Georgetown University
McCourt School of Public Policy
Spring 2025

Author: Yihan Chen
Advisor: Prof. Ani Rudra Silwal
Date: May 1, 2025

STEM Employment and Labor Market Outcomes in the U.S.

Introduction

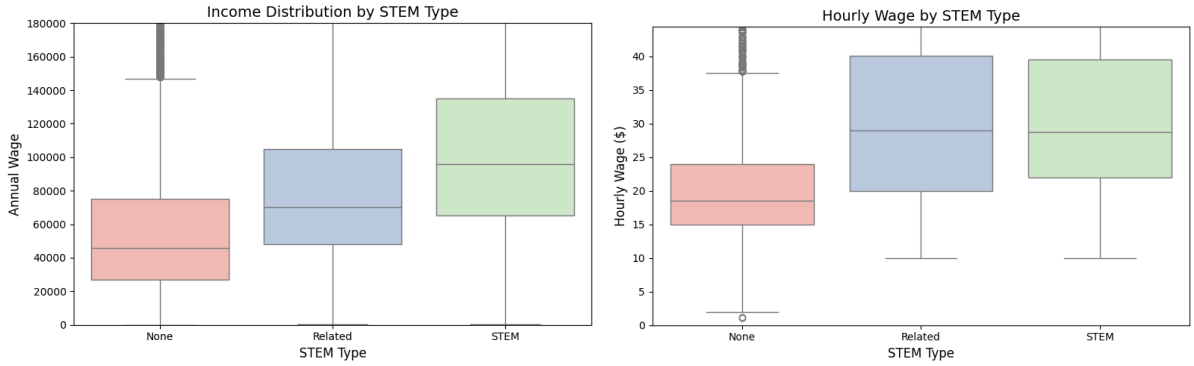
STEM (Science, Technology, Engineering, and Mathematics) occupations are widely viewed as engines of innovation and upward mobility. In recent years, these roles have played an increasingly important role in the U.S. economy. STEM and STEM-related jobs are often associated with higher earnings, stronger job stability, and greater access to long-term career growth. However, not all demographic groups participate equally in these opportunities, raising important questions about access, representation, and returns.

This descriptive analysis uses data from the **2023** **Current Population Survey (CPS)** to examine who works in STEM and STEM-related occupations, and how these roles differ by education, age, race, gender, citizenship, industry, and work characteristics.

The analysis focuses on **working-age individuals** who reported being employed at the time of the survey, including those who were **at work** or who **had a job but were not at work in the prior week**. The final sample consists of approximately **63,000 working individuals**.

Among this population (n=62,957), the **vast majority (84.5 percent) are in non-STEM** occupations, while 8.0 percent are in STEM roles and 7.5 percent are in STEM-related occupations. **STEM and STEM-related workers tend to earn substantially more** (Figure 1): the median annual income is $95,750 for STEM workers and $70,003 for STEM-related workers, compared to just $46,000 for non-STEM workers. The same pattern holds for hourly wages (n=5371), where STEM and related occupations have median rates of $28.75 and $29.00, respectively, well above the $18.55 median for non-STEM roles.

All analysis was conducted in Python. Results should be interpreted as correlational, not causal: it relies on cross-tabulations, and an Ordinary Least Squares (OLS) regression to analyze how wage and salary income varies by type of occupation and demographic profile. Most variables in our dataset show statistical significance—likely due to the large sample size—the analysis focuses primarily on the *magnitude* of differences rather than their *statistical confidence* (see Appendix).



(Figure 1: Left – Wage Income by STEM Type. Right – Hourly Wage by STEM Type)

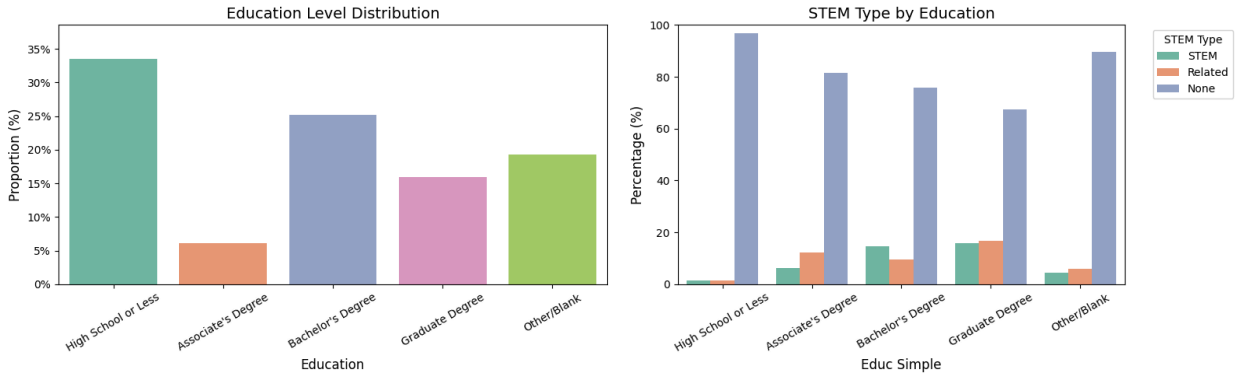
2. Labor Market Profile

This section provides an overview of the demographic characteristics of the U.S. workforce, focusing on education, age, race, gender, and marital status. This section examines both the overall distribution and the representation of STEM employment within each group. Regression results highlight the wage and salary income differentials associated with these characteristics.

2.1 Higher Education, More STEM Workers

Roughly one-third of U.S. workers have a high school education or less (33.5%), followed by 25.1% with a bachelor's degree and 15.9% with a graduate degree. The remaining workers hold associate's degrees (6.1%) or fall into the "Other/Blank" category (19.2%).

STEM participation increases with education level (Figure 2)**.** Among those with a graduate degree, nearly one-third (32.6%) work in STEM (15.9%) or STEM-related (16.7%) occupations. By contrast, STEM employment is virtually nonexistent (1.6%) among those with a high school education or less. Workers with associate's degrees show a modest STEM participation rate (6.1%).



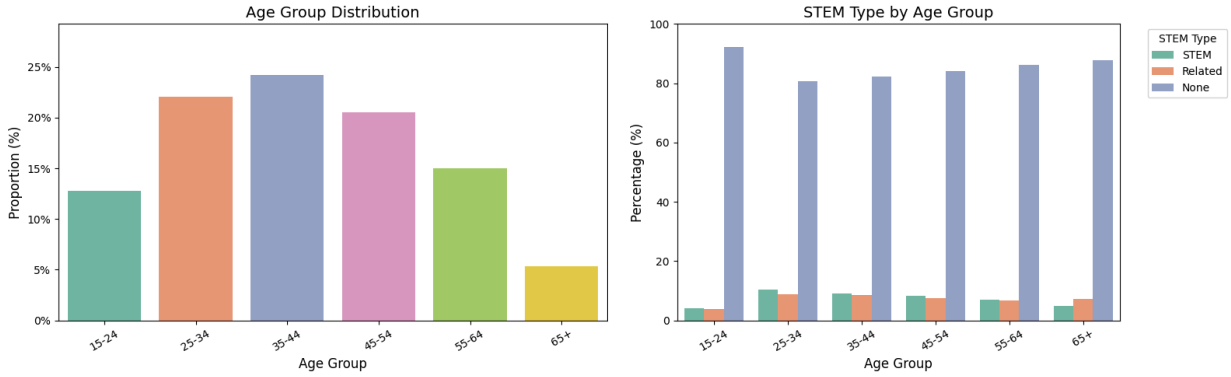
(Figure 2: Left – Distribution of Education. Right – STEM Type by Education)

Returns are high for education in the U.S. labor market. Compared to individuals with only a high school education, those with an associate's degree earn **23%** more, a bachelor's degree earn **50%** more, and a graduate degree earn **75%** more, holding all else constant.

2.2 Mid-Career Workers Dominate, Younger Workers Underrepresented in STEM

The U.S. workforce is concentrated among adults in their prime working years. Roughly one-quarter of workers fall in the 35–44 age group (24.2%), followed by 25–34-year-olds (22.1%) and 45–54-year-olds (20.5%). The youngest group (15–24) accounts for just 12.7% of the working population, and workers aged 65 and older make up only 5.3%.

STEM participation peaks in early mid-career (Figure 3). Among those aged 25–34, 10.5% are employed in STEM occupations and 8.7% in STEM-related fields. These rates are higher than those for both younger (15–24: 4.0% STEM) and older groups (65+: 5.0% STEM). STEM representation gradually declines in older age groups after age 34, though the variation is not obvious.



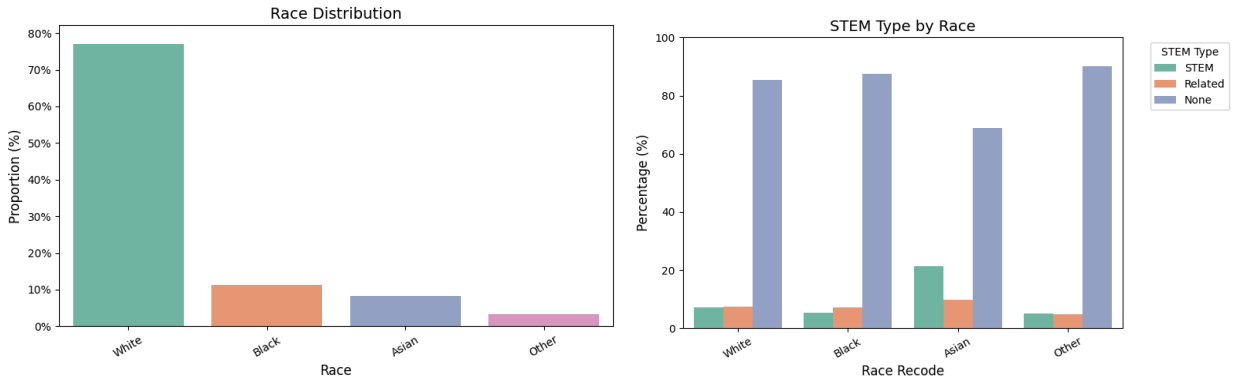
(Figure 3: Left – Age Distribution. Right – STEM Type by Age Group)

Earnings rise with age. Compared to the youngest workers (15–24), those aged 25–34 earn 41% more, those aged 45–54 earn 60% more, and even older workers (65+) earn nearly 39% more—controlling for others.

2.3 Asian Workers Are More Likely to Work in STEM

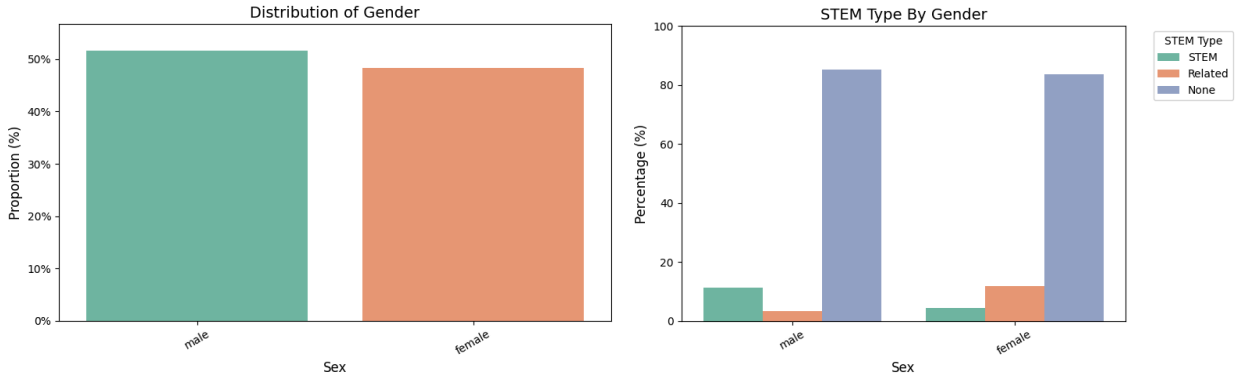
The U.S. workforce is predominantly White, with 77.1% of workers identifying as White, followed by 11.2% Black, 8.3% Asian, and 3.4% other racial groups. Gender representation is roughly balanced, with 51.7% male and 48.3% female workers.

Asian workers are substantially more likely to work in STEM occupations (Figure 4). Over one in five (21.3%) Asian workers are employed in STEM fields, far exceeding the STEM shares among White (7.1%), Black (5.2%), and Other (5.0%) workers.



(Figure 4: Left – Race Distribution. Right – STEM Type by Race)

Gender differences appear in the type of technical work (Figure 5)**.** Men are more likely to hold core STEM jobs (11.3%), while women are more likely to work in STEM-related occupations (11.8%). Just 4.5% of women work in core STEM jobs, compared to 11.3% of men—suggesting potential occupational segregation within technical fields rather than overall underrepresentation.



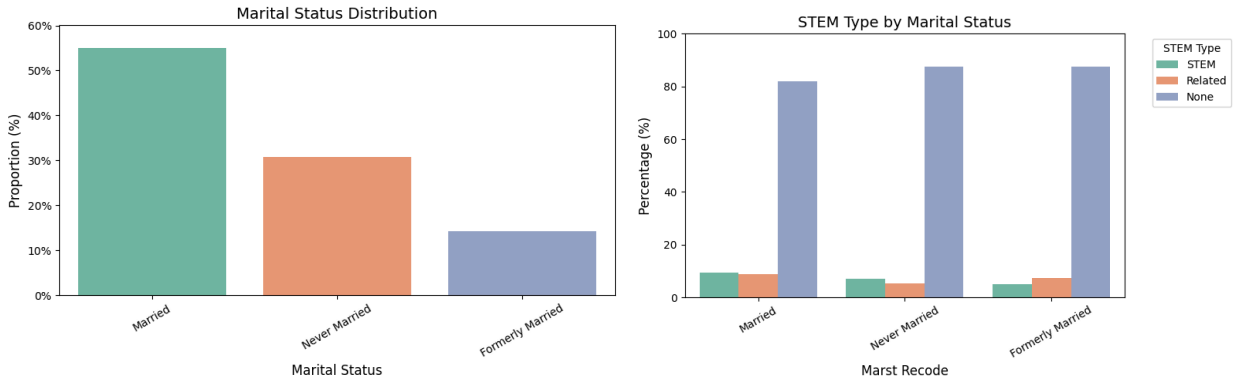
(Figure 5: Left – Gender Distribution. Right – STEM Type by Gender)

Racial and gender earnings gaps persist after controlling for job characteristics. Holding other factors constant, Asian workers earn 5% more than White workers, while Black and Other racial groups earn 5–6% less. Female workers earn 22% less than males on average.

2.4 Married Workers Are Slightly More Likely to Work in STEM

More than half of U.S. workers are married (55.0%), while 30.7% have never married and 14.2% are formerly married due to separation, divorce, or widowhood.

STEM participation shows small differences by marital status (Figure 6). Married individuals are somewhat more likely to work in STEM (9.3%) or STEM-related (8.7%) occupations than their never-married or formerly married counterparts. Among the never-married group, only 7.0% are employed in STEM and 5.4% in STEM-related jobs, while formerly married individuals show even lower shares.



(Figure 6: Left – Marital Status Distribution. Right – STEM Type by Marital Status)

Regression analysis suggests income advantages for married workers. Compared to married individuals, those who have never married earn 18% less, and formerly married individuals earn 11% less.

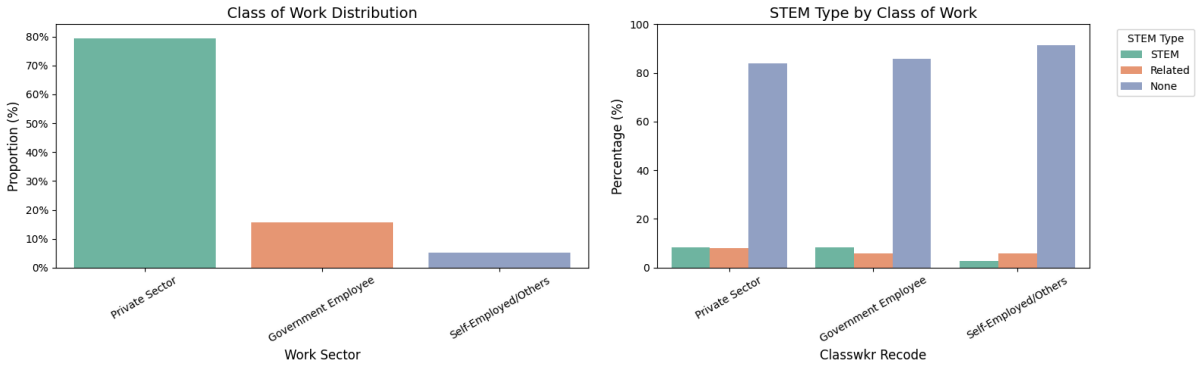
3. Employment Sector and Work Characteristics

This section describes the distribution of jobs by class of work, hours worked, and industry sector. It explores how occupational characteristics influence access to STEM jobs and discusses income differences using regression estimates.

3.1 Government Employees Slightly More Likely to Hold STEM Roles

Most U.S. workers are employed in the **private sector** (79.3%), with **15.6%** working in the **public sector (government employees)** and **5.1%** classified as **self-employed or in other arrangements** (Figure 7).

STEM employment is slightly more common in structured employment settings. Among government workers, 8.4% are employed in STEM occupations and 5.8% in STEM-related roles. Private sector workers show similar STEM representation (8.3% STEM, 7.9% related). In contrast, self-employed workers are least likely to be in STEM roles, with just 2.9% in STEM and 5.9% in STEM-related fields.



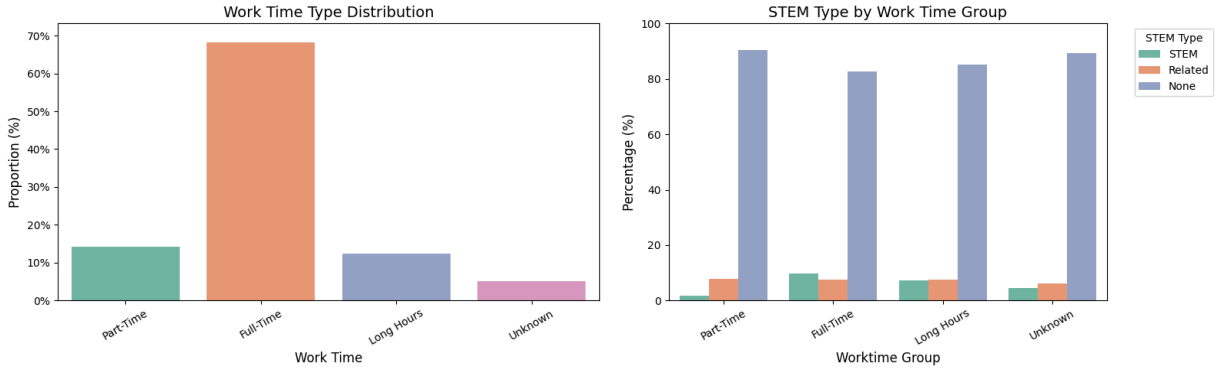
(Figure 7: Left – Class of Work Distribution. Right – STEM Type by Class of Work)

Holding all else constant, private sector workers earn **2% less** and self-employed workers earn **5% less** than government employees. While these differences are not large, they are statistically significant and reflect variations in job stability, benefits, and access to technical occupations.

3.2 Full-Time Workers Dominate STEM Fields

The majority of U.S. workers report working full-time (35–49 hours/week), accounting for 68.2% of the workforce. An additional 14.2% work part-time (fewer than 35 hours), 12.4% work long hours (50 or more hours), and 5.2% report unknown or irregular hours (Figure 8).

STEM jobs are overwhelmingly concentrated among full-time workers. Among full-time employees, 9.7% are in STEM occupations and 7.5% in STEM-related fields. In contrast, only 1.9% of part-time workers are employed in STEM, while most (90.3%) work in non-STEM jobs. Even among those working long hours, STEM participation is lower than expected, at 7.2%.



(Figure 8: Left – Hours Worked Distribution. Right – STEM Type by Work Time Group)

These results reflect how **STEM employment is typically tied to stable, full-time work**, potentially due to the structured nature of many technical roles, employer expectations for consistent labor, or access to benefits tied to full-time status.

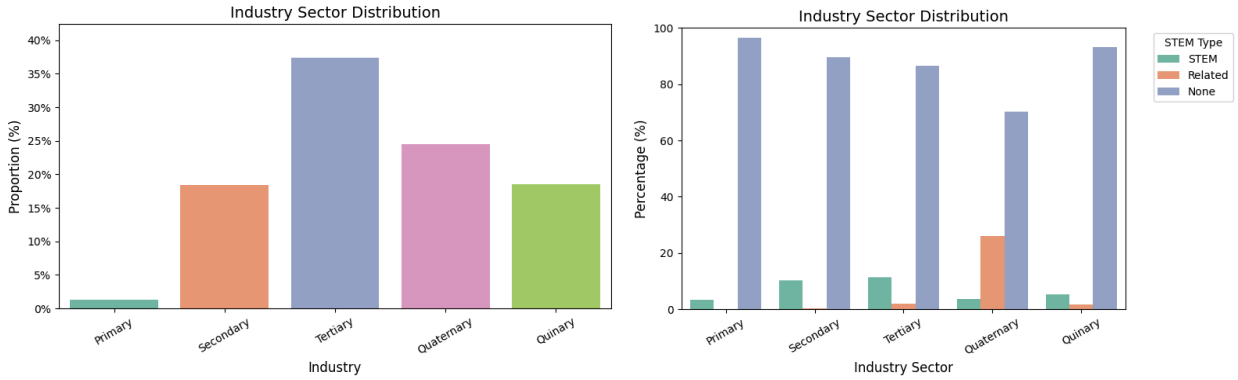
Part-time workers earn nearly 89% less than full-time workers. Long-hour workers earn **23% more**, while those with unknown work hours earn **29% less**.

3.3 STEM Roles Are Most Common in Quaternary and Tertiary Sectors

The U.S. workforce is concentrated in service-oriented sectors (Table 1). Over one-third of workers are employed in the **tertiary sector** (37.4%), which includes education, healthcare, and retail. This is followed by the **quaternary sector** (24.5%)—which includes professional, technical, and financial services—and the **quinary sector** (18.5%), composed of public administration and nonprofit work. Fewer workers are in the **secondary** (18.4%) and **primary** (1.3%) sectors.

Table 1. Industry Categories by NAICS Code	
Sector	**Representative Industries & NAICS Code Ranges**
Primary	Agriculture, Forestry, Fishing, Mining (NAICS: 11, 21)
Secondary	Manufacturing (NAICS: 31–33), Construction (NAICS: 23), Utilities (NAICS: 22)
Tertiary	Retail, Education, Health Care, Hospitality, Social Services (NAICS: 44–45, 61–62, 71–72)
Quaternary	Finance, Insurance, Real Estate, Professional Services, Information (NAICS: 51–55)
Quinary	Public Administration, Nonprofits, High-Level Management, Religious Organizations (NAICS: 92, and selected 81)
Source: https://www.census.gov/programs-surveys/aces/information/iccl.html	

STEM participation varies across sectors (Figure 9). STEM jobs are most common in the **tertiary sector** (11.3%) and **secondary sector** (10.2%). The quaternary sector, while highly skilled, employs more workers in STEM-related fields (26.1%) than in core STEM (3.7%). In contrast, the **quinary sector**—which includes many government and administrative roles—has a very low STEM share (5.2%), with nearly all workers (93.2%) outside STEM or related fields.



(Figure 9: Left – Industry Sector Distribution. Right – STEM Type by Industry Sector)

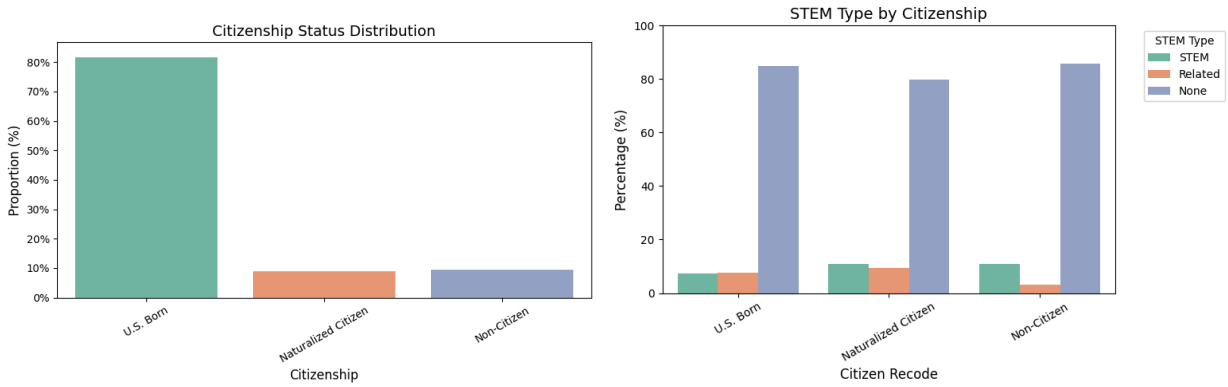
Regression results reinforce sectoral wage gaps. Compared to workers in the quinary sector, those in the tertiary and secondary sectors earn 15% and 20% more, respectively. Workers in the quaternary sector earn 8% less on average, while primary sector earnings do not differ significantly.

4. Unequal Returns to STEM by Citizenship Status

Citizenship status is closely linked to labor market outcomes in the U.S., including access to high-skilled occupations. The majority of workers in the dataset are U.S.-born (81.7%), with 9.3% classified as non-citizens and 9.0% as naturalized citizens (Figure 10).

STEM participation differs meaningfully by citizenship status. Among non-citizens, **10.9%** work in STEM occupations—higher than the **7.4%** observed for U.S.-born workers. This reflects the presence of foreign-born, highly skilled individuals, particularly those working in technical industries through employment

visas. Naturalized citizens match non-citizens in STEM participation (10.9%) and exceed both groups in STEM-related employment (9.3%).



(Figure 10: Left – Citizenship Status Distribution. Right – STEM Type by Citizenship Status)

U.S.-born workers earn 26% more than non-citizens on average. Naturalized citizens earn 17% more. Non-citizens—while more likely to enter STEM roles—may still face barriers in wages or mobility within those roles.

Further analysis shows that **non-citizens benefit more from entering STEM occupations than U.S.-born workers**. While non-citizens face lower average wages overall, the wage gain they experience from STEM employment is relatively larger than that of U.S.-born or naturalized workers. In fact, **U.S.-born STEM workers don't see as large a wage boost as expected**—about 23% less than what we'd anticipate if the benefits of being U.S.-born and working in STEM simply added together. STEM fields offer particularly strong economic returns for non-citizens, and may serve as an important pathway to upward mobility for foreign-born workers.

Conclusion

While most workers do not engage in STEM or STEM-related occupations in 2023, those who do are concentrated in specific demographic and sectoral groups—and enjoy earnings advantages.

STEM workers earn significantly higher wages, even after accounting for factors like education, age, and hours worked. These returns are especially significant for workers with higher degrees, full-time jobs, and employment in secondary or tertiary sectors. Importantly, **foreign-born workers—particularly non-citizens—are more likely to enter STEM roles**, and appear to benefit from the income gains associated with those occupations.

Nonetheless, disparities remain. Women, Black workers, and the self-employed are underrepresented in STEM fields. These patterns suggest that **access to STEM jobs remains unequal**, shaped by individual characteristics like education, and institutional factors like work setting and citizenship status.

Improving pathways into STEM—particularly for underrepresented groups—could play an important role in reducing wage inequality and expanding economic opportunity. Future research should examine the specific barriers to STEM entry, such as licensing requirements, immigration policies, or employer hiring practices.

Appendix

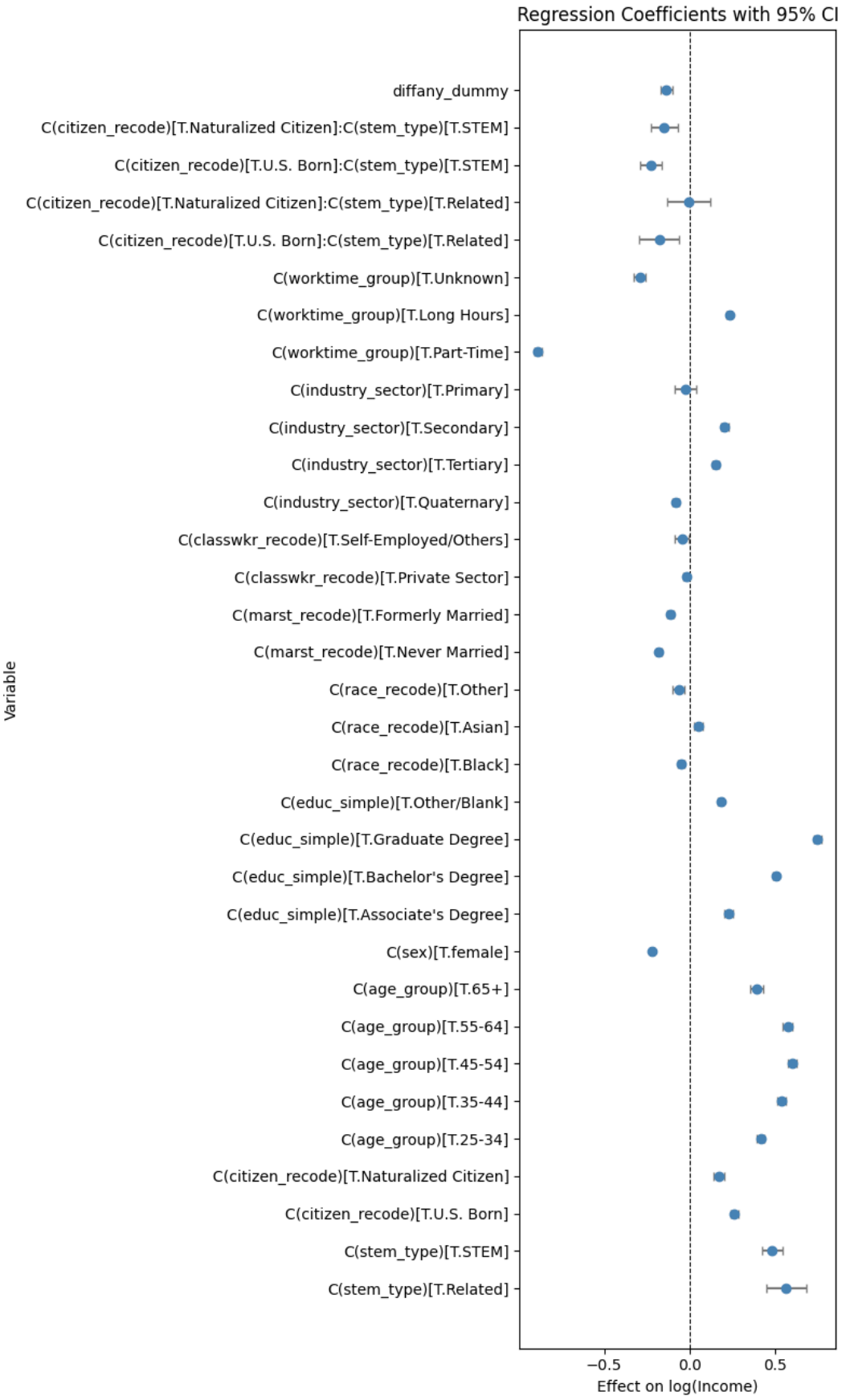
A1. Regression Model/Result

$$\begin{aligned}\log(\text{incwage}_i) = \beta_0 &+ \beta_1 \cdot \text{STEMType}_i + \beta_2 \cdot \text{Citizenship}_i + \beta_3 \cdot (\text{STEMType}_i \times \text{Citizenship}_i) \\ &+ \beta_4 \cdot \text{AgeGroup}_i + \beta_5 \cdot \text{Sex}_i + \beta_6 \cdot \text{Education}_i + \beta_7 \cdot \text{Race}_i \\ &+ \beta_8 \cdot \text{MaritalStatus}_i + \beta_9 \cdot \text{ClassOfWork}_i + \beta_{10} \cdot \text{IndustrySector}_i \\ &+ \beta_{11} \cdot \text{WorkTime}_i + \beta_{12} \cdot \text{Disability}_i + \varepsilon_i \end{aligned} \tag{1}$$

Table 1: OLS Regression: Effect of STEM Occupations on log(Wage and Salary Income)

Variable	**Category**	**Coefficient**	**Std. Error**
Intercept	—	9.949***	(0.019)
Field of Occupation	Related	0.565***	(0.058)
	STEM	0.483***	(0.031)
Citizenship	U.S. Born	0.261***	(0.012)
	Naturalized Citizen	0.172***	(0.016)
Age Group	25–34	0.414***	(0.012)
	35–44	0.537***	(0.013)
	45–54	0.598***	(0.013)
	55–64	0.572***	(0.014)
	65+	0.390***	(0.020)
Gender	Female	-0.219***	(0.007)
Education	Associate's Degree	0.227***	(0.013)
	Bachelor's Degree	0.503***	(0.009)
	Graduate Degree	0.748***	(0.010)
	Other/Blank	0.182***	(0.009)
Race/Ethnicity	Black	-0.050***	(0.009)
	Asian	0.052***	(0.012)
	Other	-0.065***	(0.018)
Marital Status	Never Married	-0.181***	(0.008)
	Formerly Married	-0.112***	(0.009)
Employment Type	Private Sector	-0.021**	(0.009)
	Self-Employed/Others	-0.046**	(0.021)
Industry Sector	Quaternary	-0.082***	(0.010)
	Tertiary	0.150***	(0.010)
	Secondary	0.205***	(0.011)
	Primary	-0.024	(0.031)
Work Time	Part-Time	-0.886***	(0.012)
	Long Hours	0.232***	(0.009)
	Unknown	-0.292***	(0.018)
Interaction: Citizenship × Field	U.S. Born × Related	-0.177***	(0.059)
	Naturalized × Related	-0.005	(0.066)
	U.S. Born × STEM	-0.229***	(0.033)
	Naturalized × STEM	-0.150***	(0.041)
Has Difficulty	Yes	-0.137***	(0.017)
R-squared		0.427	
Adjusted R-squared		0.427	
Observations		62,957	

Note: Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Reference groups: Field = None; Citizenship = Non-Citizen; Age Group = 15–24; Gender = Male; Education = High School or Less; Race = White; Marital Status = Married; Employment Type = Government Employee; Industry = Quinary; Work Time = Full-Time.
Interaction effects are interpreted relative to whose who are Non-Citizens working in non-STEM occupations.


Regression Coefficients with 95% CI
diffany_dummy
C(citizen_recode)[T.Naturalized Citizen]:C(stem_type)[T.STEM]
C(citizen_recode)[T.U.S. Born]:C(stem_type)[T.STEM]
C(citizen_recode)[T.Naturalized Citizen]:C(stem_type)[T.Related]
C(citizen_recode)[T.U.S. Born]:C(stem_type)[T.Related]
C(worktime_group)[T.Unknown]
C(worktime_group)[T.Long Hours]
C(worktime_group)[T.Part-Time]
C(industry_sector)[T.Primary]
C(industry_sector)[T.Secondary]
C(industry_sector)[T.Tertiary]
C(industry_sector)[T.Quaternary]
C(classwkr_recode)[T.Self-Employed/Others]
C(classwkr_recode)[T.Private Sector]
C(marst_recode)[T.Formerly Married]
C(marst_recode)[T.Never Married]
C(race_recode)[T.Other]
C(race_recode)[T.Asian]
C(race_recode)[T.Black]
C(educ_simple)[T.Other/Blank]
C(educ_simple)[T.Graduate Degree]
C(educ_simple)[T.Bachelor's Degree]
C(educ_simple)[T.Associate's Degree]
C(sex)[T.female]
C(age_group)[T.65+]
C(age_group)[T.55-64]
C(age_group)[T.45-54]
C(age_group)[T.35-44]
C(age_group)[T.25-34]
C(citizen_recode)[T.Naturalized Citizen]
C(citizen_recode)[T.U.S. Born]
C(stem_type)[T.STEM]
C(stem_type)[T.Related]
Variable
−0.5
0.0
0.5
Effect on log(Income)