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Gender Disparities, Career Choices, and Wage Dynamics in STEM Occupations in Brazil

Women in the STEM Labor Market in Brazil

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Abstract

The STEM labor market is considered essential for developing ideas, human capital and innovation. In Brazil, STEM fields gained notoriety with educational programs in recent years, but little is known about the STEM labor market characteristics. Understanding how gender is related to participation and success in STEM jobs is necessary to design policies that better harness the potential of women in this essential sector of the economy. This report provides an outlook of the STEM Brazilian labor market with a gender perspective using RAIS. We contribute with unprecedented data on the STEM market size, educational and occupational profile, and the gender gap over the last 17 years in the country.

1 Introduction

STEM fields (Science, Technology, Engineering and Mathematics) have gained increasing notoriety, in particular due to educational policies implemented in several countries in recent years with the aim of developing human capital and innovation. There is no universal definition of STEM, but there is reasonable agreement that STEM specialists use their knowledge in these disciplines to solve problems and provide scientific and technological advances. Among developed countries like the United States, the acronym is widely used in discussions concerning academia, government and business in general, since its emphasis on innovation have strong implications for the labor market and the economy.

Nevertheless, women are underrepresented in the STEM market around the world. In 2015, women comprised only 24% of STEM workers in the United States (USBLS, 2018). In the European Union, this share was even smaller, with only 14% of female workers in STEM fields in 2014 (EIGE, 2018). How is the representation of women in STEM jobs in Brazil?

The STEM debate is still incipient in the country, with few studies documenting the size and characteristics of its STEM labor market.[1] To help fill the gap in the literature and provide a better understanding of what the STEM market is in the country with an emphasis on gender, this document describes the STEM formal labor market in Brazil, using *RAIS*, an administrative data set from the Ministry of Labor which contains information of formal workers in Brazil. To determine which workers have STEM jobs, we use our classification proposed in the document '*STEM Classification in the Formal Labor Market in Brazil*', and match *CBO-2002*'s occupational codes in *RAIS* with our classification codes.

The number of STEM workers in Brazil is significantly smaller than what is observed in developed countries such as the United States – it has nearly eightfold more workers than

[1] Although scarce, the existing literature points to a small STEM market in Brazil. Looking at *PNAD*, the National Household Sample Survey that contains information on both formal and informal workers, Schwartzman (2018) finds that among workers with post-secondary education, only 10% work in the STEM fields, and women represent around 23% of STEM workers in the country. Bonini et al. (2020) look at formal labor market administrative data from *RAIS*, and find that the STEM workforce in the country corresponds to a tiny 0.79% of the total, and women's workforce in STEM areas is around 20% across all regions.

Brazil in absolute terms. In relative terms, Brazil has almost 3% of its workforce employed in STEM occupations, while in the USA, this share is around 6%. The percentage of STEM workers in the labor market was steady over the last 15 years in both countries. Females are underrepresented in STEM occupations, accounting for 26%. Women represent 45% of the formal labor market in Brazil. The share of females observed in both STEM and non-STEM occupations in Brazil is similar to the shares followed for the USA.

RAIS covers all formal employment in Brazil but misses the informal sector. As nearly 45 percent of workers are informal in Brazil, we use household survey data from the Pesquisa Nacional por Amostra de Domicílios Contínua (PNADC) to document wages and participation rates in STEM occupations in informal employment. We can not match precisely the STEM occupation classifications used in RAIS since the occupational codes are slightly different.[2] The main differences are that we miss professors and researchers in STEM fields as well as technical professions. Yet, the household survey data sheds light on the main characteristics of the Brazilian STEM informal workforce.

The informality among the STEM workforce in Brazil is considerably lower than the average of the country. In 2019, 27% of the STEM workers were informal, below the 45% observed for the workforce. We don't find any significant gender difference in the formal and informal STEM occupations (76% and 72% are males, respectively). The same for race, as around 70% of STEM workers, declare themselves as whites, both in the formal and informal labor market. Hourly wages are 20 percent lower in the informal sector. Furthermore, the gender hourly wage differential is very similar among the formal and informal sectors (nearly 29%). In the end, STEM informal workers don't seem to be in the informality because they are "surviving" or see informality as a buffer for unskilled individuals who do not have access to better job opportunities in the formal sector, and that could never survive as formal entrepreneurs.

Among our contributions, this paper offers an unprecedented overview of the gender gap in the STEM fields in the formal labor market in Brazil, describing in detail how the

[2]As described in section 8, both PNADC and RAIS have a 4-digit level occupation. Still, the codes in PNADC are more aggregated – PNADC has 30% fewer occupations than RAIS.

STEM market evolved overtime under a gender segregation perspective. We also compare our results with the rest of the formal labor market and the rich information present in *RAIS* data set to learn how the STEM gender gap communicates with other market and individual characteristics. Additionally, we present descriptive evidence that events in the informal sector for STEM workers do not differ substantially from the formal sector.

Besides this introduction, the paper is organized as follows: Section 2 describes the data and sample selection. Section 3 presents an overview of the STEM market. Section 4 outlines the educational profile of STEM workers. Sections 5 untangle the most frequent occupational fields and top occupations in STEM. Section 6 characterizes the wage gap. Section 7 displays the gender participation and earnings gap over time in comparison with the remainder of the labor market, and Section 8 describes the informal STEM labor market. Finally, Section 9 concludes the report.

2 Data

The data for this research comes from the *Relação Anual de Informações Sociais* (RAIS), between 2003 and 2019. *RAIS* is a longitudinal administrative database with employer-employee information provided by the Ministry of Labor. The records are created to provide information for the federal salary supplement program ('*Abono Salarial*') and employer contribution program (FGTS). In Brazil, firms are required to report all workers formally employed at some point in the previous year.

RAIS covers more than 90% of the universe of the formal labor market in Brazil (Menezes-Filho & Muendler, 2011) through restricted access records that contain an average of 37 million observations in the years described. Each worker is identified by a unique identifier (*PIS* or *CPF*) and the firms, in turn, are identified by the *CNPJ*. *RAIS* provides information about workers (type of employment, length of employment, gender, color, age, education, monthly salary, contract hours, occupation, and information on leave), as well as characteristics of the firm (sector of activity, size average salary).

In order to minimize noise and avoid double counting of workers, we restricted the analysis to a sub-sample of workers between 18 and 65 years old and who worked all months in a

given year. Workers with inactive jobs in December 31 of the regarding year were dropped. In the case of individuals with more than one active job, the main one is considered the one with the highest earnings. Real earnings were calculated by multiplying December earnings (in minimum wages) by the value of the minimum wage for each year using the *INPC* (*Índice Nacional de Preços ao Consumidor*) as a deflator with 2019 as base year.

The classification of STEM Occupations was done manually following recomendations from the *U.S. Bureau of Labor Statistics* (USBLS, 2012a,b). *CBO-2002* four-digit occupations were classified as STEM according to the *USBLS* definition of STEM occupations [3]. Higher Education Professors (*CBO-2002* code 234) of the state of *Minas Gerais* presented serious classification problems with the occupational code of up to 3 digits, between the years 2003 and 2007, and in order not to bias the results, were removed from our analysis.

3 Overview

In 2019, Brazil had approximately 1.148 million STEM workers among its 41 million formal workers, as shown in Table 1. This represented 2.8% of the total workers in the Brazilian formal labor market in 2019. In 2003, this number was 2.1%, which means that this market has not expanded much relative to the rest of the labor market in recent years. In comparison to the United States, this number represents around half of the share of STEM workers in this country.

According to a report by the U.S. Department of Commerce (USBLS, 2018), the percentage of STEM workers in the US in 2015 was 5.7%. If Brazil is much behind the US in terms of the share of STEM workers in the formal labor market, in absolute terms the picture is even worse: the USA has around 8,620 thousand of STEM workers, around eight times the total of STEM workers in Brazil.

The share of women working in the STEM labor market is small compared to the share of women working in the labor market as a whole. Figure 1 plots these shares. While in the STEM field they represented only 26% of the total of workers in 2019, in the labor market they were 45% of the total of workers. These proportions are very similar to those in the

[3]For further detail, see '*STEM Classification in the Formal Labor Market in Brazil*'

USA, with 47% of women in all jobs and 24% in STEM jobs (USBLS, 2018).

STEM workers are generally younger than the remainder of the labor market. Figure 2a (a) plots the age distribution of the two groups. While the mean age in STEM occupations is 36.6, it is slightly higher for non-STEM occupations, 37.4.

When looking at the racial composition of the STEM market, black workers are underrepresented in STEM occupations, accounting for only 30% of the workers' share, as seen in Figure 2b (b). In the formal labor market, they represent 45% of the workers. However, these numbers should be interpreted with caution, since the race variable available in *RAIS* has high number of missing observations (around 18%).

4 Education

Considering educational attainment, women in the Brazilian formal labor market were more College-Educated (that is, College Degree or more) than men in 2019. Table 2 shows that they represented 60% of the total of workers with a College Degree or above. In the STEM market, even though the women's share of the highly educated workers is smaller (26%, against 74% of men in 2019), it is because they are underrepresented in this market.

Considering all women working in STEM fields in 2019, 72%(=217/300) of them were College Educated, while 65%(=552/849) of the total of men in these fields had this education degree. The high shares of College Educated men and women illustrate how this market is highly educated compared to the rest of the labor market. In the formal labor market as a whole, in 2019 only 30%(=5,455/18,231) of women and 16%(=3,656/23,069) of men were College Educated, much lower shares than the observed for the STEM field. Comparing to 2003, there is a general increase in education both in the labor market as a whole and in the STEM labor market. While the College Educated workers in the formal market increase by a factor of 2.5, in STEM they increase by a factor of 2.2.

Figure 3a plots the share of workers in STEM jobs by education and gender (panel a), and by education conditional on gender (panel b), confirming the high educational level of this particular labor market. The distribution of educational levels is similar among men and

women, but women are slightly more educated, with more women with a Bachelor's Degree, Master's and Doctorate.

5 Occupational Fields

The distribution of men and women vary among STEM fields, as shown in Figure 4. Men are highly concentrated in Computer and Math occupations (46%), followed by Architecture and Engineering occupations (33%). Women, on the other hand, are less concentrated in particular STEM fields, but are more present in Computer and Math (38%) occupations, followed closely by Architecture and Engineering (25%) occupations and lastly by Education and Research (15%) and Physical and Life Sciences (14%).

When we look at the change in gender distribution within STEM fields over time, there is a change in the picture between 2003 and 2019. In some fields, like Management occupations, the share of female workers remained stable. For other fields, women became more represented, like Architecture and Engineering occupations, with a 5 percent point increase, and Physical and Life Sciences, with a 10 percent point increase. In Computer and Math occupations, they became even more underrepresented, with a 8 percent point decrease, but the most significant drop was in Education and Research occupations, with a 15 percent point decrease. Table 3 presents the gender distribution in STEM fields.

Plotting the top 3-digit STEM occupations in Brazil since 2003, some major shifts become evident, as illustrated by Figure 5. While engineering and architecture occupations were the top STEM occupations in 2003, there was a fall in the share of STEM workers in these occupations. In parallel, the share of Computer Professionals rose steadily. Computer Technicians are still among the top STEM occupations since 2003, but its share of workers suffered a sharp fall in 2010. Civil Construction Technicians remained stable throughout time, and Drafters, who represented a tiny share of STEM workers until 2010, gave way to Higher Education Professors which in turn were replaced by Managers in 2018.

6 Wage Gap

Figure 6 plots the average hourly earnings by gender in the STEM labor market and in the formal market.

Hourly earnings are calculated by dividing the workers' earnings in December by weekly contract hours multiplied by four. The average wage gap in STEM occupations is 7%(=1-42.78/47.94), while the average wage gap in the formal labor market is of 11% (=1-18.04/19.35). The raw comparison of average earnings can hide other factors that affect earnings, such as age and education. To control for these characteristics and have a more precise measure of the gender wage gap, we use regression analysis[4]. Figure 7 below plots the regression adjusted wage gaps in 2019 for each occupational group.

When controlling for other observable characteristics, the STEM earnings gender gap is higher (16%). The gap is greater among Architecture and Engineering (17%), Physical and Life Sciences occupations (14%) and Computer and Math occupations (13%). STEM Managers (11%) and Education and Research (9%) occupations have the lowest wage gaps.

7 STEM by Gender Over Time

Looking at the STEM participation by gender across years, there is a small but steady increase in the number of women, as seen in Figure 8a (a). The number of male workers, on the other hand, increases firmly until 2014, when it drops. Departing from around 400 thousand STEM male workers in 2003, this number raises to 850 thousand of workers, while the number of female workers has nearly doubled, from 165 thousand to around 300 thousand.

In order to understand if the breaks in the series presented above were exclusive of the STEM labor market or of the Brazilian market as a whole, we plotted the relative trajectories of workers participation in both markets, in Figure 8b (b). The relative participation is calculated by dividing the total number of female workers over the total number of male

[4]We regress the log hourly earnings for STEM workers in general and for each of the different STEM fields sample separately on gender, age, race, education attainment, state, industry sector (2 digits code) and a fourth degree polynomial of age.

workers in each year. The fall in relative participation of women that is observed in the STEM market around 2010 is not observed for the remainder of the labor market. On the contrary, women's relative participation in the labor market as a whole rose steadily since 2003.

The picture is a little different when we look at earnings. Figure 9a (a) shows that both male and female earnings in the STEM market rose in a steady pace until 2010, with women's earnings being more accentuated than men's, pointing towards a convergence in the wage gap. As from 2011, there is a shift in the earnings trajectories. Both men and women's earnings stop increasing as fast, and face a small decrease by the end of the series (from 2014 onwards). This movement is almost parallel between male and female workers, so that the wage gap, that was shrinking, became stable in these last years.

If on one hand women's relative participation in STEM fields has fallen, and is worse when compared to the rest of the labor market, the earnings scenario, on the other hand, looks better for STEM female workers. While relative earnings increase timidly for non-STEM occupations, they rose sharply for STEM occupations, confirming the gender convergence in earnings showed on Figure 9b (b).

8 STEM in the Informal Sector

The existence of a large informal sector is a prominent feature of most developing economies. In Brazil, nearly 45 percent of workers are informal. Informality is typically associated with low-skill and low-wage occupations. Informal workers are not covered by the labor legislation (e.g., minimum wages) and are not entitled to government-mandated benefits (e.g., social security). However, precisely because of this non-compliance, the presence of a large informal sector further provides greater *de facto* flexibility in the labor market (Ulyssea, 2018). This trade-off between protection and flexibility generates non-trivial patterns of selection into the informal sector. In this context, given the size and persistence of informality in Brazil's labor market, it is crucial to understand the prevalence of STEM workers in the informal markets and understand the relationship between the gender gap in STEM with the formal/informal status. To shed light on this issue, we explore data from the Brazilian Household Survey

(*Pesquisa Nacional por Amostra Domiciliar Contínua*, hereafter PNADC) from 2012 and 2019.

The list of STEM occupations includes professionals from exact, physical, biological, and engineering sciences and systems analysts and computer-related professionals. The complete list of 4-digit CBO occupations used to define STEM workers in PNADC dataset is presented in table A1. We classify 37 occupations as STEM out of 435 occupations in the CBO-dom, corresponding to 8.5% of the total number of occupations. In the CBO version available in RAIS, 65 occupations are classified as STEM out of 622 occupations (10.5%).

Analogous to the CBO classification do define STEM occupation in RAIS, depicted in section 2, we follow the definition for STEM occupations proposed by the Bureau of Labor Statistics (BLS) to classify workers in STEM and non-STEM occupations. The occupational classifications used in the PNADC (*Código Brasileiro de Ocupações* (CBO-Dom) are not directly comparable to the CBO available in RAIS and to SOC. Thus, we generated a crosswalk between these occupations to create a CBO-Dom-based STEM taxonomy.

Our classification has some shortcomings due to the nature of CBO-Dom's classification, which does not enable us to distinguish the fields of specialization of higher education professors, aggregating them in a single occupation, regardless of the area of knowledge where they teach. Therefore, defining this category as a STEM occupation would imply that any college professor would be classified as a STEM worker despite their teaching and research physics or literature. Additionally, CBO-Dom does not incorporate occupational codes that refer specifically to professionals with technical education, so it is impossible to state to what extent they have been or have ceased to be incorporated into the contingent defined as STEM.[5]

We document that nearly 31,5 thousand workers were informal in 2019, and STEM work-

[5]Our taxonomy is very similar to the one proposed by Maciente et al. (2014) with two exceptions. We include "graphics and multimedia designers" and "CEOs from related STEM industries' or areas (research and development, construction, and information and communication technology)" in our classification.

ers represent only 1.1%, accounting for 353 thousand workers.[6] We further document that roughly 27 percent of the STEM workforce works is in the informal sector, that is, are self-employed or unregistered, accounting for 353 thousand workers.

We find no significant difference in gender and sex composition among formal and informal labor markets. We find that women are under-represented in the STEM workforce in general (34%), and this share is similar to the one observed in the informal labor market (36%. Whites are also the majority of the STEM workforce (71%) in the formal and informal sectors. The race composition in the economy is more similar, with whites slightly under-represented (42% in the informal sector).

The STEM workforce is significantly more educated than the typical worker from the labor market: 95% of STEM workers have a college degree while only 23% in the occupied population have higher education.[7] The average years of education are very similar among formal and informal STEM workforce with no significant gender difference. This feature differs significantly from what we observe for the non-STEM workforce. While formal workers are more educated – they are on average two years more educated than the informal ones – and women are more educated than men – the gender gap is around two years of schooling.

Although there are no differences in demographics and schooling characteristics, the wages differ substantially among formal and informal STEM workforce.[8] Both men and women earn nearly 20 percent less in the informal labor market in comparison to the hourly wages in the formal labor market, with a gender hourly wage gap of approximately 28% in both sectors. This number mirrors the wage gap we observe among college-educated workers already documented in the literature (cite).

[6]Our sample is restricted to occupied individuals aged 18 years or more, excluding housekeepers and unpaid workers.

[7]Note that in our classifications using PNADC, the sample is selected in a more educated workforce than the one observed in RAIS. This is probably because we are not including technical educations considered as tertiary education due to code limitations.

[8]It's worthwhile noting that one cannot compare the salaries from the formal sector in PNADC and RAIS as in PNADC we have information on the self-declared income while RAIS reports the payroll.

9 Discussion

The numbers presented in this article show an unprecedented overall picture of the STEM market in Brazil from a gender perspective. Compared to developed countries like the United States, the number of STEM workers in Brazil is still small (around eight times less than the USA), and its share relative to the formal market didn't grow significantly between 2003 and 2019. However, even though the two countries' STEM market size is very different, the share of women among STEM workers is very similar (24% and 26%).

Workers in STEM jobs are more likely to hold a College Degree relative to the rest of the formal sector: around 67% of STEM workers are College-Educated, compared to 22% of the formal workers. Though working women in Brazil have higher educational attainment than men, this does not hold for STEM, as both men and women in this sector have similar education degrees.

The gender share remained relatively stable during this period, with men entering the market at a slightly more accentuated rate than women. Nevertheless, there has been a change in occupational fields: there are now more women working in Architecture and Engineering fields, as well as Physical and Life Sciences, and less towards Education and Research and Computer and Math occupations.

The average wage gap in STEM is lower than the gap in the formal sector, but increases as other characteristics are controlled for. This suggests that women in STEM jobs have better producing characteristics than men, even though they have similar educational degrees at first glance.

Over time, the participation gap increases a little in the STEM market, while the wage gap decreases, on the other hand. Changes in gender composition in the occupational fields and different wage gaps in these fields point to the importance of other possible unknown factors contributing to the wage gap in the STEM market. To achieve a better understanding of the determinants of the wage gap in STEM jobs, further investigation is necessary.

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Tables and Figures

Table 1

STEM workers in Brazil and the United States

(thousands of workers)

	Brazil			USA	
	2003	2015	2019	2000	2015
All Workers	27015	43638	41300	129717	150573
STEM	570	1125	1148	7001	8620
%	2.1%	2.6%	2.8%	5.4%	5.7%

Source: Author's calculations using RAIS and U.S. Department of Commerce

Table 2

Total and STEM Employment by Gender and Educational Attainment, 2003 and 2019

(thousand of workers)

	Male		Female		Percent Female	
	2003	2019	2003	2019	2003	2019
All workers	16344	23069	10671	18232	40%	44%
College-Educated	1625	3656	2054	5455	56%	60%
STEM workers	404	849	166	300	29%	26%
College-Educated	244	552	108	217	31%	28%

Source: Author's calculations using RAIS

Table 3

Employment by Gender and STEM Field, 2003 and 2019

	Male		Female		Percent Female	
	2003	2019	2003	2019	2003	2019
STEM total	404044	848700	166148	300270	29%	26%
Computer and Math	138990	390294	62807	114197	31%	23%
Architecture and Engineering	184403	276556	35813	75418	16%	21%
Physical and Life Sciences	29265	43559	19163	43536	40%	50%
Education and Research	31974	59676	43746	45332	58%	43%
STEM Managers	19412	78615	4619	21787	19%	22%

Source: Author's calculations using RAIS

Table 4

STEM workers in Brazil – Formality Status

(Thousands of workers)

	Workforce		***Formal***		***Informal***	
	2012	*2019*	*2012*	*2019*	*2012*	*2019*
All workers	*65,292*	*70,730*	*38,859*	*39,282*	*26,433*	*31,448*
STEM	*950*	*1,296*	*766*	*943*	*184*	*353*
non-STEM	*64,342*	*69,434*	*38,093*	*38,339*	*26,249*	*31,095*
%	*1.5%*	*1.8%*	*2.0%*	*2.4%*	*0.7%*	*1.1%*

Note: Authors own tabulation using PNAD-C. Sample includes occupied workers aged 18 years old or more; excludes housekeepers and unpaid workers.

Figure 1: Gender Shares of Total and STEM Jobs, 2019

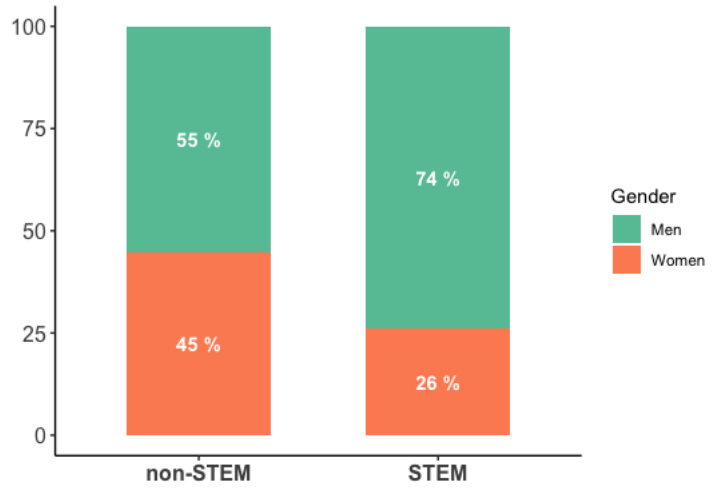
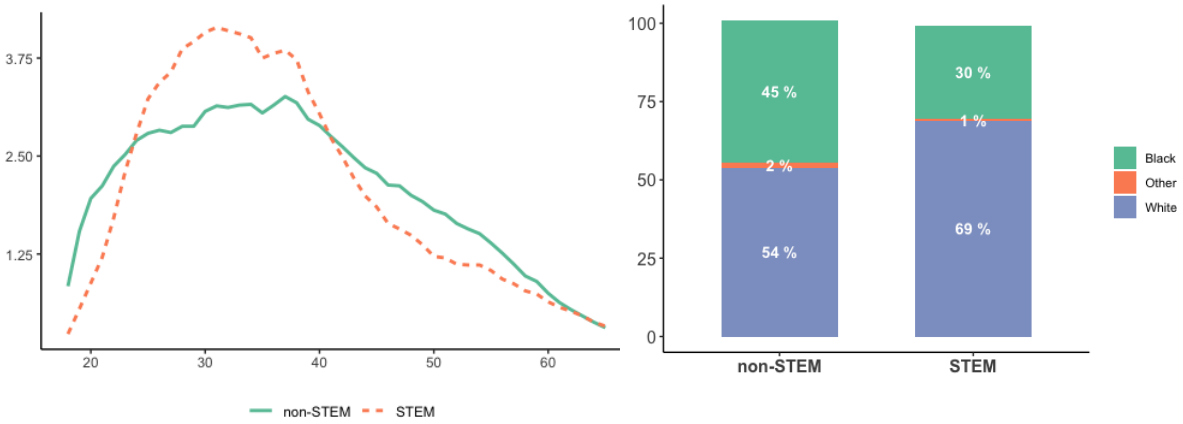


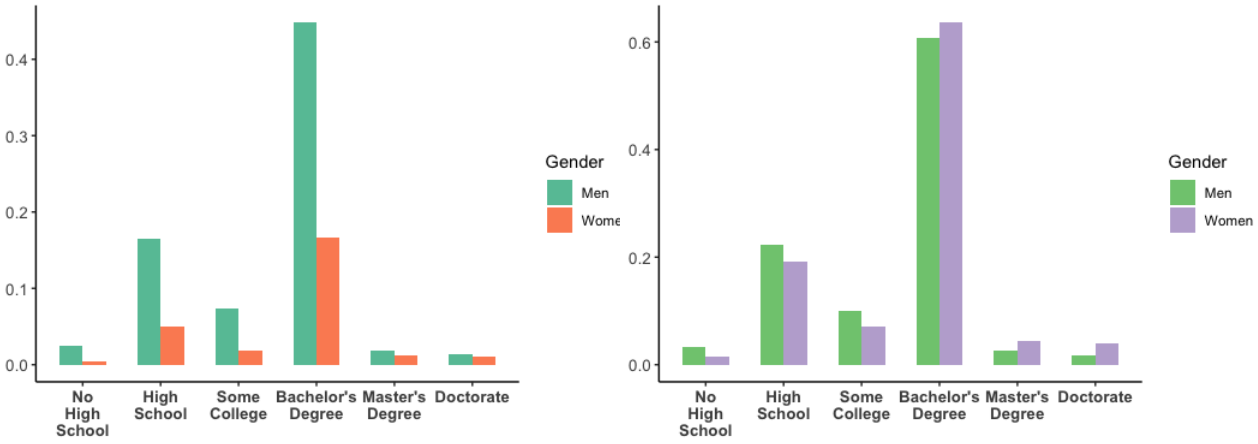
Figure 2: Demographics of Total and STEM Jobs, 2019



(a) Age Distribution

(b) Racial Shares

Figure 3: Share of Workers in STEM Jobs by Gender and Educational Attainment, and by Education Conditional on Gender, 2019



(a) Gender and Education

(b) Education, Conditional on Gender

Figure 4: STEM Workers by STEM Field and Gender, 2019

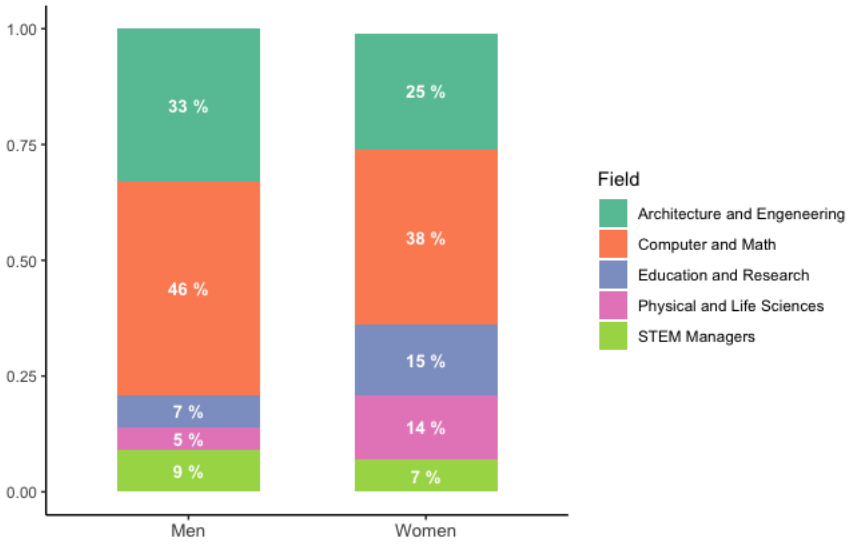


Figure 5: Most Frequent STEM Occupations, 2003 to 2019

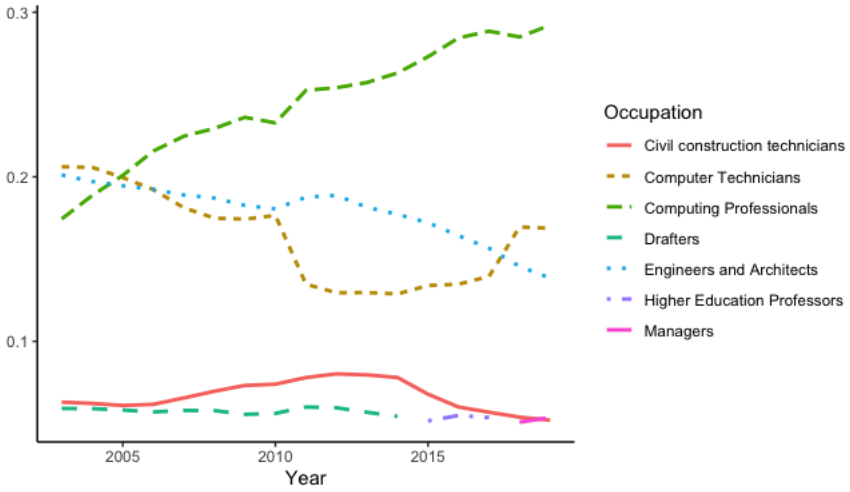


Figure 6: Average Hourly Earnings by Gender and Job Type, 2019

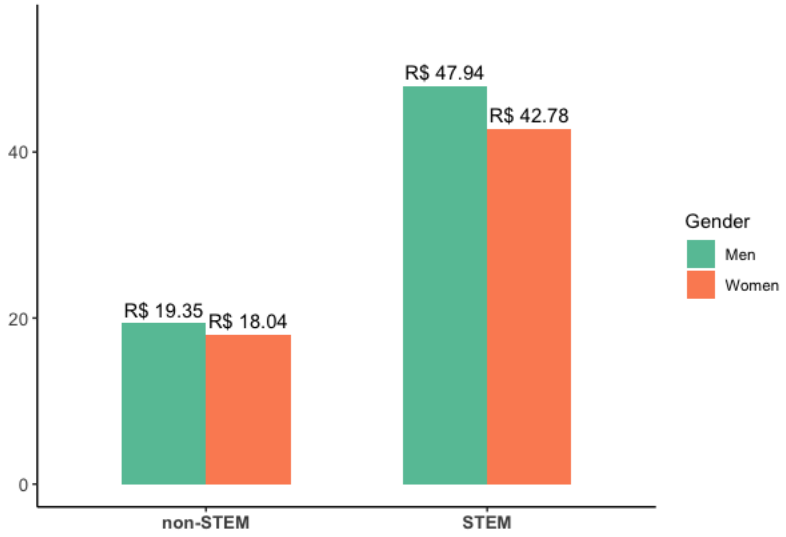


Figure 7: Regression Adjusted Gender Wage Gap of STEM Workers by Occupation, 2019

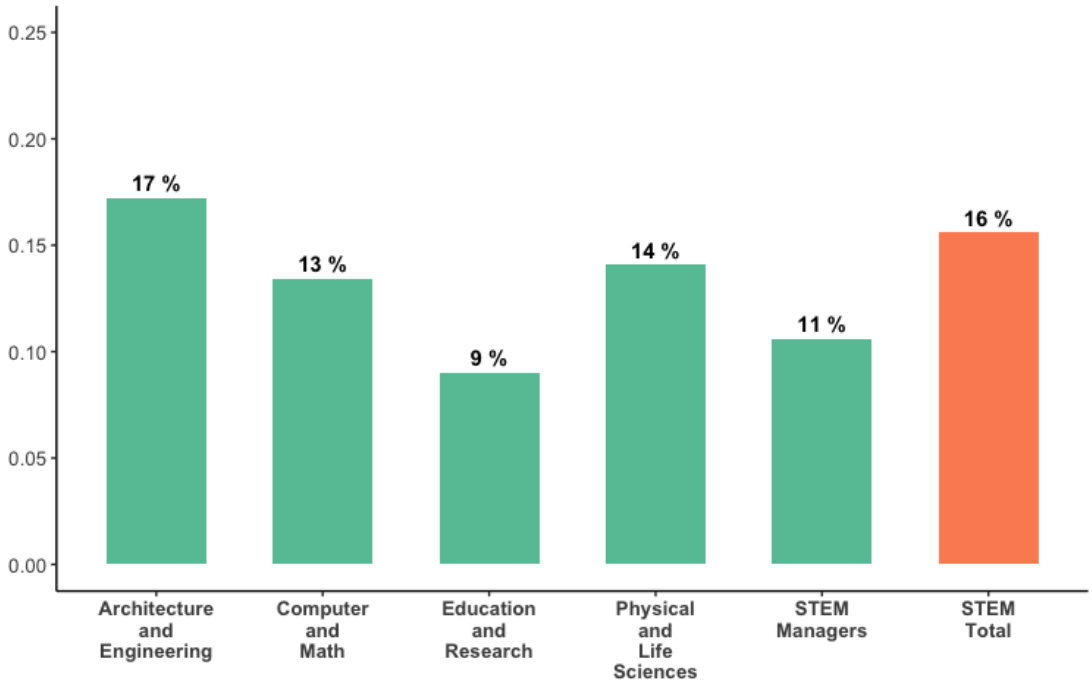
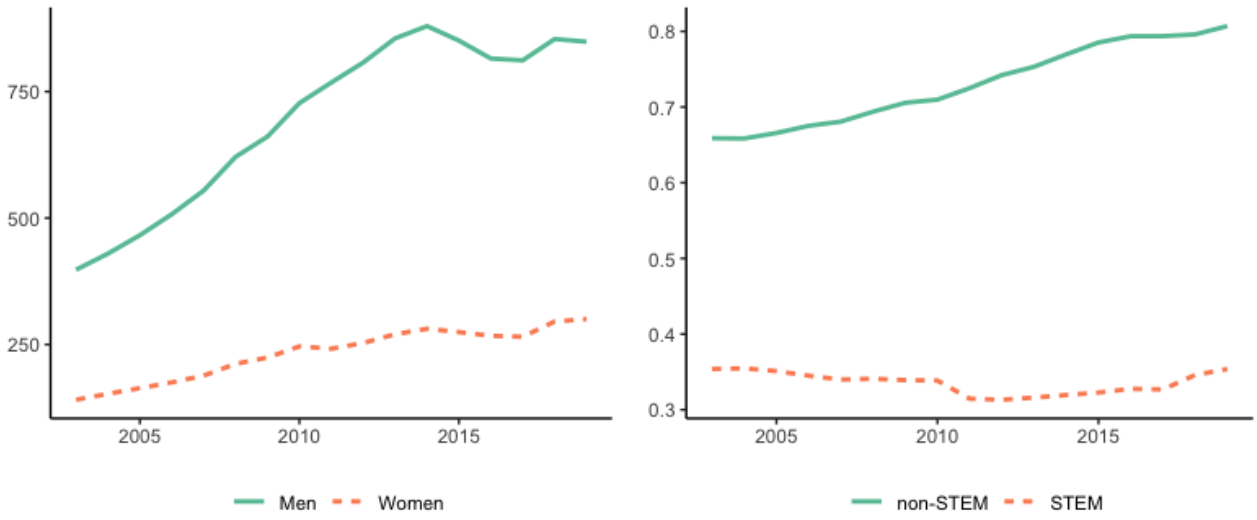


Figure 8: **STEM Absolute and Relative Participation by Gender and Market, 2003 to 2019**

(a) Absolute Participation by gender

(b) Women's Relative Participation

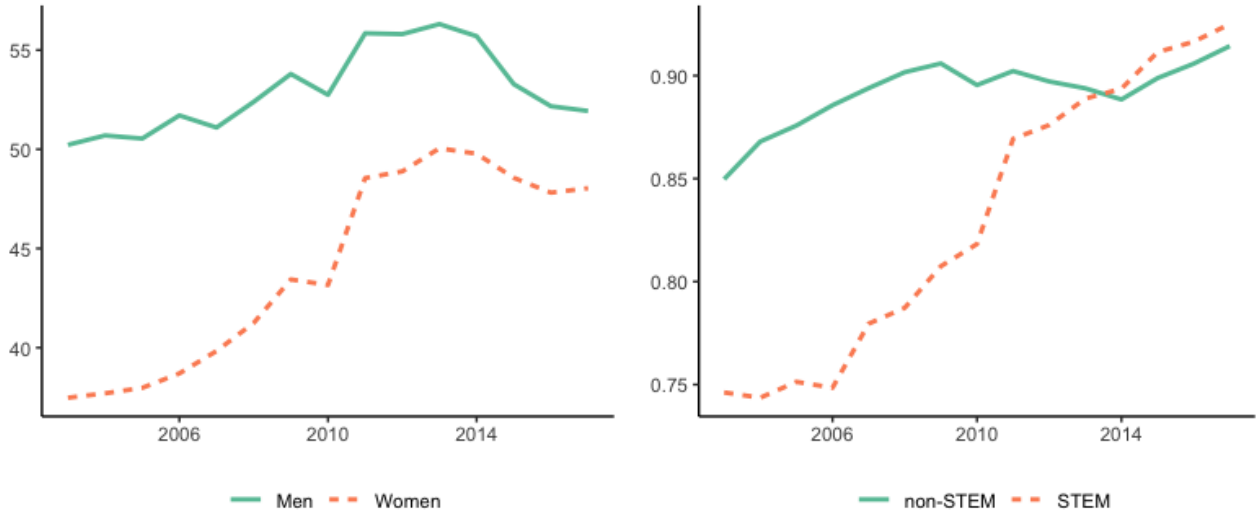


Notes: The relative participation of women in each market is calculated by dividing the total number of female workers over the total number of male workers each year. As there are fewer women than men in both markets, the number is always less than 1.

Figure 9: **STEM Absolute and Relative Hourly Earnings by Gender and Market, 2003 to 2019**

(a) Absolute Hourly-Earnings in the STEM Market

(b) Women's Relative Hourly-Earnings in Each Market

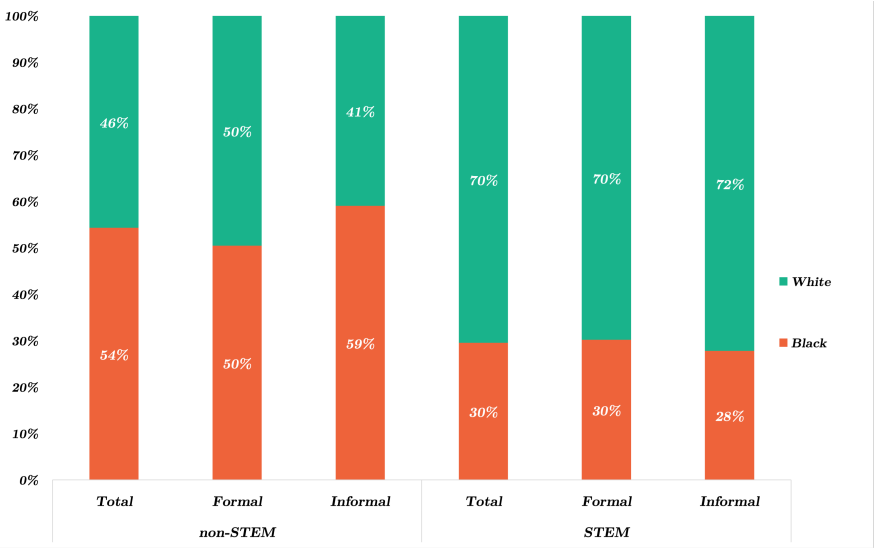


Notes: Women's relative hourly-earnings in each market is calculated by dividing the average women's hourly-earnings over men's average hourly-earnings in each year. As women earn less than men on average in both markets, the number is always less than 1.

Figure 10: **Demographics of non-STEM and STEM Jobs, 2019**

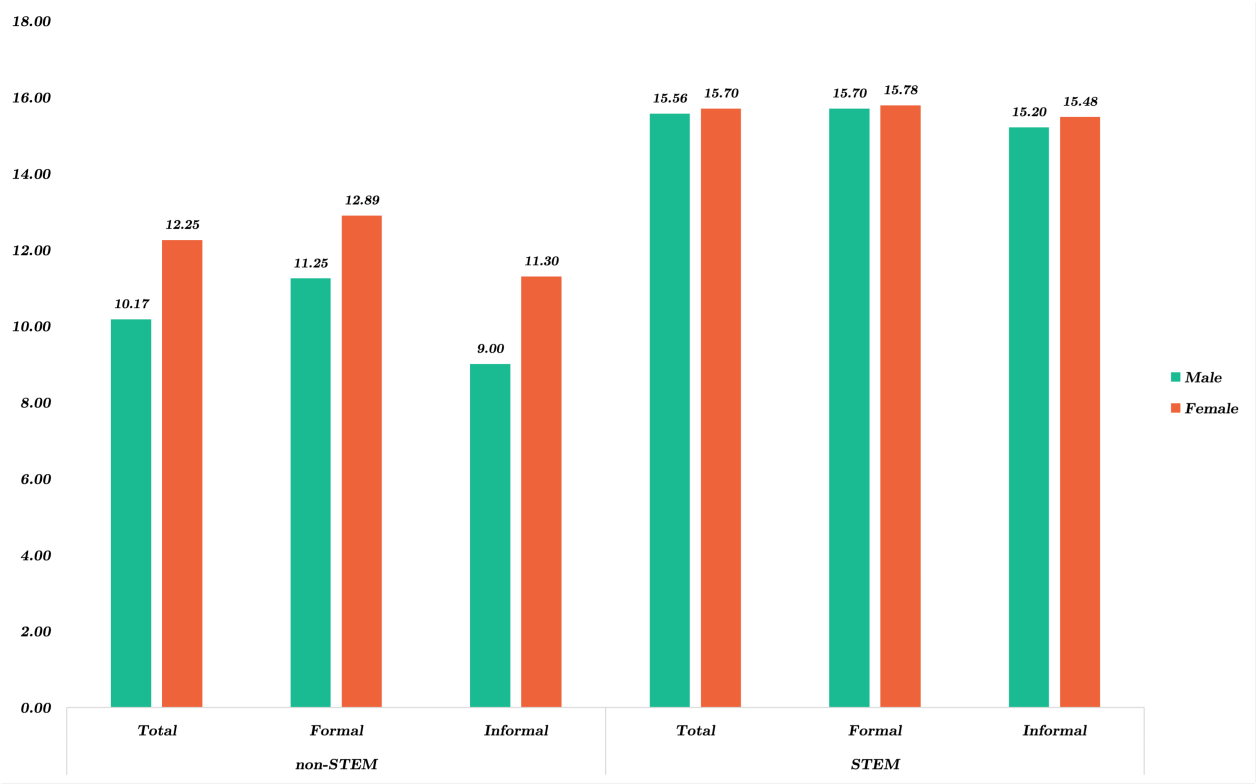
(a) Gender

(b) Race



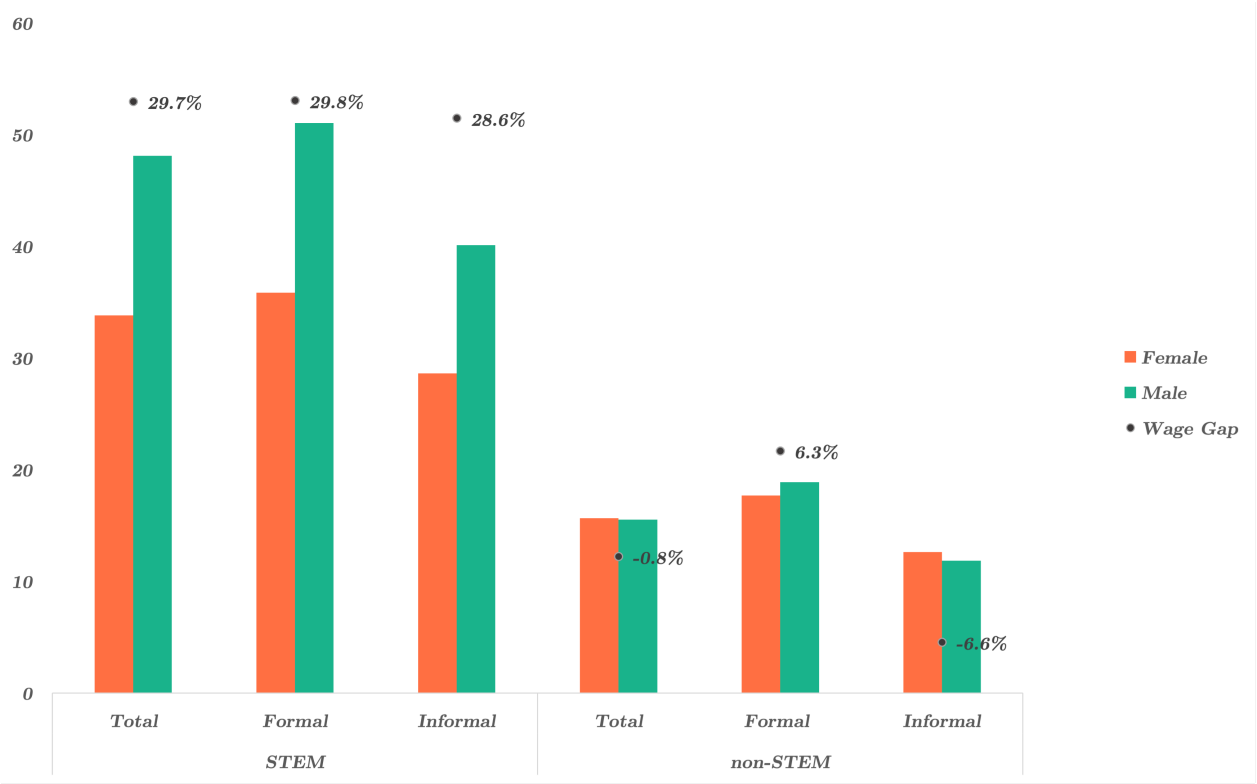
Notes: Own tabulation based on the Brazilian Household Survey (PNADC, 2019)

Figure 11: **Mean years of educations by gender and informality status**



Notes: Own tabulation based on the Brazilian Household Survey (PNADC, 2019 -1st quarter)

Figure 12: **Mean Hourly wages by gender and informality status**



Notes: Own tabulation based on the Brazilian Household Survey (PNADC, 2019)

Appendix

A List of STEM Occupations for Household Surveys

Table A1: STEM occupations taxonomy for the household CBO

Description	Code
Dirigentes de pesquisa e desenvolvimento	1223
Dirigentes de empresas de construção	1323
Dirigentes de serviços de tecnologia da informação e comunicações	1330
Físicos e astrônomos	2111
Meteorologistas	2112
Químicos	2113
Geólogos e geofísicos	2114
Matemáticos, atuários e estatísticos	2120
Biólogos, botânicos, zoólogos e afins	2131
Agrônomos e afins	2132
Profissionais da proteção do meio ambiente	2133
Engenheiros industriais e de produção	2141
Engenheiros civis	2142
Engenheiros de meio ambiente	2143
Engenheiros mecânicos	2144
Engenheiros químicos	2145
Engenheiros de minas, metalúrgicos e afins	2146
Engenheiros não classificados anteriormente	2149
Engenheiros eletricistas	2151
Engenheiros eletrônicos	2152
Engenheiros em telecomunicações	2153
Arquitetos de edificações	2161
Arquitetos paisagistas	2162

Continued on next page

Table A1 – *Continued from previous page*

Description	Code
Urbanistas e engenheiros de trânsito	2164
Cartógrafos e agrimensores	2165
Desenhistas gráficos e de multimídia	2166
Farmacêuticos	2262
Analistas de sistemas	2511
Desenvolvedores de programas e aplicativos (software)	2512
Desenvolvedores de páginas de internet (web) e multimídia	2513
Programadores de aplicações	2514
Desenvolvedores e analistas de programas e aplicativos (software) e multimídia não classificados anteriormente	2519
Desenhistas e administradores de bases de dados	2521
Administradores de sistemas	2522
Profissionais em rede de computadores	2523
Especialistas em base de dados e em redes de computadores não classificados anteriormente	2529