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The Economic Base of Arizona, Metropolitan Phoenix, Metropolitan Tucson, The Balance of the State, and Chandler

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TABLE OF CONTENTS

Summary 1
Introduction to Economic Base Studies 3
Excess Economic Activity 3
Tradable Economic Activities 4
Economic Data Used in the Base Study 11
Economic Base Study Results 14
Comparison of Datasets and Methods 14
Arizona, 2009 17
Arizona, Change Between 2001 and 2009 25
Metropolitan Phoenix, 2009 29
Metropolitan Tucson, 2009 37
Balance of the State, 2009 44
Comparison of Substate Areas, 2009 50
Appendix: The Economic Base in Chandler 55
Comparison of Databases 55
Economic Base Study Results, 2009 57
Changes Between 2001 and 2009 64

LIST OF TABLES

1. Estimates of Export Share by Sector, Arizona 6
2. Estimates of Export Share by Subsector, Arizona 7
3. Comparison of Economic Base Study Results for Various Methods and Datasets by Sector, Arizona, 2009 16
4. Sectors, Arizona, 2009 20
5. Leading Subsectors, Arizona, 2009 21
6. Leading Industries, Arizona, 2009 22
7. Sectors, Arizona, Change Between 2001 and 2009 26
8. Sectors, Metropolitan Phoenix, 2009 32
9. Leading Subsectors, Metropolitan Phoenix, 2009 33
10. Leading Industries, Metropolitan Phoenix, 2009 34
11. Sectors, Metropolitan Tucson, 2009 40
12. Leading Subsectors, Metropolitan Tucson, 2009 41
13. Leading Industries, Metropolitan Phoenix, 2009 42
14. Sectors, Balance of State, 2009 46
15. Leading Subsectors, Balance of State, 2009 47
16. Leading Industries, Balance of State, 2009 48
17. Sectors, Metropolitan Phoenix, Metropolitan Phoenix, and Balance of State, 2009 51
A-1. Comparison of Totals From Zip Business Patterns and the Maricopa Association of Governments Employment Database for Chandler Zip Codes 56
A-2. Comparison of Sectors From Zip Business Patterns and the Maricopa Association of Governments Employment Database for Chandler Zip Codes 57
A-3. Sectors, Chandler Area, 2009 61
A-4. Leading Subsectors, Chandler Area, 2009 62
A-5. Leading Industries, Chandler Area, 2009 63
A-6. Sectors, Chandler Area, Change Between 2001 and 2009 65

SUMMARY

The most important activities to a local economy are those that are "tradable" and are of unusually large size. Tradable activities are those that import money into the local economy by selling goods and services to customers outside the local area. Tradable activities "drive" the economy and are responsible for the prosperity of the local area. Nontradable activities respond to the growth occurring in tradable activities and would not exist if tradable activities were not present. An economic base analysis identifies both tradable activities and those activities of disproportionate size in a local economy.

Economic activity on a per capita basis is lower than the national average in Arizona, contributing to the state's low incomes. This subpar per capita activity is particularly an issue outside the two major metro areas, but even in the Phoenix area activity is considerably below the national average.

Arizona's economy is reasonably diverse. Reports that the economy lacks diversity are primarily based on the relatively large size of growth-related activities such as construction and real estate and the very high cyclicality of those activities. As long as the state continues its fast growth, those activities will remain disproportionately large. Further diversification of the economy will have little effect on moderating the state's severe economic cycles — that cyclicality primarily results from fluctuations in the growth rate.

Based on both tradability and disproportionate size, many of the driving activities in Arizona can be grouped into one of three clusters: tourism and seasonal residents, high-technology manufacturing and associated wholesale trade, and call centers and back-office operations. A number of other activities that do not fit into one of these categories, such as copper mining, also help drive the state's economy.

Each of these clusters is important in the Phoenix and Tucson metropolitan areas, though the specific leading industries within these categories vary between the two metro areas. In the balance of the state taken as a whole, only the tourism and seasonal residents cluster is a significant economic driver. Agriculture, mining, and government (particularly the federal government) are among the economic drivers in Arizona outside of the two major metro areas. Government also is important in the Tucson area, mostly due to the large size of the University of Arizona.

Among the three regions, the Phoenix area has the most diverse economy with the largest number of driving economic activities. This is a natural outcome of its much larger employment size. Though of equal size in terms of wage and salary employment, the Tucson area's economy is more diverse than the economy of the balance of the state.

Unlike the metro areas, the balance of the state consists of multiple local economies, with the composition of the economies varying by town. Most of the local economies are driven by only one or a few economic activities. Economic diversification would be of significant benefit to these areas, but opportunities for diversification are extremely limited in much of rural Arizona given such factors as geographic remoteness and small population size.

The latest data, for 2009, are for a recessionary period. To examine how the Arizona economy has changed over time, the 2009 data are compared to the previous recession in 2001. Because of the high cyclicality of some industries, comparing 2009 to other years would distort the picture of how the economy has changed.

Overall, the state's economy lost ground to the national average over the 2001-to-2009 economic cycle. Though Arizona's employment increased more over the eight years than the U.S. average, so did the state's population. Per capita employment fell 9.1 percent in Arizona compared to 6.5 percent in the nation.

Despite the 10 percent increase in employment in Arizona, employment in tradable activities slipped marginally. Export jobs decreased as a percentage of the total, from 27.0 percent to 24.5 percent. It is not clear how much of this decline was due to the severity of the recession in Arizona. If related to the recession, the export share should bounce back in the next few years. The decline is more ominous if it is part of a long-term trend.

Some economic activities in Arizona posted gains based on both tradability and disproportionate size over the eight years, with the greatest gains in retail trade; finance and insurance (in credit intermediation); arts, entertainment and recreation; and health care and social assistance. Significant losses on both measures occurred in construction; transportation and warehousing; agriculture; information; and professional, scientific and technical services. Other sectors were mixed, gaining on one measure but declining on the other. This particularly occurred in administrative support and waste management; accommodation and food services; and manufacturing.

An analysis of the economic base in one of Arizona's communities — Chandler — is included in the appendix of this report. Relative to the broader Phoenix area, high-technology activities are disproportionately important to the Chandler area economy. In 2009, the manufacturing of semiconductors and space vehicle propulsion units and the wholesaling of electronic parts and equipment were the most significant of these high-tech activities. Wireless telecommunications carriers also were important. Finance, specifically credit intermediation, was the other major economic activity in the Chandler area in 2009. Real estate credit, sales financing, and commercial banking all were important industries.

The Chandler area's economy gained between 2001 and 2009 even though the state's economy lost ground. A sizable gain in per capita employment in the Chandler area compared to a loss nationally and in Arizona, with Chandler's figure moving from well below to above the state's figure.

A number of economic activities in the Chandler area posted gains between 2001 and 2009: finance and insurance (particularly in the real estate credit and commercial banking industries); retail trade; wholesale trade; accommodation and food services; real estate and rental; manufacturing (primarily in the space vehicle propulsion units industry and in the primary metal subsector); professional, scientific and technical services; and arts, entertainment and recreation.

INTRODUCTION TO ECONOMIC BASE STUDIES

The North American Industry Classification System (NAICS) hierarchically divides economic activity into sectors (two-digit NAICS), subsectors (three-digit), industry groups (four-digit), and industries (five- and six-digit). The composition of an economy using any level of the NAICS can be determined based on relative size. Any one of several economic measures, such as employment or gross product, can be used to determine relative size, though most measures are not produced below the subsector level for states and substate areas.

Simply examining the composition of a local (for example, a state or metropolitan area) economy based on the NAICS using one of these economic measures provides no insight into two issues:

- The importance of an economic activity in the local economy relative to its significance in the broader regional or national economy. A category — an industry for example — of unusually large size in the local area relative to the national average is considered to have "excess" activity.
- The proportion of an activity's goods and services that are sold to customers (individuals or businesses) who are not residents of the local area. Goods and services sold to nonresidents are synonymously called "tradable," "export" and "basic." (Note that the definition of export in this situation applies to any sale to a customer from outside the local area and is not limited to international exports.)

An economic base study considers these concepts in identifying the leading economic activities in a local area.

An activity can be tradable but not have an excess or can have an excess but not be tradable. The most important activities to a local economy are those that are tradable and have an excess.

Excess Economic Activity

An economic base study calculates "location quotients" in order to determine the importance of economic activities in the local economy relative to their significance in a geographically broader economy — usually the national economy is used for the comparison. Traditionally, a base study compares the shares of total economic activity by sector, subsector, industry group, and/or industry in the local area to those in the nation. A location quotient is calculated by dividing the share in the local area by the national share. For example, if a sector's employment makes up 11 percent of the total employment locally but 10 percent nationally, the location quotient (LQ) is 1.1 (11 divided by 10). If a location quotient is greater than 1, then "excess" — that is, above average — employment exists in that sector in the local area.

The standard method of calculating location quotients is less than desirable if the overall level of economic activity in a local area is much different from the national average after adjusting for the size differential, as measured by population. In Arizona in 2009, overall per capita employment was 11 percent lower than the national average. In a case such as this, location quotients based on sectoral shares present a misleading picture of the concentration of an economic activity in the local economy — an activity's share of the local economy may be above average but its per capita activity may be below the national average.

Thus, an alternative means of calculating location quotients is to compare per capita economic activity in a local area to the national per capita figure. For example, if a sector's employment per 1,000 residents is 10 locally, but 11 nationally, the location quotient is 0.91 (10 divided by 11). A location quotient less than 1 indicates that economic activity in the local area is less than average and that a "deficit" of employment exists in that activity in the local area.

A location quotient greater than 1 raises the possibility that the local area may specialize in the activity by serving customers from outside the local area to an extent in excess of the national average. However, a local area can have above-average levels of activity without any sales to nonresidents if the purchasing preferences of residents differ from the national norm. In the Arizona desert, for example, activities related to air conditioners (sales, maintenance and repair) have excesses because of climate-induced high levels of expenditures by local residents.

When the location quotient is greater than 1, the amount of employment in the local area in excess of the national average is quantified by subtracting the local area employment divided by the location quotient from the local area employment. (If the LQ is less than 1, the deficit in employment in the local area from the national average can be calculated from the same formula.) The existence of excess employment indicates an unusually strong concentration in that economic activity, whether due to an above-average level of export sales or to local conditions that cause above-average sales to local residents.

Tradable Economic Activities

A "tradable" (or "export" or "basic") economic activity is one in which the good or service produced is sold to customers from outside the local area. In this way, money that would otherwise not be present is imported into the local economy. Importing money into a local economy is a necessity since "leakages" of money from the local economy inevitably occur. No local area produces all of the goods desired by its residents; residents vacation outside the local area.

Few economic activities sell wholly to customers outside the local area or entirely to local residents, but in some cases, the customers are predominantly one or the other. Classic tradable activities include many manufacturing, mining, and agricultural activities that have a high percentage of sales made to customers from outside the local area. A high percentage of the electronics goods manufactured in Arizona, for example, are sold to customers outside the state. Other activities that primarily import money into a region include tourism and some services, such as call centers of a national company serving a market area greater than the local area.

A few tradable activities, such as a copper mine, are location specific but many, such as most of manufacturing, can locate anywhere since their customers are spread out across the country or the globe. In contrast, largely nontradable economic activities are location specific since they sell their goods or services to local customers (which consist of local companies as well as individuals).

While necessary to the functioning of a local economy, nontradable activities do not import money into the local economy. Their presence in the local area is due to tradable activities that

create jobs. In this way, tradable activities "drive" the economy while nontradable activities respond to the growth occurring in tradable activities.

To illustrate the relationship between tradable and nontradable activities, consider the extreme case of a community that is wholly dependent on one tradable activity. Historically in some mining towns, the output of the mine has been the sole tradable product. No one lived in the area until the mine began to hire workers. While the mine was operating, a variety of nontradable activities sprang up to serve those employed at the mine. When the mine closed, the mine's employees left the town and the businesses engaged in nontradable activities immediately lost most of their customers (all except those individuals working at other nontradable activities). A community cannot survive by selling goods and services to each other because of leakages of local monies. Without a means of importing money into the community to offset these leakages, the nontradable businesses in a former mining town eventually shut down, resulting in a ghost town.

Regional economic development interests do not need to be concerned about attracting companies to serve local residents and businesses. If an unmet demand is present, a company will fill the opening without any intervention from local governments or economic development agencies. (However, cities within a metropolitan area compete with each other to attract companies serving the local population in order to receive the tax benefits of the economic activity. This competition is unhealthy from the perspective of the metro area.) Regional economic development focuses on tradable activities since communities located outside the region — elsewhere in the state, in other states, or in other nations — are competing to become the home of these tradable activities.

Estimating Tradable Shares

Unfortunately, solid data do not exist with which to estimate the tradable portion of economic activity as measured, for example, by sector or industry. The lack of data regarding tradability has resulted in most economic base studies giving little attention to this concept, instead focusing on excess activity and equating the presence of excess activity to export activity. To the extent that tradability is discussed in base studies, it has been limited to the use of judgment to differentiate economic activities as, for example, primarily tradable, partially tradable, or largely not tradable.

Though not readily available, some data do exist regarding tradability. Estimates of tradable shares are embedded within economic models. The Regional Economic Models, Inc. (REMI) model for Arizona provides tradable shares by sector and for most subsectors. The Minnesota IMPLAN Group (IMPLAN) model for Arizona provides tradable shares by sector, for most subsectors, and for selected industry groups and industries. In both models, certain subsectors (and industry groups and industries in IMPLAN) are combined before the export share is calculated. The export shares calculated from these economic models are based on a measure of production.

At the sectoral level, the correlation in the tradable shares from the two models is high at 0.84. Still, as seen in Table 1, some notable differences in estimates of tradable share exist at the sectoral level, with the extremes in the transportation and warehousing sector and the agriculture

TABLE 1
ESTIMATES OF EXPORT SHARE BY SECTOR, ARIZONA

Sector	REMI	IMPLAN	Difference
Mining	92%	82%	-10
Agriculture	98	68	-30
Manufacturing	65	67	2
Administrative Support and Waste Management	35	53	18
Utilities	37	41	4
Information	28	39	11
Wholesale Trade	18	37	19
Transportation and Warehousing	64	36	-28
Real Estate and Rental	14	36	22
Finance and Insurance	42	32	-10
Retail Trade	8	29	21
Arts, Entertainment and Recreation	17	27	10
Accommodation and Food Services	12	25	13
Management of Companies	48	23	-25
Construction	18	20	2
Other Services	7	20	13
Professional, Scientific and Technical Services	11	18	7
Education (Private Sector)	21	17	-4
Health Care and Social Assistance	7	12	5
Government	1	4	3

Source: Regional Economic Models, Inc. (REMI) and Minnesota IMPLAN Group (IMPLAN).

sector. Only three sectors in Arizona — the classic export sectors of agriculture, mining, and manufacturing — are considered to be at least 65 percent tradable.

However, the tradable shares from the two models are substantially different at the subsectoral level, with a correlation of just 0.38. For example, the difference in share is 49 percentage points or more in five of the 22 manufacturing subsectors (see Table 2) — that is, one model assumes a subsector is primarily tradable while the other assumes it is largely not tradable. Similarly large differences are found in subsectors in the transportation and warehousing sector and in the information sector.

The differences in the estimates of tradable share between the two models result primarily from data inadequacies. Data are not available by company or by industry to indicate the percentage of sales that are made to local residents and companies versus the portion made to out-of-state customers, tourists, and others who are not local residents. The differences also can be a function of conceptual complexities. Companies in the local area that produce tradable goods and services purchase goods and services from local companies that primarily serve local residents. It makes some sense to differentiate purchases by exporters from those made by local residents or local companies engaged in nontradable activities.

The differences in tradable share between the two models do not follow a pattern. In some sectors and subsectors, REMI indicates a higher tradable share, but in other cases IMPLAN has the higher share. In some subsectors, one model's estimates seem more reasonable, but in other subsectors the other model seems to provide a more likely estimate of the tradable share. In other

TABLE 2
ESTIMATES OF EXPORT SHARE BY SUBSECTOR, ARIZONA

Sector Subsector	Export Share REMI	Export Share IMPLAN	Difference	Production*
Agriculture	98%	68%	-30	$4,596
Farm	100	70	-30	3,875
Forestry, fishing, hunting and trapping	81	57	-24	228
Support	60	57	-3	492
Mining	92	82	-10	5,397
Oil and gas	67	57	-10	759
Other mining	93	87	-6	4,304
Support	59	73	14	334
Manufacturing	65	67	2	56,538
Food	82	33	-49	4,171
Beverages and tobacco	46	80	34	2,607
Textile mills	96	76	-20	111
Textile products	75	99	24	446
Apparel	28	11	-17	156
Leather and allied products	55	25	-30	56
Wood products	30	42	12	1,378
Paper	49	98	49	1,307
Printing and related	14	75	61	600
Petroleum and coal products	49	28	-21	1,167
Chemicals	56	41	-15	4,228
Plastic and rubber products	38	15	-23	1,273
Nonmetallic mineral products	40	95	55	2,880
Primary metals	72	97	25	3,754
Fabricated metal products	32	91	59	5,006
Machinery	66	58	-8	3,346
Computer and electronic products	74	70	-4	12,275
Electrical equipment and appliances	52	63	11	973
Motor vehicles and parts	36	74	38	1,403
Other transportation equipment	87	78	-9	5,843
Furniture and related	61	23	-38	1,388
Miscellaneous	79	63	-16	2,170
Transportation and Warehousing	64	36	-28	13,493
Air transportation	66	75	9	5,010
Rail transportation	95	31	-64	1,072
Water transportation	100	20	-80	34
Truck transportation; Couriers and messengers	61	10	-51	4,893
Transit and ground passenger transportation	31	0	-31	647
Pipeline transportation	95	2	-93	209
Scenic and sightseeing transportation; Support	62	30	-32	944
Warehousing and storage	81	1	-80	684
Information	28	39	11	11,423
Publishing	27	71	44	1,751
Motion picture and sound recording	90	1	-89	704
Data processing; Other information services	3	68	65	1,730
Broadcasting; Telecommunications	30	28	-2	7,239

(Table Continued on Next Page)

TABLE 2 (continued)

Sector / Subsector	Export Share: REMI	Export Share: IMPLAN	Export Share: Difference	Production*
Finance and Insurance	42%	32%	-10	$29,026
Credit intermediation; Monetary authorities	39	42	3	10,787
Securities and other financial investments	33	17	-16	8,560
Insurance	54	33	-21	9,679
Real Estate and Rental	14	36	22	56,317
Real estate	7	32	25	48,166
Rental and leasing; Lessors of intangible assets	50	61	11	8,151
Administrative Support and Waste Management	35	53	18	17,244
Administrative support	38	55	17	16,005
Waste management	5	26	21	1,239
Health Care and Social Assistance	7	12	5	28,357
Ambulatory health care	7	21	14	16,232
Hospitals	4	0	-4	8,396
Nursing care	1	0	-1	1,587
Social assistance	51	0	-51	2,142
Arts, Entertainment and Recreation	17	27	10	3,503
Performing arts and spectator sports	16	37	21	1,357
Museums and historical sites	1	0	-1	134
Amusement, gambling and recreation	21	21	0	2,013
Accommodation and Food Services	12	25	13	14,952
Accommodation	39	42	3	3,065
Food services	2	21	19	11,887
Other Services	7	20	13	10,698
Repair and maintenance	9	30	21	5,262
Personal and laundry services	1	9	8	2,827
Religious, civic, professional & similar organizations	11	10	-1	2,347
Private households	11	0	-11	262
Government	1	4	3	28,234
State and local	1	3	2	17,398
Federal civilian	0	8	8	6,559
Federal military	0	0	0	4,277

* from IMPLAN, in millions of dollars

Note: no subsectoral detail is available from REMI for the sectors not shown in this table.

Source: Regional Economic Models, Inc. (REMI) and Minnesota IMPLAN Group (IMPLAN).

subsectors, neither model provides a seemingly accurate estimate, or the two models provide similar and reasonable estimates. The remainder of this subsection examines export shares by sector and subsector in the sectoral order shown in Table 1. An indication of the size of each sector and subsector is provided in Table 2, using the IMPLAN model's estimate of production.

Mining. Both models indicate that the export share is very high in mining. It is highest (approximately 90 percent in each model) in the "other mining" (coal, metal, and mineral) subsector that dominates the sector in Arizona. According to IMPLAN, most of the industry groups within this subsector have an export share between 90-and-100 percent. Export shares are somewhat lower in the other subsectors of oil and gas extraction and mining support.

Agriculture. Though both models indicate that the sector's export share is very high, IMPLAN's estimate is noticeably lower. Farming, the largest of the subsectors in Arizona, has the highest export share of the subsectors: 100 percent from REMI and 70 percent from IMPLAN. Clearly, the 100 percent figure is too high. For example, most of the milk produced in Arizona is destined for local consumers and some farms specialize in selling their products to local restaurants.

Manufacturing. The models are in close agreement in placing the sector's export share at around 65 percent, but their estimates of the export shares in the 22 subsectors range widely. The differential exceeds 30 percentage points in nine subsectors, most of which are of moderate size. According to IMPLAN, export shares vary from nearly 100 percent in several subsectors to less than 20 percent in a couple.

Administrative Support and Waste Management. More than 90 percent of this sector's activity is in the administrative support subsector. According to IMPLAN, most of the industry groups within this subsector have an export share near 50 percent. However, REMI's export share for the subsector is less than 40 percent. The export shares are considerably lower in the waste management subsector, with REMI again having the lower figure.

Utilities. This sector consists of just one subsector. The two models agree that the sector's export share is around 40 percent, a higher figure than what might be expected given that the primary purpose of utilities is to provide services to local customers. However, a number of the power plants now located in Arizona export to other states a sizable share of the energy produced. IMPLAN indicates that the export share for electrical power is 47 percent. The export shares in the other industry groups are questionable. The share for water and sewerage systems is 45 percent, though those systems almost entirely serve local customers. The export share for natural gas is zero.

Information. While the export shares for the sector are not too different between REMI (28 percent) and IMPLAN (39 percent), this hides the very large but offsetting differences at the subsector level. In the motion picture subsector, the REMI share of 90 percent seems far too high given that the subsector in Arizona primarily consists of movie theaters, whose customers are overwhelmingly local residents.

Wholesale Trade. Wholesale trade typically is thought of partially basic, suggesting that IMPLAN's export share of 37 percent may be more realistic than REMI's share of 18 percent. Neither REMI nor IMPLAN provide any subsectoral detail.

Transportation and Warehousing. REMI's higher export share for the sector (64 percent versus 36 percent from IMPLAN) extends to most of the subsectors, with huge differences in some cases. For example, REMI assigns an export share of 95 percent to pipelines; IMPLAN's share is 2 percent.

Many activities in the transportation and wholesale trade sectors are inherently a blend of tradable and nontradable components. For example, a trucking company may both (1) transport goods into Arizona that will be sold by local companies and ultimately consumed by Arizona households, and (2) transport goods manufactured, mined, or grown in Arizona to out-of-state

customers. (Wholesale trade is a similar activity that brings goods such as groceries into Arizona and arranges for goods produced in Arizona to be exported.)

Real Estate and Rental. IMPLAN's export share of 36 percent is considerably higher than REMI's 14 percent share. Real estate is by far the larger of the two subsectors, but has a low export share. Real estate, construction, and other activities tied to population growth typically are not considered to be tradable activities. These activities are unusually important in Arizona due to the state's above-average growth rate. Yet the models suggest that roughly 20 percent of the activity in construction and real estate is tradable.

Finance and Insurance. Each model indicates that finance and insurance is a partially tradable activity. Differences in estimated export share between the two models are relatively small in each subsector.

Retail Trade. REMI, which does not provide estimates of the tradable share by subsector, assumes that the sector's export share is 8 percent. IMPLAN's figure is 29 percent. According to IMPLAN, most of the subsectors have an export share between 18 and 29 percent, though a few have shares of more than 40 percent. The export shares from IMPLAN seem high, even after considering that many retail stores sell a portion of their goods to out-of-state tourists and to seasonal residents.

Arts, Entertainment and Recreation (AER). Export shares for this sector are similar to those for retail trade. This sector primarily serves local residents; tourists and seasonal residents boost the export shares.

Accommodation and Food Services. The export share in this sector is similar to those for AER and retail trade despite the obvious impact of tourists on the accommodation subsector. While accommodation primarily serves tourists, both models place its export share at about 40 percent, suggesting that many customers are in-state tourists. The food services subsector, which has a lower export share, is considerably larger than the accommodation subsector.

Management of Companies. This sector consists of establishments at which a good or service is not produced. The headquarters of a company with many operating locations is an example. Such an establishment can exist for either a basic or nonbasic company. REMI's export share of 48 percent is twice that of IMPLAN. The sector has only one subsector.

Construction. Though construction often is cited as a driving factor in the state's economy, this is due to the sector's extreme cyclicality, not to its being a tradable activity. The two models agree that the sector's export share is only around 20 percent. REMI provides no subsectoral detail and IMPLAN's detail does not match the NAICS subsectors.

Many economists would contend that even a 20 percent tradable share is too high. However, construction work done in Arizona by a local company for a business that produces tradable goods or services might be considered to be in part a tradable activity. This argument might be extended to a home built for a new resident hired by the company with tradable activity. That individual is in Arizona because of the tradable activity and is applying savings earned elsewhere

to the purchase of the house in Arizona. Similarly, a home built for a seasonal resident or an in-migrating retiree might be considered to be tradable.

In contrast, a house built for a young couple born in Arizona who has derived all of their savings and income in Arizona does not represent a tradable activity. The construction of facilities for a local firm that serves the local population also is not tradable. Similarly, the sale of a home to a newcomer who joins the local workforce would not be considered an export activity if the presence of the new homeowner can be traced to another driving activity that ultimately is responsible for the ability of the migrant to get a job in Arizona. Thus, the above-average size of construction, real estate, and other growth-related activities in Arizona only in small part can be considered a result of tradable activities.

Other Services. REMI puts the sector's export share at only 7 percent; IMPLAN assumes 20 percent. The export shares in each of the subsectors are low.

Professional, Scientific and Technical Services. The sector's export share is less than 20 percent according to each model. This sector has only one subsector, but IMPLAN provides export shares for its nine industry groups. These shares range from zero to 53 percent.

Education Services. Only private-sector education is included in this sector; public schools are included in the government sector. The models agree that the sector's export share is low at around 20 percent. An example of an export is an out-of-state student who attends a private university located in Arizona. This sector has only one subsector.

Health Care and Social Assistance. This sector primarily serves local residents, as indicated by the low export share of about 10 percent from each model. A striking difference is in the social assistance subsector: IMPLAN assumes that none of the subsector is tradable while REMI assumes that it is 51 percent tradable. Since the nature of the social assistance subsector is to provide services to local residents, it is difficult to understand how much, if any, of this subsector is tradable.

Government. The sector's export share is less than 5 percent according to each model. The export share in each of the three subsectors — federal civilian, military, and state and local government — is less than 10 percent according to IMPLAN and 1 percent or less according to REMI. Such low shares are sensible for state and local government, but the federal government, particularly military bases, is often considered to be partially basic. However, REMI and IMPLAN each indicate that the military's export share is zero.

Economic Data Used in the Base Study

Economic activity can be measured using a multitude of indicators, but most of the data series are produced only for sectors and subsectors. To be most useful, an economic base study needs to be done at the industry level. This requires that *County Business Patterns* (CBP), produced annually by the U.S. Census Bureau, be used. *County Business Patterns* provides data for all levels of the NAICS — sector, subsector, industry group, and industry — for counties, states, and the nation. *Metropolitan Business Patterns* provides comparable data for metropolitan areas. The most recent Census Bureau data are for 2009.

Three measures are reported in *County Business Patterns* for each industry and higher level of the NAICS: the number of establishments (physical locations at which work is performed), employment, and payroll. In addition to the total number of establishments, a frequency distribution of the number of establishments by employment range (less than 5, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1,000 or more) is provided. Employment is expressed as of the week including March 12. Payroll is provided for the calendar year and for the first quarter (to better align with the March 12 employment date).

Only wage and salary employees are counted (proprietors are not included) in *County Business Patterns*. Certain economic activities are not within the scope of CBP, including most of the agriculture sector, the government sector, the rail transportation subsector, and the private households subsector. For the base study, the wage and salary employment data in CBP are supplemented by wage and salary employment data from the U.S. Bureau of Economic Analysis for the government sector; the partial agriculture sector data in CBP are replaced with BEA data.

All economic data produced by the federal government are subject to disclosure restrictions, which are in place to prevent data on a particular company from being released or otherwise ascertained. These restrictions result in considerable data being withheld from publication for subnational geographies and create serious limitations to conducting economic analyses.

While the number of establishments is not subject to the disclosure restriction, much of the employment and payroll data below the national level are withheld from publication in *County Business Patterns*. Because of the frequency distribution of establishments by employment size, it is possible to make reasonable estimates of the employment values that have been withheld. In contrast, since such a frequency distribution is not available for payroll, it is not possible to make an informed estimate of the withheld payroll data. Thus, despite the limitations of the employment measure — that it does not consider the number of hours worked or the hourly wage and is limited to only wage and salary workers — employment is the measure used in this economic base study. (The vast majority of base studies use employment from CBP.)

Economic base study results are presented in this paper for Arizona, Metro Phoenix (Maricopa and Pinal counties), Metro Tucson (Pima County), and the balance of the state (the combination of the other 12 counties). The process of imputing values for undisclosed data included cross checks in two directions:

- The estimates in each geography were forced to sum to the next higher industrial level (for example, the industries within an industry group sum to the industry group figure).
- The estimates for Metro Phoenix, Metro Tucson, "statewide," and the balance of the state sum to the state total for every industry. (The Census Bureau does not allocate certain establishments to a particular county, instead placing them in a "statewide" geographic category.)

The only industries for which an imputation could be very much different from the true value are those in which multiple large establishments are present.

The actual and imputed employment figures are transformed into per capita employment using the mid-2009 population estimates produced by the Census Bureau for the United States and by

the Arizona Department of Administration's Office of Economic and Population Statistics for Arizona and its subgeographies.

Economic base studies for the state and counties previously were produced by the Seidman Research Institute for the Arizona Department of Commerce using 1999 and 2004 data. For Arizona, data also are available for 2001, when base studies by community were produced. Because some industries are highly cyclical, analyses of the change in the economic base over time are best performed using comparable years of two economic cycles. Since 2009 was a recessionary year, the economic base is compared to the base in 2001, another recessionary year. Thus, the analysis of the change in the economic base over time in this report is limited to the state.

ECONOMIC BASE STUDY RESULTS

The economic base study results can be examined at any level of the NAICS. There are two advantages to using sectoral and subsectoral results: the tradable percentage generally is available and few of the employment figures had to be imputed from withheld *County Business Patterns* data. However, the aggregated nature of the sectoral and subsectoral data precludes the identification of the specific driving economic activities in a region. Thus, base study results by industry also are examined in this section despite the greater inaccuracy of the industry data. The latest data are for 2009, but economic activity generally did not change much between 2009 and 2011.

Because of its greater industrial detail, IMPLAN's export shares were used to calculate the excess employment presented in this section. The most industrially detailed export shares as reported by IMPLAN for Arizona were used for each geographic area. Though the shares were calculated based on production, it is necessary to assume that the shares are the same based on employment. However, export shares at higher levels of the NAICS were calculated as weighted averages based on employment. For example, if export shares are available by subsector in a particular sector, each subsector's export share is multiplied by the subsector's percentage of the sector's employment, with the product summed across the subsectors. Thus, though the detailed export shares are the same for every geographic area in Arizona, the export shares at higher levels of the NAICS vary by geography.

The "leading" subsectors and industries discussed in this section are those that have *both* positive excess employment and export employment. The selection of the leading industries and subsectors was based on the average of the ranks on excess employment and on export employment. Ideally, a single measure would be created that takes into consideration both excess employment and export employment. However, data do not exist to make an accurate calculation of "excess export employment." (A crude estimate can be made by multiplying excess employment by the export share.)

Most of this section is based on the wage and salary employment dataset using the per capita method of calculating location quotients. First, however, a summary of the results for Arizona using varying datasets and methods is presented.

Comparison of Datasets and Methods

In this subsection, results are compared for four datasets/methods:

- Wage and salary employment, with the location quotient calculated with shares.
- Wage and salary employment, with the location quotient calculated on a per capita basis (the dataset/method used in the rest of this report).
- Total employment, which includes proprietors (those self employed), with the location quotient calculated on a per capita basis.
- Gross domestic product (GDP), with the location quotient calculated on a per capita basis.

All of the data are for 2009.

As noted in the introduction, wage and salary employment is an inferior measure. Total employment is an improvement in that it incorporates all economic activity, but this measure is

not available for substate geographies and is produced only for sectors and subsectors for states. Since even total employment makes no distinction in the number of hours worked or in the wage earned, the ideal measure is one expressed in dollars. GDP is the broadest dollar measure, but by state and metro area it is produced only for sectors and selected subsectors. Other dollar measures have similar limitations. Thus, the use of total employment, GDP, and other dollar measures in a base study do not allow for much precision in identifying the activities that drive an economy.

The comparative results of the four datasets/methods are provided in Table 3 by sector. Based on wage and salary employment, the per capita method results in a location quotient 11 percent less than calculated from the share method in every sector. As a result, the estimate of excess employment was considerably higher using the share method, with the magnitude of the difference between the two methods depending on the number employed in each sector. In some sectors, positive excess employment was calculated from the share method while an employment deficit resulted from the per capita method.

The overall location quotient based on per capita total employment (0.894) was nearly identical to the figure using per capita wage and salary employment (0.889). The similarity of the results is due to overall proprietors employment as a share of total employment being nearly identical in Arizona and the United States in 2009: 20.9 percent nationally and 21.3 percent in Arizona. Arizona's employment deficit was larger using total employment than wage and salary employment simply because total employment is greater than wage and salary employment.

Proprietors employment as a share of total employment ranges widely by sector: from zero in the government sector to 77 percent in the real estate and rental sector in Arizona in 2009. Some variation in the proprietors' share between Arizona and the nation also existed by sector. Thus, the difference in the location quotient varied by sector when using wage and salary employment versus total employment, with significant, but offsetting, differences in some sectors. The differences were particularly large in agriculture, mining, construction, and real estate and rental. In the arts, entertainment and recreation sector, the location quotient exceeded 1 based on wage and salary employment but was marginally less than 1 using total employment.

Compared to the overall location quotient of 0.89 using per capita total employment, the location quotient using per capita GDP was 0.86. In eight sectors, the location quotient was not much different between the two measures. Using GDP, the location quotient was at least 0.06 higher in six sectors — utilities; construction; wholesale trade; retail trade; administrative support and waste management; and health care and social assistance —but it was at least 0.12 lower in six sectors: information; finance and insurance; real estate and rental; professional, scientific and technical services; management of companies; and arts, entertainment and recreation. These variations reflect differing relationships by sector in per employee GDP between the nation and Arizona.

In the utilities sector, the location quotient exceeded 1 based on GDP but was less than 1 based on total employment. In finance and insurance, the location quotient was less than 1 based on GDP but greater than 1 based on total employment.

TABLE 3
COMPARISON OF ECONOMIC BASE STUDY RESULTS FOR VARIOUS METHODS AND DATASETS BY SECTOR, ARIZONA, 2009

	Location Quotient				Excess Employment in Thousands		
Sector	**Share of W&S Employ-ment**	**Per Capita W&S Employ-ment**	**Per Capita Total Employ-ment**	**Per Capita Gross Domestic Product**	**Share of W&S Employ-ment**	**Per Capita W&S Employ-ment**	**Per Capita Total Employ-ment**
TOTAL	1.00	0.89	0.89	0.86	0.0	-324.2	-396.4
Agriculture	1.05	0.93	0.58	0.53	1.1	-1.8	-30.2
Mining	1.07	0.95	0.79	0.76	0.8	-0.6	-4.8
Utilities	0.99	0.88	0.87	1.04	-0.2	-1.6	-1.8
Construction	1.33	1.18	1.01	1.21	36.3	22.5	1.4
Manufacturing	0.68	0.60	0.62	0.56	-69.9	-96.8	-96.7
Wholesale Trade	0.87	0.78	0.79	0.85	-13.5	-27.0	-27.4
Retail Trade	1.15	1.03	1.01	1.11	42.1	7.9	5.4
Transportation & Warehousing	1.01	0.90	0.86	0.84	1.1	-8.6	-16.1
Information	0.85	0.76	0.80	0.52	-8.9	-16.5	-16.0
Finance & Insurance	1.15	1.03	1.02	0.80	17.6	3.3	4.7
Real Estate & Rental	1.15	1.02	1.19	1.01	5.5	0.8	30.0
Professional, Scientific & Technical Services	0.83	0.74	0.81	0.69	-25.0	-43.1	-47.3
Management of Companies	0.79	0.70	0.74	0.62	-11.2	-17.8	-16.3
Administrative Support & Waste Management	1.21	1.08	1.03	1.24	35.3	14.3	8.5
Educational Services	0.84	0.75	0.77	0.77	-9.6	-16.9	-19.1
Health Care & Social Assistance	0.93	0.83	0.83	0.91	-22.0	-62.5	-71.8
Arts, Entertainment & Recreation	1.21	1.08	0.99	0.81	7.8	3.1	-1.1
Accommodation & Food Services	1.14	1.02	1.01	1.03	30.4	4.0	1.5
Other Services	0.87	0.77	0.81	0.77	-13.0	-25.1	-37.5
Government	0.99	0.88	0.88	0.91	-4.6	-61.7	-61.7

W&S: wage and salary
Note: wage and salary employment does not include the rail transportation and private households subsectors that are included in the other measures.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; and U.S. Department of Commerce, Bureau of Economic Analysis.

Arizona, 2009

A summary of the Arizona economy by sector in 2009 is provided in Table 4. Overall, close to 2.6 million wage and salary jobs were located in the state. Per capita employment was 11 percent less than the national average; the state needed nearly 325,000 more jobs to reach the U.S. per capita average. Export employment in the state exceeded 637,000, 24.5 percent of wage and salary employment.

Three of the 20 sectors employed more than 300,000 in 2009, but two had employment of less than 15,000. The large differences in size contribute to the differences in the magnitudes of excess employment and export employment across the sectors. Two sectors had excess employment of more than 10,000, but nine sectors had a deficit of more than 10,000. Export employment exceeded 50,000 in four sectors but was less than 10,000 in three sectors.

Per capita employment exceeded the national average in seven sectors. Three sectors stand out as providing at least moderate amounts of both excess employment and export employment:

- Administrative Support and Waste Management. Though only the fifth-largest employer, this sector provided the greatest amount of export employment. With a location quotient of 1.08, excess employment ranked second.
- Retail Trade. With the second-largest employment and a location quotient of 1.03, retail trade's excess employment was third highest. Its export employment also was third highest.
- Accommodation and Food Services. The fourth-largest employer had a location quotient of 1.02 and ranked fourth on excess employment. Its export employment also ranked fourth.

Four other sectors provided lesser amounts of excess employment and export employment:

- Finance and Insurance. This sector ranked eighth on employment but had the fifth-highest amount of both excess employment and export employment. Its location quotient was 1.03.
- Construction. Despite the cyclical slump in construction, construction still was the sixth-largest employer. It had the highest location quotient (1.18) and the most excess employment. Export employment ranked seventh.
- Real Estate and Rental. Ranking 16th on employment and with a location quotient of 1.02, the sector's excess employment was slight, ranking seventh. Export employment was 14th highest.
- Arts, Entertainment and Recreation. This sector's employment was only 15th highest, but its relatively high location quotient of 1.08 contributed to its ranking sixth on excess employment. Export employment ranked 16th.

Six sectors with an employment deficit had export employment larger than the absolute value of excess employment: agriculture, mining, transportation and warehousing, wholesale trade, information, and utilities. In the other seven sectors, the absolute value of the employment deficit was larger than the export employment. Manufacturing was among these sectors. Though it had the largest employment deficit (and the lowest location quotient), it provided the most export employment.

Subsectors

Compared to the 20 sectors, 97 "subsectors" are defined for this study. They do not exactly follow the NAICS. Four of the 18 sectors available from *County Business Patterns* consist of only one subsector. Three — utilities, management of companies, and educational services — are relatively small sectors, but employment in the professional, scientific and technical services sector is larger. Its four-digit industry groups are considered to be the equivalent of a subsector in this report. The Bureau of Economic Analysis data for agriculture and government are limited to two categories for agriculture and four for government, all are considered to be subsectors in this analysis.

Four of the subsectors employed more than 100,000 in Arizona in 2009, but four had fewer than 100 employees. In only 21 of the 97 subsectors was the location quotient greater than 1 (and excess employment positive). Only in the mining other than oil and gas subsector did the location quotient exceed 2. Excess employment was greater than 10,000 in three subsectors, between 5,000 and 10,000 in nine subsectors, and between 2,500 and 5,000 in one subsector. In contrast, the employment deficit (negative excess employment) was more than 10,000 in 12 subsectors. Export employment was greater than 10,000 in 16 subsectors and between 5,000 and 10,000 in 17 subsectors. In 20 subsectors, it was less than 100.

Large size does not necessarily result in high economic impact. Five of the 10 largest subsectors are not among the 15 "leading" subsectors shown in Table 5. The leaders are the subsectors with the highest average rank on the excess employment and export employment measures. The subsectors in Table 5 are displayed in NAICS order, not in any size order.

Administrative and support services, the primary subsector in the administrative support and waste management sector, was the second-largest subsector based on employment and ranked first on both export employment and excess employment.

The retail trade sector had four subsectors among the top 15. All four ranked among the top 25 on both excess employment and export employment.

In the accommodation and food services sector, accommodation was among the top 10 on both excess employment and export employment. Food services ranked second on export employment but had an employment deficit.

In the finance and insurance sector, only credit intermediation was among the top 15 subsectors, ranking third on both excess employment and export employment. The insurance carriers subsector ranked 11th on export employment but had an employment deficit.

Construction had one representative among the top 15 subsectors. Specialty trade contractors ranked second on excess employment and eighth on export employment. The other two construction subsectors — construction of buildings and heavy construction — just missed being among the top 15.

In the real estate and rental sector, real estate was among the top 15 subsectors and the rental and leasing services subsector came close to making the list. The arts, entertainment and recreation sector had one subsector — amusement, gambling, and recreation — among the top 15.

Five other subsectors are listed in Table 5. Three of the sectors in which export employment outweighed an employment deficit had one subsector among the top 15. Air transportation ranked among the top 15 subsectors on both excess employment and export employment and had the second-highest location quotient. Mining other than oil and gas ranked among the top 20 on both excess employment and export employment and had the highest location quotient of any subsector. Data processing, hosting and related services had the third-highest location quotient.

Though the employment deficit in the manufacturing sector was of a greater magnitude than the export employment, two high-tech manufacturing subsectors were among the top 15. Electronics products and transportation equipment each ranked among the top 20 on both excess employment and export employment.

Industries

A total of 1,073 industries are defined for this study. Due to a lack of detailed data, no industries are available for the agriculture and government sectors. Four industries employed more than 50,000 and seven had employment of between 25,000 and 50,000, while 110 had no employment in Arizona and 261 others had employment of less than 100.

A total of 251 industries had a location quotient of more than 1. The location quotient exceeded 3 in 21 industries, including a figure above 10 in copper mining, guided missile and space vehicle manufacturing, and electron tube manufacturing. Excess employment exceeded 10,000 in three industries and was between 5,000 and 10,000 in 10 and between 2,500 and 5,000 in 14. In contrast, the employment deficit exceeded 10,000 in six industries. Export employment was greater than 10,000 in nine industries, between 5,000 and 10,000 in 14 industries, and between 2,500 and 5,000 in 28 industries. In contrast, 598 industries had export employment of less than 100.

The 25 leading industries are shown in Table 6. These are the industries with the highest average rank on the excess employment and export employment measures.

Seven industries in the administrative support and waste management sector were among the top 25. Other industries in this sector provided lesser amounts of both excess employment and export employment, and another industry was near the top on export employment, but did not provide excess employment. Thus, a broad number of activities contributed to the importance of the administrative support sector in Arizona. The most significant were telemarketing and landscaping services, each ranking among the top 12 on both excess employment and export employment.

Five industries in the retail trade sector were among the top 25. The supermarkets industry ranked fourth on employment, fourth on excess employment, and sixth on export employment. The large size of this population-serving industry can be explained by two factors. First, Arizonans shop at supermarkets to an unusual extent relative to other Americans — all of the

TABLE 4
SECTORS, ARIZONA, 2009

NAICS	Sector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
	TOTAL	2,597,374	0.89	-324,211	637,247
11	Agriculture	23,778	0.93	-1,777	15,083
21	Mining, quarrying, and oil and gas extraction	11,957	0.95	-636	10,427
22	Utilities	11,726	0.88	-1,635	4,895
23	Construction	146,787	1.18	22,511	29,241
31-33	Manufacturing	145,520	0.60	-96,758	93,147
42	Wholesale trade	94,376	0.78	-26,998	34,502
44-45	Retail trade	316,160	1.03	7,865	76,209
48-49	Transportation and warehousing	78,071	0.90	-8,560	19,308
51	Information	52,019	0.76	-16,462	23,157
52	Finance and insurance	131,858	1.03	3,331	38,868
53	Real estate and rental and leasing	43,230	1.02	814	15,665
54	Professional, scientific, and technical services	120,191	0.74	-43,091	19,274
55	Management of companies and enterprises	41,639	0.70	-17,789	9,383
56	Administrative support and waste management	203,021	1.08	14,309	112,840
61	Educational services	49,743	0.75	-16,914	7,320
62	Health care and social assistance	302,595	0.83	-62,523	20,813
71	Arts, entertainment, and recreation	45,015	1.08	3,146	10,898
72	Accommodation and food services	242,305	1.02	3,977	61,501
81	Other services	84,504	0.77	-25,137	18,567
91	Government	452,648	0.88	-61,712	16,149

Note: a small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 5
LEADING SUBSECTORS, ARIZONA, 2009
(Rank Among 97 Subsectors in Parentheses, With 1 Highest)

NAICS	Subsector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
212	Mining (except oil and gas)	11,174 (52)	2.65 (1)	6,953 (7)	9,803 (18)
238	Specialty trade contractors	94,886 (6)	1.21 (9)	16,131 (2)	18,902 (8)
334	Computer and electronic product manufacturing	26,317 (28)	1.31 (5)	6,214 (8)	14,190 (12)
336	Transportation equipment manufacturing	27,794 (25)	1.05 (17)	1,277 (16)	22,769 (4)
441	Motor vehicle and parts dealers	39,655 (19)	1.15 (11)	5,158 (12)	13,504 (13)
445	Food and beverage stores	64,671 (10)	1.09 (16)	5,205 (11)	14,609 (10)
452	General merchandise stores	68,183 (9)	1.12 (14)	7,438 (6)	12,251 (15)
453	Miscellaneous store retailers	17,321 (41)	1.13 (13)	2,052 (14)	8,187 (25)
481	Air transportation	16,618 (43)	1.82 (2)	7,489 (5)	12,511 (14)
518	Data processing, hosting and related services	10,686 (54)	1.33 (3)	2,622 (13)	8,074 (26)
522	Credit intermediation and related activities	73,590 (8)	1.24 (6)	14,041 (3)	23,260 (3)
531	Real estate	31,360 (23)	1.04 (18)	1,256 (17)	9,911 (17)
561	Administrative and support services	198,533 (2)	1.09 (15)	17,079 (1)	111,697 (1)
713	Amusement, gambling, and recreation industries	35,536 (21)	1.18 (10)	5,280 (10)	9,498 (20)
721	Accommodation	47,009 (15)	1.23 (7)	8,716 (4)	20,234 (7)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 6
LEADING INDUSTRIES, ARIZONA, 2009
(Rank Among 1,073 Industries in Parentheses, With 1 Highest)

NAICS	Industry	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
212234	Copper ore and nickel ore mining	8,552 (60)	35.97 (1)	8,314 (5)	8,043 (15)
334413	Semiconductor and related device manufacturing	6,875 (75)	3.06 (20)	4,625 (15)	6,014 (19)
334511	Search, detection, and navigation instruments	7,745 (67)	2.56 (24)	4,724 (14)	4,606 (27)
336412	Aircraft engine and engine parts manufacturing	5,085 (93)	3.49 (15)	3,629 (20)	3,366 (37)
336414	Guided missile and space vehicle manufacturing	11,463 (38)	17.35 (2)	10,802 (3)	11,463 (8)
423690	Other electronic parts and equipment merchant wholesalers	10,390 (44)	1.68 (66)	4,207 (16)	3,798 (29)
441110	New car dealers	21,555 (12)	1.10 (202)	1,959 (34)	7,340 (16)
441310	Automotive parts and accessories stores	8,934 (55)	1.45 (99)	2,757 (24)	3,042 (45)
444110	Home centers	13,250 (31)	1.11 (197)	1,287 (42)	3,454 (34)
445110	Supermarkets & other grocery (except convenience) stores	60,043 (4)	1.18 (172)	9,217 (4)	13,564 (6)
452910	Warehouse clubs and supercenters	40,486 (7)	1.38 (116)	11,110 (2)	7,274 (17)
481111	Scheduled passenger air transportation	15,995 (22)	2.00 (47)	8,003 (6)	12,042 (7)
518210	Data processing, hosting, and related services	10,686 (42)	1.33 (130)	2,622 (26)	8,074 (14)
522210	Credit card issuing	4,960 (95)	3.68 (11)	3,612 (21)	3,195 (41)
522292	Real estate credit	11,170 (39)	2.37 (29)	6,464 (8)	7,196 (18)
522320	Financial transaction processing and clearing	8,401 (61)	3.13 (19)	5,715 (10)	5,412 (23)
561210	Facilities support services	6,112 (81)	1.31 (135)	1,440 (39)	3,688 (31)
561330	Professional employer organizations	42,254 (5)	1.06 (222)	2,316 (29)	27,742 (1)
561422	Telemarketing bureaus and other contact centers	14,635 (27)	1.88 (52)	6,849 (7)	8,498 (11)
561440	Collection agencies	6,036 (82)	1.94 (49)	2,920 (23)	3,505 (33)
561510	Travel agencies	7,850 (65)	3.54 (14)	5,630 (11)	4,645 (25)
561720	Janitorial services	20,509 (14)	1.06 (216)	1,222 (44)	10,295 (9)
561730	Landscaping services	16,861 (19)	1.57 (84)	6,089 (9)	8,464 (12)
713910	Golf courses and country clubs	11,861 (37)	1.88 (51)	5,561 (12)	5,622 (21)
721110	Hotels (except casino hotels) and motels	41,946 (6)	1.45 (98)	12,956 (1)	18,607 (4)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

other industries (such as meat markets) in the food and beverage stores subsector had low location quotients. Second, since even the subsector had a location quotient greater than 1, the impact of the state's large number of seasonal residents and tourists is being seen. In other subsectors, the location quotient in one industry needs to be interpreted relative to those of the other industries. For example, the warehouse clubs and supercenters industry ranked high, but the location quotients in the other general merchandise stores industries were below 1.

In the accommodation and food services sector, the hotels and motels industry ranked first on excess employment and fourth on export employment. The two major food service industries ranked among the top five on export employment but had an employment deficit.

Three finance and insurance industries were among the top 25. Additional industries in this sector had relatively high excess employment and export employment. Of particular significance were the financial transaction processing and clearing and real estate credit industries, each of which ranked among the top 25 on both excess employment and export employment.

No construction industries were among the top 25, but several provided moderate levels of excess employment and export employment. None of the real estate and rental industries were among the top 25. (While one might expect the offices of real estate agents and brokers industry to rank highly, this industry has relatively little wage and salary employment — most real estate agents are self employed.)

The golf courses and country clubs industry, which ranked among the top 25 on both excess employment and export employment was the only industry in the arts, entertainment and recreation sector to rank in the top 25. The casinos industry provided the 13th-highest amount of excess employment, but it had no export employment according to IMPLAN.

Eight other industries are listed in Table 6. Four are in the manufacturing sector, two within the aerospace industry group: aircraft engines and guided missiles and space vehicles. The latter industry ranked in the top 10 on both excess employment and export employment. The other two manufacturing industries listed in Table 6 also are high-tech activities: semiconductors and search and navigation instruments. Wholesaling of electronic parts and equipment, ranking in the top 30 on each measure, is a related activity. Another high-tech activity — data processing, hosting and related services (within the information sector) — ranked among the top 25 industries as well.

The other two industries listed in Table 6 were among the most significant in the state. Copper mining ranked fifth on excess employment and 15th on export employment. Scheduled air transportation ranked sixth on excess employment and seventh on export employment.

Summary

Arizona's economy is diverse, with a number of activities helping to drive the economy in 2009. Based on the NAICS, the administrative support and waste management sector provided high numbers of both excess employment and export employment, with several industries among the major contributors. The telemarketing industry was the most significant. The accommodation and food services sector ranked high on both measures, with the hotels and motels industry near

the top on both measures. The finance and insurance sector also provided considerable excess employment and export employment, particularly in the credit intermediation subsector though the insurance carriers subsector also contributed. The real estate credit industry was the most important. The construction and retail trade sectors also provided substantial excess employment and export employment, with a number of industries in each sector contributing.

Though manufacturing had a large employment deficit, it provided substantial export employment. The guided missile and space vehicle industry was the most important, followed by semiconductors and search and navigation equipment. Though excess employment and export employment at the sectoral level were not especially significant in the mining and transportation and warehousing sectors, the copper mining and scheduled passenger air transportation industries were among the most important in the state.

Many of the leading activities can be grouped into a few clusters:

- Tourism and seasonal residents. The high ranking of nine of the top 25 industries, across five sectors, largely can be traced to the presence of nonresidents in the state. Hotels and motels, golf courses and country clubs, scheduled air passenger transportation, travel agencies, and various retail trade industries all are directly affected by these nonresidents. Given the low wages and relatively high use of part-time employees in some of these industries, the importance of tourists and seasonal residents is overstated by using the employment measure.
- High-technology manufacturing and wholesale trade. Five of the top 25 industries are in this category. Though not as dominant as in the past, the electronics and aerospace activities are still of considerable importance to the Arizona economy. Given their high wages and high productivity, the use of employment to measure their impact understates the role of these activities in the state's economy.
- Call centers and back-office operations. Five of the top 25 industries, all within the administrative support and finance and insurance sectors, are part of this grouping.

A number of other industries that have a lesser amount of excess and/or export employment also are members of each of these clusters. Other activities that do not fit into one of these three categories, such as copper mining, also help drive the state's economy.

Arizona, Change Between 2001 and 2009

It is not possible to exactly compare all of the 2001 and 2009 data due to changes in the NAICS that were adopted in 2002 and 2007. None of the sectoral detail is comparable in the construction and wholesale trade sectors and a minority is comparable in the information sector. Other changes affected the finance and insurance; real estate and rental; administrative support and waste management; and professional, scientific and technical services sectors. In addition, a few manufacturing industries cannot be compared over time.

Like the analysis of 2009 data, the focus of the analysis of the change between 2001 and 2009 is on excess employment and export employment. However, to analyze the change, negative excess employment figures in both years were changed to zero. Otherwise, some industries appear to have had a huge increase in excess employment but really only experienced a shrinkage in the size of the deficit. In some cases, the shrinkage was overwhelmingly due to a large decline in employment nationally, not to what transpired in Arizona.

Changes between 2001 and 2009 are shown in Table 7 by sector. Overall, the state's economy lost ground to the national average over this economic cycle: The employment-to-population ratio (per capita employment) fell by more in Arizona than the national average, as indicated by the decrease in the location quotient. Between 2001 and 2009, Arizona's employment increased nearly 10 percent — more than the national average — but this was dwarfed by the increase in population.

The state's employment deficit became much larger over the eight years, increasing by 46 percent. Despite the increase in wage and salary employment, export employment slipped marginally. Export jobs decreased as a percentage of the total, from 27.0 percent to 24.5 percent. It is not clear how much of this decline was due to the severity of the recession in Arizona. If related to the recession, the export share should bounce back in the next few years. The decline is more ominous if it is part of a long-term trend.

While employment deficits were changed to zeroes in the calculation of the change in excess employment over time, the actual values of the excess employment in 2001 and 2009 are included in Table 7. In seven sectors, the situation improved between 2001 and 2009: positive excess employment became larger in one sector, an employment deficit became a surplus in two sectors, and the magnitude of the deficit decreased in four sectors. In the other 13 sectors, the situation worsened, with excess employment becoming less positive in four sectors, switching from a positive to a negative in three sectors, and becoming more negative in six sectors.

The largest increase in the location quotient was 0.19 in the educational services sector, rising from 0.56 to a still-low 0.75. The increase in the other six sectors with a gain was less than 0.10. The largest decrease in the location quotient occurred in the construction sector, which was disproportionately affected by the 2008-09 recession, falling 0.22 from 1.40 to 1.18. Seven other sectors experienced a decline of at least 0.10.

In contrast, export employment rose over the eight years in 13 sectors. (While the export shares at the most-detailed level were the same in 2001 and 2009, the export shares at higher levels of the NAICS were slightly different in 2001 and 2009 due to changes in the weighting.) The

TABLE 7
SECTORS, ARIZONA, CHANGE BETWEEN 2001 AND 2009

NAICS	Sector	Change Between 2001 and 2009				Excess Employment	
		W & S Employ-ment	Location Quotient	Excess Employ-ment	Export Employ-ment	2001	2009
	TOTAL	232,850	-0.03	0	-684	-222,105	-324,211
11	Agriculture	-3,761	-0.15	-1,989	-2,146	1,989	-1,777
21	Mining, quarrying, and oil and gas extraction	1,949	-0.16	-998	1,510	998	-636
22	Utilities	1,651	0.05	0	856	-2,069	-1,635
23	Construction	-21,629	-0.22	-25,448	-4,309	47,959	22,511
31-33	Manufacturing	-48,697	-0.06	0	-32,137	-101,738	-96,758
42	Wholesale trade	6,401	0.01	0	2,340	-25,990	-26,998
44-45	Retail trade	50,348	0.06	7,865	8,534	-10,473	7,865
48-49	Transportation and warehousing	4,486	-0.16	-3,993	-782	3,993	-8,560
51	Information	-5,964	-0.07	0	-2,655	-11,684	-16,462
52	Finance and insurance	19,044	0.05	3,331	2,825	-3,123	3,331
53	Real estate and rental and leasing	1,605	-0.09	-3,448	160	4,262	814
54	Professional, scientific, and technical services	2,825	-0.15	0	-3,756	-15,422	-43,091
55	Management of companies and enterprises	-403	-0.09	0	-91	-11,381	-17,789
56	Administrative support and waste management	12,978	-0.05	-6,995	7,240	21,606	14,611
61	Educational services	22,640	0.19	0	1,951	-21,370	-16,914
62	Health care and social assistance	102,290	0.09	0	6,459	-69,382	-62,523
71	Arts, entertainment, and recreation	9,999	0.02	1,164	1,827	1,982	3,146
72	Accommodation and food services	36,612	-0.09	-16,683	8,580	20,660	3,977
81	Other services	3,701	-0.04	0	721	-18,845	-25,137
91	Government	55,439	-0.04	0	2,190	-32,351	-61,712

Note: unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

Largest increases in export employment were in the accommodation and food services, retail trade, administrative support and waste management, and health care and social assistance sectors. However, the combined gain in these four sectors was more than negated by a large decrease in the manufacturing sector.

The rest of the discussion in this subsection examines changes in excess employment and export employment by subsector and industry in order to explain the changes observed at the sectoral level. The industry data should be used cautiously due to the reclassification by the Census Bureau of some establishments from one industry to another or to the correction of errors; historical data are not revised by the Census Bureau. Some subsectors and industries are missing from the analysis due to the changes in the NAICS.

Some sectors registered increases in both excess employment and export employment:

- Retail trade had the largest increase in excess employment and the second greatest in export employment. The gains occurred particularly in the general merchandise stores subsector, with very large gains in warehouse clubs and supercenters somewhat offset by declines in department stores. Supermarkets also experienced substantial gains.
- Finance and insurance posted the second-largest increase in excess employment and the fifth-greatest in export employment. Most of the gain in excess employment occurred in the credit intermediation subsector. Big gains in a couple of industries were largely offset by large decreases in other industries — it is not known how much of these shifts may be due to reclassifications of existing establishments. The insurance carriers subsector was responsible for most of the gain in export employment; increases occurred in the health insurance and property insurance industries.
- Arts, entertainment and recreation ranked third in the change in excess employment and ninth on export employment. The gains were in the amusement, gambling and recreation subsector, particularly in the golf courses and country clubs industry. Casinos had a large increase in excess employment.
- Health care and social assistance had the fourth-largest increase in export employment, almost entirely in the ambulatory health care subsector. Various industries in this subsector posted increases.

Other sectors were mixed, experiencing gains on one measure but losses on the other:

- The administrative support and waste management sector had the third-largest gain in export employment but had the third-largest loss in excess employment. Several industries posted moderately large increases on both measures: facilities support (private prisons), telemarketing, janitorial services, and landscaping services. Large losses occurred in the employment services industry group (the temporary help and professional employer organizations industries).
- Like administrative support, the accommodation and food services sector had a large gain in export employment (the largest of the 20 sectors) but a big decrease in excess employment (the second largest). Most of this occurred in the food services subsector, but the accommodation subsector followed the same pattern.
- Manufacturing experienced a small decrease in the size of its employment deficit but had a large drop in export employment. Each of the major subsectors experienced a decline in export employment, particularly electronics. The electronics subsector also had a large

decrease in excess employment, with most of the decline in both measures occurring in the semiconductors industry. While the transportation equipment subsector also experienced a decrease in export employment, it posted a gain in excess employment. Industries related to space vehicles and guided missiles had gains in both measures while the aircraft industries had losses in both measures.

- The mining sector had a small decline in excess employment but a small increase in export employment. Copper mining posted gains on both measures while sand and gravel operations had losses on both measures.

Some sectors experienced losses in both excess employment and export employment:

- The largest loss in excess employment and the second-largest decrease in export employment occurred in the construction sector. Due to the changes in the NAICS, it is not possible to determine which construction activities had the largest decreases.
- Transportation and warehousing had the fourth-largest loss of excess employment and sixth-largest drop in export employment. This was particularly due to the long-distance general trucking industry.
- Agriculture had the sixth-largest loss of excess employment and fifth-largest drop in export employment. The declines occurred in the agricultural support subsector.

Metropolitan Phoenix, 2009

A summary of the Metro Phoenix economy by sector in 2009 is provided in Table 8. Overall, close to 1.8 million wage and salary jobs were located in the two-county metro area, 68 percent of the state total. Per capita employment was 8 percent less than the national average; the metro area needed another 153,000 jobs to reach the U.S. per capita average. Export employment in the Phoenix area was nearly 434,000 — 24.6 percent of wage and salary employment.

Eight of the 20 sectors employed more than 100,000 in 2009, but three had employment of less than 10,000. Three sectors had excess employment of more than 10,000, but five sectors had a deficit of more than 10,000. Export employment exceeded 50,000 in three sectors but was less than 5,000 in two sectors.

Per capita employment exceeded the national average in eight sectors. Four sectors stand out as providing at least moderate amounts of both excess employment and export employment:

- Administrative Support and Waste Management. Though only the fifth-largest employer, this sector provided the greatest amount of export employment. With a location quotient of 1.04, excess employment ranked fifth.
- Retail Trade. With the second-largest employment and a location quotient of 1.05, retail trade's excess employment was third highest. Its export employment also was third highest.
- Finance and Insurance. This sector ranked sixth on employment but had the second-highest location quotient at 1.31, resulting in the second-highest amount of excess employment. Export employment ranked fifth.
- Construction. Despite the cyclical slump in construction, and only the seventh-most wage and salary employment, construction had the most excess employment; its location quotient of 1.33 was the highest. Export employment ranked seventh.

Four other sectors provided lesser amounts of excess employment and export employment:

- Accommodation and Food Services. The fourth-largest employer had a location quotient of 1.02 and a small amount of excess employment, ranking eighth. However, its export employment ranked fourth.
- Transportation and Warehousing. Though ranking 11th on employment, this sector provided the sixth-most excess employment with its location quotient of 1.09. It ranked ninth on export employment.
- Real Estate and Rental. Though ranking 17th on employment, the sector's excess employment ranked seventh due to its fourth-highest location quotient of 1.13. Its export employment was only 13th highest.
- Arts, Entertainment and Recreation. Though ranking 16th on employment, the sector's location quotient was third highest at 1.20 and its excess employment was fourth highest. Its export employment was only 16th highest.

Four sectors with an employment deficit had export employment larger than the absolute value of excess employment: wholesale trade, information, manufacturing, and management of companies. In the other eight sectors, the absolute value of the employment deficit was larger than the export employment.

Subsectors

Wage and salary employment in the Phoenix area in 2009 was more than 100,000 in three subsectors but less than 100 in six subsectors. The location quotient was greater than 1 (and excess employment was positive) in only 25 of the 97 subsectors. The location quotient exceeded 2 only in the air transportation subsector. Excess employment was more than 10,000 in two subsectors, between 5,000 and 10,000 in seven subsectors, and between 2,500 and 5,000 in five subsectors. In contrast, the employment deficit (negative excess employment) was more than 10,000 in nine subsectors. Export employment was greater than 10,000 in 11 subsectors and between 5,000 and 10,000 in 13 subsectors. It was less than 100 in 23 subsectors.

The 15 leading subsectors are shown in Table 9. These are the subsectors with the highest average rank on the excess employment and export employment measures.

In the administrative support and waste management sector, the primary subsector of administrative and support services ranked first on export employment and sixth on excess employment.

The retail trade sector had three subsectors among the top 15. Another retail subsector ranked only a little lower than 15th and others had both excess employment and export employment.

Finance and insurance had two subsectors among the top 15. Credit intermediation ranked first on excess employment and third on export employment and the insurance carriers subsector was among the top 10 on each measure.

In construction, specialty trade contractors ranked second on excess employment and fifth on export employment. Construction's other two subsectors — construction of buildings and heavy construction — did not place much below the top 15.

Both of the subsectors in the accommodation and food services sector were among the top 15. Accommodation ranked among the top 20 on both excess employment and export employment. Food services ranked second on export employment and 15th on excess employment.

Transportation and warehousing had just one subsector among the top 15, but air transportation ranked among the top 10 subsectors on both excess employment and export employment. The truck transportation and couriers and messengers subsectors also provided both excess employment and export employment.

The real estate and rental sector had one representative among the top 15: real estate. The rental and leasing services subsector did not rank much lower.

In the arts, entertainment and recreation sector, the amusement, gambling, and recreation subsector was among the top 15. The performing arts and spectator sports subsector also provided both excess employment and export employment.

Three other subsectors are listed in Table 9. Each is in a sector that had an employment deficit but export employment that more than offset the deficit. Electronics manufacturing ranked

among the top 10 subsectors on both excess employment and export employment. The other two subsectors are durable goods wholesalers and data processing, hosting and related services, part of the information sector. Another information subsector, telecommunications, also ranked relatively high on both excess employment and export employment.

Industries

Of the 1,073 industries identified in this study, 10 had wage and salary employment of at least 25,000 in Metro Phoenix and another 17 had employment of between 10,000 and 25,000 in 2009. In contrast, 147 had no employment and 299 others had employment of less than 100.

A total of 286 industries had a location quotient of more than 1. The location quotient exceeded 3 in 24 industries, including a figure above 10 in electron tube manufacturing and space vehicle propulsion and parts manufacturing. Excess employment was more than 10,000 in one industry, between 5,000 and 10,000 in 10 industries, and between 2,500 and 5,000 in 16 industries. In contrast, the employment deficit exceeded 10,000 in three industries. Export employment was greater than 10,000 in five industries, between 5,000 and 10,000 in 13 industries, and between 2,500 and 5,000 in 12 industries. In contrast, 669 industries had export employment of less than 100.

The 25 leading industries are shown in Table 10. These are the industries with the highest average rank on the excess employment and export employment measures.

Six industries within the administrative support and waste management sector were among the top 25. Several other industries in this sector provided lesser amounts of both excess employment and export employment and two other industries were among the top 10 on export employment, but did not provide excess employment. Thus, a broad number of activities contributed to the importance of the administrative support sector in the Phoenix area. Landscaping services ranked the highest, among the top 10 on both excess employment and export employment.

Four retail trade industries were among the top 25. The supermarkets industry ranked third on excess employment and sixth on export employment. The warehouse clubs and supercenters industry ranked in the top 20 on each measure.

Four finance and insurance industries were among the leaders. A couple of others also had relatively high excess employment and export employment. Of particular significance were the financial transaction processing and clearing and real estate credit industries, each of which ranked among the top 15 on each measure.

Only two construction industries were among the top 25, but several others — mostly part of the specialty trade contractors subsector — also provided moderate levels of excess employment and export employment.

In the accommodation and food services sector, the hotels and motels industry ranked among the top seven on both excess employment and export employment. The two major food service

TABLE 8
SECTORS, METROPOLITAN PHOENIX, 2009

NAICS	Sector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
	TOTAL	1,761,227	0.92	-152,998	433,792
11	Agriculture	9,333	0.56	-7,410	6,174
21	Mining, quarrying, and oil and gas extraction	2,067	0.25	-6,184	1,872
22	Utilities	7,467	0.85	-1,287	3,169
23	Construction	108,638	1.33	27,212	21,642
31-33	Manufacturing	102,312	0.65	-56,429	62,628
42	Wholesale trade	76,853	0.97	-2,671	28,096
44-45	Retail trade	212,911	1.05	10,916	51,003
48-49	Transportation and warehousing	61,921	1.09	5,160	16,848
51	Information	40,942	0.91	-3,927	18,557
52	Finance and insurance	110,673	1.31	26,462	32,840
53	Real estate and rental and leasing	31,421	1.13	3,630	11,386
54	Professional, scientific, and technical services	90,924	0.85	-16,058	14,965
55	Management of companies and enterprises	36,444	0.94	-2,493	8,212
56	Administrative support and waste management	128,897	1.04	5,253	68,831
61	Educational services	38,262	0.88	-5,412	5,129
62	Health care and social assistance	196,412	0.82	-42,814	13,138
71	Arts, entertainment, and recreation	32,953	1.20	5,520	8,142
72	Accommodation and food services	159,171	1.02	3,019	39,624
81	Other services	57,953	0.81	-13,884	12,652
91	Government	255,536	0.76	-81,473	8,884

Note: a small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Metropolitan Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 9
LEADING SUBSECTORS, METROPOLITAN PHOENIX, 2009
(Rank Among 97 Subsectors in Parentheses, With 1 Highest)

NAICS	Subsector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
238	Specialty trade contractors	70,437 (4)	1.37 (6)	18,837 (2)	14,032 (5)
334	Computer and electronic product manufacturing	22,280 (24)	1.69 (3)	9,109 (4)	12,346 (8)
423	Merchant wholesalers, durable goods	49,402 (9)	1.09 (17)	3,897 (13)	18,060 (4)
441	Motor vehicle and parts dealers	27,284 (17)	1.21 (8)	4,681 (10)	9,291 (14)
445	Food and beverage stores	43,193 (11)	1.11 (13)	4,231 (12)	9,757 (13)
452	General merchandise stores	45,600 (10)	1.15 (11)	5,800 (7)	8,193 (17)
481	Air transportation	15,810 (33)	2.64 (1)	9,829 (3)	11,903 (10)
518	Data processing, hosting and related services	9,751 (45)	1.85 (2)	4,468 (11)	7,367 (18)
522	Credit intermediation and related activities	61,731 (6)	1.58 (5)	22,714 (1)	19,899 (3)
524	Insurance carriers and related activities	37,341 (13)	1.16 (10)	5,152 (9)	11,958 (9)
531	Real estate	22,893 (23)	1.16 (9)	3,169 (14)	7,235 (19)
561	Administrative and support services	125,784 (3)	1.06 (20)	6,895 (6)	68,038 (1)
713	Amusement, gambling, and recreation industries	25,367 (19)	1.28 (7)	5,543 (8)	6,921 (20)
721	Accommodation	26,315 (18)	1.05 (22)	1,225 (18)	11,550 (11)
722	Food services and drinking places	132,856 (2)	1.01 (26)	1,793 (15)	28,073 (2)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Metropolitan Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 10
LEADING INDUSTRIES, METROPOLITAN PHOENIX, 2009
(Rank Among 1,073 Industries in Parentheses, With 1 Highest)

NAICS	Industry	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
236220	Commercial and institutional building construction	10,693 (25)	1.35 (157)	2,786 (25)	2,130 (44)
238210	Electrical contractors and other wiring installation contractors	12,209 (21)	1.19 (210)	1,986 (35)	2,432 (34)
334413	Semiconductor and related device manufacturing	6,613 (58)	4.49 (8)	5,139 (11)	5,785 (12)
334511	Search, detection, and navigation instruments	6,479 (60)	3.27 (23)	4,500 (15)	3,853 (22)
336412	Aircraft engine and engine parts manufacturing	5,000 (71)	5.24 (4)	4,046 (17)	3,310 (27)
423690	Other electronic parts and equipment merchant wholesalers	9,990 (28)	2.47 (37)	5,939 (9)	3,652 (26)
441110	New car dealers	15,166 (14)	1.18 (212)	2,326 (30)	5,165 (16)
441310	Automotive parts and accessories stores	6,591 (71)	1.63 (101)	2,544 (27)	2,244 (38)
445110	Supermarkets & other grocery (except convenience) stores	40,389 (4)	1.21 (203)	7,088 (3)	9,124 (6)
452910	Warehouse clubs and supercenters	28,590 (6)	1.49 (128)	9,343 (2)	5,137 (17)
481111	Scheduled passenger air transportation	15,295 (13)	2.92 (25)	10,059 (1)	11,515 (3)
518210	Data processing, hosting, and related services	9,751 (29)	1.85 (79)	4,468 (16)	7,367 (9)
522210	Credit card issuing	3,453 (99)	3.91 (13)	2,569 (26)	2,225 (39)
522292	Real estate credit	9,314 (30)	3.02 (24)	6,230 (6)	6,001 (11)
522320	Financial transaction processing and clearing	8,313 (39)	4.72 (6)	6,553 (4)	5,356 (14)
524126	Direct property and casualty insurance carriers	11,162 (24)	1.47 (133)	3,549 (22)	2,350 (36)
561110	Office administrative services	7,243 (53)	1.21 (206)	1,234 (47)	3,778 (24)
561422	Telemarketing bureaus and other contact centers	9,082 (32)	1.78 (85)	3,981 (19)	5,274 (15)
561440	Collection agencies	4,519 (77)	2.21 (44)	2,477 (28)	2,624 (29)
561510	Travel agencies	7,552 (48)	5.19 (5)	6,098 (8)	4,469 (19)
561720	Janitorial services	17,163 (12)	1.36 (155)	4,526 (14)	8,615 (7)
561730	Landscaping services	13,362 (16)	1.89 (72)	6,304 (5)	6,707 (10)
713910	Golf courses and country clubs	9,097 (31)	2.20 (45)	4,969 (12)	4,312 (20)
721110	Hotels (except casino hotels) and motels	25,156 (10)	1.32 (167)	6,162 (7)	11,159 (4)
722211	Limited-service restaurants	47,924 (3)	1.02 (179)	1,094 (51)	10,127 (5)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Metropolitan Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

industries ranked among the top five on export employment and also provided excess employment.

The only transportation and warehousing industry among the top 25 was scheduled passenger air transportation, but it ranked first on excess employment and third on export employment. One of the trucking industries provided moderate amounts of excess employment and export employment.

None of the real estate and rental industries were among the top 25. The golf courses and country clubs industry, which ranked among the top 20 on both excess employment and export employment, was the only industry in the arts, entertainment and recreation sector to rank among the top 25.

Five other industries are listed in Table 10. Three are in the manufacturing sector. Each ranked among the top 20 on excess employment and among the top 30 on export employment. Each is a high-tech activity within the electronics or aerospace categories. Wholesaling of electronic parts and equipment, which ranked ninth on excess employment and 26th on export employment, is a related activity. The other industry listed in Table 9 is another high-tech activity: data processing, hosting and related services.

Summary

The Metropolitan Phoenix economy is diverse, with a number of activities helping to drive the economy in 2009. Based on the NAICS, the administrative support and waste management sector provided high numbers of both excess employment and export employment. Several of its industries contributed. The accommodation and food services sector ranked high on both measures, with the hotels and motels industry the most important contributor. In addition, the food services subsector provided substantial export employment. The finance and insurance sector provided considerable excess employment and export employment, particularly in the credit intermediation subsector though the insurance carriers subsector also contributed. The real estate credit and financial transaction processing and clearing industries were the most important. The construction and retail trade sectors also provided substantial excess employment and export employment, with a number of industries in each sector contributing.

Though manufacturing had a large employment deficit, it provided substantial export employment. The semiconductors industry was the most important, followed by the search and navigation equipment and aircraft engines industries. Though excess employment and export employment at the sectoral level were not especially significant in the transportation and warehousing sector, the scheduled passenger air transportation industry ranked near the top on both excess employment and export employment.

Many of the leading activities can be grouped into a few clusters:

- Tourism and seasonal residents. The high ranking of nine of the top 25 industries, across five sectors, largely can be traced to the presence of nonresidents in the metro area. Hotels and motels, restaurants, golf courses and country clubs, scheduled passenger air transportation, travel agencies, and various retail trade industries all are directly affected by these nonresidents. Given the low wages and relatively high use of part-time

employees in some of these industries, the importance of tourists and seasonal residents is overstated by using the employment measure.

- High-technology manufacturing and wholesale trade. Four of the top 25 industries are in this category. Though not as dominant as in the past, the electronics and aerospace activities are still of considerable importance to the Phoenix area economy. Given their high wages and high productivity, the use of employment to measure their impact understates the role of these activities in the state's economy.
- Call centers and back-office operations. Five of the top 25 industries, all within the administrative support and finance and insurance sectors, are part of this grouping.

A number of other industries that have a lesser amount of excess and/or export employment also are members of each of these categories. Other activities that do not fit into one of these three categories also help drive the metro area's economy.

Metropolitan Tucson, 2009

A summary of the Metro Tucson economy by sector in 2009 is provided in Table 11. Overall, close to 400,000 wage and salary jobs were located in Pima County, 15 percent of the state total. Per capita employment was 12 percent less than the national average; the metro area needed another 54,000 jobs to reach the U.S. per capita average. Export employment in the Tucson area exceeded 92,000, representing 23.4 percent of wage and salary employment.

Two of the 20 sectors employed more than 50,000 in 2009, but three had employment of less than 2,500. One sector had excess employment of more than 5,000 but seven sectors had a deficit in excess of 5,000. Export employment exceeded 10,000 in four sectors but was less than 1,000 in three sectors.

Per capita employment exceeded the national average in only six sectors. Three sectors stand out as providing at least moderate amounts of both excess employment and export employment:

- Accommodation and Food Services. The fourth-largest employer provided the second-greatest amount of excess employment with a location quotient of 1.07. Its export employment ranked fourth.
- Retail Trade. The third-largest employer, retail trade's excess employment ranked sixth; its location quotient was 1.01. Export employment was third highest.
- Government. The largest employer, and with the second-highest location quotient (1.09), excess employment was the greatest of any sector. However, a low percentage of its jobs are considered to be export; its export employment ranked ninth.

Four other sectors provided lesser amounts of excess employment and export employment:

- Construction. Despite the cyclical slump in construction, it still was the seventh-largest employer. With a location quotient of 1.05, it provided the third-most excess employment. Its export employment ranked sixth.
- Real Estate and Rental. Though only the 14th-largest employer, excess employment ranked fifth — the sector's location quotient was third highest at 1.07. Export employment ranked 12th.
- Arts, Entertainment and Recreation. Though only the 13th-largest employer, excess employment was fourth highest — the sector's location quotient was the highest at 1.14. Export employment ranked 14th.

Six sectors with an employment deficit had export employment larger than the absolute value of excess employment: manufacturing, administrative support and waste management, health care and social assistance, other services, mining, and utilities. In the other eight sectors, the absolute value of the employment deficit was larger than the export employment.

Subsectors

Wage and salary employment in the Tucson area in 2009 was more than 25,000 in two subsectors but less than 100 in 10 subsectors. The location quotient was greater than 1 (and excess employment was positive) in only 21 of the 97 subsectors. The location quotient exceeded 2 in the transportation equipment manufacturing and mining other than oil and gas subsectors. Excess employment was more than 5,000 in two subsectors, between 2,500 and 5,000 in two subsectors, and between 1,000 and 2,500 in five subsectors. In contrast, the employment deficit

exceeded 1,000 in 20 subsectors. Export employment was more than 5,000 in three subsectors and between 2,500 and 5,000 in four subsectors. It was less than 100 in 33 subsectors.

The 15 leading subsectors are shown in Table 12. These are the subsectors with the highest average rank on the excess employment and export employment measures.

In the accommodation and food services sector, the accommodation subsector ranked third on excess employment and fifth on export employment. The food services subsector was third on export employment but had an employment deficit.

The retail trade sector placed three subsectors among the top 15; another subsector ranked just outside the top 15. Food and beverage stores ranked eighth on both excess employment and export employment.

Two subsectors in government were among the top 15. Federal civilian government and state government ranked fourth and second respectively on excess employment but had relatively less export employment. The military subsector ranked sixth on excess employment but according to IMPLAN provided no export employment.

In construction, the specialty trade contractors subsector ranked in the top 10 on both excess employment and export employment. The construction of buildings subsector just missed being listed in Table 12.

The two primary subsectors in the real estate and rental sector — real estate and rental and leasing services — each ranked among the top 25 on both excess employment and export employment. In the arts, entertainment and recreation sector, the amusement, gambling and recreation subsector placed among the top 15.

Five other subsectors are listed in Table 12, including two high-tech manufacturing subsectors. The transportation equipment subsector provided the most excess employment and second-highest export employment. Electronics manufacturing ranked among the top 15 subsectors on both excess employment and export employment. Ambulatory health care ranked in the top five on both measures. Mining other than oil and gas and repair and maintenance (part of the other services sector) each were in the top 25 on both measures.

Industries

Of the 1,073 industries identified in this study, four had wage and salary employment of at least 10,000 in Metro Tucson and another three had employment of between 5,000 and 10,000. In contrast, 341 had no employment and 359 others had employment of less than 100.

A total of 232 industries had a location quotient of more than 1. The location quotient exceeded 3 in 34 industries, including a figure above 10 in four. Excess employment was more than 1,000 in seven industries and between 500 and 1,000 in 17. In contrast, the employment deficit exceeded 2,500 in six industries. Export employment was greater than 1,000 in 14 industries and between 500 and 1,000 in 22 industries. In contrast, 908 industries had export employment of less than 100.

The 25 leading industries are shown in Table 13. These are the industries with the highest average rank on the excess employment and export employment measures.

Two accommodation and food services industries placed among the top 25. The hotels and motels industry ranked second on both excess employment and export employment. Full-service restaurants ranked third on export employment but only 26th on excess employment. Drinking places had a moderate amount of both excess employment and export employment.

Four retail trade industries are included among the top 25. The supermarkets industry was in the top seven on both excess employment and export employment.

No construction industries made the list, though a few provided moderate amounts of both excess employment and export employment. In the real estate and rental sector, passenger car rental ranked in the top 25 and residential property managers provided moderate amounts of both excess employment and export employment.

The golf courses and country clubs industry, which ranked among the top 20 on both excess employment and export employment, was the only industry in the arts, entertainment and recreation sector to rank among the top 25.

Seventeen other industries are listed in Table 13. Four are in the manufacturing sector, three of which are high tech. Guided missile and space vehicle manufacturing ranked first on both measures by a very wide margin and was the dominant driving activity in the Tucson area. Two of the industries are in the electronic instruments industry group.

Four industries within the administrative support and waste management sector were among the top 25. Telemarketing ranked in the top five on both excess employment and export employment and telephone answering services ranked in the top 16 on each. Two finance and insurance industries are listed in Table 13. Credit card issuing and real estate credit each ranked in the top 15 on both measures. Of the three health care industries listed in Table 13, offices of physicians ranked ninth on both measures. The only transportation and warehousing industry among the top 25 was support activities for air transportation. Copper mining ranked among the top 25 on both measures. An educational services industry and a utilities industry rounded out the top 25.

Summary

Though reasonably diverse, the Metropolitan Tucson economy in 2009 was disproportionately dependent on one industry: guided missile and space vehicle manufacturing. State government, primarily the University of Arizona, also was quite important.

Based on the NAICS, the accommodation and food services sector ranked high on both excess employment and export employment, with the hotels and motels industry near the top on both measures. The construction and retail trade sectors provided moderate amounts of both excess employment and export employment, with a number of industries in each sector contributing.

None of the other sectors ranked high on both excess employment and export employment. Manufacturing had a large employment deficit, but it provided the most export employment. The

TABLE 11
SECTORS, METROPOLITAN TUCSON, 2009

NAICS	Sector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
	TOTAL	396,480	0.88	-53,607	92,582
11	Agriculture	874	0.22	-3,063	566
21	Mining, quarrying, and oil and gas extraction	1,738	0.90	-202	1,151
22	Utilities	2,029	0.99	-29	800
23	Construction	20,182	1.05	1,037	4,020
31-33	Manufacturing	26,958	0.72	-10,366	21,135
42	Wholesale trade	8,125	0.44	-10,573	2,970
44-45	Retail trade	47,950	1.01	455	11,754
48-49	Transportation and warehousing	8,042	0.60	-5,304	1,425
51	Information	6,666	0.63	-3,884	2,982
52	Finance and insurance	13,169	0.67	-6,631	4,287
53	Real estate and rental and leasing	7,003	1.07	469	2,560
54	Professional, scientific, and technical services	15,749	0.63	-9,405	2,263
55	Management of companies and enterprises	4,139	0.45	-5,016	933
56	Administrative support and waste management	23,227	0.80	-5,845	12,369
61	Educational services	6,024	0.59	-4,245	1,319
62	Health care and social assistance	56,070	1.00	-179	3,930
71	Arts, entertainment, and recreation	7,360	1.14	910	1,511
72	Accommodation and food services	39,428	1.07	2,712	10,216
81	Other services	15,155	0.90	-1,736	3,323
91	Government	86,523	1.09	7,283	3,067

Note: a small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 12
LEADING SUBSECTORS, METROPOLITAN TUCSON, 2009
(Rank Among 97 Subsectors in Parentheses, With 1 Highest)

NAICS	Subsector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
212	Mining (except oil and gas)	1,496 (55)	2.30 (2)	846 (10)	946 (25)
238	Specialty trade contractors	13,333 (7)	1.10 (16)	1,200 (9)	2,656 (7)
334	Computer and electronic product manufacturing	3,494 (30)	1.13 (14)	397 (14)	1,668 (13)
336	Transportation equipment manufacturing	12,487 (8)	3.06 (1)	8,402 (1)	12,222 (2)
441	Motor vehicle and parts dealers	5,835 (20)	1.10 (17)	520 (12)	1,987 (10)
445	Food and beverage stores	10,459 (10)	1.14 (13)	1,298 (8)	2,363 (8)
453	Miscellaneous store retailers	3,065 (32)	1.30 (7)	713 (11)	1,449 (18)
531	Real estate	4,953 (21)	1.07 (20)	315 (15)	1,565 (15)
532	Rental and leasing services	2,044 (41)	1.14 (12)	257 (16)	990 (24)
621	Ambulatory health care services	21,352 (5)	1.10 (15)	1,972 (5)	3,923 (4)
713	Amusement, gambling, and recreation industries	6,133 (18)	1.32 (6)	1,472 (7)	1,379 (20)
721	Accommodation	8,622 (13)	1.46 (3)	2,723 (3)	3,707 (5)
811	Repair and maintenance	4,000 (27)	1.05 (21)	186 (17)	1,255 (22)
	Federal civilian government	11,799 (9)	1.28 (9)	2,543 (4)	891 (30)
	State government	23,526 (3)	1.38 (4)	6,492 (2)	772 (36)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 13
LEADING INDUSTRIES, METROPOLITAN TUCSON, 2009
(Rank Among 1,073 Industries in Parentheses, With 1 Highest)

NAICS	Industry	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
212234	Copper ore and nickel ore mining	734 (93)	20.04 (3)	697 (14)	690 (22)
221122	Electric power distribution	1,585 (41)	1.27 (154)	332 (42)	748 (19)
312111	Soft drink manufacturing	587 (118)	3.64 (27)	426 (33)	528 (34)
334510	Electromedical & electrotherapeutic apparatus manufacture	1,239 (58)	5.61 (11)	1,018 (7)	369 (53)
334511	Search, detection, and navigation instruments	1,239 (57)	2.66 (38)	774 (12)	737 (20)
336414	Guided missile and space vehicle manufacturing	11,463 (3)	112.65 (1)	11,361 (1)	11,463 (1)
441110	New car dealers	3,224 (14)	1.07 (207)	205 (60)	1,098 (11)
442110	Furniture stores	1,170 (62)	1.66 (82)	466 (27)	543 (33)
445110	Supermarkets & other grocery (except convenience) stores	9,511 (5)	1.22 (164)	1,681 (4)	2,149 (7)
453310	Used merchandise stores	879 (82)	1.97 (62)	432 (31)	415 (45)
488190	Other support activities for air transportation	1,057 (68)	3.94 (20)	789 (11)	313 (65)
522210	Credit card issuing	1,502 (46)	7.23 (8)	1,294 (6)	968 (15)
522292	Real estate credit	1,624 (40)	2.24 (49)	899 (8)	1,046 (12)
532111	Passenger car rental	787 (89)	2.18 (52)	427 (32)	418 (44)
561421	Telephone answering services	1,663 (38)	8.86 (6)	1,475 (5)	966 (16)
561422	Telemarketing bureaus and other contact centers	4,089 (9)	3.41 (30)	2,890 (3)	2,374 (5)
561440	Collection agencies	895 (80)	1.86 (69)	415 (35)	520 (35)
561730	Landscaping services	2,320 (23)	1.40 (118)	660 (18)	1,165 (10)
611110	Elementary and secondary schools	3,178 (15)	1.16 (176)	439 (30)	600 (27)
621111	Offices of physicians (except mental health specialists)	7,887 (6)	1.13 (184)	899 (9)	1,171 (9)
621420	Outpatient mental health and substance abuse centers	1,309 (53)	2.07 (54)	675 (16)	500 (36)
621498	All other outpatient care centers	1,472 (47)	1.87 (67)	686 (15)	562 (29)
713910	Golf courses and country clubs	1,719 (34)	1.77 (72)	748 (13)	815 (18)
721110	Hotels (except casino hotels) and motels	7,446 (7)	1.67 (80)	2,980 (2)	3,303 (2)
722110	Full-service restaurants	14,932 (2)	1.03 (224)	477 (26)	3,155 (3)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

guided missile and space vehicle industry was by far the most important, followed by the search and navigation equipment industry. The administrative support and waste management sector provided substantial export employment, with the telemarketing and associated telephone answering industries the most important. The finance and insurance sector provided less export employment, with the real estate credit and credit card issuing industries the most important. Government provided the most excess employment, with the federal civilian government joining the state government as significant contributors.

Though excess employment and export employment at the sectoral level were not especially significant in the health care and social assistance sector, the ambulatory health services subsector ranked near the top on both measures. The offices of physicians industry made the largest contribution.

Many of the leading activities can be grouped into a few clusters:

- Tourism and seasonal residents. The high ranking of eight of the top 25 industries, across four sectors, largely can be traced to the presence of nonresidents in the metro area. Hotels and motels, restaurants, golf courses and country clubs, passenger car rental, and various retail trade industries all are directly affected by these nonresidents. Given the low wages and relatively high use of part-time employees in some of these industries, the importance of tourists and seasonal residents is overstated by using the employment measure.
- High-technology manufacturing. Three of the top 25 industries are in this category. The electronics and aerospace activities are of considerable importance to the Tucson area economy, with the guided missile and space vehicle industry far more important than any other industry. Given their high wages and high productivity, the use of employment to measure their impact understates the role of these manufacturing activities in the state's economy.
- Call centers and back-office operations. Five of the top 25 industries, each within the administrative support or finance and insurance sectors, are part of this grouping. Telemarketing was of particular importance.
- Government. The University of Arizona is responsible for the excess employment and export employment in the state government subsector. The unusually large size of some of the health care industries likely is related to the university's medical school. The federal government, including Davis-Monthan Air Force Base, also is an integral part of the economy.

A number of other industries that have a lesser amount of excess and/or export employment also are members of the first three of these clusters. Other activities that do not fit into one of these categories also help drive the state's economy. For example, though much reduced in relative significance, copper mining still is important to the Tucson area economy.

Balance of State, 2009

Wage and salary employment in the 12-county balance of the state was calculated as the difference between Arizona and the two populous metro areas, less employment specified by the Census Bureau as being "statewide" — not allocated to any county. Wage and salary employment in 2009 was close to 400,000 in the balance of state, 15 percent of the state total.

Unlike the metro areas, the balance of the state consists of multiple economies, with the composition of the economies varying by town. A summary of the economy by sector for the entire 12-county region is provided in Table 14. Per capita employment was 29 percent less than the national average; the balance of state needed another 159,000 jobs to reach the U.S. per capita average. Export employment in the balance of state was about 85,000 — 21.5 percent of wage and salary employment.

Three of the 20 sectors employed more than 50,000 in 2009, but two had employment of less than 2,500. Only six sectors had a location quotient of more than 0.8; nine had a figure of less than 0.5. One sector had excess employment of more than 10,000, but seven sectors had a deficit in excess of 10,000. Export employment exceeded 10,000 in two sectors but was less than 1,000 in three sectors.

Per capita employment exceeded the national average in only three sectors, but the location quotient was quite high in two of these. In addition to excess employment, these three sectors also provided at least moderate amounts of export employment:

- Agriculture. Though only the eighth-largest employer, this sector's high location quotient (2.78) resulted in excess employment ranking second. Export employment ranked fourth.
- Government. Though its location quotient was not that high at 1.13, government was by far the largest employer in the balance of the state, resulting in the most excess employment. Export employment ranked seventh despite a very low export share.
- Mining. Like agriculture, mining was not a major employer (ranking 12th), but this sector's very high location quotient (3.31) resulted in the third-highest excess employment. Export employment ranked sixth.

Three sectors with an employment deficit had export employment larger than the absolute value of excess employment: retail trade, accommodation and food services, and utilities. In the other 14 sectors, the absolute value of the employment deficit was larger than the export employment.

Subsectors

Wage and salary employment in the balance of the state in 2009 was more than 25,000 in two subsectors but less than 100 in nine subsectors. The location quotient was greater than 1 (and excess employment was positive) in only 13 of the 97 subsectors, but the location quotient exceeded 3 in three of these subsectors. The location quotient was less than 0.8 in 76 of the subsectors. Excess employment was more than 5,000 in four subsectors, between 2,500 and 5,000 in two subsectors, and between 1,000 and 2,500 in four subsectors. In contrast, the employment deficit exceeded 5,000 in 11 subsectors. Export employment was more than 5,000 in three subsectors and between 2,500 and 5,000 in four subsectors. It was less than 100 in 30 subsectors.

The “leading” subsectors are shown in Table 15. These are the subsectors with the highest average rank on the excess employment and export employment measures. Only 12 subsectors in the balance of the state had both excess employment and export employment.

Both of the subsectors in the agriculture sector were among the top 10 on the excess employment and export employment measures. In the mining sector, the mining other than oil and gas subsector was among the leaders, ranking third on excess employment, first on export employment, and first on the location quotient.

Two subsectors of government ranked among the top 12. The federal civilian and local government subsectors ranked first and second respectively on excess employment but had relatively less export employment. The military subsector had the sixth-most excess employment, but was not considered to be an export activity by IMPLAN.

Seven other subsectors are listed in Table 15, including four retail trade subsectors. All four ranked among the top 20 on both excess employment and export employment. Accommodation was among the top five on both measures. The two other subsectors in Table 15 did not rank as high: miscellaneous manufacturing, and scenic and sightseeing transportation.

Industries

Four of the 1,073 industries industries employed more than 10,000 and another four employed between 5,000 and 10,000 in the balance of the state in 2009. In contrast, 331 industries had no employment and 430 others had employment of less than 100.

A total of 133 industries had a location quotient of more than 1. The location quotient exceeded 3 in 25 industries, including a figure above 10 in six industries. Excess employment was more than 1,000 in seven industries and between 500 and 1,000 in eight others. In contrast, the employment deficit exceeded 2,500 in 10 industries. Export employment was greater than 1,000 in 12 industries and between 500 and 1,000 in 15 industries. In contrast, 937 industries had export employment of less than 100.

The 25 leading industries are shown in Table 16. These are the industries with the highest average rank on the excess employment and export employment measures. Due to a lack of detailed data, no industries are available for the agriculture and government sectors: two of the three leading sectors.

The only mining industry among the top 25 was copper mining, which ranked first on excess employment, export employment, and the location quotient. Eight other mining industries contributed much lesser amounts of both excess employment and export employment. Coal, dimension stone, and construction sand and gravel had the highest figures.

Nine industries in the retail trade sector were among the 25 leading industries, and several others provided lesser amounts of both excess employment and export employment. Home centers, supermarkets, warehouse clubs and supercenters, and gasoline stations with convenience stores each ranked among the top 20 on both excess employment and export employment.

TABLE 14
SECTORS, BALANCE OF STATE, 2009

NAICS	Sector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
	TOTAL	397,974	0.71	-159,299	85,394
11	Agriculture	13,571	2.78	8,697	8,343
21	Mining, quarrying, and oil and gas extraction	7,959	3.31	5,557	7,248
22	Utilities	2,230	0.88	-319	926
23	Construction	17,967	0.76	-5,738	3,579
31-33	Manufacturing	16,250	0.35	-29,963	9,384
42	Wholesale trade	8,408	0.36	-14,743	3,074
44-45	Retail trade	55,292	0.94	-3,513	13,450
48-49	Transportation and warehousing	8,108	0.49	-8,416	1,035
51	Information	4,131	0.32	-8,931	1,415
52	Finance and insurance	6,622	0.27	-17,894	1,481
53	Real estate and rental and leasing	4,804	0.59	-3,287	1,718
54	Professional, scientific, and technical services	11,799	0.38	-19,346	1,832
55	Management of companies and enterprises	1,051	0.09	-10,285	237
56	Administrative support and waste management	13,810	0.38	-22,186	7,363
61	Educational services	5,450	0.43	-7,264	870
62	Health care and social assistance	50,113	0.72	-19,531	3,745
71	Arts, entertainment, and recreation	4,702	0.59	-3,284	1,245
72	Accommodation and food services	43,706	0.96	-1,753	11,662
81	Other services	11,387	0.54	-9,526	2,590
91	Government	110,589	1.13	12,478	4,198

Note: a small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 15
LEADING SUBSECTORS, BALANCE OF STATE, 2009
(Rank Among 97 Subsectors in Parentheses, With 1 Highest)

NAICS	Subsector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
111-112	Farm	4,849 (22)	1.65 (6)	1,909 (9)	3,378 (7)
113-115	Forestry, Fisheries, Agricultural Support	8,722 (13)	4.51 (2)	6,787 (4)	4,965 (5)
212	Mining (except oil and gas)	7,841 (15)	9.74 (1)	7,036 (3)	7,156 (1)
339	Miscellaneous manufacturing	3,659 (27)	1.54 (8)	1,289 (10)	1,490 (16)
444	Building material & garden equipment & supplies dealers	5,334 (21)	1.10 (12)	485 (11)	1,391 (18)
447	Gasoline stations	5,478 (19)	1.61 (7)	2,078 (8)	1,490 (15)
452	General merchandise stores	13,763 (6)	1.19 (10)	2,176 (7)	2,473 (9)
453	Miscellaneous store retailers	2,999 (33)	1.03 (13)	86 (13)	1,418 (17)
487	Scenic and sightseeing transportation	330 (78)	3.83 (3)	244 (12)	98 (68)
721	Accommodation	12,072 (8)	1.65 (5)	4,768 (5)	4,977 (4)
	Federal civilian government	21,923 (3)	1.91 (4)	10,462 (1)	1,655 (13)
	Local government	67,654 (1)	1.18 (11)	10,405 (2)	2,220 (11)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

TABLE 16
LEADING INDUSTRIES, BALANCE OF STATE, 2009
(Rank Among 1,073 Industries in Parentheses, With 1 Highest)

NAICS	Industry	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
212234	Copper ore and nickel ore mining	6,732 (7)	148.43 (1)	6,687 (1)	6,331 (1)
221112	Fossil fuel electric power generation	731 (83)	2.87 (27)	476 (16)	345 (45)
236115	New single-family general contractors	1,544 (30)	1.78 (58)	677 (11)	308 (49)
311991	Perishable prepared food manufacturing	923 (68)	6.37 (10)	778 (9)	303 (52)
313112	Yarn texturizing, throwing, and twisting mills	425 (129)	8.95 (7)	378 (19)	380 (40)
322122	Newsprint mills	561 (104)	30.33 (3)	543 (15)	561 (24)
327320	Ready-mix concrete manufacturing	684 (88)	2.21 (43)	374 (20)	681 (17)
331411	Primary smelting and refining of copper	325 (161)	51.29 (2)	319 (22)	320 (48)
339113	Surgical appliance and supplies manufacturing	3,182 (12)	7.37 (8)	2,750 (3)	1,179 (9)
424480	Fresh fruit and vegetable merchant wholesalers	1,509 (31)	3.81 (20)	1,113 (6)	552 (25)
441310	Automotive parts and accessories stores	1,337 (39)	1.14 (111)	159 (42)	455 (33)
441320	Tire dealers	899 (70)	1.33 (90)	223 (30)	306 (50)
444110	Home centers	2,906 (16)	1.27 (98)	624 (14)	758 (15)
445110	Supermarkets & other grocery (except convenience) stores	10,143 (4)	1.05 (122)	448 (18)	2,291 (5)
447110	Gasoline stations with convenience stores	4,177 (8)	1.52 (72)	1,426 (5)	1,136 (10)
447190	Other gasoline stations	1,301 (41)	2.01 (53)	652 (12)	354 (41)
452112	Discount department stores	3,009 (15)	1.05 (121)	136 (53)	541 (27)
452910	Warehouse clubs and supercenters	7,895 (6)	1.41 (80)	2,292 (4)	1,419 (7)
453220	Gift, novelty, and souvenir stores	924 (67)	1.34 (89)	232 (28)	437 (36)
541512	Computer systems design services	2,112 (22)	1.10 (117)	192 (36)	492 (30)
561210	Facilities support services	1,796 (27)	2.02 (51)	905 (8)	1,084 (11)
621420	Outpatient mental health and substance abuse centers	1,801 (26)	2.30 (41)	1,017 (7)	688 (16)
621498	All other outpatient care centers	1,242 (43)	1.28 (96)	269 (23)	474 (31)
621910	Ambulance services	1,242 (44)	2.10 (49)	651 (13)	474 (32)
721110	Hotels (except casino hotels) and motels	9,344 (5)	1.69 (62)	3,814 (2)	4,145 (2)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

The hotels and motels industry ranked second on both excess employment and export employment. Other industries in the accommodation and food services sector ranked high on either excess employment or export employment, but not on both.

Six industries in the manufacturing sector are listed in Table 16. Surgical appliance and supplies manufacturing (part of the miscellaneous manufacturing subsector) ranked the highest, in the top 10 on both excess employment and export employment. Three industries in the health care and social assistance sector placed among the top 25. Outpatient mental health and substance abuse centers ranked highest, in the top 20 on each measure. The other industries in Table 16 include lone representatives of the utilities; construction; wholesale trade; professional, scientific and technical services; and administrative support and waste management sectors. The facilities support services industry, part of the administrative and support subsector, primarily consists of privately run prisons and ranked in the top 11 on both excess employment and export employment.

Summary

The balance of Arizona consists of multiple local economies. Most are driven by only a few economic activities. Other than tourism and seasonal residents, the 12-county area does not have any significant clusters of economic activities. Instead, the region as a whole in 2009 was disproportionately dependent on a relatively small number of specific activities: agriculture, copper mining, and the federal government.

Based on the NAICS, only three sectors provided both excess employment and export employment: agriculture, mining, and government. Both of agriculture's two divisions — farming and agricultural support — were among the subsectoral leaders. The federal government and local government were among the subsectoral leaders, particularly on excess employment. The mining other than oil and gas subsector was near the top on both measures, primarily due to the copper mining industry.

The impact of tourism was most clearly evident in the accommodation and food services sector, particularly in the hotels and motels industry. Nonresidents boosted the excess employment and export employment figures in retail trade.

Various other industries helped drive the economy of the balance of the state, including various manufacturing industries, private prisons, and outpatient mental health and substance abuse centers.

Comparison of Substate Areas, 2009

In 2009, wage and salary employment was nearly the same in the balance of the state and the Tucson area; the Phoenix area had 4.4 times as many workers. The overall location quotient was less than 1 in each of the three substate regions. Per capita employment was below the national average by 8 percent in the Phoenix area, 12 percent in the Tucson area, and 29 percent in the balance of the state. Excess employment, which is dependent on the magnitudes of the location quotient and wage and salary employment, was significantly negative in each region. The deficit in the balance of the state was larger than in the Phoenix area, despite the wide difference in size between the two regions. Overall, export employment amounted to 24.6 percent of the wage and salary employment in the Phoenix area, 23.4 percent in the Tucson area, and 21.5 percent in the balance of the state.

The sectoral results for Metro Phoenix, Metro Tucson, and the balance of the state are shown in Table 17. Government was the largest employer in all three regions of the state; other sectors with substantial employment in all three regions were retail trade, health care and social assistance, and accommodation and food services. Wage and salary employment levels by sector were highly correlated across the three regions, particularly between the two populous metro areas and between the Tucson area and the balance of the state.

A low correlation in the location quotients by sector existed between the Phoenix and Tucson areas. No correlation was present between the Tucson area and the balance of the state; a negative correlation was present between the Phoenix area and the balance of the state. Thus, significant differences in the economic base were present across the three regions.

In none of the 20 sectors was the location quotient greater than 1 in all three regions of the state. However, it was below 1 in all three regions in nine sectors: utilities; manufacturing; wholesale trade; information; professional, scientific and technical services; management of companies; educational services; health care and social assistance; and other services. The location quotient exceeded 1 in each of the two populous metro areas in the construction; retail trade; real estate and rental; arts, entertainment and recreation; and accommodation and food services sectors. Government's location quotient was above 1 in the Tucson area and the balance of the state.

Excess employment by sector in the Phoenix area was not correlated to either the Tucson area or the balance of the state. However, the excess employment figures in the Tucson area and the balance of the state were highly correlated. All three regions had a significant employment deficit in manufacturing and a moderate deficit in professional, scientific and technical services.

Though each of the 20 sectors had export employment in each region, four sectors ranked among the top four in each of the three regions: manufacturing, retail trade, administrative support and waste management, and accommodation and food services. Finance and insurance ranked fifth in export employment in the two populous metro areas, but ranked down the list in the balance of the state. Agriculture ranked fifth and mining sixth in the balance of the state, but these sectors ranked near the bottom in each of the two metro areas. Some of these sectors, particularly retail trade and accommodation and food services, do not have a high export share, but the high wage and salary employment in these sectors resulted in considerable export employment.

TABLE 17
SECTORS, METROPOLITAN PHOENIX, METROPOLITAN TUCSON AND BALANCE OF STATE, 2009

	Wage & Salary Employment			Location Quotient		
Sector	**Phoenix**	**Tucson**	**Balance**	**Phoenix**	**Tucson**	**Balance**
TOTAL	1,761,227	396,480	397,974	0.92	0.88	0.71
Agriculture	9,333	874	13,571	0.56	0.22	2.78
Mining	2,067	1,738	7,959	0.25	0.90	3.31
Utilities	7,467	2,029	2,230	0.85	0.99	0.88
Construction	108,638	20,182	17,967	1.33	1.05	0.76
Manufacturing	102,312	26,958	16,250	0.65	0.72	0.35
Wholesale Trade	76,853	8,125	8,408	0.97	0.44	0.36
Retail Trade	212,911	47,950	55,292	1.05	1.01	0.94
Transportation & Warehousing	61,921	8,042	8,108	1.09	0.60	0.49
Information	40,942	6,666	4,131	0.91	0.63	0.32
Finance & Insurance	110,673	13,169	6,622	1.31	0.67	0.27
Real Estate & Rental	31,421	7,003	4,804	1.13	1.07	0.59
Professional, Scientific & Technical Services	90,924	15,749	11,799	0.85	0.63	0.38
Management of Companies	36,444	4,139	1,051	0.94	0.45	0.09
Administrative Support & Waste Management	128,897	23,227	13,810	1.04	0.80	0.38
Educational Services	38,262	6,024	5,450	0.88	0.59	0.43
Health Care & Social Assistance	196,412	56,070	50,113	0.82	1.00	0.72
Arts, Entertainment & Recreation	32,953	7,360	4,702	1.20	1.14	0.59
Accommodation & Food Services	159,171	39,428	43,706	1.02	1.07	0.96
Other Services	57,953	15,155	11,387	0.81	0.90	0.54
Government	255,536	86,523	110,589	0.76	1.09	1.13

(Table Continued on Next Page)

TABLE 17 (Continued)

Sector	Excess Employment			Export Employment		
	Phoenix	Tucson	Balance	Phoenix	Tucson	Balance
TOTAL	-152,998	-53,607	-159,299	433,792	92,582	85,394
Agriculture	-7,410	-3,063	8,697	6,174	566	8,343
Mining	-6,184	-202	5,557	1,872	1,151	7,248
Utilities	-1,287	-29	-319	3,169	800	926
Construction	27,212	1,037	-5,738	21,642	4,020	3,579
Manufacturing	-56,429	-10,366	-29,963	62,628	21,135	9,384
Wholesale Trade	-2,671	-10,573	-14,743	28,096	2,970	3,074
Retail Trade	10,916	455	-3,513	51,003	11,754	13,450
Transportation & Warehousing	5,160	-5,304	-8,416	16,848	1,425	1,035
Information	-3,927	-3,884	-8,931	18,557	2,982	1,415
Finance & Insurance	26,462	-6,631	-17,894	32,840	4,287	1,481
Real Estate & Rental	3,630	469	-3,287	11,386	2,560	1,718
Professional, Scientific & Technical Services	-16,058	-9,405	-19,346	14,965	2,263	1,832
Management of Companies	-2,493	-5,016	-10,285	8,212	933	237
Administrative Support & Waste Management	5,253	-5,845	-22,186	68,831	12,369	7,363
Educational Services	-5,412	-4,245	-7,264	5,129	1,319	870
Health Care & Social Assistance	-42,814	-179	-19,531	13,138	3,930	3,745
Arts, Entertainment & Recreation	5,520	910	-3,284	8,142	1,511	1,245
Accommodation & Food Services	3,019	2,712	-1,753	39,624	10,216	11,662
Other Services	-13,884	-1,736	-9,526	12,652	3,323	2,590
Government	-81,473	7,283	12,478	8,884	3,067	4,198

Note: A small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *County Business Patterns* and *Metropolitan Business Patterns*; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

That every sector had some export employment and that some of the sectors without a high export percentage had among the highest export employment illustrates that the forces driving the economy in 2009 were diverse. Much of the overall export activity occurred in sectors that are not primarily export oriented. Sectors were placed into one of three groups based on their export share in the state: four sectors have a share greater than 55 percent, five have a share between 30 and 45 percent, and the other 11 have a share of 25 percent or less. The latter group — sectors that primarily are nonbasic — accounted for 46-to-47 percent of the total export employment in the two populous metro areas and 52 percent in the balance of the state. The group with export shares of more than 55 percent accounted for 38 percent of the total export employment in the balance of the state and in the Tucson area, and 32 percent in the Phoenix area.

Subsectors and Industries

Accommodation was the only subsector listed as a leader in each of the three regions (see Tables 9, 12, and 15). Several subsectors were among the leaders in two of the three geographic areas as well as in the state. Among the leaders in the Phoenix and Tucson areas were specialty trade contractors; electronics manufacturing; motor vehicle dealers; food and beverage stores; real estate; and amusement, gambling and recreation. Mining other than oil and gas; miscellaneous store retailers; and the federal government were among the leaders in the Tucson area and the balance of the state. General merchandise stores was among the leaders in the Phoenix area and the balance of the state.

At the industry level (see Tables 10, 13, and 16), only two were among the leaders in each of the three regions: hotels and motels and supermarkets. Nine industries were among the leaders in the two metropolitan areas: search and navigation instruments, new car dealers, credit card issuing, real estate credit, telemarketing, collection agencies, landscaping services, and golf courses and country clubs. Two industries were among the leaders in the Phoenix area and in the balance of the state: automotive parts stores and warehouse clubs and supercenters. Three industries were among the leaders in the Tucson area and in the balance of the state: copper mining, outpatient mental health and substance abuse centers, and other outpatient care centers.

Summary

Among the three regions, the Phoenix area has the most diverse economy with the largest number of driving economic activities. This is a natural outcome of its much larger employment size. The Phoenix area provides various services and certain retail goods to the rest of the state. Though of equal size in terms of wage and salary employment, the Tucson area's economy is more diverse than the economy of the balance of the state. The substantial distances between mostly small population centers that are present in the balance of the state inhibit the formation of clusters, or more generally, of many economic activities that predominantly occur in urban areas. This leaves the balance of the state disproportionately dependent on the location- and resource-based activities of agriculture and mining.

At each of the sectoral, subsectoral, and industrial levels, the Tucson area in 2009 had fewer activities with a location quotient greater than one than the Phoenix area, and the balance of the state had fewer activities with excess employment than the Tucson area. However, for those activities with a location quotient greater than 1, the location quotients tended to be higher in the

Tucson area and the balance of the state than in the Phoenix area, reflecting the greater dominance of a smaller number of economic activities.

One cluster was important in all three regions: tourism. Otherwise, the economy in the balance of the state was heavily dependent on agriculture and mining, as well as government. Government also was important in the Tucson area, though state government, in the form of the University of Arizona, was of particular importance to the Tucson area while the federal government was the most important government subsector in the balance of the state. In each of the two populous metro areas, high-technology manufacturing and call centers and back-office operations were important clusters. However, the specific leading industries within these groupings varied between the two regions. In the high-tech cluster, guided missiles and space vehicles was the dominant activity in the Tucson area while semiconductors was the most important in the Phoenix area. In the call centers and back-office operations cluster, telemarketing was of particular significance in the Tucson area while a larger number of industries contributed in the Phoenix area.

APPENDIX: THE ECONOMIC BASE IN CHANDLER

Economic activity rarely is reported by city. *Zip Business Patterns*, a companion product to *County Business Patterns*, provides limited information by zip code. The sum of several zip codes — 85224, 85225, 85226, 85227, 85244, 85246, 85248, 85249, and 85286 — is used in this appendix as a proxy for the city of Chandler. However, the estimated population of these zip codes was 256,025 in 2009, about 8 percent more than the estimated population of the city. These zip codes include part of the Gila River Indian Community, a bit of Gilbert, and unincorporated area, particularly Sun Lakes.

Zip Business Patterns is structured like *County Business Patterns*, with one important exception: no employment figures are provided by industry; the only employment figure reported is for the zip code total. As in *County Business Patterns*, the frequency distribution of establishments by employment size is available by industry. This information is used to make estimates of employment by industry, with the sum of the industries forced to equal the published total for a zip code.

The information on government and agriculture that was used to supplement the *County Business Patterns* data for the state and metropolitan areas is not available at a subcounty level. Thus, the analysis of the Chandler area's economic base is limited to the nonagricultural private sector.

Previous analyses of the Chandler area were included in the community base studies conducted for the Arizona Department of Commerce. Data are available for 2001 and 2004. Along with the data for 2009, changes in the Chandler area economy between 2001 and 2009 are examined in a later subsection of this appendix; these are comparable years in terms of the economic cycle.

The accuracy of the data for the Chandler area is substantially lower than for the state or large metropolitan areas, for two reasons:

- Except for the total, wage and salary employment is estimated for every industry in the Chandler area; in the broader geographic areas, the employment figures were withheld for only some industries.
- Errors in the raw data, such as geographic misallocations (placing an establishment in the wrong zip code) and industrial misallocations (assigning an improper NAICS code to an establishment), will be more obvious in any local area. At broader geographic levels, such errors will to a greater extent offset. In order to assess possible inaccuracies in the Census Bureau information, its data were compared to those of a second dataset, as discussed in the next subsection.

Comparison of Databases

The Maricopa Association of Governments (MAG) annually produces an "employment database" that consists of all establishments with at least five employees in Maricopa County. This is a "microdata" set, with information such as company name, address, employment, and NAICS code provided by establishment. Records from the nine zip codes making up the Chandler area were extracted from the 2009 MAG database, excluding records with NAICS codes not included in *Zip Business Patterns* (ZBP).

A comparison of the MAG and *Zip Business Patterns* datasets for Chandler reveal substantial differences. MAG's employment figure is 12 percent higher than the estimated total for establishments with five or more employees from ZBP. MAG reports 64 percent more establishments of five or more employees. However, MAG reports slightly fewer large establishments (those with at least 100 employees) but a much larger number of smaller establishments than ZBP, especially in the 10-to-19 employees category (see Table A-1). In particular, a very large number of establishments in the MAG database are shown as having 10 employees. Though MAG does not attempt to identify establishments with employment of less than five employees, it seems likely that some of its establishments with 10 or fewer employees are included in ZBP, but with employment in ZBP of less than five.

Differences in the totals could result from geographic misallocations: an establishment could be present in both databases, but might be allocated to a Chandler zip code in one and to a Tempe (for example) zip code in the other. It also is possible that an establishment is missing from one of the databases. Even when an establishment is included, and the zip code is properly allocated in each database, the employment figure could differ. Many companies refuse to provide this information and some will provide inconsistent figures if contacted twice in a short time period.

In nearly all of the sectors, MAG reports more establishments, though the ratio to the number reported in *Zip Business Patterns* varies widely. In contrast, employment from MAG is less than from ZBP in the majority of sectors, but is substantially higher in a few sectors, particularly manufacturing (see Table A-2). An additional factor can contribute to the differences by sector in the databases: differing NAICS codes may be assigned to the same establishment. Determination

TABLE A-1
COMPARISON OF TOTALS FROM ZIP BUSINESS PATTERNS AND THE MARICOPA ASSOCIATION OF GOVERNMENTS EMPLOYMENT DATABASE FOR CHANDLER ZIP CODES

	Zip Business Patterns	Maricopa Association of Governments	Ratio of MAG to ZBP
Employment	91,637	102,631	1.12
Number of Establishments:			
Total	5,049	-	-
5-or-More Employees	2,263	3,721	1.64
Less-Than-5 Employees	2,786	-	-
5-to-9 Employees	864	1,001	1.16
10-to-19 Employees	652	1,974	3.03
20-to-49 Employees	445	420	0.94
50-to-99 Employees	163	192	1.18
100-to-249 Employees	95	94	0.99
250-to-499 Employees	22	20	0.91
500-to-999 Employees	13	9	0.69
1,000-or-More Employees	9	11	1.22

Source: U.S. Department of Commerce, Census Bureau, *Zip Business Patterns*, and Maricopa Association of Governments.

TABLE A-2
COMPARISON OF SECTORS FROM ZIP BUSINESS PATTERNS AND THE MARICOPA ASSOCIATION OF GOVERNMENTS EMPLOYMENT DATABASE FOR CHANDLER ZIP CODES

	Employment			Establishments*		
	ZBP	MAG	Ratio	ZBP	MAG	Ratio
Agriculture	20	50	2.50	1	1	1.00
Mining	9	6	0.67	1	1	1.00
Utilities	19	77	4.05	1	3	3.00
Construction	4,284	6,412	1.50	131	291	2.22
Manufacturing	11,032	25,570	2.32	118	279	2.36
Wholesale Trade	6,685	3,689	0.55	113	144	1.27
Retail Trade	15,193	15,443	1.02	472	516	1.09
Transportation and Warehousing	1,805	1,655	0.92	34	49	1.44
Information	2,616	2,168	0.83	69	69	1.92
Finance and Insurance	8,897	2,977	0.33	128	192	1.50
Real Estate and Rental	2,517	2,018	0.80	67	169	2.52
Professional and Technical Services	7,106	6,794	0.96	126	320	2.54
Management of Companies	1,642	517	0.31	20	13	0.65
Administrative Support	3,936	9,188	2.33	122	149	1.22
Education (Private)	1,486	1,457	0.98	51	78	1.53
Health and Social Assistance	8,980	8,026	0.89	294	415	1.41
Arts, Entertainment, Recreation	2,724	3,403	1.25	35	53	1.51
Accommodation and Food Services	10,480	8,973	0.86	362	456	1.26
Other Services	3,310	3,898	1.18	151	362	2.40
Not Classified	6	310	51.67	0	31	-

* Of five-or-more employees

Source: U.S. Department of Commerce, Census Bureau, *Zip Business Patterns*, and Maricopa Association of Governments.

of the proper NAICS industry is difficult for some establishments. For example, many larger establishments house multiple functions that are classified in different industries. The primary function should be the basis for the industry classification applied to the entire establishment. Many questionable industry assignments are seen in the MAG database; it is not possible to evaluate the ZBP database directly since the microdata are not publicly available.

Economic Base Study Results, 2009

A summary of the Chandler area economy by sector in 2009 is provided in Table A-3. The agriculture and government sectors are not included.

Overall, close to 92,000 nonagriculture private-sector wage and salary jobs were located in the Chandler area, 6.1 percent of the metropolitan Phoenix total. The estimated population of the Chandler area also was 6.1 percent of the metro total. Per capita employment excluding agriculture and government was 4 percent less than the national average — the Chandler area's 0.960 location quotient was marginally higher than the 0.959 figure for the metro area. The Chandler area's location quotient is particularly noteworthy given the area's distance from the urban core (downtown-midtown Phoenix) — employment density generally declines with

distance from the core. The Chandler area needed another 3,800 jobs (6.0 percent of the metro area total) to reach the U.S. per capita average. Export employment in the Chandler area exceeded 26,500 — 29.0 percent of nonagriculture private-sector wage and salary employment. This export share was a little higher than the 28.0 percent of the Phoenix area; the Chandler area's export employment accounted for 6.3 percent of the metro total.

Three of the 18 sectors employed more than 10,000 in the Chandler area in 2009, but two (mining and utilities) had employment of less than 25. Five sectors had excess employment of more than 1,000, but five sectors had a deficit in excess of 1,000. Export employment exceeded 1,000 in six sectors but was less than 10 in two sectors.

Per capita employment exceeded the national average in eight sectors. Four sectors stand out as providing substantial excess employment as well as considerable export employment:

- Manufacturing. The second-largest employer, manufacturing provided the greatest amount of export employment. With a location quotient of 1.12, excess employment ranked fourth.
- Finance and Insurance. This sector ranked only fifth on employment but had the highest location quotient at 1.71, resulting in the highest amount of excess employment. Export employment ranked third.
- Retail Trade. With the most employment and a location quotient of 1.22, retail trade's excess employment was second highest. Its export employment also was second highest.
- Wholesale Trade. Despite the seventh-most employment, wholesale trade had the third-most excess employment; its location quotient of 1.36 ranked fourth. Export employment ranked fifth.

Four other sectors provided lesser amounts of excess employment and export employment:

- Accommodation and Food Services. The third-largest employer had a location quotient of 1.08 and the sixth-most excess employment. Its export employment ranked fourth.
- Real Estate and Rental. Though ranking 13th on employment, the sector's excess employment ranked seventh due to its third-highest location quotient of 1.46. Its export employment was ninth highest.
- Professional, Scientific and Technical Services. Ranking sixth on employment, this sector provided the eighth-most excess employment with its location quotient of 1.07. It ranked seventh on export employment.
- Arts, Entertainment and Recreation. Though ranking 11th on employment, the sector's location quotient was second highest at 1.60 and its excess employment was fifth highest. Its export employment was only 13th highest.

Two sectors with an employment deficit had export employment larger than the absolute value of excess employment: information and construction. In the other eight sectors, the absolute value of the employment deficit was larger than the export employment.

Only three sectors in the Chandler area had a location quotient similar to the figure for the entire metropolitan area. The location quotient in the Chandler area was higher than the metro figure in manufacturing; finance and insurance; arts, entertainment and recreation; wholesale trade; real estate and rental; professional, scientific and technical services; and retail trade. The location

quotient was lower in the Chandler area than the metro figure for utilities; transportation and warehousing; administrative support and waste management; construction; educational services; management of companies; mining; and health care and social assistance.

Considering all of the measures, three sectors were considerably more important to the Chandler area economy than to the Phoenix area economy: manufacturing, wholesale trade, and professional, scientific and technical services. In contrast, construction, transportation and warehousing, and administrative support and waste management were much less important in the Chandler area.

Subsectors

Nonagriculture private-sector wage and salary employment in the Chandler area in 2009 was more than 5,000 in three subsectors and between 2,500 and 5,000 in eight subsectors, but less than 100 in 29 subsectors. The location quotient was greater than 1 (and excess employment was positive) in only 27 of the 91 available subsectors. The location quotient exceeded 2 in seven subsectors. Excess employment was more than 2,500 in two subsectors and between 1,000 and 2,500 in seven subsectors. In contrast, the employment deficit was more than 1,000 in eight subsectors. Export employment was greater than 2,500 in two subsectors and between 1,000 and 2,500 in five subsectors. It was less than 100 in 46 subsectors.

The 15 leading subsectors are shown in Table A-4. These are the subsectors with the highest average rank on the excess employment and export employment measures.

In the manufacturing sector, four subsectors placed among the top 15. Electronics manufacturing was among the top five on both excess employment and export employment, transportation equipment manufacturing ranked sixth on both measures, and primary metal manufacturing ranked in the top 11 on both measures. All three of these subsectors had a location quotient among the top five.

In the finance and insurance sector, only credit intermediation was among the top 15 subsectors. It ranked first on both excess employment and export employment.

The retail trade sector had four subsectors among the top 15 and another ranked only a little lower than 15th. The food and beverage stores subsector was the highest ranked on both excess employment and export employment.

In wholesale trade, the durable goods subsector ranked among the top five on both excess employment and export employment. In the accommodation and food services sector, food services — the largest subsector — ranked among the top seven on both excess employment and export employment.

Professional, scientific and technical services had one subsector among the top 15: management, scientific and technical consulting. The scientific research and development sector had the highest location quotient and the second-highest amount of excess employment, but IMPLAN's low export share translates to limited export employment.

The real estate and rental sector had one representative among the top 15: real estate, which ranked eighth on both excess employment and export employment. In the arts, entertainment and recreation sector, the amusement, gambling, and recreation subsector was among the top 15. One other subsector is listed in Table A-4: telecommunications, part of the information sector.

Of the top 15 subsectors in the Chandler area, nine were among the top 15 in the Phoenix metro area. The telecommunications subsector did not miss the top 15 list for the metro area by much, but the other five subsectors on Chandler's list — primary metal manufacturing; transportation equipment manufacturing; miscellaneous manufacturing; building material and garden equipment and supplies dealers; and management, scientific and technical consulting services — had location quotients of less than 0.9 in the metro area.

Four of the six subsectors among the top 15 in the metro area but not on the Chandler area list — air transportation; data processing, hosting and related services; insurance carriers; and administrative and support — had a location quotient of less than 0.6 in the Chandler area. The location quotients in the Chandler area also were less than 1 in the specialty trade contractors and accommodation subsectors.

Industries

Caution is suggested in using the industry data for the Chandler area. Industrial and geographic misclassifications could materially affect the results. Further, some industries may be dominated by a single establishment.

Of the 1,073 industries identified in this study, eight had wage and salary employment of at least 2,500 in the Chandler area and another 10 had employment of between 1,000 and 2,500 in 2009. In contrast, 536 (one-half of all industries) had no employment and 392 others had employment of less than 100.

A total of 187 industries had a location quotient of more than 1. The location quotient exceeded 3 in 52 industries, including a figure above 10 in 12 industries. Excess employment was more than 2,500 in five industries and between 1,000 and 2,500 in four industries. In contrast, the employment deficit exceeded 1,000 in four industries. Export employment was greater than 1,000 in four industries and between 500 and 1,000 in seven industries. Only 47 industries had export employment of more than 100.

The 25 leading industries are shown in Table A-5. These are the industries with the highest average rank on the excess employment and export employment measures.

Six industries within the manufacturing sector were among the top 25. Two high-tech industries ranked the highest, with semiconductors among the top five on both excess employment and export employment and space vehicle propulsion units ranking nearly as high. The location quotient was high in all six industries and exceeded 19 in five.

TABLE A-3
SECTORS, CHANDLER AREA, 2009

NAICS	Sector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
	TOTAL PRIVATE NONAGRICULTURE	91,617	0.96	-3,822	26,559
21	Mining, quarrying, and oil and gas extraction	8	0.02	-496	3
22	Utilities	19	0.04	-517	9
23	Construction	4,232	0.85	-748	843
31-33	Manufacturing	10,900	1.12	1,191	7,377
42	Wholesale trade	6,605	1.36	1,741	2,415
44-45	Retail trade	15,011	1.22	2,657	3,440
48-49	Transportation and warehousing	1,784	0.51	-1,688	155
51	Information	2,584	0.94	-160	781
52	Finance and insurance	8,791	1.71	3,641	2,846
53	Real estate and rental and leasing	2,487	1.46	788	809
54	Professional, scientific, and technical services	7,021	1.07	478	911
55	Management of companies and enterprises	1,622	0.68	-759	366
56	Administrative support and waste management	3,889	0.51	-3,673	2,073
61	Educational services	1,468	0.55	-1,203	374
62	Health care and social assistance	8,873	0.61	-5,758	546
71	Arts, entertainment, and recreation	2,691	1.60	1,013	410
72	Accommodation and food services	10,355	1.08	804	2,478
81	Other services	3,270	0.74	-1,123	725

Note: a small amount of unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Zip Business Patterns*, 2009, and Minnesota IMPLAN Group (IMPLAN).

TABLE A-4
LEADING SUBSECTORS, CHANDLER AREA, 2009
(Rank Among 97 Subsectors in Parentheses, With 1 Highest)

NAICS	Subsector	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
331	Primary metal manufacturing	1,043 (27)	3.30 (4)	727 (11)	1,019 (7)
334	Computer and electronic product manufacturing	3,147 (7)	3.91 (2)	2,341 (4)	2,619 (2)
336	Transportation equipment manufacturing	2,417 (12)	2.28 (5)	1,355 (6)	1,465 (6)
339	Miscellaneous manufacturing	544 (40)	1.09 (23)	46 (24)	488 (17)
423	Merchant wholesalers, durable goods	5,237 (3)	1.88 (9)	2,454 (3)	1,915 (5)
441	Motor vehicle and parts dealers	1,802 (18)	1.30 (16)	419 (15)	613 (12)
444	Building material and garden equipment and supplies dealers	1,375 (22)	1.35 (15)	357 (16)	359 (23)
445	Food and beverage stores	3,050 (8)	1.28 (18)	667 (12)	689 (9)
452	General merchandise stores	2,863 (10)	1.18 (20)	429 (14)	514 (16)
517	Telecommunications	2,044 (15)	2.07 (7)	1,055 (9)	626 (11)
522	Credit intermediation and related activities	8,069 (2)	3.38 (3)	5,683 (1)	2,628 (1)
531	Real estate	2,268 (14)	1.88 (10)	1,061 (8)	717 (8)
5416	Management, scientific, and technical consulting services	1,021 (28)	1.42 (14)	301 (17)	427 (18)
713	Amusement, gambling, and recreation industries	2,587 (11)	2.13 (6)	1,375 (5)	389 (19)
722	Food services and drinking places	9,105 (1)	1.14 (21)	1,090 (7)	1,924 (4)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Zip Business Patterns*, 2009, and Minnesota IMPLAN Group (IMPLAN).

TABLE A-5
LEADING INDUSTRIES, CHANDLER AREA, 2009
(Rank Among 1,073 Industries in Parentheses, With 1 Highest)

NAICS	Industry	Wage & Salary Employment	Location Quotient	Excess Employment	Export Employment
331316	Aluminum extruded product manufacturing	639 (32)	43.63 (4)	624 (13)	622 (8)
331419	Primary nonferrous metal, except copper and aluminum	333 (53)	44.98 (3)	326 (19)	328 (17)
332111	Iron and steel forging	333 (55)	19.10 (7)	316 (22)	255 (22)
334413	Semiconductor and related device manufacturing	2,771 (8)	30.73 (6)	2,681 (4)	2,424 (1)
336415	Space vehicle propulsion units and parts manufacturing	2,043 (10)	162.45 (1)	2,030 (6)	1,182 (4)
339950	Sign manufacturing	319 (57)	4.93 (28)	255 (30)	291 (19)
423690	Other electronic parts and equipment merchant wholesalers	3,807 (4)	15.36 (9)	3,559 (1)	1,392 (3)
425120	Wholesale trade agents and brokers	447 (42)	1.83 (94)	203 (38)	163 (28)
441110	New car dealers	1,177 (17)	1.50 (122)	391 (17)	401 (14)
444110	Home centers	1,058 (19)	2.21 (79)	578 (14)	276 (21)
445110	Supermarkets & other grocery (except convenience) stores	2,900 (6)	1.42 (129)	863 (10)	655 (7)
452112	Discount department stores	842 (22)	1.40 (134)	238 (32)	151 (32)
452910	Warehouse clubs and supercenters	1,409 (14)	1.20 (150)	232 (33)	253 (23)
454111	Electronic shopping	368 (49)	3.46 (44)	262 (28)	163 (29)
517210	Wireless telecommunications carriers (except satellite)	1,860 (11)	8.03 (17)	1,628 (7)	569 (9)
522110	Commercial banking	3,997 (2)	3.07 (52)	2,695 (3)	132 (40)
522220	Sales financing	732 (27)	8.52 (15)	646 (12)	472 (12)
522292	Real estate credit	2,855 (7)	15.14 (10)	2,667 (5)	1,839 (2)
531311	Residential property managers	1,586 (12)	5.01 (27)	1,269 (8)	501 (11)
541612	Human resources consulting services	619 (34)	7.70 (18)	538 (15)	283 (20)
561440	Collection agencies	345 (50)	2.77 (57)	221 (34)	201 (25)
561730	Landscaping services	689 (30)	1.60 (114)	258 (29)	346 (16)
621210	Offices of dentists	995 (20)	1.42 (131)	292 (25)	148 (34)
722110	Full-service restaurants	4,528 (1)	1.20 (147)	768 (11)	957 (5)
722211	Limited-service restaurants	3,126 (5)	1.09 (168)	262 (27)	661 (6)

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Metropolitan Business Patterns*, 2009; U.S. Department of Commerce, Bureau of Economic Analysis; and Minnesota IMPLAN Group (IMPLAN).

Three finance and insurance industries were among the leaders. Of particular significance were real estate credit, which ranked in the top five on both excess employment and export employment measures, and sales financing, which ranked 12th on each measure.

Six retail trade industries were among the top 25. The supermarkets industry ranked in the top 10 on both excess employment and export employment.

Two wholesale industries were among the top 25, with the electronic parts and equipment industry ranking very high on all measures. In the accommodation and food services sector, the two major restaurants industries were among the top 25.

One professional, scientific and technical services industry placed among the top 25: human resources consulting. The physical and biological research other than biotech industry ranked second on excess employment but was far down the list on export employment, based on the IMPLAN export share. One real estate and rental industry was among the top 25. Residential property managers ranked in the top 11 on both excess employment and export employment.

Four other industries are listed in Table A-5. The wireless telecommunications carriers industry ranked among the top 10 on both excess employment and export employment. Two industries in the administrative and support subsector and one in ambulatory health care round out the list.

Summary

High-technology activities are disproportionately important to the Chandler area economy. In 2009, the manufacturing of semiconductors and space vehicle propulsion units and the wholesaling of electronic parts and equipment were the most significant of these high-tech activities. Wireless telecommunications carriers also were important.

Finance, specifically credit intermediation, was the other major economic activity in 2009. Real estate credit, sales financing, and commercial banking all were important industries.

A variety of other activities also helped drive the Chandler area economy. Combined, three metal manufacturing industries — aluminum extruded product, primary nonferrous metal, and iron and steel forging — had a large impact. Various retail trade, food service, and amusement and gambling industries taken together also had a large impact.

Changes Between 2001 and 2009

Changes between 2001 and 2009 in the Chandler area economy are shown in Table A-6. Overall (based on total nonagricultural private-sector wage and salary employment), the Chandler area's economy gained over this economic cycle even though the state's economy lost ground. The employment-to-population ratio rose considerably, compared to losses nationally and in Arizona. The Chandler area's figure moved from well below to above the state's figure. As indicated by the substantial increase in the location quotient from 0.74 to 0.96, the sizable gain in per capita employment in the Chandler area compared to a loss nationally.

The Chandler area's employment deficit shrank between 2001 and 2009; the deficit in 2009 was only 18 percent the size of the deficit in 2001. Export employment increased 34 percent over the

TABLE A-6
SECTORS, CHANDLER AREA, CHANGE BETWEEN 2001 AND 2009

NAICS	Sector	Change Between 2001 and 2009				Excess Employment	
		W & S Employ-ment	Location Quotient	Excess Employ-ment	Export Employ-ment	2001	2009
	TOTAL NONAGRICULTURE PRIVATE SECTOR	31,178	0.22	0	7,238	-21,294	-3,822
21	Mining, quarrying, and oil and gas extraction	5	0.01	0	0	-342	-496
22	Utilities	4	0.00	0	2	-451	-517
23	Construction	-1,179	-0.32	-792	-235	792	-748
31-33	Manufacturing	207	0.18	1,191	377	-655	1,191
42	Wholesale trade	2,941	0.52	1,741	1,075	-706	1,741
44-45	Retail trade	5,497	0.32	2,657	1,050	-1,080	2,657
48-49	Transportation and warehousing	1,369	0.36	0	94	-2,254	-1,688
51	Information	1,346	0.48	0	599	-1,433	-160
52	Finance and insurance	6,259	1.14	3,641	1,607	-1,914	3,641
53	Real estate and rental and leasing	1,830	1.00	788	579	-775	788
54	Professional, scientific, and technical services	4,522	0.58	478	500	-2,593	478
55	Management of companies and enterprises	-3,465	-1.80	-3,039	-781	3,039	-759
56	Administrative support and waste management	945	0.06	0	560	-3,519	-3,664
61	Educational services	726	0.15	0	186	-1,116	-1,203
62	Health care and social assistance	4,597	0.19	0	187	-6,065	-5,758
71	Arts, entertainment, and recreation	1,003	0.27	592	100	421	1,013
72	Accommodation and food services	4,222	0.22	804	1,037	-963	804
81	Other services	1,258	0.22	0	300	-1,809	-1,123

Note: unclassified employment is not displayed.

Source: Calculated from U.S. Department of Commerce, Census Bureau, *Zip Business Patterns*, 2009; and Minnesota IMPLAN Group (IMPLAN).

eight years. However, export jobs decreased as a percentage of the total, from 33 percent to 30 percent.

While employment deficits were changed to zeroes in the calculation of the change over time, the actual values of the excess employment in 2001 and 2009 are included in Table A-6. In 12 of the 18 sectors, the situation improved between 2001 and 2009: positive excess employment became larger in one sector, an employment deficit became a surplus in seven sectors, and the magnitude of the deficit decreased in four sectors. In contrast, an employment deficit became larger in four sectors and the excess switched from a positive to a negative in two sectors.

Large increases in the location quotient occurred in several sectors, including a gain of 1.14 in finance and insurance and 1.00 in real estate and rental. Only two sectors experienced a decline.

Export employment rose considerably (by more than 1,000) over the eight years in four sectors and by moderate amounts in several other sectors. The largest increases were in the finance and insurance, wholesale trade, retail trade, and accommodation and food services sectors. Only two sectors experienced a decrease.

The rest of the discussion in this subsection examines sectoral changes in excess employment and export employment by subsector and industry. The industry data should be used cautiously due to errors and reclassifications of some establishments from one industry to another.

Most sectors registered increases in both excess employment and export employment. Those with the largest gains follow:

- Finance and insurance posted the largest increase in both excess employment and export employment. Nearly all of the increases occurred in the credit intermediation subsector. Big gains in some industries — particularly real estate credit and commercial banking — were somewhat offset by decreases in other industries — it is not known how much of these shifts may be due to reclassifications of existing establishments.
- Retail trade had the second-largest increase in excess employment and the third greatest in export employment. The gains occurred in a number of subsectors and industries, with none of especially large size.
- Wholesale trade had the third-largest increase in excess employment and the second largest in export employment, but due to the changes in the NAICS, it is not possible to determine which activities had the largest increases.
- The accommodation and food services sector had the fifth-largest gain in excess employment and the fourth-greatest increase in export employment. Most of this occurred in the food services subsector.
- Real estate and rental registered the sixth-largest increases on both excess employment and export employment. The residential property managers industry accounted for nearly all of the gains.
- Manufacturing experienced the fourth-largest increase in employment but only ranked ninth in export employment. The increases occurred primarily in the transportation equipment subsector's space vehicle propulsion units industry and in the primary metal subsector. Several subsectors had modest-to-moderate decreases, particularly electronics (the semiconductors and bare printed circuit boards industries) and machinery.

- The professional, scientific and technical services sector had lesser increases on both measures. The research and development industry had a large increase in excess employment. Smaller increases in the human resources consulting industry were offset by losses in the computer systems design industry.
- The arts, entertainment and recreation sector also posted lesser increases. The gains were in the amusement, gambling and recreation subsector. Casinos had a moderate increase in excess employment and the golf courses and country clubs industry had smaller gains on both measures.

Two sectors experienced losses in both excess employment and export employment. The largest loss in both measures occurred in the management of companies sector. The construction sector also declined, but due to the changes in the NAICS, it is not possible to determine which activities had the largest decreases.