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COVID-19 impact on gender gap

A quantitative study of COVID-19 effect gender gap employment rate in relation to natives

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Abstract

This study investigates the impact of the COVID-19 pandemic on the employment gender gap, with a particular focus on immigrant populations. Using employment data from the early and middle phases of the pandemic, the analysis reveals that immigrants experienced larger declines in employment compared to native-born individuals, driven by their concentration in sectors less amenable to remote work. Among immigrant groups, South American-born individuals faced the most significant employment losses. The gender gap in employment widened, could be explained due to increased caregiving responsibilities during school closures, which disproportionately affected women's labor supply. While men's employment also declined, their recovery was faster, likely reflecting differences in occupational distribution and socio-economic pressures. Education emerged as a key protective factor across all groups, emphasizing the importance of human capital in mitigating employment shocks. The findings underscore the need for targeted policies to support immigrant women, including accessible childcare, flexible work options, and recognition of foreign qualifications. The study highlights structural labor market barriers intensified by the pandemic and calls for further research into heterogeneity within immigrant groups and the long-term effects of COVID-19 on employment dynamics.

Declaration

I hereby declare that this thesis represents my own work.

I have read and applied the current research ethics guidelines concerning the use of artificial intelligence (AI) tools in this work, as outlined in the General Course Information. In the preparation of this work, the author utilized the following AI tools, specifying the purpose for their use: Grammar checks.

As author, I have reviewed and edited the content as needed and take full responsibility for the content of the thesis.

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Innehållsförteckning

1. Introduction	6
2. Theory.....	9
3. Literature review	10
4. DATA.....	13
5. Methodology.....	17
6. Results	19
6.1 Robustness check	27
6.1.1 Graphs	27
7. Discussion.....	29
8. Conclusion.....	31
References	32
Appendix	34

Figures

Figure 1: Native born employment rate trends with gender gap (2013-2023)

Figure 2: Foreign-born employment rate trends with gender gap (2013-2023)

Figure 3: South American-born employment rate trends with gender gap (2013-2023)

Tables

Table 1: Descriptive statistics for foreign-born and native-born aged 25-54

Table 2: Sectoral distribution by group

Table 3: Precovid employment gender gap for native-born, foreign-born and South American-born

Table 4: Postcovid employment gender gap for native-born foreign-born and South American-born

Table 5: Precovid in service sector gender gap for native-born, foreign-born and South American-born

Table 6: Postcovid in service sector gender gap for foreign-born, native-born and South American-born

Table 7: Precovid in Industry sector gender gap for foreign-born, native-born and South American-born

Table 8: Postcovid in Industry sector gender gap for native-born, foreign-born and South American-born

Appendix

Appendix 1: Correlation matrix

1. Introduction

The COVID-19 pandemic led to significant labor market disruptions, which exacerbated pre-existing inequalities and disproportionately affected already vulnerable groups such as immigrants and women. In general, economic downturns increase unemployment rates, where previous research suggest that job losses during crisis are not evenly distributed (Bergmark & Palme, 2003; Chiswick et. al., 1997).

Economic crises tend to affect men and women differently, as industries with higher female employment often suffer more job losses during downturns. Alon et al. (2020) argue that the COVID-19 recession was unique in that it particularly harmed sectors dominated by women, such as hospitality and restaurants. In contrast to previous recessions, which primarily affected male-dominated industries like manufacturing and construction, the pandemic widened the employment gender gap.

Understanding this shift is essential, as gender disparities in employment have long-term consequences for economic inequality. Immigrant women face additional, intersecting vulnerabilities.

One of the key reasons why the gender employment gap among immigrants is an important subject of study is that it intersects with broader structural inequalities in the labor market. Borjas (1985) argues that immigrants' economic outcomes are highly dependent on their human capital, including language proficiency and educational background. However, Aldén & Hammarstedt (2014) suggest that non-European immigrants in particular face additional employment barriers, including labor market discrimination. If the pandemic disproportionately affected certain immigrant groups, it may have deepened inequalities within the foreign-born population itself.

Immigrants, particularly those with lower levels of host-country-specific human capital, face structural disadvantages in employment (Borjas, 1985). However, Kraal et. al (2009) mentions that not all human capital is transferable from other countries when arriving. This could be such as language, source country education and experience. Understanding how the pandemic affected these groups is crucial for labor market policy and economic

recovery efforts, particularly in the U.S., where immigrants constitute a significant portion of the workforce.

Despite increasing attention to the gendered effects of the COVID-19 pandemic, relatively few studies have examined its specific impact on the employment gap between foreign-born men and women in the U.S during the pandemic. Previous research has shown that both gender and immigration status play a role in labor market outcomes (e.g. Collins et al., 2020), but how these factors interacted during the pandemic remains an open question.

The purpose of this study is to examine how the COVID-19 pandemic has impacted the gender gap in employment and income among foreign-born individuals in the United States. The study focuses on analyzing differences between immigrant women and men, taking into account key socio-demographic factors such as age, education level, family status, and presence of children. Despite increasing attention to the gendered effects of the COVID-19 pandemic, relatively few studies have examined its specific impact on the employment gap between foreign-born men and women in the U.S during the pandemic. Previous research has shown that both gender and immigration status play a role in labor market outcomes

This study seeks to fill that gap by answering the following research questions:

- How did COVID-19 affect the employment gender gap?

The study utilize cross-sectional microdata from Luxembourg Income Database to answer the research question of the employment gender gap. The analysis is restricted to employed individuals and focuses on immigrants in general that is then split to South American immigrant, due to most immigrants is originated from South American countries. The analysis compares employment disparities across natives, immigrants and South American, including prime working age individuals that is defined between the age of 25 to 54 years old, done to restrict most of the youth that is enrolled in studies. Furthermore, the analysis will include sectors to see which sector had the greatest gap. The sector is divided into industry and service sector, which allows a broader perspective on the pandemic's labor market effects. The three category groups, especially immigrants and South American, including everything mentioned above, allows a comparative analysis of integration into the labor market.

The methodological framework used for investigating the research question involves the application of a multiple linear regression model. The analysis aims to examine the impact of COVID-19 as an economic shock on the gender gap in employment among foreign-born and natives individuals within the U.S. labor market. Notably, not much existing literature has not extensively explored the gender-specific effects of the pandemic in the United States, when considering key socio-demographic variables such as family situation which could be an important factor to include in the regression. The study then pursues to examine and explain how gender gap differs between the sectors. Therefore, this study contributes to the current body of research by specifically examining how the COVID-19 pandemic affected both employment and income outcomes for foreign-born women compared to men.

Furthermore, the study incorporates variables such as education level, marital status, and the presence of children, factors that critical for understanding gender disparities in both employment. By adopting this approach, the study seeks to provide a nuanced understanding of how the intersection of gender, age, and immigrant status influenced labor market outcomes during the COVID-19 pandemic in the U.S. The findings are expected to offer valuable knowledge for labor market policies and programs aimed at promoting gender equality and immigrant integration in the post-pandemic recovery.

The structure of the study is as follows: Section 1 provides background information on the impact of the COVID-19 pandemic. Section 2 presents the theoretical framework relevant to the study. Section 3 offers a summary of pre-existing literature on immigrants, gender disparities, and employment outcomes in the U.S. labor market. Section 4 outlines the data utilized in the analysis. Section 5 describes the methodological approach applied to address the research question. Section 6 introduces the results regarding employment and income disparities among foreign-born individuals during the COVID-19 pandemic, using various socio-demographic variables. Section 7 contains a discussion of the findings. Section 8 concludes the paper by summarizing the main results and discussing their implications.

2. Theory

Human Capital Theory, initially developed by Becker (1964), posits that individuals' economic outcomes are influenced by their investment in skills, knowledge, and experience. Education, work experience, language proficiency, and vocational training are considered key forms of human capital. Individuals with higher levels of human capital are generally expected to have better labor market outcomes, including higher employment rates and incomes.

In the context of immigrant employment, human capital is particularly relevant. Immigrants' ability to integrate into the labor market is influenced by factors such as education levels, language skills, and the transferability of foreign credentials. However, disparities often arise due to structural barriers that limit the returns on immigrants' human capital. For instance, foreign education or work experience may be undervalued in the host country's labor market, reducing employment opportunities and income prospects. The concept of host-country-specific human capital refers to skills and knowledge that are not fully transferable across national borders. This is due in large part to language barriers, cultural differences, and the limited portability of relevant job experience and market-specific expertise (Chiswick, 1978).

Economic recessions and shocks often have differentiated effects on men and women. Previous research shows that downturns tend to disproportionately impact women when industries with high female employment, such as restaurants and hospitality, are hit hardest (Alon et al., 2020). Conversely, recessions affecting manufacturing and construction tend to disproportionately impact men. Caregiving responsibilities, childcare access, age, education, and family status are critical factors influencing labor force participation and income, especially for immigrant women. Studies show that increased caregiving demands during the pandemic led many women to reduce work hours or leave the labor force temporarily, which in some cases were true for men also (Collins et al., 2020).

Borjas (2023) posits that education serves as a credible signal of a worker's productivity to employers, thereby enhancing wage prospects. Education and training constitute critical investments in human capital accumulation. This investment in education leads to the accumulation of human capital, which further increases with labor market experience as

individuals age, consistent with the Age-Earnings profile. Consequently, employability tends to improve alongside the financial and time investments made in education, which augment an individual's skills and knowledge base.

These socio-demographic variables interact with immigrant status and gender, influencing the extent and nature of employment and income disparities. Recognizing these complex interactions is crucial for understanding and addressing the gendered impacts of COVID-19 on foreign-born populations.

3. Literature review

Borjas and Cassidy (2020) examined the impact of COVID-19 pandemic on employment among immigrants in the United States. The study revealed that, although immigrant men typically had higher employment rates than native-born men before the pandemic, this trend reversed during April 2020. One of the key explanation lies in that immigrants were working in sectors with low potential for remote work, making them more vulnerable to job loss. The study also found that undocumented immigrants experienced greater employment losses than their documented counterparts. This was due to weaker job security and exclusion from social safety nets. Furthermore, factors such as education and geography explained little of the observed employment gap, suggesting occupational structure played more decisive role.

Albanesi and Kim (2021) explored the gendered impact of the COVID-19 recession on the U.S. labor market, revealing a disproportionate decline in employment and labor force participation among women, especially mothers. Unlike previous recessions, where men were typically more affected, this crisis hit women harder due to their overrepresentation in vulnerable service sectors and increased caregiving responsibilities caused by school and childcare closures. The study emphasizes that these disruptions may have lasting effects, including lower future wages for women and permanent job losses due to automation in heavily impacted sectors.

Villarreal and Yu (2022) investigate how the COVID-19 pandemic affected gender differences in U.S. employment outcomes during its first nine months. Using panel data from the Current Population Survey and individual fixed-effects models, they focus on

changes in labor force participation, full-time employment, and unemployment. Importantly, they adjust for seasonal employment patterns, which are often overlooked in studies of gender inequality. While women experienced sharper employment losses early in the pandemic, there was no significant long-term decline in their full-time employment relative to men. However, women's labor force participation fell more than men's by late 2020. The study emphasizes the need for nuanced analyses that consider both employment type and seasonal trends to accurately assess gendered labor market impacts. Furthermore, the study finds that some months, showed that gender disparities decreased among those with young children.

García et al. (2023) found that men and parents among Mexican and Central American immigrants reported the highest levels of perceived pandemic precarity. Fathers experienced greater precarity than mothers. For men, being married was associated with increased precarity, while for women, marriage was linked to reduced precarity. However, marriage increased precarity for those without children regardless of gender. The study supports the idea that Latino immigrant men experience greater financial stress due to pressures to fulfill traditional provider roles (hegemonic masculinity). Conversely, Latina women's caregiving roles may normalize economic hardship, leading to lower reported precarity despite increased responsibilities. These results highlight the importance of examining both gender and family structure to understand how immigrant families experience economic insecurity during crises.

Alon et al. (2020) examine the distinct gendered effects of the COVID-19 recession compared to previous economic downturns. Unlike typical recessions, which disproportionately affected male-dominated industries such as manufacturing and construction, the COVID-19 crisis severely impacted sectors with high female employment, such as hospitality and service industries. This is even though that typically women's employment is concentrated in less cyclical sectors such as education and healthcare. The closure of schools and daycare centers dramatically increased childcare responsibilities, disproportionately burdening women, particularly single mothers who are already economically vulnerable. The study further highlights that increased adoption of flexible work arrangements and telecommuting during the pandemic has the potential to reduce gender inequality in the long run. Importantly, men with access to remote work tend to assume greater childcare responsibilities when their partners lack similar flexibility,

suggesting that changes in work practices may lead to a more equitable division of labor within households.

Collins et al. (2020) investigate how COVID-19 school and daycare closures affected work hours among dual-earner, heterosexual couples in the US. Using panel data and fixed effects models, they find that mothers with young children reduced their work hours four to five times more than fathers between February and April 2020, increasing the gender gap in work hours by 20–50%. While telecommuting offered some buffering effect, mothers—especially those with children aged 1–5, still experienced significant reductions in paid work time due to the intensive caregiving demands that remain largely gendered. The findings contradict optimistic views that the pandemic would foster greater gender equality in domestic labor, instead highlighting persistent inequalities where mothers disproportionately bear the burden of childcare and homeschooling. The authors suggest that without employer flexibility and increased paternal caregiving, these pandemic-driven disparities may lead to long-term setbacks in women’s labor force participation.

Lee et.al. (2022) study labor market assimilation of migrants in 16 Western European countries, highlighting notable gender differences. Their findings show that female migrants tend to start with larger employment gaps compared to males but often converge faster toward native employment rates over time. For women, factors such as cultural attitudes, local institutions, and language skills play a complex role in shaping employment outcomes. They also point to the importance of regional attitudes and labor market institutions in shaping assimilation patterns, especially for women. In a related but distinct context, Blau et.al. (2011) examine married immigrant women’s labor supply assimilation in the United States using Census data from 1980-2000. They find that women from countries with traditionally higher female labor force participation tend to work more and close the gap with native women more rapidly than those from low-participation countries. Their results emphasize the role of cultural background and gender norms in shaping labor market outcomes for immigrant women, a factor less explored in European studies. Together, these studies underline the complex interplay between gender, culture, and labor market institutions in migrant assimilation, highlighting that while patterns differ across regions, gender remains a crucial dimension for understanding immigrant economic integration.

Adams-Prassl et al. (2020) present real-time survey evidence from the US, UK, and Germany, showing substantial cross-country variation in the immediate labour market impacts of COVID-19. Germany, supported by its established short-time work scheme, experienced significantly fewer employment disruptions. In contrast, in the US and UK, women, less-educated workers, younger individuals, and those unable to perform a substantial share of their tasks from home were disproportionately affected by job losses and earnings declines. The proportion of tasks that can be carried out remotely emerges as a strong predictor of job loss. The authors caution that the higher incidence of employment separations in the anglophone countries risks eroding match-specific human capital, potentially hindering the pace of post-pandemic economic recovery.

4. DATA

This study's empirical investigation utilizes data drawn from the Luxembourg Income Study (LIS) Database, which offers standardized and comparable micro-level data suited for cross-country analysis of income, employment, and household demographics. The focus is placed on the population of the United States, encompassing both native-born and immigrant individuals. The sample is deliberately limited to persons aged between 25 and 54 who are either actively employed or currently participating in the labor market. To ensure consistency and relevance of labor market comparisons, individuals enrolled in education and those not engaged in the labor force have been excluded from the analysis.

The complete dataset initially comprises 2 031 898 observations. Given the study's focus on employment rates within the prime working-age population, the sample was narrowed to individuals aged 25 to 54, resulting in a subset of 800 516 observations. Subsequently, variables deemed irrelevant to the analysis were excluded, retaining only those presented in Table 1. Observations lacking data on employment status or where employment was recorded as zero were removed. Following these data cleaning steps, the final sample for the prime working age cohort consisted of 580 321 observations. These were further categorized into groups as detailed in Table 1, illustrating the distribution of observations across each subgroup.

The study pays particular attention to immigrants, with further disaggregation by gender and region of origin, including immigrants from South America. This allows for a detailed

comparison of employment and income patterns between native and immigrant populations across gender lines.

The dependent variable, employment status, is operationalized as the probability of being engaged in paid work during the data collection period. In cases where main activity information is missing, data on the individual's primary income source is used as a proxy. Natives are defined as persons born within the USA. Immigrants encompass those born outside the USA, foreign citizens, individuals self-identifying as immigrants, or classified as such by the data provider. For the purpose of this study, the immigrant group is further disaggregated by region of birth, focusing on South American origin, other regions such as Asia, the Middle East, Europe, and Nordic countries were excluded due to insufficient sample sizes within the target age group.

The variable married indicates registered marital status, based on self-reported responses. The descriptive statistics present the proportion of individuals reporting being married ("yes"). Children refers to whether the respondent has at least one child living in the household, indicated by a binary yes/no variable.

Educational attainment is classified into three tiers according to the International Standard Classification of Education (ISCED 2011). Low education corresponds to less than upper secondary education completed (ISCED levels 1–2), equivalent to fewer than 12 years of formal schooling. Medium education comprises upper secondary or post-secondary non-tertiary education (ISCED levels 3–4), roughly 12 years of schooling completed. High education indicates completion of tertiary education (ISCED levels 5–8), denoting more than 12 years of schooling.

Employment rates, defined as the likelihood of being engaged in paid work, are generally higher among males compared to females. Native males have an employment rate of 85.3%, while immigrant males show a slightly higher rate of 87.6%. Among females, employment is lower overall, with 75.8% of native women employed compared to 63.2% of immigrant women. South American females have an employment rate of 87.9%, whereas South American males have a lower rate of 60.5%.

Table 1 also presents descriptive information about key demographic and socioeconomic characteristics across the groups. Notably, native female exhibit the highest average educational attainment after finishing low secondary, as measured by years of completed schooling, closely followed by native males. This pattern suggests that, on average, natives have higher levels of education compared to immigrants and specific immigrant subgroups.

Regarding marital status, immigrants display more variation in family structure and legal relationship status compared to natives. For example, immigrant females, particularly those from South America, show a higher proportion of married individuals than their male counterparts. Similarly, the presence of children in the household is more common among immigrant females than native females, which may reflect differing family dynamics or cultural norms within immigrant populations.

It is important to interpret these differences cautiously, as the sample sizes for some immigrant subgroups are relatively small, which could affect the reliability of comparisons. Additionally, differences in demographic profiles between groups may influence these patterns and should be considered when drawing conclusions.

Table 1: Descriptive statistics for foreign-born and native-born aged 25-54

	Employment (Probability)	Education (at least low secondary)	Children (Yes)	Married (Yes)	Average age	Obs
Native male	0.853 (0.354)	1.424 (0.595)	0.502 (0.499)	0.625 (0.484)	38.774 (8.810)	227,671
Immigrant male	0.876 (0.328)	1.222 (0.771)	0.551 (0.497)	0.703 (0.456)	39.465 (8.465)	61,652
Native female	0.758 (0.428)	1.532 (0.574)	0.591 (0.491)	0.667 (0.471)	38.769 (8.831)	228,558
Immigrant female	0.632 (0.482)	1.324 (0.749)	0.660 (0.473)	0.774 (0.417)	39.763 (8.472)	62,440
South American female	0.879 (0.325)	0.881 (0.748)	0.549 (0.497)	0.673 (0.469)	39.446 (8.553)	33,472
South American Male	0.605 (0.488)	1.018 (0.772)	0.687 (0.463)	0.735 (0.441)	40.087 (8.549)	31,754

mean coefficients; sd in parentheses

The analysis has been deliberately restricted to these two sectors due to the limited number of observations in alternative industries, which would undermine the statistical robustness

of the results. Furthermore, all observations with missing data in key variables were excluded through listwise deletion to maintain dataset integrity.

Among native-born males, 28.4% are employed within the Industry sector, while the majority, 71.6%, are engaged in Service-related occupations, based on a sample of 189,994 individuals. Immigrant males demonstrate a slightly higher concentration in Industry employment at 31.58%, with 68.42% in Service sectors, drawn from 53,028 observations. Native-born females predominantly work in the Service sector with 92.16%, while only 7.84% employed in Industry, across 174,106 observations. Immigrant females exhibit a modestly higher proportion in Industry with 11.3% and 88.7% in Service occupations across 39,975 observations. When focusing on the South American subgroup, female employment is mainly concentrated in Service sector with 87.04%, while 12.96% in Industry across 19,174 observations. South American males display a distinctive pattern, with 41.95% employed in Industry and 58.05% in Service, across 28,301 observations.

These findings underscore significant heterogeneity in sectoral employment patterns shaped by gender, immigration status, and regional origin. Notably, South American males exhibit a substantially greater propensity for Industry employment relative to other groups, which may reflect both labor market integration challenges and occupational specialization.

Table 2: Sectoral distribution by group

	Industry	Service	Total obs
Native male	53,954 (28.40)	136,040 (71.60)	189,994 (100.00)
Immigrant male	16,748 (31.58)	36,280 (68.42)	53,028 (100.00)
Native female	13,644 (7.84)	160,462 (92.16)	174,106 (100.00)
Immigrant female	4,517 (11.30)	35,458 (88.70)	39,975 (100.00)
South American female	2,485 (12.96)	16,689 (87.04)	19,174 (100.00)
South American Male	11,871 (41.95)	16,430 (58.05)	28,301 (100.00)

mean coefficients; sd in parentheses

NOTE: Parenthesis shows percentage of how many works in the specific sector.

5. Methodology

The primary objective of this research is to investigate gender disparities in employment and income throughout the COVID-19 pandemic, with particular emphasis on how these disparities vary by immigration status, educational attainment, age, and other socio-demographic factors. To explore these dynamics, two empirical models are employed—one assessing employment outcomes and another focusing on income levels. Central to the analysis are interaction terms between gender and immigration status, which enable an in-depth examination of how the pandemic differently affected men and women, especially within immigrant populations.

The employment model estimates the probability of an individual being employed during both pre-pandemic and post-pandemic periods, explicitly analyzing gender-based differences. The regression controls for key socio-demographic variables including education, age, immigration status, presence of children, and marital status. The model specifications are expressed as follows:

$$(1) emp_{it} = \beta_0 + \beta_1 PreCovid_t + \beta_2 Female_i + \beta_3 (PreCovid_t \times Female_i) + \beta_4 Education_i + \beta_5 children_{it} + \beta_6 married_{it} + \beta_7 Age_{it} + \beta_8 Age_{it}^2 + \varepsilon_{it}$$

$$(2) emp_{it} = \beta_0 + \beta_1 PostCovid_t + \beta_2 Female_i + \beta_3 (PostCovid_t \times Female_i) + \beta_4 Education_i + \beta_5 children_{it} + \beta_6 married_{it} + \beta_7 Age_{it} + \beta_8 Age_{it}^2 + \varepsilon_{it}$$

The dependent variable in this study is employment emp_{it} , which measures whether individual i is employed at time t . The model includes several independent variables and their interactions to analyze how the COVID-19 pandemic affected employment, with particular focus on gender differences and immigration status.

β_3 will be the parameter of interest that captures the effect on the employment rate of being female changes pre- and postcovid compared to male counterpart.

To differentiate between the pre-pandemic and post-pandemic periods, two binary (dummy) variables were created based on the survey year. The variable $PreCovid_t$ takes the

value of 1 for observations from the years 2019 and earlier, and 0 otherwise. Conversely, the variable $PostCovid_t$ equals 1 for observations from 2020 and onwards.

The variable $Female_i$ is a dummy taking the value 1 if the individual is female and 0 if male. The rest of the variables are control variables. $Education_i$ is a dummy indicating whether the individual has completed at least upper secondary education. $children_{it}$ and $married_{it}$ are dummy variables indicating whether the individual has $children_{it}$ or is $married_{it}$, respectively. Age_{it} is a continuous variable, and Age_{it}^2 is included to capture nonlinear effects of age on employment. The study specifically focuses prime working age which is defined as 25-54 years old in USA.

By controlling for detailed socio-demographic variables, this study isolates the specific impact of COVID-19 on immigrant gender gaps beyond general employment trends. Furthermore, by examining immigrant subgroups such as South American, the study highlights heterogeneity within immigrant populations, whereas some studies treat immigrants as a homogenous group.

To investigate the gender disparities in employment before and after the COVID-19 pandemic among different population groups, separate regression analyses were conducted for native-born and foreign-born individuals. This approach allows for a focused examination of employment dynamics within each group without mixing heterogeneous populations. By modeling natives and immigrants separately, the study provides a nuanced understanding of how the COVID-19 pandemic affected gender disparities in employment within these distinct populations.

The employment regression was restricted to observations within a particular sector category by applying a filter condition. The sectors that is included in the study is industry and service sector. Industry sector includes for instance manufacturing, meanwhile service sector includes banking for instance. However, this approach enables a focused examination of gender and immigration status effects on employment outcomes within that sector, without introducing potential collinearity or bias that might arise from including sector dummies in the full sample regression. While sector could alternatively be included as a categorical control variable (i.e., a set of dummy variables representing different industries) in a pooled regression model, the chosen strategy of sector-specific regressions

provides clearer insights into heterogeneity across sectors. This methodology helps reveal whether gender and immigrant employment gaps differ substantially depending on the economic sector, which is particularly relevant given that some industries were disproportionately affected by the COVID-19 pandemic.

This study uses cross-sectional data, which may introduce selection bias if some groups are overrepresented or underrepresented. There is also a risk of multicollinearity if explanatory variables are highly correlated with each other, but robustness checks have been applied to mitigate this risk (See Appendix 1). Additionally, errors-in-variable bias could occur due to misunderstandings in responses, particularly in immigrant populations where language barriers may exist. For external validity, the non-random nature of the sample could limit the generalizability of the results. It's important to consider whether the sample used in this study represents the broader population and to account for any potential biases in the data collection process.

Unlike some previous studies that analyze gender disparities or COVID-19 effects separately, this study explicitly models the interaction between gender and the COVID-19 period to capture the differential impact on women compared to men over time within each subgroup. While using interaction terms between gender and time periods is a common approach in labor market and pandemic research, this study contributes by applying this method specifically to immigrant populations in the United States. By focusing on immigrants, the study provides a more nuanced understanding of how the pandemic has affected gender disparities in employment and income within this vulnerable group, which is less commonly addressed in existing literature.

6. Results

The regression is done according to the equation shown in section 5, where the dependent variable is employment rate. If the results shows a negative coefficient it should be interpreted as negative relationship between women and male counterpart, meanwhile a positive coefficient shows the opposite.

Appendix 1 presents the Pearson correlation coefficients between the key variables in the analysis: employment, education, marital status, children, age, gender, and income. The correlations also offer insight into potential issues related to multicollinearity in subsequent

regression models. This is then tested for each result which shows that there is no problem within multicollinearity in the results.

Table 2 presents the employment gender gap before the COVID-19 pandemic for native-born individuals, immigrants overall, and South American-born immigrants specifically. The interaction term between Precovid and female is statistically significant and negative across all three groups, indicating that prior to the pandemic, women had a lower probability of employment compared to men. The gender gap is more pronounced for foreign-born (column 2), the employment rate for immigrant women was 3.3 percentage points lower than for foreign-born men. For the native born (column 1) the gender gap is 1.5 percentage points lower for women compared to male counterpart. Furthermore, the Southamerican foreign-born women have 2.9 percentage point lower employment rate compared to their male counterpart.

In all groups, higher education levels are strongly associated with higher employment probabilities. Other factors, such as having children and marital status, show mixed effects across groups.

Table 3: Precovid employment gender gap for native-born, foreign-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Precovid	0.004** (0.002)	0.016*** (0.003)	0.023*** (0.004)
Female	-0.104*** (0.002)	-0.228*** (0.004)	-0.265*** (0.005)
Precovid*female	-0.015** (0.002)	-0.033*** (0.005)	-0.029*** (0.007)
Education 1	0.234*** (0.003)	0.061*** (0.003)	0.061*** (0.004)
Education 2	0.355*** (0.003)	0.122*** (0.003)	0.134*** (0.004)
Children	0.023*** (0.001)	-0.003 (0.003)	0.005 (0.003)
Married	0.056*** (0.001)	-0.028*** (0.003)	-0.025*** (0.004)
Age	0.008 (0.001)	0.024*** (0.024)	0.013*** (0.002)
Constant	0.398*** (0.013)	0.283*** (0.028)	0.525*** (0.038)
Observations	456,229	124,092	65,226
R-Squared	0.075	0.096	0.114

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due only used as squared term , however, included in the regression.

The results in Table 4 show that the post-COVID period is associated with a statistically significant decrease in employment for all groups. For native-born individuals (column 1), employment decreased by 0.8 percentage points during the post-COVID period. For immigrants (column 2), the decrease was larger, at 2.3 percentage points, and for South American-born individuals (column 3), the decrease was even more pronounced at 3.2 percentage points, all significant.

The interaction term between post-COVID and female indicates that the gender gap in employment widened further during the post-COVID period. This is true for foreign-born and South American. For foreign-born in general, the increase was 4.2 percentage points and for South American-born individuals, the gap widened by 4.4 percentage points, both statistically significant. However, native born gender gap decreased, showing a 1.3 percentage points decrease. This suggests that the pandemic exacerbated existing gender disparities in employment, particularly among immigrant and South American-born women.

Education continues to have a positive and significant effect on employment for all groups, with higher levels of education associated with higher employment probabilities. Other control variables such as children, marital status, and age show consistent patterns with previous findings.

Table 4: Postcovid employment gender gap for native-born foreign-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Postcovid	-0.008*** (0.001)	-0.023*** (0.003)	-0.032*** (0.005)
Female	-0.118*** (0.001)	-0.258*** (0.003)	-0.293*** (0.004)
Postcovid*female	-0.013*** (0.002)	-0.042*** (0.005)	-0.044*** (0.007)
Education 1	0.234*** (0.003)	0.061*** (0.003)	0.062*** (0.004)
Education 2	0.355*** (0.003)	0.122*** (0.003)	0.134*** (0.004)
Children	0.023*** (0.001)	-0.003 (0.003)	0.005 (0.004)
Married	0.056*** (0.001)	-0.028*** (0.003)	-0.026*** (0.004)
Age	0.008*** (0.001)	0.024*** (0.024)	0.013*** (0.002)
Constant	0.402*** (0.013)	0.299*** (0.028)	0.551*** (0.038)
Observations	456,229	124,092	65,226
R-Squared	0.075	0.096	0.114

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due to only used as squared term, however, included in the regression.

Table 5 presents the employment gender gap within the service sector before the COVID-19 pandemic for native-born individuals, immigrants overall, and South American-born immigrants specifically. The interaction term between Precovid and female is not statistically significant, however negative across all three groups, indicating that prior to the pandemic, women had a lower probability of employment in the service sector compared to men. The gender gap is more pronounced for South American-born (column 3) with 1.0 percentage points lower employment rate within service sector compared to their male counterpart. For the Foreign-born women in general, the employment rate within service sector is 0.2 percentage points lower compared to their male counterpart. Native-born women have 0.1 percentage points lower employment rate compared to their male counterpart.

Education positively influences employment probabilities within the service sector, with higher education levels significantly increasing the likelihood of employment across all

groups. Other controls such as children, marital status, and age have small and mixed effects, with some statistically significant but modest in magnitude.

Table 5: Precovid in service sector gender gap for native-born, foreign-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Precovid	0.003 (0.001)	0.010*** (0.002)	0.019*** (0.004)
Female	-0.016*** (0.001)	-0.033*** (0.003)	-0.032*** (0.003)
Precovid*female	-0.001 (0.002)	-0.002 (0.003)	-0.010 (0.005)
Education 1	0.054*** (0.002)	0.018 *** (0.003)	0.019*** (0.003)
Education 2	0.075*** (0.002)	0.033*** (0.002)	0.035*** (0.003)
Children	-0.005*** (0.001)	0.002 (0.002)	0.002 (0.003)
Married	0.016*** (0.001)	-0.001 (0.002)	0.001 (0.003)
Age	-0.006*** (0.001)	0.009*** (0.001)	0.003** (0.002)
Constant	0.753*** (0.009)	0.720*** (0.022)	0.817*** (0.032)
Observations	296,502	71,738	33,119
R-Squared	0.011	0.012	0.012

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due only used as squared term , however, included in the regression.

The results presented in Table 6 reveal that the post-COVID period is associated with a statistically significant decline in employment within the service sector across all groups. Specifically, employment among native-born individuals (column 1) decreased by 0.4 percentage points, while the reduction was notably larger for immigrants with 1.5 percentage points and even more pronounced for South American-born individuals with 2.5 percentage points, with all estimates statistically significant.

The interaction term between post-COVID and female, present a nuanced picture. Native-born gender gap slightly increased post-COVID. The results shows that native-born women (column 1) have 0.2 percentage points lower employment rate within the service sector compared to their native counterpart. This result however, is not statistically significant which needs to be caution when looking at it. However, both foreign-born (column 2) and South American-born (column 3) female showed a decreased gender gap within the employment rate in the service sector, both showing 0.8 percentage points.

However, result is statistically significant only for foreign-born. This implies a relative narrowing of the gender gap in employment post-COVID, indicating that immigrant women experienced a less severe decline compared to their male counterparts.

This results could reflect differential sectoral employment patterns, policy impacts, or labor market adaptations affecting immigrant women specifically.

Education remains a robust and positive predictor of employment for all groups, reinforcing the critical role of human capital. Other covariates such as children, marital status, and age maintain consistent directional effects aligned with previous analyses.

Table 6: Postcovid in service sector gender gap for foreign-born, native-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Postcovid	-0.004 *** (0.004)	-0.015*** (0.003)	-0.025*** (0.004)
Female	-0.016*** (0.004)	-0.034*** (0.002)	-0.041*** (0.003)
Postcovid*female	-0.002 (0.002)	0.008** (0.004)	0.008 (0.006)
Education 1	0.055*** (0.002)	0.018*** (0.003)	0.019*** (0.003)
Education 2	0.075 *** (0.002)	0.033*** (0.002)	0.035*** (0.002)
Children	-0.005*** (0.001)	0.002 (0.002)	0.002 (0.003)
Married	0.016*** (0.001)	-0.009 (0.002)	0.001 (0.003)
Age	0.006*** (0.001)	0.008*** (0.001)	0.003** (0.002)
Constant	0.757*** (0.030)	0.728*** (0.022)	0.837*** (0.031)
Observations	296,502	71,738	33,119
R-Squared	0.011	0.013	0.013

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due only used as squared term , however, included in the regression.

The results presented in Table 7 illustrate the precovid gender gap in employment within the industry sector across native-born, immigrant, and South American-born groups. Starting with the main effects, the Precovid coefficient is negative and statistically significant for immigrants (-1.2 percentage points) and positive and significant for South Americans (1.5 percentage points), suggesting a slightly lower baseline employment rate in

the industry sector for immigrants prior to COVID-19, while South Americans appear to have a marginally higher baseline rate. For the native, the coefficient is negative (-0.3 percentage points) and not statistically significant.

The interaction term between Precovid and female is statistically significant only for foreign-born and South American-born, however negative across all three groups. This indicating that pre-pandemic, women had a lower probability of employment in the industry sector compared to men. The gender gap is more pronounced for South American-born (column 3) with 1.7 percentage points lower employment rate within industry sector compared to their male counterpart. For the Foreign-born women in general, the employment rate within industry sector is 1.2 percentage points lower compared to their male counterpart. Native-born women have 0.4 percentage points lower employment rate within industry sector compared to their male counterpart.

Education positively affects employment for all groups, though less for immigrants and South Americans. Having children and being married show small positive effects on employment for immigrants and South Americans.

Table 7: Precovid in Industry sector gender gap for foreign-born, native-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Precovid	-0.003 (0.002)	-0.012*** (0.003)	0.015*** (0.004)
Female	-0.012*** (0.002)	-0.023*** (0.006)	-0.018** (0.007)
Precovid*female	-0.004 (0.003)	-0.012* (0.007)	-0.017* (0.009)
Education 1	0.045*** (0.003)	0.008** (0.003)	0.006* (0.003)
Education 2	0.059*** (0.003)	0.016*** (0.004)	0.011** (0.005)
Children	-0.004*** (0.001)	0.012*** (0.003)	0.016*** (0.004)
Married	0.025*** (0.002)	0.009** (0.004)	0.009** (0.004)
Age	0.001 (0.001)	0.004** (0.001)	0.004* (0.002)
Constant	0.881*** (0.016)	0.828*** (0.035)	0.828*** (0.043)
Observations	67,598	21,265	14,356
R-Squared	0.013	0.009	0.008

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due only used as squared term , however, included in the regression.

The results in Table 8 show that the post-COVID period is associated with a statistically significant decrease in employment for immigrants (-1.6 percentage points) and South American-born individuals (-2.1 percentage points) in the industry sector, while the effect for native-born individuals is small and not statistically significant.

The interaction term between post-COVID and female shows that Native-born gender gap slightly decreased post-COVID with 0.7 percentage points within the industry sector. However, foreign-born female showed an increased gender gap within the employment rate in the industry sector. For foreign-born, gender gap increased within the industry sector, showing a result of 1.0 percentage point that is statistically significant. However, for the South American-born, where the gender gap decreased, showing a result of 1.7 percentage points.

Control variables such as education, children, marital status, and age continue to show expected signs and statistical significance, supporting their role as relevant factors in employment outcomes.

Table 8: Postcovid in Industry sector gender gap for native-born, foreign-born and South American-born

	(1)	(2)	(3)
VARIABLES	Native	Immigrant	South American
Postcovid	0.001 (0.002)	-0.016*** (0.003)	-0.021*** (0.004)
Female	-0.016*** (0.002)	-0.034*** (0.006)	-0.035** (0.006)
Postcovid*female	0.007* (0.003)	-0.010 (0.007)	0.017* (0.010)
Education 1	0.045*** (0.003)	0.008** (0.003)	0.007* (0.004)
Education 2	0.059*** (0.003)	0.016*** (0.004)	0.011** (0.005)
Children	0.004*** (0.001)	0.012*** (0.003)	0.016*** (0.004)
Married	0.025*** (0.002)	0.009** (0.004)	0.009** (0.004)
Age	0.001 (0.001)	0.004** (0.002)	0.004* (0.002)
Constant	0.879*** (0.030)	0.842*** (0.035)	0.845*** (0.043)
Observations	67,598	21,265	14,356
R-Squared	0.011	0.010	0.009

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Age squared is not included in table 2 due only used as squared term, however, included in the regression.

6.1 Robustness check

6.1.1 Graphs

A negative value of the gender gap indicates that the employment rate of women is lower than that of men. Movements towards zero reflect a narrowing of the gap, while positive values imply that women's employment exceeds that of men.

Figure 1 shows employment rate trends for native-born women and men, alongside the gender-specific employment gap, over the period 2013–2023. Prior to the COVID-19 pandemic (2013–2019), both groups display broadly similar patterns, with minor fluctuations. Men's employment rates tend to exhibit slightly greater year-to-year variability compared to women's. Throughout most of the pre-pandemic period, the gender gap remains negative or close to zero, indicating that women generally had slightly lower employment rates than men.

In 2020, marking the onset of the pandemic, both groups experience a marked decline in employment, accompanied by a sharp narrowing of the gender gap. This suggests that the initial labour market shock affected men and women in a relatively symmetrical manner. During the post-pandemic recovery period (2021–2023), both groups see substantial gains in employment, although the increase is more pronounced among men. This leads to a gradual widening of the gender gap from 2021 onwards.

From a robustness perspective, the lack of clear parallel pre-trends warrants caution in interpreting the causal estimates. This suggest that it could be other factors than the pandemic that influence the employment rates. This is also true for figure 2 and figure 3.

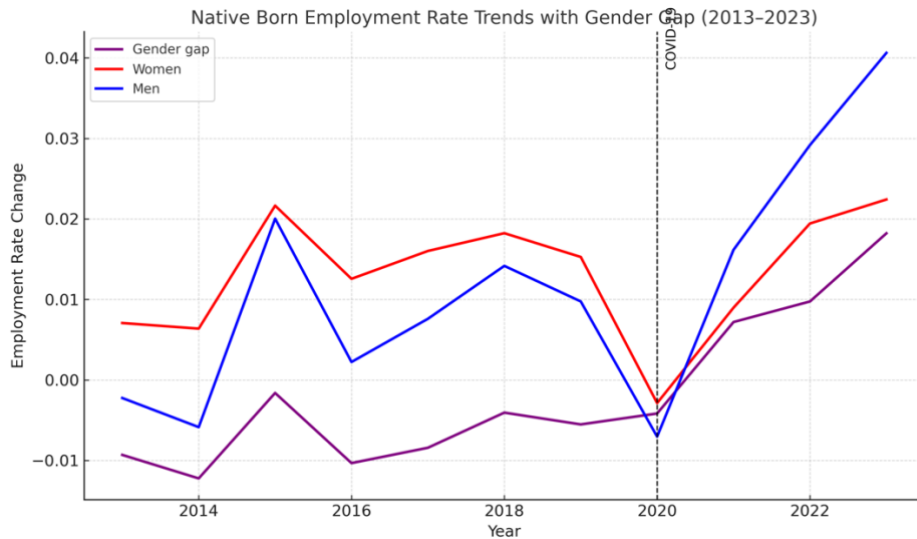


Figure 1: Native born employment rate trends with gender gap (2013-2023)

Figure 2 shows employment rate trends for Foreign-born women and men, alongside the gender-specific employment gap, over the period 2013–2023. Prior to the COVID-19 pandemic (2013–2019), both groups display broadly similar patterns, with minor fluctuations. Foreign-born male employment rates tend to exhibit slightly greater year-to-year increase in employment rate which then decreases 2017. Throughout most of the pre-pandemic period, the gender gap remains negative or close to zero, indicating that women generally had slightly lower employment rates than men. The gender gap widened post-COVID, reaching the lowest point year 2021.



Figure 2: Foreign-born employment rate trends with gender gap (2013-2023)

Figure 3 shows employment rate trends for South American-born women and men, alongside the gender-specific employment gap, over the period 2013–2023. Prior to the COVID-19 pandemic (2013–2019), both groups display broadly similar patterns, with minor fluctuations. South American-born women employment rates tend to exhibit slightly greater variations year-to-year in employment rate with then a great decrease year 2020 when the pandemic hit. Throughout most of the pre-pandemic period, the gender gap remains somewhat positive during some years or close to zero, indicating that women generally had slightly higher employment rates than male counterpart. However, not true during year 2013 and 2014. The gender gap wended when the pandemic hit, hitting the lowest point during 2022.

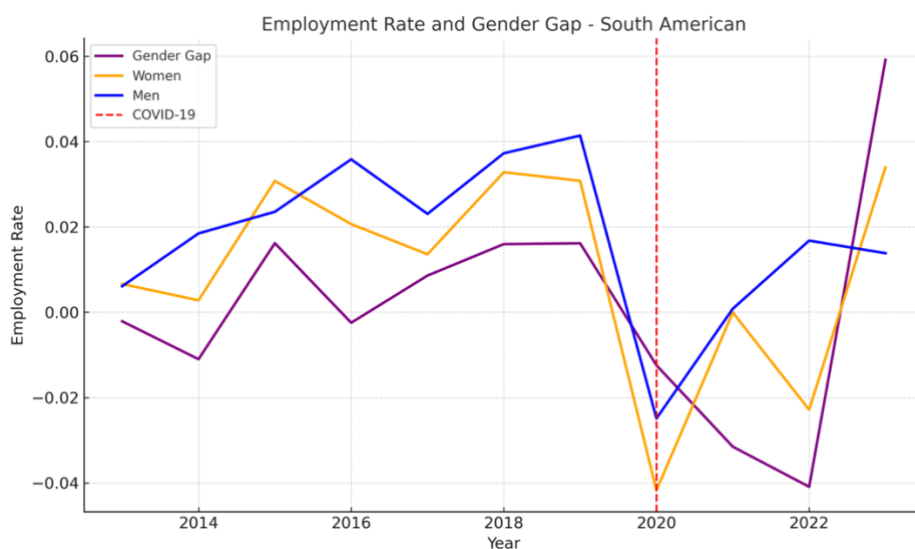


Figure 3: South American-born employment rate trends and gender gap (2013-2023)

7. Discussion

The results of this study align closely with, and contribute to, the existing literature on the gendered and immigrant-specific impacts of the COVID-19 pandemic on employment outcomes. Partly consistent with Borjas and Cassidy (2020), our findings show that foreign-born women experienced larger declines in employment rates during the post-COVID period compared to their male counterpart and natives. This reflects immigrants' greater exposure to sectors with limited remote work opportunities. The notably larger negative employment effect observed among South American-born immigrants particularly supports the notion that occupational structure and sectoral vulnerability play a decisive

role in pandemic-related employment losses beyond factors such as education or geography.

Another explanation for the widened gender gap, as suggested by Albanesi and Kim (2021), is the increased caregiving responsibility during the pandemic due to school closures, leading to reduced working hours (Collins et al., 2020). This effect may be especially pronounced among women with younger children, although this aspect was not controlled for in the present study. However, this could be due to language barriers (Chiswick et. al., 1997). Furthermore, one could investigate whether discrimination is present or not, which is not controlled for.

Interestingly, while men's employment also declined, the magnitude of the decline was smaller, and recovery appeared quicker in comparison. This may be attributed to the sectoral distribution of immigrant men, who tend to be more represented in occupations that were either less affected or recovered more rapidly. Additionally, traditional gender norms and economic pressures may have compelled men to maintain employment despite adverse conditions. Furthermore, caregiving responsibilities during the crisis appear to have impacted women more heavily, potentially reducing their working hours (Collins et al., 2020). However, despite maintaining employment, immigrant men have reported greater precarity and financial stress in other studies (García et al., 2023), indicating that employment retention does not necessarily equate to economic security.

While the overall gender gap among foreign-born individuals increased, some sectors exhibited a narrowing of this gap, suggesting sector-specific resilience or differential impacts that warrant further investigation. The consistent importance of education across all groups highlights human capital as a critical buffer against employment shocks, underscoring the need for targeted policies that promote educational access for women, particularly immigrants.

These findings carry important policy implications. They suggest that supporting immigrant women's labor market integration requires targeted measures such as accessible childcare, flexible work arrangements, and programs for language acquisition and credential recognition. Addressing structural barriers that hinder full labor market

participation among both immigrant men and women is essential to mitigate the long-term scarring effects of the pandemic.

Finally, while this study provides valuable insights, several limitations should be acknowledged. The data cover only the early to middle phases of the pandemic, and longer-term effects may differ. Additionally, heterogeneity within immigrant groups concerning country of origin, length of stay, and legal status was not fully explored, which may obscure important variations in outcomes. Future research should examine these dimensions and consider qualitative approaches to better understand the lived experiences behind these quantitative trends. Future research could also investigate the difference directly between foreign-born and natives.

8. Conclusion

This study confirms that the COVID-19 pandemic has exacerbated employment disparities along both gender and immigrant lines. Foreign-born women, particularly those from South America, experienced the largest declines in employment, highlighting the role of sectoral vulnerability and occupational segregation. Increased caregiving responsibilities during school closures could disproportionately affected women's ability to maintain employment, however not controlled for in this study. While immigrant men's employment also declined, their recovery was quicker, possibly due to sectoral differences and social norms, though this did not necessarily translate into economic security.

The findings emphasize the protective effect of education as a buffer against employment shocks and underscore the necessity for targeted policy measures. These should focus on improving access to childcare, flexible work options, language acquisition, and credential recognition to support immigrant women's integration into the labor market. Addressing structural barriers for both immigrant men and women is crucial to preventing long-term negative effects of the pandemic on employment.

Finally, the study acknowledges limitations such as the relatively short data timeframe and unexamined heterogeneity within immigrant groups. Future research should explore these complexities further, including direct comparisons between foreign-born and native-born populations, and incorporate qualitative methods to capture the lived experiences behind the observed trends.

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Appendix

Appendix 1: Correlation Matrix

Correlation matrix	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Employment	1.000							
(2) Education	0.182	1.000						
(3) Married	0.069	0.116	1.000					
(4) Children	0.037	0.022	0.475	1.000				
(5) Age	0.008	-0.022	0.347	0.176	1.000			
(6) Female	-0.157	0.084	0.052	0.094	0.003	1.000		
(7) Immigrant	-0.052	-0.132	0.081	0.048	0.039	0.002	1.000	
(8) Sector	-0.0123	0.196	-0.032	-0.025	-0.034	0.252	-0.045	1.000