CAUSES OF VARYING ECONOMIC PERFORMANCE BY STATE

March 2011

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P3 | PRODUCTIVITY AND PROSPERITY PROJECT

ASU W. P. CAREY SCHOOL of BUSINESS
ARIZONA STATE UNIVERSITY

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SUMMARY

National

Few states have experienced consistently strong aggregate economic growth relative to the national average over the last decade. Similarly, not many states have consistently lagged behind. The economic performance in some states has been highly variable. In particular, Arizona, Florida, Idaho, and Nevada—typically fast-growing states—ranked near the top of the states during the 2002-07 economic expansion but placed near the bottom during the 2008-09 recession. In contrast, many of the states that underperformed during the expansion experienced a relatively mild recession.

The varying economic performance across states since 2000, especially during the expansion and the 2008-09 recession, had little relationship to such factors as a state's economic diversity or job quality. Instead, local factors—such as a state's specific industrial mix—played a large role.

In general, fast-growing states have unusually large construction and real estate sectors, which are among the most cyclically volatile sectors in the nation. Moreover, some of these fast-growing western and Sunbelt states were targeted by real estate investors during the construction-real estate boom that occurred from 2004 through 2006 and thus were disproportionately affected by the subsequent real estate bust.

The construction-real estate boom and bust played a very large role in explaining variations in the overall economic performance by state, particularly of Arizona and other fast-growth states. The retail trade sector also was highly volatile in these states, as real estate profits during the boom translated into strong retail sales, while the real estate crash resulted in very large declines in retail sales during the recession.

In addition to construction, real estate, and retail trade a few other sectors made a significant positive contribution in most of the states with the fastest overall economic growth but had a large negative impact in many of the states with the poorest economic performance. During the expansion, the expansion of the health care sector was highly related to the overall growth rate. During the recession, the growth of the manufacturing, government, and accommodation and food services sectors was highly related to the overall growth rate.

Arizona

Aggregate economic growth in Arizona was faster than the national average from 2000 through 2006, especially during the boom from 2004 through most of 2006. In contrast, since late 2007, economic performance in Arizona has been below the national average.

The state's relatively strong aggregate economic growth from 2000 through 2006 was the result of population and employment growth that greatly exceeded the national average. Growth rates in measures of prosperity and productivity, such as per capita personal income or earnings per employee, were only average. These measures have slumped relative to the U.S. average since 2007.

During the economic expansion from 2002 through 2007, retail trade, construction and health care were particularly large contributors to the state's rapid growth. Construction was particularly responsible for the severity of the 2008-09 recession in Arizona, with the administrative support sector also slumping badly. In terms of the degree of swing from the expansion to the recession, construction and retail trade were primarily responsible.

Improvements in job quality and broadened economic diversity should be goals of economic development, but reaching these goals does not guarantee a consistently high-performing economy. Very broad economic diversity in particular is at odds with strong economic performance (and also with high job quality) since a very diverse economy by definition includes highly cyclical industries and industries that pay low wages.

Instead, the goal should be a reasonably diverse economy, but one with relatively high shares in cyclically stable industries and in higher-paying industries and relatively low shares in highly cyclically industries and in lower-paying industries. A balance between low cyclicality and high job quality must be sought, since some of the high-paying industries, such as semiconductor manufacturing, also are relatively cyclical.

Currently, Arizona's job quality is below the national average, but the state ranks just above the median state. In contrast, Arizona has the nation's second-most cyclical economy. Thus, the key to achieving a more consistently high-performing economy is to reduce the significance of cyclical industries and increase the relative importance of more stable industries.

Arizona's biggest challenge is its high growth rate, which inherently results in a disproportionate share of its economy being in highly cyclical industries that are sensitive to changes in local population growth, such as construction and real estate. Further, in an economy that is growing rapidly, economic development efforts to attract high-quality jobs (and presumably more stable jobs with strong prospects for the future) can have only a marginal impact. For example, when Intel's new fab facility comes online in 2013 or 2014, its few thousand jobs likely will be dwarfed by job growth tied to population gains. Total job growth likely will be around 100,000 in each of those years.

In contrast, if Arizona experienced no net migration, it would need to create only about 25,000 jobs per year in order to meet the demands of young adults entering the workforce net of retiring workers. In that scenario, Intel's fab plant and just a few other high-wage operations would have a big impact on the state's industrial mix, job quality, etc. Arizona eventually will reach a state of little, if any, net in-migration, as in most other states, but that time may still be many years away. In the interim, little possibility exists that state policies could significantly lower the state's growth rate while maintaining Arizona as an attractive place for high-quality employers to do business.

INTRODUCTION

This paper was prompted by a news report on state economic performance that focused on a composite measure produced by the *Business Journal*. The composite consists of nine components, all released monthly by the U.S. Bureau of Labor Statistics (BLS), such as private-sector employment and the unemployment rate. The exact formula used to calculate the composite is proprietary. The five-year period used in the report has little meaning from the perspective of the economic cycle. Instead, it is more informative to compare data from the same point of two economic cycles or to report performance by phase of the economic cycle.

The Federal Reserve Bank of Philadelphia also produces a composite measure. Its coincident index consists of four components, all released monthly by the BLS:

- nonfarm wage and salary employment
- wage and salary disbursements deflated by the consumer price index
- average hours worked in manufacturing
- the unemployment rate

All of the data are seasonally adjusted.

The advantage of the BLS data, and therefore composite measures based on these data, is timeliness: the BLS data are released monthly within a few weeks of the end of a month. However, the BLS data have serious limitations.

First, all of the monthly BLS data are derived from surveys and therefore are subject to error. The unemployment rate is derived from a household survey; monthly estimates are highly derived and not reliable for most states. The other three components of the Federal Reserve Bank's coincident index are from the Current Employment Statistics (CES) program, a monthly sample of employers. Month-to-month fluctuations are large and the estimates are subject to potentially substantial revision, as the CES estimates are later benchmarked to the Quarterly Census of Employment and Wages. The results from this census of employers are not available until more than six months after the end of a quarter.

The results of the annual benchmarking were released in early March. A very significant revision was made to the Arizona data, with an increase in the unemployment rate and a decrease in employment. The preliminary data had indicated that Arizona had gained more than 30,000 jobs between December 2009 and December 2010, with the growth rate among the top 10 states. The revised data show that employment in December 2010 was 13,600 *less* than in December 2009; nationally job growth during this 12-month period totaled 872,000.

The second significant limitation to the BLS data is conceptual. The employment and disbursements indicators are limited to wage and salary employment; the CES data are further limited to nonfarm employment. The employment estimate does not differentiate between full-time and part-time employment; a minimum-wage worker and a high-wage worker receive the same weight. Thus, a dollar measure that inherently is adjusted for the wage level and the number of hours worked is superior to an employment measure for most purposes.

Dollar measures of economic performance—that are comprehensive rather than limited to nonfarm wage and salary employment—are produced by the U.S. Bureau of Economic Analysis

(BEA). Released quarterly about three months after the end of a quarter, the BEA's earnings measure incorporates total compensation rather than only wage and salary disbursements.

The analysis in this paper of the economic performance across states is based on earnings, adjusted for inflation using the gross domestic product implicit price deflator. Nearly 10 years of data are analyzed, divided into four phases:

- The recession that occurred in 2001
- The expansion from the end of the 2001 recession to the beginning of the 2008-09 recession
- The 2008-09 recession
- The recovery so far from the 2008-09 recession

Using the quarterly earnings data, economic cycle turning points (i.e. the beginning and end of a recession) are identified in each state, with the total real percent change in earnings during expansions and recessions calculated. For consistency of comparisons across states, percentage changes in earnings using the dates of the turning points in the national economy also are calculated by state.

ECONOMIC PERFORMANCE BY STATE

Aggregate economic growth rates are heavily influenced by the rates of population an employment growth. The most insightful measures of economic performance are those on a per capita basis (which are measures of prosperity) and on a per employee basis (proxy measures for productivity). However, estimates by state of total employment and population are produced only annually, with preliminary 2010 data for employment and revised annual population estimates since 2000 that are tied to the 2010 census still months away from being available. Therefore, economic performance is defined in this paper as the percent change in aggregate real earnings. States with fast growth in employment and population also experience relatively fast growth in earnings.

Performance by Period

The real percent changes in earnings by state based on the turning points in each state are shown in Table 1 for each of four periods: the recession of 2001, the expansion from 2002 through 2007, the 2008-09 recession, and the recovery so far from the last recession.

Using the national economic cycle, similar data are displayed in Table 2. However, the figures in Table 2 are shown as a quarterly average so that the performance across the four time periods can be easily compared. The state figures are expressed as the difference from the national average. The rank among the 50 states and the District of Columbia also is shown for each time period.

Based only on the real quarterly earnings measure, the 2001 recession nationally lasted from the second quarter through the fourth quarter. The official dates of the recession, established by the National Bureau of Economic Research, were April through November. The latest recession officially was dated as from January 2008 through June 2009. Based only on the real quarterly earnings measure, the recession encompassed the second quarter 2008 through third quarter 2009 period.

The 2001 Recession

Nationally, real earnings fell in each of the last three quarters of 2001; the total decline was 2.1 percent. Most of the states experienced a decline over these three quarters, with a few starting or ending their recession a quarter earlier or later than the national average. Several states either did not experience any decline in real earnings during this period, or a small decrease occurred in just one quarter. The 10 best-performing states had losses of 0.5 percent or less and were scattered geographically, except for a concentration around Maryland.

The states that experienced the deepest recession had declines from 2.6 percent to 5.2 percent. The three Pacific Coast states and three other southwestern states were among the 10 states with the poorest performance. In contrast, Arizona's economy did not decrease as much as the national average.

The 2002-07 Expansion

Nationally, real earnings expanded 14.2 percent between the 2001 and 2008-09 recessions. Five Mountain region states and Texas were among the top 10 states, with growth exceeding 23 percent. Arizona ranked fifth. The weakest growth, of 10 percent or less, was focused in the

TABLE 1
INFLATION-ADJUSTED PERCENT CHANGE IN QUARTERLY EARNINGS BASED ON THE TURNING POINTS OF EACH STATE

	Recession (2001)	Expansion (2002-07)	Recession (2008-09)	Recovery (2010)*
United States	-2.1%	14.2%	-6.3%	2.1%
Pacific				
Hawaii	-1.8	**27.3**	**-4.3**	0.3
Alaska	**-0.2**	22.7	**-0.1**	2.6
Washington	-4.3	18.4	-5.0	1.0
Oregon	-2.9	13.3	-7.6	1.9
California	-3.5	13.4	-8.6	1.9
Mountain				
Arizona	-1.6	**27.1**	-9.2	0.7
New Mexico	**-0.5**	20.5	**-4.8**	**3.1**
Colorado	-3.5	12.7	-5.6	1.3
Utah	-1.4	**23.6**	-5.4	0.5
Nevada	-2.6	**36.3**	-16.6	0.6
Idaho	-1.7	22.5	-10.5	2.5
Montana	-1.4	**23.6**	-5.5	2.9
Wyoming	**-**	**39.6**	-7.5	**3.1**
West South Central				
Texas	-3.0	**24.9**	-5.4	**3.1**
Oklahoma	-2.1	23.3	-5.8	2.7
Arkansas	-1.1	17.2	-7.0	**3.1**
Louisiana	**-0.1**	20.4	**-4.1**	1.7
West North Central				
Kansas	-1.3	17.0	-5.7	2.4
Nebraska	-0.9	17.8	-5.6	3.0
South Dakota	-2.0	**29.0**	-7.7	2.5
North Dakota	-1.5	**38.0**	-5.7	2.5
Minnesota	-2.0	13.7	-8.4	**3.2**
Iowa	-1.9	20.9	-7.0	**4.5**
Missouri	-1.0	10.0	-5.1	0.8
East North Central				
Illinois	-2.2	10.6	-7.4	1.6
Wisconsin	-1.0	9.1	-6.8	2.6
Michigan	-3.5	-4.5	-10.9	2.2
Indiana	-2.8	9.5	-8.3	3.0
Ohio	-1.7	3.3	-6.6	1.8
Middle Atlantic				
Pennsylvania	-1.4	11.0	**-3.9**	2.3
New Jersey	-2.3	10.0	-6.7	1.6
New York	-5.2	16.5	-7.4	3.0
New England				
Connecticut	-2.6	9.4	-7.2	2.3
Rhode Island	-0.8	14.0	-7.7	2.6
Massachusetts	-4.4	9.6	-6.2	3.0
Vermont	-1.5	9.0	-5.8	**5.1**
New Hampshire	-2.4	12.0	-6.7	2.6
Maine	**-0.4**	9.2	-5.9	2.6

(continued)

TABLE 1 (continued)
INFLATION-ADJUSTED PERCENT CHANGE IN QUARTERLY EARNINGS BASED ON THE TURNING POINTS OF EACH STATE

	Recession (2001)	Expansion (2002-07)	Recession (2008-09)	Recovery (2010)*
South Atlantic				
West Virginia	**-0.4**	12.6	**-2.5**	2.2
Delaware	**-**	9.5	-7.5	1.1
Maryland	**-0.4**	16.9	**-3.0**	2.3
District of Columbia	**-0.4**	**24.7**	**-1.4**	**6.2**
Virginia	-1.8	19.8	**-2.7**	2.7
North Carolina	-2.5	15.0	-6.7	**3.6**
South Carolina	-1.5	14.2	-6.0	2.5
Georgia	-0.8	13.0	-7.3	1.5
Florida	**-0.4**	23.3	-10.2	1.2
East South Central				
Alabama	-0.9	15.6	-5.5	1.6
Mississippi	-1.3	13.2	-5.5	1.6
Tennessee	-0.8	13.6	-7.8	**3.6**
Kentucky	-1.6	12.0	**-4.2**	**3.1**

Note: for each period, the 10 highest values are shown in **bold**, and the 10 lowest are shaded
* Through third quarter 2010

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Great Lakes region and in the Northeast. Michigan's economy declined even during this expansionary phase.

The 2008-09 Recession

The recession during 2008 and 2009 was long (nationally, a length of six quarters versus three quarters in the 2001 recession) and deep (nationally, an average quarterly decline of more than 1 percent versus 0.7 percent during the 2001 recession). The total inflation-adjusted loss in earnings was 6.3 percent nationally during the 2008-09 recession. Alaska escaped the recession, but most of the other top-performing states, four of which are in the South Atlantic region, still had decreases of more than 3 percent.

Four of the hardest-hit states, with losses of more than 7.5 percent, are in the West. Another typically fast-growing Sunbelt state, Florida, also was among the bottom 10. Arizona had the fifth largest decrease.

The 2010 Recovery

Nationally, the gain was 2.1 percent over a period of four quarters (fourth quarter 2009 through third quarter 2010, the latest data). Most of the states with the slowest recovery are in the West. Several of the slow-growth states, including Arizona, have had gains of less than 1 percent. In contrast, New Mexico and Texas are among the growth leaders. The other leaders are scattered around the country. However, since these recent estimates remain subject to revision, these conclusions are preliminary.

TABLE 2
AVERAGE QUARTERLY INFLATION-ADJUSTED PERCENT CHANGE IN EARNINGS BASED ON THE NATIONAL TURNING POINTS

	I. Recession (2001)	II. Expansion (2002-07)	III. Recession (2008-09)	IV. Recovery (2010)*	Rank I.	Rank II.	Rank III.	Rank IV.
United States	-0.70	0.53	-1.07	0.50				
	Difference From United States:							
Pacific								
Hawaii	0.25	0.44	0.31	-0.43	27	5	14	48
Alaska	0.98	0.24	1.41	-0.11	6	12	1	31
Washington	-0.12	0.14	0.31	-0.38	43	19	15	47
Oregon	-0.28	-0.04	-0.22	-0.04	47	29	41	25
California	-0.47	-0.05	-0.17	-0.02	49	34	24	42
Mountain								
Arizona	0.16	0.43	-0.52	-0.35	34	6	48	45
New Mexico	1.02	0.22	0.32	0.20	5	14	13	9
Colorado	-0.47	-0.05	0.16	-0.27	48	34	24	42
Utah	0.26	0.32	0.16	-0.36	26	9	22	46
Nevada	0.21	0.65	-1.23	-1.00	29	3	51	51
Idaho	0.12	0.26	-0.55	-0.06	38	11	49	27
Montana	0.84	0.28	0.29	-0.08	8	10	17	28
Wyoming	1.48	0.79	-0.01	0.10	2	1	35	15
West South Central								
Texas	-0.22	0.33	0.22	0.27	45	8	19	6
Oklahoma	0.49	0.20	0.35	0.07	14	16	11	19
Arkansas	0.33	0.00	0.39	0.13	24	27	10	13
Louisiana	0.86	0.15	0.74	-0.25	7	18	4	40
West North Central								
Kansas	0.51	0.07	0.12	0.05	13	23	25	22
Nebraska	0.46	0.12	0.18	0.18	17	20	20	11
South Dakota	0.41	0.45	-0.01	-0.26	20	4	34	41
North Dakota	0.19	0.77	0.53	-0.61	32	2	7	50
Minnesota	0.18	-0.04	-0.39	0.30	33	30	47	5
Iowa	0.06	0.23	-0.05	0.52	39	13	36	2
Missouri	0.44	-0.15	0.17	-0.32	18	40	21	44
East North Central								
Illinois	-0.05	-0.13	-0.22	-0.09	41	39	42	29
Wisconsin	0.44	-0.19	-0.12	0.15	19	46	38	12
Michigan	-0.24	-0.74	-0.82	0.05	46	51	50	21
Indiana	-0.20	-0.17	-0.37	0.24	44	43	46	7
Ohio	0.13	-0.40	-0.08	-0.05	37	50	37	26
Middle Atlantic								
Pennsylvania	0.25	-0.11	0.40	0.08	28	38	9	18
New Jersey	1.03	-0.19	0.03	-0.31	4	47	32	43
New York	-0.99	0.07	-0.25	0.23	51	22	43	8

(continued)

TABLE 2 (continued)
AVERAGE QUARTERLY INFLATION-ADJUSTED PERCENT CHANGE IN EARNINGS BASED ON THE NATIONAL TURNING POINTS

	I. Recession (2001)	II. Expansion (2002-07)	III. Recession (2008-09)	IV. Recovery (2010)*	Rank I.	Rank II.	Rank III.	Rank IV.
United States	-0.70	0.53	-1.07	0.50				
	Difference From United States:							
New England								
Connecticut	0.28	-0.24	0.00	-0.20	25	49	33	37
Rhode Island	0.46	-0.06	0.10	-0.14	16	35	26	33
Massachusetts	-0.84	-0.17	0.10	0.09	50	41	27	16
Vermont	0.21	-0.19	0.34	0.32	31	45	12	4
New Hampshire	0.02	-0.09	0.09	-0.12	40	37	28	32
Maine	0.60	-0.19	0.29	-0.21	11	44	16	38
South Atlantic								
West Virginia	0.76	-0.17	1.01	0.05	9	42	3	20
Delaware	1.65	-0.21	0.08	-0.46	1	48	29	49
Maryland	0.66	0.08	0.74	-0.17	10	21	5	34
District of Columbia	1.17	0.35	1.14	0.53	3	7	2	1
Virginia	0.14	0.19	0.71	0.01	36	17	6	23
North Carolina	-0.09	0.03	0.05	0.19	42	25	30	10
South Carolina	0.21	0.00	0.05	0.12	30	26	31	14
Georgia	0.48	-0.05	-0.18	-0.10	15	32	40	30
Florida	0.54	0.21	-0.28	-0.20	12	15	45	36
East South Central								
Alabama	0.39	0.05	0.16	-0.18	22	24	23	35
Mississippi	0.34	-0.04	0.23	-0.25	23	31	18	39
Tennessee	0.41	0.45	-0.01	-0.26	21	28	44	3
Kentucky	0.15	-0.08	0.47	0.08	35	36	8	17

* Through third quarter 2010

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Performance Across Periods

Few states have posted consistently strong growth across all four time periods. As seen in Table 1, Alaska, New Mexico, and the District of Columbia have had the most consistently strong performance. Other than during the 2008-09 recession, Wyoming has performed well; Louisiana was well above the national average until the current recovery period. Similarly, not many states have consistently lagged behind, though Michigan and Indiana were among the bottom 10 states in each of the first three time periods.

A few typically fast-growing states ranked near the top during the 2002-07 expansion but ranked near the bottom during the 2008-09 recession: Arizona, Idaho, Nevada, and Florida. South Dakota also was among the leaders during the expansion but among the laggards during the recession.

Based on quarterly data, real earnings in Arizona grew a little faster than the national average during the 2000-through-2003 period. From 2004 through most of 2006, gains in Arizona were considerably above the national average. As the boom dissipated during late 2006 and 2007, Arizona's growth rate slowed to about equal to the national average. Since fourth quarter 2007, economic performance in Arizona has been below the national average in 11 of the 12 quarters.

The state's relatively strong aggregate economic growth from 2000 through 2006 was not associated with solid growth in measures of prosperity and productivity, such as per capita personal income or earnings per employee. Instead, it simply was the result of population and employment growth in Arizona that greatly exceeded the national average. Even during the economic expansion, growth in per capita personal income and in earnings per employee was barely faster than the national average. Since then, Arizona's performance on both measures has been below the national average.

CAUSES OF DIFFERENTIAL ECONOMIC PERFORMANCE ACROSS STATES

This section investigates causes of the variation in economic performance across states by time period as well as causes of the variation in performance across periods by state.

Diversity of the Economy and Job Quality

Conceptually, the diversity of a state's economy might be correlated to economic performance. In order to measure economic diversity (breadth), a comparison must be made to a larger economy. For example, the diversity of a state's economy is measured against the national economy. By definition, a diverse economy includes cyclically volatile and stable industries, low-paying and high-paying industries, etc.

Using the North American Industry Classification System (NAICS), economic diversity can be measured at any of four increasingly detailed levels: sector, subsector, industry group, and industry. The best measure uses industry data, but the magnitude of data withheld by the BEA due to the federal disclosure restrictions precludes using industry data. Only at the sectoral level are no data withheld in any state.

Because of the time required to impute missing data, the calculation of economic diversity was limited to subsectors in one year: 2007, at the end of the economic expansion. Since it is easier and more accurate to impute employment rather than earnings, the diversity measure by state is based on annual employment figures reported by the BEA rather than earnings. The measure of economic diversity—the coefficient of specialization—was calculated for each state as the absolute value of the difference in subsectoral shares between each state and the national average summed across all subsectors.

On this basis, Arizona has a relatively diverse economy (15th most diverse among the states). In part this is due to the state's size. A moderate correlation exists between the coefficient of specialization and population size; economic diversity tends to be greatest in states with a substantial population and least in small states.

The quality of jobs in a state conceptually might also be correlated to economic performance. Job quality is defined by wages, with the latest estimates for 2004. In order for a state to have above-average job quality, it must have a disproportionately high share of its jobs in high-paying industries and occupations and/or a low share of jobs in low-paying industries and occupations. Thus, economic diversity and job quality conceptually must have an inverse relationship. A moderate negative correlation does exist between the coefficient of specialization and the measure of job quality.

Economic Performance and Diversity

Defining economic growth as average quarterly growth in each time period (dated using the national economic cycle), no correlation was found between the coefficient of specialization and growth since the end of the latest recession, but a moderate correlation was measured during the recessions of 2001 and 2008-09 and in the intervening expansion. The correlation is negative: states with greater economic diversity tend to have a slower pace of economic growth.

The correlations between the coefficient of specialization and swings in economic growth from one period to the next also were calculated. These correlations are weak and probably meaningless; states with greater economic diversity have a counterintuitive slight tendency toward larger swings in economic performance.

Economic Performance and Job Quality

Job quality also was compared to economic growth by period and to swings in growth from one period to the next. No correlation between job quality and economic growth existed during the 2001 recession or the economic expansion, but a modest positive correlation was measured during the last recession and in the current recovery. That is, states with higher job quality tended to have had somewhat stronger economic performance since 2007. Little correlation exists between job quality and the swings in economic performance.

Thus, neither job quality nor the diversity of the economy explain very much of the differences in economic performance across states or over time. This suggests that variations in economic growth by sector are the main cause of the overall differences in growth rates.

Varying Sectoral Performance

At any time, economic performance nationally and within any state can vary significantly from one sector to another. Some sectors, such as construction, are quite volatile, with strong growth during expansions but large losses during recessions. States with a disproportionate share of economic activity in such sectors have the most volatile economies over an economic cycle. Since many of the highly cyclical industries, such as those in the construction and real estate sectors, are highly tied to population growth, Arizona and other fast-growing Sunbelt and western states have the most cyclically volatile economies.

Other than these highly cyclical sectors, certain sectors expand faster than others during any economic expansion and/or suffer more than others in any given recession, related to factors unique to those sectors and to that time period. A classic example is the large fluctuations in the oil industry and in the economies of states that have oil or other sources of energy as natural resources. A state with a disproportionately large share of economic activity in such sectors may be hard hit in certain recessions but little affected in other recessions, or may experience strong growth in one expansion that is not sustained in later expansions.

In order to identify those economic activities responsible for causing the variation in overall growth rates across states, a shift-share analysis was employed. The analysis looked at the change in annual average employment by sector from 2000 to 2001, from 2001 through 2007, and from 2007 through 2009, roughly corresponding to the first three of four periods analyzed in this report. Again, it is suboptimal to use sectoral data and to use employment data, but the magnitude of withheld data left little choice for a 50-state analysis of multiple time periods.

Shift-Share Analysis

Shift-share analysis divides growth by sector into three components:

- National Share. If everything were equal geographically and by sector, each state would grow at the pace of the nation. Thus, in each sector, state employment in the prior period is multiplied by the overall U.S. growth rate to obtain the national share component.

- Industrial Mix. This component reflects the inconsistency in growth rates by sector nationally. State employment in each sector in the prior period is multiplied by the difference between the national growth rate for the sector and the national growth rate in the entire economy. If a state, for example, has a relatively large share of its economy in a sector that posted above-average growth nationally, this would boost the state's overall growth rate.
- Regional Shift. In each sector, state employment in the prior period is multiplied by the difference in the sectoral growth rate between the nation and the state. The resulting regional shift is the key factor explaining differences in growth rates across states or time periods. This component is said to measure the "competitiveness" of a sector in each state, but this definition of "competitiveness" incorporates a number of factors, including the population growth that drives aggregate economic growth in western and Sunbelt states.

Arizona

For Arizona, in addition to using annual employment, a shift-share analysis was performed based on real quarterly earnings, timed to Arizona's turning points. While the results of these two shift-share analyses generally are in agreement, differences exist, which largely reflect the differing performance as measured by employment versus earnings. In addition, using the annual employment data, a shift-share analysis was done at the subsector level.

2001 Recession. Between 2000 and 2001, total employment in Arizona increased by 27,682 jobs, a gain of 1.0 percent compared to only 0.1 percent nationally. Had Arizona performed identically to the national average, it would have experienced job growth of only 2,357. The state's industrial mix accounted for additional job growth of 2,158, with the regional-shift component responsible for the remaining job growth of 23,167. In contrast, real earnings dropped during the recession, both nationally and in Arizona. A large negative in the national-share component and a small negative in the industry-mix component were partially offset by a gain in the regional-shift component.

Only four of the 20 sectors experienced a job loss in Arizona between 2000 and 2001. The predominant cause of these job losses was the poor performance nationally in these sectors (the industrial-mix component). Though the overall industrial-mix component was positive, this was the net of gains in many sectors and substantial losses in a few, most notably manufacturing and administrative support. In contrast, real earnings fell in most sectors due to a combination of the national-share and industrial-mix components.

The regional-shift component varied considerably between the employment and earnings measures in many sectors. Three sectors stood out as having a positive contribution on both measures: government, finance and insurance, and agriculture. The positive overall value in government resulted from the federal and local government subsectors; state government had a negative value.

2002-07 Expansion. During the expansion, total employment in Arizona rose by 631,088 jobs; the growth rate of 22.4 percent compared to 8.7 percent nationally. Had Arizona performed identically to the national average, it would have experienced job growth of 245,267. The state's

industrial mix accounted for another 36,573 jobs, while the regional-shift component was responsible for job growth of 349,248. The overall results were similar based on the real earnings measure, though the importance of the national-share component was greater, and the industrial-mix component was slightly negative, based on earnings.

The positive overall value for the industrial-mix component based on employment was the net of large negative values in a few sectors (especially manufacturing) and positive values in a number of sectors, particularly real estate. However, the industrial mix results based on earnings were rather different, including a negative value for real estate.

The only sectors not to expand in Arizona during the expansion were manufacturing and information, largely corresponding to the national weakness in these two sectors—the negative value in the industrial-mix component. The information sector was the only one with a negative value in the regional-shift component, based on employment.
Most sectors in Arizona expanded considerably during the expansion. The regional-shift component was particularly large for retail trade based on employment. Other sectors with a significant contribution based on both employment and earnings were health care; construction; government; professional, scientific and technical services; administrative support; and real estate.

2008-09 Recession. After a stronger performance than the national average on aggregate economic growth during the expansion, Arizona lost jobs between 2007 and 2009 at a greater pace than the national average (-7.1 percent versus -3.4 percent). Arizona's employment fell 244,615; had the state performed identically to the nation, it would have lost 116,635 jobs. Instead of a small positive factor as in the two prior periods, the state's industrial mix worked against it during the recession, causing the loss of 10,152 jobs. The regional-shift component also swung from a substantial positive in the expansion to a negative during the recession, responsible for a job loss of 117,828 jobs. The results were similar based on earnings, except that the national-share component accounted for a greater share, and the regional-shift component a lesser share, of the overall loss.

The industrial-mix component was especially negative for construction, manufacturing, and administrative support, based on both employment and earnings. In contrast, the industrial mix was a positive factor for health care and government.

Nearly half of the net job losses in the regional-shift component occurred in the construction sector; smaller losses occurred in several other sectors, including administrative support; retail trade; accommodation and food services; and professional, scientific and technical services. Each of these sectors were negative based on earnings. In contrast, health care and educational services posted moderate positive values, particularly based on employment.

Looking specifically at the regional-shift component, the swing from strong growth during the expansion to large losses during the recession in employment can be traced particularly to the construction and retail trade sectors. Other sectors with substantially poorer performance during the recession based on both employment and earnings include government (state and local

governments registered large negative values during the recession); health care; administrative support; and professional, scientific and technical services.

2009-10 Recovery. Based on earnings, Arizona's economic recovery has lagged behind that of the nation. The gains in the state have been wholly due to the national-share component. The regional-shift component is negative overall and for 15 of 20 sectors, including administrative support and construction. The industrial-mix component also is slightly negative.

Across Time Periods. Most sectors have followed the overall pattern of the regional-shift component: a small positive contribution during the 2001 recession, a large positive value during the expansion, a negative value during the 2008-09 recession, and a negative value in the early stages of the economic recovery. However, some notable exceptions exist, including the very large negative value of the construction sector during the 2008-09 recession. The educational services sector (which does not include public-sector education) registered strong gains relative to the small size of the sector through all periods. Health care was disproportionately strong during both the expansion and the 2008-09 recession. Retail trade was unusually cyclical, with a large positive value during the expansion but a large negative during the 2008-09 recession. The information sector fell during the expansion.

All States

The results of a shift-share analysis for all states based on annual employment at the sectoral level are reported in this and the following subsection.

2002-07 Expansion. In most states, health care, real estate, and construction made large positive contributions to the industry-mix component. In contrast, manufacturing, retail trade, and government generally had large negative effects on the industry-mix component.

However, the regional-shift component is primarily responsible for the differing economic performances across states. Four sectors—construction, real estate, retail trade, and health care—were of particular importance in that they made a significant positive contribution in most of the states with the fastest overall economic growth but had a large negative impact in many of the states with the poorest economic performance.

2008-09 Recession. Health care, government, and finance and insurance made large positive contributions to the industry-mix component in most states; mining contributed in some states. In contrast, manufacturing, construction, retail trade, and administrative support generally had large negative effects on the industry-mix component.

In the regional-shift component, five sectors—construction, retail trade, manufacturing, government, and accommodation and food services—were of particular importance. They made a significant positive contribution in many of the states with the strongest overall economic growth but tended to have a large negative impact in the states with the greatest economic losses.

States With Changing Fortunes Between the Expansion and the Recession

Several states posted strong growth during the expansion but had among the weakest performances during the 2008-09 recession. Each of these states—in particular, Arizona, Idaho,

Nevada, and Florida, but also Alabama, Georgia, North Carolina, Oregon, South Carolina, and Utah—are located in the West or Sunbelt. In most of these states, the single largest cause for the swing in the regional-shift component is the construction sector, which went from a large positive value during the expansion to a significant negative value during the recession. The retail trade and administrative support sectors also contributed to this downward swing in performance in most states; the manufacturing sector contributed in some states.

In contrast, several states that lagged behind most states in economic growth during the 2002-07 expansion were among the strongest performers during the 2008-09 recession. While scattered around the country, many of the states in this group are located in the Plains region. The relative improvement in performance can be traced primarily to the construction and retail trade sectors. These states did not experience much of a boom in construction and real estate during the expansion and thus did not have strong gains in retail sales. Therefore, the needed correction from the excesses during the boom was relatively small and these sectors did not decline much during the recession. Other sectors that contributed to the relative improvement in these states were health care and government. Both of these sectors experienced sluggish growth during the expansion in these states, and therefore did not have much of a decline during the recession.

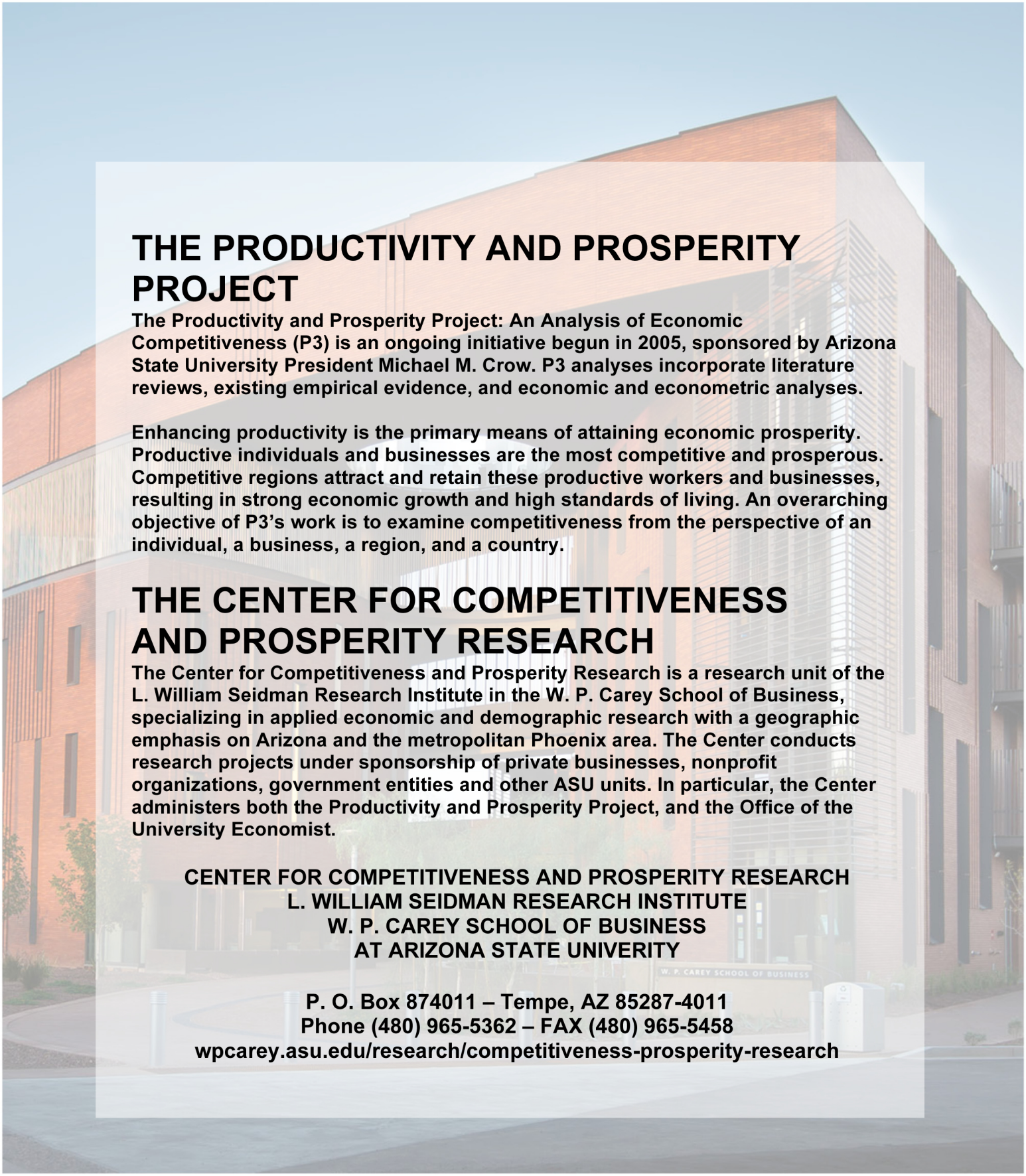
CONCLUSION

Job quality and economic diversity are two laudable goals for economic development in states and local areas, but do not guarantee a consistently high-performing economy. Great economic diversity in particular is at odds with strong economic performance (and also with high job quality). Instead, the goal should be a reasonably diverse economy, but one with relatively high shares in cyclically stable industries and in higher-paying industries and relatively low shares in highly cyclically industries and in lower-paying industries. A balance between low cyclicality and high job quality must be sought, since some of the high-paying industries, such as semiconductor manufacturing, also are relatively cyclical.

Currently, Arizona's job quality is below the national average, but the state ranks just above the median state. In contrast, Arizona has the nation's second-most cyclical economy. Thus, the key to achieving a more consistently high-performing economy is to reduce the significance of cyclical industries and increase the relative importance of more stable industries.

Arizona's biggest challenge is its high growth rate, which inherently results in a disproportionate share of its economy being in highly cyclical industries. Further, in an economy that is growing rapidly, economic development efforts to attract high-quality jobs (and presumably more stable jobs with strong prospects for the future) can have only a marginal impact. For example, when Intel's new fab facility comes online in 2013 or 2014, its few thousand jobs likely will be dwarfed by job growth tied to population gains. Total job growth likely will be around 100,000 in each of those years.

In contrast, if Arizona experienced no net migration, it would need to create only about 25,000 jobs per year in order to meet the demands of young adults entering the workforce net of retiring workers. In that scenario, Intel's fab plant and just a few other high-wage operations would have a big impact on the state's industrial mix, job quality, etc. Arizona eventually will reach a state of little, if any, net in-migration, as in most other states, but that time may still be many years away. In the interim, little possibility exists that state policies could significantly lower the state's growth rate while maintaining Arizona as an attractive place for high-quality employers to do business.



THE PRODUCTIVITY AND PROSPERITY PROJECT

The Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3) is an ongoing initiative begun in 2005, sponsored by Arizona State University President Michael M. Crow. P3 analyses incorporate literature reviews, existing empirical evidence, and economic and econometric analyses.

Enhancing productivity is the primary means of attaining economic prosperity. Productive individuals and businesses are the most competitive and prosperous. Competitive regions attract and retain these productive workers and businesses, resulting in strong economic growth and high standards of living. An overarching objective of P3's work is to examine competitiveness from the perspective of an individual, a business, a region, and a country.

THE CENTER FOR COMPETITIVENESS AND PROSPERITY RESEARCH

The Center for Competitiveness and Prosperity Research is a research unit of the L. William Seidman Research Institute in the W. P. Carey School of Business, specializing in applied economic and demographic research with a geographic emphasis on Arizona and the metropolitan Phoenix area. The Center conducts research projects under sponsorship of private businesses, nonprofit organizations, government entities and other ASU units. In particular, the Center administers both the Productivity and Prosperity Project, and the Office of the University Economist.

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