

High-Tech Quake May Shake More Than Silicon Valley

Analysts Believe Temblor Could Spell Financial Trouble for Troubled U.S. Economy

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There is a major earthquake lurking in Silicon Valley's future, and when it hits, the aftershocks will be felt far beyond California.

The San Andreas Fault, which runs along the western edge of the Silicon Valley, is overdue for another major temblor. It's been quiet since the earthquake and fire that all but leveled San Francisco on April 18, 1906.

But the San Andreas is not Silicon Valley's only, or even most dangerous, earthquake hazard. The greater risk is the Hayward, which generated a magnitude 6.7 quake in 1868 directly beneath what is now the eastern edge of Silicon Valley. Back then, it leveled a few sparsely populated towns and startled the cattle.

But if the same quake happened today, the consequent destruction would dwarf the economic havoc wreaked by Hurricane Katrina.

In late 2007, the Bureau of Labor statistics estimated that a repeat of the 1868 quake would affect more than \$9 billion in quarterly wages and nearly three quarters of a million jobs in the San Francisco Bay area, compared to Katrina's effect on \$3 billion quarterly wages and just over 300,000 jobs.

In fact, these shocking numbers are merely conservative estimates. [Risk Management Solutions](#), a hazard modeling consultancy based near the Hayward Fault in Newark, Calif., estimates that economic losses from an 1868 repeat would likely exceed \$165 billion.

But even this is a "minimum number," according to Tom Brocher of the [U.S. Geological Survey Earthquake Hazards Program](#) and member of the [1868 Hayward Earthquake Alliance](#). Add in loss from fire, infrastructure damage and related business disruption, and the total could top \$1.5 trillion, more than what has been spent on the Iraq War to date.



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The Bay Area is aggressively mitigating its seismic risk by repairing bridges and reinforcing freeways and buildings, but there is a limit to what can be done. Most of the Bay Area's growth has occurred in a 100-year seismically quiet period following the 1906 quake, and planners have consistently underestimated the severity of the earthquake risk.

All of the Bay Area's airports and ports, and many of its highways and countless homes and businesses, are built on soft soils susceptible to shaking and subsidence, or downward shifting of structures. The Bay Area's primary water system, the Hetch-Hetchy Aqueduct, crosses several faults, including the Hayward, and terminates at a reservoir built directly atop the San Andreas Fault just south of San Francisco. In the East Bay, the Hayward Fault runs directly under fire stations, hospitals and schools, including the 30,000 student UC Berkeley campus, whose [stadium](#) is slowly being torn in two by the fault's inexorable creep.

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A repeat of the 1906 or 1868 quakes will likely close most of the Bay Area's airports for days, possibly weeks. One or more of the Bay's seven major bridges will be shut down, roads and highways will be closed, water supplies disrupted, and of course thousands of homes and businesses will be damaged beyond habitability. California has the toughest seismic building codes in the country, but the codes are designed to save lives not structures. Like Katrina, the region will face a severe shortage of housing and business space that will be difficult to quickly replace.

The consequent disruption to Silicon Valley's business ecology could be severe. The Valley is the largest high-tech cluster on the planet, the headquarters for giants like Apple, Google and Intel, and a hotbed of startups, with just under 30 percent of all U.S. venture capital dollars invested here.

The Silicon Valley is also the largest R&D center in the U.S., home to several major university research campuses, a national lab and countless corporate research enterprises engaged in everything from semiconductors to biotech, materials science and clean tech. The largest companies have extensive continuity plans that contemplate moving business operations to sites outside the Bay Area, but R&D operations and start-ups are not so portable.

The shaking will damage delicate equipment, trigger the loss of inadequately backed-up data and disrupt the personal lives of critical researchers and executives. It could be months or longer before business life returns to anything remotely resembling pre-quake conditions.

It is sobering to consider the consequences of a quake-induced high-tech disruption on the U.S. economy. The technology sector is deeply networked and highly interdependent. This is a plus when it comes to temporarily relocating business operations, but networks also spread unwelcome problems in unpredictable ways. Just as the recent mortgage crisis has spawned a crop of unintended consequences from the Bear Sterns collapse to retail chain store closings, the effects of a high-tech quake could reverberate around the world.

Such an outcome has an unsettling precedent in the 1906 San Francisco earthquake, which caused direct damages of \$500 million in 1906 dollars, or just over

1.5 percent of the 1906 U.S. GDP.

This doesn't sound like much, but in a bit of brilliant economic sleuthing, Marc Weidenmier of Claremont McKenna College and his colleague Kerry Odell of Scripps College discovered that the financial reverberations bounced across the Atlantic to England and then back to the United States, precipitating the financial panic of 1907.

It turns out that at least half of the property insurance in San Francisco had been underwritten by British fire insurance companies, who were forced to liquidate assets in order to pay the 1906 claims. This caused stock values to drop precipitously and also threatened the gold-based British economy as gold flowed out to cover the U.S. payments.

The Bank of England responded by raising interest rates and tightening lending to the United States, which in turn pushed our country into a recession, leading to the Panic of 1907 and ultimately to a worldwide economic downturn.

Gold-based economies are a distant memory, but there are plenty of other ways quake-triggered financial shocks could propagate today. The Federal Reserve would never repeat the Bank of England credit-tightening blunder, but Weidenmier notes that the wild card is exchange rates. If the quake occurred in a moment like the present, when the dollar already was weak, then any attempt to stimulate recovery through additional liquidity could also cause further dollar depreciation. This in turn could shake global investor confidence in the dollar once and for all, triggering a long-feared shift from the dollar to the euro as the world's de facto reserve currency.

Such an outcome would change the U.S. financial landscape forever. Let us hope that the high-tech quake does not arrive anytime soon, but when it does let us also hope that Silicon Valley's legendary entrepreneurs will find a way to beat the odds and quickly overcome the adversity it throws their way.

Our economy, and that of the world, may depend on it.

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