NEW YORK CITY COMPTROLLER
BRAD LANDER

Spotlight

New York City's Tech Sector

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Introduction

New York City's economy, though quite complex and diverse, has been driven in large part by the securities industry (more colloquially, Wall Street) for the past half century. As a result, the city's economic fortunes — and particularly its tax base and fiscal strength — have been highly dependent on the ups and downs of the financial industry and financial markets. Given the strong growth in the financial sector over this period, this has been a fortuitous key industry for New York City. But being highly dependent on any single industry can be risky and lead to more volatility than there would be in a more diversified economy. The rise of the tech sector in New York City over the past few decades has gone a long way to balance things out.

The city's "new media" boom of the late 1990s petered out in the early 2000s, as employment in that fledgling sector fell by roughly a third. But since then, the tech sector has grown rapidly in the Big Apple, even showing resilience through the "Great Recession" of 2008-09. The tech boom that had thrust cities like Seattle, San Francisco, and Austin into a sustained economic boom had finally made it to New York. Once again during the pandemic, New York City's tech sector showed resilience and reached new highs. *Starting in 2020, the number of jobs in New York City in the tech sector surpassed those on Wall Street,* and by a widening margin since then (even as the number of jobs in the financial sector remains near its historic high).

In this Spotlight, we take a closer look at the city's tech sector (or perhaps more accurately, "cluster") and explore how it has evolved over the decades, and what implications it might have for the city's economy down the road.

The Tech Cluster: by Industry vs Occupation

In contrast with the securities industry, or other industries such as Hospitality, Advertising, Legal Services, Health Services, etc., each of which is delineated by industry codes, there is no clearly defined technology industry. Rather, it can be thought of as a cluster of industries. Moreover, when this industry is discussed, it generally pertains to digital/information technology (as opposed to biotech, medical tech, construction tech, etc.), and that is also the primary focus of this Spotlight. A number of informative reports have been published on New York City's tech sector, by a range of organizations such as the NYS Comptroller's Office, the Center for an Urban Future, the Federal Reserve Bank of New York, Tech: NYC, and the city's Economic Development Corporation (EDC). These reports all focus on technology industries, as opposed to occupations, while a 2022 report by HR&A Advisers does address tech as both an industry and an occupation. While these studies, as well as this Spotlight, all take slightly different approaches to gauging the size and contribution of the tech sector to the local economy, they all wind up with very similar estimates of both the level and past growth.

Technology is more easily recognized by occupation than by industry. A major occupational category defined by the Bureau of Labor Statistics is Computer & Mathematical Occupations. These occupations, of course, overlap with industries. For instance, an information security specialist or a help desk expert might well work outside the tech industry — possibly in banking

or health services or retail, for example. At the same time, an HR recruiter or accountant might well work for a software firm or an on-line retail platform (firms in the tech industry, based on our definition). There are advantages and disadvantages of focusing on each of these two dimensions. Tech occupations are more clearly defined: most everyone at a large organization knows who their tech people are, yet few would likely feel certain about which nearby firms qualify as tech firms. Moreover, most tech workers can easily move and advance within tech occupations across different industries and can refer to occupation-specific salary data as a reference to their own pay. Thus, the occupation data represent a good indicator on the labor market for "tech workers." On the other hand, industry-specific data are much more timely, are available at a monthly (as opposed to annual) frequency, are more indicative of the structure of the local economy, and are available at a much finer geographic level (county, as opposed to broad metro area). In order to paint a more complete picture of the tech sector here, we first look at tech from an occupation lens and then from an industry lens, the latter of which is our preferred metric.

Trends in Tech by Occupation

Every year, the Bureau of Labor Statistics provides a comprehensive synopsis of detailed occupations in their Occupational Employment & Wage Statistics program, based on data collected in May of the prior year. These data are presented at the national, state, and metro area levels. The broad occupational group, Computer and Mathematical Occupations, is the one we focus on in this Spotlight, though we also include "Computer and Information Systems Managers," which falls under Managerial Occupations. This is by no means a perfect or complete tabulation of what we might think of as "tech workers"; for instance, it does not include Computer Science Teachers or a variety of engineering occupations. Conversely, it does include some occupations that we may not think of as tech, such as Actuaries. However, it does seem to capture the lion's share of what we think of as tech jobs.

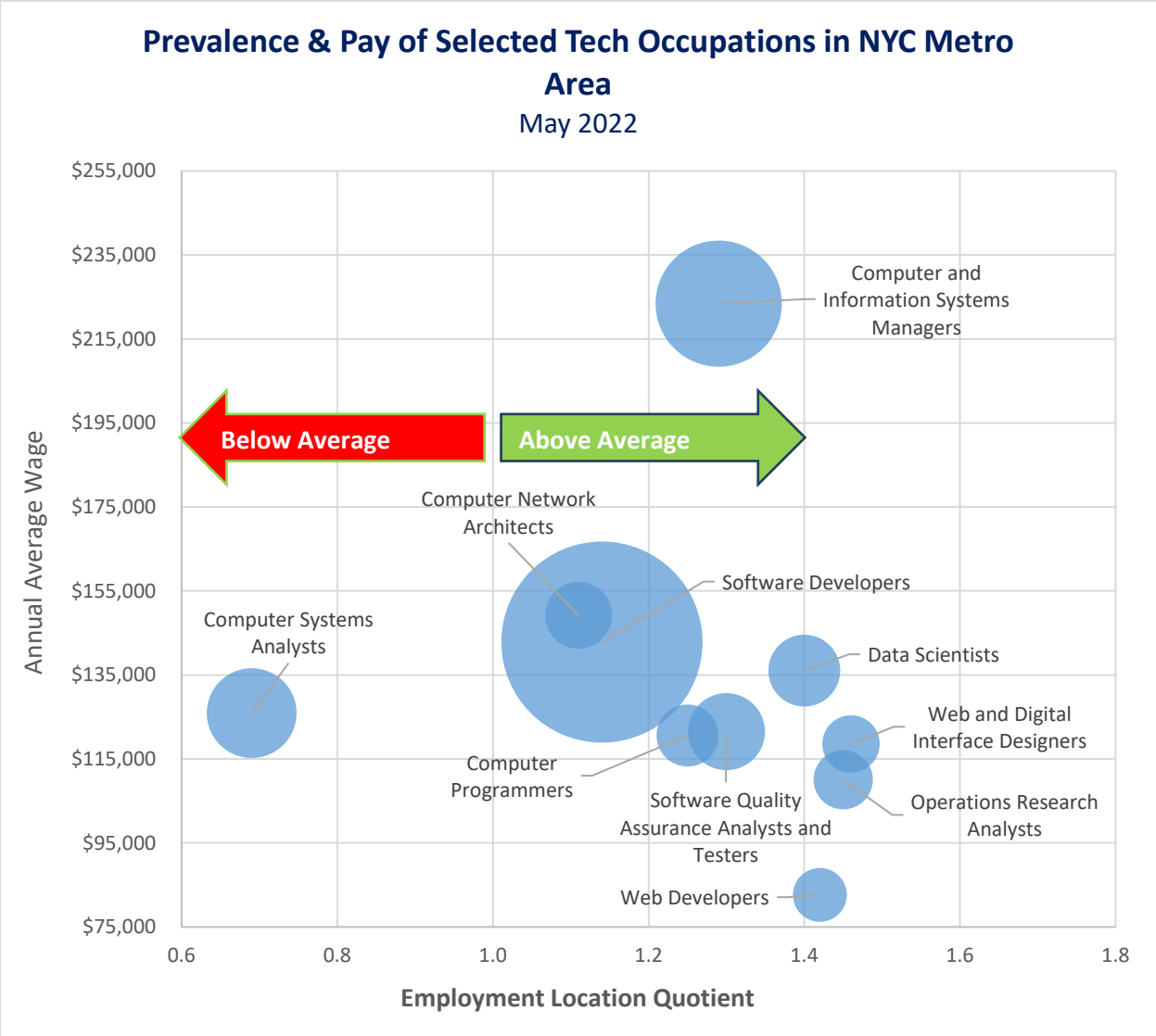
This data set is not broken out for New York City proper (i.e. the 5 boroughs), but rather for the broader metro area, which includes Long Island, the Lower Hudson Valley, and northern New Jersey, 25 counties in all. Given that many people commute into (and out of) the city for their jobs, the metro area is a reasonable proxy for local labor market conditions. However, it is not necessarily as representative of the city in terms of its municipal economy or tax base.

Having said all this, how do these tech occupations look in our area? And how have they changed over time?

Chart 1 below highlights three dimensions to compare tech occupations currently: how well various tech occupations pay, how concentrated they are locally (relative to the nation as a whole), and how much they have grown (over the past 14 years). Each "bubble" represents one of the tech occupations; the size of the bubble reflects the number of jobs in that occupation (in the NYC area); its horizontal position reflects the occupation's local concentration (that is, its share of local employment, relative to its share nationwide); and its vertical position reflects the

occupation's average annual pay in the metro area. Thus, for example, Computer Systems Analysts account for a below-average share of the local workforce relative to the nation, are slightly more numerous than Data Scientists (locally), and are paid $126,000 on average, which happens to be slightly more than double the average local wage across all NYC occupations, which is just under $62,000.

Chart S1



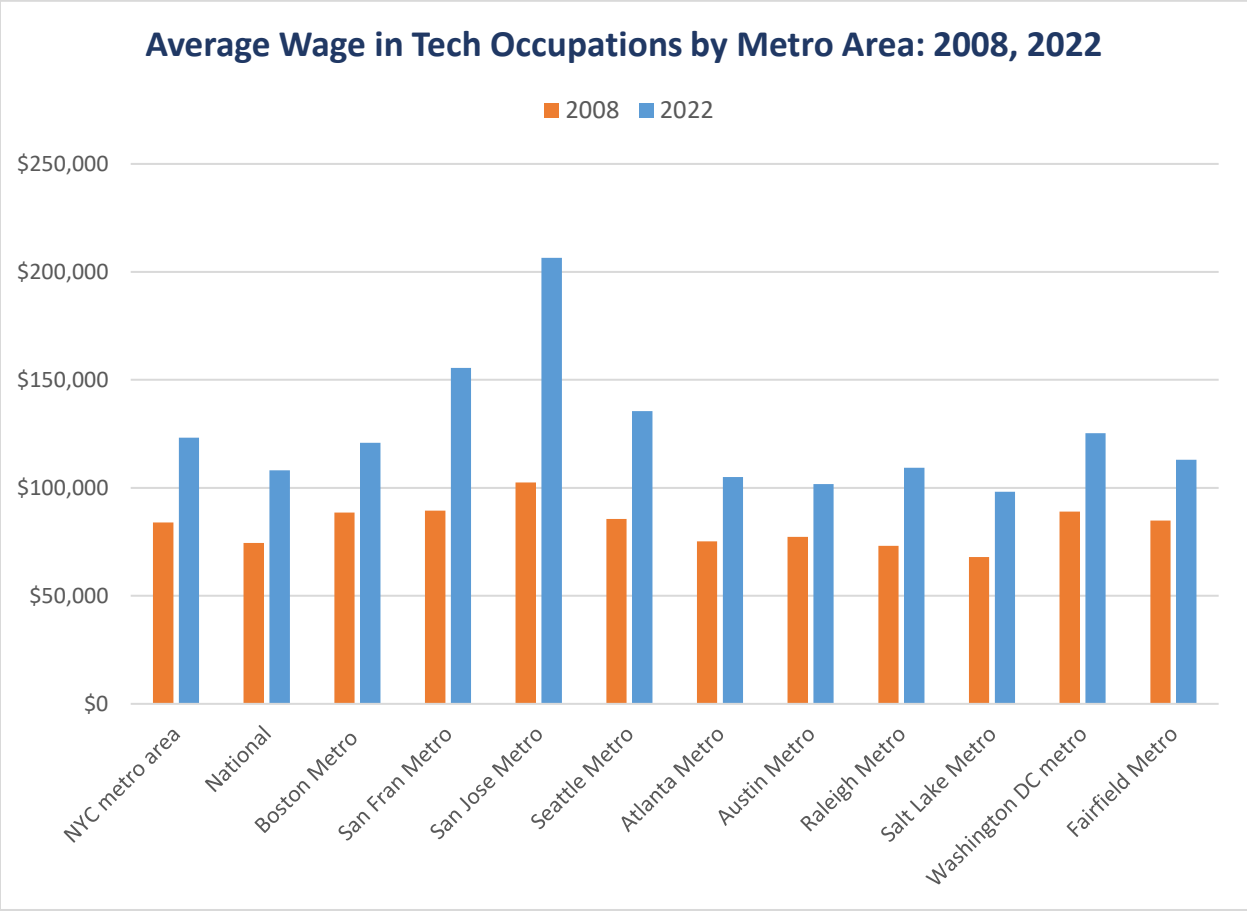
Source: BLS Occupational Employment & Wage Statistics Program

And how has employment in these tech occupations changed over the years across the New York City metro area? This turns out to be a nearly impossible question to answer accurately, because the detailed occupations have evolved substantially over the years; some occupations (or titles) today did not exist back in 2008, while others that were highly populated back then have faded or evolved. As an example, there were roughly 40,000 Computer Programmers in the metro area

back in 2008, versus 10,000 today, whereas there are now about 17,000 Web Developers & Digital Interface Designers today, versus 0 back in 2008 (because the classification didn't exist). Overall, the number of New York area workers in tech occupations (Computer & Math occupations, as well as Computer & Info Systems Managers) has grown by just 29% over those years, largely because New York City's historically large finance sector, as well as a range of other service industries such as advertising, have long been quite technology-intensive. Moreover, because the occupation data cover a much wider geographic region than the industry data, the former may underestimate trends in the five boroughs of New York City proper. And, based on our findings in the next section, which focuses on tech industries rather than occupations, and has much more granular geographic detail—this is likely the case.

Chart 2 below shows how average pay in tech occupations in NYC compares with other areas, and how this has changed over time. While New York city tops the nation in overall pay scales, it lags San Francisco, San Jose, and Seattle in pay among tech occupations.

Chart S2



Source: BLS Occupational Employment & Wage Statistics program

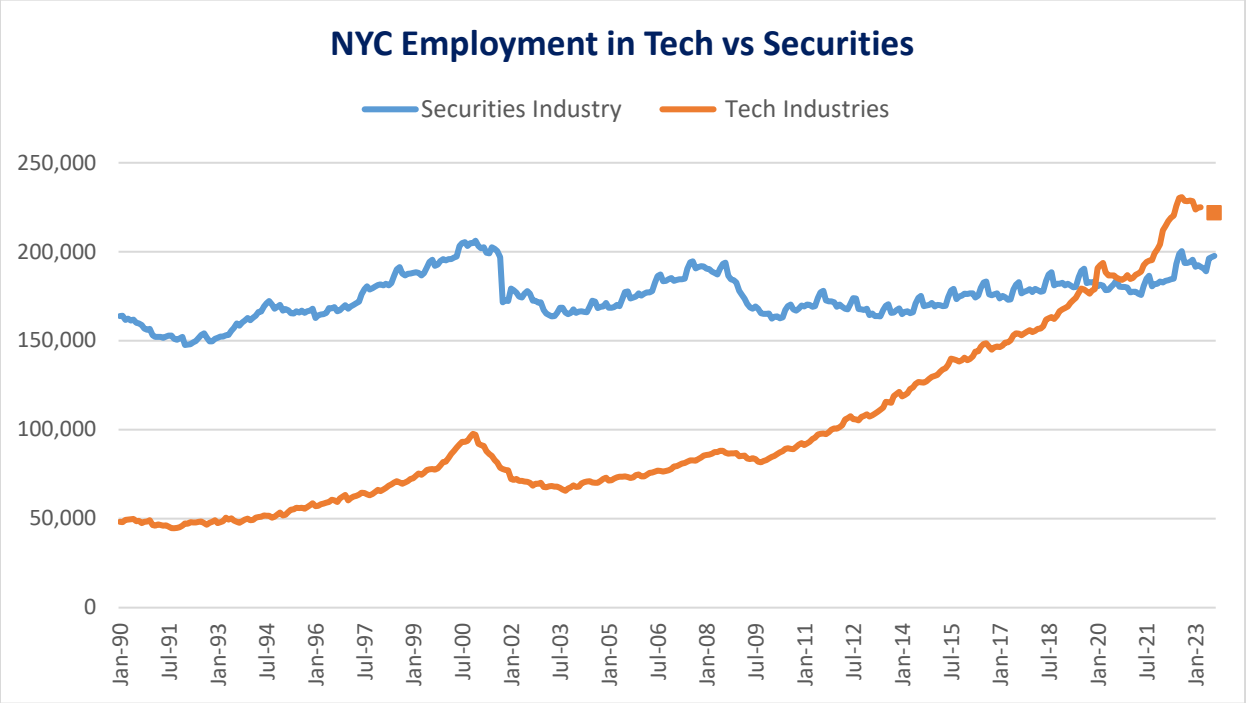
Trends in Tech by Industry

Here we pivot from looking at technology **occupations** to looking at technology **industries,** which we consider a more telling metric about the tech sector and its role in the local economy. As mentioned earlier, the criteria for identifying which industries qualify is somewhat subjective, though studies by a variety of organizations have been fairly consistent on what constitutes this tech cluster, thus establishing somewhat of a consensus. Specifically, reports on New York City's tech sector, by a variety of organizations mostly focus on technology industries, as opposed to occupations. While they don't all define the cluster in exactly the same way, the various industry buckets are fairly similar. The table *in the Appendix* summarizes what each group's report includes, as well as this Spotlight. The one noteworthy industry that some include (but we don't) is Telecommunications. Our rationale is that, based on the BLS's Occupational Employment Statistics, fewer than one in five jobs in the Telecommunications industry fall under technology occupations.

Our analysis focuses on employment and wage & salary earnings data as indicators. A number of metrics are relevant in gauging the importance of New York City's tech cluster and our analysis focuses on its size, relative importance, pay scales, and mix. We look at both level and change (growth) in these metrics. Based on these criteria, we attempt to gauge how well the city stacks up against the nation as a whole, other parts of our metropolitan region, and a few other tech hubs across the nation.

Over the past half century, the securities industry (a.k.a., Wall Street) has been the mainstay and primary driver of the city's economy and tax base. Prior to the 2008 recession it accounted for roughly 5% of employment, a remarkable 25% or total wage and salary earnings, and an even larger share of total income tax revenues. While it remains very important, its share of the city's economy has diminished, accounting for under 20% of wage and salary earnings in 2022. Meanwhile, the tech industry has grown rapidly, both in terms of employment and income. Chart 3 below illustrates how rapidly tech employment across New York City has grown over the years and has overtaken securities in terms of employment, despite a modest pullback over the past 12 months.

Chart S3

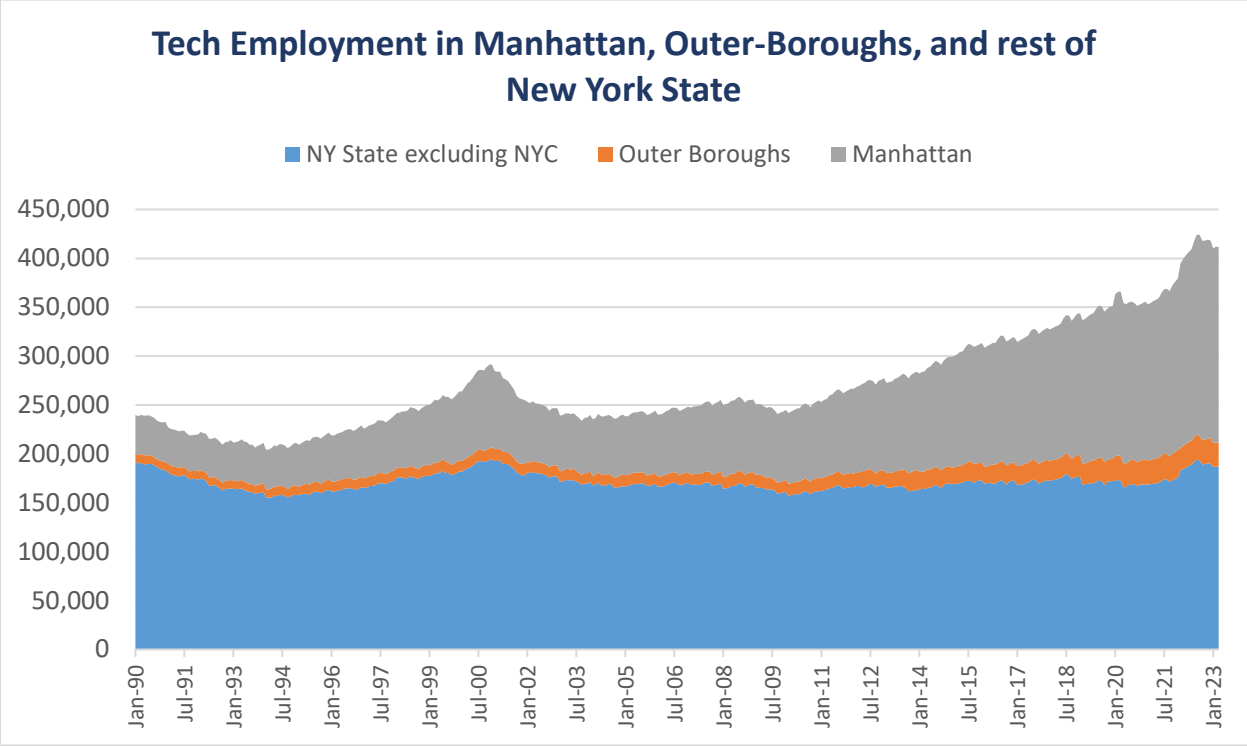


Sources: Moody's Economy.com; New York State Department of Labor (QCEW & CES)

Note: Complete data on tech industries, based on QCEW (Quarterly Census of Employment & Wages), are only available up to March 2023; data point for August 2023 is an estimate based on a partial tally of tech industries available from CES (Current Employment Statistics) data.

It is also interesting to note where the number of jobs in tech have been growing most rapidly. Within New York City, almost all of these tech firm jobs (and most of the net job creation) were added in Manhattan. And, as shown in Chart 4 below, almost all of the regional net job creation (i.e. across New York State as well as New Jersey) has accrued to Manhattan. Nonetheless, the outer boroughs have seen rapid growth in percentage terms, albeit from a small base. Moreover, as recently as 2016, New Jersey and Long Island both had a higher concentration of tech industry jobs than New York City, but that has now reversed in what might be described as an "urban" trend in the tech sector.

Chart S4



Sources: Moody's Economy.com; New York State Department of Labor (QCEW)

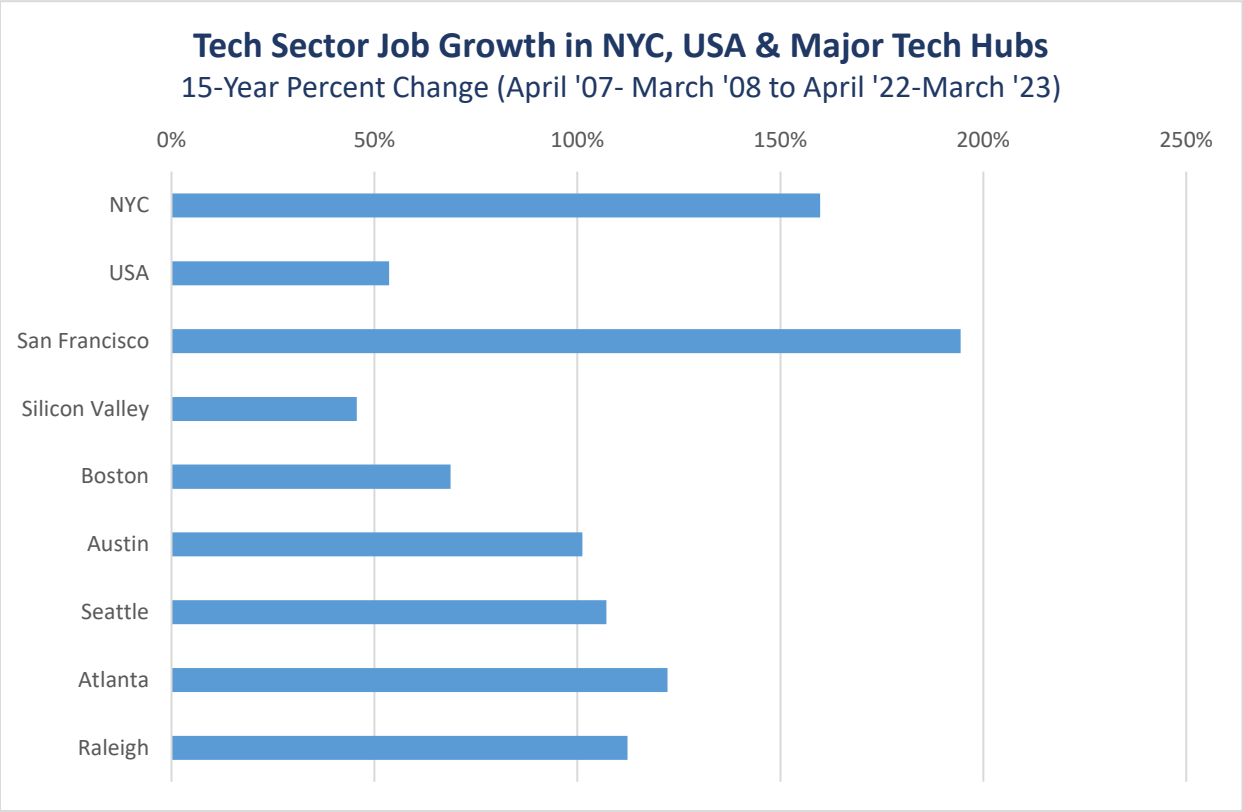
This urbanization of tech is not unique to New York City, as we will see in the next section comparing and contrasting New York City with other notable tech hubs across the United States. And while average pay in the tech sector is nowhere near on par with Wall Street, it is still quite high relative to pay scales in other local industries.

How Does NYC Compare?

In terms of job growth, New York City has out-performed most other areas over the past couple of business cycles. As shown in Chart 5 below, tech industry employment in the 5 boroughs of New York City has increased by a striking 160%, surpassed only by the San Francisco area (including Oakland & Berkeley but not Silicon Valley). In fact, Silicon Valley (covering San Mateo, Santa Clara & Santa Cruz counties) has seen much more moderate growth of about 45%, albeit from a much higher base level, while other tech hubs such as Seattle, Austin, and Raleigh have seen a roughly doubling in tech employment. Interestingly, in the areas ringing New York City, there has been very modest growth in tech employment. This trend from the suburbs and edge cities toward large urban centers is a phenomenon not unique to the New York metropolitan region, as this has also been seen more broadly across the U.S.—as reflected in the comparative gains in San Francisco versus Silicon Valley in Chart 5 below. Moreover, while tech employment in New York City did slump early in the pandemic, when many people fled urban centers, it rebounded strongly in 2021 and was up 17% from pre-pandemic levels by early 2023. Over that

same period it rose 11% in the surrounding “outer ring” (Long Island, Westchester, Fairfield, and New Jersey).

Chart S5

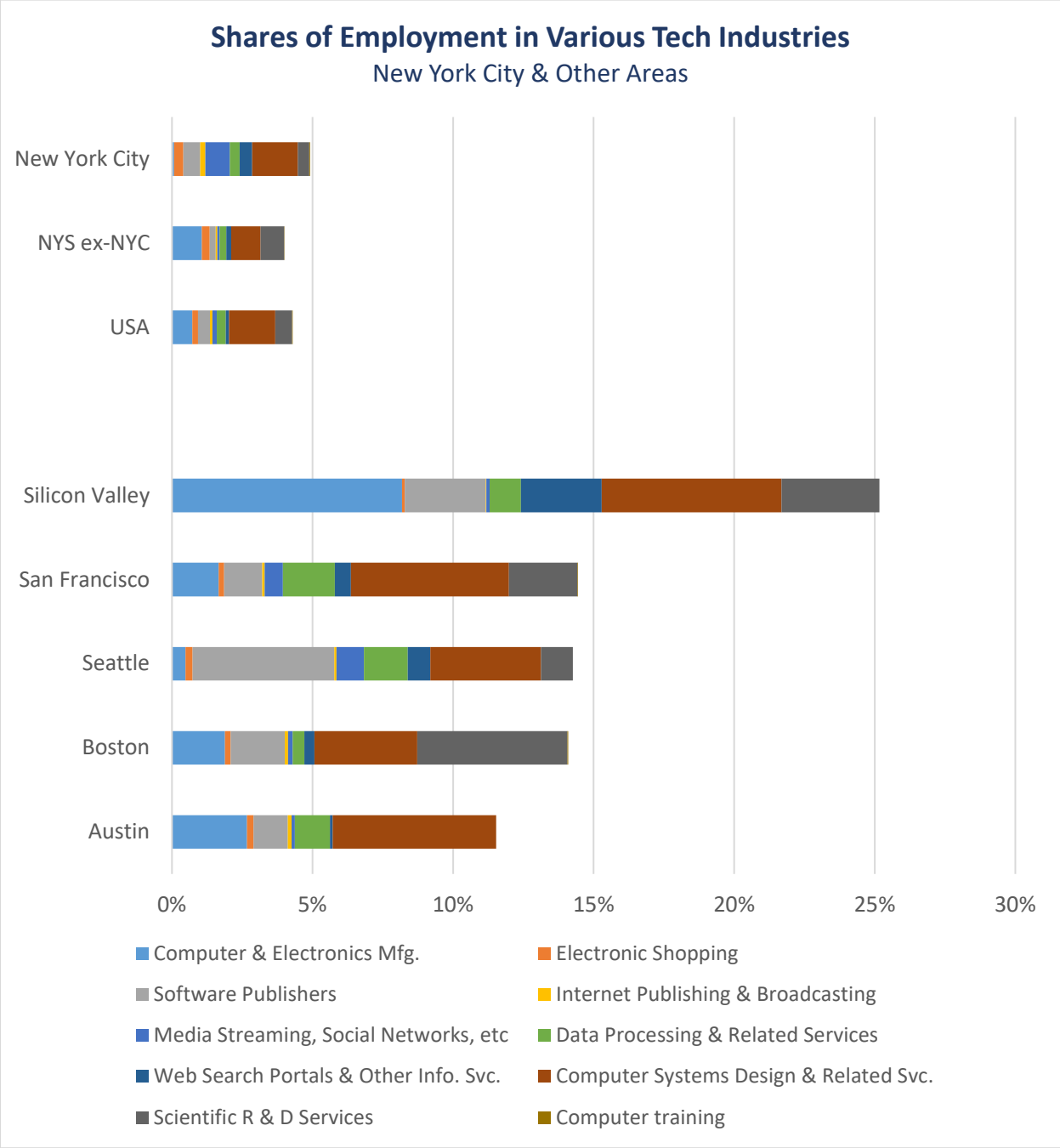


Sources: Moody’s Economy.com; Bureau of Labor Statistics (QCEW)

Note: San Francisco includes San Francisco & Alameda counties; Silicon Valley includes San Mateo, Santa Clara & Santa Cruz counties; Boston includes Middlesex & Suffolk counties; Raleigh includes Wake & Durham counties. Seattle, Austin, and Atlanta include only the core urban counties (King, Travis, and Fulton, respectively).

With the number of tech industry jobs in New York City exploding over the past two decades, one might think that the city has now become a major tech hub, on par with cities like Seattle, San Francisco, San Jose, Boston, and Austin. This depends on what metric one uses. In terms of concentration of tech jobs (i.e. tech’s share of total local employment), New York City still lags by a long shot, as shown in Chart 6 below. We also see that, as in most places, computer system design accounts for the largest share of the New York City tech industry, in terms of employment. Media streaming distribution services (including social networks) account for a disproportionately large share of tech-industry jobs in New York City.

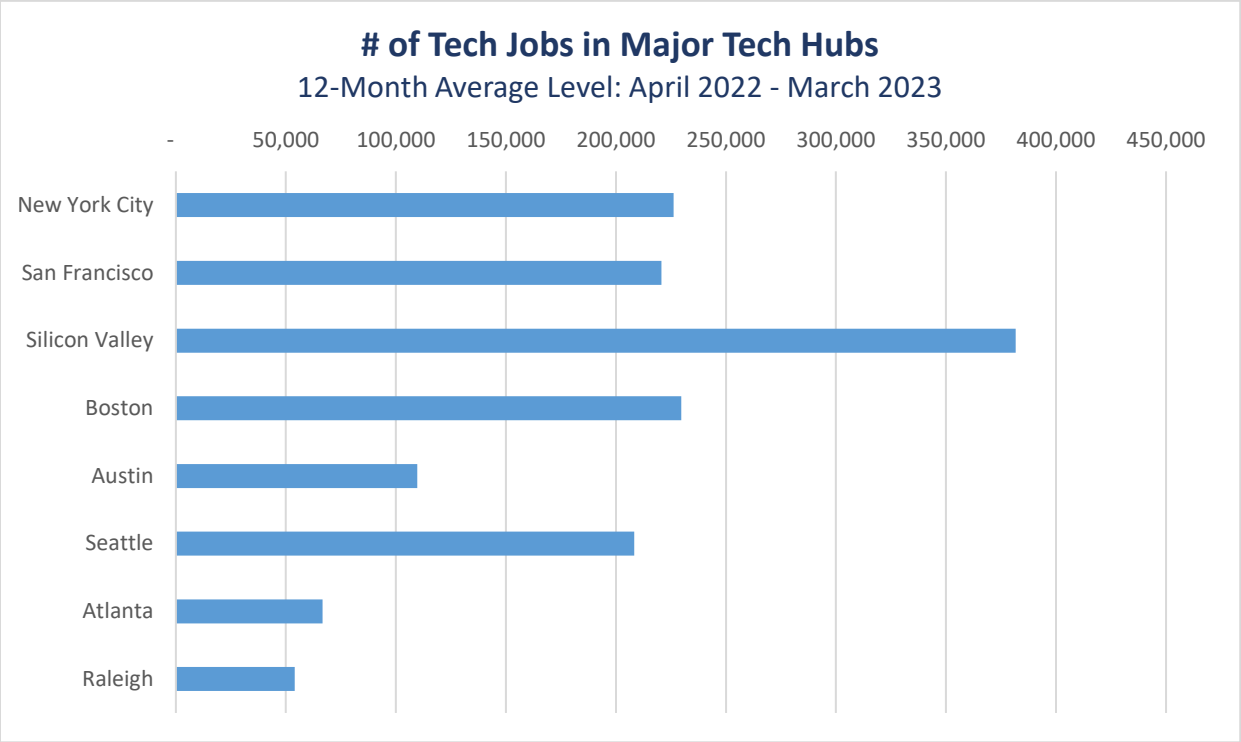
Chart S6



Note: Silicon Valley includes San Mateo, Santa Clara & Santa Cruz counties; Boston includes Middlesex & Suffolk counties; San Francisco includes San Francisco & Alameda counties. Seattle and Austin include only the core urban counties (King and Travis, respectively).

But in terms of the sheer number of tech industry jobs, New York City has indeed caught up with or surpassed all these major tech hubs, with the exception of Silicon Valley and Boston, as shown in Chart 7 below.

Chart S7



Sources: Moody's Economy.com; Bureau of Labor Statistics (QCEW)

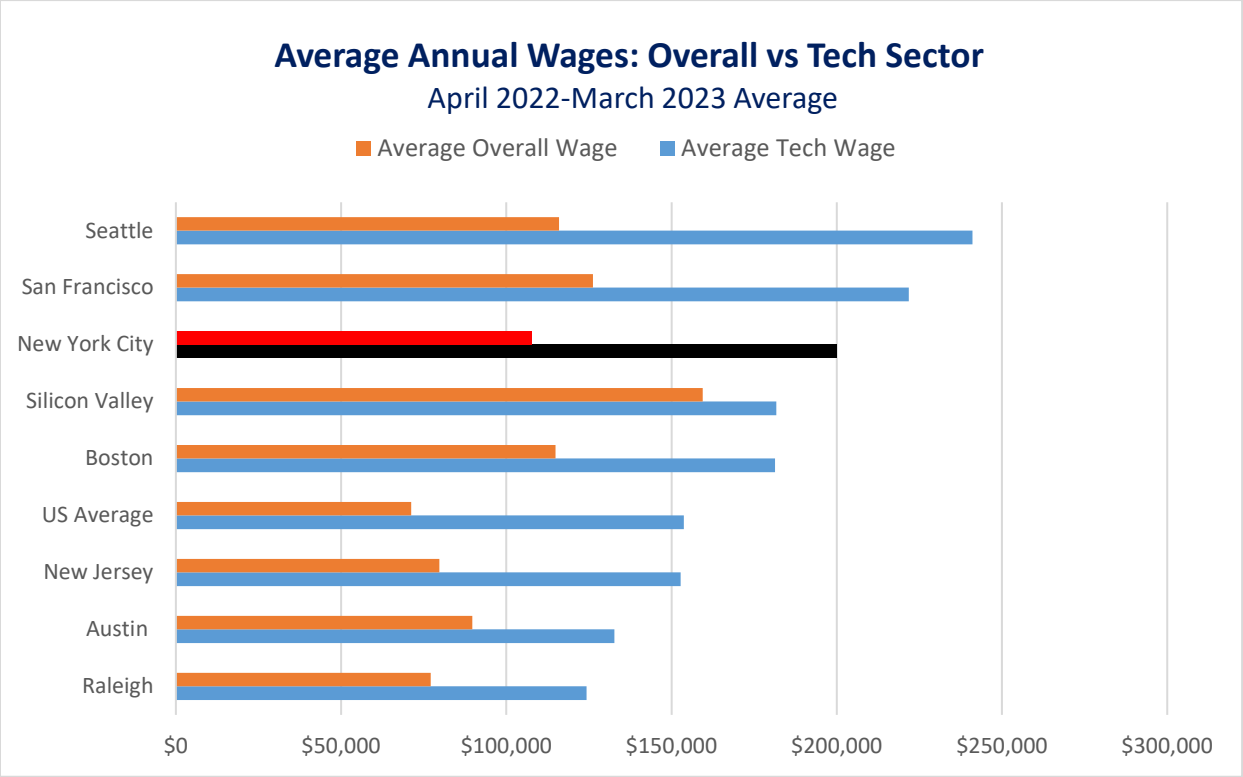
Note: Silicon Valley includes San Mateo, Santa Clara & Santa Cruz counties; Boston includes Middlesex & Suffolk counties. San Francisco includes San Francisco & Alameda counties. Raleigh includes Wake & Durham counties. Seattle, Austin, and Atlanta include only the core urban counties (King, Travis, and Fulton, respectively).

Fiscal Implications for NYC

Because there is no universally defined tech sector, and because it has evolved dramatically over time, quantifying tax revenues associated with this cluster of industries is difficult with any precision. However, it is likely that the growing importance of New York City's tech sector has made the City's tax revenues a bit less dependent on the highly cyclical finance sector. In fact, it may well be that growth in this local sector cushioned the pandemic's blow to the city's economy in 2020. This is not to say that the tech sector is not at all cyclical — in fact, widely announced tech layoffs over the past year appear to have slowed overall growth. But if the strong secular upward trend here continues, then the sector should remain resilient, even during down cycles. Much, of course, will depend on the extent to which these tech cycles coincide with finance-sector cycles. Tech industries currently account for about 5% of New York City employment but

almost 10% of total wage and salary income, as average earnings in this sector (~$200K), though not on par with Wall Street, are still about 75% above the all-industry average. They are also about a third higher than the nationwide average among tech industries, as shown in Chart 8 below. While the tech sector's contribution to overall PIT (personal income tax) revenue is difficult to quantify, it likely exceeds its share of income, given that the City's modestly progressive tax structure draws more proportionally from higher-paying jobs. And this does not include indirect (i.e. multiplier) effects on other industries that also contribute to tax revenues.

Chart S8



Sources: Moody's Economy.com; Bureau of Labor Statistics (QCEW)

Note: Silicon Valley includes San Mateo, Santa Clara & Santa Cruz counties; Boston includes Middlesex & Suffolk counties. San Francisco includes San Francisco & Alameda counties. Raleigh includes Wake & Durham counties. Seattle, Austin, and Atlanta include only the core urban counties (San Francisco, King, Travis, and Fulton, respectively).

Another channel through which the tech sector has contributed to the vitality of the city's economy (and its tax base) is through commercial real estate markets. The NY State Comptroller's comprehensive 2022 study on the city's tech sector noted that *"… new leasing by tech firms continued through much of the pandemic, as tech businesses accounted for a higher share of overall leasing activity than prior to the pandemic."* That study also noted that, not surprisingly, tech workers tend to be younger and more highly educated than the average worker -- a group that, anecdotally at least, tends to value urban lifestyles and amenities.

Inclusion Efforts

Given the rapid ongoing expansion in New York City's tech sector, one important challenge pertains to how inclusive the growth has been. The State Comptroller's report, based on pre-pandemic data from the American Community Survey, found that 77% of tech workers in the City had at least a college degree, fewer than 30% were women, and fewer than 10% were Black. A variety of efforts are underway to make this sector more inclusive by creating opportunities for these under-represented groups. Once such effort is the NYC EDC's (Economic Development Corporation) Founder Fellowship Program, whose mission is to support tech entrepreneurs from under-represented backgrounds. Another is CCNY's (City College of New York) Digital Gaming Pathways program, creating a bachelor's degree in digital game design, which also teaches broader skills in mathematics and computer programming. More broadly, CUNY has been expanding efforts to prepare New Yorkers for tech jobs and careers as highlighted in this testimony from the Center for an Urban Future. Going forward, we will continue to monitor not only overall growth in New York City's tech sector but how inclusive that growth is.

Conclusion

New York City's tech sector has grown dramatically over the past two decades and has been a significant contributor to overall growth in employment, income, and tax revenues. Even after this extraordinary growth, New York City still lags other tech hubs substantially in terms of tech's share of employment and earnings. But rather than view this as a shortcoming, we see it as a potential source of further growth in the years ahead. As the tech sector has evolved, it has become an increasingly urban phenomenon, and one which has become increasingly integrated into other industries, from retail to transportation to finance. Both of these trends bode well for New York City, as it is about as diverse and urban an economy as exists today, and one that boasts a diverse, well-educated, and productive workforce.

Acknowledgements

This report was prepared by Jason Bram, Director of Economic Research, with assistance from Astha Dutta, Economic Data Analyst. Archer Hutchinson, Creative Director, led the design.

Appendix

How Various Reports Define/Delineate NYC's Tech Sector

		NY Fed (2015)	NY State Comptroller (2022)	Center for an Urban Future (2022)	HR&A Advisers (2022)	NYC Comptroller (2023)
334	Computer Manufacturing	X	X	X	X	X
4541/45999	Electronic Shopping	X		X	X	X
5112/5132	Software Publishers	X	X	X	X	X
517	Telecomm.		X		(Part)	
518/5182	Data Processing	X	X	X	X	X
51913/5161	Internet Publ., Broadcasting & Web Search	X	X	X	X	X
5415	Computer Systems Design	X	X	X	X	X
5417	Scientific R&D Services	X	(Part)	X	X	X
61142	Computer Training		X			X

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