

Final Report:

The Sonoma County Economy

Prepared for:
The Sonoma County Innovation Council

Prepared by:
Moody's Economy.com

December 2008

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EXECUTIVE SUMMARY

The economy of Sonoma County is at a crossroads as a new decade approaches. It enjoys enormous advantages in terms of its natural resources, its skilled workforce and its enviable quality of life. The county also enjoys many opportunities as a number of smaller industries and enterprises emerge to lead the economy forward. And yet, there are challenges too, as a variety of factors generate constraints on resources, as its leading industries strive to compete in a global marketplace, and as new enterprises and activities struggle to establish themselves.

The county is fortunate to have a wide array of public programs, private initiatives and public/private partnerships that strive to turn economic challenges into advantages, and opportunities into realities. Periodically, it is important to take a step back, assess the economic landscape and search for new and innovative ways to support the people and the organizations that make up the fabric of the county's economy. The purpose of this study is twofold. First is to help make this assessment. Second is to create some tools by which the Sonoma County Innovation Council and the broader community can identify initiatives for the county to take advantage of its unique resources and to keep the economy vibrant and competitive so that its benefits are enjoyed by all members of the community.

This report is divided into five sections. The first outlines important measures of economic competitive advantage for Sonoma County and compares it with other locations in the Bay Area, as well as with California and U.S. averages. The second identifies the primary building blocks of the economy by identifying clusters of industries that are expected to drive the economy in coming years. The third describes a forecasting model that has been created for the economy that outlines the pattern of expected growth for the clusters and the entire economy. The fourth provides a focus on the county's demographic patterns. The fifth provides the results of seven alternative scenarios that reflect potential policy issues for Sonoma County.

Section 1: Competitive Advantage

Sonoma County benefits from a long period of entrepreneurship that has resulted in high per capita income and, through the end of the 1990s, strong growth in per capita income. As the economy has gone through a period of restructuring since 2000, however, Sonoma County's income growth has lagged behind much of the rest of the state and the country. The area is not alone in the Bay Area, however, as San Jose and San Francisco's income trends have been even worse over the course of this decade.

Sonoma County has a number of advantages for long-term growth. By some measures, Sonoma County is very competitive with the U.S., but is not so competitive with the larger Bay Area metro areas. For example, the educational attainment of the workforce is higher than the national average, but lower than in San Francisco, Oakland or San Jose. Similarly, the productivity of the economy surpasses the U.S. norm, but only exceeds Napa County within the Bay Area. Sonoma County has a more diverse economy than San Francisco or

San Jose, but Oakland and even Solano County have greater economic diversity, and thus more opportunities for growth over the long term.

In terms of the cost of doing business, Sonoma County is regionally competitive with much lower costs than in San Jose, San Francisco or Oakland. The relatively good availability of office space in the county today means that there is room for firms to expand, and space is likely to be available at more moderate rates than elsewhere in the Bay Area. And yet its costs are still nearly 10% higher than the U.S. average. Similarly, housing affordability is better than the larger Bay Area metro areas, but still very uncompetitive compared to the national norm. And finally, recent growth trends, in terms of population and employment, have been rather weak in Sonoma County. It should be noted, however, that the Census Bureau estimates that local population growth rose in 2007 for the first time since 2003, indicating some improvement has already occurred in recent quarters.

Section 2: Economic Clusters

Nine clusters of industries are identified that have characteristics of a high concentration, rapid growth or both. As such, they provide a foundation for the economy's future and a way to provide focus for policy initiatives. These nine clusters are:

1. Agriculture, Food and Wine
2. Technology-Producing Industries
3. Tourism
4. Construction and Green Services
5. Creative Professional Services
6. Health and Wellness
7. Wealth Management
8. Retail Trade
9. Wholesale Trade

These clusters should be thought of as building blocks for the economy. They have distinct characteristics, and yet there are many linkages between them in terms of resources, markets and policy. For example, Cluster 1 (agriculture, food and wine) and Cluster 3 (Tourism) are obviously linked as visitors come to enjoy the vineyards, wine and unique food products of the county. Increasingly Cluster 6 (health and wellness) also is linked to these as health and wellness services are linked to travel and tourism as well as to local demand.

Separately, Cluster 2 (tech-producing industries) and Cluster 5 (creative professional services) are closely linked through research and development and business support services. Similarly, Cluster 4 (construction and green services) is linked to these two as it is supported by the research and manufacturing expertise that has developed in the county.

Finally, Clusters 7, 8 and 9 play unique roles in the local and regional economy. Wealth management provides needed financial infrastructure for investment in local enterprises and entrepreneurs. Retail trade has an unusually large concentration in the county, due in part to

its links to tourism. But it also can play a large role in providing markets for unique products in the county. Wholesale trade is a broad and rapidly growing industry serving a region beyond the borders of Sonoma County. It may be difficult to view trade, particularly wholesale trade, as a driving cluster for the economy. These clusters often are thought of as operating in the background of other more dynamic clusters. But based on their concentration and growth, the data suggest that they be considered by policymakers as potential future sources of growth for the economy and for the labor force.

Section 3: Economic Forecast

A customized econometric model has been created to simulate the unique structure of the economy based on its nine clusters. The model also specifically includes components that model the growth and characteristics of the labor force and local resources that support the economy.

The model projects that long-term growth, as measured by employment, will occur fastest in the Creative Professional Services cluster. Health and Wellness, Tourism and Wealth Management also will grow faster than average over the next ten years. Other industries that have provided so much support for the economy in past years, such as Agriculture, Food and Wine as well as Tech-Producing Industries, will grow more through productivity gains and expansion into new or niche markets. Thus, their contribution to job growth may be small, yet they will still be critical industries that generate income and wealth and also support other clusters in the economy. By the end of the forecast horizon, the Construction & Green, Health & Wellness, Retail, and Tourism industries will be roughly the same size, employing between 22,000 and 24,000 workers each. The Wholesale, Tech-Producing and Wealth Management industries will remain small but will all see positive employment growth throughout the ten-year forecast horizon.

Section 4: Demographic Forecast

Population and labor force trends in the county are changing rapidly. Experienced workers will be leaving the labor force in coming years as the baby boom generation ages. Similarly, a long period of rapid population growth has come to an end. The U.S. Census Bureau estimates that population growth in Sonoma County has fallen between 2002 and 2006, achieving positive growth again in 2007. The California Department of Finance also concludes that demographic trends have weakened, although it estimates that population growth remained modest but positive at rates of less than 1% annually since 2002. The forecast projects a further acceleration in population growth in coming years to a rate that will once again exceed 1% annually. Population growth is not expected to go back to the rapid rates of the 1970s or 1980s when it regularly exceeded 3% per year, but it will look more like the moderate growth of the first half of the 1990s.

As net domestic migration has turned negative, the population and labor force have been supported in recent years by international immigration. Thus, the composition of the population and the labor force is changing and will continue to do so. For example, in 2006 the Hispanic population accounted for 22% of the total. In ten years its share may rise to just

shy of 40%. In the early years of the coming decade, not only will labor force growth slow considerably, but it will be younger and less experienced with fewer skills. And yet these two factors—measured by labor force participation rates and educational attainment of the population and labor force—ultimately determine the economy’s long-run growth potential. These measures are explicitly included in the Sonoma County forecast model and are broken down by age and ethnic group.

Section 5: Alternative Scenarios

The Sonoma County Innovation Council has identified several critical natural resource and economic policy issues to be addressed by the economic model. Issues of particular interest include: water availability/constraints, anticipated energy availability/restrictions, climate control regulations, workforce quality and shifts in global competitiveness. Briefly the seven scenarios are as follows:

Scenario 1: Energy Cost Savings

The first scenario illustrates the impact of a permanent 10% reduction in energy costs. Such cost savings could be the result of new energy production facilities or public subsidies for the development or dissemination of efficiency-improving technological developments.

By 2020, a 10% energy cost savings is found to increase county employment by 2,900 workers, which amounts to about 1.3% of area payrolls. Real Gross County Product is found to increase by \$274 million and local government tax collections by \$16.1 million.

Scenario 2: Waste Management and Emissions Cost Savings

The second scenario illustrates the impact of a permanent 10% reduction in waste management and emissions costs. Such cost savings could be the result of new capital projects such as bike paths or transit systems. Public subsidies for the development or dissemination of green technologies can lower costs as well.

By 2020, a 10% reduction in waste management/emissions cost savings is found to increase county employment by 1,500 workers, which amounts to about 0.7% of area payrolls. Real Gross County Product is found to increase by \$108 million and local government tax collections by \$6.3 million.

Scenario 3: Water Cost Savings

The third scenario illustrates the effects of a permanent 10% reduction in water costs. Such cost savings could be the result of public subsidies for efficiency improvements, water conservation programs, or new capital expenditures on treatment facilities.

By 2020, a 10% water cost savings is found to increase county employment by 3,800 workers, which amounts to about 1.8% of area payrolls. Real Gross County Product is found to increase by \$327 million and local government tax collections by \$19.3 million.

Scenario 4: Lowering the Tax Burden

The fourth scenario illustrates the effects of a permanent 10% reduction in effective corporate tax rates (that is, revenues per dollar of profits). On average, business taxes amount to 5% of the overall cost of doing business in Sonoma County.

By 2020, a 10% decrease in the corporate tax burden is found to increase county employment by 900 workers, which amounts to about 0.4% of area payrolls. Real Gross County Product is found to increase by \$82 million. Local government tax revenues would indirectly rise by \$5.7 million because of the additional growth, offsetting more than 5% of the direct revenue decline caused by the statutory tax cuts.

Scenario 5: Increasing Regulatory Efficiency

The fifth scenario illustrates the effects of an increase in the efficiency of government regulations. In the scenario, it is assumed that innovations lead to an average annual savings of 100 hours worked per firm across all industries.

By the end of the forecast horizon, a 100-hour-per-firm increase in regulatory efficiency is found to increase county employment by 600 workers, which amounts to about 0.3% of area payrolls. Real Gross County Product is found to increase by \$28 million and local government tax collections by \$2 million.

Scenario 6: Lower housing costs

In an alternative scenario for house prices, it is assumed that once Sonoma County goes through the existing housing cycle, house-price appreciation is much slower than the baseline projection through the remainder of the forecast horizon. By the end of 2017, the median sales price for single-family homes is nearly \$100,000 lower than in the baseline forecast. The result of lower house prices is to raise demand for housing. Thus, residential construction permit issuance rises and construction employment is higher for the first two years of the scenario. Population growth into Sonoma County is higher as well, particularly after the housing market cycle ends in late-2009 and early 2010. Faster population growth spurs faster job growth, although the increase in job growth is concentrated in the lower-skilled employment sectors.

Scenario 7: Workforce improvement

This scenario is a combination of several assumptions regarding the improvement in educational attainment levels of Sonoma County's Latino population. Upper-, lower- and middle-range improvement scenarios are combined with the assumption that the

college attainment level of the Latino population increases by 10%. The lower bound scenario assumes that the gap in high school attainment rates between Latinos and non-Latinos narrows over the forecast horizon, with the high school dropout rate for Latinos falling at the same pace as that for non-Latinos. The mid-range scenario assumes that the share of the Latino population with less than a high school diploma falls by half by 2020. In the upper bound, or best case scenario, the share of Latinos with less than a high school diploma falls to 3% by 2020, matching the rate for non-Latinos in the county. The impact of higher educational attainment raises not only the quantity but also the quality and productivity of the labor force. When this most optimistic scenario is combined with the assumption of a 10% increase in both the college and some college attainment rates, county employment rises by 3% over the baseline forecast, or about 6,500 jobs, by 2020. Real Gross County Product increases by 3.4% above the baseline, or by \$800 million. County tax revenues increase by \$54 million by 2020.

Scenario 8: Trade Shock

To illuminate the effects of changing terms of trade on the regional economy, an alternative forecast scenario was produced to reflect an environment of a weaker dollar. To put the change in perspective, the shock to the trade-weighted exchange rate was designed to match the size of the movements seen during the Asian financial crisis of the last decade. However, instead of the dollar becoming stronger as it did during the 1990s, the alternative scenario assumes a rapid improvement in terms of trade. Specifically, the dollar is roughly cut by one-third over a three-year period, but regains around half of these losses over the next few years.

All told, the boost to producers from a weaker dollar more than offsets the reduction in household buying power. The assumed movement in exchange rates leads to a maximum increase in area employment of just over 1%. Given the profits earned by area exporters, output increases are somewhat more pronounced.

Many of the economic gains flowing from improved terms of trade will be accrued by the agriculture and tourism clusters, which enjoy the strongest direct ties to the global economy. Local consumer service industries and retailers fare the worst, given their relative lack of exports and high degree of exposure to regional household buying power.

SECTION 1: COMPETITIVE ADVANTAGES OF THE SONOMA COUNTY ECONOMY

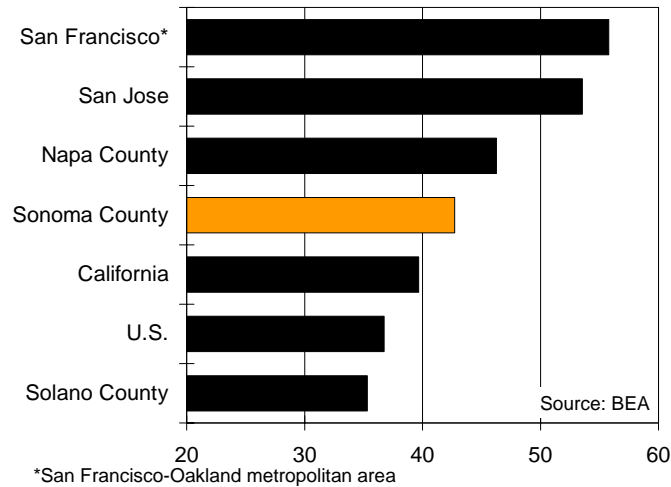
The economy of Sonoma County is at a crossroads as a new decade approaches. It enjoys enormous advantages in terms of its natural resources, its skilled workforce and its enviable quality of life. The county also enjoys many opportunities as a number of smaller industries and enterprises emerge to lead the economy forward. And yet, there are challenges too, as a variety of factors generate constraints on resources, as its leading industries strive to compete in a global marketplace, and as new enterprises and activities struggle to establish themselves.

This section reviews some of the basic economic indicators for the county, compares them to other areas of the Bay Area and to national norms, and identifies strengths and challenges that emerge from these indicators.

Per Capita Income

The entrepreneurship evident in Sonoma County over past decades has developed an economy of specialized and high-value products that has resulted in a level of income that exceeds both U.S. and statewide averages. In 2006, per capita income approached nearly \$43,000 (see Chart 1).

Chart 1: Sonoma County's Income Leads State and U.S.
Per capita income, 2006, ths \$

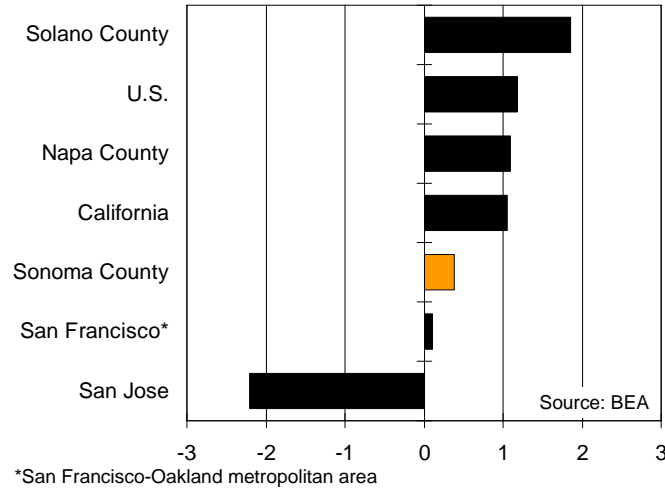


While per capita income is high versus the broad averages for California and the nation, it remains below nearly all the rest of the San Francisco Bay Area. Only Solano County has lower per capita income within the Bay Area.

The rate of growth of per capita income in Sonoma County has slowed in recent years, a result of the rapid restructuring of the county's economy following the 2001 recession that included the loss of many highly paid jobs in technology-producing industries. In prior years, the county's growth rate consistently beat the California and U.S. growth rates, during the 1970s, the 1980s and the 1990s. Since 2000,

however, per capita income growth has lagged considerably behind not only the U.S. and the state, but behind nearly all of the Bay Area as well (see Chart 2). The pace has picked up during the past several years, but still has not managed to take the lead.

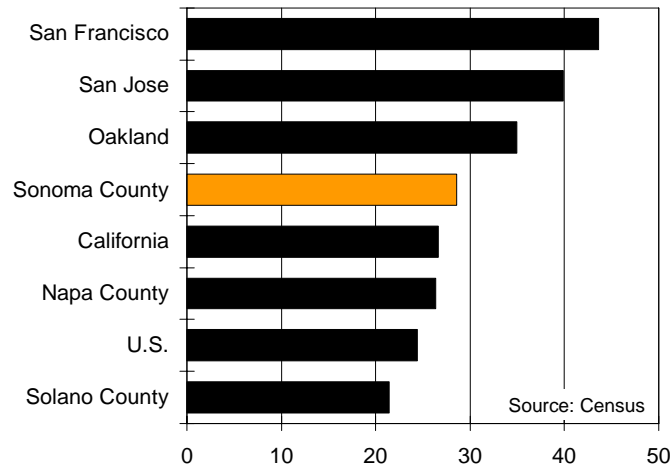
Chart 2: Restructuring Has Hindered Income Growth
Real per capita income, annualized % change, 2000-2006



Educational Attainment

One of Sonoma County’s greatest comparative advantages lies in the quality of the local workforce. Workforce quality, business investment and compensation are highly linked such that a high-quality labor force is associated with positive economic growth over the long run. As measured by the percentage of adults with a bachelor’s degree, the county is well ahead of the state and the U.S. averages, and also ahead of neighboring Napa and Solano counties (see Chart 3). The availability of skilled labor is advantageous for the development of high-wage industries and high-skill occupations and should support the economy’s continued restructuring and growth. Evidence of these links is the rising number of jobs over the past three years in accounting, legal, scientific and technical service industries as the economy and industrial production have accelerated. Sonoma County trails behind San Francisco, San Jose and the Oakland metropolitan areas, although this should not be surprising given the large number of universities in these areas. But Sonoma County offers an alternative location and an alternative labor pool, particularly when labor market conditions tighten elsewhere in the Bay Area.

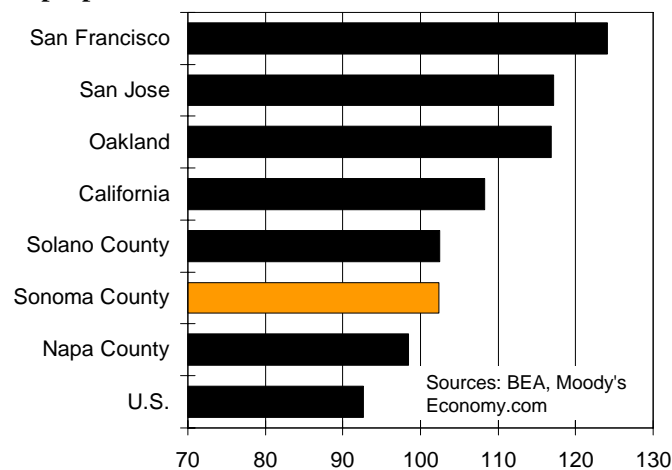
Chart 3: Workforce Quality Is Advantageous for Sonoma County
Population aged 25+ with bachelor's degree or higher, 2000, %



Productivity

Sonoma County's productivity, as measured by output per worker, is well above the national average, a reflection its high value-added industries and its skilled workforce, (see Chart 4). Within the Bay Area, however, Sonoma County ranks only above Napa County and is about equal to Solano County. It trails behind the rest of the region, and also behind the statewide average.

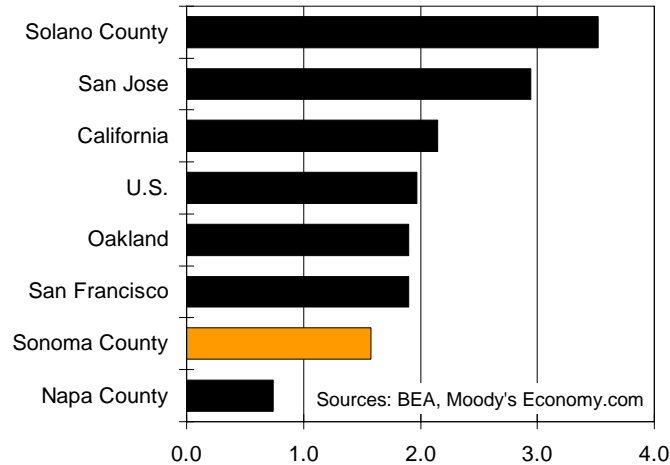
Chart 4: Productivity in Sonoma County Leads U.S.
Output per worker, 2006, \$ ths



The restructuring of the economy since 2001 has limited productivity growth in recent years, which correlates well with income trends. The county's close ties with information and other technology industries allowed for huge increases in productivity during the late 1990s. Moody's Economy.com estimates that local output per worker rose by 7% annually at its peak. Since then, however, it has been difficult to replicate that rapid gain in productivity. Since 2000, productivity growth in the county has not even kept up with the U.S. or statewide averages (see Chart 5).

Maintaining a high level of productivity is an essential aspect of Sonoma County’s comparative advantages. Strong productivity growth is essential for maintaining its high standard of living and guaranteeing the economy’s long-term potential rate of growth. When taken down to the very basics, the long-term potential growth rate is determined by two factors: the growth rate of the labor force and the growth rate of productivity. Further, high productivity will place the county in a good position to compete in global markets, to attract business investment over the long term.

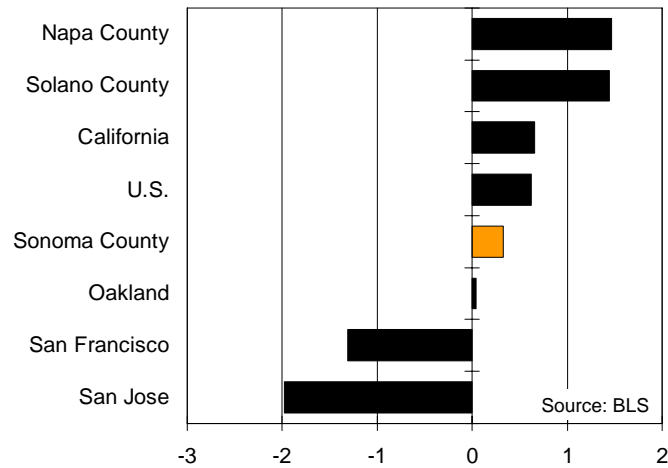
Chart 5: Productivity Growth Has Slowed
Output per worker, 2000-2006, annualized % change



Employment Growth

The restructuring of Sonoma County’s economy since the 2001 recession is evident in its labor market trends. Not only did it take nearly three years for a return to job growth after the recession, but the rate of growth after 2004 has been moderate at best; its annualized rate of growth so far this decade has lagged behind statewide and U.S. trends (see Chart 6).

Chart 6: Labor Markets Have Been Slow to Recover
Employment, annualized % change, 2000-2007



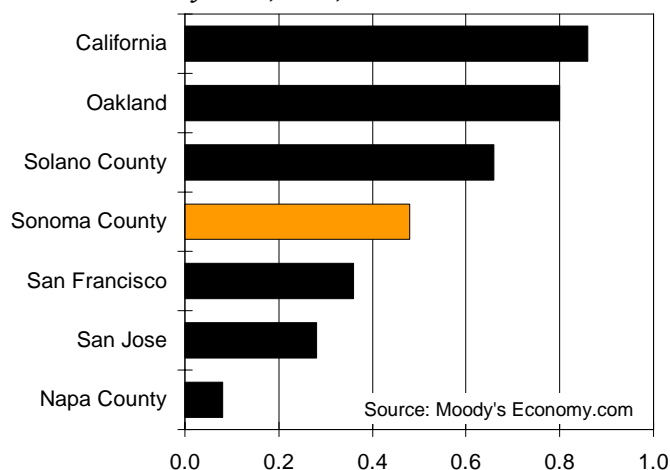
In one respect, however, the county’s economy is now at a turning point because total employment, as measured by the BLS payroll survey, has just surpassed its previous high recorded in 2001. Between 2001 and 2003, employment fell by nearly 5%, a loss of 10,000 jobs. The loss of jobs among the electronics, telecom and optical network industries among others has been replaced by expansion of professional and technical services. Additionally, Sonoma’s long-standing tourism industry remains healthy. Leisure and hospitality employment never fell at the start of the decade and has maintained steady, if moderate, growth ever since.

While Sonoma County may well lag behind its larger neighbors for productivity and income growth, its job growth has exceeded that seen so far this decade in San Francisco, Oakland and San Jose. If the recession and subsequent restructuring in Sonoma County was painful and slow, it was even worse in these other three areas.

Industrial Diversity

One factor that has helped Sonoma County’s economy to recover is its diversity, at least when compared to San Francisco and San Jose. As the technology-producing industries faltered, there were others that continued to support employment and income gains. Nevertheless, the county’s economy is somewhat specialized, as indicated by its industrial diversity index of less than 0.5 on a scale that is based on 1.0 representing an economy that mirrors the industrial structure of the U.S. (see Chart 7).

Chart 7: Sonoma County's Narrow Economic Base
Industrial diversity index, 2006, U.S. = 1.0



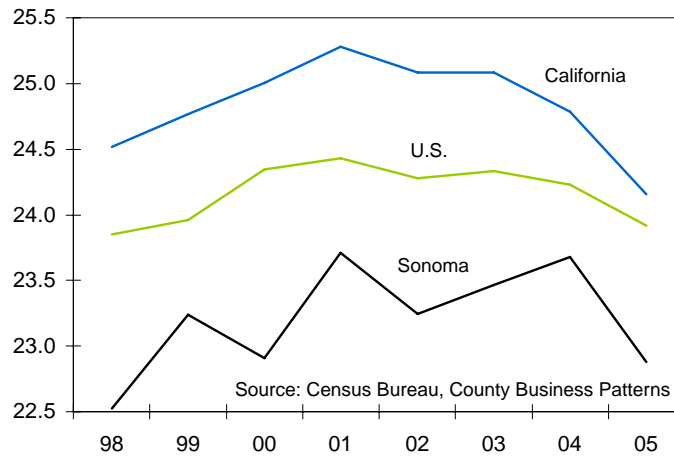
The specialized nature of Sonoma County's economy, therefore, exposes it to some downside risk with potential for additional periods of volatility. Further, the economy has become increasingly specialized over time as its diversity index fell from 0.65 in 1970 to a low of 0.45 in 2000. Since then, with some restructuring away from technology and telecom industries, the index has risen back to 0.48. Further diversification of the economy in coming years could lead to a more stable pattern of growth over the long term.

Second-Stage Companies

Even if an economy is not particularly diverse, it can benefit from the presence of small to midsize companies. So-called second-stage companies—defined as firms that employ between 10 and 99 employees—have a propensity to grow and expand their payrolls. Second-stage companies do play an important role in the Sonoma County economy as they account for nearly a quarter of the county's total number of establishments (see Chart 8).¹ Such establishments are also vital as they attract investment and skilled-workers while simultaneously driving culture and community growth.

¹ While the term second-stage company is used, the measure from the Census Bureau's County Business Patterns is the number of establishments with 10 to 99 workers. An establishment is a single physical location where business transactions take place and for which payroll and employment records are kept. Groups of one or more establishments under common ownership or control are firms. A single-unit firm owns or operates only one establishment. A multi-unit firm owns or operates two or more establishments. See <http://www.census.gov/epcd/cbp/view/cbpmethodology.htm> for more information on County Business Patterns definitions.

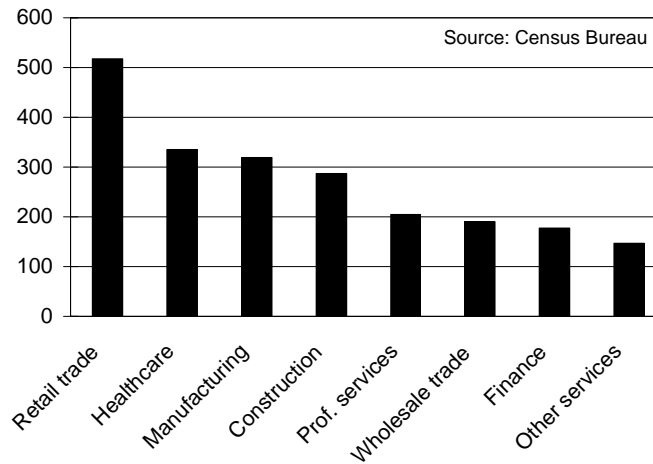
Chart 8: Second-Stage Firms Nearly a Quarter of Total...
Second-stage establishments, % of total



The concentration of establishments with 10 to 99 employees in Sonoma County is nearly as great as the U.S. average, although California as a whole has a higher concentration than the U.S. or Sonoma County. Still, there were over 3,000 second-stage establishments in Sonoma County as of 2005, which is the most recent year for which data are available. Thus, there is very good potential to support the growth of these establishments through local policy initiatives.

Second-stage companies are distributed rather evenly across the various industries that make up the Sonoma County economy. Above all, retail trade has the largest number. Healthcare and construction also account for a large number. This should not be surprising as these industries often are composed of entrepreneurs or professionals that manage small independent operations. A more surprising feature of the economy is that manufacturing has about the same number of second-stage enterprises as healthcare and construction (see Chart 9). This is important because generally manufacturing enterprises—large or small—are components of the county’s so-called basic economy, which sells its goods or services outside of the local area and thus generates income for the local economy. A variety of services make up most of the remaining concentrations. The breadth of second-stage enterprises across a variety of industries, including manufacturing, provides policymakers with many options to pursue in order to support and encourage the growth and success of the broader economy.

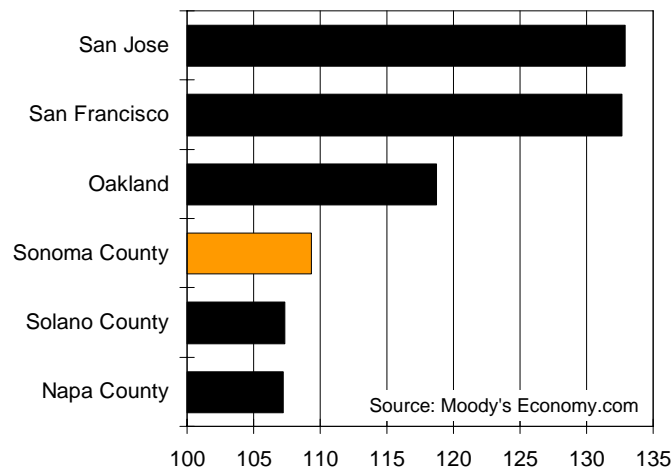
Chart 9: ...And Are Important for a Variety of Industries
Second-stage companies, # per industry



Cost of Doing Business

Another factor providing some regional competitive advantage is its cost of doing business (see Chart 10). As measured by a cost of doing business based on the U.S. equaling 100, the county is well below San Francisco, Oakland and San Jose. The index is based on four factors: unit labor costs, energy costs, the tax burden, and office rents. Thus, given the skilled labor force and the relative local advantage with regard to the cost of doing business, Sonoma County has good potential to compete within the region for a variety of industries.

Chart 10: Sonoma's Business Costs Are Regionally Competitive
Cost of doing business index, 2006, U.S. = 100



And yet, Sonoma County must compete with more than just other Bay Area metropolitan areas. Here the county is at a disadvantage as its cost index is 9% above the national average, and it is less competitive with the rest of the West as well.

The breakdown of Sonoma County's cost of doing business index shows that the area is not uncompetitive across all cost factors. Local unit labor costs and the tax burden are a shade below the national average while energy costs are about 50% above average and office rents are about 10% above average.² Notably, since 2003, the overall cost of doing business has steadily declined due in part to improved electric utility rates following the severe power shortage earlier this decade. The county's latest cost index of 9% above the U.S. average is improved from 114% at the height of the electric power crisis in 2003.

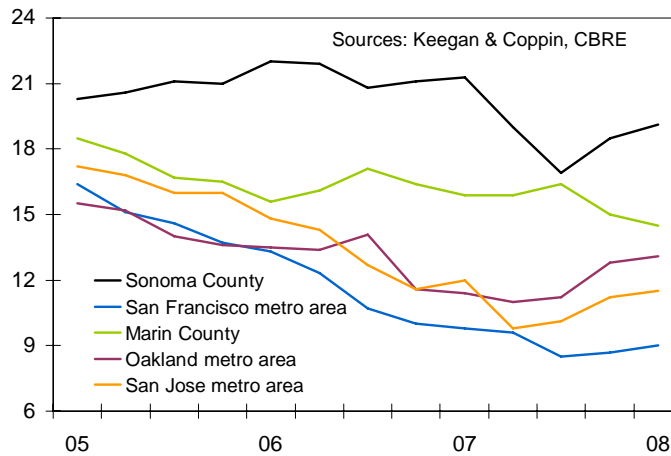
Commercial Real Estate

Prices for commercial real estate help to expand Sonoma County's comparative advantage versus the rest of the Bay Area. Its commercial real estate market has weakened over the past year in line with the nationwide commercial real estate market. Vacancy rates on suburban and metropolitan office space began to rise nationally toward the end of last year as demand for office-using employment fell. Lower demand for office space brought a peak in commercial real estate prices in December 2007. Nationwide demand for industrial real estate is even weaker, as lower levels of absorption have led to a persistent rise in the industrial vacancy rate to 10.5% from its cyclical low of 9.5% in the third quarter of 2006.

Sonoma County exhibits much of the same recent weakness. The county's structurally high office vacancy rate rose to 19.1% in the first quarter of 2008 from 18.5% in the last quarter of 2007 and 16.9% in the third quarter, according to information provided by Keegan & Coppin Company. However, the office market has improved over time; the office vacancy rate has declined from a level of nearly 22% two years ago (see Chart 11).

² Unit labor costs are measured as earnings per dollar of output; the tax burden is total taxes and fees as a percent of total personal income; energy costs are the average price per kilowatt-hour charged to commercial and industrial users; and office rents are the average price paid per square foot of class A office space.

Chart 11: Office Space Is Readily Available in Sonoma County
Office vacancy rate, %



The county’s high office vacancy rate, however, creates some advantage in the near term. There is ample space in Sonoma County for business expansion, whereas other markets, particularly downtown San Francisco, can be classified as undersupplied, Sonoma County suffers from no such constriction and thus businesses also have better bargaining power on leasing rates, which may lure businesses to the county.

Sonoma County’s industrial real estate market offers less of an advantage versus the rest of the Bay Area. Space is ample; the county’s industrial vacancy rate is 14% according to Keegan & Coppin. But vacancy rates elsewhere in the Bay Area also are in the low teens so the difference is not great. So, while availability and pricing for office space are favorable for economic expansion, Sonoma County industrial space offers less of a relative advantage versus the Bay Area than does its office space.

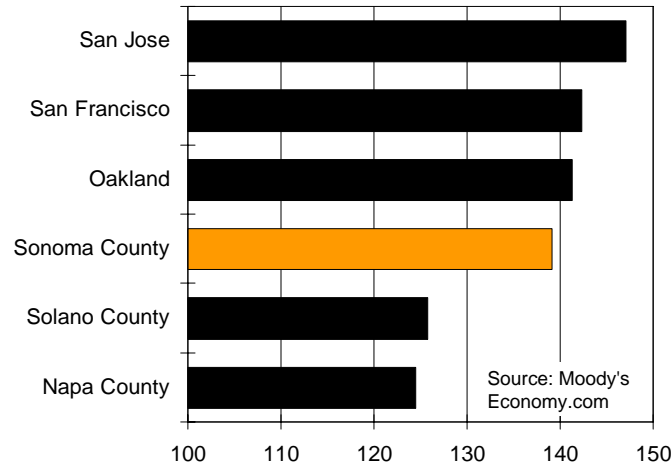
Cost of Living

Sonoma County fares less well for its cost of living. It is only slightly below the larger Bay Area metropolitan areas and is nearly 40% higher than the U.S. average (see Chart 12). The overall cost of living is an important determinant of migration patterns, long-run economic potential, and quality of life. Sonoma County’s cost of living index rose from about 130 to 140 between 2000 and 2006, largely due to rising housing costs, which make up a large share of the index.³ The cost of living index likely will improve when all data become available for 2007 due to the ongoing correction in house prices. While Sonoma County benefits from the inflow of migrants from comparatively higher-cost areas such as San Jose and San Francisco, the county is annually losing a larger number of migrants than it receives, according

³ The cost of living index measures the relative cost to the average household in the nation to maintain its standard of living in each metropolitan area. The index is created by summing expenditures on various components of consumption in each metropolitan area relative to average U.S. expenditures on the components. The components that vary across metropolitan areas include housing, food and apparel, utilities, transportation, and auto insurance.

to Census estimates. One direct consequence of poor migration trends, and by extension the high costs that encourage them, is a slower rate of labor force growth.

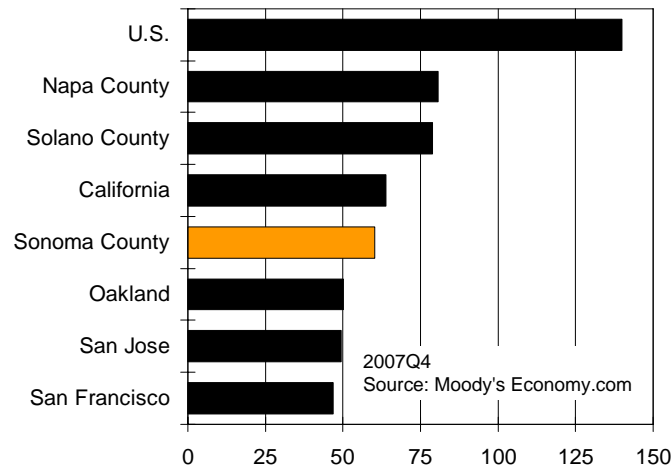
Chart 12: High Living Costs in Sonoma County
Cost of living index, 2006, U.S. = 100



Housing Affordability

Housing affordability remains a problem for Sonoma County. As recently as 2006, a family earning the median income in Sonoma could afford to pay less than 50% of the required mortgage payment on the median-priced home. Although the recent downturn in house prices is disheartening for homeowners, at least it is resulting in some improvement in the market's affordability. As of the end of 2007, the affordability index had risen to 60 (see Chart 13).

Chart 13: Housing Affordability Is a Long-Term Weakness
% of median house price median-earning family can afford



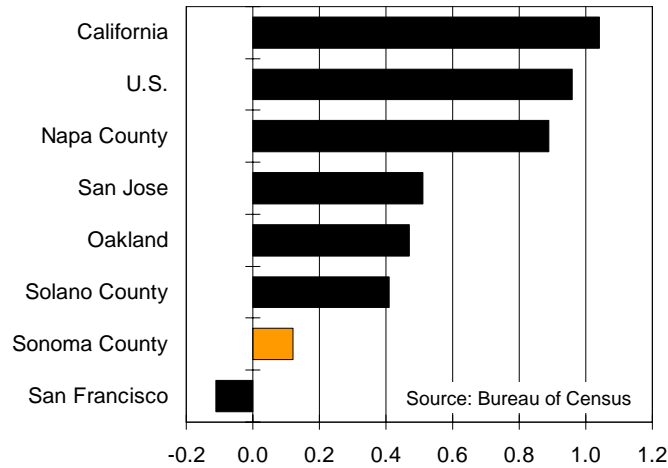
Affordability has improved, and is still better than in San Francisco and San Jose—two of the least affordable housing markets in the country. But Sonoma County remains significantly less affordable than Napa and Solano counties, and well below

the national average. Further, the recent improvement from 50 to 60 is significant but the Sonoma County housing market is still much less affordable than it was in the late 1990s when the affordability index reached 90. By this historical measure and by comparison with the U.S., the county's housing market has a way to go before affordability is not a constraint on the economy.

Population Growth

The moderate pace of job growth and the lingering lack of affordability constrain Sonoma County's population growth. Since the beginning of the decade, there has been virtually no population growth in the county (see Chart 14). According to the Census Bureau's estimates, population fell for three consecutive years during 2004 to 2006. Only in 2007 did it turn positive again with a 0.4% growth rate, about half the national average. This remains, however, in stark contrast with the previous three decades in which the county outpaced the nation. However, it bears mentioning that independent estimates from the California Department of Finance's Demographic Research Unit depict population growth in a somewhat more positive light. Under these estimates, population growth decelerated sharply following the last recession, but did not decline between 2004 and 2006, as indicated by the Census estimates. The DRU estimates a provisional population growth rate for 2007 of 0.9%, which remains no better than the U.S. or statewide rates.

Chart 14: Population Growth Among Slowest in Bay Area
Population, annualized % change, 2000-2007



SECTION 2: ECONOMIC CLUSTERS FOR SONOMA COUNTY

Economic clusters are groups of related industries that drive the economy. They do this in two ways. First, they are, in most cases, industries that are growing faster than average, and thereby create jobs and generate demand for other goods and services in the local economy. Second, they create wealth in the economy by selling their goods or services to markets outside of the county or to visitors from outside that spend their money within the county. Another term for the industries in these clusters is “basic” industries, because without them the economy would not expand and wealth would not be created.

The basic industries that compose the clusters build on the comparative advantages that are inherent in Sonoma County’s resources—its workforce, its natural resources, and its capital. These resources are plentiful. For example, the county’s workforce is relatively skilled. Its natural resources are bountiful, as attested by its rich soil, mild climate, and extensive shoreline, forests and parklands. It has built up local capital through entrepreneurship over the past several decades. This is indicated by the county’s high per capita income. And yet, as indicated by the slowdown in per capita income growth, the county’s economy has lost some of its luster in recent years.

Since comparative advantages in a regional or local economy shift over time, it is appropriate to look at measures that can identify the strengths of today’s economy. To accomplish this, a detailed study of recent employment trends by detailed industrial classifications is undertaken to identify current and emerging basic industries that drive the economy today or may become economic drivers in coming years.

Criteria for Industry Components of Clusters

Basic industries are identified as those that have a high degree of concentration in the county. Industries concentrate or cluster in an area to take advantage of the area’s comparative advantages. Thus, industries that have a high degree of concentration are good candidates to include in a cluster for policy analysis. Also, industries that may not yet be highly concentrated, but are rapidly growing and are increasingly concentrating in the area also are good candidates for inclusion in one of the county’s clusters.

To identify the basic industries to be included in a cluster, two measures are used:

1. Employment growth: The annualized rate of growth over the past ten years, 1997 to 2007.
2. Relative concentration: A measure of how prevalent an industry is in the county. The measure of relative concentration is called a location quotient (LQ). An LQ is a simple ratio that divides the percent share of employment in an industry in Sonoma County by the percent share of

employment in the same industry in the U.S. Thus, if an industry accounts for 5% of total employment in the county and also 5% of total employment nationwide, the industry's LQ equals 5 divided by 5 or 1.0. If an industry accounts for 10% of the county's employment but just 5% of U.S. employment, the industry's LQ equals 10 divided 5 or 2.0. An industry with an LQ greater than 1 is considered a basic industry because it has a high relative concentration.

The determination of clusters is a two step process. The first is to determine the universe of industries that can be considered basic industries, or those that appear to be on a track to becoming basic industries (see Appendix 1). To do so, employment data are used at the detailed 4-digit NAICS level of industrial classification.⁴ Each industry's ten-year job growth rate and its location quotients for each of the past ten years are calculated. Then each industry is assigned to one of four categories:

1. Stable Industries: Rising or stable employment with a high relative concentration (LQ above 1.0).
2. Emerging Industries: Rising employment and increasing concentration (LQ below 1.0 but rising).
3. Faltering Industries: Falling employment but still high concentration (LQ above 1.0).
4. Diminishing Industries: Falling or stable employment and low concentration (LQ below 1.0 and falling).

Each Category 1 (stable) and Category 2 (emerging) industry is a basic industry or shows the potential to become a basic industry and so is a candidate for inclusion in one of Sonoma County's economic clusters.

The second step is to combine basic industries into clusters that share common characteristics. While the first step is entirely analytical, this second step involves some judgment. Industries combined together in a cluster have common characteristics related to products, production processes, markets or labor requirements.

This two-step process resulted in the identification of nine potential economic clusters for the county. These clusters are used for four purposes:

1. To understand the broad structure of the county's economy.
2. To be able to track the growth of the economy and to determine the contribution of each cluster to growth.

⁴ See Appendix 1 for a detailed description of how industries are classified.

3. To help produce an econometric model of the economy that represents the unique structure of the county's economy for use in forecasting and creating alternative scenarios.
4. To help shape policy initiatives to encourage innovation and growth.

The clusters need not be thought of as rigid divisions of the economy. Indeed, even among two or more clusters there can be common characteristics. Further, policy can be crafted to jointly address two or more clusters. Indeed, for the purposes of policymaking, clusters may be combined further in order to address factors such as a common marketing strategy or a common development program. There is great flexibility in using the detailed industry-level data to identify the industry clusters.

One aspect of this flexibility is that it allows the inclusion of some Category 3 and 4 industries into the clusters based on the interests and knowledge of policymakers. In a few cases, a cluster was identified, but it was not considered complete unless an additional industry was included, one that might contribute to growth in the future, or simply was needed to adequately round out the definition of the cluster, despite the fact that its recent performance did not meet the exact criteria for inclusion. Thus, we start with a somewhat blind but objective approach, relying on the data to illustrate the industrial structure of the county. But we finish with inputs from individuals who are on the ground and who have good knowledge of the local situation.

The Clusters

This section describes each of the nine potential clusters that have been identified for Sonoma County (see Table 1). The clusters are:

1. Agriculture, Food and Wine
2. Technology-Producing Industries
3. Tourism
4. Construction and Green Services
5. Creative Professional Services
6. Health and Wellness
7. Wealth Management
8. Retail Trade
9. Wholesale Trade

Table 1: Composition of Economic Clusters

Industry Category*	Industry NAICS Code	Industry Name
1. Agriculture, Food and Wine		
3	FR	Agriculture
1	311	Food Manufacturing
1	3121	Beverage Manufacturing (Wineries, Distilleries and Breweries)
2. Technology-Producing Industries		
1	3344	Semiconductor and Other Electronic Component Manufacturing
3	3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
3	3391	Medical Equipment and Supplies Manufacturing
3. Tourism		
2	4811	Scheduled Air Transportation
2	4812	Nonscheduled Air Transportation
1	4851	Urban Transit Systems
1	4853	Taxi and Limousine Service
1	4855	Charter Bus Industry
2	4881	Support Activities for Air Transportation
2	4884	Support Activities for Road Transportation
1	7112	Spectator Sports
2	7121	Museums, Historical Sites, and Similar Institutions
1	7131	Amusement Parks and Arcades
1	7132	Gambling Industries
1	7139	Other Amusement and Recreation Industries
1	7211	Traveler Accommodation
1	7212	RV (Recreational Vehicle) Parks and Recreational Camps
1	7213	Rooming and Boarding Houses
1	7221	Full-Service Restaurants
2	7222	Limited-Service Eating Places
4. Construction and Green Services		
1	23	Construction
2	327	Non-metallic minerals (clay, cement, concrete products)
1	5617	Services to buildings and dwellings
1	5621	Waste collection
2	5629	Remediation and Other Waste Management Services
4	2211	Electric Power Generation, Transmission and Distribution
5. Creative Professional Services		
2	5112	Software Publishers
2	5121	Motion Picture and Video Industries
2	5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
2	5411	Legal Services
1	5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services
1	5413	Architectural, Engineering, and Related Services,
2	5414	Specialized Design Services
2	5415	Computer Systems Design and Related Services
2	5416	Management, Scientific, and Technical Consulting Services
1	5417	Scientific Research and Development Services
2	5418	Advertising and Related Services
1	5419	Other Professional, Scientific, and Technical Services
3	7113	Promoters of Performing Arts, Sports, and Similar Events
1	7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
1	7115	Independent Artists, Writers, and Performers
6. Health and Wellness		
1 & 2	621	Ambulatory Health Care Services -- would include privately owned community health care
1 & 2	622	Hospitals
1	623	Nursing and Residential Care Facilities
1	8121	Personal Care Services
7. Wealth Management		
2	5211	Monetary Authorities - Central Bank
2	5222	Nondepository Credit Intermediation
1	5223	Activities Related to Credit Intermediation
2	5231	Securities and Commodity Contracts Intermediation and Brokerage
1	5232	Securities and Commodity Exchanges
2	5239	Other Financial Investment Activities
2	5251	Insurance and Employee Benefit Funds
1	5312	Offices of Real Estate Agents and Brokers
8. Retail		
1	RT	Retail Trade
9. Wholesale		
2	42	Wholesale Trade

* Industry Category Definitions

Category 1 (Stable): Rising or stable employment and with high concentration (location quotient above 1.0).

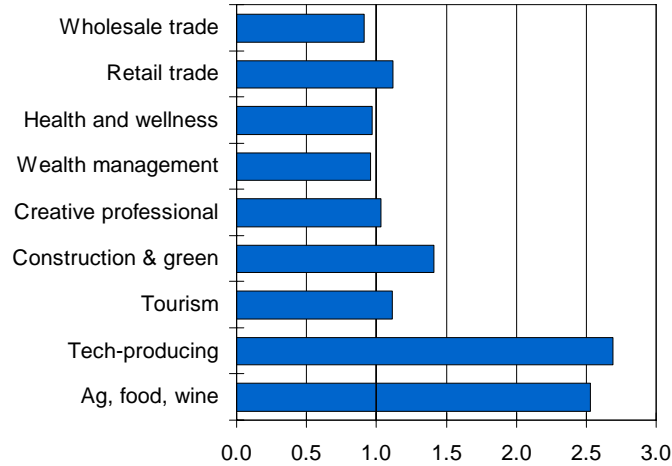
Category 2 (Emerging): Rising employment and increasing concentration (location quotient below 1.0 but rising).

Category 3 (Faltering): Falling employment but still high concentration (location quotient above 1.0).

Category 4 (Diminishing): Falling or stable employment and low concentration (location quotient less than 1.0).

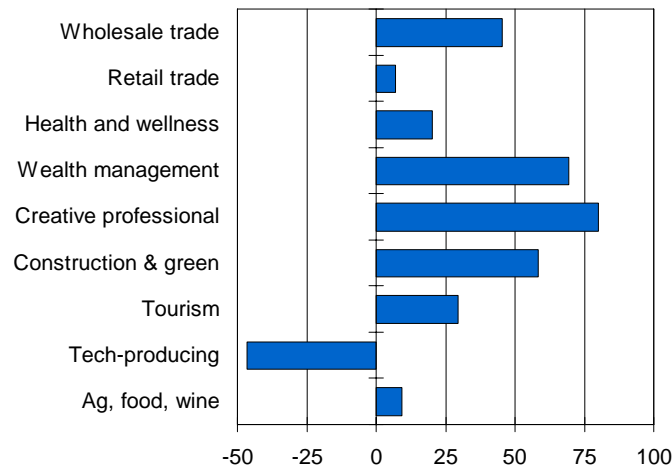
Among the nine clusters, two have an extraordinary presence in Sonoma County. The Agriculture, Food and Wine cluster and the Technology-Producing cluster each have an LQ of greater than 2.5% (see Chart 15). In other words, employment in these two clusters is two-and-a-half times more concentrated in Sonoma County than nationwide. These are the most obvious clusters that shape the local economy today. But the other seven clusters also have a driving role as well.

Chart 15: Relative Concentration of Clusters
Location quotients, 2007, 1.0=U.S. average



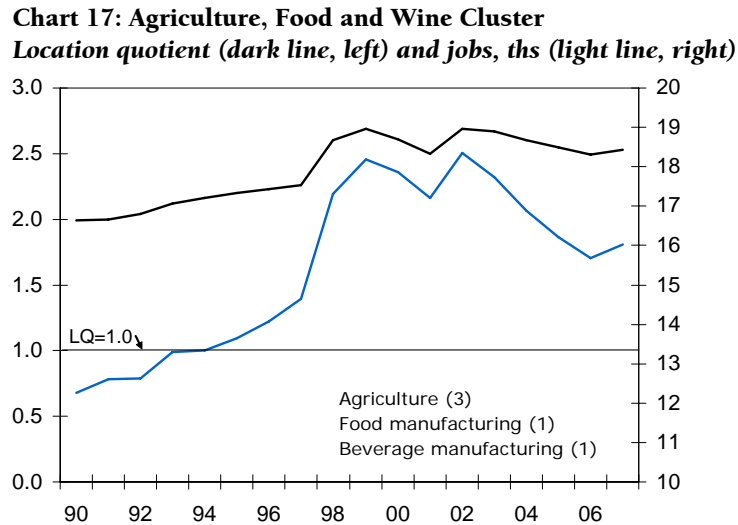
Most also have an above average concentration in the county’s workforce, and those that do not have seen rapid growth in recent years. Thus, they conform to the decision criteria of rapid growth and a high concentration in the economy. The one exception to this rule is the Technology-Producing cluster, which has seen its employment base cut by nearly half in recent years (see Chart 16). But its extraordinary concentration that remains in the county warrants that it still be evaluated regarding its role in the future growth and innovation of the local economy.

Chart 16: Employment Growth, 1997-2007
Ten-year % change



Cluster 1: Agriculture, Food and Wine

The Agriculture, Food and Wine cluster is one of the most prevalent clusters in the economy; not so much by its size—it is similar in the size of its workforce to several other clusters—but by its high relative concentration due to the well-known comparative advantages of soil and climate in Sonoma County. Its relative concentration in the economy has remained high and steady over much of the past ten years. Its location quotient today of 2.5 is the second highest of all nine clusters in the county (see Chart 17).⁵



Three industries are included in the Agriculture, Food and Wine cluster. They include all agriculture, food manufacturing, and beverage manufacturing. Thus, it includes the dominant viticulture and winemaking industries. But the industry is broader than this. It includes organic produce and fruits, specialty livestock and meats, and other specialty food products that are finding increasing demand within the restaurant and broader consumer markets throughout the Bay Area and beyond.

It is remarkable that despite a decline in employment in the industry in recent years, and despite the expansion of vineyards and wine production in many parts of the country, the cluster's LQ has remained rather constant. This indicates competitiveness of the industry in its ability to maintain its role in the economy despite challenges of recent years that include rapid global supply growth of quality wines and shortages of local labor, particularly during the annual grape crush, and pest infestations. It also illustrates the increasing diversity of the cluster as components other than winemaking continue to expand.

⁵ The industries listed in the chart are the components of the cluster. The figures in parentheses indicate the category of the industry. Category 1 is stable; Category 2 is emerging; Category 3 is faltering; Category 4 is diminishing.

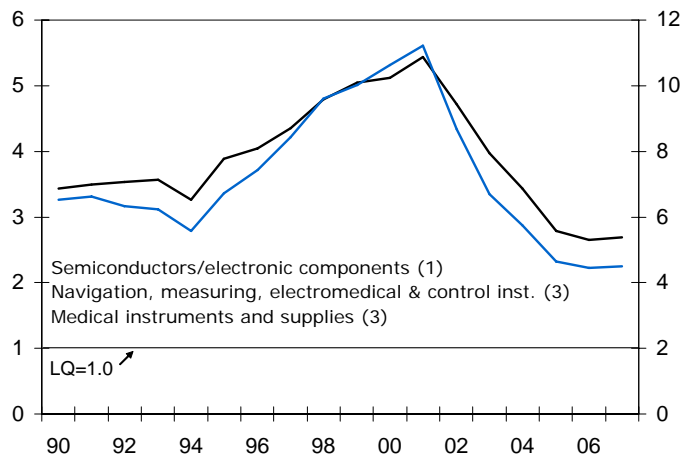
This cluster is perhaps the most global in nature of all of the county’s clusters due to the wine industry. It competes against producers from around the world that create increasingly high quality products. It competes both in the U.S. domestic market and in global markets. Thus, more than any other cluster, the dollar exchange rate and the growth of the global economy have important impacts on the performance of this cluster. Currently, the low value of the dollar and the strong growth of the global economy create some promising market conditions in terms of pricing and global market growth.

Cluster 2: Technology-Producing Industries

The Technology-Producing Industries cluster is composed of three industries. They include semiconductors and electronic components; navigational, measuring, electromedical and control instruments manufacturing, and medical equipment and supplies.

This cluster has suffered a great amount of volatility in recent years as it soared during the late 1990s when it saw its relative concentration rise to an unprecedented LQ value of nearly 6.0, doubling in just five years. But since 2000, this industry has faltered and current employment is half of what it was at its peak (see Chart 18). Two of the three components of the cluster—electromedical and medical instruments—are Category 3 industries, indicating their faltering trends in recent years. And yet the cluster remains a highly concentrated industry in Sonoma County; its LQ has fallen back to around 3.0 but this still indicates a concentration of employment three times the national average. Thus, there is an indication of some remaining comparative advantage in terms of the skilled labor pool, its installed base in the county, and its proximity to tech-producing areas elsewhere in the Bay Area. This year the industry has stabilized considerably.

Chart 18: Technology-Producing Industries Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



As with the Agriculture, Food and Wine cluster, the Tech-Producing cluster competes globally in terms of its market and its competitors. Thus it enjoys the same

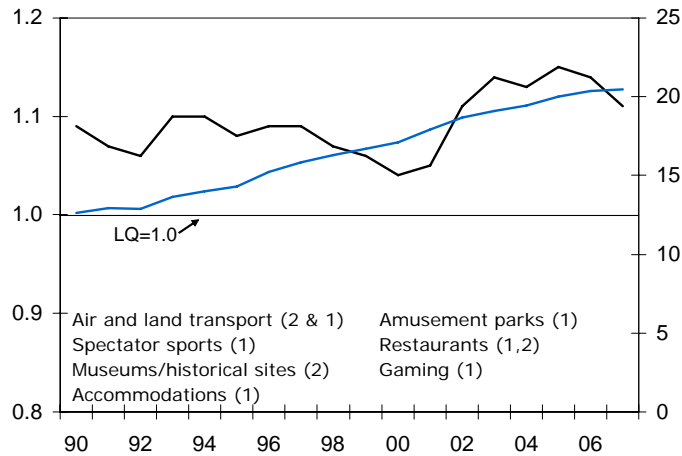
kinds of near-term advantages regarding the low value of the dollar and the fast growing global economy. The major difference, however, is that the resources that anchor the Agriculture, Food and Wine cluster to the county—soil and climate—are not mobile, although they must be protected. The resources that anchor the Tech-Producing cluster—labor force and capital—are mobile. Both clusters will need to rely on innovation as they face shifting and ever severe global competition. Innovation will be fundamental to maintaining the tech-producing industries in Sonoma County. Increasingly, technology production is moving offshore to lower-cost places to do business. Research and development remains where the innovative human capital is located.

Cluster 3: Tourism

The Tourism cluster includes a broad range of industries that includes transportation, travel services, hotels and other traveler accommodations, museums, amusements, gaming and restaurants. It does not explicitly include wineries—they are a part of Cluster 1. And yet it is difficult to separate the tourism industry from the wineries and the specialty food producers that are the ultimate destination for so many visitors to the county. This is an example of the kind of overlap that exists between the county's clusters and the potential for breakthrough initiatives that may apply to more than one cluster. Another kind of overlap exists with tourism that relates to wellness activities such as spas and outdoor activities that can be associated with the health and wellness cluster that is discussed below. These activities, however, are often associated with hotels and recreation services that are a part of the tourism industry.

The tourism cluster has experienced the most steady job growth of all nine clusters over the past ten years. Through the boom years of the late 1990s and the difficult post-recession years of 2002 and 2003 this industry has managed to expand (see Chart 19). As a rather acyclic industry—in other words, not prone to rise or fall with the broader business cycle—it provides considerable support for employment and income growth in good times and in bad.

Chart 19: Tourism Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



One reason why this cluster is so steady is that it draws its demand from a wide variety of sources, and it caters generally to higher income households. The wide variety of sources includes visitors not just from the Bay Area and elsewhere in the West but from all around the U.S. and worldwide. The benefit of attracting higher income households is that their spending patterns are not highly influenced by business cycles. But higher income households and global travelers are always looking for unique and new experiences. Thus, innovation becomes a critical factor in maintaining the stable growth of the tourism cluster.

The breadth of the market for this cluster also illustrates its global nature. It also gains from the value of the dollar as overseas visitors flock to the U.S. to take advantage of goods and services priced relatively inexpensively in terms of their home currencies. Further illustrating the interconnectedness of the clusters, this generates opportunities for the wine and food industries to create marketing relationships with visitors that can last many years as global markets expand. Indeed, these relationships may not always be so easy to establish as the dollar is not likely to stay at its current low rate versus the Canadian dollar, the U.K. pound or the euro over the long term. This is a very good time to create these marketing relationships.

The nature of this cluster may very well change in coming years if a large proposed casino is built in Sonoma County. There would be a one-time increase in the number of people employed in the cluster and the concentration of the tourism cluster in the economy would rise. An estimate of the complete economic impact of the project would require a separate study, which would best make use of an input-output modeling approach that explicitly traces the economic relationships between the casino and all other sectors in the economy. Such a model is capable of tracing all of the intermediate purchases by the casino from within the local economy and from elsewhere, and also tracing increased spending by its employees.

Over the long term, a new large casino would create a small shift in the nature of the tourism market for Sonoma County. Given that casinos are an increasing part of

tourism strategies throughout the U.S. and the world, it does not necessarily directly contribute to the draw of visitors from across the U.S. and abroad—one need not travel far from home these days to find a gaming venue—except that it builds upon the other more unique features of Sonoma County’s tourism industry. The casino likely would cater more to regional visitors. Thus, it would make the local tourism cluster somewhat more reliant on the regional economy.

Cluster 4: Construction and Green Services

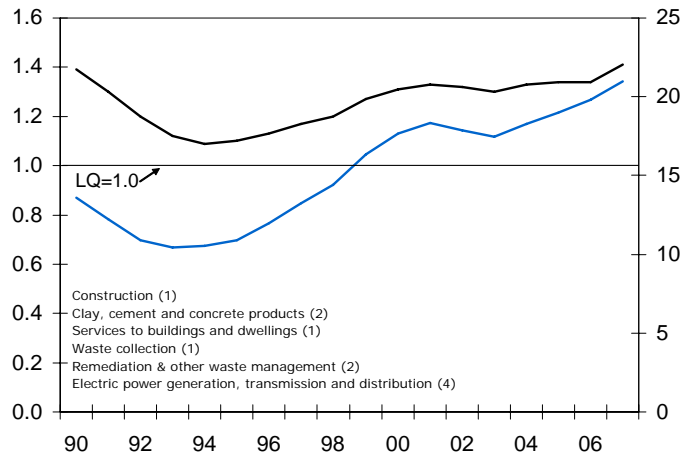
This cluster combines a variety of industries that hold potential for developing green technology and for using green technology in the production of goods and services. The largest component of the industry is construction. It is an industry that already is putting into practice energy-saving and other resource-saving devices. The current lull in construction activity in the county gives the industry an opportunity to explore new technology and to understand what meets the needs of the market. Construction products and services to buildings are extensions of the construction industry. They provide local construction supplies and they service buildings upon their completion, helping to maintain the efficiency of their resource utilization. Waste collection and remediation also are logical components of the cluster.

Each of these industries is a Category 1 or 2 industry that is either stable with a location quotient above 1.0 or is emerging with rapid job growth and increasing concentration in the county’s economy (see Chart 20). Construction and its related industries usually are not considered basic industries that drive a local economy, but rather they are driven by demand created by other basic industries. As basic industries expand, they bring into the area income and investment, which generate demand for new construction and commercial and industrial space. Construction thrives when the county’s basic industries are thriving. So it is fitting that construction be a part of a cluster; all the more so when it may contribute to a more efficient economy through better resource utilization, or when they create innovative products and services that may be marketed elsewhere.

One difficulty in identifying a green cluster, however, is that the concept of green industries is changing rapidly, with new and emerging technologies and industries. Further, the concept is being shaped by evolving state government policy, most directly by AB32.⁶ The bill, among other things, will create market-based compliance mechanisms to achieve reductions in greenhouse gas emissions, and thus will shift industry cost structures in ways that are not yet certain. These shifting cost structures will likely lead to technological innovations that also are unknown. Thus it is difficult to know what other industries might be included specifically in a green cluster that are not a part of other clusters. It is also uncertain how Sonoma County’s unique comparative advantages will shape local green industries as it competes with other areas in California operating under the same set of state policy initiatives. Undoubtedly, however, there are local resources that can be put to use.

⁶ The California Global Warming Solutions Act of 2006

Chart 20: Construction and Green Services Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



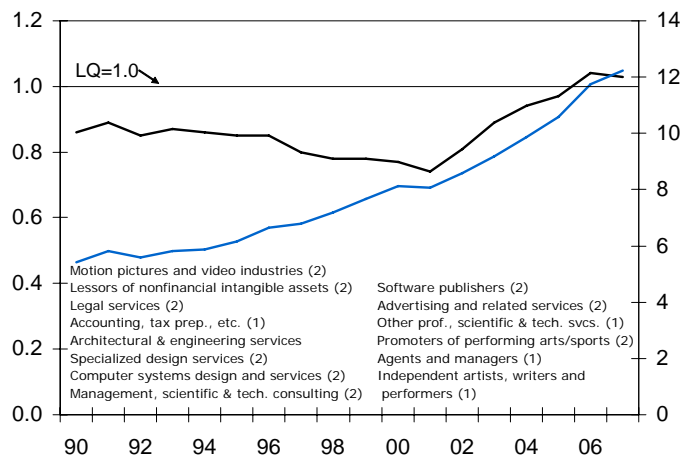
State policy is clearer today in other aspects of the environment and climate change. For example, the state is providing incentives to its regulated electric utilities to encourage a reduction in energy use and to encourage alternative forms of energy generation. Thus, the electric power generation industry is included in the construction and green services cluster. This is done even though as a Category 4 industry, characterized by declining employment and diminishing concentration, it does not fall into the traditional definition of a driving or basic industry.

It seems evident that as innovation in green technology evolves, the definition of a green cluster also will evolve. The formal recognition of a green cluster, however, would be one way for policymakers to address the question of how to support innovation within the cluster. And given the evolving nature of green technology, this cluster, more than any other, has some overlap with other more well-defined clusters. For example, the Creative Professional services cluster includes research and development that would support green technology. Another example is that technology may continue to evolve to support increasingly efficient use of water and power, management of pests and disposal of waste by the Agriculture, Food and Wine cluster, thus perhaps making this cluster more competitive in the global market and perhaps provide unique marketing niches as well. A third example might be the evolution of the Tech-Producing cluster to include green products and technology.

Cluster 5: Creative Professional Services

The Creative Professional Services cluster includes many industries that are dependent on intellectual capital for the production of goods or services. The cluster is comprised of a large number of industries, but many of them are small, with an employee count in the tens or hundreds at the most. And yet taken together, the cluster includes more than 12,000 payroll workers and countless others that are self-employed (see Chart 21). Similar to the Tourism cluster, the Creative Professional Services cluster has only a moderate correlation to the business cycle, thereby providing some stability to the economy over time.

Chart 21: Creative Professional Services Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



The cluster is comprised of two general types of industries. First are those that directly produce a broad range of creative services. It includes activities related to motion pictures and video productions; design services; computer systems design; management, scientific and technical consulting services; scientific research; advertising; and artists, writers and performers. The second type includes professional services that must find creative solutions in supporting small but innovative service providers. Such industries include legal services; accounting, tax preparation and payroll services; architectural and engineering services; and promoters and agents for the arts and sports, and for artists, athletes, entertainers and performers. A strong core of professional business services that are experienced in supporting creative industries can help to keep them in the county as they grow, and to attract other creative individuals and groups seeking a business environment supportive of creative entrepreneurs.

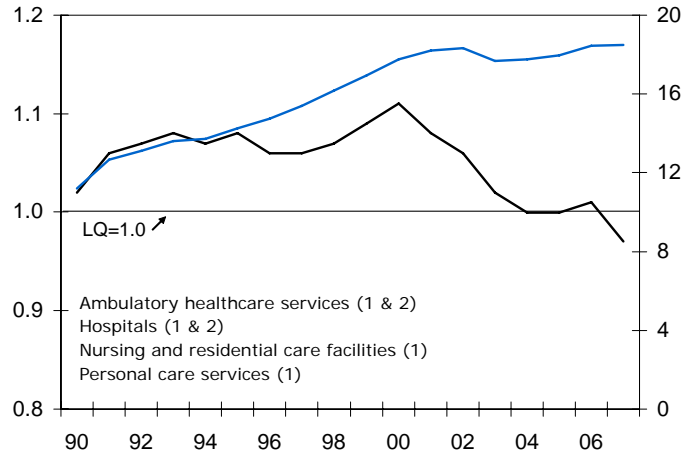
The rise of the Creative Professional Services cluster's location quotient to above 1.0 during the past two years shows that its concentration in the local economy has surpassed the threshold for consideration as a basic industry for the economy. Given the area's relatively skilled workforce, its location close to even higher concentrations of creative talent in the Bay Area, and its highly valued quality of life, there should be good potential in coming years to accommodate, attract, and develop a larger Creative Professional Services cluster in Sonoma County.

Cluster 6: Health and Wellness

Healthcare has long been an industry supporting the economy as health centers in Sonoma County have served a broad territory of northern California outside of the county's boundaries. Thus, healthcare had a location quotient above 1.0 for many years. Employment in the industry, however, has leveled off in recent years, due in part to some consolidation of primary healthcare facilities in the county. With the

rest of the economy expanding at a steadier pace, the Health and Wellness location quotient dropped to below 1.0 in 2007 (see Chart 22).

Chart 22: Health and Wellness Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



The Health and Wellness cluster is defined by traditional healthcare services such as ambulatory care, hospitals and nursing and residential care facilities. But, as indicated by the rapid growth of personal care, a Category 1 industry in Sonoma County that includes diet, weight loss and other personal care facilities, wellness programs also are in increasing demand.

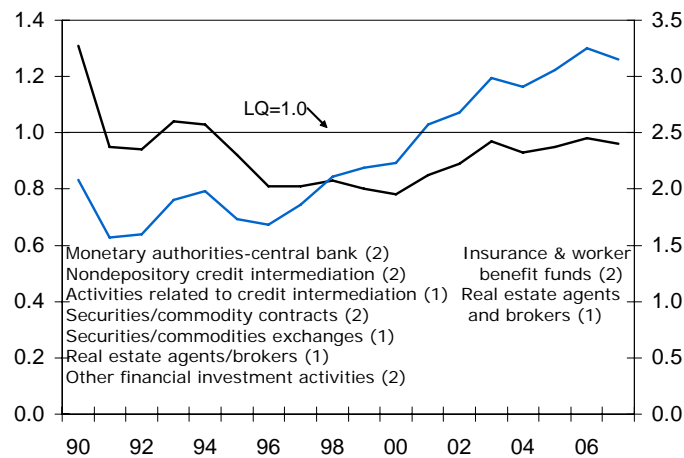
As mentioned regarding the Tourism cluster, there is some overlap of wellness activities between the Tourism cluster and the Health and Wellness cluster. For example, spas that are a part of a hotel are classified as hotel services and placed in the tourism cluster. But there are also independent massage therapy enterprises, for example, that would be classified in the ambulatory healthcare or personal care industries and thus in the Health and Wellness cluster.

The Health and Wellness cluster, however, also includes privately-owned community healthcare centers—government-sponsored community healthcare would be classified as government—as well as wellness and healthcare for the growing population of retirement age. Thus, it seems fitting to identify a Health and Wellness cluster that focuses on rising demand for community healthcare as well as rising demand for senior healthcare and services as the population ages and as the area’s quality of life attracts retirees. Adequate health and wellness care are quality-of-life factors that retirees seek. And finally, a question arises as to whether Sonoma County will remain a healthcare center for a broader region of northern California, thus providing the economy with income earned from outside the county while also providing more advanced services locally.

Cluster 7: Wealth Management

This is a small but growing cluster. As a cluster, it takes on the characteristics of a Category 2 industry. In other words, it is growing quickly and its relative concentration is rising, but its location quotient has not yet surpassed 1.0. Indeed, it has nearly leveled off just below the 1.0 threshold (see Chart 23). Further, it is a rather small cluster with a workforce under 3,500 and does not include components of financial services such as insurance carriers and brokers that had played a significant and rising role in past years, but not so in recent years. Given the relatively high level of income and wealth in the county and the role that finance plays in developing the economy and supporting innovative ventures, this cluster is worthy of focus with regard to innovation and public policy and with regard to tracking economic growth in coming years.

Chart 23: Wealth Management Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



Clusters 8 & 9: Retail Trade and Wholesale Trade

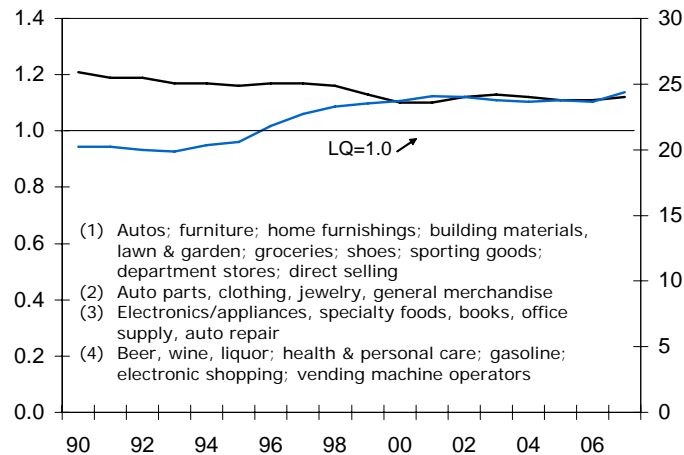
Retail and wholesale trade are not often obvious candidates for inclusion as clusters or worthy of policy assessment for economic innovation. And yet these industries have characteristics of basic industries in terms of their markets and in terms of their growth and concentration. Thus, they bear some examination.

In terms of their markets retailing is an industry that serves, in part, the tourism market, and much like the Health and Wellness cluster, it also serves a broader northern California market outside of the county. In this respect it drives the local economy and may have potential to do so further.

In terms of its growth, however, retailing's workforce remained essentially flat over the past five years (see Chart 24). This did change, however, in 2007 with some renewed gains in the industry's total payroll employment. In terms of concentration, retailing has always had a location quotient above 1.0, which is a characteristic that is common to areas where the economy is driven at least in part by tourism. Thus,

retailing, and particularly retailing's links to other industries, may be a very appropriate area for seeking innovation.

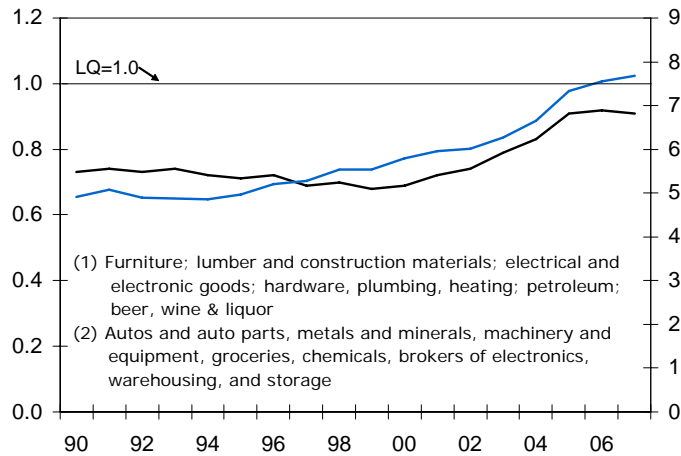
Chart 24: Retail Trade Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



Retailing has been an effective policy tool for economic development in a number of areas—sometimes it has been very innovative; sometimes not. Examples include the mundane expansion of retail shopping outlets in the border areas between states or localities with no sales tax and those with a sales tax. This does not really apply to Sonoma County. A more aggressive and very successful policy was the development of the huge Mall of America in Minneapolis, which has undergone several expansions since it first opened, although this example also is not a likely candidate for Sonoma County policymakers. A third example would be specialty markets, such as Pike Place Market in Seattle that focuses on regional specialties—both foods and goods—that draw locals and tourists alike. Such retailing centers support local producers. It can also be said that showcasing local products can lead to expansion of other industries such as local specialty restaurants and internet-based trade and shipping services. Sonoma County is a unique place with its own specialty goods and services that may also suggest innovative policies for appropriate future growth of retailing and related activities.

Wholesale trade emerges as a cluster from its rapid growth in recent years. Its location quotient has risen from below 0.7 a decade ago to just above the 1.0 threshold today (see Chart 25). A number of the components of wholesale trade already are Category 1 industries with a location quotient of greater than 1.0. These include, logically, wine distribution, but also other industries that are related to construction and home repairs, furniture and petroleum. All components of wholesale trade are either Category 1 or 2.

Chart 25: Wholesale Trade Cluster
Location quotient (dark line, left) and jobs, ths (light line, right)



The data describe an industry that likely serves an increasingly large territory or clientele that is larger than Sonoma County, and thus, is indicative of an emerging basic industry. Therefore, it would be appropriate for innovation policy to address wholesale trade regarding its role in economic development. Further, issues of transportation, communication or environment may be addressed to support wholesale trade and the economy's overall growth in ways that are compatible with other industries and with the county's general plan. For example, a question arises as to how best to accommodate and take advantage of the re-establishment of north-south rail service in the county, service that could serve to support wholesaling and to better link the entire county economy to rest of the region. Additionally, there are links to be explored between wholesaling and retailing or with other clusters in the local economy.

SECTION 3: ECONOMIC FORECAST

This section provides a brief description of the forecast model and outlines the baseline forecast for the economy of Sonoma County. The structure of the model is designed so that each of the nine economic clusters are modeled and projected separately, allowing the model to simulate specifically the behavior of each cluster. The method for compiling each section of the forecast model is outlined below, describing the main drivers of each section and the methods by which policy simulations can be run through the model.

The labor market sector of the Sonoma County model determines payroll employment, household employment, the labor force, the number of unemployed, and the rate of unemployment. Payroll employment is forecasted for each of Sonoma County's nine identified industrial clusters as well as the non-cluster segments of the economy. The employment equations are specified differently depending on whether the clusters are primarily export-oriented or if the cluster has a significant component that is locally-oriented.

The labor market sector is the portion of the model where most assumptions about the three target areas of study will filter into the economy. Assumptions about resource availability, terms of trade and the like will be translated into economic effects through the industry-level employment data. Given projections for the industry clusters that are likely to drive growth going forward, by identifying which industries stand to be most affected by changes in labor supply, global competition and resource availability, the model can give us a sense of how changes to these target areas will affect the overall growth outlook.

For example, the mix of skilled and non-skilled labor differs across industries, which leads to changes in the supply of each type of worker, and thus to different impacts upon the economy. Similarly, various demographic groups tend to make different spending decisions, and as a result, population changes do not affect all local consumer industries in the same way. Additionally, as the baby-boom generation ages, the growing number of elderly residents will likely support demand for health services more than they will support demand for primary schooling.

Assumptions over other target areas will be filtered through the industry-level employment data as well. For global competition, industries face differing amounts of exposure to foreign markets. Therefore, changes in growth abroad, exchange rates and the like will have different impacts across industries. Similarly, industries differ in their degree of labor intensity, which affects the degree to which they are affected by global competitive forces. The economic effects of environmental regulation and resource availability can be translated into industry-level shocks in a similar way, by identifying which industries depend heavily on various resources as inputs to their production processes, as well as which industries face large costs from reducing emissions or other forms of waste.

Locally-Oriented Sectors

Wealth Management

In order to forecast the wealth management cluster, it was broken into two smaller clusters that were each forecasted separately. Nearly two-fifths of the wealth management cluster is comprised of real estate agents and brokers offices, which behave very differently and have different drivers than the rest of the cluster, which is composed of finance industries. The forecast for the finance segment of the wealth management cluster depends on the net new cash flow in stock, bond, fixed income and money market mutual funds nationally as well as the cost of doing business in the wealth management cluster and employment in the finance industry in California. The real estate agent and broker forecast depends on industry employment in California, the cost of doing business in the broader wealth management cluster and the median existing single-family house price in Sonoma County. These forecasts comprise the wealth management cluster, which is expected to grow slowly in Sonoma County until about 2016. After that, industry employment growth will hold steady or decline slightly through the end of the forecast horizon as the real estate segment within the cluster begins to contract on the back of slower population growth in the county.

Health and Wellness

The forecast for the health and wellness cluster in Sonoma County is driven by the cost of doing business in the industry in Sonoma County, employment in the industry in the state and the population 65 and older in Sonoma County. This cluster will become larger and increasingly more important as the share of the population 65 and older in Sonoma goes from just under 13% in 2007 to just shy of 17% by 2020.

Retail Trade

Besides the cost of doing business in the retail industry in Sonoma County and employment in the industry in California, retail trade employment in the Sonoma County model is driven by retail sales in the county. The retail sales forecast is driven by personal disposable income in the county. Income growth in the county (and retail sales) will begin to slow around 2012 as the county's population growth reaches a peak and begins to grow very slowly afterward. As a result, employment in retail trade will begin falling around this time, and by 2020, the retail industry in Sonoma will be about the same size as the health and wellness cluster in terms of employment.

Construction and Green Services

In addition to the cost of doing business and employment in the industry in California, the Construction and Green Services cluster's demand drivers include housing starts in Sonoma County and nationwide retail sales of electricity. The

housing starts forecast captures the expected growth in the county's population over the forecast period.

Export-Oriented Sectors

Creative Professional Services

The forecast for the Creative Professional Services cluster is driven by the one-period lag of employment in the industry in Sonoma as well as the cost of doing business in the industry, and employment in the industry in the state. California's real gross state product relative to U.S. GDP is also used to capture the relative health of California's economy vis-à-vis the nation.

Agriculture, Food and Wine

One of Sonoma's most important clusters, Agriculture, Food and Wine, is driven by real per capita income in the U.S. as well as population growth nationally. Because Sonoma County's wine industry serves an international market, the U.S. trade balance also is a driver of industry performance.

Wholesale Trade

The Wholesale Trade cluster in Sonoma is closely related to the county's Agriculture, Food and Wine industry. Demand drivers for the industry's forecast include consumer prices in Sonoma County as well as the industry's growth in the state and the cost of doing business.

Technology-Producing

The Technology-Producing cluster in Sonoma is driven by the industry's performance in the state as well as the cost of doing business. The sharp drop in Sonoma County's tech-producing industries following the dot-com bust in 2001 and the shifting of these jobs away from the county is captured in the state industry employment variable.

Tourism

The Tourism cluster in Sonoma County is driven by overall job growth in the state as well as the dollar value of exports from the U.S. and the cost of doing business.

The forecasts for each of Sonoma County's nine clusters are shown in Charts 26 and 27. The fastest growing industry and the industry that will add the most net jobs over the next ten years is the Creative Professional Services cluster. Health & Wellness, Tourism and Wealth Management will all grow faster than average over the next ten years. By the end of the forecast horizon, the Construction & Green, Health &

Wellness, Retail, and Tourism industries will be roughly the same size, employing between 22,000 and 24,000 workers each.

Chart 26: Industry Cluster Forecast Performance
Employment, average annualized growth, 2007Q4-2017Q4, %

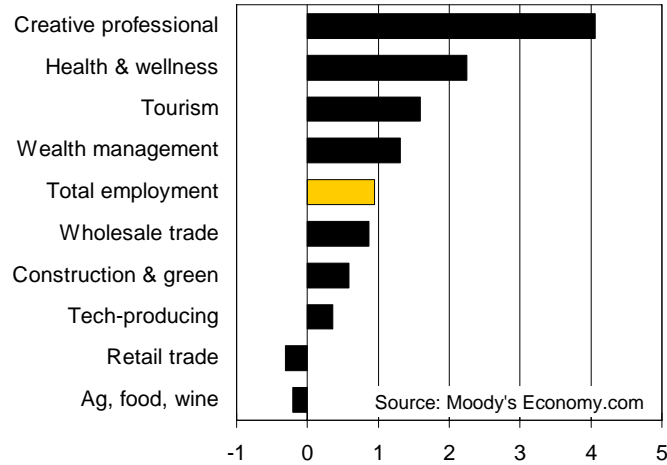
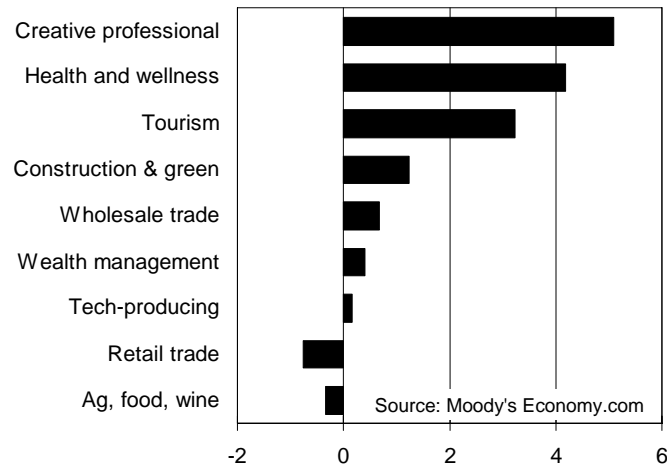


Chart 27: Industry Cluster Forecast Performance
Net job gains, ths, 2007Q4-2017Q4



The Wholesale, Tech-Producing and Wealth Management industries will remain small but will all see positive growth throughout the forecast.

Table 2: Economic Forecast

Sonoma County (Santa Rosa-Petaluma Metropolitan Statistical Area)

Source: BEA, BLS, BOC, Moody's Economy.com

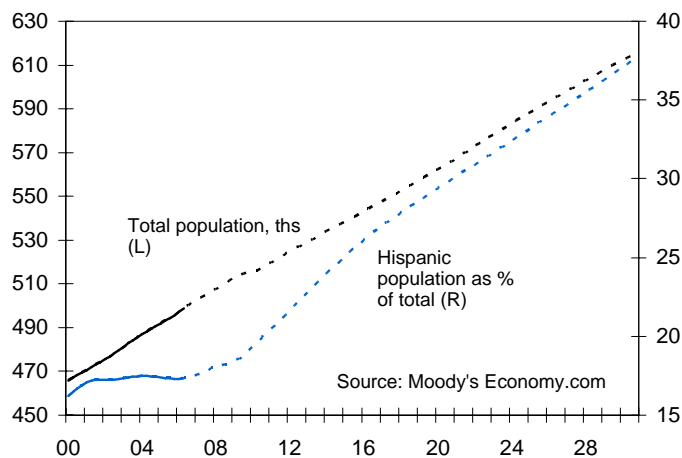
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Compound Growth			
												97-07	02-07	07-12	07-17
Gross Metro Product (Bil Constants)	12.5	13.4	14.7	16.3	16.3	16.4	16.5	17.1	17.4	18.0	18.5	4.0	2.4	2.8	2.2
% Change	5.6	7.8	9.5	10.8	0.2	0.5	0.6	3.3	2.3	3.1	2.6				
Total Employment (Ths.)	173.2	182.8	189.6	195.7	198.5	196.1	191.6	192.5	193.2	195.0	196.4	1.3	0.0	1.5	1.0
% Change	4.7	5.5	3.7	3.2	1.4	-1.2	-2.3	0.5	0.3	1.0	0.7				
Ag, Food & Wine	14.7	17.4	18.2	17.9	17.2	18.4	17.8	16.9	16.3	15.7	15.5	0.5	-3.4	0.4	-0.1
Tech-Producing	8.4	9.6	10.0	10.6	11.2	8.6	6.7	5.7	4.6	4.3	4.1	-6.9	-13.8	1.0	0.7
Tourism	15.8	16.3	16.7	17.1	17.9	18.7	19.1	19.5	20.0	20.3	20.4	2.6	1.8	2.5	1.6
Construction & Green Services	13.3	14.4	16.4	17.7	18.3	17.9	17.5	18.3	19.0	19.6	19.3	3.8	1.5	1.9	0.6
Creative Professional Services	6.9	7.3	7.8	8.3	8.3	8.8	9.4	10.1	10.8	11.9	13.1	6.6	8.3	4.7	3.8
Health & Wellness	15.4	16.2	17.0	17.8	18.2	18.4	17.7	17.7	18.0	18.4	18.7	2.0	0.3	2.7	2.1
Wealth Management	1.9	2.1	2.2	2.2	2.6	2.7	3.0	2.9	3.1	3.2	2.9	4.3	1.4	0.7	0.3
Retail Trade	22.7	23.3	23.5	23.7	24.1	24.0	23.8	23.6	23.8	23.8	24.1	0.6	0.1	1.3	0.1
Wholesale Trade	5.3	5.5	5.5	5.8	5.9	6.0	6.3	6.6	7.3	7.5	7.7	3.8	5.1	1.5	1.0
Other Transportation/Utilities	3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.6	2.9	3.1	0.3	1.3	1.3	0.9
Other Manufacturing/Resources	10.5	11.0	10.9	10.8	10.0	9.3	8.8	8.5	8.7	8.0	8.1	-2.6	-2.7	0.0	-0.6
Other Consumer Services	22.2	22.8	23.6	24.5	24.1	22.7	21.3	20.8	19.9	20.4	20.1	-1.0	-2.4	1.4	0.7
Other Information	2.6	2.9	3.0	3.5	3.9	3.6	3.4	3.6	3.0	2.5	2.4	-0.8	-7.8	1.6	0.4
Other Education	5.3	5.4	5.1	5.2	5.7	5.9	5.8	5.7	5.7	5.6	5.8	0.9	-0.3	2.3	2.3
Government	25.2	25.6	26.6	27.6	28.0	28.4	28.5	29.7	30.4	30.7	31.1	2.1	1.8	-0.3	0.2
High-Wage Employment	78.0	82.2	85.0	88.6	89.0	84.7	81.0	80.5	79.7	80.8	82.2	0.5	-0.6	2.0	1.4
Lower-Wage Employment	95.2	100.6	104.6	107.1	109.4	111.4	110.6	112.0	113.5	114.2	114.2	1.8	0.5	1.2	0.6
Labor Force (Ths.)	237.7	245.6	249.1	253.3	257.9	258.0	254.8	256.1	256.2	258.1	262.0	1.0	0.3	1.9	1.6
% Change	3.6	3.3	1.4	1.7	1.8	0.1	-1.3	0.5	0.0	0.8	1.5				
Unemployment Rate (%)	3.8	3.3	2.7	3.4	3.7	5.1	5.5	5.0	4.5	4.0	4.4	Average Level		4.5	
												4.1	4.8	4.6	
												Compound Growth		3.7	
												5.4	4.8	4.8	
Personal Income (Bil \$)	12.7	13.8	14.6	16.8	17.0	17.0	17.3	18.0	19.1	20.3	21.5	3.2	2.2	3.0	2.0
% Change	9.4	8.4	5.8	14.8	1.1	0.0	1.7	4.3	6.4	5.8	6.2				
Personal Income (Bil Chained 2000\$)	13.4	14.4	15.0	16.8	16.6	16.4	16.3	16.6	17.2	17.7	18.3	3.2	2.2	3.0	2.0
% Change	7.5	7.4	4.1	12.0	-0.9	-1.4	-0.3	1.6	3.3	2.9	3.5				
Wages & Salaries (Bil \$)	5.2	5.8	6.3	7.2	7.5	7.5	7.4	7.7	8.1	8.5	9.0	5.6	3.7	5.2	4.5
% Change	11.7	11.9	8.9	14.4	3.4	0.0	-0.8	4.2	4.4	5.1	5.9				
Population (Ths.)	437.1	445.9	453.4	460.5	464.9	464.5	465.1	465.0	463.6	462.6	464.4	0.6	0.0	1.2	1.4
% Change	2.0	2.0	1.7	1.6	1.0	-0.1	0.1	0.0	-0.3	-0.2	0.4				
Age: <5	29.9	28.9	28.0	27.6	27.6	27.4	27.7	28.3	29.0	29.1	29.3	-0.2	1.3	1.6	1.5
Age: 5-19	92.4	94.5	96.2	97.6	97.6	96.0	95.1	94.4	93.4	91.5	90.8	-0.2	-1.1	-0.4	0.2
Age: 20-24	23.7	24.9	26.5	28.1	30.2	31.0	31.8	32.3	31.8	31.8	32.0	3.0	0.6	2.2	0.7
Age: 25-44	136.6	136.6	135.4	134.1	132.5	129.8	126.9	124.5	121.1	119.1	118.1	-1.4	-1.9	0.4	0.9
Age: 45-64	96.8	103.1	109.4	115.0	118.7	122.4	125.5	127.7	130.0	132.3	134.8	3.4	1.9	1.9	1.5
Age: >65	57.7	57.9	57.9	58.1	58.3	57.9	58.0	58.0	58.4	58.7	59.5	0.3	0.5	3.0	3.5
Households (Ths.)	165.3	168.3	170.8	173.1	174.8	174.7	175.0	175.0	174.5	174.2	174.9	0.6	0.0	1.5	1.6
% Change	1.8	1.8	1.5	1.4	1.0	0.0	0.2	0.0	-0.3	-0.2	0.4				
Retail Sales (Bil. \$)	4.6	5.0	5.4	5.8	6.2	6.4	6.7	6.9	7.2	7.5	7.9	5.6	4.3	2.2	2.0
% Change	6.4	8.0	9.6	6.4	6.4	4.4	3.4	4.2	4.4	4.3	4.7				
Personal Bankruptcies (#)	2,090	2,173	1,627	1,158	1,183	1,223	1,300	1,267	1,997	451	603	-11.7	-13.2	10.1	4.8
% Change	3.9	4.0	-25.1	-28.8	2.2	3.4	6.3	-2.5	57.6	-77.4	33.7				
Total Residential Permits (Ths.)	2.0	3.1	3.0	2.5	2.6	1.9	2.3	1.9	2.8	1.9	1.6	Average Level		2.0	
% Change	31.9	56.1	-0.8	-17.5	3.1	-25.4	16.8	-14.3	46.1	-32.2	-16.1	2.3	2.1	1.8	
Single-family Permits	1.8	2.1	2.3	2.0	1.7	1.4	1.5	1.3	1.6	1.4	1.0	1.6	1.4	1.3	1.6
Multifamily Permits	0.2	1.0	0.7	0.5	0.9	0.6	0.7	0.6	1.2	0.6	0.6	0.7	0.7	0.5	0.5
Median-Existing Home Price (Ths. \$)	220.4	248.9	284.3	360.6	408.1	436.4	490.6	574.4	698.9	686.4	641.8	Compound Growth		1.4	
% Change	5.4	12.9	14.2	26.8	13.2	6.9	12.4	17.1	21.7	-1.8	-6.5	11.3	8.0	-0.8	

SECTION 4: DEMOGRAPHIC FORECAST

In the Sonoma County model, population is one of the major drivers of the economy's performance. The top-down structure of the model ensures that changes in population growth feed through to the industries in the county that serve the local population (see Appendix 3). Examples of such industries include local government, education and healthcare. The makeup of Sonoma County's population over the next ten years also is an important consideration because different age and ethnicity groups participate in the labor force at different rates and bring different levels of skill to bear on the economy. Both of these factors—labor force participation rates and educational attainment of the population and labor force—ultimately determine the economy's long-run growth potential.

The baseline forecast projects that Sonoma County's population will increase by about 30% between 2007 and 2030, rising to just over 615,000 in 2030. Growth in the Hispanic population will be the main driver behind the county's growth (see Chart 28). Hispanics accounted for about 22% of the county's population in 2006 and Moody's Economy.com expects this share to rise to just shy of 40% by the end of the forecast horizon. Although growth in both the Hispanic and non-Hispanic populations in the county has been slowing since the late 1990s, fast job growth in the county and throughout California since 2003 will help to boost population growth in the near term. In fact, Sonoma County's population declined in 2005 and was flat in 2006—Moody's Economy.com expects growth to turn positive again in 2007. Recently released population data for California show an acceleration in population growth in the state as a whole in 2007.

Chart 28: Growing Hispanic Population in Sonoma County



All of the population growth in the near-term forecast will be among the Hispanic population. The non-Hispanic population is expected to continue to decline through next year, with growth turning positive by 2010. Rapid growth in the Hispanic

population is one of the factors that drive the outlook for higher labor force participation and faster job growth over the near- and mid-term forecasts for Sonoma County. The makeup of the Hispanic population in Sonoma (and in general in the U.S.) is much younger than the non-Hispanic population (see Chart 29). The relative youth of the Hispanic population means that over the mid-term forecast, the working-age population as a share of the total population in Sonoma County (defined as ages 25-64) will be about five percentage points higher than the national average. This will boost Sonoma County's labor force participation rate, which will continue to climb this year, peaking at about 69%, whereas nationally the participation rate will decline in the near term as the U.S. population ages (see Chart 30).

Chart 29: Younger Age Structure Among Hispanics...
Age groups as share of population, %, 2010Q4

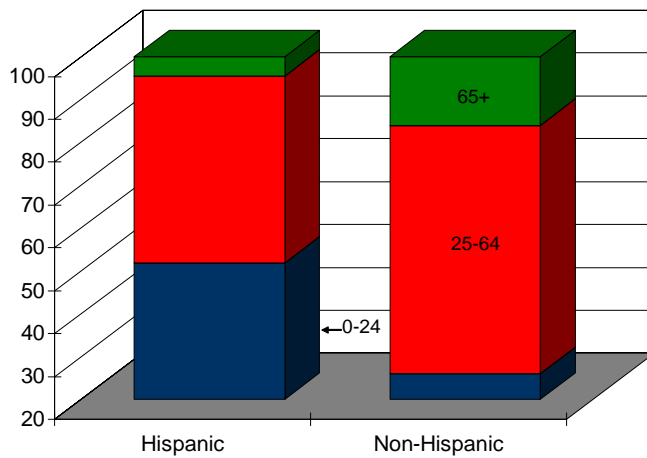
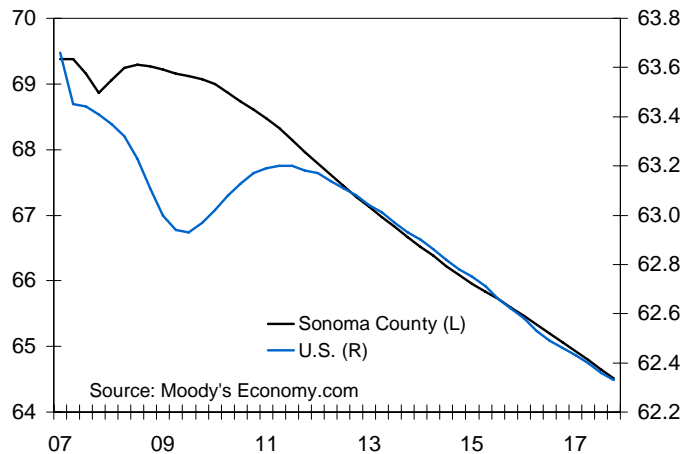


Chart 30: ...Means Higher Labor Force Participation
Labor force as % of population 15 and older

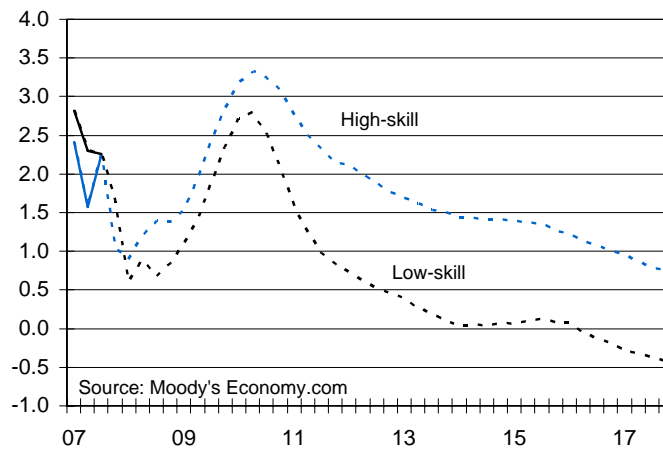


The education level of Sonoma County's population will improve throughout the forecast as well, with improvements projected among the Hispanic and non-Hispanic components of the population. But due to a reduction in the average educational attainment of Hispanic adults since 1990, aggregate gains will be more prevalent

among the non-Hispanic segment of the population. The share of Sonoma County’s population age 25 and older with a bachelor’s degree will increase from roughly 32% in 2007 to about 41% by 2030. By the end of the forecast, nearly half of Sonoma County’s non-Hispanic adult population is projected to hold at least a bachelor’s degree compared to less than 20% of the county’s Hispanic population.

The reason for faster rates of educational attainment among the non-Hispanic population compared to the Hispanic population is the expected near-term continuation of historical trends that show the educational attainment rate of the Hispanic population in Sonoma County has been falling since 1990. Data from both the 1990 and 2000 decennial censuses, as well as annual data from the American Community Survey since 2000, show that the share of the adult Hispanic population in Sonoma County that holds at least a bachelor’s degree has been steadily falling. This is likely due to the flow of recent immigrants into the county, creating a Hispanic population in Sonoma County that is in part “newer” than the average California and U.S. Hispanic populations. Evidence of this is that the Hispanic population in Sonoma County is younger on average than in the U.S. and in California; as Sonoma County’s Hispanic population ages and becomes more entrenched, educational attainment is expected to rise over the long run.

Chart 31: Mix of Job Growth Will Require More Education
Employment, % change year ago



Educational attainment will be an important driver of Sonoma County’s economy throughout the forecast horizon since growth in the high-wage, high-skill industries will outpace that of the lower-wage, lower-skill industries in the long-run forecast (see Chart 31 and Appendix 4). Given recent trends in educational attainment, most of the future gains projected for Sonoma County’s educational attainment will come from the non-Hispanic population. An alternative scenario is presented in Section 6 that estimates the impact on the economic outlook from a more rapid gain in educational attainment.

SECTION 5: ALTERNATIVE SCENARIOS

One purpose of the economic forecasting model for Sonoma County is to be able to address possible alternative outcomes for the economy in the years to come. The model is put to use to answer “What if...?” types of questions. What if business costs were to improve? What if there was a severe shortage of water? What if housing costs were to remain permanently lower than expected?

The Sonoma County Innovation Council has specifically asked that the model be structured so as to address two broad types of alternative scenarios. The first relates to resource constraints and the business climate. The second relates to specific economic and demographic assumptions for the future. This section, therefore, is divided into two parts.

Section 5A addresses the resource constraints and provides outcomes regarding business costs, resource constraints, and the burden of regulation. Section 5B addresses alternative assumptions on demographics and workforce quality, lower housing costs, and the impact of global markets through shifting exchange rates.

Section 5A: Natural Resources, Business Costs and the Regulatory Environment

Scope

The Sonoma County Innovation Council has identified several critical natural resource issues to be addressed by the economic model. Regulation costs, together with tight supplies of natural resources, stand to greatly impact regional growth in the years ahead. Issues of particular interest include water availability/constraints, expected energy availability/restrictions, waste disposal costs, and limitations/opportunities that new climate control regulations could bring to the region.

Resource modeling strategy

How do natural resource constraints and tax and regulatory policies affect regional economic activity? The answer clearly depends on the nature of the economy in the area being studied. The mix of industries in a given area is of particular importance.

For example, a steel town stands to be more affected by strict air quality standards than does an artist’s colony. Similarly, farm communities are hurt more by water shortages than are financial centers.

Given the tight relationship between industrial structure and the importance of resource issues, the drags on production created by environmental regulation and supply constraints are studied at the detailed industry level in the model. Keeping true

to the nature of the overall study, resource issues are examined through the lens of the special industry clusters that have been identified as being particularly important to Sonoma County's economic future.

The question remains of how to translate changes in resource constraints and regulations into changes in industrial activity. Given the complexity of the issues and limitations of the historical data, the impact of natural resources on economic activity is not well understood by analysts even at the national level. Often there is no record of how firms and households react to changing resource constraints. Empirical studies are typically based on historical shocks to resource supplies that can be interpreted as natural experiments. A wide range of results emerge from these studies, and it is unclear to what extent their results translate to the Sonoma County economy.⁷

Given the lack of consensus among analysts regarding the economic effects of resource issues, it is important to keep the Sonoma County model flexible in order to be able to incorporate alternative assumptions over the degree of linkage between natural resources and economic activity. The modeling strategy represents an attempt to keep these assumptions transparent and to address the impacts of various resource issues in a consistent and intuitive way. Given assumptions about the timing and magnitude of changes in resource costs, each type of resource issue is incorporated into the model through the same general mechanism. Specifically, changes to resource constraints, tax and regulation policies are translated into changes to the relative cost of doing business in Sonoma County.

Business Costs

The sensitivity to business costs in the economic model can help illuminate the industries in which Sonoma County enjoys a comparative advantage in production.

Typically, the more mobile the factors of production in a given industry, the more sensitive that industry is to changes in relative business costs. If production can be easily shifted to Singapore or Sacramento from Sonoma, firms in the industry may move in order to exploit regional differences in business costs. Area technology manufacturers know this fact all too well. Conversely, industries such as agriculture and tourism are less sensitive to the cost environment. The grapes grown in Sonoma cannot be easily moved, nor can the scenery and climate that draw tourists to the area. The sensitivity to a rise in overall business costs estimated for each cluster can be used as a rule of thumb in terms of how either a rise in business costs, or, conversely,

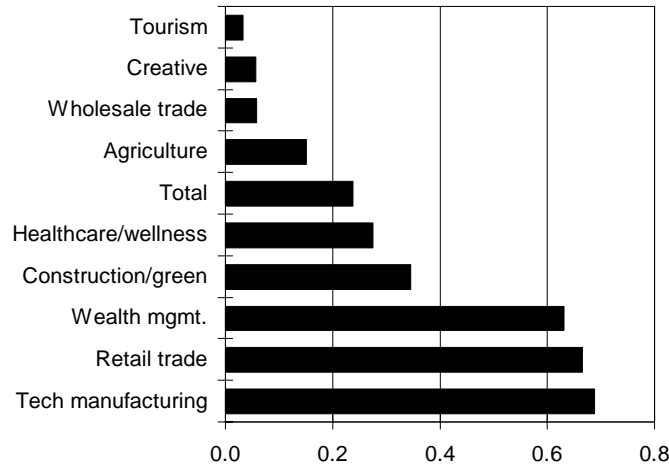
⁷See for example:

A. Myrick Freeman III, *The Measurement of Environmental And Resource Values: Theory and Methods* (Washington, D.C., Resources for the Future, 1993) and *The Benefits of Environmental Improvement: Theory and Practice* (Washington, D.C., Resources for the Future, 1979).

Richard Bishop and Thomas Heberlein, "Measuring Values of Extramarket Goods: Are Indirect Measures Biased?" *American Journal of Agricultural Economics*, vol. 61, no. 5, December 1979.

an improvement in business costs, would impact employment in each cluster (see Chart 32).

Chart 32: Industry Cluster Sensitivity to Business Costs
% job gain resulting from a 1% decline in business costs



The differing sensitivity of industry clusters to the cost environment brings with it clear implications for regulation and tax policies. Tax incentives are likely to be most successful, and regulation costs the most damning, for firms in cost-sensitive industries. While industries such as agriculture and tourism are key drivers of the local economy, public policies have relatively little impact on their rate of expansion.

As a result, tax breaks and regulatory cost savings often should be targeted to other, more at-risk industries. This is akin to an efficient system of excise taxes that imposes the highest tax rates on items such as cigarettes, for which demand is not sensitive to price.

The cost of doing business for each industry cluster is represented as an index that compares costs in Sonoma County to those in the U.S. as a whole. The industry-specific cost of doing business indices are comprised of six cost components: rents/real estate costs, taxes, energy, water, waste disposal/air quality, and unit labor costs. Each component is derived using county or metropolitan area-level data.⁸

Using business costs as the link between resource issues and economic performance allows the study to fully exploit the detailed industry-level employment data that form the backbone of the Sonoma County economic model.

Industries are found to be more or less sensitive to resource issues for two primary reasons. As was described earlier, industries differ in their reaction to changes in resource constraints due to their overall sensitivity to the cost environment.

⁸ Details regarding the construction of individual cost components are provided in the appendix.

The second way that industries differ in their reaction to changes in resource constraints is according to their use of factors of production. Employment in a given industry cluster is assumed to be relatively sensitive to the costs of inputs that they use a lot. For example, output at Sonoma County's many wineries is relatively sensitive to changes in water costs, while being less responsive to changes in local tax burdens. Similarly, employment in labor-intensive service industries such as the wellness and creative clusters are assumed to be relatively sensitive to changes in worker compensation.

To arrive at a measure of the exposure of different industries to different factors of production, data from the Bureau of Economic Analysis's Input-Output tables were analyzed. Within the Input-Output accounts, the purchase of various factors of production is detailed across industry groups. Measures for the amount that each industry spends per unit of output on labor, taxes, waste management, utilities and rent are provided in the tables.

Input-Output data on the use of production inputs per unit of output are aggregated across the customized industry clusters for Sonoma County. Given a lack of attention to air quality issues in the Input-Output accounts, data on the use of waste management services across industries are supplemented with industry-level data on emissions from the California Air Resources Board.

Table 3: Cost of Doing Business Weights
Per cent share of input costs by industry, 2005
Sources: BEA, Calif. Air Resources Board, Moody's Economy.com

	Water	Energy	Waste Management/ Air Quality	Taxes	Worker Compensation	Real Estate & Rental Leasing
Agriculture	32.4	9.7	13.4	0.7	14.1	29.7
Technology producing	6.8	10.3	9.3	1.1	34.6	37.9
Tourism	3.0	27.1	1.0	7.4	41.7	19.7
Construction/Green	1.9	11.5	21.0	2.7	42.0	21.0
Creative	5.9	11.1	0.0	1.9	50.4	30.7
Wealth	10.9	12.7	4.2	5.1	42.8	24.3
Health	15.3	4.7	0.2	0.9	60.4	18.4
Retail trade	18.5	7.4	2.3	16.3	43.0	12.4
Wholesale trade	10.7	7.5	0.0	19.0	45.2	17.5
Federal govt	10.3	15.2	0.7	0.0	63.7	10.1
State & local govt	17.3	7.2	0.7	0.0	67.9	7.0
Other manufacturing/mining	4.1	37.0	9.3	0.9	24.0	24.7
Other transport & utilities	0.4	8.4	4.7	4.7	30.0	51.8
Other information	4.4	10.0	0.0	5.1	27.1	53.4
Other education	15.6	3.5	0.5	0.8	60.3	19.2
Consumer services	24.4	6.5	0.7	5.0	49.1	14.4
Min	0.4	3.5	0.0	0.0	14.1	7.0
Max	32.4	37.0	21.0	19.0	67.9	53.4
Mean	11.4	11.9	4.2	4.5	43.5	24.5

In general, the dependence of different industries on various factors of production as implied by the Input-Output accounts yields intuitive results. Among all industry clusters, agriculture displays the greatest need for water. Tax burdens are highest among local consumer industries that are subject to sales taxes. Worker compensation costs are the most significant for high-skilled service industries.

The impact of resource shocks on the Sonoma County regional economy is a direct reflection of these dependencies together with the overall sensitivity of industry clusters to business costs. The size of industries in the baseline outlook, therefore, largely determines the overall importance of changes in resource availability on aggregate economic activity.

Many differences in the effects of business cost innovations can be traced to the importance of different factors of production. Since labor cost make up nearly half of the total cost of doing business in Sonoma County, labor market innovations are found to have a larger impact on economic activity than do reforms to tax burdens or environmental regulations.

Personal incomes

While business costs are the main conduit through which resource issues influence economic growth, resource issues affect the consumer side of the economy as well. As households pay less for water, electricity and the like, they have more money left over to spend on everything else.

Similar to the use of Input-Output accounts to illuminate what businesses spend their money on, Consumer Expenditure Survey data are used to examine regional household spending patterns in order to determine the role of natural resources. As an example, if households dedicate 10% of their overall spending to electricity in the survey, a 50% increase in electricity prices would cut overall household buying power by about 5%. When considering any potential cost-saving resource policy such as a bike path or geothermal plant, the model has been designed to incorporate consumer-side effects as well as the impact on firms of changing business costs. In the current report, however, no specific policy alternatives are outlined, so consumer-side effects are omitted from the alternative scenarios.

Scenario 1: Energy Cost Savings

Charts 33 and 34 illustrate the effects of a permanent 10% reduction in energy costs. Such cost savings could be the result of new energy production facilities or public subsidies for the development or dissemination of efficiency-improving technological developments.

Chart 33: Employment Effects of Energy Cost Innovations
Employment, ths

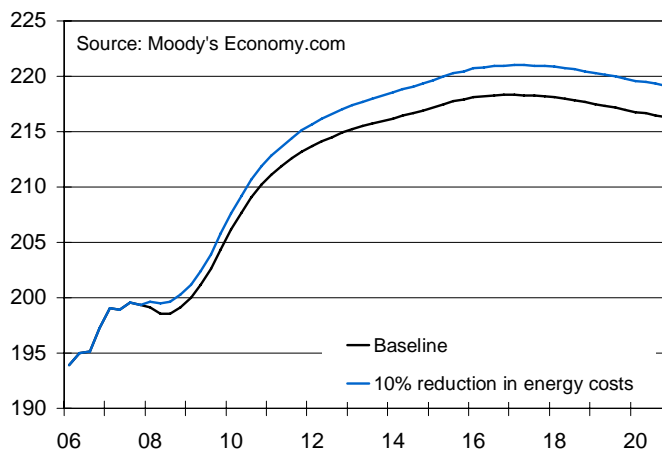
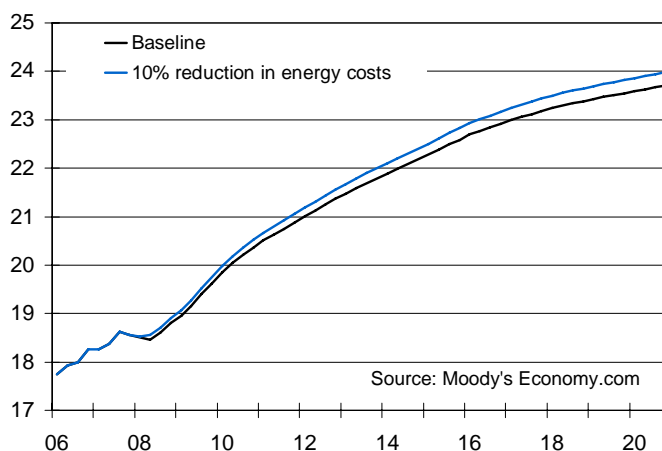


Chart 34: Output Effects of Energy Cost Innovations
Real Gross County Product, \$ bil



On average, energy costs amount to 12% of the overall cost of doing business in Sonoma County. Not surprisingly, manufacturers and other producers of goods have a relatively large exposure to energy costs. However, the burden of energy costs is also large for some of Sonoma’s most important service industry clusters, including tourism and health services.

By 2020, a 10% energy cost savings is found to increase county employment by 2,900 workers, which amounts to about 1.3% of area payrolls. Real Gross County Product is found to increase by \$274 million and local government tax collections by \$16.1 million.

Scenario 2: Waste Management and Emissions Cost Savings

Charts 35 and 36 illustrate the effects of a permanent 10% reduction in waste management and emissions costs. Such cost savings could be the result of new capital projects such as bike paths or transit systems. Public subsidies for the development or dissemination of green technologies can lower costs as well.

Chart 35: Employment Effects of Waste & Emissions Innovations
Employment, ths

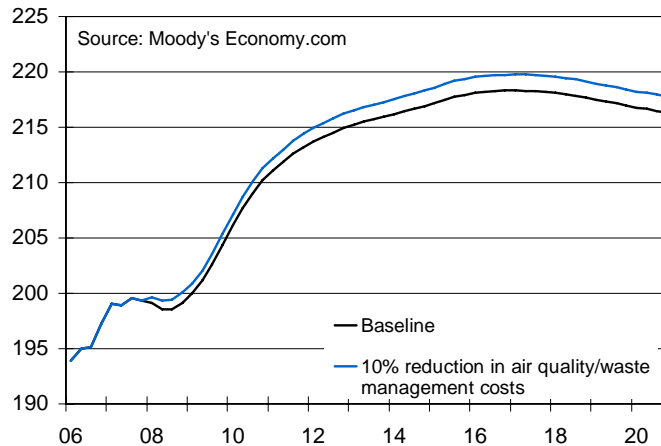
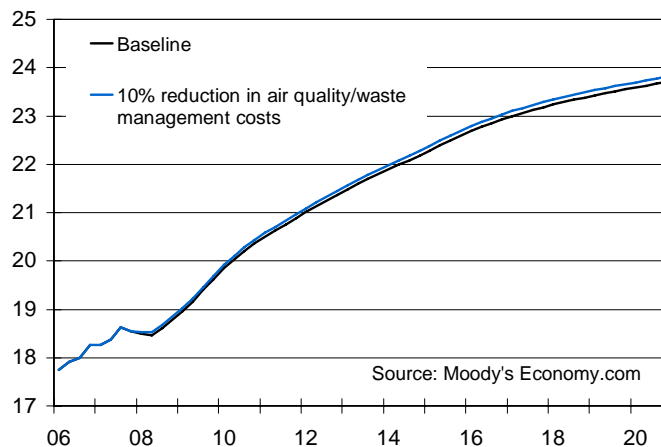


Chart 36: Output Effects of Waste & Emissions Innovations
Real Gross County Product, \$ bil



On average, waste management costs are small, amounting to only 4% of the overall cost of doing business in Sonoma County. The transportation industry, manufacturers, farms, and builders all face a relatively large burden from environmental costs.

By 2020, a 10% air quality/waste management cost savings is found to increase county employment by 1,500 workers, which amounts to about 0.7% of area payrolls.

Real Gross County Product is found to increase by \$108 million and local government tax collections by \$6.3 million.

Scenario 3: Water Cost Savings

Charts 37 and 38 illustrate the effects of a permanent 10% reduction in water costs. Such cost savings could be the result of public subsidies for efficiency improvements, water conservation programs, or new capital expenditures on treatment facilities.

Chart 37: Employment Effects of Water Conservation Policies
Employment, ths

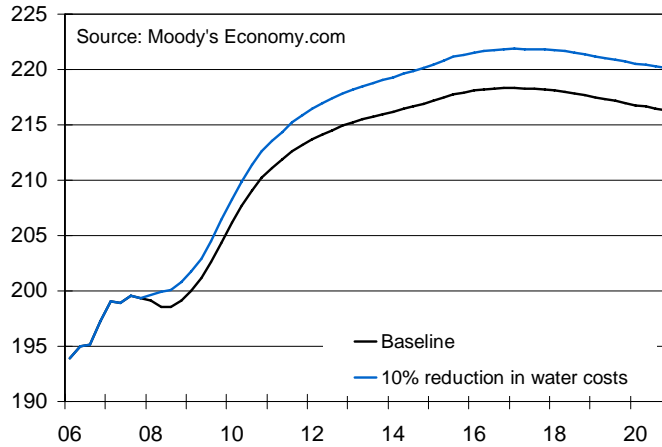
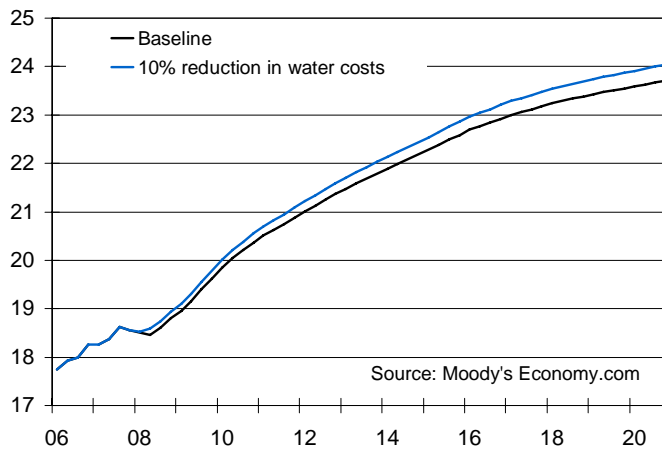


Chart 38: Output Effects of Water Conservation Policies
Real Gross County Product, \$ bil



On average, water costs amount to 11% of the overall cost of doing business in Sonoma County. Of course, wineries and other farms have the highest exposure to changes in water costs. However, in addition to wineries, many service industries depend heavily on water. Retailers, health services, local government and educational services all require relatively large amounts of water.

By 2020, a 10% water cost savings is found to increase county employment by 3,800 workers, which amounts to approximately 1.8% of area payrolls. Real Gross County Product is found to increase by \$327 million and local government tax collections by \$19.3 million.

Scenario 4: Lowering the Tax Burden

Charts 39 and 40 illustrate the effects of a permanent 10% reduction in effective corporate tax rates (that is, revenues per dollar of profits). On average, business taxes amount to 5% of the overall cost of doing business in Sonoma County. Tax burdens are highest among firms that are exposed to sales and other excise taxes, including retailers, wholesalers, and the tourism industry.

Chart 39: Employment Effects of Lowering Tax Burden
Employment, ths

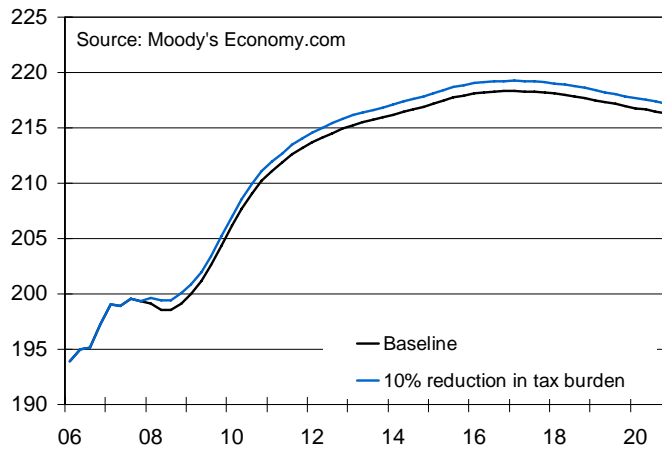
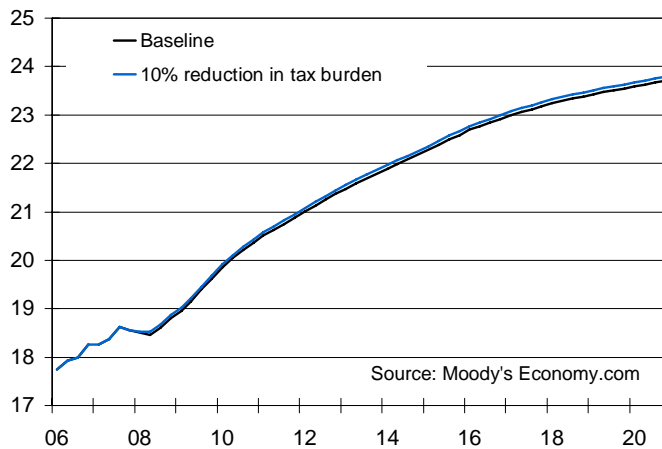


Chart 40: Output Effects of Lowering Tax Burden
Real Gross County Product, \$ bil



By 2020, a 10% decrease in the corporate tax burden is found to increase county employment by 900 workers, which amounts to approximately 0.4% of area payrolls. Real Gross County Product is found to increase by \$82 million. Local government tax revenues would indirectly rise by \$5.7 million because of the additional growth, offsetting more than 5% of the direct revenue decline caused by the statutory tax cuts.

Scenario 5: Increasing Regulatory Efficiency

Charts 41 and 42 illustrate the effects of a reduction in the burden of government regulation. In the scenario, it is assumed that innovations lead to an average annual savings of 100 hours worked per firm across all industries.

Chart 41: Employment Effects of Streamlined Regulations
Employment, ths

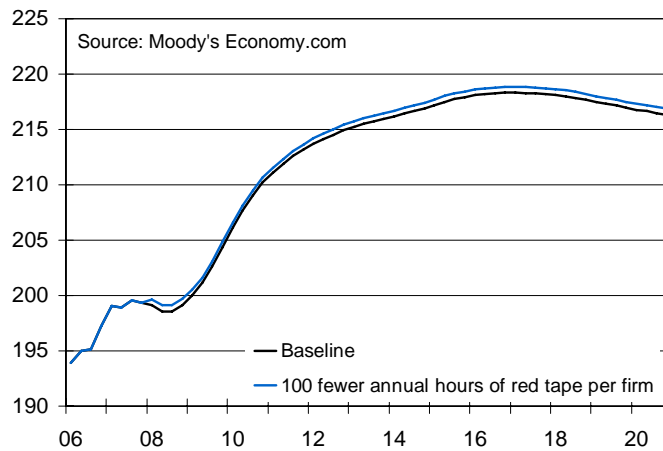
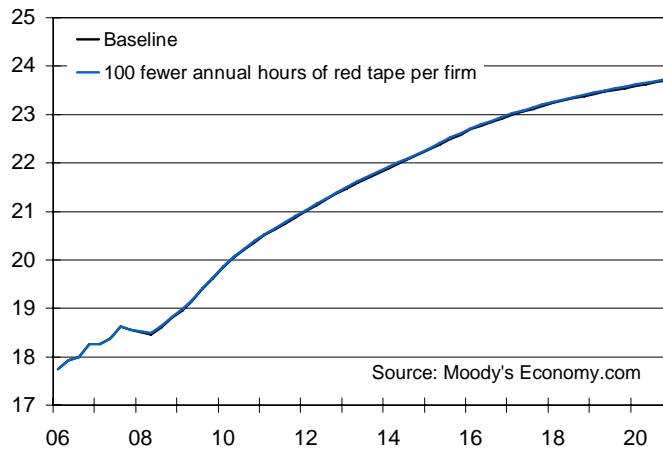


Chart 42: Output Effects of Streamlined Regulations
Real Gross County Product, \$ bil



On average, each business in Sonoma County uses a bit more than 30,000 hours of labor per year. As such, a 100-hour reduction in time spent on red tape amounts to a

0.3% reduction in unit labor costs. The burden of labor costs is highest among government, health service providers, and the creative cluster.

By the end of the forecast horizon, a 100-hour-per-firm increase in regulatory efficiency is found to increase county employment by 600 workers, which amounts to about 0.3% of area payrolls. Real Gross County Product is found to increase by \$28 million and local government tax collections by \$2 million.

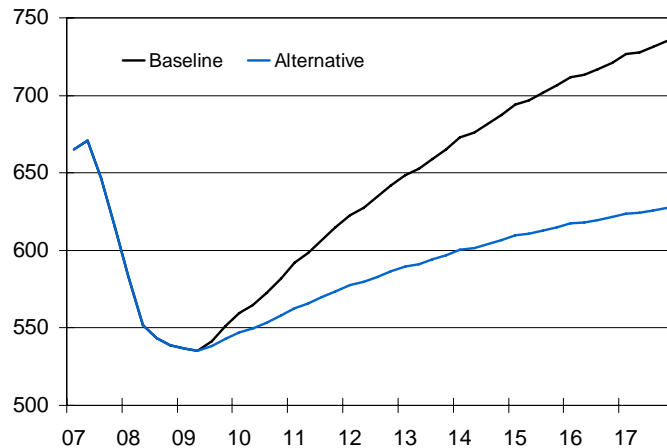
Section 5B: Alternative Scenarios—Demographic and Economic Assumptions

Scenario 6: Lower Housing Costs

After peaking at \$716,000 in mid-2005, Sonoma County’s median existing single-family house price has fallen nearly 11% and is expected to continue falling until the middle of 2009. The forecasted peak-to-trough decline in house prices is nearly 34% in the baseline forecast. The predicted decline is more than 10% larger than the national house-price decline and about 6% larger than the average for California. The sharper than average drop in house prices in Sonoma County will bring housing affordability well above that of San Francisco and Oakland over the next five years.

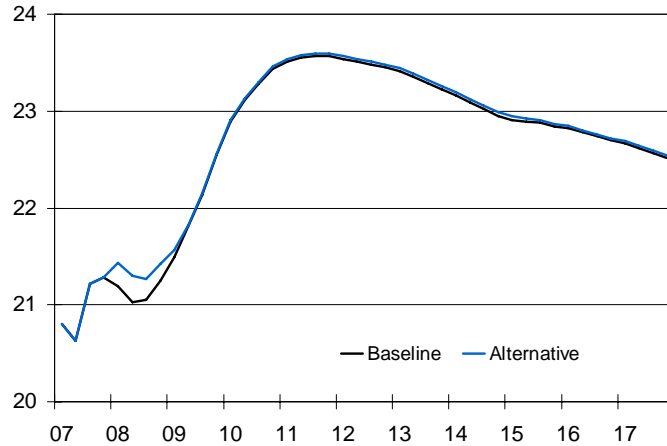
High house prices and low affordability are signals of the strong desire to live and work in Sonoma County. However, it also can constrain growth, especially in support service industries where wages are insufficient to offset the high costs of housing. In an alternative scenario for house prices, it is assumed that once Sonoma County goes through the existing housing cycle, house-price appreciation is much slower than the baseline projection through the remainder of the forecast horizon (see Chart 43). By the end of 2017, the median sales price for single-family homes is nearly \$100,000 lower than in the baseline forecast.

Chart 43: Lower Housing Cost Alternative Price Assumption
Median existing single-family house price, \$ ths



The result of lower house prices is to raise demand for housing. Thus, residential construction permit issuance rises and construction employment is higher for the first two years of the scenario (see Chart 44).

Chart 44: Lower Housing Cost Scenario: Construction Jobs Employment, construction/green cluster, ths



Population growth in Sonoma County will be higher as well, particularly after the housing market cycle ends in late 2009 and early 2010 (see Charts 45 and 46). Faster population growth spurs faster job growth, although the increase in job growth is concentrated in the lower-skilled employment sectors. Part of this is due to the rise in homebuilding itself, which requires increased hiring of construction workers, but consumer-driven service industries, which tend to be lower-paying, also get a boost from faster population growth. The result is that real gross county product is only marginally higher—annualized growth is about 10 to 20 basis points higher than in the baseline forecast on average.

Chart 45: Lower Housing Cost Scenario: Population Impact Population growth, % change year ago

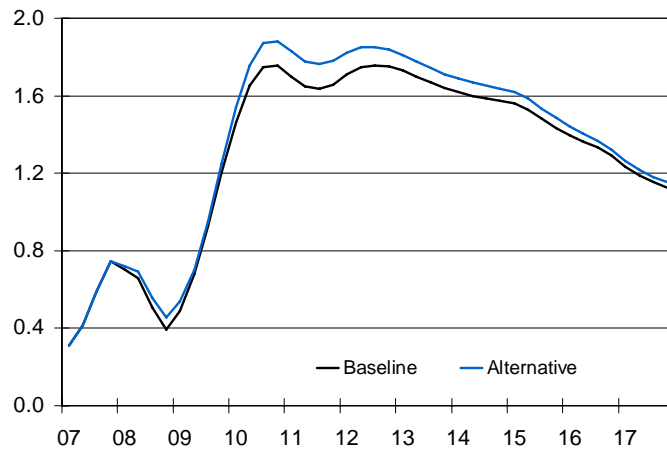
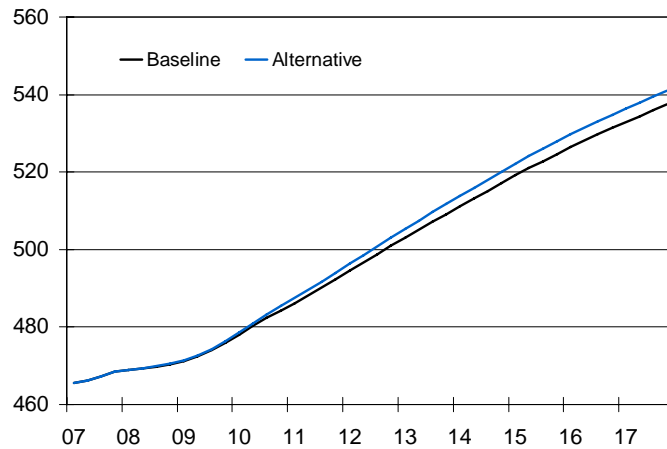


Chart 46: Lower Housing Cost Scenario: Population Impact
Population, ths



Scenario 7: Workforce Improvement

Potential gains from policy initiatives targeted to improve the quality of Sonoma County’s workforce are the focus of the workforce improvement scenarios. According to the 2000 decennial Census, the educational attainment rate of Sonoma County’s adult population was above average compared to the nation and the rest of California when measured by the share of the adult population with at least a bachelor’s degree. However, Sonoma County’s population has changed dramatically over the past two decades as younger, less educated immigrants have become a large share of the county’s population and workforce. Indeed, according to the Sonoma County Office of Education, the high school graduation rate for Hispanics in the 2006 school year was 62%, compared to 78% for white, non-Hispanic students. If this large gap in graduation rates persists, the overall high school educational attainment rate of the county’s population will fall over time, resulting in a less productive, lower-skilled workforce. The Moody’s Economy.com baseline forecast calls for the share of the adult population with less than a high school diploma or GED to rise through the forecast, reaching just over 16% by 2020—over 2 percentage points higher than its rate in 2006.

The importance of a secondary education can be illustrated by the difference in wages between a high school dropout and a high school graduate with no college. In 2005, a worker with a high school diploma or GED and no post-secondary education had average annual earnings that were 50% higher than those of a high school dropout. The difference between a college graduate and a high school graduate is much larger, but given the high school dropout rate among Hispanics in Sonoma County, it is a good first step to focus on high school attainment.

Unfortunately, no historical time series data exist for graduation rates for Hispanics and non-Hispanics in Sonoma County, which would have been preferred over aggregate attainment figures. The high school educational attainment rate produced

by the Census Bureau is available on an annual basis from 2000 to 2006 and for 1990 for Hispanics and non-Hispanics.

The workforce improvement scenarios were done in two stages. First, various assumptions about the high school attainment rate among Hispanics were incorporated into the model. In the first assumption—Closing the Gap—the share of Hispanics with less than a high school diploma was assumed to drop to the same rate as for non-Hispanics. In the second assumption—Half the Dropout Rate—this share was expected to drop by 50% by the end of the forecast horizon in 2020. In the third assumption—Modest Improvement—the narrower education gap, it is assumed that the share of Hispanic high school dropouts falls at the same rate as it does for non-Hispanics.

The second stage of the scenarios is to add on the assumption that the share of Hispanics with some college and with a college degree or higher increases by 10% each.

Finally, a scenario—Raising the Bar—that incorporates the most aggressive workforce improvement scenarios for Hispanics combined with an overall increase in college attainment for non-Hispanics was run. Raising the Bar for all of Sonoma County’s population produces the largest increase in output and employment for the county.

Closing the Gap: Hispanic workforce improvement

The optimistic workforce improvement alternative scenario demonstrates how Sonoma County could boost its long-run economic performance if the high school educational attainment level of the Hispanic population is raised over the next decade. In this scenario, it is assumed that over the next 12 years, the share of the adult (25 years and older) Hispanic population with less than a high school diploma (or GED) decreases to match the share of the non-Hispanic population. This assumption means that the share of the Hispanic population with less than a high school diploma goes from about 57% in 2007 down to around 3.5% by the end of 2020. This assumption is likely an upper bound or “best-case scenario” for workforce improvement since the decline in the high-school dropout rate would have to fall dramatically in order for this to come to fruition. In the baseline forecast, the share of the Hispanic population with less than a high school diploma is expected to continue increasing over the forecast horizon, reaching 67% by 2020.

This assumption about educational attainment raises the level of employment in Sonoma County 1.6%, or 3,500, above the baseline forecast (see Chart 47). Real GDP rises by 1.7%, or by \$400 million (see Chart 48).

Chart 47: Workforce Improvement Boosts Job Growth
Employment, ths

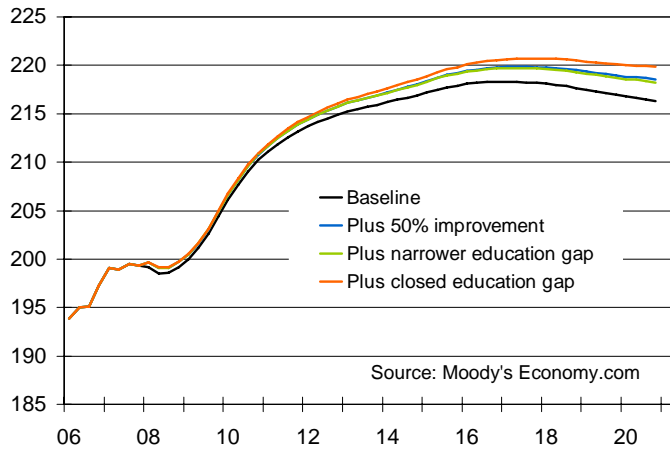
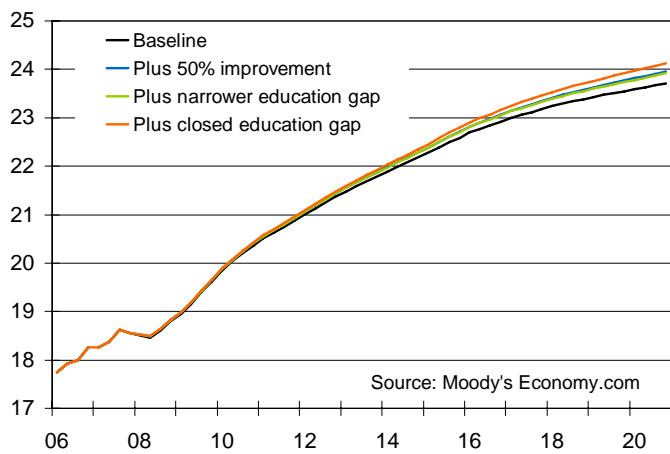


Chart 48: Workforce Improvement Boosts Output
Real Gross County Product, \$ bil



County tax revenue would increase by \$28.7 million by 2020. When the assumptions about post-secondary education among Hispanics are added to this scenario, employment is 3% higher, rising 6,500 above the baseline forecast (see Chart 49). GDP is 3.4% higher than the baseline by 2020, or about \$800 million higher (see Chart 50). In this scenario, county revenues rise \$53.8 million above the baseline by 2020.

Chart 49: Higher College Attainment Means More Jobs...
Employment, ths

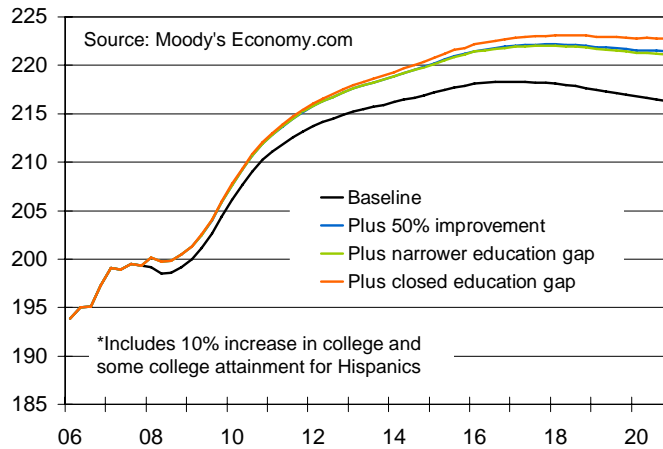
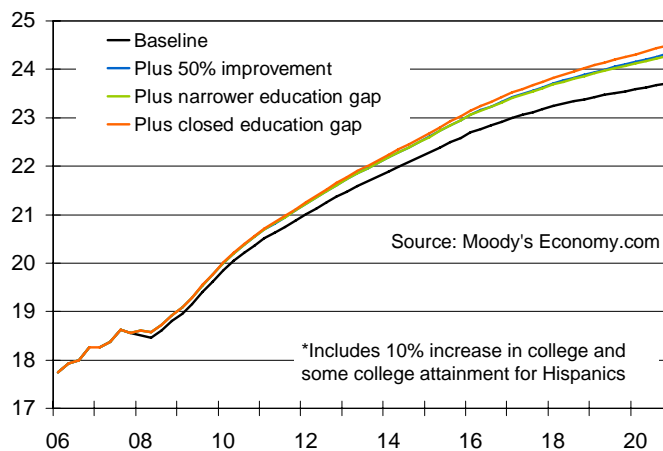


Chart 50: ...And Higher Output
Real Gross County Product, \$ bil



Half the Dropout Rate: 50% improvement in high school attainment

The mid-range assumption incorporates a 50% reduction in the share of the Hispanic population with less than a high school diploma. This means that the share of Hispanics with less than a high school diploma falls from 58% at the end of 2007 to 29% by the end of 2020. Chart 47 shows that this assumption alone raises the level of employment in Sonoma County by 1%, or 2,200. GDP increases by 1.3%, or by \$300 million, under this scenario (see Chart 48). County revenues would rise by \$20 million by the end of the forecast range.

When the assumption regarding higher college attainment rates among Hispanics are added on to these scenarios, employment increases by 5,100 above the baseline by the end of 2020, representing 2.4% of total employment (see Chart 49). GDP increases by 2.5% above the baseline, or by \$700 million, under this dual scenario (see Chart 50).

County revenues would increase by \$41.9 million above the baseline forecast by the end of 2020.

Modest Improvement: Hispanic dropout rate falls, but only at same pace as non-Hispanic rate

This workforce improvement scenario assumes that rather than close the gap on the high school educational attainment rate between Hispanics and non-Hispanics, the gap is reduced so that the share of Hispanics with less than a high school diploma falls at the same rate as that for non-Hispanics over the forecast horizon. This means that the share of adult Hispanics with less than a high school degree falls from 57% in 2007 to 36% in 2020. Under this assumption, employment is just under 1% higher than the baseline forecast by 2020, representing an increase of 1,900 jobs (see Chart 47). GDP rises 0.8% higher than the baseline forecast under this scenario, representing an increase of \$200 million (see Chart 48). County tax revenues are \$17.7 million higher under this scenario.

When the assumption of a 10% increase in the share of Hispanics with some college education and a 10% increase in the share of college grads is incorporated on top of this lower bound assumption, employment increases by 4,800 over the baseline forecast by 2020, representing a 2.2% increase (see Chart 49). GDP is 2.5% higher, or about \$600 million above the baseline, by the end of 2020 (see Chart 50). County revenues rise \$40.4 million above the baseline by 2020.

Raising the Bar: The most aggressive workforce improvement scenario

The most aggressive workforce improvement scenario combines three assumptions. First, it is assumed that Hispanic students will close the gap with non-Hispanics in terms of high school attainment levels. Second, the share of Hispanics with a college degree will increase by 10% and the share of Hispanics with some college or an associate's degree will rise by 10%. Finally, the share of non-Hispanics with a college degree and with some college also will rise by 10% by the end of the forecast horizon. Combining these three assumptions produces the largest increase in employment, output and tax revenues. Employment increases by nearly 20% above the baseline forecast, or by 40,000, by the end of 2020 (see Chart 51). Gross County Product increases by \$5 billion above the baseline, or by 21%, by 2020 (see Chart 52). County tax revenues increase by \$374 million above the baseline by 2020.

Chart 51: Closing the Gap and Raising the Bar Adds Jobs...
Employment, ths

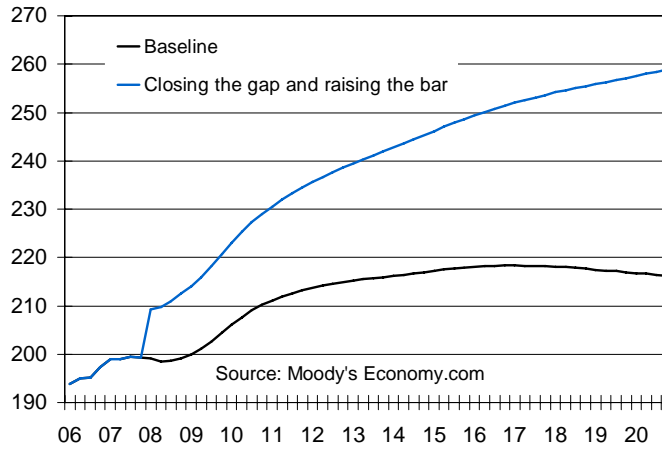
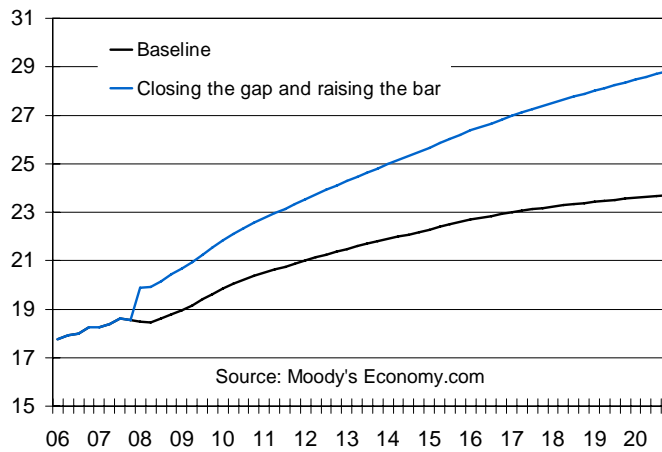


Chart 52: ...And Output
Real Gross County Product, \$ bil



Data sources and methodology

Both the lower and upper bounds of these scenarios assume that higher output growth will be achieved by increasing the productivity of the workforce through higher levels of education. The increase in productivity works to lower the unit labor costs to firms. Productivity is assumed to increase by the difference between the average annual earnings of a high school dropout and a high school graduate in the first stage of these scenarios, and between a high school graduate and a college graduate (or a person with some college) in the second stage. This means that firms that are more labor intensive will reap the benefits of a more highly educated workforce, more so than capital-intensive firms.

Data on educational attainment of Hispanics and non-Hispanics come from the U.S. Census Bureau's Decennial Census 2000 and 1990 as well as the American Community Survey for years 2001 to 2006. Data on average earnings by educational

attainment are for the nation and come from the Census Bureau's Current Population Survey.

Neither the Sonoma County Office of Education nor the California Department of Education has historical graduation rates for Hispanics and non-Hispanics; both agencies only have data for the 2006 school year. Both agencies are in the process of collecting such data, which will likely be available over the next two to four years.

Scenario 8: Trade Shock

Given the increasingly strong global ties of the regional economy, terms of trade stand to greatly influence growth over the extended forecast horizon. In recent years, Sonoma County's main Asian trading partners have experienced rapid rates of expansion, which together with a weaker dollar and a growing wine industry has led to increased demand for area exports.

Given current terms of trade, locally produced goods, including wine, are much less expensive for consumers in other countries, and travel to Sonoma County is relatively cheaper than in the past. With the value of many Asian currencies, particularly the Chinese yuan, still considered to be undervalued, further improvements in terms of trade could persist going forward.

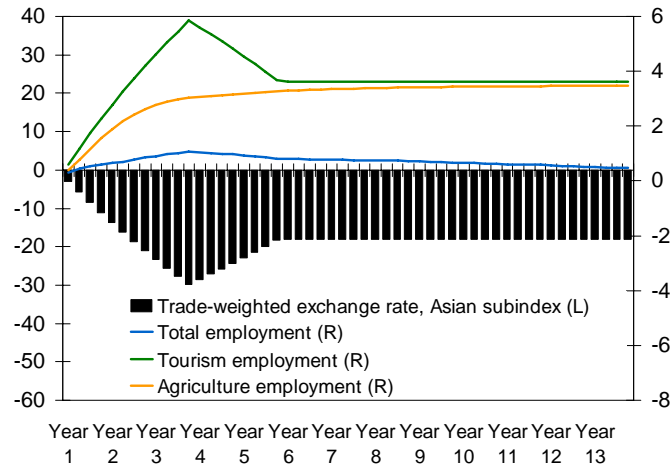
To illuminate the effects of changing terms of trade on the regional economy, an alternative forecast scenario was produced to reflect an environment of a weaker dollar. To put the change in perspective, the shock to the trade-weighted exchange rate was designed to match the size of the movements seen during the Asian financial crisis of the last decade. However, instead of the dollar becoming stronger as it did during the 1990s, the alternative scenario assumes a rapid improvement in terms of trade. Specifically, the value of the dollar is roughly cut by one-third over a three-year period, but regains around half of these losses over the next few years.

In the economic model, terms of trade impact growth through two primary channels. First, a weaker dollar leads to increased demand for export-oriented sectors such as agriculture and tourism. Second, the weaker dollar makes imported goods more expensive for local firms and households, thereby reducing spending power. To capture the reduction in buying power, disposable income levels are reduced according to the share of spending on imported goods. According to the Bureau of Economic Analysis, imported goods account for 9.6% of consumption spending in the U.S. as a whole. Based on this estimate, it is assumed that consumption spending in Sonoma County would be reduced by around 10 basis points for each percentage reduction in the value of the dollar.

All told, the boost to producers from a weaker dollar more than offsets the reduction in household buying power. The assumed movement in exchange rates leads to a

maximum increase in area employment of just over 1% (see Chart 53). Given the profits earned by area exporters, output increases are somewhat more pronounced.

Chart 53: Terms of Trade Are Important for Large Clusters
Exchange rate shock: % difference from baseline scenario



Many of the economic gains flowing from improved terms of trade will be accrued by the agriculture and tourism clusters, which enjoy the strongest direct ties to the global economy. Local consumer service industries and retailers fare the worst, given their relative lack of exports and high degree of exposure to regional household buying power.

Scenario 9: Adding It All Up—Total Returns From Innovation

Finally, a scenario that includes the most optimistic workforce improvement scenario (closing the gap on Hispanic high school attainment and a 10% increase in Hispanics with some college and a college education) combined with a 10% cost reduction in energy, water, air, office rents and taxes was run (see Charts 54 and 55). In this scenario, the baseline population forecast is assumed. If business costs are reduced by 10% across the board, Gross County Product would be \$2.3 billion higher by 2020—about 9.7% higher than the baseline forecast. Employment would be 20,400 higher by 2020, or about 9.4% above the baseline employment forecast. County tax revenues would increase by \$169.3 million above the baseline forecast for revenues by 2020.

Chart 54: Combined Innovations: Hiring Increases
Employment, ths

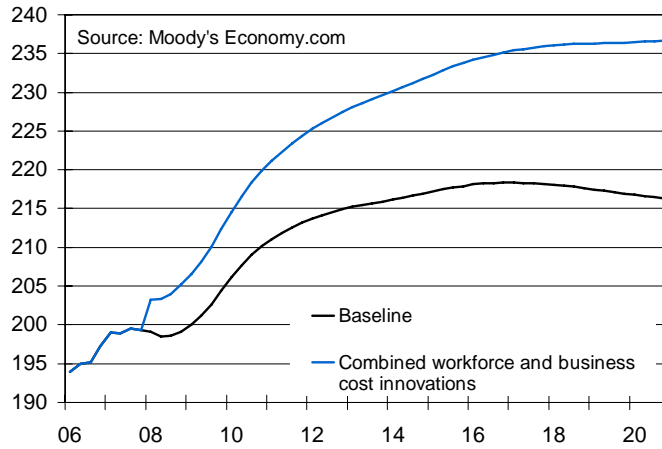
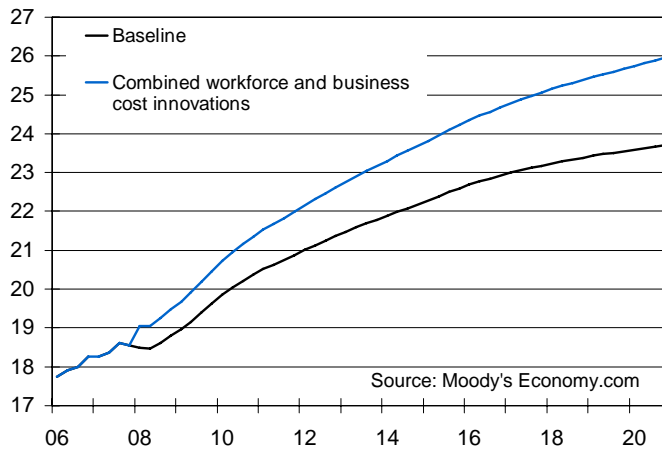


Chart 55: Combined Innovations: Output Gains
Real Gross County Product, \$ bil



SECTION 6: APPENDICES: DATA SOURCES AND METHODOLOGIES

APPENDIX 1: INDUSTRIAL CLASSIFICATIONS

This analysis of economic clusters is undertaken at a detailed level of industry classification. The system of classification is the North American Industry Classification System (NAICS). This is the standard system used by the U.S. Departments of Labor and Commerce and by the California Economic Development Department to manage employment and industry data. Versions of NAICS are also used in Canada and Mexico. All industries are classified into one of 25 so-called 2-digit NAICS categories.⁹ The U.S. Labor Department's Bureau of Labor Statistics further aggregates these into 12 supersectors; but both the supersectors and the 2-digit classification do not provide sufficient detail to understand the structure of the economy.

The NAICS system is hierarchical. Each 2-digit classification is further divided into a number of 3-digit classifications and each 3-digit classification is divided into 4-digit classifications. For this study, the 4-digit classifications are used for Sonoma County and for the U.S. There are a total of 285 4-digit industry classifications. Thus, the study is done at a very high level of detail, providing the ability to identify economic clusters from the bottom up, including only those components that are truly driving the economy.

⁹ The 2-digit refers to the numerical code assigned to each category. Each 2-digit category has a 2-digit numerical code assigned to it.

APPENDIX 2: LABOR MARKET FORECASTS

Local-Oriented Sectors

The local sector in most areas is generally composed of service-oriented businesses. Local sectors can include construction, wholesale and retail trade, business and health services, state and local government, and utilities. These are oftentimes support services, providing the necessary infrastructure for the export sectors and the local population. These equations are modeled as a function of a demand proxy (e.g., real personal income, population, relevant export sector activity), and a wage term to capture labor substitution effects.

Real personal income is the most commonly used proxy, either alone or in combination with population, for the level of demand for local consumer services. It is one of the best measures of aggregate economic activity, reflecting wages and salaries, transfer payments, and nonwage income.

Since employment in the local economy is an important determinant of wages and salaries, this introduces an important simultaneity into the model. In other words, personal income is a function of employment, and certain employment categories are a function of income.

Population levels are also an important determinant of the demand for certain local services including government services and transportation services. This adds another degree of simultaneity in the model system given that migration flows are influenced by employment opportunities, and certain employment categories are modeled as a function of population. This also provides an avenue by which changes in the demographic structure of Sonoma County can be translated into economic effects. Since different demographic groups consume different bundles of local services, changes in the local population can be assumed to impact demand differently across industries.

Household employment is modeled as a function of total payroll employment and the ratio of household-to-payroll employment. The two measures of employment can vary over the business cycle given changes in the number of people holding multiple jobs and the number of self-employed.

The labor force is determined by the working-age population and nonfarm payroll employment growth in the county. The working-age population is determined through an identity based on total population.

Export-Oriented Sectors

The export-oriented sectors include those businesses that sell goods and/or services to customers residing outside of the county. The large size of its export-oriented industries is what most sets the Sonoma County economy apart from others in the

region. In particular, Sonoma's large winemaking, tourism, financial service and technology industries are largely export-based.

Those businesses considered to be export-based are more closely linked to income growth and spending in other areas such as Oakland, New York or China than to demand conditions within Sonoma County itself. For example, most of the wine produced in Sonoma County is consumed elsewhere, and as a result, industry demand will largely be determined by consumer spending in other areas. That said, the income generated from these businesses provides an important source of demand for the state's locally-oriented sectors, generating additional profits and income, some of which will be spent on other goods and services produced in the county.

For example, the manufacturing industry remains a predominant export-oriented sector. Employment in major local manufacturing industries, such as wineries and makers of telecommunications equipment and medical instruments, will be modeled using measures of national and international consumer and business spending. Measures of labor productivity and relative business costs are often used as well. Where appropriate, assumptions regarding industry-level variables such as sales, profits and exports are taken from the Moody's Economy.com macroeconomic and industry modeling system.

Over the past quarter-century, an increasing number of service businesses have become more export-oriented. In particular, Sonoma County's large and growing tourism, financial service industries and creative clusters can be considered largely export-based. For example, demand for travel to Sonoma County and spending at its many retailers and hospitality firms rely on broader regional, national and international economic conditions.

APPENDIX 3: DEMOGRAPHICS

The demographic sector of the model plays an integral role in the model structure. Population growth is an important determinant of local economic conditions as well as construction and consumer spending activity. In turn, population growth is dependent on economic activity as the availability of job opportunities influences migration flows between states and across Sonoma County. The economic explanation of regional migration flows is that labor will move from low-wage, less-developed areas to high-wage areas where economic opportunities are greater. Living cost differentials are also important, however, which introduces ties to area housing markets. Migration flows also respond to nonpecuniary factors such as a more pleasant climate or less crime.

The Moody's Economy.com population forecast for Sonoma County is a function of California's population, job growth over the prior year and the median existing house price in Sonoma County relative to house prices in the San Francisco metropolitan area.

The demographics block of the Sonoma County model includes forecasts for the population of the county by five-year age group and Hispanic and non-Hispanic ethnicity. In order to forecast the age/ethnicity groups, Moody's Economy.com applied population shares projected by the California Department of Finance's Demographic Research Unit (DRU) for Sonoma County's age/ethnicity makeup to its existing baseline population forecast for Sonoma County. The DRU publishes population projections out to 2040 at ten-year intervals. Moody's Economy.com interpolated these projections to fill in the interim years and then quarterized the series to apply them to the existing quarterly population forecast.

The components of population change are either exogenous or identities in the model. To forecast births and deaths, for instance, Census Bureau projected birth and death rates are applied to the population forecast. Although the DRU does have projections of births for California's counties, it does not project deaths; therefore, the Census Bureau data were used here. Net migration is simply the difference between total population and the natural increase (births minus deaths) in the population.

In addition to forecasting population and its components and households, the Moody's Economy.com Sonoma County model also includes forecasts of the population's educational attainment level. The educational attainment level of the population age 25 and older is forecasted for both the total population and the non-Hispanic population in Sonoma County; educational attainment for the Hispanic population is the residual of these two series. The historical data come from the decennial censuses for 1990 and 2000 and the Census Bureau's American Community Survey from 2001 to 2006. The forecasts for educational attainment are trend forecasts based on historical patterns for each level of education and ethnicity group.

APPENDIX 4: SKILL LEVELS

The classification of high-wage/high-skill and lower-wage/lower-skill industries is based on annual wage and employment data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages (QCEW). Splitting Sonoma County's industry employment into these two broad categories is a simple way of illustrating the average wage structure of the local economy over the forecast horizon. In order to classify Sonoma County's industrial clusters and non-cluster industries into high- or low-wage industries, the average annual wage per employee was computed using 2006 QCEW data. This is the last year for which historical data are available. The QCEW data are considered the most reliable source of wage and employment data because they are based on a nearly complete universe count (or census) of total establishment employment from unemployment insurance tax records that all business establishments are required to file by law. The average annual wage per employee was computed for all industries combined as well.

Industries with an average wage above the all-industry average are considered high-wage/high-skill, while industries with an average wage below the all-industry average are considered lower-wage/lower-skill. Industries included in the high-skill definition include tech-producing, creative professional, wholesale trade, health and wellness, and wealth management. Lower-skill industries include construction & green services; agriculture, wine and food; retail trade; and tourism.

APPENDIX 5: OTHER ECONOMIC VARIABLES

Personal Income Sector

The personal income segment of the model includes total personal income, which is divided into wage and salary income and nonwage income. Total personal income is modeled based on job growth in Sonoma County and personal income in the state. Wages and salaries in Sonoma are shared down to the county from the state using relative job growth in Sonoma versus California. Nonwage income is simply the difference between total personal income and wages and salaries.

Housing Sector

The housing sector determines the number of single-family and multifamily permits issued, existing home sales, existing median house prices, mortgage originations for purchase and refinancings, and mortgage delinquency and foreclosure rates. Ultimately, the level of housing permits issued equals the number of household formations. Household formations, therefore, are an important explanatory variable in the housing permit equations. Permits issued and household formations are not equal in each period, however, given changes in the business cycle and building activity. Also affecting permit issuance, therefore, are general economic conditions as represented by employment or income growth, housing affordability, which is determined by the level of house prices, household income, and the level of interest rates, and the availability of credit.

Existing home sales are determined by state existing home sales and the ratio of local-to-state housing permits issued. Using this specification captures both local and state level factors that influence housing market activity.

House prices are specified as a function of factors that influence both the demand and supply of homes. The demand for homes depends on real income per household, the number and age of households, real after-tax borrowing costs, and the rental vacancy rate. Real income per household measures are determinants of both the ability and willingness of households to purchase a home. Rising income levels will result in increased homebuying activity. The demographic variable is important because households have different levels of demand for housing services depending on their age. Very young households, for example, are more likely to rent, while older households have already purchased a home and are less likely to move. The real after-tax cost of borrowing for a home also clearly influences homebuying decisions. Finally, the rental vacancy rate is included in the equations to account for the rent/buy decision. A falling vacancy rate generally results in rising rents, and thus makes purchasing a single-family home more attractive.

The supply of homes depends on the housing supply-demand balance, a measure of credit availability, and the cost of construction materials. The housing supply-demand balance is based on the number of permits issued and the number of new household formations. Over time, the level of housing permits issued will closely

follow the number of new household formations, abstracting from demolitions. Credit availability is also important given the aggressive lending practices of recent years.

The Consumer Sector

The consumer sector includes retail sales, consumer credit outstanding, the consumer credit delinquency rate, and the consumer price index. Real retail sales in Sonoma County are based on real disposable income. Consumer credit conditions are based on U.S. lending standards and local employment and income trends. State-level terms will be adjusted by relative income growth and bankruptcy rates.

APPENDIX 6: POLLUTION AND WATER RESOURCES

Water Resources Methodology

Moody's Economy.com estimates of water use by industry in Sonoma County are based on city-level data scaled to approximate countywide consumption patterns. Water use data are supplied by the City of Santa Rosa Utilities Department. The city-level data contain detailed industrial and institutional water use figures catalogued according to the four-digit Standard Industrial Classification (SIC) system, spanning the four years from 2003 through 2006. Commercial and agricultural water use figures are also supplied, although not at the level of detail available in the industrial/institutional series.

Estimates of industrial, institutional and commercial water use are converted to a NAICS-based framework for consistency with Moody's Economy.com industry employment and output forecasts. For industrial/institutional water use, an SIC/NAICS employment crosswalk is employed to facilitate the conversion process. Using the employment ratios contained in the crosswalk, the industrial and institutional water use data supplied by Santa Rosa are translated into corresponding six-digit NAICS industry categories and aggregated to conform to Sonoma's specific cluster definitions.

Commercial water use, defined by Santa Rosa as all users not classified as either industrial or institutional users, is estimated using year 2000 four-digit SIC-based employment data for the Santa Rosa Metropolitan Area (Sonoma County). SIC industries for which industrial or institutional water use is available are excluded from the commercial water use estimation. Employment for each industry defined as a commercial user is expressed as a ratio of total employment in the commercial use category. SIC-based commercial water use is derived by allocating to each industry a proportion of total commercial water use equal to its share of total commercial user employment. Using an SIC/NAICS employment crosswalk, commercial water use is converted into a NAICS-based format and aggregated to conform to Sonoma's cluster definitions. Commercial and industrial/institutional data are then summed to obtain the estimated commercial/industrial/institutional water use for Santa Rosa.

Dedicated irrigation accounts, defined by the City of Santa Rosa as accounts using water primarily for landscape irrigation purposes, are assumed to fall under the agriculture, food and wine cluster.

The scaling process to convert from Santa Rosa water use to countywide water use utilizes data from the California Urban Water Conservation Council (CUWCC). Annual urban water usage reports for the Sonoma County Water Agency's eight largest contractors are available. Data contained in these reports catalogue urban water supplies and usage for several customer classes during a contractor's fiscal year. Commercial, industrial and institutional (C/I/I) water usage between fiscal year 2003 and fiscal year 2006 for the eight largest contracts is aggregated and used to scale up Santa Rosa's industrial water use to provide a countywide C/I/I estimate. Whereas the data available from the CUWCC are reported on a fiscal year basis, Santa Rosa's usage data are

expressed on a calendar-year basis, so some discrepancy in annual water use is likely to result. However, for the purposes of the scaling calculation, the seasonal differences in total annual water usage are assumed to be insignificant. In practice, both annual and fiscal year totals closely approximated one another.

Given the importance of agricultural activity to Sonoma County's economy, countywide agricultural water use is estimated. Annual applied water use data and total crop acreage, available for the years 1998 through 2003, are supplied by the California Department of Water Resources Division of Planning and Local Assistance (DWR). However, given the year-to-year volatility in the land use and applied water data from the DWR, an averaging procedure is employed in order to minimize the influence of some of these exogenous variables. For example, soil conditions, average temperature and many other atmospheric and weather-related factors may influence the ultimate water needs of many types of crops grown in Sonoma. Total average annual applied water for 1998 through 2003 is multiplied by total average annual acreage to approximate total agricultural water usage. The agricultural and urban water usage data are then aggregated to produce an estimate of countywide water use.

Water use restriction and allocation scenarios are based on data available in the City of Santa Rosa's Urban Water Shortage Contingency Plan. Water rationing and rate increases contained in the document are used to represent the expected allocation and price of water in the event of a shortage. Given that agricultural water use represents such a large portion of total county water use, the percentage reduction required by agricultural users is assumed to match the overall shortage in water supply during a drought.

Greenhouse Gas Emissions Methodology

Moody's Economy.com estimates of greenhouse gas emissions by industry for the County of Sonoma are based on the California Air Resources Board (ARB) statewide greenhouse gas emissions inventory released in November 2007. The ARB's work contains estimates for emissions by source category as specified in the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines for National Greenhouse Gas Inventories. Several departures from the IPCC's methodology occurred during the course of the ARB's estimation process, which are detailed in the ARB staff report.

Estimates for greenhouse gas emissions by NAICS category are derived from the annual emissions data series available from the ARB. Data span years 1990 through 2004, and provide estimates of total annual emissions in terms of CO₂-equivalent greenhouse gases emitted by source category, as defined in the IPCC's guidance documents. Significant conceptual differences exist between the IPCC-defined source categories and existing industry classification systems. In some cases, emissions from a given source category can reasonably be classified into several different industry categories, or may not fit any description of a NAICS-based industry.

The IPCC-supplied description of that category is assigned to a NAICS-based industry according to the closest comparable description of that industry, as supplied by the BLS. Several of the IPCC categories did not classify easily into any NAICS category. These source categories are excluded from further calculations. NAICS-based estimates of statewide emissions are aggregated to conform to Sonoma County's cluster definitions and shared down to Sonoma County via Moody's Economy.com estimates of output per cluster.

Data used in the estimation of pollution costs come from the ARB's *Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration*. The reports contained in the document elaborate on the proposed early action effort, designed to help reduce statewide greenhouse gas emission. Although many of the reduction and cost estimates are preliminary, several of the proposed measures outline specific reduction targets and cost estimates. These estimates collectively serve as the input data used to estimate the average cost per unit of reduction in greenhouse gas.

In order to gauge the impact AB32 may have on specific statewide industries, reduction targets and costs are collected or estimated. Each early action measure for which an emissions reduction estimate is available in the ARB's early action document is given a cost associated with the total reduction. Actions for which no cost estimate is available are assigned the average cost per unit of reduction, calculated from the sample of early actions for which reduction costs are available. A timeline outlining the estimated reductions, costs and industries affected by each early action is created.

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APPENDIX 7: SONOMA COUNTY SERIES INCLUDED IN THE FORECAST

Gross County Product

- Gross Product
- Real Gross Product (2000\$)
- Implicit Gross Product Deflator

Income (Mil \$)

- Wages & Salary (Mil \$, SAAR)
- Nonwage Income
- Total Personal Income
- Disposable Income
- Per Capita income

Real Income (Implicit Gross Product Deflator) (2000\$)

- Total Personal Income
- Disposable Income
- Per Capita Income

Employment

- Total Non-Agricultural (Ths, SA)
 - Agriculture, Food & Wine
 - Construction & Green Services
 - Wealth Management
 - Creative Professional
 - Technology-Producing
 - Retail Trade
 - Wholesale Trade
 - Tourism
 - Health & Wellness
- Residual employment categories
 - Skilled employment
 - Unskilled employment

Labor Force

- Total Employed (Ths, SA)
- Number of Unemployed
- Unemployment Rate (%)
- Labor Force (Ths, SA)
- Labor Force Participation Rate (%)

Average Hourly Earnings – Manufacturing

Relative Cost of Doing Business Indices

- Industry Clusters (2005=100)

Demographics

Total Population, Non-Hispanic Population, and Hispanic Population (Ths)

Population: 00-04, (Ths, #)

Population: 05-09, (Ths, #)

Population: 10-14, (Ths, #)

Population: 15-19, (Ths, #)

Population: 20-24 (Ths, #)

Population: 25-29 (Ths, #)

Population: 30-34 (Ths, #)

Population: 35-39 (Ths, #)

Population: 40-44 (Ths, #)

Population: 45-49 (Ths, #)

Population: 50-54 (Ths, #)

Population: 55-59 (Ths, #)

Population: 60-64 (Ths, #)

Population: 65 and older (Ths, #)

Share of Population with a Bachelor's Degree (%)

Total Population

Birth Rate (# of Births per 1,000)

Death Rate (# of Deaths per 1,000)

Number of Households (Ths)

Net Migration (Ths)

Housing

Total Permits

Single-Family (#, SAAR)

Multifamily (#, SAAR)

Existing Single-Family Home Sales (Ths, SAAR)

Median Existing Single-Family House Price (Ths \$, SA)

Affordability Index (Index)