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Tech Stocks and House Prices in California

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The San Francisco Bay Area is notable for its concentration of high-tech firms. The Bay Area also has experienced a sharp appreciation in house prices in recent years. Part of the explanation for the soaring house prices may lie in the so-called “wealth effect.” The combination of a large number of high-tech firms and the pervasiveness of employees with stock options raises the potential for a link between the changes in stock prices of high-tech firms in the area and spending in the region. Economic theory would suggest that households experiencing unexpected changes to wealth adjust their consumption of durable goods such as housing. If the supply of housing is constrained in the short run—and supply constraints are notoriously tight in the Bay Area—then changes in wealth affecting the demand for housing are likely to be reflected in house prices.

This *Letter* examines the relationship between changes in stock prices of high-tech firms headquartered in the San Francisco Bay Area and changes in housing prices in that region. The experience in the Bay Area is compared to that of two other major metropolitan areas of California, Los Angeles and San Diego.

The high-tech sector in California

The high-tech sector is of central importance to the California economy. According to the American Electronics Association (2000), based on 1998 data, California had more than twice the number of high-tech jobs than did the second largest state, Texas. High-tech workers accounted for an estimated 7% of the total private sector workforce in California in 1998. Within the state, the San Francisco Bay Area stands out among the other “cyber-regions” (American Electronics Association 1998). The largest concentration in the Bay Area is in Santa Clara County, where approximately 28% of nonfarm payroll jobs is in the high-tech sector. Overall for the Bay Area, the high-tech share of total employment is

estimated to be approximately 11%. By comparison, the estimate for the Los Angeles area is a share of about 4-1/4%, while for San Diego the share is closer to 6-1/4%.

Rather than gauge the presence of the high-tech sector based on employment, the strategy in this *Letter* is to identify high-tech firms in a particular region, so as to track the stock market value of these firms. In the analysis, high-tech firms include those with primary SIC codes that place them in pharmaceuticals, computer and office equipment, communications, electronic components, instruments, or computer and data processing services. Also included are companies with “.com” or “E-” in their names. While not all of these firms are purveyors of technology products (for example, E*Trade), they are associated with the information economy. Moreover, their alleged compensation practices imply that their employees' wealth is affected substantially by the firms' stock prices. The firms were selected from the Compustat database and include only publicly traded firms.

Consistent with the employment figures cited above, the firm-level database indicates that the Bay Area dominates the other two large metropolitan areas in the state in terms of the number of publicly traded high-tech firms headquartered there. [Figure 1](#) displays the distribution of high-tech firms and shows that, in June 2000, the Bay Area had 455 publicly traded firms versus 163 for Los Angeles and 77 for San Diego. The difference between the Bay Area and Los Angeles is especially notable, given that the Los Angeles area economy is about twice the size of the Bay Area economy.

The differences among the three regions are even more dramatic when measured on the basis of market valuation. [Figure 2](#) shows that market capitalization of the high-tech firms in the Bay Area is about ten times larger than that of high-tech firms in either Los Angeles or San Diego. The figure also reveals that high-tech firms in each of the three regions have performed extremely well over the past five years. Over that period, the total market capitalization of the high-tech sectors grew by 470% in the Bay Area, 320% in Los Angeles, and 400% in San Diego. At the end of June 2000, the total market capitalization of the publicly traded Bay Area high-tech firms was a staggering \$2.6 trillion.

California real estate markets

Real estate markets in California also boomed during the late 1990s. [Figure 3](#) shows the median house prices for the Bay Area, Los Angeles, and San Diego. The median house price in the Bay Area currently stands at \$466,630—up 23% from the year before and up 56% since January 1998. Much of the increase in the Bay Area median price comes from appreciation in Silicon Valley. The median house price in Santa Clara County is \$554,550—which is 35% higher than the year before and 70% higher than in January 1998.

The Los Angeles median house price peaked at \$212,010 in April of this year. As of June, it stood at \$197,640—down 4% from the year before, but 15% higher than the median price in January 1998. These median prices mask a great deal of heterogeneity across different submarkets in Los Angeles; some markets, such as Beverly Hills and Malibu, have enjoyed very strong price appreciation in the past few years. In San Diego, the median house price is currently \$271,420—up 15% from the year before and up 42% since January 1998.

The stock market's influence on the housing market

The similarities between the patterns of stock market wealth in [Figure 2](#) and house prices in [Figure 3](#) lead one to suspect that there could be a causal relationship between the two series. It is possible to compute the number of workers in high-tech companies located in the cities of interest and estimate their potential capital gains over the past three years (see Matthey 2000 for such a computation for IPOs). Such an exercise depends heavily on assumptions about employee ownership shares of their firms, the distribution of options across a firm's employees, and, most importantly, whether workers employed by high-tech firms actually live in the regions where their firms are headquartered. This last requirement causes particular concern as the large, multinational high-tech firms in the sample display

considerable variation in the percentages of their employees assigned to corporate headquarters. In this *Letter*, we simply ask whether local stock price changes lead to changes in local real estate prices (Green 1999 asks a similar question, although with different stock market data and a different sample period). Using this approach does not require having direct estimates of the shares of high-tech workers assigned to corporate headquarters, though if the shares are in fact low, a systematic relationship may not be detected.

The analysis points to a high-tech wealth effect in the Bay Area. Changes in stock prices improve the forecasts of changes in the San Francisco house prices, while the reverse is not true. That is, stock price changes lead house price changes. These results are obtained by estimating a system of equations (formally, a vector autoregression) relating changes in house prices, stock market prices, and employment growth to past changes in these variables. The data are quarterly for the period January 1992 through June 2000. The number of lags is four. The employment growth variable is included to control for other sources of housing demand besides the wealth variable.

To assess the magnitude of the wealth effect, a 10% increase in the market valuation of local high-tech firms leads to about a 1% to 2% increase in house prices over two years. To assess the relative importance of the wealth effect, errors in predicting changes in the market valuation of high-tech firms account for about 30% of the forecast error in Bay Area house prices two years ahead. Interestingly, local high-tech stock price changes improve the forecasts of house price changes even when lagged returns on the S&P 500 index are included in the regression. This suggests that there may be a distinct wealth effect channel from the local high-tech sector affecting house prices in the Bay Area.

From Figures 2 and 3, it is clear that the most dramatic changes both in market value of high-tech firms and Bay Area house prices have occurred over the past few years. The strength of the statistical evidence of a link between the series also depends heavily on including the data for the period since 1997 in the sample. This does not necessarily negate the results, but it does suggest that signs of wealth effects from the high-tech sector on a local housing market may not be easy to detect in the absence of a relatively large high-tech sector and definitive changes in market values.

Comovement between high-tech stock prices and house prices is not evident in the Los Angeles and San Diego data. This, of course, does not mean that wealth effects are absent in these markets. It is more likely that, since the high-tech firms headquartered in those areas make up a smaller share of local economic activity, the evidence of wealth effects is swamped by variation due to other factors. Indeed, there is evidence that broader stock market variables, such as the return on the S&P 500, have greater implications for house prices than the local high-tech returns in the two regions.

Conclusion

Statistical analysis indicates significant comovement between house prices and stock prices of high-tech firms headquartered in the Bay Area, a relation that does not appear to hold for the Los Angeles and San Diego areas. The analysis, then, supports the commonly held view that Bay Area house prices have been driven in part by a wealth effect stemming from the stock price appreciation of high-tech firms in the region. Given this link, since stock market volatility in the spring of 2000 was a minor hiccup relative to the huge stock market gains that Bay Area companies have enjoyed over the past three years, wealth effects from high-tech stocks will likely remain a strong factor in the demand for housing in the region in coming quarters.

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