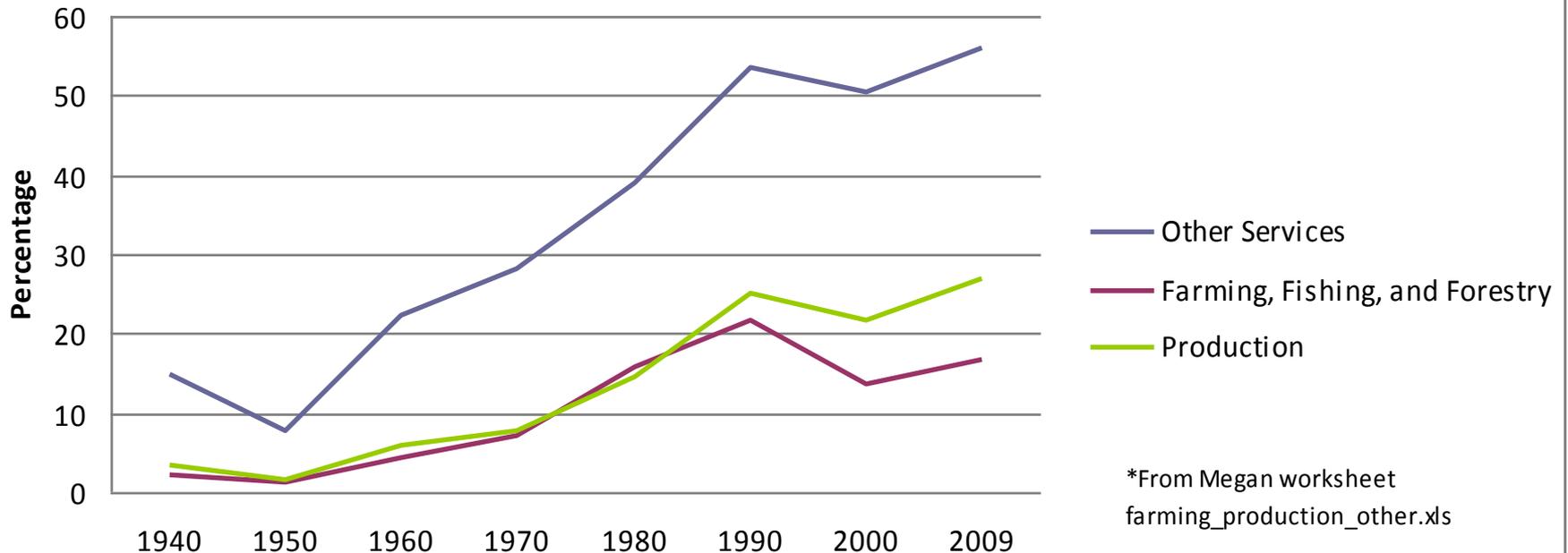
Our economy has fundamentally transformed from a high school to a post secondary economy.



Setting the PACE

Not even traditional hands-on occupations have been immune

Percent of Major Occupation Group Obtaining Post Secondary Schooling



*From Megan worksheet
farming_production_other.xls



Getting it right by occupation

The world has changed

Currently there are only 3 in 10 jobs, nationally, that provide family sustaining earnings to high school graduates. This will continue to diminish over time.

Access to a middle class lifestyle has plummeted for those without post-secondary education

In 1970, 65% of High School Graduate headed families were in the middle class, which declined to just above 40% by 2007.



More education leads to more productive workforce which provides better earnings to the workforce and improves the state economy

IMPROVING
STATE ECONOMY



BETTER WAGES



PRODUCTIVE WORKFORCE



EDUCATION



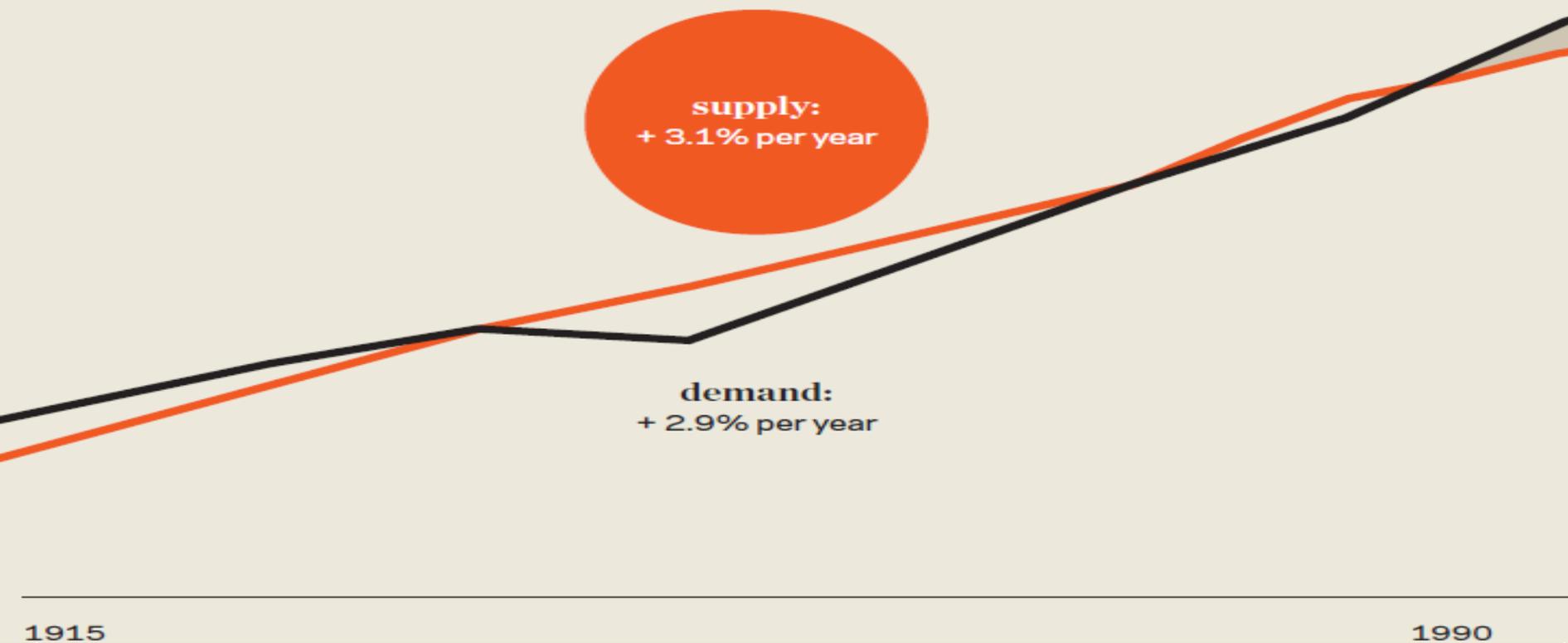
Rewards of getting it right

The Economy

- Nationally: 78% of wage income is generated by workers with postsecondary education while making up 59% of the workforce.
- Nationally: In 1970, 17% of the prime age working population had at least a BA and Contributed 24% of total wage income. By 2008, this workforce share increased to 36% while the wage share climbed to 51%.
- In Utah: 78% of wage income is generated by workers with postsecondary education while making up 63% of the workforce.
(more some college no degree then the nation)
- In Utah: Since 1992, Associate degree holders have increased their contribution from 7% to 10.5%. BA share has increased from 39%-45%. Some College, no degree has been flat. **(attainment vs. access)**



From 1915 to 1980, supply grew in tandem with demand. But, starting in 1990, the share of college-educated young people in the workforce rose very slowly.

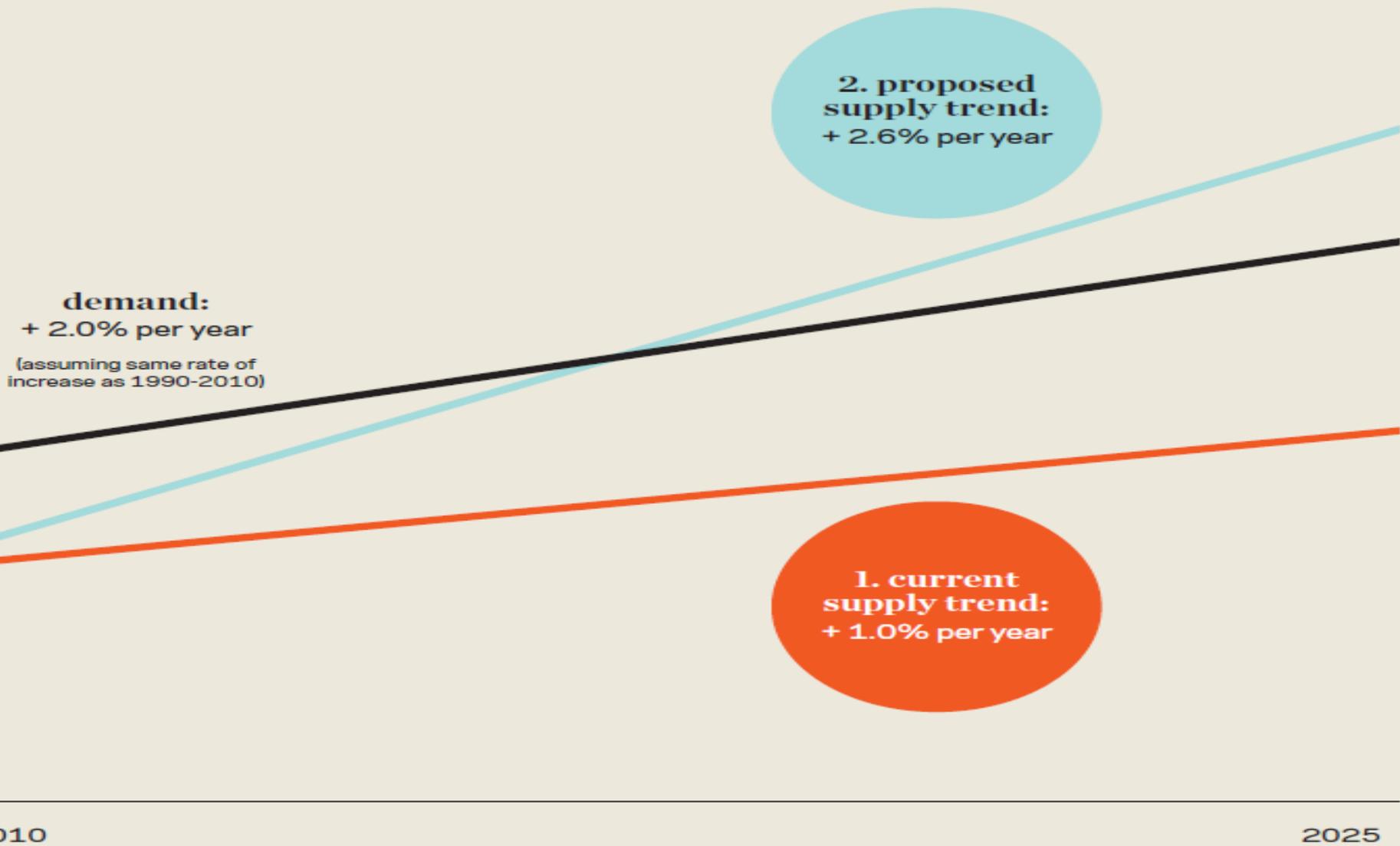


demand:
+ 2.0% per year

growing deficit of college-educated workers

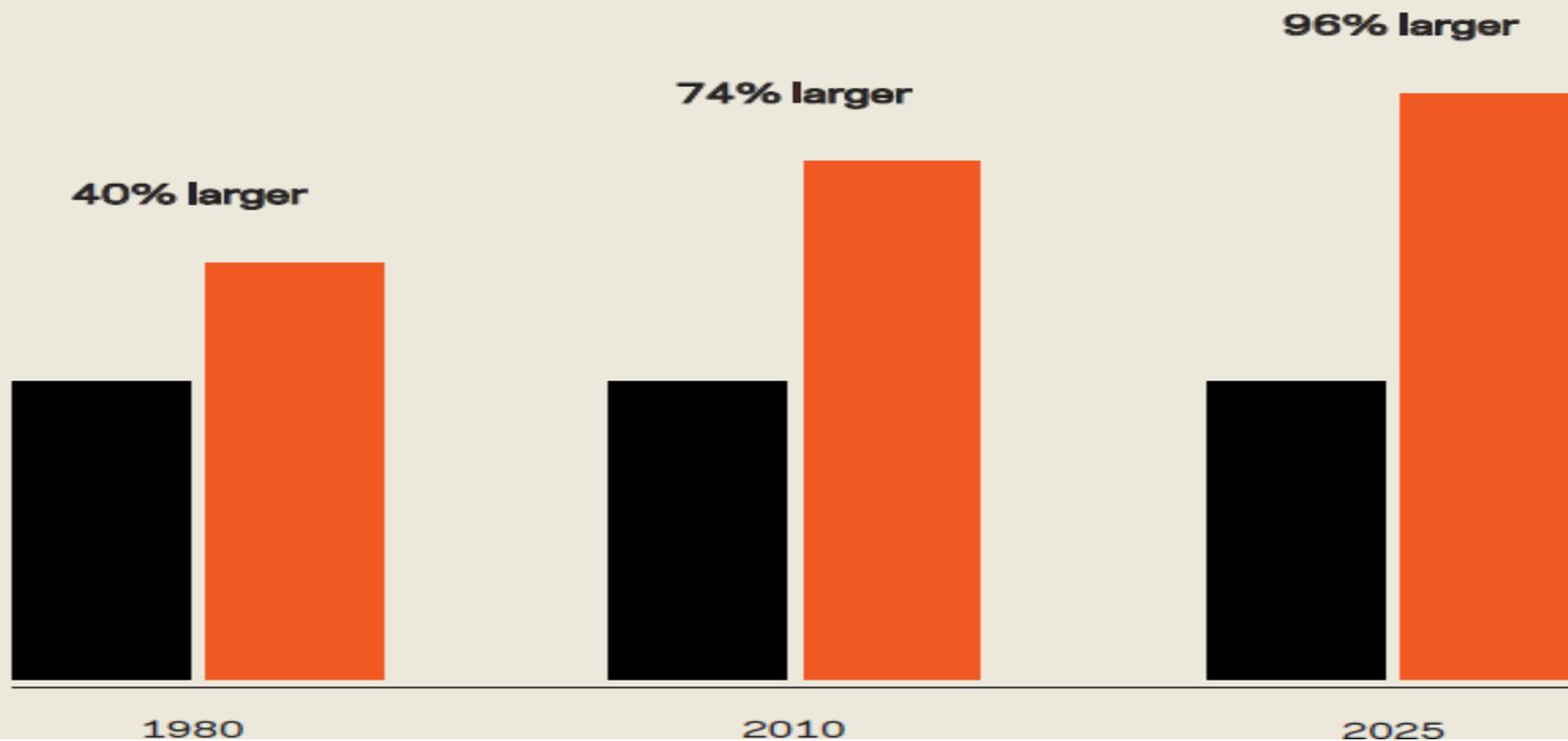
supply:
+ 1.5% per year

Looking ahead to the year 2025, there are two potential paths forward.



If we continue to underproduce college-educated workers, the large and growing gap between the earnings of Americans of different educational attainment will grow even wider.

■ High school earnings
■ Bachelor's degree earnings



Obstacles on Route 66%

Enrollment growth in Utah is not keeping up with population growth

Between 1994 and 2009 the youth (18-24) population grew by 40%
While first time freshmen enrollment grew by 20%.

This is a good rate of enrollment growth but still one step forward and two steps back.

This is completely driven by white youth enrollments (10% growth) being much less than population growth (32%).

Utah has done a very good job providing college access to the growing multicultural minority population which increased from 11% to 16% of the youth population (enrollment growth exceeds population growth for minorities).



Obstacles on Route 66%

Utah has a high percent of the workforce that has gone to, and not completed, college (24% of the workforce vs. 18% nationally)

Utah is younger than the nation:

- 22% are 18-24, 34% are 25-35, and 44% are 36-55.
- National comparables are: 19%, 28%, and 54%.

High school graduates and those with some college no degree are not enrolled

- 67% of these Utah citizens (18-35) are not enrolled
- 49% of those 18-24 (**Key target zone**)
- 86% of those 25-35 (**Key target zone**)
- 96% of those 36-55 (Career progression and family formation makes this a harder group to target)



What to do!
Throw up your hands?
Or roll up your sleeves?

Roll up your sleeves is probably the best
answer



Driving Route 66 Not just a scenic drive

Education is not going it alone.

Coordination with workforce is developed and prioritized in the state to a degree not often observed



Going so fast we might need a PACE maker

Education is not an end in itself but a means to an end

Working with your workforce department can help increase alignment between Schooling and foundation skills and occupational/professional preparation.

Honing the linkages between transcript data and workforce data can help build better stackable certificates based on empirical evidence of career pathways, Ladders, and lattices. Research can expose actionable levers to increase completions

Using projections data, potentially enhanced by emerging data like internet job Postings data, can help adjust student expectations and enrollment targeting to expected demand rather than data on yesterday's workplace. (lagged enrollment signals)

Education and Workforce should work together to see if occupation can be brought Onto the data to enhance the ability to eek out skill requirements.

Significant evidence exist that liking student expectation and curriculum development To the workplace can improve completion and enhance career readiness.

