

DAINAMIC BANKING

NAVIGATING THE
DIGITAL FRONTIER



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THE IMPACT OF STEM AND REGULATION ON THE MODERN BANKING LANDSCAPE



EXECUTIVE SUMMARY

The labor market has undergone substantial disruption over the past two decades, particularly in financial services. Science, technology, engineering, and mathematics (STEM) occupations, especially computer operations and data science jobs, have exploded in popularity. Banks have used workers in these occupations to create new digital services for consumers and to comply with a rapid increase in regulatory requirements. Unfortunately, small and mid sized banks have had a challenging time undergoing a digital transformation because these workers demand higher wages than their counterparts and require other internal complementary investments. This whitepaper explores the increase in STEM workers and argues that the effect has been especially pronounced in finance, suggesting that the future requires digital transformation for small and mid sized banks to be competitive and comply with a growing regulatory burden.



ABOUT DAINAMIC

HOW WE'RE DIFFERENT

We believe that sophisticated tools and reliable economic intelligence should not be concentrated among only the largest organizations. And, they don't need to be given recent advances.

Sadly, the majority of investors and banks have little data infrastructure and technical experience to obtain and process the requisite data to inform decision-making, let alone produce reliable forecasts and estimates of potential losses that are relevant for regulatory compliance.

Dainamic Banking provides the tools to access and leverage data at their fingertips, in addition easing the burden of regulatory compliance.



STEM GROWTH

The employment landscape in the U.S and globally has been drastically altered over the past few decades. One of the most notable changes has been the increasing “digitization” of the labor market since the 1980s – that is, the rapid expansion of jobs requiring digital skills, according to [my research](#) published in the Journal of Monetary Economics.

Of these digitally intensive jobs, science, technology, engineering, and mathematics (STEM) occupations have taken the stage (see Table 1 for a list). Since the turn of the century, STEM employment has grown faster than total employment, reflecting the ever-increasing demand for technical skills. For example, a [2018 report](#) from the Bureau of Labor Statistics (BLS) reported that STEM occupations grew by 10.5% between 2009 and 2015, compared to a growth of 5.2% in non-STEM occupations. This trend is expected to persist, with the BLS forecasting a further growth of 8.8% in STEM jobs from 2018 to 2028.

These [projections are driven by](#) computer occupations with an expected growth rate of 11.5% between 2019 to 2029, which would account for nearly half of all STEM jobs by 2029, and mathematical and science occupations (including data scientists) with an expected growth rate of 26.5%. This highlights the demand for both digital and technical skills.

The increase in demand for STEM workers is arguably the most striking in the financial services sector, according to a [2020 report](#) of mine published by the Mercatus Center. STEM employment increased fastest in finance between 2011 and 2017 by 30% – second to professional services – and STEM workers earn roughly 6% more than their non-STEM counterparts in finance, relative to other occupations controlling for demographic factors.



REGULATORY IMPACT

The increasing prevalence of FinTech and robo-advisors has also driven up the demand for STEM graduates within finance who can develop scalable software and build reliable predictive models. These FinTech companies have – in many ways – automated away tasks that would have been done by humans, saving money and delivering good results.

But what can explain these observed patterns in STEM jobs? Is it that some sectors, like finance, experienced a change in the cost of capital, or simply experienced greater technological advances that required more STEM workers?

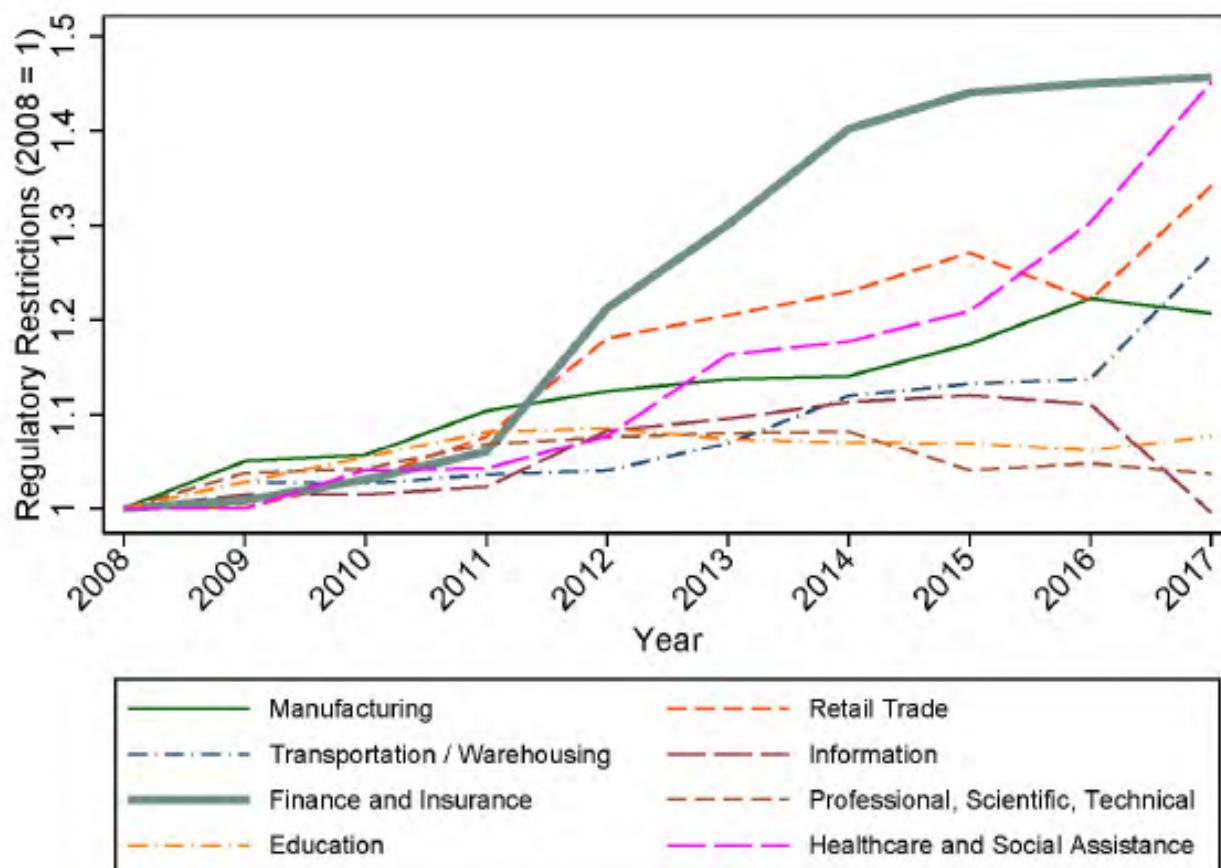
Not necessarily. The culprit may have actually been the surge in regulation, which may have unintentionally led to the crowding out of many lower and middle skilled workers that traditionally worked in banks, such as tellers and brokers.

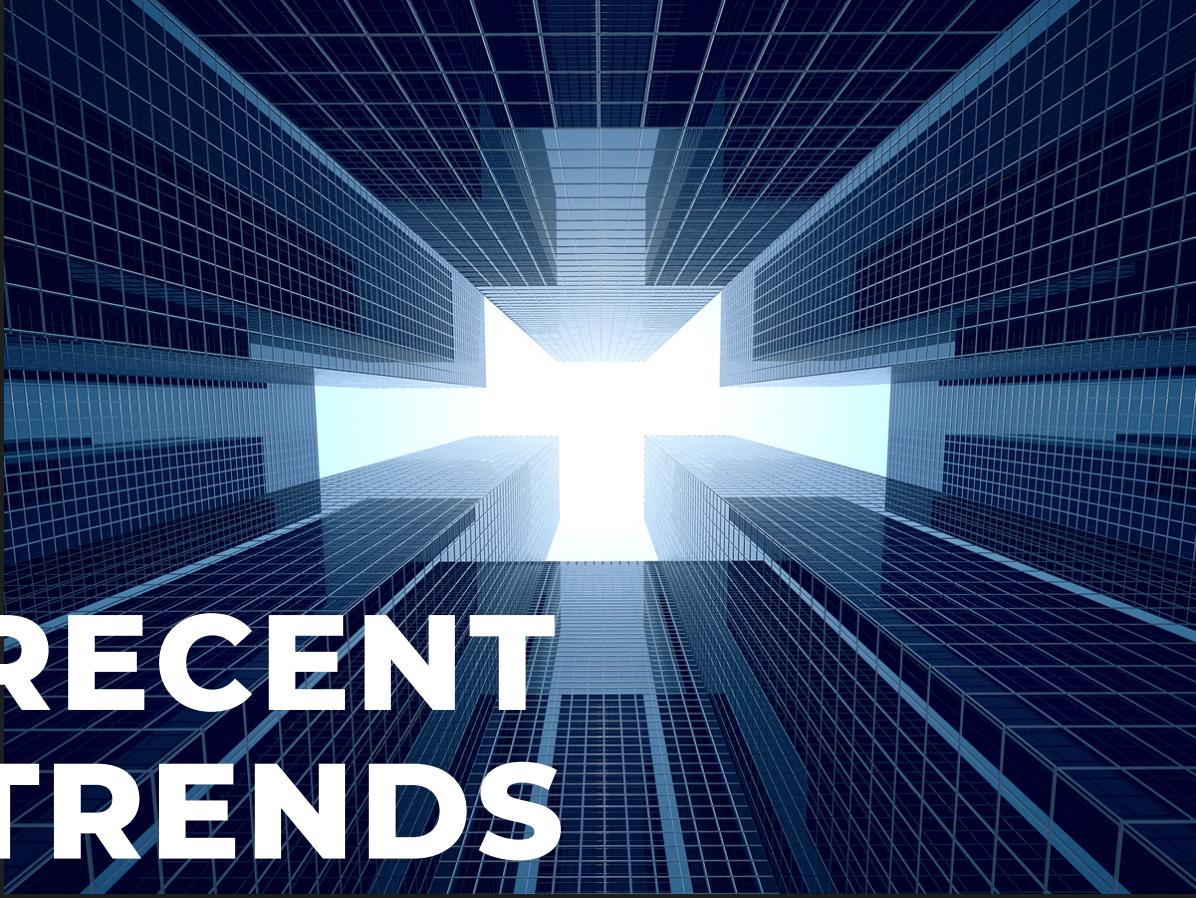
Higher regulation in the financial sector is a double-edged sword for small and mid-sized banks. On one hand, increased regulation theoretically aims to protect consumers and ensure the stability of the financial system. On the other hand, regulatory compliance is often burdensome for smaller banks that lack the resources of their larger counterparts.

Take the [recent guidance on current and expected losses \(CECL\)](#), which requires banks to develop “reasonable and supportable” forecasts, including their anticipated losses. Regulatory authorities have specifically said that historical data is not necessarily sufficient for generating loss estimates, so banks will need much more serious expertise and time to not only generate reliable forecasts, but also assemble the infrastructure for conducting these analyses in a transparent, replicable, and scalable basis.

CECL is not a one-off: my [2020 report](#) shows that finance exhibited the greatest growth in regulation, second to healthcare, over the past decade and that the increase in regulation is causally linked with the rise of STEM employment. Given that the regulatory burden falls primarily on labor, banks find it profitable to hire STEM workers who have both advanced data skills and analytical capabilities to create systems and processes that automate away tasks typically done by people and could be prone to error or liability. Hiring STEM workers functions as a way of complying with regulation and reducing labor costs.

Unfortunately, compliance costs are inevitably more burdensome for small and mid-sized banks since they generally lack the budgets to hire teams of data scientists and a smaller workforce to spread the fixed costs of regulatory compliance over. [My research](#) has found that roughly half of patenting in banking is done by the top 5 banks, and the remainder generally done by the top 30 banks. Furthermore, the majority of patents issued are in the areas of data collection and analytics. Nonetheless, small and mid-sized banks can still leverage digital technologies to their advantage by partnering with financial technology firms that deploy Banking-as-a-Service (BaaS) platforms to help manage these transitions.





RECENT TRENDS

NEW DATA FROM 2019-2022

The following analysis draws on data from the Occupational Employment and Wage Statistics program by the Bureau of Labor Statistics, containing information on employment and hourly wages across occupations and industries over time.

We focus specifically on trends in science, technology, engineering, and math (STEM) and non-STEM jobs, following the [BLS classification](#).

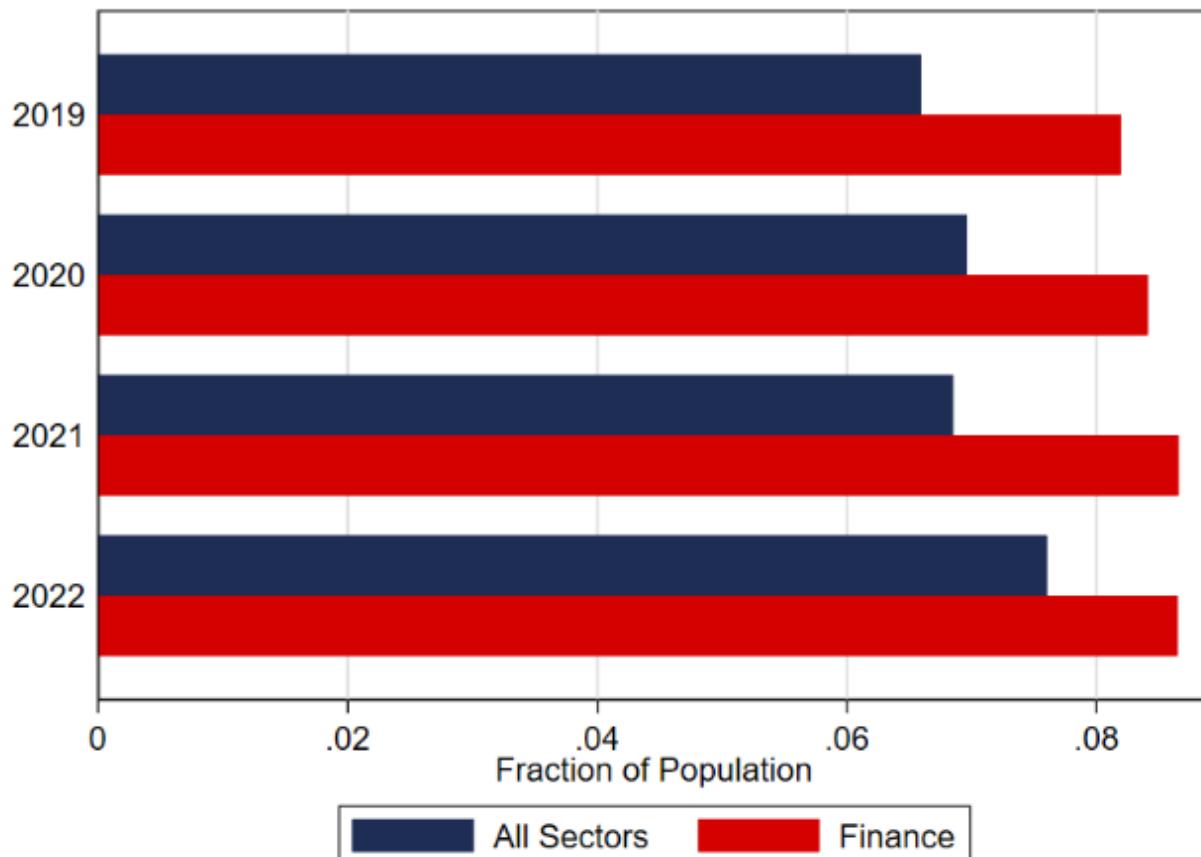
The pages that follow report the most recent trends in STEM and non-STEM jobs, contrasting the experience of finance with other sectors.

Trend 1: Increase in the proportion of STEM workers

The proportion of STEM workers in financial services has seen a noticeable rise to 8.6% in 2022, up from 8.1% in 2019. This expansion surpasses the overall economy's proportion of 7.6% and is largely driven by a surge in computer and data science-related occupations. It's crucial to note this increase aligns with the rapid digitization of finance and the rise of FinTech innovations, both of which demand advanced technical expertise. These emerging fields are creating opportunities for STEM professionals, transforming the sector into a high-tech industry that requires analytical thinking and problem-solving skills.

The continued increase in the proportion of STEM workers builds on pre-2019 trends, which were reported in my earlier Mercatus report.

Figure 1: Proportion of Workers in STEM, Finance and All Sectors

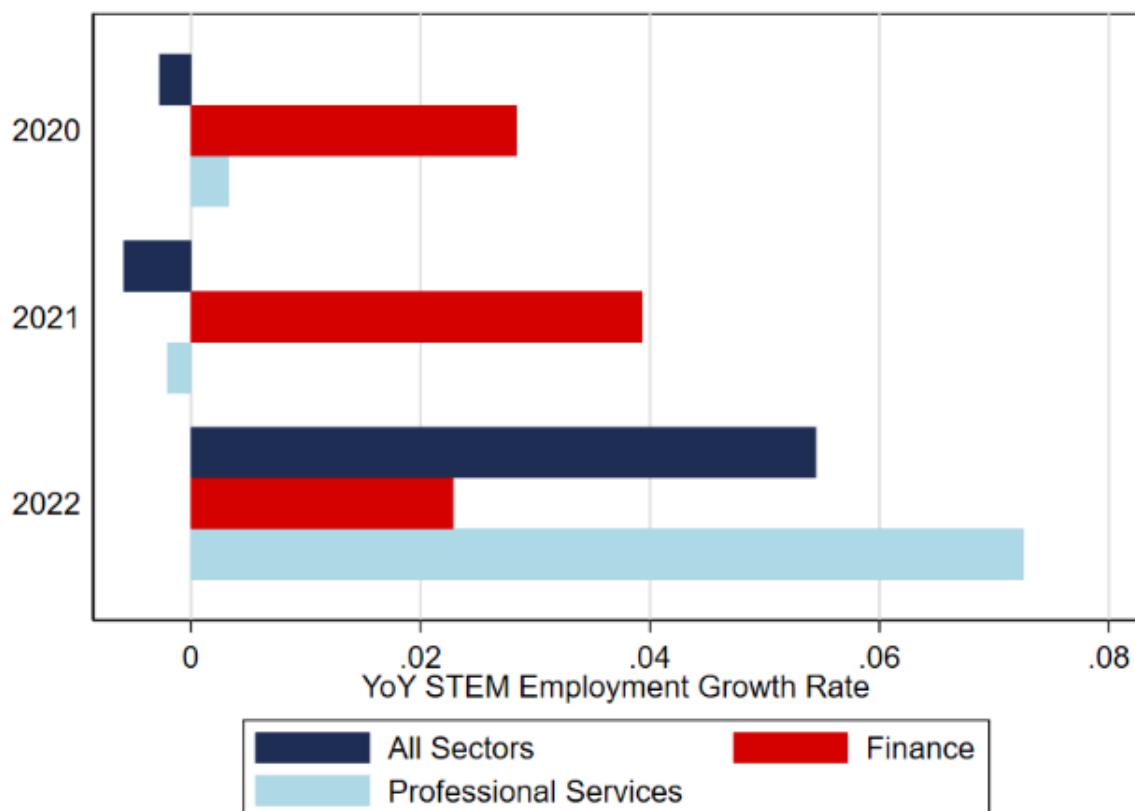


Trend 2: Increase in the number of STEM workers

The increase in the proportion of STEM workers is important because it shows that the composition of finance is changing, but it is also useful to understand how fast STEM jobs have been expanding year-to-year.

Despite COVID-19, STEM jobs in the financial services sector exhibited resilience and continued growth, rising by 3% in 2019-20, 4% in 2020-21, and 2% in 2021-22. This consistent growth in financial services contrasts starkly with trends in professional services and the overall economy, which saw a decline in STEM employment in 2020-21. While the growth rebounded in professional services by 7% in 2021-22, it emphasizes the sustained demand for STEM skills within the financial services sector. This trend could also be linked to the increased reliance on digital platforms and remote work practices during the pandemic, where technology played a crucial role. In particular, STEM jobs were more likely to be done as productively remotely.

Figure 2: STEM Employment Growth Across Sectors

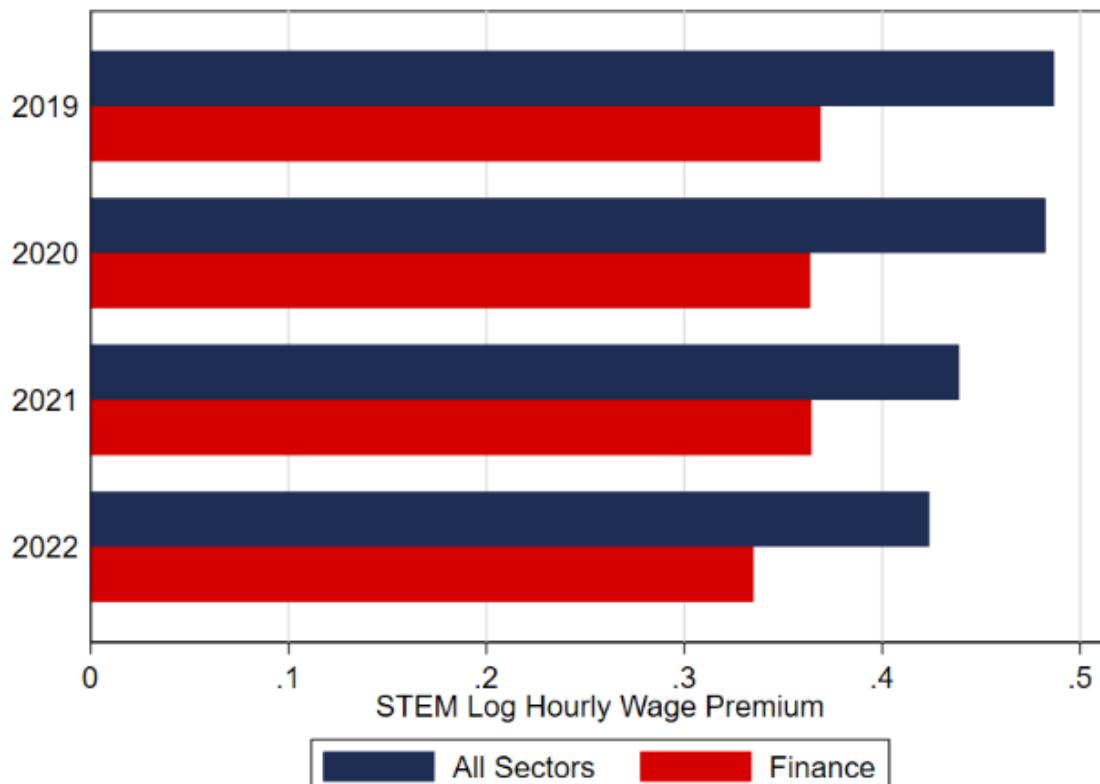


Trend 3: STEM wage premium holds steady

The wage premium refers to how much more, in real hourly wages, one group earns, relative to another, and frequently reflects value.

As the supply of STEM workers in financial services expanded, it has led to a moderating effect on wages. STEM workers still earn over 30% more per hour than their non-STEM counterparts in finance, but the premium has declined only slightly by about 5 percentage points since 2019. This change is likely a reflection of the increase in supply of STEM workers, as more individuals acquire digital and technical skills to meet the growing demand. And, despite this decrease, the premium for STEM skills remains high, reinforcing the value and importance of these skill sets in the digital economy.

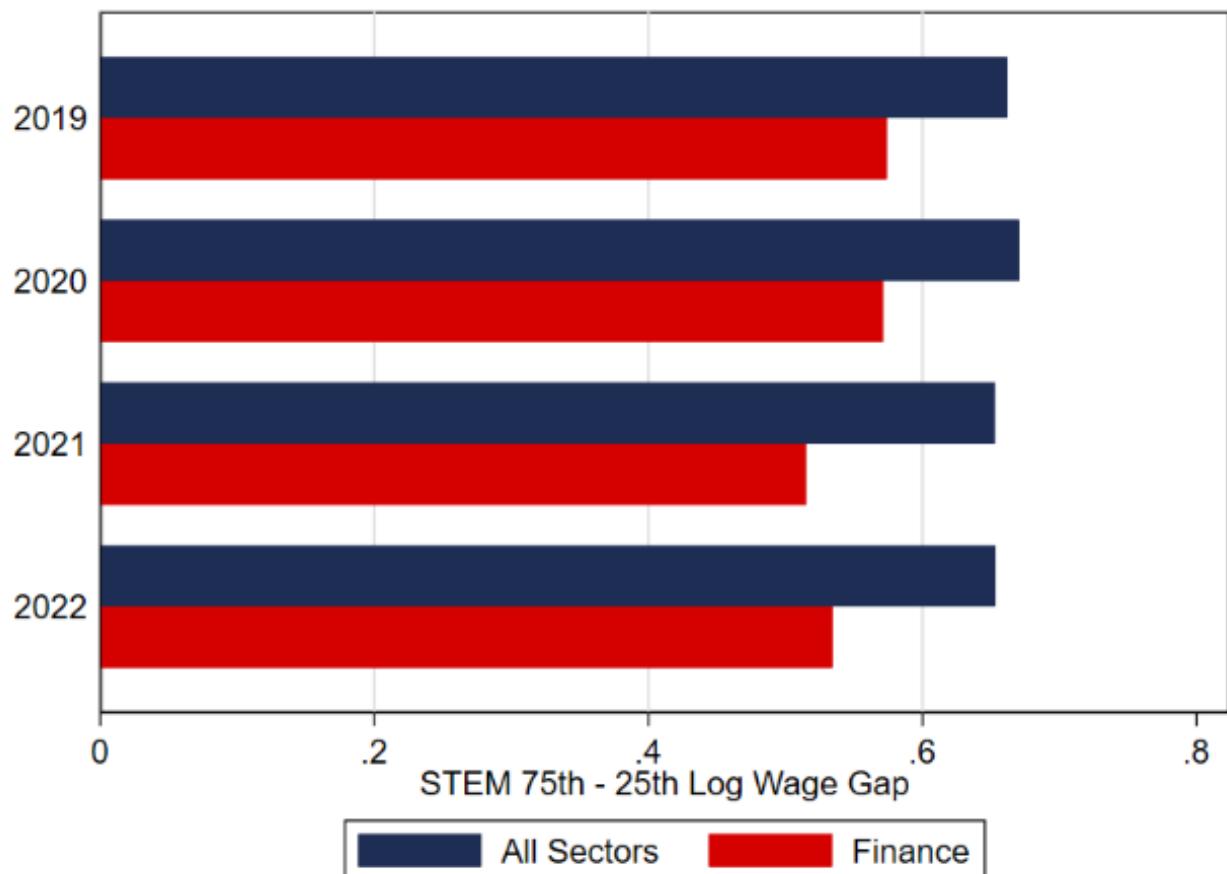
Figure 3: STEM Hourly Wage Premium



Trend 4: Wage dispersion in STEM finance declines, holds steady overall

The internal wage disparity - measured as the wedge between wages in the 75th net of 25th percentile - within the STEM sector in finance is showing signs of compression. The pay premium for the top quartile (75th percentile) of STEM jobs over the bottom quartile (25th percentile) has declined slightly, indicating a rise in compensation for those at the lower end of the STEM distribution. This could suggest that as STEM roles become more common and embedded in finance, pay scales are beginning to level out. This convergence is another marker of the democratization of STEM skills within the sector, as more roles incorporate technical and analytical competencies.

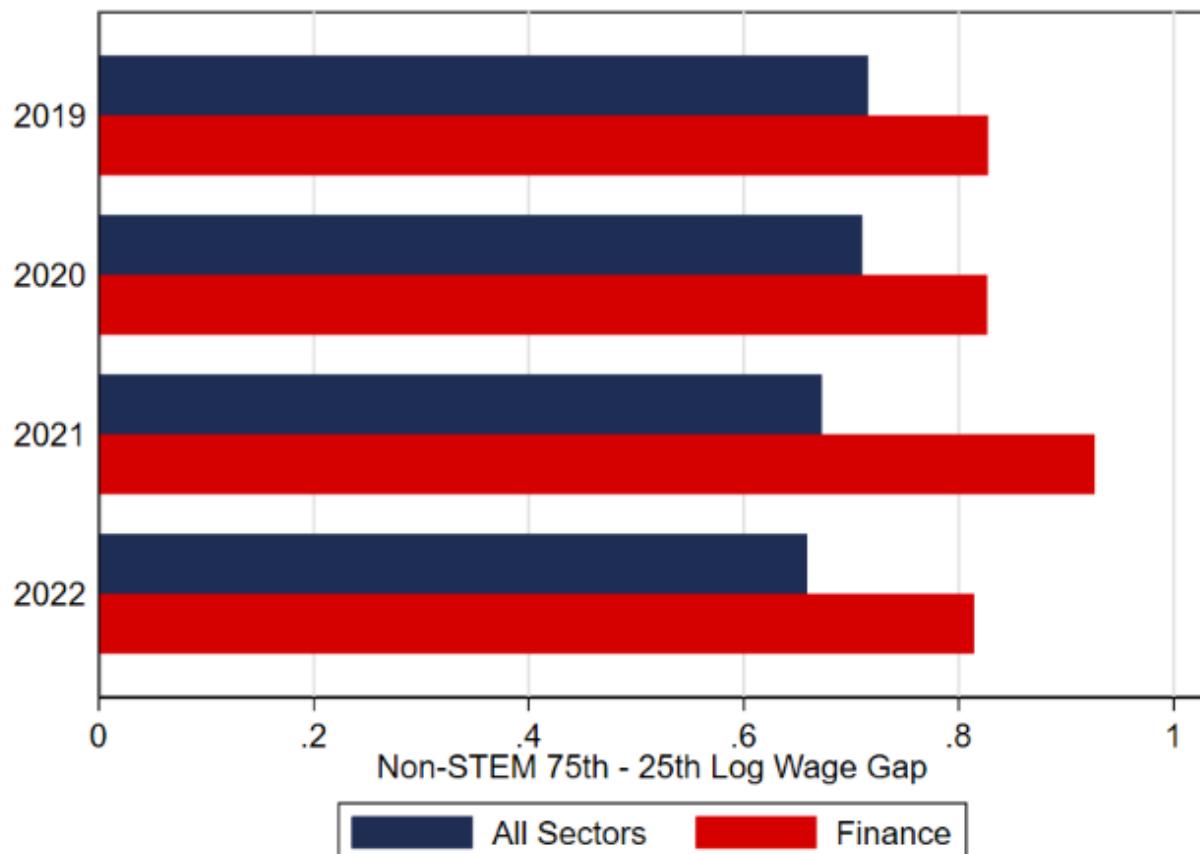
Figure 4: Within-Occupation Wage Dispersion in STEM



Trend 5: Wage dispersion in non-STEM finance holds steady, declines overall

Wage dispersion - following the prior definition - for non-STEM jobs in financial services has remained stable, with the 75th percentile earning the same premium over the 25th percentile in 2022 as they did in 2019. This steady pattern suggests that the more significant shifts in pay scales and job growth are occurring predominantly within the STEM sphere. It underscores how the transformational impact of technology and digitization in finance is primarily reshaping the landscape of STEM jobs, leaving non-STEM jobs comparatively less affected.

Figure 5: Within-Occupation Wage Dispersion in non-STEM

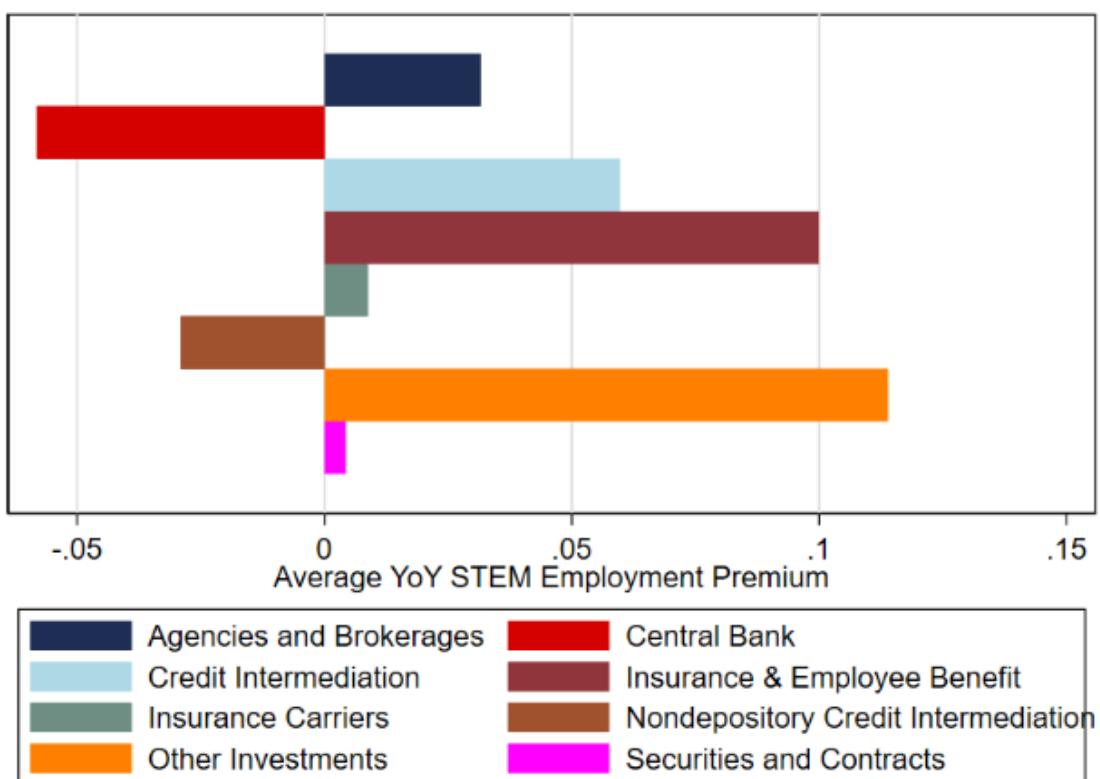


Trend 6: Employment in STEM jobs grew faster than non-STEM, especially in credit intermediation, other investment classes, agencies and brokerages, and insurance

Now, we disaggregate across the different finance sub-sectors.

Other investments saw the greatest STEM employment growth, relative to non-STEM, with over 10 percentage points year-to-year, followed by insurance and employee benefit funds with 10 percentage points greater growth, credit intermediation and 6 percentage points, and 3 percentage points more among agencies and brokerages.

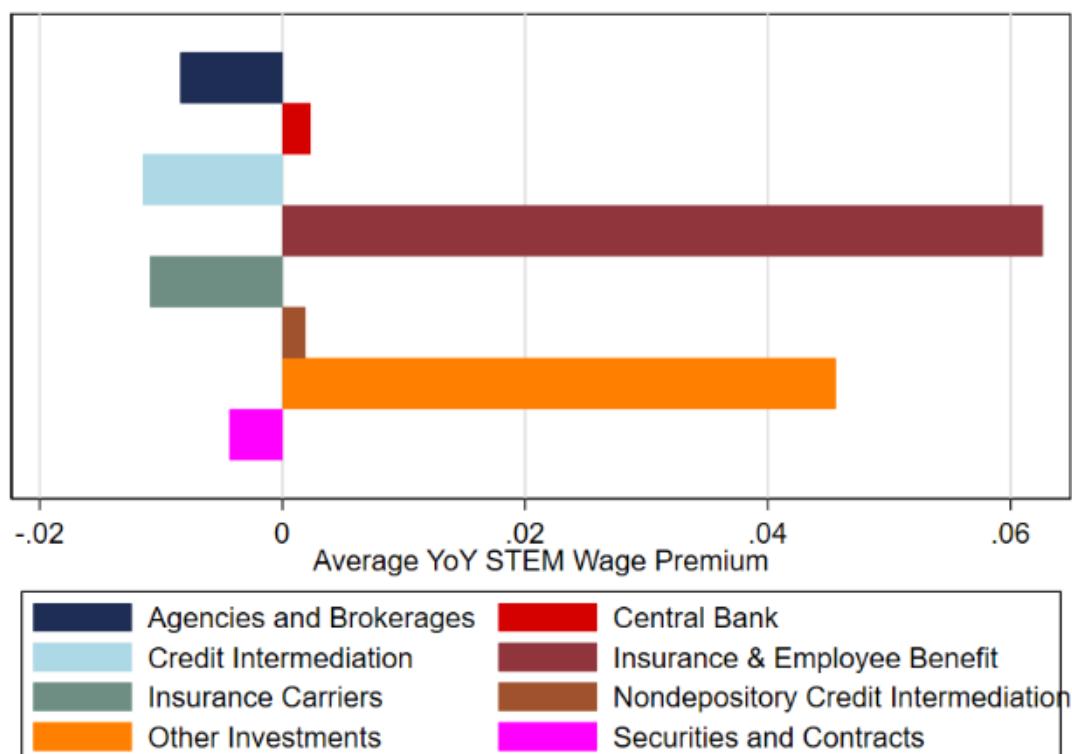
Figure 6: Relative Employment Differences in STEM versus Non-STEM Occupations



Trend 7: Hourly wages in STEM jobs grew faster than non-STEM, especially in other investment classes and insurance and employee benefits

While wage growth was relatively faster in non-STEM jobs with a few exceptions: other investment classes and insurance and employee benefits, and – to a lesser extent – central banks and non-depository credit intermediation. That both wages and employment grew fast in both insurance & employee benefit and other investments suggests that the supply of STEM workers could not keep up with demand, so prices had to rise even more rapidly to attract more workers.

Figure 7: Relative Wage Differences in STEM versus Non-STEM Occupations



THE FOUNDER



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Christos holds dual doctorates and masters in economics and management science & engineering from Stanford University with over 80 peer-reviewed research papers, over 200 stories in the media, and holds academic appointments at Stanford University, Columbia University, among others.

Christos previously served on the White House Council of Economic Advisers and as a non-resident fellow at the Harvard Kennedy School of Government and MIT Sloan. He continues to advise organizations and governments.