DWS

Marketing Material*

November 2019 / Research Report

Technology Impact on U.S. Office Market

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Table of Contents

1 / Key Points ………………………………………………………………. 3

2 / The Risk of another Tech-Driven Recession Akin To 2001 …………… 4

3 / The Tech Exposure and Implications in Major U.S. Office Metros…….. 7

4 / The "Tech-Friendly" Office Environment ……………………………....... 10

Important Information ……………………………………………………….. 103

Research & Strategy—Alternatives ………………………………………….. 167

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1 / Key Points

- The technology sector has become a vital force for demand across the U.S. office markets. The current flow of capital fueling tech startups as well as larger public and private companies, lower corporate taxes, and a continued push to integrate technology into various business models should continue to boost the industry. Moreover, while equity valuations are high, tech companies today are in stronger financial health and have more seasoned business models than during the dotcom bubble.
- Traditional tech centers have been the primary beneficiaries of the current economic expansion. These are markets historically known for their high concentration of tech-educated workers and a large allocation of venture capital. San Francisco, San Jose, Seattle and Boston captured the lion's share of office demand and produced some of the strongest total returns in the nation.
- Even though broad market conditions are expected to remain healthy, growth in the traditional tech-oriented markets could moderate due to the low unemployment rate and the competitive hiring environment for tech talent. Emerging tech markets with favorable demographics and business-friendly environments are likely to capture spillover tech demand from the traditional tech markets.
- Faced with challenges in talent acquisition and retention, companies, in particular in the technology sector, focus on providing cutting-edge office environments with exceptional amenities. These flexible office environments foster employee connectivity and collaboration and focus on creating a curated workplace experience that includes à la carte settings with a menu of services, locations and support.

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2 / The Risk of another Tech-Driven Recession Akin To 2001

The tech sector has been a major driver of economic performance in the United States over the past few decades. Technology has become part of daily life and an integral tool for businesses large and small. According to the Financial Times, only two tech companies were included among the 10 largest companies in the world in 2000. In 2019, seven of the top 10 companies were tech firms. These large companies are not only driving an unprecedented era of advanced technology but also the direction of the stock market. The NASDAQ, a tech-heavy stock price index, has increased at a rapid rate since the dotcom bust, topping 8,000 in October 2019, more than 60% above the record high of 5,048 in March 2000[1].

Technology firms have also been a top driver of office demand. Their share of leasing activity nationwide increased to 20% in Q1 2019 – the largest of any industry – from 11% in 2011[2]. Many tech markets such as the Bay Area have seen significant demand for office space, pushing down vacancy rates to their lowest levels in years. The key question for investors is whether the recent momentum is sustainable.

The dotcom bubble took hold in the late 1990s as access to the internet expanded and computing took on an increasingly important role in people’s daily lives. Online retailing was one of the biggest drivers of this growth, attracting big investors and gaining a place in American consumer culture. The NASDAQ increased from around 1,000 points in 1995 to more than 5,000 in 2000. Companies went to market with Initial Public Offerings (IPOs) that fetched huge prices, with stocks sometimes doubling on the first day of trading. It was a seeming wonderland where anyone with an idea could make money.

In early 2000 everything started to change. On March 10, the NASDAQ’s market capitalization was $6.7 trillion; on March 30 it was $6.0 trillion and on April 6 it was $5.8 trillion. In less than a month, nearly a trillion dollars of wealth had evaporated. Many companies were losing between $10 and $30 million a quarter — a rate that was clearly unsustainable[3]. Companies started folding. Magazines ran stories advising investors on how to limit their exposure to the tech sector. During the 2000 Super Bowl, 17 dotcom companies paid $44 million for ad spots, according to a Bloomberg article from the following year. At the 2001 Super Bowl, just one year after the tech crash, only three dotcom companies ran ads during the game[4].

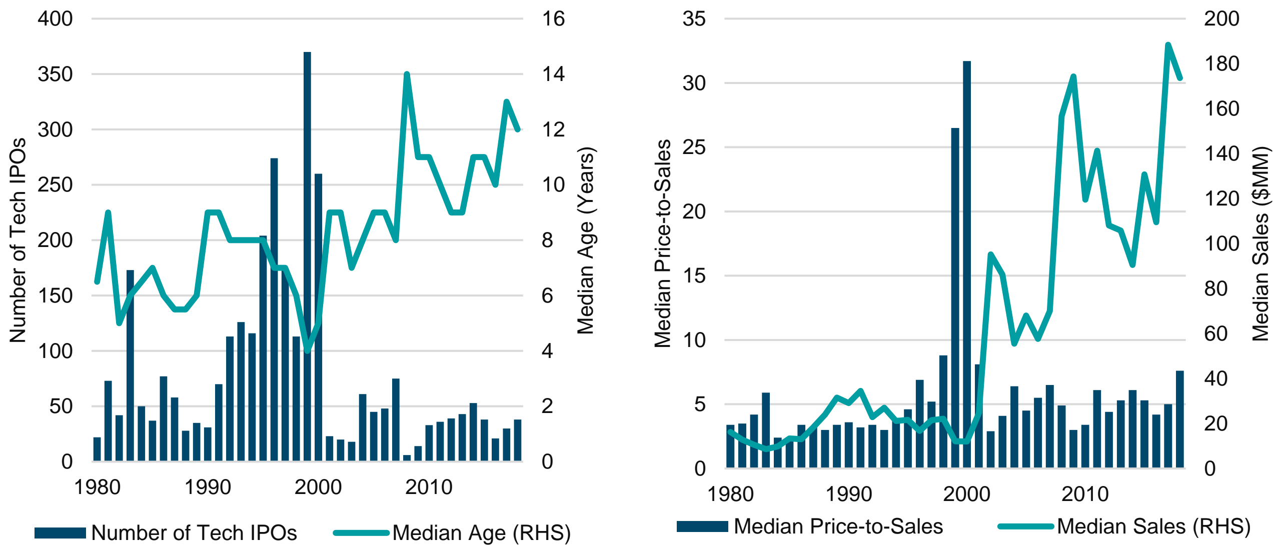
The shadow of the 2000 dotcom bust looms especially large today, as the economy is in another era of tech-led growth. A large chinese e-tailer had a history-making IPO in the fall of 2015, and 2019 could also be a big year for technology listings. A few large tech firms already gone public, and others may join them soon. While analysts expect a drop in the number of IPOs, the tech companies that are expected to go public include some of the world's biggest by market value. The value of “Unicorns,” start-ups held privately and worth more than $1 billion — so-called because, for a long time, people thought they couldn’t really exist – reached $1.15 trillion in 2019 with 53% of value concentrated in the United States[5].

Should investors worry, or is it different this time? While valuations are high, tech companies today are in stronger financial health and have more seasoned business models than in 2000. They are generally waiting longer before filing an IPO, in part because they have tapped into an abundance of private capital. The median age of an IPO tech company was 12 years in 2018, compared with four in 1999. About 80% of start-ups are bought by bigger companies or other investors, compared to about half 20 years ago[6]. More than 600 companies staged initial public offerings in 1999 and 2000, just prior to the dotcom bust, and only 14% of them were profitable[7]. While the share of money-losing tech start-ups filling IPOs was nearly the same in 2018 (88% of all tech IPOs), there were only 38 of them (see Chart 1).

[1] Nasdaq. August 2019.
[2] Cushman & Wakefield. August 2019.
[3] Bloomberg. August 2019.
[4] Times. August 2019.
[5] CB Insights Global. Global Unicorn Club: Private Companies Valued at $1B+. May 2019.
[6] Jay R. Ritter University of Florida. December 2018.
[7] Jay R. Ritter University of Florida. December 2018.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

CHART 1: NUMBER OF TECH IPOS IN THE U.S., MEDIAN AGE, MEDIAN SALES AND MEDIAN PRICE-TO-SALES

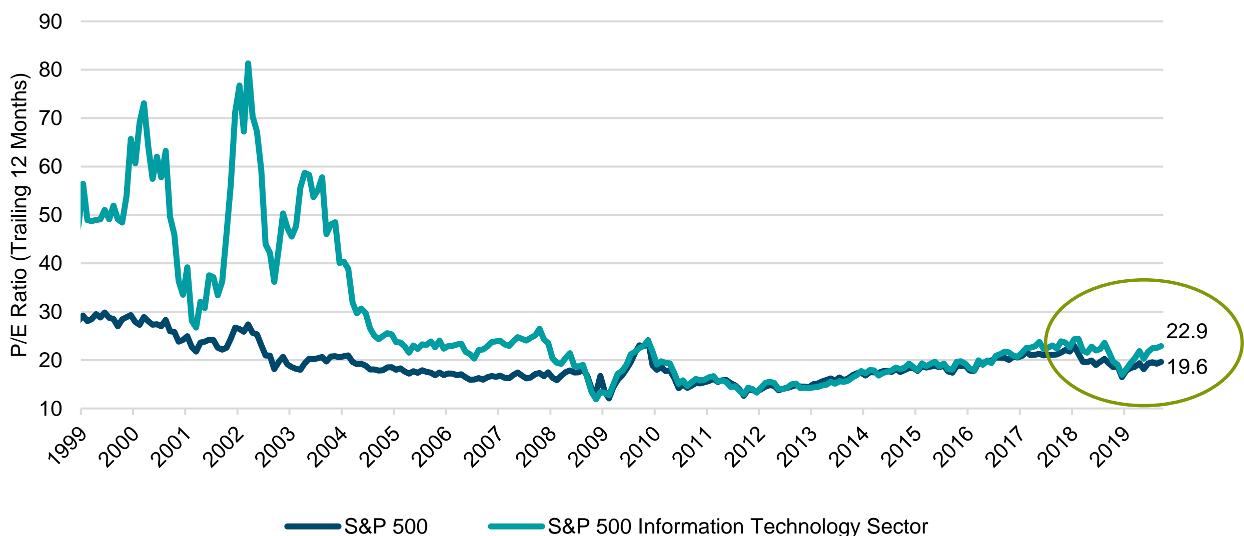


Sources: Jay R. Ritter University of Florida, DWS. December 2018. (Most recent data available) May not be indicative of future results.

Although the technology industry appears healthier than during the dotcom bubble, there are risks to consider:

- **High valuations.** Current valuations are nowhere near their 2000 peaks, but they are fluctuating near cyclical highs. The price-to-earnings on the S&P 500 Information Technology Sector index remained elevated over the past few years, outpacing the S&P 500 broader index and reaching a near cyclical high of 22.9 in October 2019, above the 15-year historical average of 20.8 (see Chart 2), albeit well below the high-water mark of 73.1 during the dotcom bubble[8]. Moreover, while most of the newly public companies boast positive sales trends, their profitability still lags behind as they invest in future growth.

CHART 2: PRICE-TO-EARNINGS RATIO: S&P 500 VS. S&P 500 INFORMATION TECHNOLOGY SECTOR



Sources: Bloomberg, DWS. October 2019. Past performance may not be indicative of future results.

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[8] Bloomberg. October 2019.

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- **Increased regulation.** Freedom from onerous regulations has arguably helped to foster innovation and growth. Technology is among the least regulated industries in the United States, subject to 27,000 federal laws vs. 128,000 for Finance and 215,000 for Manufacturing[9]. However, a few large tech firms have been under scrutiny recently due to data privacy breaches and antitrust issues. Regulators are likely to impose further limits on large technology companies, which could curb growth and profitability. The magnitude of any impact will depend on the degree to which business models are disrupted.

- **Forecasts of lower global growth.** The International Monetary Fund (IMF) further reduced its global growth outlook in October 2019, already the lowest since the financial crisis, and suggested that policy "missteps" on trade and Brexit could derail a projected global rebound. The world economy will expand by 3.0% in 2019 and 3.4% in 2020, according to the IMF, a downward revision of 0.3% and 0.2%, respectively, from April 2019 projections[10]. A rate of 3.3% or lower would be the weakest since 2009. The International Monetary Fund (IMF) also slashed forecasts for growth in the global volume of trade in goods and services, reducing its July 2019 estimate by 1.4 points to 1.1% in 2019[11], the weakest level since 2012. Company earnings also may decrease.

- **Secular shift in demographics.** A major demographic crisis is looming over organizations and economies throughout the world. In the U.S., talent shortages are becoming a serious issue with tech companies prioritizing recruiting and access to qualified labor when making office location decisions. As of now, unemployment in the U.S. is at its lowest rate in half a century: Nearly 60% of employers struggle to fill their vacancies within 12 weeks[12]. Global talent shortages could total more than 85 million people by 2030, costing companies trillions of dollars in lost opportunity. The U.S. is predicted to be hit the hardest by the talent deficit, which will cost the country $435.7 billion in lost revenue, or 1.5% of the economy[13]. In the 1970s, the U.S. labor force increased at a 2.6% annual rate; the latest figure stood at about 0.2%[14]. To counter the demographic drag, American companies have relied on an influx of people from outside the country. Immigrants accounted for 17.1% of the U.S. workforce in 2017, a share that has been rising for years[15]. However, immigration policies are becoming stricter in the current political environment.

[9] BofAML Global Investment Strategy. November 2018.
[10] IMF. World Economic Outlook. October 2019.
[11] IMF. World Economic Outlook. October 2019.
[12] BLS. 8Allocate. April 2019.
[13] Korn Ferry Institute. Spring 2018.
[14] U.S. Census. August 2019.
[15] U.S. Census. August 2019.

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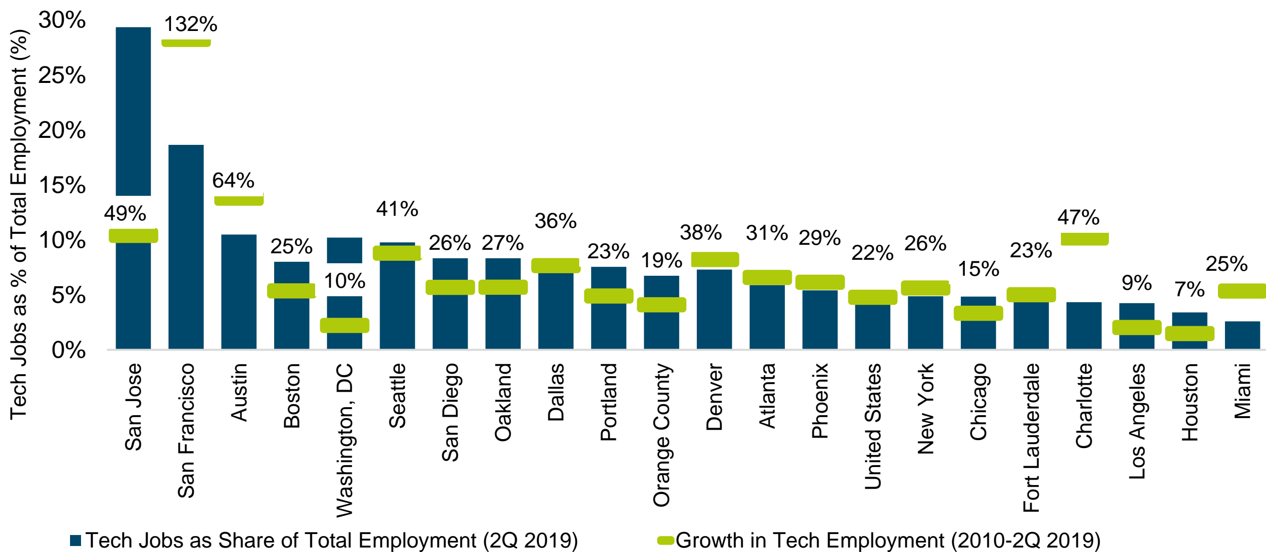
3 / Tech Exposure and Implications in Major U.S. Office Metros

The modern technology sector has evolved rapidly and includes many different activities—from streaming video, digital advertising and internet publishing to virtual reality, video gaming, cloud computing, cyber security and artificial intelligence. There is also transportation technology such as driverless cars and ride-sharing. Life sciences accounted for nearly 20% of total tech leasing in 2018, followed by data processing, hosting and related services (i.e., cloud computing) with approximately 15%[16]. Technology is part of just about every major industry. For example, fintech—the use of technology in the financial sector—is exploding. From payment processing and trading algorithms to blockchain payment systems and cyber security, fintech is among the fastest growing employment categories in many financial firms. Also, retailers are investing heavily in eCommerce technology. Growth in emerging technologies has more than offset a decline in others, such as telecommunications.

Tech Exposure

The sector added approximatively 1.3 million jobs – an increase of 22% from the first quarter of 2010 to the second quarter of 2019, compared with 16% in the wider labor market. To further understand the evolution of the technology industry across the nation, we analyse a list of 21 major U.S. metros. Per DWS House View, these are metros categorized as Investable Markets. They have an established office sector, deep talent pool, and broad employment and institutional presence.

CHART 3: TECHNOLOGY SECTOR CONCENTRATION BY MAJOR U.S. OFFICE MARKET



Source: Moody's Analytics, DWS. Data as of 2Q 2019. May not be indicative of future results.

In general, traditional tech hubs have garnered a disproportionate share of new tech jobs. Tech concentration was the highest in San Jose and San Francisco with 29% and 19%, respectively, in the second quarter of 2019. While San Jose's tech exposure has stayed virtually constant, San Francisco's has increased considerably, from 12% in 2000 to 19% in the second quarter of 2019. Since 2010, San Francisco's technology employment grew by 132%[17]. The metro's growth has been attributed to the success of established firms as well as some firms' preferences for a more urban environment compared to the nearby Silicon Valley. Home to a few large tech industry titans, Seattle has seen its tech concentration grow from 8% to 10% as other large tech players have looked to tap into the metro's relative affordability and strong talent pool.

[16] Cushman & Wakefield. August 2019.
[17] Moody's Analytics. August 2019.

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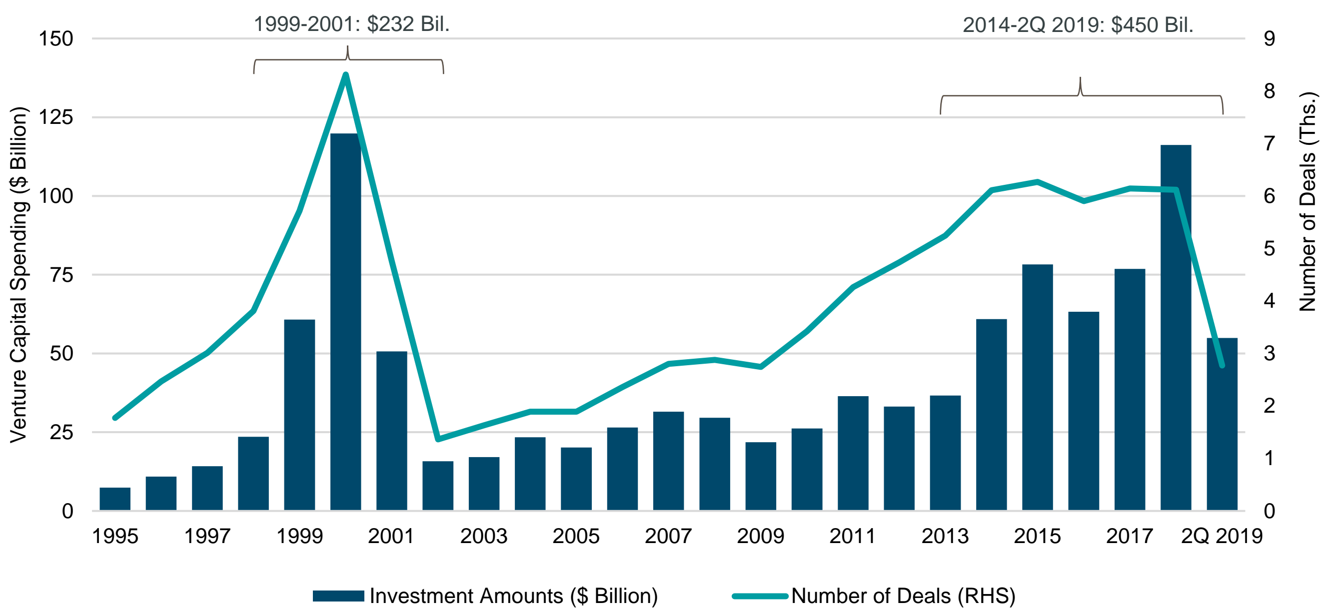
While the major tech metros are likely to remain dominant hubs, a few smaller metros have been attracting an increasing tech presence. Austin, Dallas, Seattle, and Charlotte may lead in tech job growth over the next five years. New York, despite the relatively smaller technology job share compared to its overall job market, has a large concentration of established technology firms and the metro could see a surge in tech employment as many Bay Area technology firms expand their footprint across Manhattan.

Access to talent, particularly in the younger age cohorts, is a key driver of tech-sector growth. San Francisco, Austin and Seattle have more than a third of their population within the ages of 25 and 44, compared to about a quarter for the overall U.S. Moreover, while 35% of the U.S. population over 25 years old has a bachelor's degree or higher, many of the technology cities exceed that level, including San Francisco (55%), San Jose (51%), Boston (48%), and Austin (45%).

Successful tech metros are also recipients of large amounts of venture capital funding, the driving force of the industry since the late 1990s. Technology companies in the start-up phase have used venture capital financing to expand and evolve into what is now known as big tech. By May 2019, funding for tech-related businesses soared and the number of companies with valuations of $1.0 billion or more—popularly known as Unicorns—reached a record 172[18]. Venture capital investments increased by 50% to $116 billion in 2018, the largest amount invested by venture capital funds since the all-time high of $120 billion in 2000. 2019 was off to a strong start, with $55 billion investments in the first half of the year.

CHART 4: U.S. VENTURE CAPITAL INVESTMENT



Sources: PWC Moneytree, DWS. August 2019. May not be indicative of future results.

A trend has emerged in the venture industry over the last few years of fewer, larger deals, with deal numbers shrinking even as investment levels held steady. Well established tech metros in the West Coast, New York and Boston have been the largest recipients of venture capital historically. San Francisco received almost $263 billion of venture capital since 2010, followed by New York ($72.2 billion) and Boston ($56.7 billion).

More recently, smaller metros like San Diego, Seattle, Austin, and Raleigh have gained funding as tech companies have extended their reach in search of talent and favorable business environments. The cost efficient and talent dense southern metros such as Austin and Dallas are currently prime beneficiaries from corporate relocations and expansions. Dallas has long been an attractive city for both residents and businesses, claiming no personal income or business taxes, while continually adding jobs and providing a low cost of living. Additionally, its sheer size allows it to maintain many of the lifestyle amenities important to urban dwellers. Austin, Texas, offers access to talent through the University of Texas, walkable amenities both downtown and in South Austin, and a highly favorable business environment for start-ups. Moreover, average rental rates for apartments in Austin are 115% lower than New York and 154% lower than San Francisco.

[18] CB Insights Global. Global Unicorn Club: Private Companies Valued at $1B+. May 2019.

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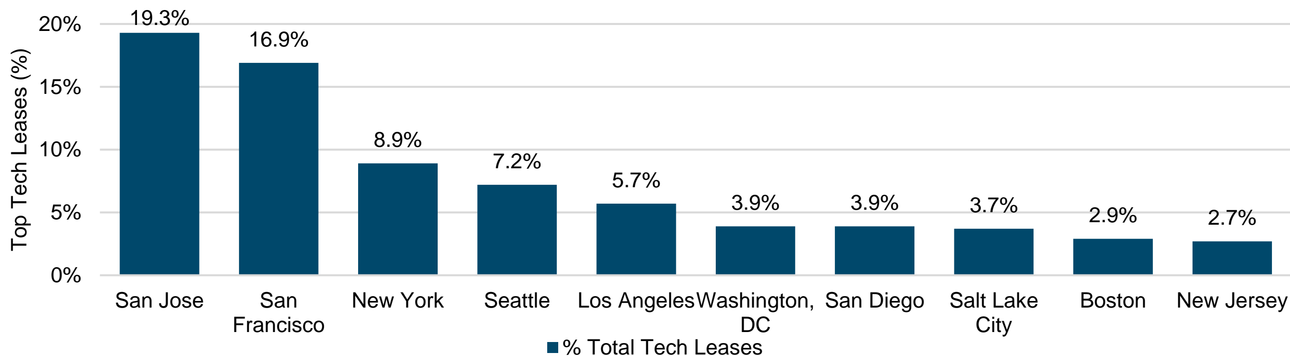
Implications for Office Markets

The technology industry's growth has extended directly to the office market: The tech sector was, by far, the largest lessor of office space in the U.S. in 2018, accounting for more than a quarter (26.7%) of the 311.9 million square feet of new leases, followed by finance (17.6%), real estate (6.2%) and retail (4.8%)[19]. Moreover, tech leases were increasingly large: An analysis of jumbo leases (400,000 SF+) by Cushman & Wakefield showed that there were 35 new jumbo leases signed in 2018 for a total of 20.9 million square feet, 18 of which were tech with a combined leased square footage of 11.4 million square feet. In comparison, there were only 18 jumbo leases totalling 9.6 million square feet in 2017. The average tech lease was almost double the average non-tech leases (71,428 square feet for tech vs. 36,225 square feet for non-tech) [20].

Although most U.S. markets have seen an increase in technology leasing, the sector remains highly concentrated in the core technology markets. The 10 markets with the largest volume of technology leasing were in San Jose, San Francisco, New York, Seattle, Los Angeles, Washington, DC, San Diego, Salt Lake City, Boston and New Jersey, accounting for 75% of all tech leases in 2018. Tech represented the lion's share of office leasing in San Jose (78.1%), San Francisco (60.1%), Boston (47.7%), and Seattle (46.8%)[21].

CHART 5: U.S. TOP 10 TECH LEASES IN 2018



Sources: Cushman & Wakefield, DWS. August 2019. May not be indicative of future results.

San Francisco and San Jose have benefited disproportionately from the recent growth in technology. At 4.5% and 7.1%, office vacancy rates in San Francisco and San Jose were among the lowest in the nation in the second quarter of 2019[22]. Since 2010, annual net absorption as a percent of stock averaged 2.2% and 5.6% in San Francisco and San Jose, respectively[23]. That boosted the metros' rent and office total return performance at levels above all DWS Investable Markets. While DWS investable markets averaged 3.0% annual rent growth since 2010, San Francisco and San Jose averaged 9.4% and 5.0%, respectively. Investors also benefited from outsized annual office total returns of almost 15% during the same period (vs. 10.1% for DWS Investable Markets)[24].

While there may still be room for further office rent growth in the Bay Area, it may taper amid low unemployment and high living costs. Rather, we believe office momentum will shift to other burgeoning tech markets, including more established tech markets like Austin and Seattle, and emerging tech markets such as Dallas, Charlotte and Portland. These metros not only provide a more affordable alternative, but also benefit from business-friendly environments, availability of moderately priced housing, vibrant, urban lifestyles to attract younger residents and spur population growth. Portland is strategically located between two top tech markets, while Charlotte's affordability and high quality of life, combined with the recent Charlotte Fintech Initiative, should strengthen the positive impact of Charlotte's high-tech sector. Office rent growth in these markets may exceed the national average bolstered by tech-driven office demand. New supply could become a challenge, but not in the near-term, as new demand could move faster than new construction, which often takes several years to build and deliver.

[19] Cushman & Wakefield. August 2019.
[20] Cushman & Wakefield. August 2019.
[21] Cushman & Wakefield. August 2019.
[22] CBRE-EA. August 2019.
[23] CBRE-EA. August 2019.
[24] NCREIF. August 2019.

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4 / The "Tech-Friendly" Office Environment

Modern firms are navigating through a much more dynamic technology environment than at any time in history. Today the typical lifespan of companies listed in the S&P 500 is less than 20 years, compared to more than 69 years in the 1920s[25]. The speed of business, driven by advances in technology and globalization, is requiring organizations to be more flexible and nimble to manage the demands of the current and future marketplace. This mandates that corporate offices are designed to provide space that supports flexibility and business agility. At the same time, they have become a key component in the war for talent.

Talent acquisition and retention is a major concern for today's companies, more so for those in the technology industry. Enhancing the employee experience and creating flexible space to meet current and future needs are top priorities for tech firms. Goals for improving space utilization, creating workplaces that support employee attraction and retention, and increasing productivity influence tech workplace office strategies. Recent surveys highlight that technology tenants' value location, particularly in urbanized mixed-use environments, office space that fosters connectivity and collaboration, and amenity-rich office environments that promote employee well-being and enhance productivity[26].

Location, always an important factor in real estate, now ranks as a top concern for companies hiring technology workers. Younger tech employees are opting to live in connected settings. They favor amenity-rich urban type locations where they can take public transportation to the office over driving to the suburbs. Employers are taking steps to keep their companies appealing to city dwellers. Some have traded suburban offices for vibrant city locations while other companies, most notably those in the Bay Area, operate private shuttles between San Francisco and their Silicon Valley headquarters, or have added a satellite office in an urban location. Companies are urbanizing because they need to be close to talented workers who favor places that are walkable, bike-able, and connected by transit. They also want to be near other knowledge-intensive firms to share ideas and practice "open innovation."[27]

In the U.S., a few tech firms have opted to locate in former industrial buildings in downtown locations in San Francisco. Other are also investing in downtown cores but moving into vertical campuses featuring interconnected atriums. Amazon created a university-like campus in downtown Seattle, transforming Seattle's South Lake Union District, a once moribund manufacturing area, into a major center for new technology and biotechnology research. In Los Angeles, Silicon Beach, a roughly three-mile strip between Santa Monica and Venice, has become a notable start-up hub for media-tech companies, because its walkability and urban-like amenities make it the place where young tech talent prefer to live, work and play. According to data from CBRE Econometric Advisors (CBRE-EA), office rent growth in urban locations has outperformed during the current cycle, increasing by roughly 40% since 2010, the end of the past recession, compared to only 27% for suburban office[28].

More important than city or suburb, however, is creating a sense of community, where tech workers can find an identity, rich culture, dining, shopping, and entertainment. Suburban areas with ample transit and urban type mixed-use environments can convey a sense of cool, like Palo Alto, Cambridge, or Boulder. The further away office locations are from the convenience of an urban environment the more tech companies have to compensate. Many suburban tech campuses have a wide variety of on-site services including elaborate cafeterias, exercise facilities, laundry and dry cleaning, hairdressers, gas and auto servicing centers, and even physicians. This cost is often lower than that of a Class A building downtown. Even so, Palo Alto has experienced such high demand in recent years that the office market is just 4.5% vacant and asking rents are over $107 per square foot, beating New York City's Plaza District ($99 per square foot)[29].

Exceptional amenities will continue to differentiate tech firms as appealing environments for building and nurturing careers. Tech employers are more likely to provide their workers with access to coworking or communal work spaces, whether through corporate memberships to external coworking centers or by creating their own shared spaces. Progressive tech employers are also more likely to support work-life balance by assisting with a range of personal tasks. To promote connectivity and collaboration more tech organizations focus on creating a curated workplace experience that includes à la carte environments with a menu of services, locations and support. The "tech-friendly" office space has been trending toward a more densified and efficient usage, with plenty of common space for conference rooms, group hangouts, social space and kitchens. The "tech friendly" office building can be compared to a hotel with grand lobby areas, coffee shops and cafes, fitness centers, state of the art technology, wellness rooms and bars. The objective behind the office design is to make tenants happier and more productive, while helping tech companies to retain their employees, build morale and attract new talent. As long as the talent

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[25] HOK Workplace Report. August 2019.
[26] HOK Workplace Report. August 2019.
[27] Brookings Institute. August 2019.
[28] CBRE-EA. August 2019.
[29] JLL. August 2019.

war remains, technology firms will likely continue to favor state-of-the-art office space filled with all the amenities necessary for a productive office environment.

Glossary

A dotcom, or dot-com, company is a company whose business model is based on the internet. Dotcoms are named after the .com at the end of their website URLs. A dotcom bubble that built in the 1990s burst in 2001, when many of the companies failed to report a profit.

Initial public offering (IPO) is the process by which a private company can go public by sale of its stocks to general public. ... The company which offers its shares, known as an 'issuer', does so with the help of investment banks

The International Monetary Fund (IMF), created in 1945 and headquartered in Washington, D.C., is an organization of 188 countries, working to foster global monetary cooperation, secure financial stability, facilitate international trade, promote high employment and sustainable economic growth, and reduce poverty around the world.

The NASDAQ is an electronic exchange where stocks are traded through an automated network of computers instead of a trading floor. It stands for National Association of Securities Dealers Automated Quotations System and is the world's second-largest stock exchange based on market capitalization.

The NASDAQ Composite Index indicates price movements of securities in the over-the-counter market. It includes all domestic common stocks in the Nasdaq System (approximately 5,000 stocks) and is weighted according to the market value of each listed issue. The Index was initiated in 1971 with a base of 100. Specialized industry indexes are also published.

The S&P 500 Index includes 500 leading U.S. companies capturing approximately 80% coverage of available U.S. market capitalization.

The S&P 500 Information Technology Index comprises those companies included in the S&P 500 that are classified as members of the GICS® information technology sector.

Appendix

PERFROMANCE OVER THE PAST 5 YEARS (12-MONTH PERIODS)

	9/30/2018-9/30/2019	9/30/2017-9/30/2018	9/30/2016-9/30/2017	9/30/2015-9/30/2016	9/30/2014-9/30/2015
NASDAQ Index	3.9%	24.4%	19.0%	2.2%	14.2%
S&P500 Index	3.1%	16.1%	13.3%	1.4%	8.7%
S&P 500 Information Technology Index	-0.7%	3.0%	7.9%	3.5%	5.4%

Sources: Bloomberg, DWS. October 2019. Past performance may not be indicative of future results.

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