The Bay Area

A REGIONAL ECONOMIC ASSESSMENT

A Bay Area Council
Economic Institute Report

October 2012

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Introduction

This study was prepared by the Bay Area Council Economic Institute at the request of the Bay Area's regional regulatory agencies—the Metropolitan Transportation Commission, the Association of Bay Area Governments, the Bay Area Air Quality Management District, and the Bay Conservation and Development Commission—and the region's leading business and economic development organizations. The agencies, companies and business organizations have supported its development as a public-private partnership to address issues with which they are all concerned.

The analysis has been framed with two principal objectives: to comprehensively assess what is driving the regional economy from the perspective of competitiveness, growth, and jobs, and to identify impediments to stronger growth and job creation. While the Economic Institute has not been asked to develop detailed recommendations or to present a comprehensive economic strategy—which would be a much larger undertaking—this study does suggest paths forward whose implementation could serve as the basis for such a strategy. At the heart of these suggestions are the ideas of public-private partnership and closer collaboration between business and government to strengthen the region's economic competitiveness and enable the creation of jobs across the economic spectrum. These objectives have two important sub-themes: inclusive growth that provides opportunities for low- and moderate-income communities, and sustainable growth that reduces greenhouse gas and other emissions through better planning.

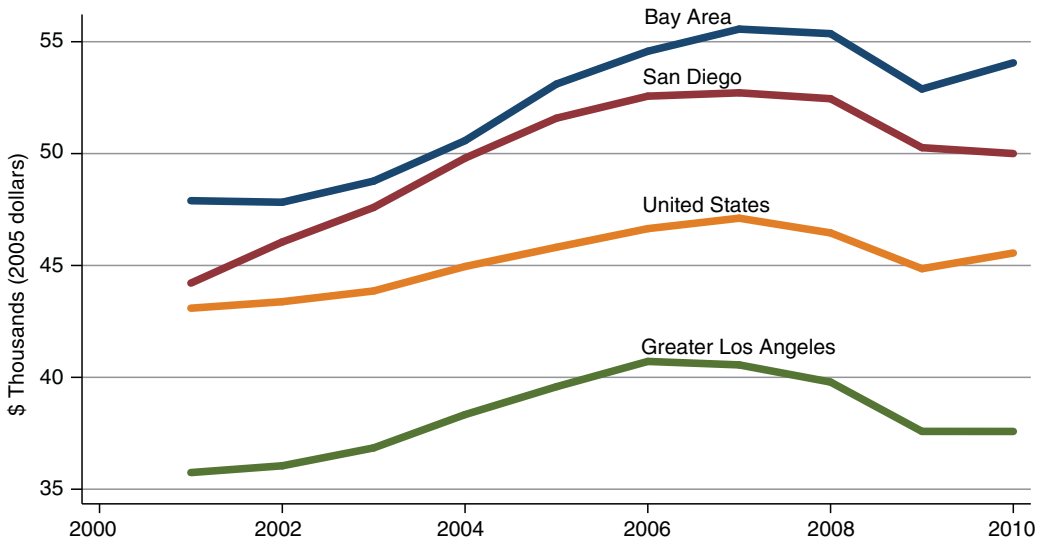
This study finds that the Bay Area enjoys unique economic assets that have enabled it to prosper across economic cycles. It finds that a strategic focus on the sectors where it is most competitive and which have defined its global leadership offers the best opportunity to generate future jobs and growth. It also finds growing economic inequality, and a risk that significant parts of the population won't share in the region's general economic success. The question that presents itself is, despite the region's present economic strength, could its economy be even stronger and could it be generating more jobs for more of its residents if a number of impediments could be overcome? This raises issues such as housing cost and availability, congestion, regulatory efficiency, and a lack of strategic focus on regional economic priorities. These concerns point to the need for both a more effective partnership between business and government on economic issues and a stronger sense of shared purpose surrounding growth and development. The study concludes by making suggestions for meeting these needs. More immediately, however, it is designed to provide a shared foundation of facts and analysis on which both government and business can build a closer strategic partnership.

Bay Area Counties

The Bay Area Economy

The Bay Area economy is one of the most productive and prosperous in the country. In 2010, median household income in the Bay Area was $82,500—41% higher than in the country as a whole and 37% higher than statewide. This is consistent with the region's reputation for supporting a large number of innovative, highly productive, frontier technology companies—a reputation that is well deserved and has become increasingly true over time. Trend analysis of regional Gross Domestic Product (GDP) per person shows significant growth in the region's economic output (Figure 1) In nearly every year since 2002, growth in per capita GDP has outpaced the nation. Overall levels have been consistently higher in the Bay Area than in Los Angeles or San Diego, the state's other major metropolitan regions.

Figure 1: Real GDP per Capita

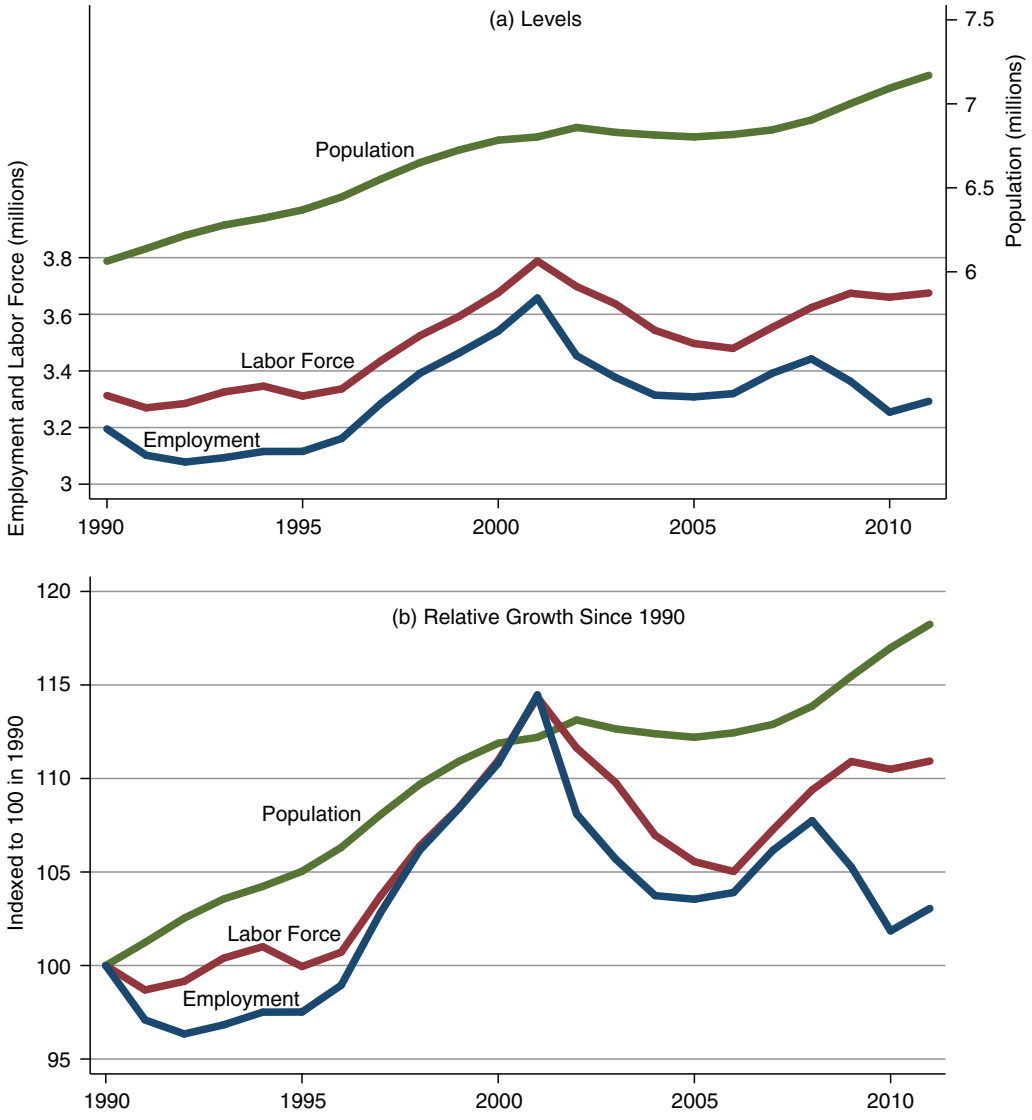


Source: Bureau of Economic Analysis; calculations by Bay Area Council Economic Institute

At the same time, the Bay Area is not a region with a rapidly growing population, or employment (Figure 2). Though population has grown from just over 6 million in 1990 to roughly 7.2 million in 2011, overall population levels were stagnant for the five-year period following the bursting of the dot-com bubble

in 2002. Overall, population growth during this period (1990 to 2010) averaged just 0.78% per year, slower than the national average of 1.07%.

Figure 2: Employment, Labor Force and Population



Source: California EDD; calculations by Bay Area Council Economic Institute

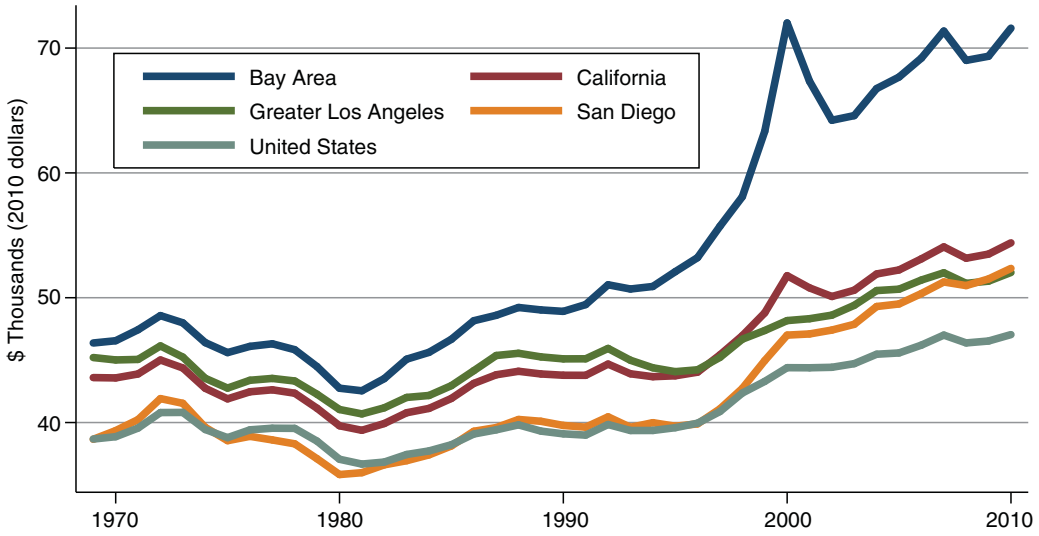
Not only is population growing slowly, but so is employment. In 2011, employment was at levels first seen in 1997, some 14 years before. The proportion of the population that is working or actively seeking work has also been in decline since 2001. Much of this decline in recent years is a result

of the Great Recession and offsets gains achieved during the recovery from the dot-com bust. The Bay Area unemployment rate remains above 8% but should eventually return to levels between 4 and 6%, which are more characteristic of the region.

The dichotomy of stagnant employment and rising GDP per capita is explained by the changing nature of jobs in the Bay Area. Changing industry concentrations are requiring more educated workers, and trends within industries are also moving toward the employment of relatively more educated workers. These trends correlate with movement toward both higher value-added industries and higher value-added activities within industries—both of which raise regional GDP per capita.

This increased demand for skill has had a positive influence on average wages in the region. Over the last 20 years, wages in the Bay Area have increased at a pace significantly exceeding that of the rest of the country (Figure 3). Average wages have always been high in the Bay Area, but in 1981 the gap between Bay Area wages and wages in other parts of the state and nation began to grow. That year, Bay Area wages were on average 16% higher than wages in the U.S. economy as a whole. By 2010, this figure had grown to 52%—a high level, but lower than its peak during the dot-com years.

Figure 3: Average Wages



Source: Bureau of Economic Analysis; calculations by Bay Area Council Economic Institute

This change is striking given that relative wages in the Bay Area had maintained a fairly constant relationship to wages in the broader U.S. economy in

the decade before 1981.[1] With the exception of the dot-com years, the growth in relative wages in the Bay Area was fairly consistent from 1981 to 2011. (While the dot-com bubble generated an extremely rapid increase in wages, this anomalous period was just that, an anomaly, and did not significantly affect the long-term trajectory of wages in the region.)

Industry Composition

Industry in the Bay Area is heavily concentrated in sectors that require a high-skilled labor force and sectors related to tourism. The region's most concentrated industries are Professional, Scientific, and Technical Services (PSTS) and Information (Table 1), both of which place a premium on highly educated employees. Other sectors with heavy concentrations in specific sub-regions of the Bay Area are (1) Accommodation and Food Services and (2) Arts, Entertainment, and Recreation, both of which are highly dependent on the region's tourism industry. Another sector that deserves mention, Manufacturing on the Peninsula and in Silicon Valley, is heavily focused on sophisticated equipment design and development.

These sectors are strong in the region because a presence in the Bay Area provides a competitive advantage for businesses in these fields. Businesses requiring skilled employees benefit from the Bay Area's highly educated labor force. Many also benefit from the region's high concentration of research universities, private and federal laboratories, and investment capital. While concentrations, both here and elsewhere, tend to form where there is a tangible benefit to being in a certain location, it is often the case that the relationship goes both ways. The Bay Area's concentration in skilled sectors tends to attract skilled workers. This correlation is particularly true of regions with a high quality of life, such as the Bay Area. This positive attraction, however, can be offset by negative factors such as high housing costs or long commutes.

The region's high average wages are to some extent the result of the industrial composition of the economy. PSTS ranks second nationally in terms of average education per employee, while the Information sector ranks fifth nationally.[2] High education normally correlates with high wages.

The share of Bay Area employment in PSTS is twice that in the rest of the country, with heavy concentrations in San Francisco and the Peninsula (Table 1). In the Bay Area, this sector is led by Computer Systems Design and Related Services and by Scientific Research and Development. In the former category are firms such as IBM, NetApp, Sun, and Solera. In the

[1] Bay Area wages were just 20% higher than average U.S. wages in 1970, very close to the 16% figure for 1981.

[2] Educational Services has the highest average educational attainment among its employees. See the charts in Appendix D online for more on education requirements by industry.

latter category are Lawrence Livermore, Lawrence Berkeley and Sandia National Laboratories; Hewlett-Packard; Lockheed Martin; and the Electric Power Research Institute. The Information sector, primarily software publishing companies, is heavily represented in the region and also has a large share of high-skilled workers. In this category are companies such as Oracle, Adobe, Electronic Arts, and McAfee, among many others.

Table 1: 2011 Industry Sector Employment in Bay Area Sub-Regions Compared to the U.S. by Location Quotient[3]

Industry	Bay Area	East Bay	North Bay	San Francisco	San Jose
Prof., Sci., and Tech. Srvcs.	2.0	1.5		2.5	2.3
Information	1.6			2.0	2.8
Other Srvcs. (Except Public Admin.)	1.6	1.6	1.5	2.0	
Real Estate and Rental and Leasing	1.2			1.5	
Accommodation and Food Srvcs	1.1		1.3	1.4	
Construction	1.0		1.4		
Arts, Entertainment, and Recreation	1.0			1.4	
Manufacturing	1.0				1.9
Admin. Support and Waste Mgmt. Srvcs.	1.0				
Retail Trade	0.9				
Wholesale Trade	0.9				
Finance and Insurance	0.9			1.3	
Health Care and Social Assistance	0.8				
Transportation and Warehousing	0.8				
Educational Srvcs.	0.7				
Ag., Forestry, Fishing and Hunting	0.7		4.2		
Public Admin.	0.7				
Utilities	0.3				
Mining	0.0				

Source: BLS; calculations by Bay Area Council Economic Institute

GDP is the total value added in a region—the earnings of companies above their labor and other costs of production. The PSTS sector—and particularly industries within the sector that are concentrated in the Bay Area—generate

[3] A location quotient is the ratio of two shares. In this case, the numbers in the table are the ratio of the employment share in the Bay Area divided by the employment share for the United States as a whole. Location quotients above one indicate that the share in the Bay Area, or its sub-regions, is higher than the share in the nation as a whole, or more heavily concentrated in the region. Location quotients below zero indicate that the share in the local region is less than the share in the nation as a whole, or less concentrated.

added value at a rate 25% faster than the economy as a whole. The Information sector performs even better, producing added value at a rate twice as fast as the economy as a whole. In these, as well as high value-added portions of Manufacturing and other sectors, the Bay Area's increased specialization is driving up regional GDP per capita.

Another factor contributing to high regional wages is the fact that within almost all sectors of the economy, Bay Area businesses have higher educational requirements than their counterparts elsewhere in the nation or in other major metropolitan areas in California.[4] Again, this is likely due to the relative abundance of skilled workers in the region. It is evident that many businesses have chosen to locate high-skilled activities in the Bay Area and to locate activities requiring relatively less-educated workers elsewhere.

Some sectors that employ relatively few workers in the Bay Area are also worth noting. Transportation and Warehousing is one—with a share of employment in the region that is 20% less than in the nation as a whole. This is surprising given the presence of two major goods shipment hubs: the Port of Oakland and San Francisco International Airport. Educational Services is another sector with a surprisingly small share of employment: 30% less than in rest of the United States. This relative dearth of educators holds at all levels, from elementary to junior college employment.

The Bay Area's sub-regions are surprisingly similar in terms of their industry concentrations. Many of the most prominent industries are distributed region-wide. The three most concentrated sectors in the Bay Area are focused in two sub-regions, San Francisco and San Jose. Three out of four of the sub-regions have strength in at least two of the Bay's sectors of concentration. Only the North Bay has a concentration in just one of these sectors.

PSTS, Information, and Other Services are the top 3 sectors. The first two were described in detail above. The primary component of Other Services comes from private households employing workers on or about the premises in activities primarily concerned with the operation of the household. This includes cooks, maids, baby-sitters and nannies. Private households may also employ gardeners, caretakers and other maintenance workers. These positions are spread throughout the region, with the highest concentrations in three of the four sub-regions, San Francisco, the East Bay, and Marin County. Automotive repair and maintenance is also included in Other Services and has a significant concentration in the Bay Area, with 14% more workers in this sector locally than in the nation as a whole.

[4] Real Estate Rental and Leasing has similar worker educational attainment levels in both Los Angeles and the Bay Area, and agriculture in San Diego has a higher level of educational attainment: these are the lone exceptions to the rule.

Evolution Over Time

The Bay Area economy is dynamic, and has evolved with the changing times. In the 1980s and 1990s, a major driving force behind growth was the development and manufacture of computer hardware. In the late 1990s, that focus shifted to one less based on the production of goods and more focused on the provision of services, many of which are provided over the Internet—Information Services, specifically (Table 2).

Table 2: Bay Area Employment by Industry, 1990–2011

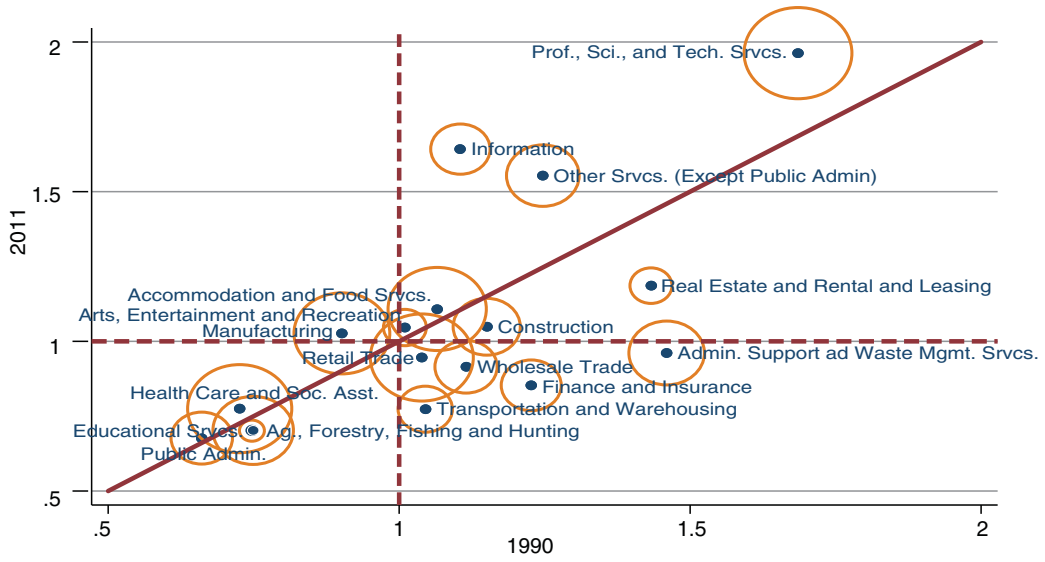
	Share of Bay Area Employment (%)				Employment Levels (Thousands)			
Industry	1990	2000	2003	2011	1990	2000	2003	2011
Prof., Sci. & Tech. Srvcs.	7.8	10.3	9.4	11.8	205	332	278	340
Health Care & Soc. Asst.	7.4	7.6	8.9	11	196	244	262	317
Retail Trade	12.9	11	11.4	10.8	342	353	336	311
Accom. & Food Srvcs.	7.8	7.7	8.6	9.8	207	249	252	283
Manufacturing	14.9	13.1	10.9	9.3	395	423	320	269
Educ. Services	5.9	6.2	7.1	6.6	156	200	208	190
Admin., Support & Waste	6.2	7.3	5.9	5.8	165	237	172	167
Other Srvcs.	4.0	4.0	4.7	5.4	107	128	138	154
Construction	5.6	5.8	6.1	4.6	149	188	179	132
Wholesale Trade	5.3	4.3	4.2	3.9	141	137	124	113
Public Admin.	3.9	3.1	3.8	3.8	103	101	111	110
Finance & Insurance	5.8	3.9	4.8	3.7	153	124	141	105
Information	2.9	4.3	3.8	3.6	78	139	110	103
Trans. & Warehousing	4.1	3.8	3.7	3.0	109	123	110	86
Mgmt. of Companies	0.6	3.4	2.3	2.1	15	111	68	60
Arts, Ent., & Rec.	1.6	1.3	1.5	1.9	42	43	45	54
RE, Rental, Leasing	2.4	1.9	2.1	1.8	62	62	61	52
Other	0.9	0.8	0.9	1.3	24	27	27	37
Total	100.0	100.0	100.0	100.0	2,649	3,219	2,943	2,884

Sorted by 2011 Share of Bay Area Employment
Source: BLS; calculations by Bay Area Council Economic Institute

These changes in shares are significant but need to be viewed in the context of changes in the U.S. economy overall. From an employment standpoint, Figure 4 shows industries that are performing well in the Bay Area relative to the United States as a whole. Industries in the figure that are plotted above the red diagonal line are growing faster or shrinking more slowly in

the Bay Area than elsewhere in the country. Three industries stand out in this regard: PSTS, Information, and Other Services. Between 1990 and 2011, these sectors grew more quickly in the Bay Area than in the rest of the country. Manufacturing is also above the diagonal line. Although employment in Manufacturing is declining as a share of Bay Area employment, its share is falling faster in the rest of the country.

Figure 4: 1990–2011 Industry Sector Employment in the Bay Area Compared to the U.S. by Location Quotient



Ring size reflects the relative size of the industry
Source: Bureau of Labor Statistics; calculations by Bay Area Council Economic Institute

The parts of Manufacturing that are keeping the regional share high include (1) Computer and Peripheral Equipment Development and Production and (2) Semiconductor and Other Electronic Component Production. Both are categories related to technology. Key firms in these categories include Cisco Systems, Intel, Sun Microsystems, HP, and Apple. While many of these companies do not physically produce products in the region, they do design and develop products locally.

Within PSTS, growth has been driven by sectors related to the region's manufacturing strengths: (1) Scientific Research and Development Services and (2) Computer Systems Design and Related Services. Growth in the Information sector has been driven by software publishers (Oracle, Adobe, and MacAfee, as indicated above). Non-tech employment categories (within Other Services) that have grown faster locally include outpatient care centers and private household hiring.

Several significant sectors of the Bay Area economy appear to be in long-term decline. These include Finance and Insurance, Transportation and Warehousing, and Wholesale Trade. While the decline in Finance and Insurance is relatively recent, perhaps reflecting the Great Recession, the other sectors have been shedding employment since roughly 2000.

The decline in Finance and Insurance employment appears to have begun in 2005, roughly coincident with the bursting of the housing bubble. Employment in the sector had been roughly constant since 2001, with growth from 2002 through 2005. This growth was arguably artificial and masked declines that would have occurred in the absence of the housing bubble's significant creation of jobs originating mortgages.[5] The recent trend decline in employment in this sector reflects this loss of mortgage related jobs and more broadly the financial nature of the recession. Employment in the sector grew from 2010 to 2011, suggesting that projections of a modest recovery are plausible.

Neither Transportation and Warehousing nor Wholesale Trade has high concentrations even in Bay Area sub-regions housing goods movement hubs. That both have been in decline for the last decade is also surprising. Perhaps this reflects the increasing service orientation of the regional economy. More plausibly, however, it may reflect the movement of such activity to less expensive locations outside of the region.

Employment in both the (1) Construction and (2) Real Estate, Rental, and Leasing sectors has also declined significantly in recent years. Much of this is likely due to high employment levels related to the housing market and the impact of the Great Recession, which began in the housing market. A return to peak levels is not expected in either sector for some time.

More broadly, the trend within the Bay Area is in two directions. The first is toward greater concentration in a smaller number of industries. For instance, the East Bay had employment concentrations in four industries in 1990, with no location quotient above 1.4. By 2011, there were only two industries with high location quotients, and both had location quotients above 1.5.

In San Jose, the degree of concentration also increased. Among sectors with a high degree of concentration in San Jose sub-region, Manufacturing went from having the *highest* level of concentration in 1990 at 1.8 to having the *lowest* level of concentration in 2011 at 1.9. Other areas of concentration (e.g., PSTS and Information) also grew rapidly over the period. The same pattern is roughly true for San Francisco. The anomaly is the North Bay,

[5] Although Orange County is notorious for its housing bubble mortgage origination activities, Contra Costa County added about 1,000 jobs in this sector between 2000 and 2005. It has since lost nearly 8,000 of those jobs.

which has reduced its levels of concentration and its number of relatively concentrated industries, indicating increasing diversification of the economy.

Throughout most of the Bay Area, then, the picture is one of growing concentration in a smaller set of industries. The second trend is that this smaller set of industries is also becoming uniform across the region. The Professional, Scientific, and Technical Services sector epitomizes this trend. Relative to overall employment, there are now two employees in PSTS in the Bay Area for every one in the nation as a whole. This is an increase from 1.7 in 1990. This concentration has increased by at least 0.2 workers in the East Bay, San Francisco, and San Jose sub-regions during this period.

Case Study: High Tech

When people think of industry in the Bay Area, it is often the high technology sector that comes to mind. In 2011, employment in "high-tech" amounted to 415,000 jobs, or about 12.5% of Bay Area employment. The high technology sector is composed of a range of industries, including parts of both the manufacturing and service sectors of the economy (Table 3). Many of these industries are heavily concentrated in the Bay Area. Specifically, Computer and Peripheral Equipment Manufacturing has 12 employees in the Bay Area for every one employee in the rest of the country, relative to overall employment.

Table 3: High Technology Industry Classifications

NAICS Code	Industry
3254	Pharmaceutical and medicine manufacturing
3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, electromedical, and control instruments manufacturing
3364	Aerospace product and parts manufacturing
5112	Software publishers
5161	Internet publishing and broadcasting
5179	Other telecommunications
5181	Internet service providers and Web search portals
5182	Data processing, hosting, and related services
5413	Architectural, engineering, and related services
5415	Computer systems design and related services
5417	Scientific research-and-development services

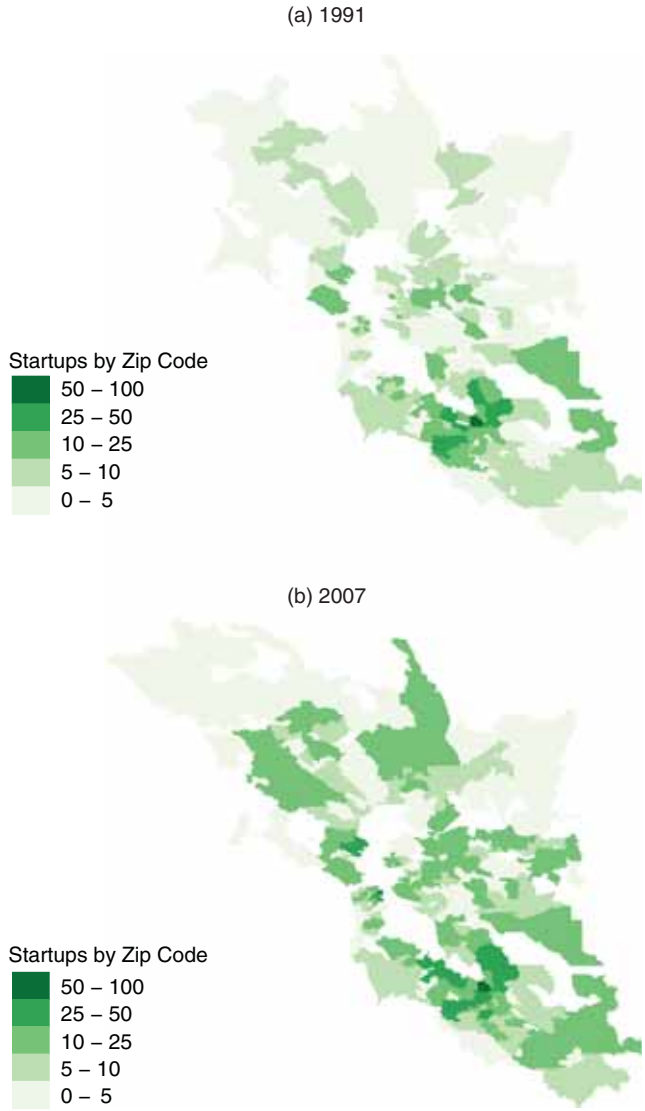
Source: BLS

It is also a common perception that most job growth in the high-tech part of the economy occurs in Silicon Valley. While there is certainly a heavy concentration of high-tech employment in Silicon Valley, technology start-ups have spread throughout the region. The location of start-ups is important, as illustrated in the next section, because the bulk of job creation in the region comes from the start-up of new companies. Many of today's start-ups are tomorrow's thriving and growing companies, driving employment in the future.

Figure 5 illustrates the change in patterns of start-up locations between 1991 and 2007.[6] From Figure 5, it is clear that start-up activity in the high technology sector is spreading through the region. Panel (a) shows that in the early 1990s, most start-up activity was concentrated in Silicon Valley. From panel (b), it is clear that start-ups are now commonplace throughout the region. Start-ups are not only more common than in the early 1990s, but they are more dispersed.

[6] The first year of reliable National Employment Time Service (NETS) data is 1991, and 2007 is the year prior to the onset of the recession.

Figure 5: The Geography of High Technology Firm Start-up Locations



Source: 2010 National Employment Time Series (NETS) Database; calculations by Bay Area Council Economic Institute

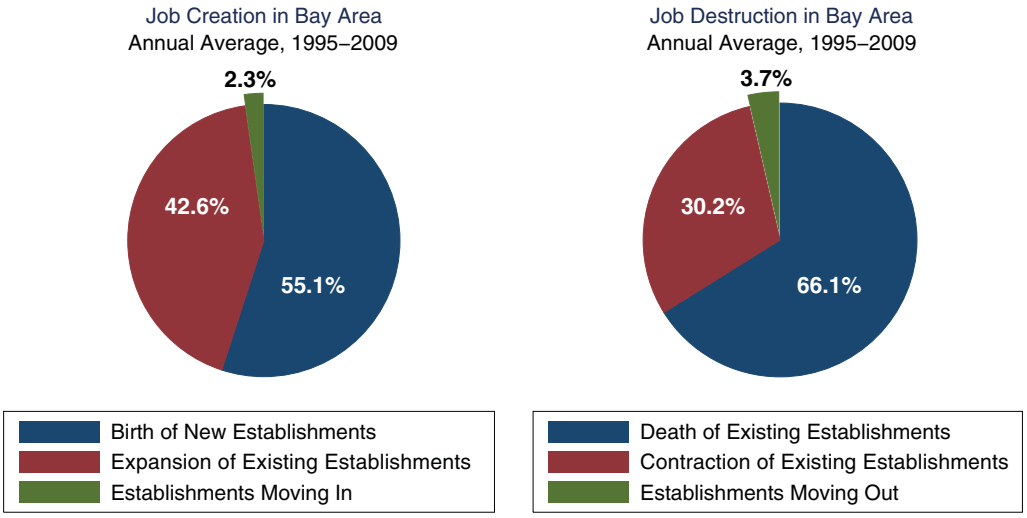
Establishment-Level Dynamics

A deeper understanding of the Bay Area's business dynamics can be gleaned by examining data at the establishment level. An "establishment" represents a distinct location of (or within) a business enterprise. The underlying dynamics can be measured in terms of job creation and job destruction. Jobs are created when new establishments are born, when existing establishments expand or when establishments from outside the region

move in. Jobs are destroyed when existing establishments die, contract, or move out of the region.

Two broad facts immediately emerge from the establishment-level analysis. First, the relative importance of establishments moving in and out of the region is very small. The left panel of Figure 6 shows that establishments moving into the Bay Area account for only around 2% of job creation. The birth of new establishments (55.1%) and, to a lesser degree, the expansion of existing ones (42.6%) are the important drivers of job creation. Similarly, the right hand panel shows that establishments leaving the Bay Area account for only around 3.7% of job destruction, which is primarily driven by establishment deaths (66.1%), but is also the result of establishment contractions (30.2%).

Figure 6: Job Creation and Destruction in the Bay Area



Source: 2010 National Employment Time Series (NETS) Database; calculations by Bay Area Council Economic Institute

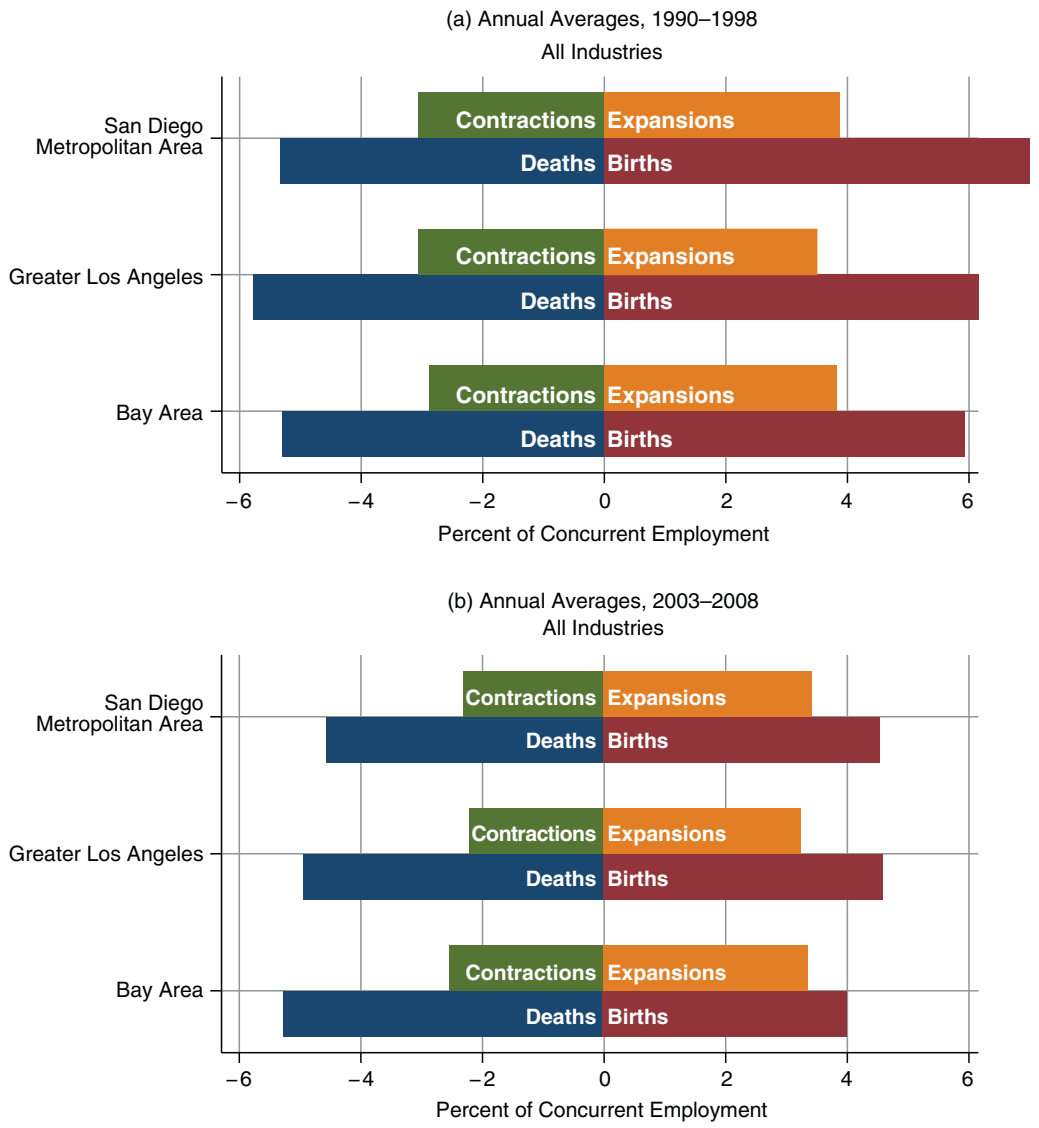
Second, jobs churn on a grand scale. Job churning refers to changes in the pool of jobs—new jobs entering while other jobs leave—and is a good measure of whether an economy is dynamic and flexible. (Job churn can go undetected if only changes in the total number of jobs are observed.) From 1990 to 2008, the equivalent of 9.1% of the existing stock of jobs was created each year—meaning that for every 11 existing jobs, one more new job was created. Over the same period, 8.3% of the existing job stock (1 in 12 jobs) was destroyed each year. For annual numbers, these are substantial.

Beyond these two broad observations, what else can be learned from the pattern of establishment dynamics?

Figure 7 shows the contributions of the components of job creation and destruction in the Bay Area relative to Los Angeles and San Diego. Here,

moves are absorbed into births and deaths for a clearer exposition. These figures present evidence from before and after the dot-com bubble to avoid conflating the experience of that extraordinary time with the more fundamental long-run dynamics in the region. The figure on the left is from the eight years prior to the bubble (1990–1998) and the figure on the right reflects the experience of the five years following the bursting of the dot-com bubble (2003–2008). The latter period is also chosen to exclude the experience of the recent recession, which is not helpful in understanding long-term trends.

Figure 7: Employment Flow Decomposition by California Sub-Region



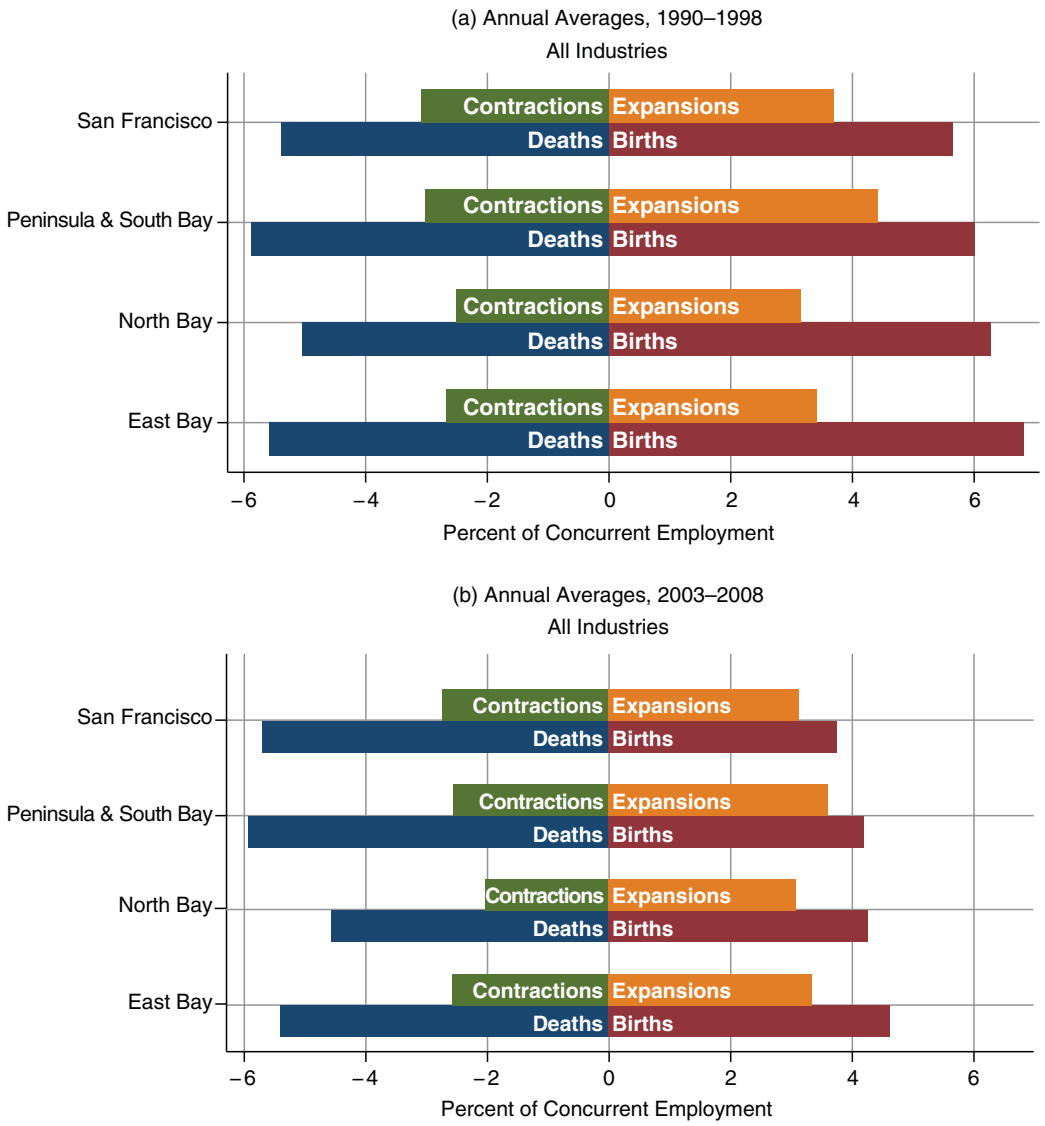
Source: 2010 National Employment Time Series (NETS) Database; calculations by Bay Area Council Economic Institute

In 2003–2008, the Bay Area stands out as having fewer jobs created by establishment births than the other cities, and a higher number of jobs lost from establishment deaths. While these findings may reflect lingering effects of the dot-com bust, they may also reflect other factors. There could be regulatory or other barriers to establishment births that are more prevalent in the Bay Area than elsewhere in California, such as the higher cost of housing, which necessitates higher wages. Preceding the dot-com bubble, from 1990 to 1998, the Bay Area also gained fewer jobs from

establishment births each year than the other regions, although the difference relative to Los Angeles was small.

A comparison of these statistics among Bay Area sub-regions suggests that lingering effects of the dot-com bubble alone are unlikely to be driving these results, as this gradation appears during the 1990s, before the dot-com bubble. Figure 8 provides statistics for San Francisco, Silicon Valley (the Peninsula and South Bay), the North Bay and the East Bay, once again separating the periods 1990–1998 and 2003–2008.

Figure 8: Employment Flow Decomposition by Bay Area Sub-Region



Source: 2010 National Employment Time Series (NETS) Database; calculations by Bay Area Council Economic Institute

The striking fact about these figures is that the annual rate of job growth from establishment births is lowest in San Francisco, second lowest in Silicon Valley, and then higher in the North Bay and highest in the East Bay.

This pre-dot-com data lends support to the argument that the lower levels of firm births and higher levels of firm deaths are driven not by lingering effects of the dot-com bubble, but by other systematic barriers to establishment birth, like housing costs or the regulatory environment. Of course housing prices tend to vary a great deal by location but, roughly speaking, they are most expensive in San Francisco, followed by Silicon Valley, and then the North Bay and the East Bay, in line with the gradation of job growth due to establishment births.

A closer look at Figure 8 provides further insight. If one area experiences more job churn than another, it will appear to have more job growth—and also more job loss—resulting in a combined blue and red bar that is longer (as well as a combined green and yellow bar that is longer too). This appears to be the case for Silicon Valley and San Francisco. Silicon Valley had more job churn than San Francisco during the 1990–1998 and 2003–2008 periods, indicating that Silicon Valley's economy is more dynamic and flexible than San Francisco's. The same pattern holds for the East Bay relative to the North Bay, with the East Bay exhibiting more job churn than the North Bay in both periods as well. This similarity can probably be attributed to these regions' proximity to Silicon Valley and San Francisco, respectively, highlighting the fact that the Bay Area functions as a single economic unit.

Finally, during both 1990–1998 and 2003–2008, Silicon Valley experienced more job growth due to expansions and less job loss due to contractions than San Francisco. This situation suggests that firms in Silicon Valley, conditional on being born and surviving, tended to grow larger than those in San Francisco. The fact that this observation is also borne out in data on establishment size—including in the Professional, Scientific and Technical Services (PSTS) sector—suggests that the situation may reflect more than just differences in the types of establishments founded in each region and may also reflect something about the nature of the firms that choose to locate in Silicon Valley.

Overall, the establishment-level analysis described in this section highlights two important observations about the Bay Area economy. First, establishment moves into and out of the region are relatively rare. As a proportion of job creation and job destruction, they account for less than 5% in any given year and between 2 and 3.6% in an average year. This suggests that a focus on job moves may not provide the highest return to economic development efforts. Relative to the contributions of establishment births, movements are quite unimportant. A caveat to this conclusion is that evidence does suggest that multi-establishment businesses headquartered in the region do appear

more inclined to expand employment outside the region than within it. Whether this is because of the local business climate (e.g., cost and regulation), the lack of appropriately skilled workers, or expansion into new markets is unclear.

That businesses moving out of the region are relatively uncommon could be misinterpreted as evidence that the business climate is not problematic. If it were, businesses should be observed leaving at much greater rates. Instead, the data suggest that companies that start in the region have a compelling reason for doing so. For PSTS and Information, it is the installed base of firms in these sectors and the access to other similar companies. For the region's manufacturing companies it may be the enormous amount of basic and applied research that takes place in the region. That movements out are so small is an indication that the competitive advantage that many businesses gain from being in the region outweighs the cost of doing business in the region. Businesses that do not experience the benefits that the region has to offer will tend to locate elsewhere, or not start in the first place.

The second observation is that business starts are relatively uncommon in the Bay Area. The rate of new business formation in the region is slower than in either Los Angeles or San Diego. This is true despite the relatively friendly start-up atmosphere of the region: the culture is one that forgives failure, the region has a very entrepreneurship friendly eco-system, and the region provides access to a diverse workforce. That these aspects of the regional business environment do not result in a larger number of start-ups here than elsewhere is probably a reflection of the high costs of doing business in the region.

The Bay Area: A Single Economic Unit

The nine counties of the Bay Area are accounted for in national statistics as a set of five separate metropolitan statistical areas (MSAs).[7] Accordingly, it is tempting to think of these areas as separate entities, and much of the region's economic development planning is based on analysis of relatively small areas. While this sub-regional attention is important, the data suggests that, for many purposes, planning would be better undertaken on the regional level. In fact, the Bay Area functions as a single economic unit and the linkages between its MSAs are particularly strong. Strategies focused only on developing pieces of the region in isolation therefore miss out on the benefits of focusing on the region as a whole.

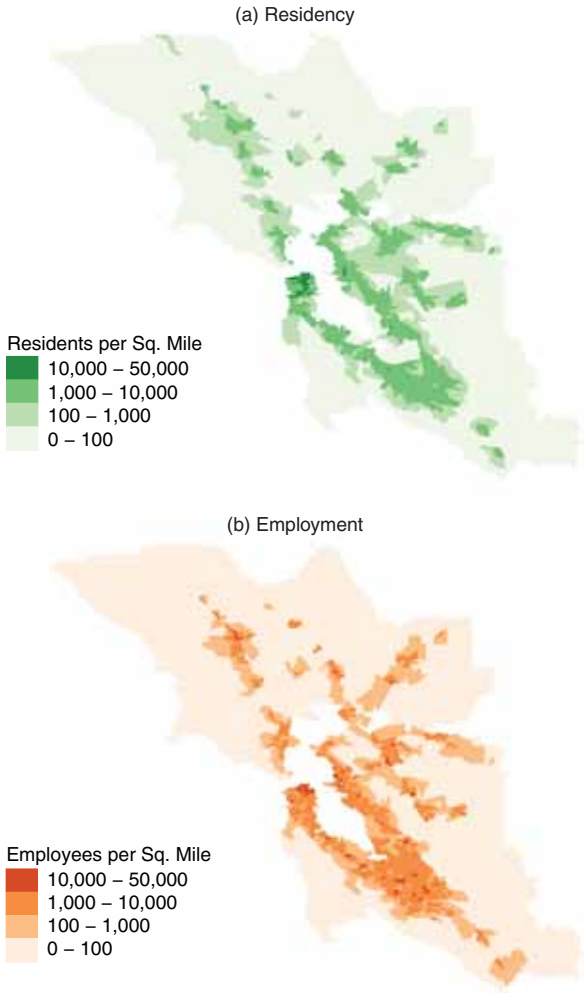
Panels (a) and (b) of Figure 9 show the Bay Area's residential and employment densities, respectively. A careful look shows that employment density tends to peak more than residential density, and employment is scattered more or less everywhere people live.

Whether or not the distribution of residents and employment suggests that the Bay Area is a single economic unit depends on the degree of inter-connectedness in terms of where people live and work. For example, if everyone working in Oakland also lived in Oakland and everyone working in San Francisco also lived in San Francisco, the two areas could hardly be considered a single economic unit. The first column of Table 4 reports the percentage of each Bay Area county's employed residents who work within the county; lower numbers in this column suggest greater inter-connectedness.[8]

[7] These areas are defined by the White House Office of Management and Budget: see http://www.whitehouse.gov/sites/default/files/omb/assets/bulletins/b10-02.pdf

[8] Caution is needed when interpreting this table, because the size of a county makes a difference. If the entire Bay Area were one large county, the numbers would likely approach 100%, whereas if each city block were a county, the numbers would likely approach 0%. For our purpose, we can suppose that the counties are roughly similar in size and that we are more or less comparing like things, although one should interpret the high figures for Santa Clara County as being the least precise, since it is disproportionately more populated than the other counties.

Figure 9: Residential and Employment Density Throughout the Bay Area



Source: U.S. Census LEHD Data, 2010; calculations by Bay Area Council Economic Institute

Table 4 illustrates the degree of inter-connectedness within the nine-county region. The weighted average for all nine Bay Area counties shows 53% of residents working in the county in which they live, and 51% of employees living within the county in which they work. These numbers suggest that the different parts of the Bay Area are closely linked and operate together. This is important and suggests the appropriate geographic scale for economic development strategies. For example, consider a strategy that creates jobs near low-income communities in Oakland. Such a strategy may benefit the Bay Area as a whole, in the sense that *someone* living *somewhere* in the

Bay Area will fill the jobs created, but that someone may well live in Fremont, Pleasanton or Walnut Creek. The benefit captured by the low-income Oakland communities at which the strategy is aimed could be small.

Table 4: Bay Area Commute Patterns by County, 2010

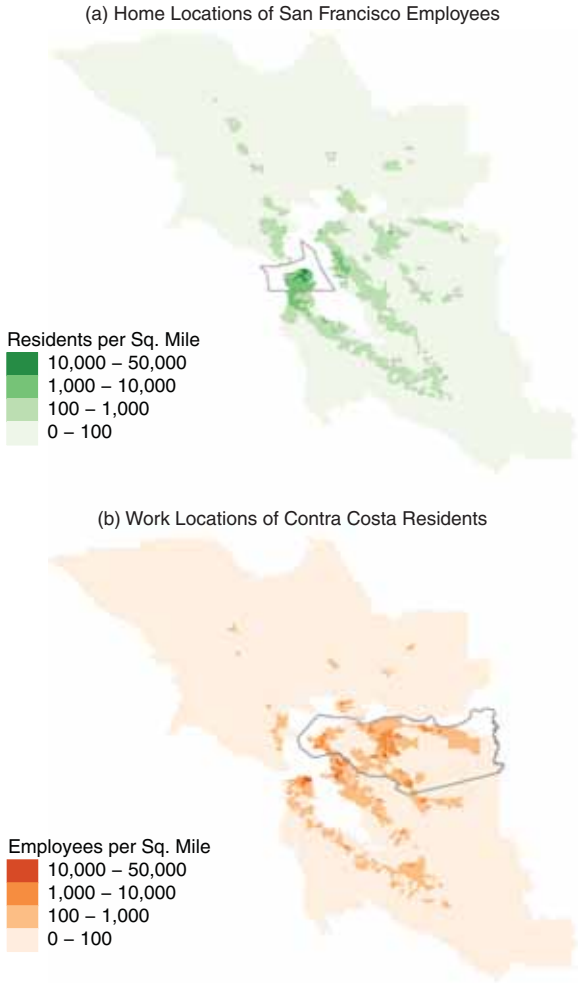
County	% of Employed Residents Who Work in the County	% of Workers Who Live in the County
Solano	36	39
Contra Costa	39	51
San Mateo	40	40
Marin	41	39
Alameda	49	47
Napa	55	52
San Francisco	60	40
Sonoma	63	71
Santa Clara	71	61
Average (pop. weighted)	53	51

Source: LEHD 2010; calculations by Bay Area Council Economic Institute

Beyond demonstrating regional inter- connectedness, Table 4 indicates the counties whose residents and employees engage in the most commuting. The table is sorted by the percentage of residents in each county who also work in the county. Solano and Contra Costa stand out as having less than 40% of their working residents employed within the county. Solano also has less 39% of its jobs filled by county residents, comparable to Marin, also at 39%. Marin and San Mateo also have significant volumes of movement across county lines.

The maps in Figure 10 illustrate labor flows for two of the region's counties: map 10(a) indicates the home locations for those employed in San Francisco County, while map 10(b) indicates Contra Costa County residents' work locations. The spread of each around the Bay Area provides an indication of the incorporation of the county into the Bay Area labor market. San Francisco has the largest net inflow of employees, while Contra Costa County has the largest net outflow of workers. Other counties exhibit a similarly wide reach as demonstrated by the maps in Appendix B online.

Figure 10: Residential and Employment Reach for Specific Bay Area Counties



Source: U.S. Census LEHD Data, 2010; calculations by Bay Area Council Economic Institute

Table 5 indicates the differences in labor flows across counties. There are several types of counties from a commute perspective. Bedroom counties are those with more workers commuting out than commuting in. Job center counties are those with more workers commuting in than out, and there are also counties that are more balanced. Contra Costa, Solano, and Sonoma stand out as bedroom counties, while Alameda, San Francisco, and Santa Clara stand out as job centers. Marin, Napa, and San Mateo are all relatively balanced. Of these last three, however, Marin stands out as having a significant discrepancy in the types of workers that flow in and out. Those flowing out are relatively well educated, while those flowing in have somewhat lower levels of educational attainment.

Table 5: Cross County Labor Flows, 2010

	Number of Employed Individuals Who			
County	Work and Live in the County	Work Outside/Live in the County	Work in and Live Outside of the County	Net Outflows
Alameda	281,946	291,025	313,609	-22,584
Contra Costa	150,804	235,401	145,984	89,417
Marin	36,095	51,658	55,320	-3,662
Napa	29,780	24,845	27,553	-2,708
San Francisco	204,206	136,091	300,123	-164,032
San Mateo	115,884	175,951	174,744	1,207
Santa Clara	481,144	200,248	306,383	-106,135
Solano	54,573	96,449	57,521	38,928
Sonoma	108,334	64,698	43,944	20,754

Note: Net Outflows is column 3 minus column 4.
Source: LEHD 2010; calculations by Bay Area Council Economic Institute

Employed residents of Contra Costa County commute to locations throughout the Bay Area in large numbers. Contra Costa commuters to San Francisco number more than 30,000, as do commuters to Oakland, and more than 10,000 Contra Costa residents commute to San Jose. Although much smaller in number, sizable percentages of Solano residents (11% or about 17,000) and Sonoma residents (7% or about 12,400) commute to these same three cities.

Counties also vary in the nature of their labor flows. For instance, San Mateo County inflows and outflows of workers are comparable across occupations and skill levels. Marin and Napa, however, both have greater outflows of skilled workers and inflows of less skilled workers into local supporting industries.

A logical response to the bifurcated nature of the employment and residence locations of many Bay Area workers would be to think that more housing needs to be made available near job centers or more employment needs to be made available near residential communities. While this may be true, it will not necessarily improve the geographic match for many workers. There are many reasons individuals choose to live outside the areas where their jobs are located. These reasons can include a geographical compromise between two working partners, a search for the best schools for children, or perhaps a desire to live near open spaces when the job is located in an inner city area.

The importance of regional transportation infrastructure is immediately clear given the substantial commutes that take place around the region.[9] In this regard, the Bay Area measures up reasonably well. In particular, adjusting for population base, commute times in the Bay Area are comparable to those of other regions—higher than some but lower than others, or about what might be expected for a region of this size. The use of public transportation in the Bay Area is relatively high, suggesting that the systems in place are serving the region well, at least relative to other similar regions. There is still a great deal of room, however, for increased public transit ridership.

This transportation infrastructure does need to take into consideration commutes into and out of the region. On any given day, more than half a million workers cross into or out of the region on their way to work (Table 6). Workers commuting into the Bay Area fill nearly 12% of the jobs in the region and nearly 9% of the region's working residents commute to locations outside the region. These figures highlight the importance of inter-regional infrastructure for the success of the regional economy.

Table 6: Outside Employment, 2010

Category	Employment	% of Bay Area Total
Residents Working Outside the Bay Area	248,436	8.6
Employees Living Outside of the Bay Area	337,988	11.8

Source: LEHD 2010; calculations by Bay Area Council Economic Institute

That the nine counties of the Bay Area are so heavily inter-connected has implications for economic policy development in the region. In particular, policies directed toward attracting jobs to a particular part of the Bay Area need to recognize that the benefits of this activity may well come at the expense of neighboring communities. For instance, a Target in San Rafael will almost surely take business away from the Targets in Novato and Richmond. Although good for the tax base in San Rafael, it may come at the expense of Novato and Richmond coffers. At the same time, because of the highly mobile nature of the Bay Area workforce, jobs created in one area provide the benefits of consumer spending in the locations where workers live.

Accordingly, a cooperative and coordinated approach to job creation would take into consideration the benefits to the region as a whole of job creation in a specific location, likely increasing the returns from economic development efforts throughout the entire region.

[9] See Appendix A online for more on the nature of commutes relative to other metropolitan areas of the country.

Sources of Bay Area Economic Prosperity

The Bay Area is often described as thriving because of the high-skilled nature of its labor force. To be sure, the labor force is exceptional, but whether it is the labor force that drives the economy or the economy that drives the skill level of the labor force is an open question. Although the labor force has for many years exhibited a high level of education, the importance of venture capital funding and the emergence of a strong innovative culture throughout the region have served to enhance the returns to workers with high skills and hence the high-skilled level of the labor force.

This section examines statistics on the Bay Area's labor force, including a discussion of overall levels of education and common occupations as well as the influence of venture capital funding and the innovation/entrepreneurial culture that is so strong in the Bay Area economy.

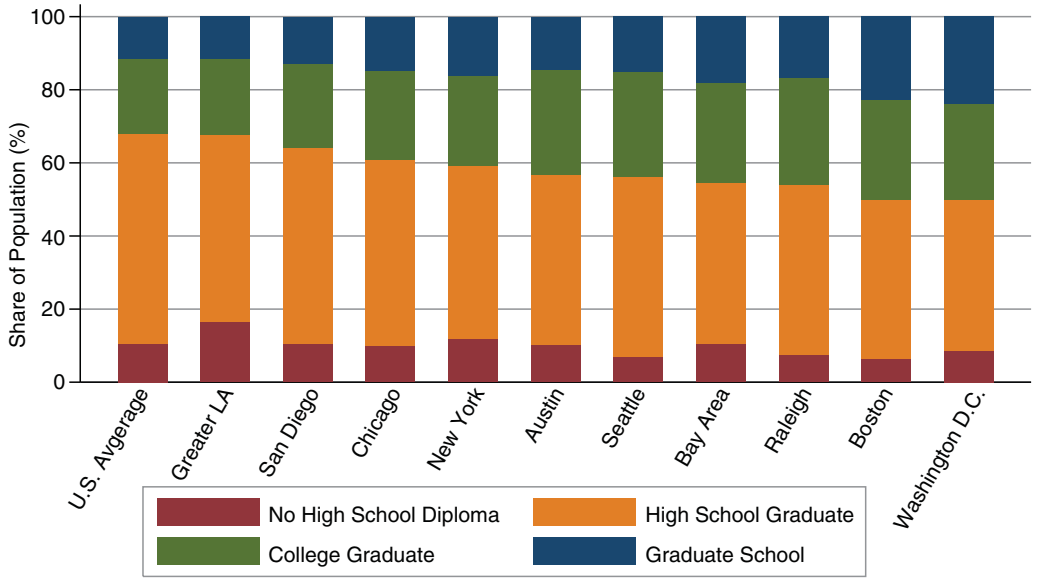
A High-Skilled Labor Force

Educational Attainment

Across the United States, 28% of all workers have achieved at least a bachelor's degree. This figure is much higher for the Bay Area, with 46% of workers possessing a bachelor's or some form of advanced degree.[10] This makes the Bay Area one of the nation's top 4 regions in terms of educational attainment (Figure 11). Only Raleigh, North Carolina with its Research Triangle, Boston with its plethora of universities, and Washington, DC with its overload of economists and lawyers, register as more highly educated. Among workers with at least a college degree, a very high percentage of those in the Bay Area have gone on to receive an advanced degree. Only Boston and Washington, DC have higher proportions with advanced degrees.

[10] This would include professional degrees such as an MBA or a J.D., or a Master's or Ph.D. The percentage cited here is from the U.S. census. Other data sources produce slightly different results: see Table 7 in particular.

Figure 11: Educational Attainment Across Metropolitan Areas, 2010



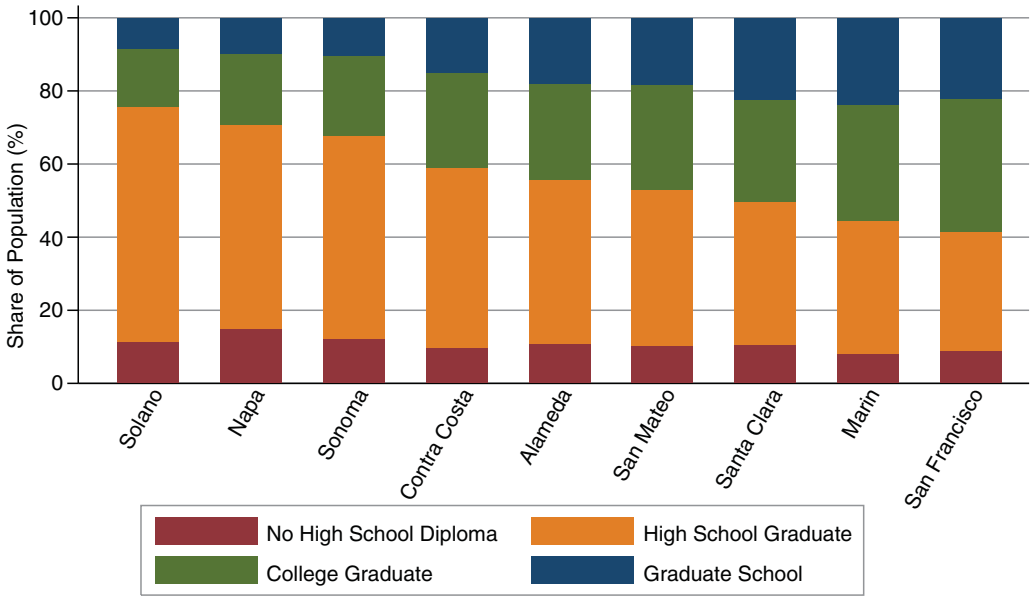
Source: LEHD 2010; calculations by Bay Area Council Economic Institute

Relative to other major metropolitan areas of the state, the Bay Area has been leading by this measure since at least 1990, and between 1990 and 2010, the region extended its lead. During that period, the Bay Area increased the proportion of workers with at least a bachelor's degree by 10 percentage points, from 36% to 46%. The figures for San Diego increased by 9 percentage points and for Los Angeles by 7 percentage points; nationwide, the proportion of workers with a bachelor's degree increased by 8 percentage points.

This growth is likely driven by two factors. The first is the increased concentration of venture capital investment in the region. In the late 1990s, just under 30% of all venture capital investment in the United States occurred in the Bay Area. Recently, the region's share has grown to just over 40%. The overall amount of venture investment in the region has increased in step with the growth in high-skill-intensive sectors. Although this investment does directly create jobs for skilled workers, it generates activity by start-ups that compete for VC dollars. A second factor is the wealth of research and development that occurs in the region both among private and public institutions and organizations.

In terms of regional distribution, San Francisco, at 61.2%, has the highest proportion of workers with at least a bachelor's degree. Between 1990 and 2010, all regions of the Bay Area increased their proportions of the population with at least a bachelor's degree, although the North Bay experienced the smallest gain.

Figure 12: Educational Attainment in Bay Area Counties, 2010



Source: U.S. Census and American Community Survey; calculations by Bay Area Council Economic Institute

Table 7 offers insight into some significant differences in educational attainment levels around the Bay Area. The top panel shows the percentage of the Bay Area's or sub-region's labor force that has achieved each level of education, while the bottom panel indicates the percentage that have achieved *at least* that level of education. For example, the top panel indicates that 26.7% of the Bay Area's employed residents has a bachelor's degree and no further education. The bottom panel, on the other hand, indicates that 43.4% of workers have at least a bachelor's degree or more.

Table 7: Educational Attainment In and Around the Bay Area

	Percent of the Labor Force with Specific Education Level				
Level of Education	Bay Area	San Francisco	Peninsula	East Bay	North Bay
Less than High School	11.0	7.9	10.3	9.6	11.9
High school graduate	18.0	12.0	15.9	19	19.5
Some college, but less than 1 year	4.9	2.7	4.2	5.2	6.4
1 or more years of college, no degree	14.9	10.6	13.7	15.2	18.5
Associate's degree	7.8	5.6	7.9	7.7	9.6
Bachelor's degree	26.7	39.3	27.9	26.8	22.8
Master's degree	11.7	14.3	14.6	11.5	7.6
Professional school degree	2.6	4.9	2.4	2.4	2.5
Doctorate degree	2.4	2.7	3.2	2.4	1.2
	Percent of the Labor Force with AT LEAST the Specific Education Level				
Level of Education	Bay Area	San Francisco	Peninsula	East Bay	North Bay
Less than High School	100.0	100.0	100.0	100.0	100.0
High school graduate	89.0	92.1	89.7	90.4	88.1
Some college, but less than 1 year	71.0	80.1	73.8	71.4	68.6
1 or more years of college, no degree	66.1	77.4	69.6	66.1	62.2
Associate's degree	51.2	66.8	55.9	50.9	43.7
Bachelor's degree	43.4	61.2	48.0	43.2	34.1
Master's degree	16.7	21.9	20.2	16.4	11.3
Professional school degree	5.0	7.6	5.6	4.8	3.7
Doctorate degree	2.4	2.7	3.2	2.4	1.2

Source: 2010 American Community Survey 5-year estimates; calculations by Bay Area Council Economic Institute

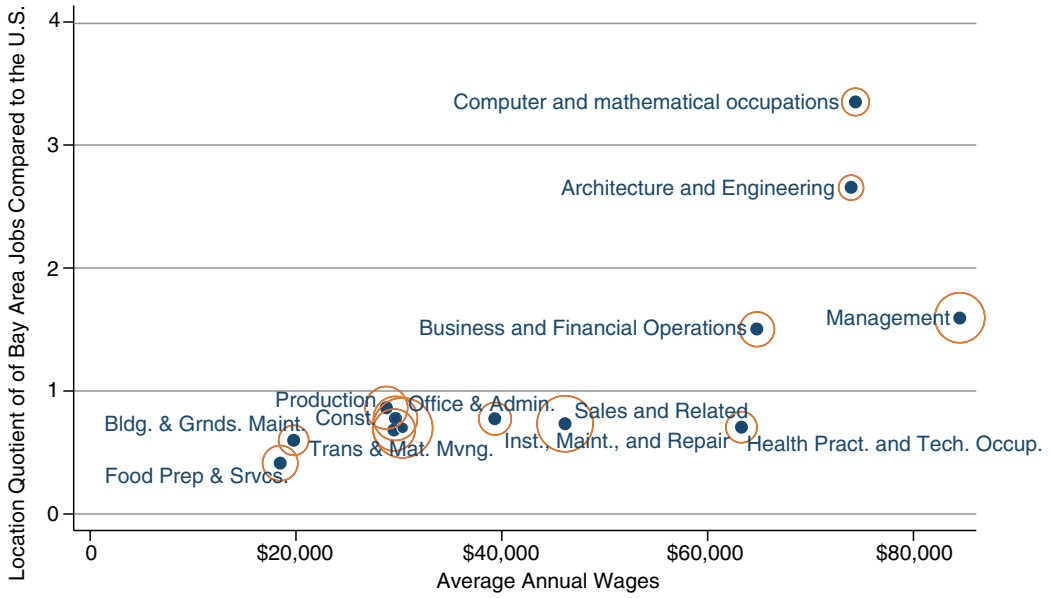
Other entries in the top table that stand out are the percentages of the labor force with just a high school diploma in the East Bay and the North Bay. At roughly 19%, they are both significantly higher than the figures for other parts of the Bay Area. Table 7 also shows that a significant proportion of those with a high school diploma have some additional schooling, including some college or perhaps an associate's degree. In the Bay Area as a whole, this describes more than one-quarter of the workforce. Just under half (49%) of those with less than a bachelor's degree have some education beyond high school. This is slightly higher than the comparable figure for the United States as a whole (44%).

An examination of the occupations that are over- and under-represented in the region provides another way of assessing the Bay Area labor force. As was done with industries in a previous section, we can calculate location quotients for occupations. Location quotients indicate which occupations

have heavy concentrations and a higher percentage of the labor force in the Bay Area compared to the nation as a whole.

Figure 13 presents those location quotients, along with average annual wages. There are two occupational categories that stand out as being highly over-represented in the Bay Area: (1) computer and mathematical occupations and (2) architecture and engineering. Both are present in the Bay Area at more than three times their share of the U.S. labor force overall. Also heavily concentrated, but much less so, are (1) management, and (2) business and financial operations; both have location quotients of about 1.5, indicating shares in the Bay Area that are 50% higher than in the U.S. overall.

Figure 13: Bay Area Occupation Concentrations



Ring size reflects the relative size of the occupation.
Source: Bureau of Labor Statistics; calculations by Bay Area Council Economic Institute

In addition to being heavily concentrated in the Bay Area, these four occupational categories are also associated with high average annual wages. The full time average employee wage in the United States was $44,410 in 2010. The wage averages in the four most heavily over-represented occupations in the Bay Area are all in excess of $60,000, with most closer to $80,000. This suggests both a significant demand for and supply of skilled, highly educated workers in the Bay Area.

Not only are workers heavily concentrated in high wage occupations, but wages in all occupations are higher because of the high value-added nature of production in the Bay Area. From Figure 14, it is clear that in every broad category of occupation, from Management at the top to Food Preparation

and Service at the bottom, wages in the Bay Area are higher than elsewhere in the U.S. economy. This is the result of a combination of three factors.

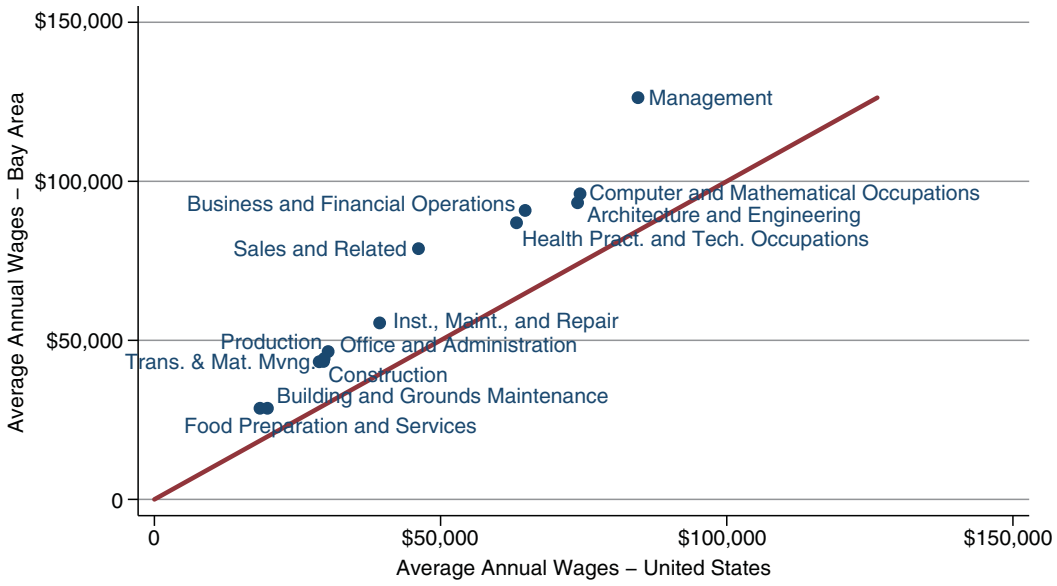
First, the better an economy performs, the more it compensates workers at all levels. A high value-added economy such as that of the Bay Area generates high wages for skilled workers who in turn spend that money in the local economy. This expands the demand for workers in all levels of occupations and increases their wages accordingly.

Second, the high cost of living in the region may necessitate the payment of high wages. This not only plays a role in determining the wages of skilled workers, but through the effect discussed above, makes it difficult to expand the supply of workers in lower-skilled occupations, keeping their wages relatively high.

Third, as was discussed with the industries above, it may well be the case that within each occupation category, more highly skilled occupations are over-represented in the Bay Area. For example, the Sales and Related category includes cashiers, insurance sales agents and real estate brokers. It is possible that real estate brokers are simply more highly represented in this category in the Bay Area than in the rest of the country. That this would be true for all broad occupation categories would be surprising, however.

All three factors play some role in producing the higher wage levels seen across occupational categories.

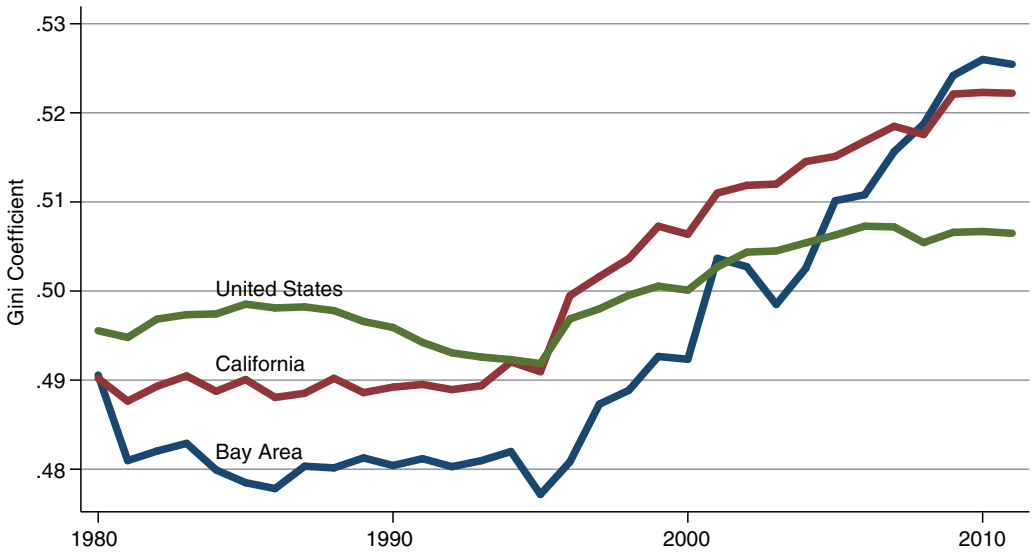
Figure 14: Bay Area Average Wages by Occupation Relative to National Averages, 2010



Source: Bureau of Labor Statistics; calculations by Bay Area Council Economic Institute

One consequence of recent changes in the Bay Area economy and workforce is that wage and salary inequality has increased significantly. Although this is a nationwide trend, it is particularly true in California and the Bay Area (Figure 15). Despite having changed relatively little in the previous 20 years, beginning in 1995, the trend toward strong growth in high-income employment increased rapidly. It also increased in California and the rest of the country, but at much slower rates. At the same time, while lower-skilled and hence lower-wage workers are clearly falling behind, they are well compensated relative to their peers outside of the Bay Area.

Figure 15: Wage and Salary Inequality, 1977–2011



Source: U.S. Census CPS; calculations by Bay Area Council Economic Institute

It is also of concern that opportunities for workers in the middle-income ranges have been diminishing over time. Among those with incomes below the region's median, there are relatively more workers in the group with incomes less than one-half of the median, and relatively fewer in the group just below the median (i.e., those with salaries and wages between 80% and 100% of the median).

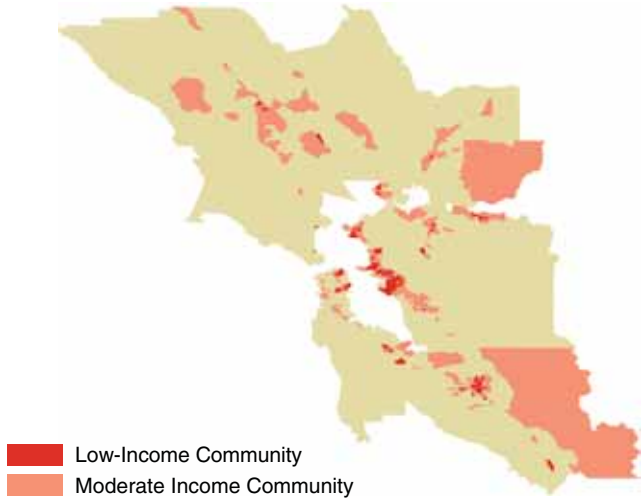
Low- and Moderate-Income Communities

Despite the highly educated nature of the labor force in the Bay Area as a whole, there are significant areas of concentrated low- and moderate-income workers. These are individuals who live in households with incomes less than half of the Bay Area's median household income (low) and households with levels of incomes more than half of the median but less than 80% of the median (moderate). Bay Area median household income in 2010 is estimated to have been just over $76,000. Low-income communities are

thus those with median household incomes below $38,000, and moderate-income communities have a median between $36,000 and $61,000. Figure 16 presents a map of the location of low- and moderate-income (LMI) communities: dark red indicates a low-income community, while pink indicates a moderate-income community.

Low- and moderate-income households are located throughout the Bay Area, but they are heavily concentrated in the areas highlighted in Figure 16. For many employed members of these LMI households, work locations are far from home. The average commute for members of these communities is 22.1 miles, somewhat longer than average for the region's workers as a whole (21.3 miles). Public transit usage is comparable, but slightly higher than average for these communities at about 13% compared to nearly 12% for the broader community. Car is the most common means of transport at 76.4%, followed by walking at 5.4%. However, despite the near equal rates of public transportation utilization, LMI workers are more likely to work during off-peak hours. Since transit operators increase and decrease service based on peak and off-peak hours, traveling during off-peak hours increases the likelihood of an extended wait for service and thus, a longer travel time.[11]

Figure 16: Locations of Low- and Moderate-Income Communities



Source: U.S. Census LEHD Data, 2010; calculations by Bay Area Council Economic Institute

Commutes from LMI communities are lengthy because the primary sources of employment for these individuals are spread throughout the region. Four

[11] Loveless, Shirley, "Access to Jobs: Intersection of Transportation, Social, and Economic Development Policies—Challenge for Transportation Planning in the 21st Century," *Refocusing Transportation Planning for the 21st Century: Proceedings of Two Conferences*, February 1999, 133–163.

industry sectors in particular provide jobs for these workers: Retail Trade (13.6% of LMI workers), Health Care and Social Assistance (11.4%), Accommodation and Food Services (11.3%), and Manufacturing (9.8%). The concentrations are high in all four sectors, but are particularly high in Retail Trade and Accommodation and Food Services. About half of LMI workers in Retail Trade are in sales positions, two-thirds of those in Accommodation and Food Services are in food preparation and service, and a majority of those in Manufacturing are engaged in production. More generally, the most common job categories for workers in LMI households are office and administrative support (15.5%) and sales and related occupations (11.3%). Also, about 7.2% of workers in these households are employed in construction and extraction.

Relative to the rest of the population, workers from LMI communities are nearly twice as likely to be African American and 50% more likely to be Hispanic than they are to be either white or of some other race (Asian or Pacific Islander or Native American). They are also more likely to be young; the majority are less than 36 years old. Educational attainment is also low. Nearly 70% of workers in LMI households have no post-high-school degree, associate's or otherwise, whereas the same is true of just 46% of the general population. This data helps support a "skills mismatch" theory, i.e., that LMI communities with lower levels of education are left unable to compete for emerging knowledge-based employment opportunities.[12]

A 2010 study by Ted Egan of the San Francisco Office of the Economic Analysis suggests that lengthy commutes will only increase. Suburbanization of not only housing stock, but increasingly of employment, has led to traditional transit-based job centers shifting to auto-centric office parks in higher-income cities.[13] It is argued that this combination of factors creates a two-fold problem: workers from LMI communities are both unable to compete for knowledge-based white-collar jobs due to lower levels of education and they lack the resources to commute or relocate near areas where lower-skilled jobs are available.

Over the course of the last 25 years, there has been a nationwide trend towards an increasing share of households in the low-income category and a smaller share of households in the moderate-income category. This is evidence of the widening disparity in income distribution in the country. The same trend is evident in the Bay Area. However, while the Bay Area's share of moderate-income households declined from 1977 to 1980, it grew significantly from 1980 to 2011, to a level higher than it was in 1977. What is

[12] Kasarda, J., and K. Ting, "Joblessness and Poverty in America's Central Cities: Causes and Policy Prescriptions," *Housing Policy Debate*, 7(2) (1996): 387–419.

[13] Egan, Ted, "Commute Equity: An Examination of Bay Area Trends" (San Francisco Office of Economic Analysis, October, 2010) http://www.bayareavision.org/initiatives/PDFs/Commute%20Equity.pdf

important here is the implication for the share of households between 80% and 100% of median household income: it has declined significantly, reflecting a greater hollowing out of the middle income range in the Bay Area than is true either nationally or in California as a whole.[14]

Policies aimed at improving opportunities for workers in LMI communities should optimally focus on the demand for their services and the skills they bring to the job. Increasing the demand for their services can best be accomplished by facilitating the growth of the broader economy rather than by narrowly encouraging the growth of sectors that need their services. Those sectors will grow in response to a higher level of overall economic activity in the region. A more targeted policy solution is to increase education and workforce training, both in basic and specific job skills. This approach may be more sustainable over the long term and can provide added benefits by expanding the human capital available to the economy as a whole. With significant retirements coming and job replacement opportunities likely to become abundant, one effective strategy may be to prepare workers from LMI communities for the jobs that will become available due to retirements, rather than attempting to create more jobs in the categories in which they already find employment.

Venture Capital

The role of venture capital in the Bay Area has been growing steadily since 1995. Between 1995 and 2011, yearly venture capital investments in the Bay Area increased from $453 million to just under $3 billion. This amounts to an increase of 660%, much higher than the rate of inflation (47%) over that period. Most of this growth has come in high value-added sectors such as Software, Telecommunications, Semiconductors, and Computer and Peripherals Manufacturing. The Bay Area was the recipient of between 45% and 75% of all venture capital investments in each of these sectors in the United States in 2010.

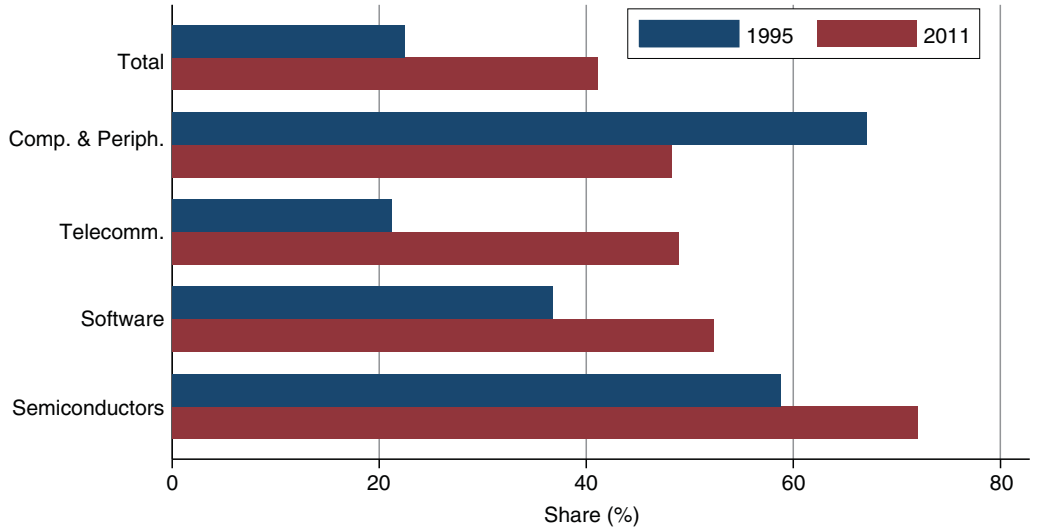
It should be noted that the value of these investments in the Bay Area is not large enough to drive wholesale changes in the economy directly, but the nature of much of the new business formation was significantly influenced by this increase.

The Bay Area, which typically receives in excess of 40% of all venture capital funding in the United States, represents the innovative frontier for many cutting-edge technologies. With the rapid growth of venture capital funding locally, has come a growing emphasis in the Bay Area economy on innovation and entrepreneurship. Many in the local economy are inspired to try to develop "the next great thing."

[14] See Appendix A online for more details on this point.

Due in part to this strong history of venture capital funding, the Bay Area has a sizeable share of many key technology sectors. Some 12% of U.S. computer and electronics manufacturing employment is in the Bay Area. Similarly, more than 10% of U.S. employment in the software sector is in the region.

Figure 17: Silicon Valley's Share of U.S. Venture Capital Investments, 1995–2011



Source: PricewaterhouseCoopers MoneyTree

The Clean Economy

The clean ("green") economy is an increasingly promising source of new technologies, processes, and industries with the potential to generate significant numbers of jobs. Despite high expectations, the clean economy is still poorly measured in terms of its spatial geography, its sub-industries and the jobs they create. Using what information is available, California—and more specifically the Bay Area—appear to be gaining leadership in this growing field.

A July 2011 study by the Brookings Institution, *Sizing the Clean Economy: A National and Regional Green Jobs Assessment*,[15] analyzed the implications of the emerging clean economy on employment. Its definition of the "cleantech" sector includes wave/ocean power, solar photovoltaic, wind, biofuels/biomass, carbon storage and management, renewable energy

[15] Muro, Mark, Jonathan Rothwell, and Devashree Saha with Batelle Technology Partnership Practice, *Sizing the Clean Economy: A National and Regional Green Jobs Assessment* (Washington, DC: The Brookings Institution, Metropolitan Policy Program, July 2011) http://www.brookings.edu/~/media/Series/resources/0713_clean_economy.pdf

services, battery technologies, electric vehicle technologies, solar thermal, professional energy services, fuel cells, smart grid, and geothermal.

Cleantech jobs in the nation grew 8.3% between 2003 and 2010, compared to 4.2% for all jobs. The cleantech annual wages average in 2010 was $43,343, compared to the U.S. annual wages average of $38,616. As shown in Figure 8. the Bay Area is home to two metropolitan areas in the top ten for cleantech employment, taking both the number 1 and number 5 positions. The San Francisco Metropolitan Statistical Area has more cleantech jobs than any region n the country, and together the San Francisco and San Jose Metropolitan Statistical Areas accounted for 11% of all U.S. cleantech employment.

Table 8: Metropolitan Statistical Areas with the Most Cleantech Jobs, 2010

Rank	Metropolitan Area	Cleantech Jobs, 2010
1	San Francisco-Oakland-Fremont, CA	13,917
2	Albany-Schenectady-Troy, NY	10,092
3	Knoxville, TN	8,184
4	Chicago-Joliet-Naperville, IL-IN-WI	7,642
5	San Jose-Sunnyvale-Santa Clara, CA	6,192
6	Los Angeles-Long Beach-Santa Ana, CA	4,302
7	Boston-Cambridge-Quincy, MA-NH	4,259
8	Kansas City, MO-KS	3,932
9	Atlanta-Sandy Springs-Marietta, GA	3,853
10	New York-Northern New Jersey-Long Island, NY-NJ-PA	3,844

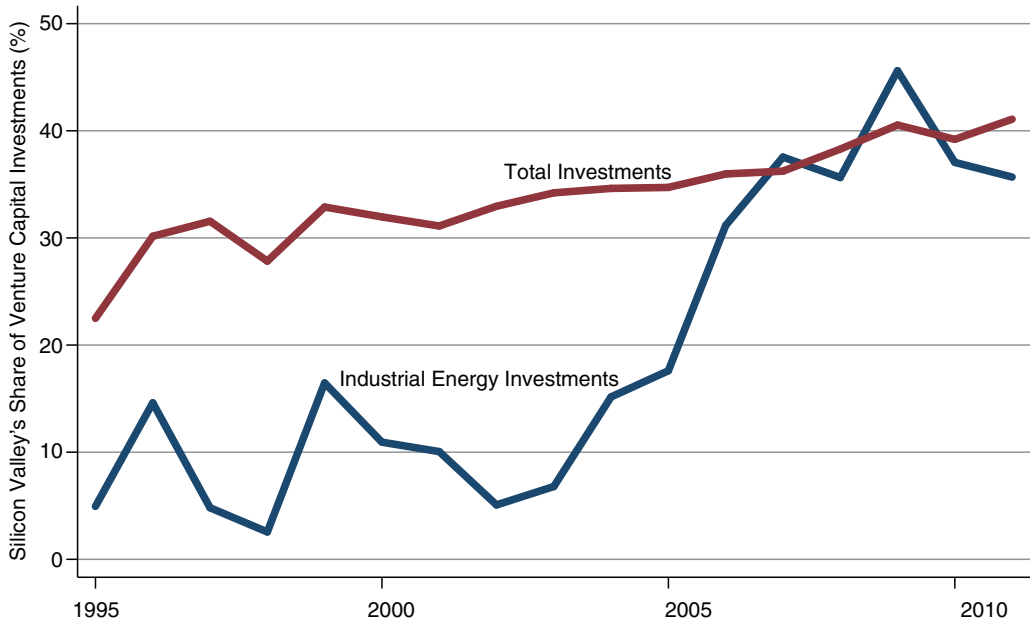
Source: The Brookings Institution, 2011

The Bay Area has also attracted an increasingly large share of the nation's venture capital investment in Industrial Energy: from 2002 to 2011, the Bay Area has gone from having a 5.1% share to having a 35.7% share. While the Industrial Energy sector is not defined exactly the same way as the cleantech sector, its sub-categories include environmental, agricultural, transportation, manufacturing, construction and utility-related products and services as defined by PricewaterhouseCoopers and the National Venture Capital Association, and the vast majority of the increase in venture capital investments in Industrial Energy has effectively been in cleantech.

Investment in this sector has been flowing not just into Silicon Valley, but also into the East Bay and San Francisco. Since the fourth quarter of 2009, more than $2 billion in investment has been made on the Peninsula, another $1 billion in the East Bay, and $247 million in San Francisco. With nearly 40% of all such investment flowing into the region, the Bay Area is at the

forefront of new product development and stands to benefit significantly from further growth in the clean technology sector.

Figure 18: Venture Capital Investment in Industrial Energy



Source: PricewaterhouseCoopers MoneyTree

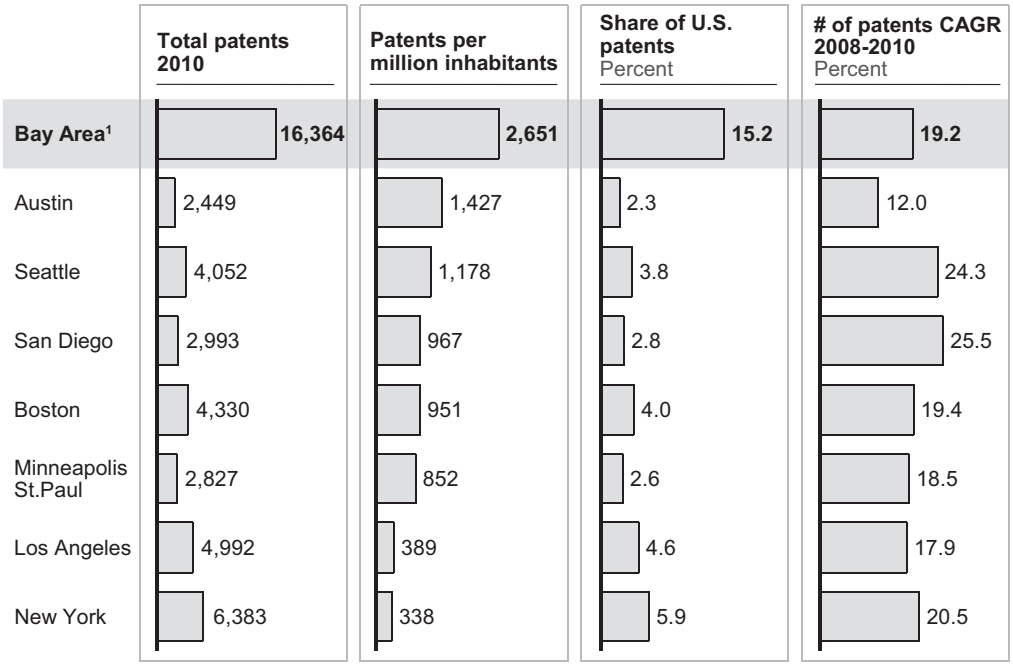
Innovation and Entrepreneurship

Innovation and entrepreneurship are critical to any discussion of prosperity in the Bay Area. The Bay Area has been the world's leading innovation center for the past 60 years. Its impact on the economy and how it operates, from enterprise productivity to health and communications, has been immense. The region's ability to play a role in the creation of entirely new business paradigms and spaces of social activity—including personal computers and smart phones, semiconductors, cleantech, biotechnology and personalized medicine, relational databases, magnetic storage and, most recently, cloud computing—is unrivaled, producing world-class companies and jobs in the region, nationally and around the world. It has also impacted the lives of hundreds of millions of people, who use and benefit from the technology and services it generates.

Figure 19 shows how the Bay Area remains at the head of its peer regions in terms of patents granted. The region's ability to conceive, research, develop and commercialize new technologies and business models is based on an interconnected innovation system composed of a diverse set of institutions and actors that are linked by networks and share distinct cultural perspectives

on how value is created. Together, these components and processes constitute an innovation value chain that—because innovation is dynamic and often non-linear—can also be described as an innovation cloud. This system has proven resilient, reinventing and repurposing itself through multiple crises and economic cycles.

Figure 19: Patents Granted



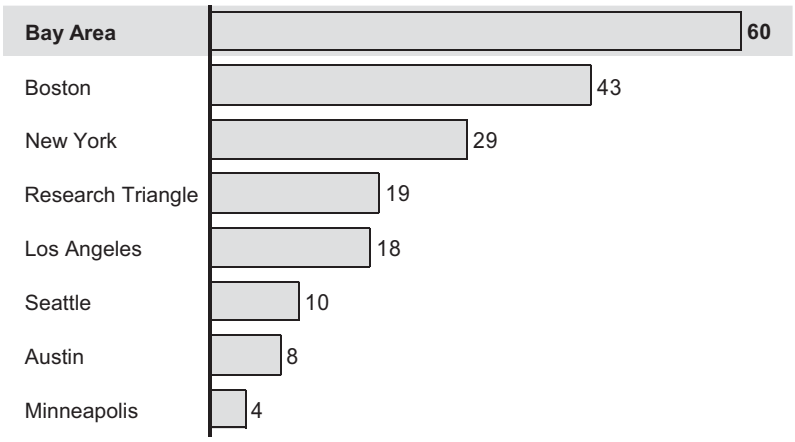
1 Data for San Francisco and San Jose MSAs

Source: U.S. Patent and Trademark Office; U.S. Census Bureau; Bay Area Council Economic Institute and McKinsey & Company analysis

The critical core of the Bay Area innovation system lies in its world-class institutions of higher education. With four University of California campuses and Stanford serving as anchors, the Bay Area accounts for more top graduate programs than any other region in the nation. (Boston comes in second with 43 to the Bay Area's 60, and New York is third with 29.) Also supporting the Bay Area innovation system are the five California State University campuses that call the region home, and 26 California Community Colleges. The Bay Area's research universities are also a major source of patents and inventions that are licensed to private companies—to date the region's four UC campuses have generated nearly 1,800 patents and 3,000 active inventions—and they generate graduates and faculty with an extraordinary track record for taking ideas and technologies from the laboratory bench to commercial applications.

Figure 20: Leading Graduate Programs

Number of business, medical, science and engineering graduate programs ranked in the top 10 nationally[1]
Top graduate programs by region, 2011



1 Includes ranking for specialty programs (10 in business, 7 in science, 12 in engineering, and 9 in medicine). Total = 38 x 10 = 380
Source: U.S. News Best Grad Schools 2011; Bay Area Council Economic Institute and McKinsey & Company analysis

Federal laboratories are another core component of the innovation system. These include four U.S. Department of Energy labs—Lawrence Berkeley, Lawrence Livermore, Sandia (California), and the Stanford Linear Accelerator—as well as NASA's Ames Research Center, the San Francisco Veterans Administration Medical Center, the Veterans Administration Palo Alto Health Care System, and the Joint Genome Institute (a collaboration of Lawrence Berkeley with Lawrence Livermore).

Built on this infrastructure of research facilities is another layer of unique institutions that are multi-disciplinary, multi-partner collaborations: the Joint BioEnergy Institute (which includes Lawrence Berkeley, Sandia, Lawrence Livermore, UC Berkeley and UC Davis), and two California Institutes for Science and Innovation—QB3 (the California Institute for Quantitative Biosciences which links UC San Francisco, UC Berkeley and UC Santa Cruz) and CITRIS (the Center for Information Technology Research in the Interest of Society which links UC Berkeley, UC Davis, UC Santa Cruz, and UC Merced).

Also intertwined with this network of state and federal institutions and facilities is a large Bay Area community of independent and corporate labs, some of which conduct basic (deep) research, but most of which focus principally on applied research. Like the university and federal laboratories, their fields of inquiry span a range of disciplines and sectors from Information and Communications Technology (ICT) to Life Sciences. The most prominent of these include Hewlett-Packard, Agilent, SRI International, Kaiser, PARC,

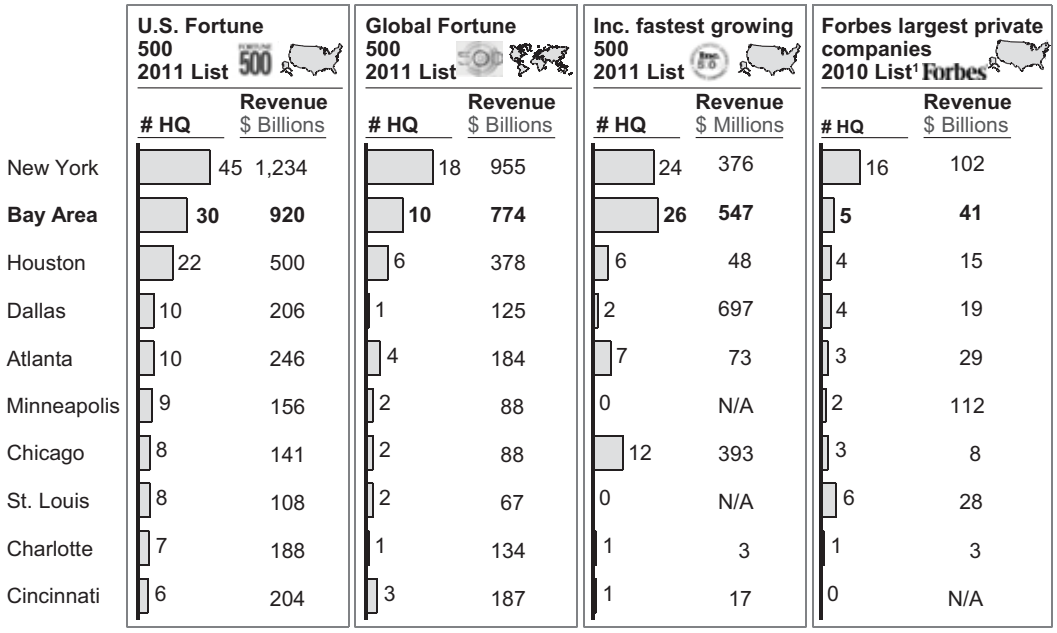
Intel, Genentech, The Gladstone Institutes and the Buck Institute for Research on Aging. A large number of nationally and globally headquartered companies also operate R&D facilities in the region. The list notably includes IBM, GE, Microsoft, Lockheed Martin, Pfizer, Bayer, Merck, Huawei, Novartis and SAP. Many U.S. and foreign auto companies have labs in the region that tap into the latest innovations in information technology for potential automotive applications.

These educational institutions, research laboratories and research-based companies have close collaborative relationships. Corporate and independent labs in particular conduct joint research with universities and federal labs, facilitating the creation of new knowledge and the translation of basic science into commercial applications.

Harder to quantify, but equally essential, is a business culture that encourages risk-taking and accepts failure, i.e., an environment that supports entrepreneurial activity. In a recent attempt to quantify this, Booz & Company in cooperation with the Bay Area Council Economic Institute, found in a survey of the top 1,000 public companies that Bay Area companies are three times as likely to report that their companies' innovation strategies are tightly aligned with their overall business strategies (54% compared to 14% reporting weak alignment). And when asked if their corporate cultures supported their companies' innovation strategies, 46% of Bay Area companies strongly agreed that they did, compared to 19% of companies surveyed overall. Perhaps the most important binding factor, however, is the region's openness to new ideas and new participants. Multiple disciplines collide and interact, creating novel ideas and unanticipated applications (where, for example, information technology meets life sciences to create bio-informatics). This is enabled by a culture that is highly permeable, with few institutional barriers to the movement of people and the combining of ideas.

While not limited to technology, the Bay Area's entrepreneurial leadership is closely identified with technology. Many of the region's iconic and soon-to-be-iconic firms have been started by entrepreneurs within the last thirty years. Whether still in start-up mode or well-established, their contribution to the Bay Area's economic identity, employment, innovation and competitiveness has been central to the region's success.

Figure 21: Largest and Fastest Growing Companies



1 Forbes largest private companies list is comprised of 223 companies; revenues for a number of Forbes largest private companies are calculated by using Forbes estimate or company provided estimate

Source: Fortune Magazine; Inc. 500; Forbes; Bay Area Council Economic Institute and McKinsey & Company analysis

More than anywhere else in the world, the Bay Area is known as a mecca for entrepreneurs and innovators. Google, VMware, Genentech and, more recently, Facebook and Zynga have in only a few years grown from just a few dozen employees to 30,000, 12,000, 11,000, 4,000 and 3,000 respectively. In the process, they have created new paradigms that are transforming global business. It is therefore important that Bay Area leaders understand the conditions that either nurture or discourage entrepreneurial activity. As noted earlier in this report, most new jobs are created by start-ups and young companies that are already present in the region. Enabling their development, survival and growth will be critical to ensuring the Bay Area's future economic dynamism.

Impediments to Growth and Prosperity

Although the Bay Area is well endowed with assets that support high-quality economic growth—its educated labor force, its institutions of higher learning, its culture of innovation and its venture capital opportunities—the region is also held back in several ways. The first has to do with housing. High housing prices in the Bay Area and a dearth of new home construction are clear impediments to growth. The housing issue is largely the result of local, regional, and state regulations. These regulations express the preference of the community, but are perhaps pursued in the absence of an understanding of their broader economic implications. The second impediment has to do with regulations more broadly. It is often claimed that California, and the Bay Area in particular, is a difficult place in which to do business. There are certainly ways in which this is true.

Housing Costs

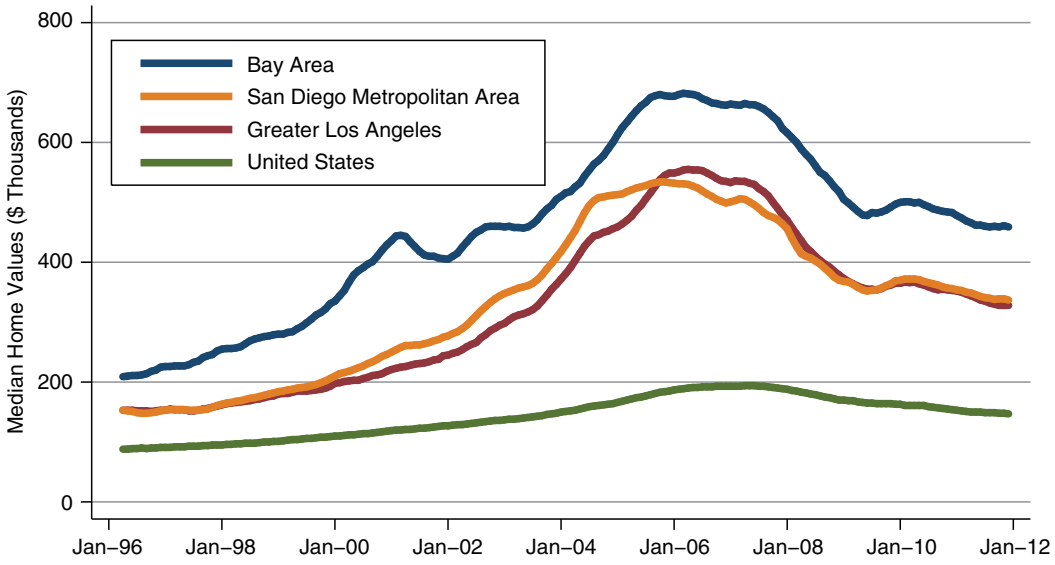
Housing prices in coastal California are notoriously high, and in the Bay Area they are a great deal higher. The underlying causes are no mystery: California, and especially in the Bay Area, is characterized by a powerhouse economy and a good climate that draw people in and boost housing demand, as well as by severe institutional constraints on construction that prevent that demand from being met and cause housing prices to skyrocket. Before addressing the underlying causes in more detail, it is helpful to present some basic facts about the Bay Area's housing prices and the footprint of its built-up area.[16]

Figure 22 shows the Zillow.com housing price indices for the Bay Area, Greater Los Angeles and the San Diego metropolitan area, as well as for the nation as a whole. The recent housing crisis is easy to spot. Housing prices in the three California regions peaked dramatically in 2006, fell sharply until 2009 and declined more slowly through the end of 2011. Figure 22 also shows that over the long stretch of the late 1990s and early 2000s, California housing prices climbed more or less steadily. This steady climb contrasts with the experience of states such as Nevada, Arizona and Florida, in which the rise in housing prices only began 2 or 3 years before the crisis and was far steeper and more abrupt. The exception to the steady climb is the lower

[16] A "built-up area" is defined as a block-group (similar to a census tract, only smaller) that has had 10% or more of its total area built upon.

housing price peak in 2001, appearing only for the Bay Area, which captures the effect of the dot-com bubble whose effect was sharpest in Silicon Valley.

Figure 22: Median Home Prices, 1996–2012



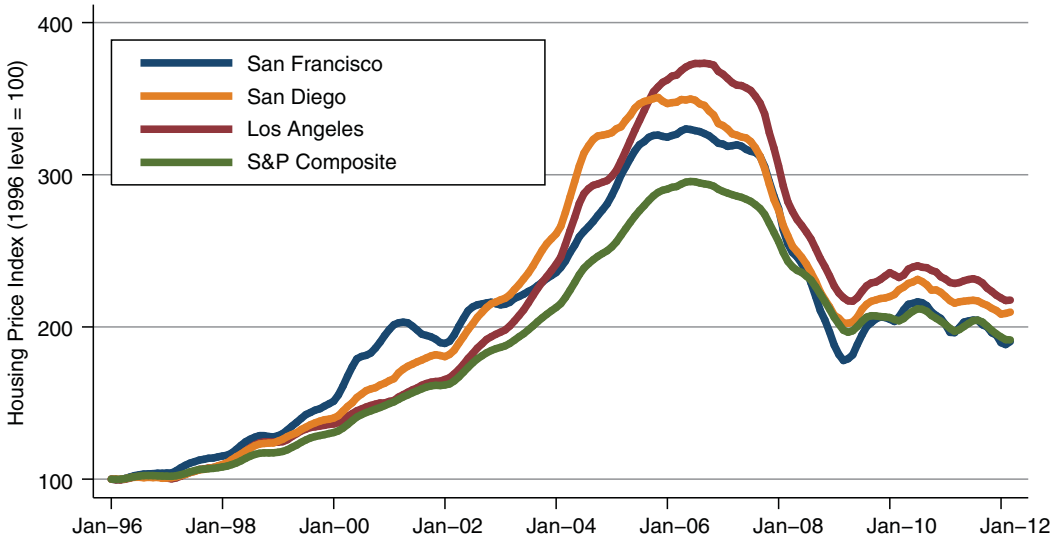
Note: Zillow housing price indices are estimates of the (nominal) median home value.
Source: Zillow.com; calculations by Bay Area Council Economic Institute

Shifting to a long-run perspective, Figure 22 shows that housing prices in California are well above those in the nation as a whole, and that housing prices in the Bay Area are well above those in the rest of California. Unlike most housing price indices which only measure changes over time—i.e., which have all indices equal 100 at some base year—the Zillow.com index captures the median home value in a region, so it reflects the level of prices and not just their rise and fall. It can thus be interpreted in dollar terms, as the value of the median priced home. Whereas the U.S. housing price index—which includes California—never rose above $200,000 even at its peak, the indices for Greater Los Angeles and the San Diego metropolitan area peaked at roughly $575,000, about 2.75 times as high. The Bay Area's prices, however, peaked at approximately $700,000, and it is important to note that this is the *median* home value, so half of the homes in the Bay Area were valued *above* this figure.

The Bay Area's higher home prices have little to do with the housing crisis or the bubble that preceded it. Figure 23 shows the Standard and Poor's/Case-Shiller housing price indices for the same California regions (and for a composite of the 10 largest U.S. housing markets). This index is of the standard kind, so the values at the base year—1996 in this case—equal 100 for each region, and the index tracks their changes from that point on. Figure 23

shows that from 1996, Bay Area housing prices rose above those for Greater Los Angeles and the San Diego metropolitan area during the dot-com bubble, but since then Bay Area housing prices have actually increased *less* than in the other California regions.

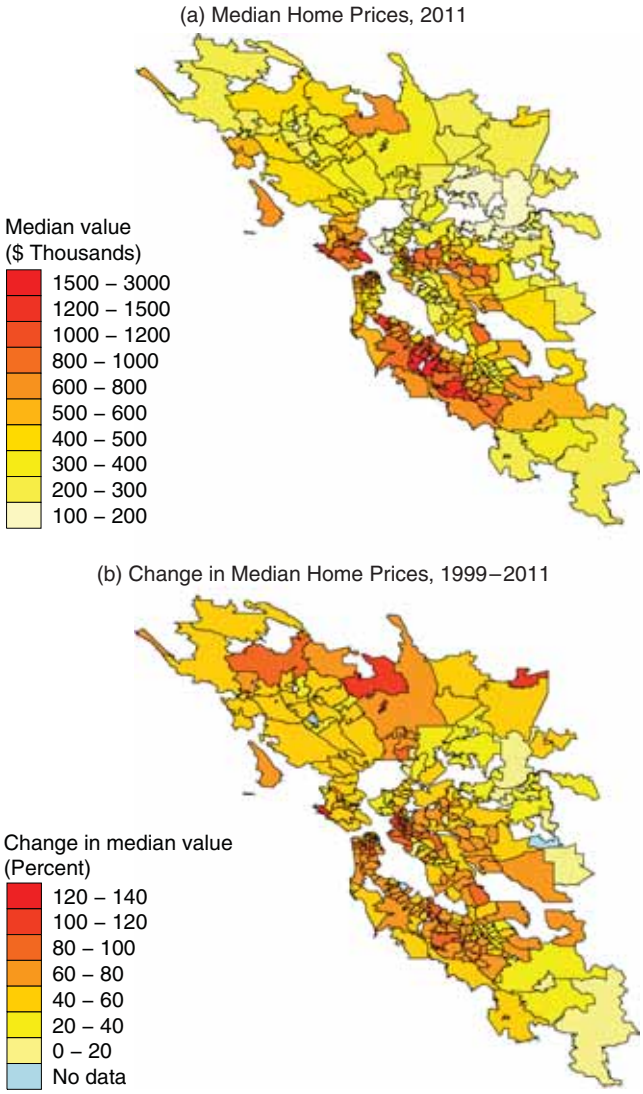
Figure 23: Case-Shiller Home Price Index, 1996—2012



Note: The S&P/Case–Shiller Composite 10 index aggregates those of Boston, Chicago, Denver, Las Vegas, Los Angeles, Miami, New York, San Diego, San Francisco and Washington.
Source: Standard & Poor's; calculations by Bay Area Council Economic Institute

Within the Bay Area, housing prices are highest in Silicon Valley and San Francisco. They are also high in Marin County and in affluent parts of the East Bay. Figure 24 maps median housing prices across the region, showing more expensive areas in red. Panel (a) presents a snapshot of 2011 prices, and although home prices for San Francisco and Silicon Valley did not experience as sharp a fall during the housing crisis as elsewhere in the region and have been quicker to recover, the relative cost of housing in different parts of the Bay Area has not changed dramatically over time. Panel (b) shows the percentage change in the median housing price for different parts of the region from 1999 to 2011. Most of the Bay Area appears in various shades of orange, indicating that most parts of the region have seen a similar—dramatic—increase in housing prices over this period. San Francisco and Oakland stand out, as home prices in these two cities have experienced particularly high increases, reflecting the rising popularity of the urban lifestyle. On the other hand, certain semi-rural or exurban outlying areas have experienced lower housing price increases than elsewhere in the region.

Figure 24: Bay Area Home Prices



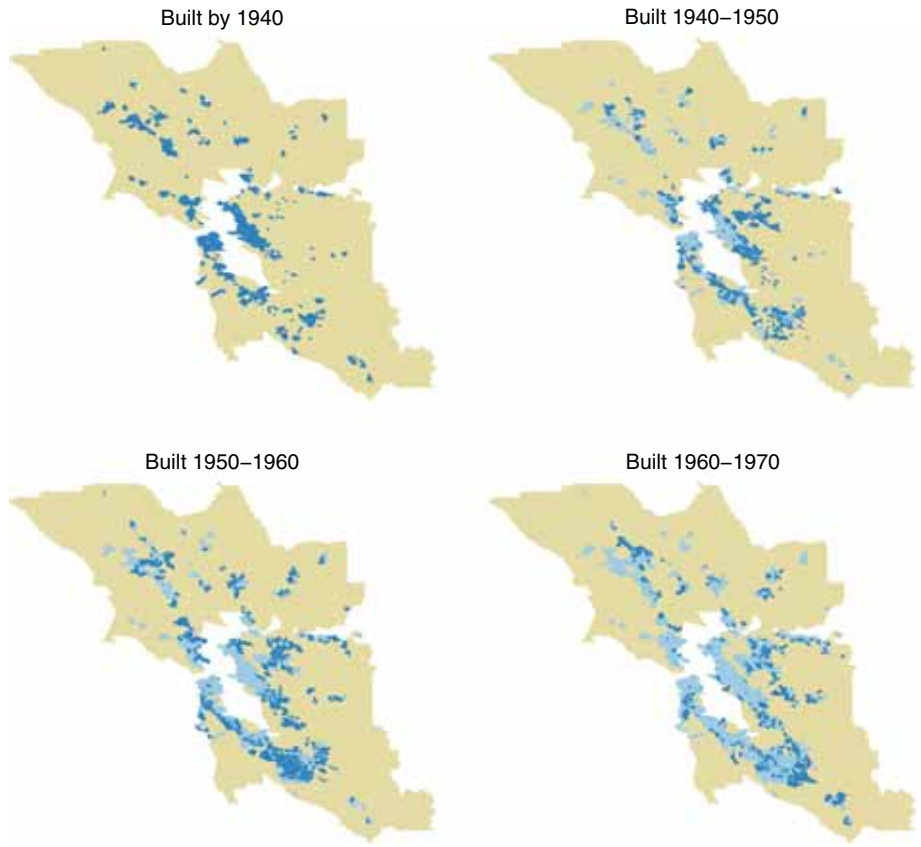
Source: Zillow.com, Census; calculation and mapping by Bay Area Council Economic Institute

Why are housing prices so high in the Bay Area? Part of the story is that California and especially the Bay Area are very attractive. The climate is great and the economy—short term fluctuations aside—has been relatively strong. These factors generate strong demand for housing. Without the good climate and the strong economy, housing prices in California would be Midwest prairie flat. But this is only half of the story: demand by itself is not enough to raise housing prices. If strong demand were met by strong construction—a home for whoever wants one—prices would be much lower.

It is the ongoing failure to construct new housing in line with demand that is primarily responsible for extraordinarily high housing prices.

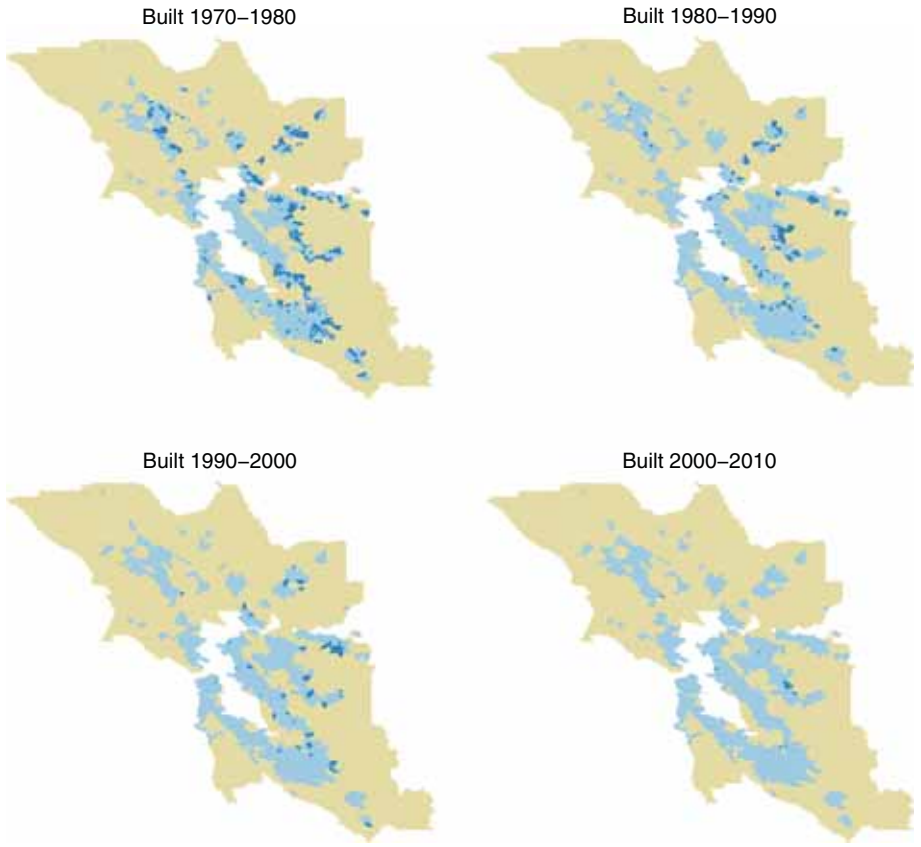
The series of maps in Figure 25 illustrates the geographical expansion of the Bay Area's built-up footprint over time. The salient fact to glean from these maps is that in the 1970s the expansion rate of the built-up area began to slow. By the 1980s it was a mere trickle, limited almost entirely to the East Bay, and by the 1990s it had virtually ground to a halt. The current built-up area covers approximately 21% of the total land area, and does not reflect any shortage of flat land. Of course, constructing new housing doesn't necessarily require using more land. It is also possible to increase density, and to some degree that has occurred. Large-scale densification, however, has been curtailed by institutional constraints on construction.

Figure 25a: The Bay Area's Built-Up Footprint Over Time, 1940–1970



Note: data is plotted at the census block–group level
Source: ACS 2006–2010; calculation and mapping by Bay Area Council Economic Institute

Figure 25b: The Bay Area's Built-Up Footprint Over Time, 1970–2010



Note: data is plotted at the census block–group level
Source: ACS 2006–2010; calculation and mapping by Bay Area Council Economic Institute

One important factor inhibiting new construction is the California Environmental Quality Act (CEQA). Envisioned in the late 1960s as a way of protecting the environment, CEQA sets the lowest possible legal bar for raising objections to a project. In practice, this means that almost any opposition, however minor, can slow down construction projects for years. Many developers, especially smaller ones, cannot afford to remain leveraged for such a long time and are driven out of the market entirely, resulting in a market that is less competitive and not as consumer friendly. CEQA is regularly used to pursue non-environmental objectives by a range of players in ways that inhibit development but are far removed from the original environmental intent of the law.

New housing construction is not popular in many cities in California. Cities do not stand to gain much from new housing, because it yields little in the way of property taxes and costs much to service. Instead, cities often prefer

to promote commercial land uses in their territory, knowing that people can live in the next city, where financial incentives do not affect city policy. Cities may mask the construction constraints under headings such as environmental impact fees, while well-intentioned policies such as affordable housing quotas, which if replaced by in-lieu fees, can indirectly raise housing costs. The institutional constraints to construction described so far are just the beginning, and they apply throughout California, not just in the Bay Area. Bay Area agency regulations add additional costs and obstacles to construction.

Beyond regulatory constraints that add to the cost and difficulty of housing construction, it is also true that potential building sites may also be under-utilized due to a lack of amenities. In particular, there is significant variability in the quality and availability of schools in the region. Schools are an important amenity and their quality near a potential housing development site can significantly affect the return to the developer. Where the quality of schools is lacking or other crucial amenities are missing, development will be slow. Accordingly, good schools are not only a workforce and economic imperative, but are also a regional asset to entice developers to build and people to live in communities throughout the region which currently lack quality educational systems.

Regulation: Business views on the Bay Area's Economy and Related Regulatory Issues

In addition to housing, other regulations are more directly influencing both the nature and the amount of economic activity in the region, putting the brakes on growth.

In researching this report, the Economic Institute interviewed 76 regional business leaders, as well as leaders of major regional business and economic development organizations. They included, on a weighted basis, companies in all nine Bay Area counties and a cross-section of Bay Area industries representing technology (life sciences, software, hardware, high-tech manufacturing), non-technology manufacturing, professional and technical services, building and design (construction, architecture and engineering), financial services, tourism, retail and logistics. Most of the companies (87%) were headquartered in the Bay Area, and all of the interviewees were owners, presidents, or senior managers engaged in business strategy, planning or government affairs.

The survey group also included firms with employment in the region on different scales, as follows:

- 8% have 1–4 employees
- 44% have 5–29 employees
- 35% have 25–99 employees
- 11% have 100 or more employees
- 3% did not respond

Many of the participating firms have significant numbers of employees outside the Bay Area, indicating that far from being exclusively tied to the region, they operate in diverse locations and have options for where they hire and do business:

- 12% have 1–5 percent of employees working in the Bay Area
- 9% have 6–24 percent of employees working in the Bay Area
- 6% have 25–49 percent of employees working in the Bay Area
- 26% have 50–74 percent of employees working in the Bay Area
- 47% have 75–100 percent of employees working in the Bay Area

Views on the Economy

The companies surveyed reported mixed performance over the last three years: 28% had grown, 25% had declined, and for 45% business had stayed the same. For most, this suggests a less-than-dynamic business environment, with much of the economy treading water (sector-by-sector performance, of course, can vary considerably.)

Firms that provided data on past and present employment levels reported very modest three-year growth in employment at 1.8%. This reflects the slow recovery in the job market that the Bay Area, along with the rest of California and the nation, has experienced since the end of the Great Recession. Looking forward, however, 45% of the companies that responded planned to increase their count of permanent employees in the region over the next twelve months. Only 4% expected to have fewer employees, and about half (45%) expected no change. This represents a 4.1% growth in employment for these companies, suggesting modest momentum in hiring, albeit from a low base.

When asked for the main reasons why their companies had originally located in the Bay Area, the reason most often given (in 59% of the cases) was that the founders lived here. Other factors (but well down the scale) included access to talent, proximity to customers and collaborators, growth opportunities, connections to universities or related institutions, access to technology, quality of life, and connections to Asia.

When asked why their companies are currently in the Bay Area, the responses were similar but more balanced. Forty-five percent said it was because the owners/employees live here, 19% pointed to industry/business growth in the region, and 9% pointed to a qualified talent pool.

The survey probably did not fully capture entrepreneurs or overseas companies locating to the Bay Area for access to technology or venture capital. It does indicate, however, how strongly company formation is rooted in individuals who are already in the region, and how much decisions on company location can turn on the personal preferences and perceptions of business leaders.

Major Themes

Questions regarding business issues were clustered around two major themes: perceptions of the region's business climate (including regulation), and the Bay Area's regional plans.

Business Climate and Regulation

Generally, the region comes out reasonably well as a place to do business, with 56% of respondents describing it as good or excellent, 28% rating it fair, and 35% rating it poor or very poor. The 35% poor or very poor rating, however, suggests a strong undercurrent of dissatisfaction. Business views of the region's *business climate* (including regulation) were mixed but generally positive, with just over 40% of business decision makers satisfied with the overall climate, 27% neither satisfied nor dissatisfied, and 26% dissatisfied. One significant dividing line was between firms that are growing and those that aren't. Firms that have grown in the last three years or that expect to grow in the next 12 months are considerably more likely to be satisfied with the region's business climate than those that have declined or that don't anticipate growth. To some degree this may reflect the region's business distribution, where technology is experiencing strong growth while other sectors are still struggling to recover from the recession.

Views of the region's *regulatory environment* are also mixed, but lean even more toward the negative, with 38% expressing satisfaction, one-third (33%) indicating dissatisfaction, and 24% in between. Regulatory environment issues include zoning, permitting, and environmental regulations. Dissatisfaction about local and regional taxes was expressed, not surprisingly, by 36%, while 30% expressed some level of satisfaction (with 27% in the middle). One issue a number of respondents identified, besides the overall level of taxation, is the number of taxes that a business is subject to. There is a perception among many business leaders that between the state and local levels there are too many taxes, including many small taxes that cumulatively can be substantial and that are not being efficiently managed.

The frustrations of business leaders who expressed dissatisfaction with the regulatory environment are broadly concentrated in three areas:

1. Lack of consistency between regulations and requirements at the local, regional and state levels was a major theme. Business leaders were frustrated with the perceived lack of consistency between regulatory agencies' policies at all these levels, and many commented that this situation limited their ability to expand within the region.

2. The State of California and the City of San Francisco were particularly identified as having bureaucracies that are difficult to work with.

3. Consistent with the theme of excessive or inconsistent regulations, the complexity and costs of meeting regulatory requirements from too many agencies were also issues.

Most respondents were not specific regarding the regulations they were most concerned about, although the California Environmental Quality Act (CEQA) was a clear concern at the state level. Issues with how CEQA is implemented are widespread and cut across industries; CEQA is cited by the biotech industry as a significant factor pushing regional biotech companies to locate manufacturing outside California. OSHPD (Office of Statewide Health Planning and Development) regulations were called out as impediments to the building of hospitals, and state labor regulations that make it difficult to hire part-time employees were also cited.

At the regional level, conflicts between Bay Area Air Quality Management District rules and the region's smart growth guidelines were called out, as was duplication between Regional Water Quality Control Board regulations and federal regulations. In the case of streams and wetlands, the overlapping of multiple requirements by federal, state and regional agencies, all operating under different laws, was cited as an example of redundancy and lack of coordination, even where those laws provide the opportunity to streamline.

At the local level, city-specific issues such as taxation and health care requirements in San Francisco were cited. For the most part, however, business concerns are focused on the inefficiency of current regulatory frameworks and their lack of transparency, both within jurisdictions—San Francisco was mentioned more than once—and between jurisdictions. At issue are the number of regulatory layers, multiple jurisdictions, their duplicative and overlapping nature, and the unnecessary time and financial costs that result.

Infrastructure and Workforce

Most respondents expressed satisfaction or were neutral when asked for their views on key components of Bay Area infrastructure: public transit including BART, busses and Caltrain (57% satisfied); airports (72% satisfied); the overall ease of commute for employees (60% satisfied); and access to broadband (78% satisfied). Fewer expressed satisfaction (44%) when asked about roads and bridges. Concern with highway congestion and poor maintenance of roads and highways were consistent themes. In the North Bay counties, inadequate intra-county public transit was also frequently mentioned.

Business leaders are generally satisfied with access to capital in the region, with just over half of the respondents indicating positive views, and only 12% negative.

Workforce questions point to other concerns. While the region enjoys a rich and highly educated workforce, 62% of respondents reported difficulty finding qualified applicants to meet their companies' workforce needs. While the region's university and community college systems ranked well, many companies were concerned with the quality of the K-12 public education system.

Regional Plans

We also asked companies if they were aware of the regional transportation, land use and sustainability plans being developed by Bay Area agencies, such as Plan Bay Area or the Sustainable Communities Strategy (SCS). Over 60% of the companies surveyed were unaware of the regional plans, and just under 40% had some awareness of them. It should be noted, however, that approximately one-third of the interviewees who gave positive responses were thinking of projects such as high-speed rail, redevelopment, or vehicle charging stations. The percentage that were knowledgeable about the regional plans being led by Joint Policy Committee member agencies was therefore considerably lower than 40%.

The respondents who were aware of regional agency plans for growth and sustainability were somewhat more likely to believe that the plans would have a positive, rather than a negative impact on the region than a negative one, but about one-third were concerned that the plans would lead to more taxes or generate ineffective bureaucracies.

Emerging Themes

Several other notable themes emerged from the interviews:

1. K-12 public education was described as broken, with negative implications for jobs not requiring a college education. While the region's K-12 system received low satisfaction ratings (32%) and high levels of dissatisfaction (33%), respondents were much more positive about their ability to recruit high-skill talent (with 63% reporting satisfaction.) This suggests that for now the region has a reasonably ample supply of workers with the specialized skills that businesses require. It is questionable, however, whether the region can continue to provide that skilled workforce if the K-12 system continues to underperform. This is also a problem because the quality of public education is tied to perceptions of the region's quality of life, which is currently a positive factor in recruiting and retaining top talent, but which could turn negative if the quality of K–12 education declines further.

2. The Bay Area's quality of life remains a positive differentiator for the region, with over 90% of respondents expressing satisfaction. It is an important asset, as many business leaders and their employees want to live and work here. This helps the region retain existing businesses and talent, and draws new resources to the region. The importance of quality of life is also reflected in answers to questions about why businesses were founded in the Bay Area and, to a lesser extent, why they remain here. It should not be assumed, however, that positive perceptions of the region's quality of life can indefinitely counter negative perceptions of its business climate. Regulatory concerns have an impact, and generally positive perceptions of the region's quality of life can be eroded by long commutes and inadequate or overburdened infrastructure.

3. In general, business leaders feel satisfied with their connectivity with clients and customers, educational institutions, and regional economic development organizations, all of which had over 50% positive ratings. Interestingly, with national perceptions of elected officials at historic lows, just over 50% of Bay Area business leaders also feel satisfied with their access to local elected officials and policy makers.

Bay Area Futures

The growth of the Bay Area economy will continue to center on technology and innovation. Regional demographic trends will reflect the impact of baby boomer retirement and rapid growth in the region's Asian and Hispanic populations. Since the development of regional economic strategy should reflect what we know about the region's future opportunities and challenges, these findings from recent long-term projections developed by ABAG are summarized below.

Demographics

Over the course of the next 20 to 30 years, the trend in demographics will be dominated by two shifts: the current workforce will be retiring and the Asian and Hispanic population will make up a larger share of residents in each future decade approaching 2040. These trends will accelerate through the coming decades.

The implications of these shifts are significant and stem primarily from the aging of the population. Along with aging comes retirements and the potential demand for smaller housing units as well as increased demand for housing in high-amenity neighborhoods. The primary implications are:

1. A growing number of baby boomers will retire as we move toward 2030.
2. These retirements will produce a large number of replacement job openings across a wide range of occupations and skill categories.
3. These job openings will need to be filled by growth in the workforce, particularly by workers aged 25–34, by existing workers and by new immigrants.
4. Housing demand patterns are likely to change significantly.

The increased rate of retirements presents both a challenge and an opportunity. The challenge is in filling vacant positions. Many of these positions will be high-skilled, requiring the attraction of significant numbers of well-educated workers. This will create opportunity for the younger members of

the workforce, even in industries such as manufacturing where continued decline in overall employment is expected.

The resulting changes in housing patterns are also important for the region. As the prime family housing group, those aged 35–54, shrinks in absolute size through 2030, the demand for single-family residences will also decline, potentially making this segment of the market more affordable. Similarly, growth in the younger (25–34) and older (65+) demographics over the next 20 to 30 years will increase demand for smaller residences nearer to amenities and city centers. This trend is in line with many of the region's plans for housing development.

Employment

The Bay Area is recovering strongly from the effects of the Great Recession. Between July 2011 and July 2012, Bay Area employment grew by 3.3%, adding 101,800 non-farm wage and salary jobs, significantly outpacing employment growth in California (2.6%) and the nation as a whole (1.4%).

The region is projected to outpace the state and the nation in job growth to 2020 and 2040, although the differences between the regional, state and national job growth rates are not large.[17] The Bay Area is projected to add nearly 700,000 jobs between 2010 and 2020 (+20.2%) although nearly 300,000 of these jobs represent recovery of jobs lost during the recession. With 2007 as the starting point, Bay Area job growth to 2020 is projected to be a more modest 11.4%, still outpacing the expected 9.2% state and 8.8% national job growth rates.

Bay Area job growth will be driven by the region's competitive advantage in technology and innovation. That advantage can be seen in the region's large and growing share of U.S. venture capital funding and by the region's competitive advantage in faster-growing high-wage industries. These sectors point to technology, foreign trade, and tourism as core economic bases through 2020 and beyond. As such, they represent the prime candidates for efforts to sustain and improve the region's competitive position.

Job growth between 2010 and 2020 will also be relatively broad-based. However, much of the increase will represent recovery from the recession. For instance, Construction employment in the Bay Area fell by roughly 30% during the recession and has only recently resumed growth. Forecasts indicate increased employment of more than 41% in this sector between 2010

[17] The projections discussed here are presented in greater detail in Appendix G online. They are based on work done by Steve Levy at the Center for Continuing Study of the California Economy.

and 2020. However, this increase will be only to a level that is still 5% below 2007 levels. Only a handful of sectors will see double-digit increases in the next 10 years that represent significant gains over 2007 employment levels. These include Professional and Business Services, Educational Services, Health Care and Social Assistance, and Information. An additional sector that is expected to grow, reflecting the prosperity of the region, is Other Services, which includes many in-home workers such as nannies and housekeepers. Leisure and Hospitality is another sector projected to have double-digit growth.

Employment Opportunities and Implications for Regional Economic Strategy

Employment opportunities generally stem from two sources: job growth and job replacement. Job growth comes from the birth of a new company or the expansion of an existing company. Job replacement occurs when workers have left existing jobs. There are many reasons for such attrition, including retirement, finding a different job, or moving out of the region. Between 2010 and 2020, some 60% of all employment opportunities in the Bay Area will come from job replacements. Job growth will be substantial, but much of it will be making up for jobs lost during the recession. Given the aging nature of the U.S. and Bay Area workforce, job replacements will present good opportunities for active local workers through 2020. The implication of this trend is that workforce policy should focus on these replacement job opportunities in addition to training workers for fast-growing sectors.

The generation of baby boomers who are retiring had the highest educational attainment of any American labor force cohort in history. Replacing them and providing for the increasing skill requirements of new jobs will be a challenge that, at the broadest policy level, requires four components: (1) training opportunities for existing workers, (2) improved K–12 education and access to higher education, (3) immigration policies that welcome workers at all skill levels and (4) policies that provide incentives for high-skilled workers in other areas of the country to come to the Bay Area to live and work.

The good news is that job openings will exist at all skill levels to replace retiring workers and meet the demands of an expanding economy. The challenge is that even today, Bay Area companies are reporting shortages of high-skilled workers while, in addition, there is a continuing increase in the skill requirements for most occupations. The dramatic increase in the use of technology in cars and its implications for auto mechanics is one example.

The Bay Area has one of the nation's most highly educated workforces with many high-skilled younger workers. Historically, this has been achieved through having great higher education institutions and by attracting talented workers to live and work in the Bay Area. Today, California's public colleges and universities are under great financial stress, leading to reductions in enrollment and class offerings. Federal immigration policy also inhibits the region's ability to attract and retain top global talent. And Bay Area communities are struggling to provide high-quality public services and infrastructure in a time of fiscal challenges.

These challenges must be addressed in any Bay Area economic strategy.

Summary and Recommendations

Summary of Findings

Taken as a whole, the Bay Area's economy is productive, highly innovative, and a competitive presence in the national and global economies. It also faces major challenges. Its strengths come from the quality and diversity of its labor force, its high quality of life, the large-scale presence of venture capital and other investors, and the abundance of both private and public research that takes place here. The challenges come from the high costs of living and doing business in the region, from underinvestment in infrastructure, from an underperforming K-12 system, and from financial threats to many of the institutions of higher education that have for many years served as a foundation for the region's competitiveness and leadership.

The Bay Area's strengths are reflected in growth in household incomes and in growth in GDP per capita. The region's economy has increasingly specialized in sectors that generate significant value-added per employee, particularly Professional, Scientific, and Technical Services, and Information. The high concentration of venture capital in the region supports new companies and ideas, and accounts for a large share of national and global venture investment. This not only supports new company formation locally, but also helps attract innovative young companies from elsewhere in the country and around the world to locate here.

This success, however, masks underlying issues that make the region less competitive than it could be. Despite the fall in home prices since the Great Recession, housing in the Bay Area is still extremely expensive compared to most of the country, and constraints on new construction contribute to unnaturally high prices. These prices serve to raise the cost of living, contribute to congestion (where affordable housing is remote from job and transportation centers), erode the quality of life for middle and lower income workers, and ultimately impact the ability of those individuals to live and work here.

The high cost of doing business in the Bay Area is another source of weakness. This is evidenced in a slower rate of new business formation in the region than elsewhere in the state, and is confirmed by the survey of business community members conducted for this study. That survey and other interviews with leaders of the region's economic development community show significant concern by businesses about inconsistency and inefficiency of the

region's regulatory processes, which can unnecessarily add to cost and can ultimately reduce competitiveness.

While focusing on the region's competitive assets offers the best high-level strategy for future growth, increasing income inequality, education and skills gaps, and continued high unemployment suggest that regional strategies should incorporate a focus on how to better include low and moderate income communities in the region's general prosperity. The connections between land use, transportation, housing, and environmental goals impact all Bay Area businesses and residents and their quality of life, and they point to regional plans and initiatives such as the Sustainable Communities Strategy as important catalysts for long-term development patterns. How these plans are developed and implemented also has important implications for jobs and business growth.

One important conclusion of the study is that despite the distinct characteristics of its various sub-regions, the Bay Area functions as a single economy. Not only are areas of business concentration increasingly similar across the region, but commute patterns show that whether the business is in Silicon Valley or the East Bay, the potential labor pool extends throughout the region. Given the Bay Area's inter-connectedness, it is important that economic development policies and strategies be more focused and coordinated than they are at present.

From a jobs and competitiveness standpoint, the challenge for Bay Area leaders is how to make the region a highly desirable place to locate and build a business. This can turn on many factors, the most important being the following:

1. Does the region offer good access to markets – either local or global?
2. Can companies access the necessary factors of production, particularly labor?
3. Is the cost of doing business competitive with other locations?
4. Are there unique sector strengths or characteristics that serve to concentrate activity, potentially mitigating high operating costs?
5. Does the founder/decision-maker want to live in the region?

For the Bay Area, the first, fourth and fifth factors are competitive strengths. The regional market is large, with diverse industries, 7 million residents and high per capita income. Access to national and global markets, particularly fast-growing markets in Asia, is facilitated by world-class port and airport infrastructure, and by deep demographic ties. The region's reputation as a global innovation hub, its many research institutions and centers of higher

education, the access it provides to venture capital and angel investment, and its unique concentration of technology-led industries make it a magnet for entrepreneurs and leading-edge companies, not just nationally but from around the world.

As this study shows, the region's high quality of life also attracts talented workers and company founders and helps retain them. The attraction of company founders to the area through a high quality of life was revealed in the surveys carried out for this study. It is also a common finding from similar efforts. Companies tend to locate in places that are desirable to founders, entrepreneurs, and CEOs. To that end, the emphasis of local policymakers on sustainability (through the Sustainable Community Strategy efforts) and climate change (through adaptation strategies), may contribute to business attraction and retention through their effects on quality of life. In fact, leadership on sustainability and climate change, including the supportive environment this creates for emerging cleantech industries, could prove to be a source of significant competitive advantage for the Bay Area going forward.

The second factor, access to a trained and talented workforce, is a more mixed story. The region ranks in the top 5 regions nationally in the level of educational attainment of its workforce. This is critical, as employers consider workforce quality and availability as a prime factor when considering where to locate or expand. Like research capacity and investment capital, the high quality of the region's workforce makes it an attractive place to pursue high value-added activities in cutting-edge industries. On the other hand, with high demand for the most skilled workers, companies report increasing difficulty in finding the employees they need. Overall unemployment remains stubbornly high, and workers with little education or dated skills are finding it hard to find work. Regional employment levels are currently no higher than they were in 1997, some 15 years ago.

To the extent that a labor shortage exists, it may also be influenced by housing availability and the high prices prevailing in most of the Bay Area compared to other metropolitan centers. High housing costs may inhibit all but the most skilled and educated workers from moving here, and make it difficult for workers who are not highly compensated to remain here. This, in turn, makes it difficult for industries and companies that are not highly productive or in the highest value-added product or service categories to survive in the region. From this perspective, an expanded housing supply would support industry and workforce growth, particularly in production and in middle-skill, middle-wage jobs.

The third factor, the costs of doing business, is exacerbated by housing costs but can also be traced to other drivers. Regulatory costs and inefficiency and the time required to secure necessary permits and approvals are

often cited by businesses as factors that add to costs and uncertainty, placing the Bay Area at a competitive disadvantage. While this may not heavily influence the most creative, highly productive companies, it almost certainly does affect manufacturing and companies that pay middle-tier wages or hire workers with lower skill and educational levels. This is a concern, since in recent years the region has seen a growing disparity in income levels, with relatively more residents who are highly educated and highly paid, more residents—primarily in service industries—who have fewer skills and who have not seen comparable wage or employment growth, and a decline in jobs and wages in the middle of the spectrum. The resulting imbalance has long-term consequences for economic competitiveness, public services and societal stability.

Broadly speaking, this study finds that regional economic strategy will benefit from a focus on the industries that are most competitive, and that enabling their success is the most effective way to benefit Bay Area residents in the service industries that depend on them. It finds that maintaining a high quality of life in the region—including an attractive, healthy environment—is an intangible but important factor in the region's economic success that merits attention through means such as sustainable growth strategies, the protection of open space, and more widely accessible quality education. It finds that measures that help reduce the high costs of living and of doing business in the region—through the increased availability of housing and improved regulatory efficiency—will also support economic growth and job creation. With this as background, this study offers the following recommendations.

Recommended Areas for Attention

Businesses interviewed for this study shared a common concern about the lack of efficiency, consistency and transparency in the region's regulatory climate. While there is recognition of the necessity for regulation, there is widespread feeling that there are too many regulations and that the multiplicity of regulations from different agencies and jurisdictions has led to the unnecessary expenditure of time and resources. This makes companies less competitive relative to companies in jurisdictions with fewer or better-managed regulatory requirements. This problem, as expressed by the companies we spoke to, has several elements: an excessive number of regulatory requirements; too many governmental layers imposing regulations with similar objectives but no coordination; and a lack of streamlined processes that could enable businesses to respond more efficiently. On the whole, the business community supports intelligent regulation and recognizes its role in ensuring a strong region and a healthy environment, but it would like to see a more balanced and efficient process in which economic considerations are given greater attention earlier in the regulatory process.

This concern extends to regulations at the local, regional and state levels, suggesting that in addition to regulatory processes within the region, State of California regulations need attention by regional leaders. While concerns were expressed on a range of specific regulations and issues, for the most part, businesses focused on the lack of transparency and efficiency of the regulatory process itself, both of which translate into higher costs and ultimately reduced hiring and competitiveness.

These responses and other Bay Area Council Economic Institute research point to at least six areas where public-private action can improve the region's governance and create a more positive environment for economic growth and job creation.

Identify a Public-Private Focal Point for Regional Economic Strategy

At present, the Bay Area lacks a clear mechanism for considering and implementing economic paths and strategies, either through agency plans or through mechanisms that are beyond the scope of those plans. While each regional agency has clear roles and responsibilities, none is tasked with looking at the regional economy or focusing on its health and competiveness. This lack of authority and capacity hinders the Bay Area's ability to focus on economic priorities, develop strategies, and implement them. Between the public and private sectors, this capacity exists in limited form at the county level but not at the regional level. The lack of a vehicle to consider regulatory harmonization and streamlining is one example.

The issue also touches on the Bay Area's ability as a region to engage with national and global partners (in contrast with other national and global city-regions that plan and represent themselves effectively). Regional leaders should therefore consider how to create a focal point for regional economic strategy, linking regional agencies—individually or through the Joint Policy Committee (JPC)—with the business and economic development communities, to identify regional priorities and develop public-private approaches with the potential to positively affect the economy and future job creation. Such a focal point should ideally be a public-private partnership and could take any number of forms: for example, an empowered JPC acting with private sector partners through a formally-established business advisory committee, or the establishment of a structured relationship between the JPC with an existing non-profit organization or set of organizations to provide designated consultative or facilitation services focused on economic development and strategy.

Option 1: Create a Business Advisory Committee to the JPC

There is a strong perception in the business community that regional plans are often developed with minimal concern for their impacts on businesses and the economy, and that when economic concerns are included, they are

usually an after-thought. As one option for addressing this gap, the JPC should consider establishing an advisory committee of leaders in the business and economic development communities to advise and assist in the development of regional plans such as the Sustainable Communities Strategy. Committee members should be consulted at an early stage as plans are being developed, as well as during their drafting. The inclusion of economic perspectives early rather than late in the process would serve to minimize conflicts in later stages of the planning process and ensure that plans are designed with consideration for their jobs and economic impact.

Option 2: Partner with an External Organization or Group of Organizations in a Public-Private Partnership to Address Regional Economic Issues and Priorities

Regional agencies, through the JPC, could partner with an existing non-profit organization or group of organizations to create a public-private forum on regional economic issues and priorities, linked to regional agencies and the private sector. Such a forum would operate outside of, but in collaboration with, the JPC.

Engage Business Earlier in Individual Agency Plans

If the JPC is empowered to review and consider agency plans and regional plans, such as the Sustainable Communities Strategy (SCS), and serves as an effective vehicle for coordination and integration, a business advisory committee to the JPC may be an effective vehicle for engaging business community views. In this scenario, JPC would engage its member agencies both at the inception and in the final stages of new plan development, providing opportunities for business input at key junctures. A public-private partnership external to the JPC could play a similar role but with less focus on agency plans and more focus on overarching economic priorities. Each agency should also individually consider how to engage business earlier and more substantially in its planning processes, to ensure that economic considerations are integrated as early as possible.

Harmonize Local Regulations at the Regional Level

To the extent possible, regulations within the region should be more streamlined and transparent. While individual jurisdictions have clear regulatory interests, in permitting for example, the lack of consistency across the region reduces transparency and raises costs. Within jurisdictions, one-stop service centers (such as those in Sunnyvale) should be considered. Government leaders should also look for opportunities to harmonize regulations between jurisdictions across the region.

Solar installation offers one example of how the current system could be improved. In cleantech, competitive pricing with conventional (fossil) energy

sources is a challenge. An inordinate amount of the cost of installing renewable energy systems such as solar is related to permitting and regulatory costs, due in part to duplication from jurisdiction to jurisdiction. Inconsistent codes and processes also inhibit the ability of the industry to deploy technologies at scale. According to a 2011 report by AECOM, local government permitting accounts for 5% to 20% of the total installation cost of a residential solar project in California at approximately $2,500 per installation. The report estimates that if local jurisdictions were to put in place a streamlined and uniform permitting system, total permitting costs could fall significantly.

Other examples of permit requirements that are common to many jurisdictions and may be candidates for regional streamlining include historic preservation, inclusionary zoning, school fees, project labor agreements, and local applications of the California Environmental Quality Act (CEQA).

Focus Economic Development Strategies in Sectors Where the Region is Most Competitive

The region is highly competitive and has significantly higher levels of concentration than the nation and the state, in several key sectors: computer systems design and equipment, semiconductors and other electronic equipment, magnetic and optical media, software, space research and technology, communications equipment, industrial machinery, scientific research, pharmaceuticals and medicine, information services, and beverages. As the analysis in this report shows, competitiveness in these industries supports jobs throughout the region and at all levels of the economy. Economic strategies that focus on these sectors are likely to have the greatest impact.

This focus should not only be on specific industries, but should also be on areas where the region has particular strengths that support these industries and the growth of the regional economy more broadly. These strengths include the high quality of the labor force, an entrepreneurial culture, and the high amenities available in the region. Focal points for policy support include measures that encourage new business formation and increase survival rates and the likelihood of success for newly-formed businesses, policies to invest in the workforce, and policies that increase the regulatory efficiency and lower the cost of doing business in the region.

Focusing on strengths does not mean ignoring all areas of weakness. The region clearly has significant weaknesses—in particular, housing. Maximizing the potential of the region's strengths naturally means paying attention to weaknesses that make it more difficult to attract future growth in areas of strength. Examples of these areas of weakness include high housing costs (construction), infrastructure, K–12 education, and customer service in government interactions. Paying attention to the fundamental building blocks of a prosperous economy is every bit as important to success as is attention to the specific needs of the economy's strongest industries or features.

Focus Economic Development Strategy More on Supporting the Survival and Growth of Young Companies than on Attracting Businesses from Other Jurisdictions

Most new jobs are created by local entrepreneurs who start and grow companies, more than by companies who move from other locations. Creating a positive climate for local entrepreneurial activity and helping to support the survival and growth of young companies is the most effective focus for economic development strategy.

Develop a Stronger Regional Focus on Workforce Training and Development

One of the Bay Area's strengths is its diverse and competitive workforce. The ability of individuals to compete in that workforce and thereby contribute to the economy is directly linked to their skills and levels of education. Less educated residents or those with outdated skills are therefore at a disadvantage. This is a distinct issue in low- and moderate-income communities, although it applies to workers across the board. Manufacturing is particularly impacted, since it is often difficult for companies to find workers with the necessary experience and skills—one factor that tends to push manufacturing out of the Bay Area.

Community colleges are an important resource for workforce training and skills development, including the retraining of existing workers. Many Bay Area community colleges have developed innovative training programs, in partnership with companies in their districts, to equip workers with the specific skills required by local industries. Recently, the California Community College system has begun working at the regional level to integrate training programs by industry sector, so that businesses seeking workers can share their needs and develop training partnerships at scale, without having to deal with multiple institutions. This presents a significant opportunity for local governments to engage with businesses in their jurisdictions and with community colleges both in their districts and in the region to develop flexible, industry-driven workforce programs.

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The Bay Area Council Economic Institute is a partnership of business with labor, government, higher education and philanthropy, that works to support the economic vitality and competitiveness of the Bay Area and California. The Association of Bay Area Governments is a founder and key institutional partner. The Economic Institute also supports and manages the Bay Area Science and Innovation Consortium (BASIC), a partnership of Northern California's leading scientific research laboratories and thinkers. Through its economic and policy research and its many partnerships, the Economic Institute addresses major issues impacting the competitiveness, economic development and quality of life of the region and the state, including infrastructure, globalization, science and technology, and governance. A public-private Board of Trustees oversees the development of its products and initiatives.

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