HEALTH INSURANCE LITERACY IN TCU: EXAMINING THE DIFFERENCE IN HEALTH

INSURANCE KNOWLEDGE BETWEEN INTERNATIONAL AND DOMESTIC COLLEGE

STUDENTS AND ADDRESSING THE NEEDS OF HEALTH INSURANCE EDUCATION

FOR INTERNATIONAL STUDENTS

by

Lily Ta

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Approved by:

Supervising Professor: Dongwoo Kim, Ph.D

Department of Economics

Susan Staples, Ph.D

Department of Mathematics

Rishav Bista, Ph.D

Department of Economics

Dawn Elliott, Ph.D

Department of Economics

ABSTRACT

International students are increasing in U.S. academic institutions and are making great contributions to the U.S. Economy. As the number of international students experiencing health and financial problems is growing, it is important for them to utilize health insurance to protect their well-being. Nevertheless, it is uncertain that some international students are aware of how U.S. health insurance works. In order to address this issue, we conducted research that compared international students to domestic students in health insurance literacy at TCU, based on their backgrounds (classification, gender, college major, seeking insurance information, and number of health center visits). Our research showed that the international population possessed less health insurance knowledge than their domestic fellows, in regard to every background. We concluded that international students need to be educated on health insurance in order to understand the significance of preventative care in case of unexpected unhealthy conditions, and the guarantee against financial burden in the case of unexpected medical expenses.

Introduction

The impact of international student enrollment on the United State's Educational

System's economy, is significant and growing. During the 2017- 2018 academic year,

international students supported more than 450,000 jobs and contributed $39 billion to the U.S.

education system; this amount represents more than two times the value of their contribution in

a decade ago (International Educator, 2019). International students also demonstrate excellent

academic performance at schools: they are passionate achievers, unlikely to obtain below-

average score in classrooms, and amongst the smartest students on campus (Allameh, 1989).

Furthermore, with foreign student population, schools can foster a diverse campus environment,

create new learning experiences with cultural perspectives, and develop international

relationships among students. These enormous contributions indicate that foreign students are

indispensable parts of the modern day higher educational experience in America.

Many reasons motivate international students to pursue higher education in the United

States. Common factors leading foreign students to study in America include the reputation and

prestige of U.S. universities, stellar academic programs, career opportunities, chances to refine

English skills, exposure to diverse ideas and lifestyles, and excellent student support systems

(Miller, 2019). However, chasing the "American educational dream" can lead international

students to experience struggles and hardship in different aspects. These challenges include, but

are not limited to, overcoming spoken language barriers, adapting to different cultural norms,

handling cultural misunderstandings, facing financial issues, lacking friends and social support,

and dealing with feelings of racial discrimination, homesickness, and isolation. (Sherry et al.,

2010). Because of these challenging circumstances, it is without doubt that international students

are at risk to develop physical or mental issues. According to a report in 2018 about international

students' mental health challenges, there was an increase of 6% in international students who

experience health issues which affected their academic performance of foreign students, with 83% of them reported to have health issues in colleges, both mental and psychological problems (Qin, 2019). With the growing presence of international students on U.S. campuses and the indisputable value of this population in the higher educational system, the appropriate healthcare and counseling systems need to be in place to provide support for international students in need. One way to ensure better medical interventions and better mental health care, while at the same time address the financial insecurities of foreign students is to promote the utilization of health insurance, which provides a cost-effective access to health care in universities.

Most universities mandate health insurance for every international student. Nevertheless, while health insurance serves as a helpful source for their well-beings, it is uncertain that some international students were able to comprehend how to use insurance benefits to take advantage of the medical and mental health care systems in the U.S. Recent research indicates that foreign student group lacks health insurance knowledge because of the complex insurance terminologies and lack of education on insurance (Adegboyega et al., 2020). However, no previous literature compares the knowledge level of international students to that of domestic students.

In this research, we will focus on the difference in health insurance knowledge between international and domestic students based on several factors and determine if such difference is significant. We will examine this topic in the undergraduate level at Texas Christian University (TCU), including both international and domestic students in this campus. There are three research questions that lead the study:

1. Is there a difference in health insurance knowledge between domestic and international students?

2. What are the main factors that cause the difference in knowledge of health insurance between international and domestic students at TCU?

3. Does TCU do a good job in promoting university health center and health insurance to both foreign and domestic student population?

While TCU mandates international students to have health insurance, it also requires domestic students to have either university health insurance or private insurance (TCU Health Center). This policy allows us to address the degree of health insurance knowledge based on the fact that every student possesses a health insurance plan. We hope that the results from this study will help health educators understand students' experiences with health insurance and see how important health insurance is for students (especially international students) on campus.

Literature Review

Health insurance is the means of financial protection for someone's health throughout a certain period of time. In a health insurance plan, Kagan (2020) explained that health insurance companies pay all or some portions of medical costs for patients with health insurance plan, in exchange of premium payment made by the patients. In most universities, authorities provide affordable student health insurance which are covered by either the school or the insurance company, in return they charge the students for health insurance fees (ASO Staff, 2022). In TCU, Haylor, Freyer & Coon is in charge of the students' health insurance plans. The services in the school's health center includes primary care, sexual health, allergy clinic, psychiatric, and TCU Pharmacy (TCU Health Center).

We first investigated factors that affect everyone's perception of health insurance. Then, we determined whether there was a difference in health insurance literacy between international and domestic students in regard to any of those factors. Several studies indicate that age, gender, and college major is significantly related to how people subscribe or experience with health coverages (Edward et al., 2019; Dane & Hira, 1987; Chen & Volpe, 1998). Additionally,

financial responsibilities imply how students will use health insurance, especially after graduation (Gordon & Brown, 2016). These responsibilities comprise the degree of actively researching information which is associated with the degree of knowing health insurance (Adegboyega et al., 2020). Finally, several literatures suggest that college campuses should encourage healthy lifestyles as well as improve health education (Mackert et al., 2018; Adegboyega et al., 2020; Tyler et al., 2018). Therefore, we will use university promotion as the final contributor to health insurance knowledge of both domestic and international students.

How does age impact a person's knowledge of health insurance? Edward et al. (2019) conducted a study using Health Reform Monitoring Survey and found that compared to older age groups, young adults were much more likely to not have enough health insurance information and expertise in using health insurance plan, even if they possessed high education. Thus, the researchers recommended further effort to increase health insurance literacy to young adults. Dane and Hira (1987) also discovered that a student's age was positively correlated to his or her insurance knowledge. One explanation, they stated, was that as students were older, they were more aware of learning money management, including health insurance, as a necessity. Therefore, younger college students, even though understanding the basic facts about money management, lacked pratical experiences and specific knowledge. In another study, observation and interviews revealed that young adults had difficulty in defining what deductible, premium tax credit, out-of-pocket expense, and cost sharing meant, which limited their ability to shop insurance plan (Wong et al., 2015). Because of these studies, we infer that an increase in age is associated with increase in understanding health insurance.

Gender is another important aspect of health insurance literacy. Bartholomae et al. (2016) created a study with the smart choice health insurance™ program and observed that males had lower score in health insurance literacy compared to females. Furthermore, males were 58.4%

less likely to improve such literacy than females were. Another research also showed the similar findings (Kutner et al., 2016). They further elevated that males learned less about health insurance information through written and digital media, heard less about that information from acquaintances and professionals than females did. Males also had difficulty in understanding and using terminology. Politi et al. (2014) performed some interviews with different recruiting sites in St. Louis city and noticed that males generally could not answer the questions about what was in the health insurance, while females tried to relate some insurance terms to their past experiences or explained by their own understandings. We conclude that females are more fluent in health insurance knowledge and are more active in learning it than males.

Students' college majors also reflect the degree that they understand health insurance. Business students were better and more correct at answering financial knowledge, including insurance, than non-business students (Chen et al., 1998). Although there were no further studies that indicated which specific major created students with better health insurance knowledge, we know that business students possess more health insurance literacy through in-class learning. Indeed, 30% of business graduates are now health insurance specialists, while less than 10% of students with other majors work the same position (Health Insurance, 2021).

Researching and utilizing health insurance have a positive relationship with the health insurance literacy as well. One study focused this feature on domestic and international student population. For domestic students, the barrier for using health insurance for seekers was the insurance cost, while it was the lack of understanding for non-seekers (Mackert et al., 2017). On the contrary, for international students, most of them were non-seekers because of both insurance cost and the lack of understanding. International student population also expressed concerns about language as a bigger factor in looking up health insurance information. Moreover, most college students had low self-efficacy and low health insurance literacy, which indicated their

low confidence in utilizing health insurance plan (James et al., 2020). This limitation affects students in the long-term if they do not receive adequate education to understand the importance of health insurance.

Health insurance is an underrated savior in college life because it helps students in both healthy and cost-saving way. We will use the above-mentioned factors to examine the difference in health insurance knowledge between international and domestic student group, therefore we can entail the health insurance education for international students if such difference is significant.

Methods

Overview

Since the targeted subjects of the study are domestic and international students, we conducted a web-based survey to undergraduates at TCU. Types of questions in the survey were Yes/No, short answers, multiple choices, and linear scales. The survey did not inquire personal information from the participants, but rather asked the demographic questions as one small part. To be specific, personal information includes names, identification numbers, address information, physical/biometric characteristics, or asset information (University of Pittsburgh).

We first asked the students whether they were undergraduate or graduate students, and whether international or domestic students. According to Immigration Policy Institute, the U.S. international students, or foreign students, are students who are enrolled in academic or nonacademic institutions with either F visas (student visas), J visas (exchange visas), or M visas (vocational training visas) (Israel and Batalova, 2014). On the contrary, domestic students are considered as U.S. citizens, permanent residents, asylees, refugees, or undocumented aliens (University of Texas at Dallas). We then proceeded to ask demographic background which

included college names, classification, majors, age groups, and gender. The survey was created

from Google Form. To gather the information, we collected general email addresses from the

Department of Mathematics and the Department of Economics in TCU, sent invitation emails to

the addresses, and asked the administrators of the addresses to forward the emails to all

undergraduate students. We included the Google Form survey in all emails and collected the data

from the survey responses. The responses from the survey were only known by the student

researcher, the Principal Investigator, and Co-Investigators. They were stored in the Google

Form's Responses tab and were exported as a Google Sheets document for result examination.

Measures

We analyzed the insurance knowledge based on the survey responses. Based on the

Literature Review, there were six components of the survey that we wanted to consider into the

degree of insurance knowledge in both domestic and international students: student status, age

group, gender, major, insurance information seeking, and number of health center visits. Student

status was either domestic or international. Age groups included 18 to 24 years old, 25 to 34

years old, 35 to 44 years old, 45 to 54 years old, 55 to 64 years old, and over 65 years old.

Gender includes male and female. Major included every area of study that a student is

specializing in. Insurance information seeking is either yes or no. The number of health center

visits could be any non-negative integers.

Expectation

Our expectation was that how much a student understood health insurance had a positive

correlation with age group, since older people had more practical experiences in which they have

to know health insurance for financial management. The level of knowledge was anticipated to

be directly related to gender, with males acquiring less health insurance information than

females. Additionally, we predicted that students who learned health insurance in college had

more health insurance information than students who did not learn. Seeking information reflected how much a student independently comprehended health insurance knowledge. Finally, we assumed that the number of health center visits were positively connected to a student's understanding of health insurance. The outcomes that we wanted to achieve were the levels of knowledge for domestic and international students if there was a change in age group, gender, major, insurance information seeking, and number of health center visits for both student populations. In the following section, we will construct equation models based on these factors, involving some interaction terms for easier comparisons between international and domestic students.

Data Analysis

We used STATA, a statistical software for data science, to analyze the data obtained from the survey. Any participant who answered all questions in the survey had their data included in the analysis. In order to build an equation model, we had to determine independent and dependent variables. Here, our dependent variable was the level of knowledge, which was measured in units from 1 to 5, based on the survey results. We denoted this ordinal variable in the model as *level*. The independent variables in the model were student status, age group, gender, major, insurance information seeking, and the number of health center visits. The nominal variable is the number of health insurance visits. The dummy variables are student status, gender, major, and insurance information seeking. The categorical variable is the age group. Let age group be 0 for 18 to 24 years old, 1 for 25 to 34 years old, 2 for 35 to 44 years old, 3 for 45 to 54 years old, 4 for 55 to 64 years old, and 6 for over 65 years old. Gender is 0 for female and 1 for male. Based on the TCU curriculum, we believe that students majoring in Actuarial Science, Finance, and Economics have some knowledge about insurance in general. Thus, major variable is 1 for those students and 0 for otherwise. If a student has looked up

information about health insurance before, the independent variable outcome is 1. Otherwise, it is 0. The number of visits is a numerical data and is measured in times. For students who were in their first semester at TCU or never visit the health center before, their number of visits will be 0 times. We denoted student status, age group, gender, major, insurance information seeking, and the number of health center visits as *intl, age, male, major, seek,* and *uhc* respectively. In general, our theoretical regression equation is:

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + u$$

The most important task was to see the difference in insurance knowledge between international and domestic students regarding a certain background or factor (either age group, gender, major, insurance information seeking, or number of health center visits), so we will use interaction terms to estimate the amount of difference. Thus, using STATA, we generated 5 more independent variables, each of which were a multiple of student status and another above-mentioned background. These variables were denoted as *intl_age, intl_male, intl_major, intl_seek,* and *intl_uhc*. In total, there were 5 regressions equations to consider in the analysis:

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + \beta_i x_i(intl\_age) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + \beta_i x_i(intl\_male) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + \beta_i x_i(intl\_major) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + \beta_i x_i(intl\_seek) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(age) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc) + \beta_i x_i(intl\_uhc) + u$$

Results

Data Analysis

We received 40 responses after 2 weeks of sending the survey to the students of Department of Mathematics and the Department of Economics. Since these departments sent the survey to students who minored in Math and Econ, we received responses from students of non-Math and non-Econ majors as well. 1 out of 40 responses did not qualify because a student did not answer the question about the student's level of health insurance knowledge. Therefore, 39 results will be put in the regression analysis. One problem of the result was that 37 out of 39 responses were in the age group 18 to 24, which could cause some difficulties in determining the impact of different age groups on the level of knowledge. However, because we also asked the students about their classification (freshman, sophomore, junior, and senior) in the survey and 39 responses for that question was more diverse, we used classification, instead of age group, as an independent variable. Classification and age group (or age) determined the insurance knowledge similarly because an increase in a student's age was generally an increase in their classification. We denoted classification as *year*, with freshman as 0, sophomore as 1, junior as 2, and senior as 3. The five new regressions equations are:

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(year) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc)$$
$$+ \beta_i x_i(intl\_year) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(year) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc)$$
$$+ \beta_i x_i(intl\_male) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(year) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc)$$
$$+ \beta_i x_i(intl\_major) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(year) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc)$$
$$+ \beta_i x_i(intl\_seek) + u$$

$$Y(level) = \beta_1 x_1(intl) + \beta_2 x_2(year) + \beta_3 x_3(male) + \beta_4 x_4(major) + \beta_5 x_5(seek) + \beta_6 x_6(uhc)$$
$$+ \beta_i x_i(intl\_uhc) + u$$

Before performing regression analysis, we wanted to better understand the characteristics of the equation's variables. Thus, we tested both dependent and independent variables and observed whether there were potential issues with them. We started with the correlation among dependent and independent variables, as illustrated in the matrix below. Most of the correlations implied the weak relationships between level and each of the independent variables. The highest value of correlation was 0.2946 between *level* and *major* variables. Nevertheless, when we examined the potential multicollinearity, we found out that the correlations between any two independent variables were very low. Therefore, we decided not to eliminate any independent variable from the regression model.

```
. corr level intl year major male seek uhc
(obs=39)

                level     intl     year    major     male     seek      uhc

       level   1.0000
        intl  -0.2296   1.0000
        year   0.2283   0.0508   1.0000
       major   0.2946  -0.2743   0.0470   1.0000
        male   0.0854  -0.2357  -0.0331   0.1091   1.0000
        seek   0.0854   0.2357  -0.0331  -0.2182  -0.1538   1.0000
         uhc  -0.1252   0.1356  -0.1633  -0.0092   0.0000   0.1263   1.0000
```

There were other observations from this matrix. Firstly, the level of health insurance knowledge was negatively correlated with whether the student was an international or not. This suggested that if a student was international, then their knowledge level was lower than that of a domestic student with the same background (classification, gender, major, information seeking, and the number of health center visits). Secondly, student classification and the level of knowledge vary in the same direction. In other words, a student's increase in classification occurred at the same time as their understanding of health insurance increased. Thirdly, the level of health insurance knowledge was positively correlated with whether the student is a male or

not. When a student was a male, coincidentally, the level of knowledge for that student was higher than that of a female student with the same background (student status, classification, major, information seeking, and the number of health center visits). Another observation was that the correlation between *seek* and *level* was positive, which suggested that the more a student seek the health insurance information, the more knowledge they gained. The final observation was quite interesting: the number of health center visits is negatively correlated to the level of knowledge, which indicated that the more a student went the university health center was associated with the less that student knew about health insurance. We concluded from these observations that if there was a change in a certain background for international and domestic students, then there would be some variations in the difference in health insurance literacy between these two types of students.

Regression results

After the overview of every factor of the model, we moved on to the regression analysis and determined the estimated returns to classification, gender, major, insurance information seeking, and the number of health center visits for international and domestic students. Each estimated return was the difference in health insurance literacy between international and domestic students caused by a change in a certain background, on a range from 0 to 4. It was determined based on the coefficients in the regression summary. We also included the summary statistics for each variable to visualize the context of the result.

1. Classification:

```
.  reg level intl intl_year year major male seek uhc

      Source │        SS          df        MS            Number of obs   =         39
─────────────┼──────────────────────────────────          F(7, 31)        =       1.77
       Model │  12.5407511         7   1.79153587          Prob > F        =     0.1290
    Residual │  31.3566848        31   1.01150596          R-squared       =     0.2857
─────────────┼──────────────────────────────────          Adj R-squared   =     0.1244
       Total │  43.8974359        38   1.15519568          Root MSE        =     1.0057


       level │  Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
─────────────┼────────────────────────────────────────────────────────────────
        intl │   .5682734    .6720389     0.85   0.404    -.8023591    1.938906
   intl_year │  -.5868741    .320888     -1.83   0.077    -1.24133     .0675814
        year │   .3915224    .1789637     2.19   0.036     .0265236    .7565213
       major │   .6181732    .3424867     1.80   0.081    -.080333     1.316679
        male │   .0843922    .3544079     0.24   0.813    -.6384274    .8072118
        seek │   .4746303    .3603465     1.32   0.197    -.2603012    1.209562
         uhc │  -.0709452    .1285801    -0.55   0.585    -.333186     .1912955
       _cons │   1.999993    .4741282     4.22   0.000     1.033002    2.966984
```

$$Y(\widehat{level}) = 2 + 0.5683x_1(intl) + 0.3915x_2(year) + 0.0844x_3(male) + 0.6182x_4(major)$$

$$+ 0.4746x_5(seek) - 0.071x_6(uhc) - 0.5869x_i(intl\_year)$$

```
.  sum level

    Variable │        Obs        Mean    Std. dev.       Min        Max
─────────────┼──────────────────────────────────────────────────────────
       level │         39    2.948718     1.0748          1          5
```

Summary of *level* variable

Holding other factors (*male, major, seek, uhc*) constant – For international population, an additional year of college was associated with an increase in a student's knowledge level by $0.5869 - 0.3915 = 0.1954$ units. For domestic population, an additional year of college was associated with an increase in a student's knowledge by 0.3915 units. Additionally, with an additional college year, an international student was expected to know $0.5869 - 0.5683 = 0.0186$ units less than a domestic student does.

2. Gender:

```
. reg level intl year major intl_male male seek uhc

      Source |       SS           df       MS        Number of obs   =        39
-------------+----------------------------------     F(7, 31)        =      1.28
       Model |  9.8439232          7   1.40627474    Prob > F        =    0.2923
    Residual |  34.0535127        31   1.09850041    R-squared       =    0.2242
-------------+----------------------------------     Adj R-squared   =    0.0491
       Total |  43.8974359        38   1.15519568    Root MSE        =    1.0481


       level | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        intl |  -.2969963   .4385451    -0.68   0.503    -1.191415    .5974224
        year |   .2059919   .1566571     1.31   0.198    -.1135124    .5254962
       major |   .5202996   .3639404     1.43   0.163    -.2219616    1.262561
   intl_male |  -.7424605   .9391511    -0.79   0.435    -2.657872    1.172951
        male |   .2701322   .4182592     0.65   0.523     -.582913    1.123177
        seek |    .496122   .3756098     1.32   0.196    -.2699393    1.262183
         uhc |  -.0844915   .1348861    -0.63   0.536    -.3595935    .1906105
       _cons |   2.296767   .4634221     4.96   0.000     1.351612    3.241923
```

$$Y(\widehat{level}) = 2.2968 - 0.297x_1(intl) + 0.206x_2(year) + 0.2701x_3(male) + 0.5203x_4(major)$$

$$+ 0.4961x_5(seek) - 0.0845x_6(uhc) - 0.7425x_i(intl\_male)$$

```
. sum level if male == 1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       level |         13    3.076923    .9540736          2          5
```

Summary of *level* variable in male population

```
. sum level if male == 0

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       level |         26    2.884615    1.142871          1          5
```

Summary of *level* variable in female population

Holding other factors (*year, major, seek, uhc*) constant - For international students, a male was anticipated to know 0.7425 - 0.2701 = 0.4724 units of knowledge level less than a female. For domestic students, a male was anticipated to know 0.2701 units of knowledge level more than a female. From the regression, we assumed that an international student knew about health insurance 0.297 + 0.7425 = 1.0395 units less than a domestic student, if the student is a male. For female population, we assumed that an international student had 0.297 units of knowledge less than a domestic student.

3. Major:

```
. reg level intl year intl_major major male seek uhc

      Source |       SS           df       MS      Number of obs   =        39
-------------+----------------------------------   F(7, 31)        =      1.24
       Model |  9.5914905          7  1.37021293   Prob > F        =    0.3125
    Residual |  34.3059454        31  1.1066434    R-squared       =    0.2185
-------------+----------------------------------   Adj R-squared   =    0.0420
       Total |  43.8974359        38  1.15519568   Root MSE        =    1.052

-------------+----------------------------------------------------------------
       level | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        intl |  -.6459168   .5123676    -1.26   0.217    -1.690897    .3990638
        year |   .2096129   .1570746     1.33   0.192    -.1107428    .5299686
  intl_major |   .5020811   .8016249     0.63   0.536    -1.132844    2.137006
       major |   .4230269   .4359398     0.97   0.339    -.4660782    1.312132
        male |   .1587023   .3770112     0.42   0.677    -.6102171    .9276217
        seek |    .460823   .3792381     1.22   0.233    -.3126382    1.234284
         uhc |  -.0575403   .1365221    -0.42   0.676     -.335979    .2208985
       _cons |   2.378712   .4814115     4.94   0.000     1.396866    3.360557
```

$$Y(\widehat{level}) = 2.3787 - 0.6459x_1(intl) + 0.2096x_2(year) + 0.1587x_3(male) + 0.423x_4(major)$$

$$+ 0.4608x_5(seek) - 0.0575x_6(uhc) - 0.5021x_i(intl\_major)$$

```
. sum level if major == 1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       level |         21    3.238095    1.044259          1          5
```

Summary of *level* variable for students majoring in Actuarial Science, Economics, and Finance

```
. sum level if major == 0

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
       level |         18    2.611111    1.036901          1          5
```

Summary of *level* variable for students not majoring in Actuarial Science, Economics, and Finance

Holding other factors (*year, male, seek, uhc*) constant – For international population, students who majored in either Actuarial Science, Economics, or Finance was predicted to understand 0.5021 + 0.4230 = 0.9251 units more than a domestic student with the same majors. For domestic population, students who majored in either Actuarial Science, Economics, or Finance was predicted to understand 0.4230 units more than a domestic student with the same majors. When comparing international and domestic students, we estimated that international students perceived 0.6459 + 0.5021 = 1.148 units of knowledge less than a domestic student, if they both major in Actuarial Science, Economics, or Finance. In student population that did not study Actuarial

Science, Economics, or Finance majors, an international student is anticipated to possess 0.6459 units of knowledge less than a domestic student do.

4. Health insurance information seeking:

```
. reg level intl year major male intl_seek seek uhc

      Source |       SS           df       MS      Number of obs   =        39
-------------+----------------------------------   F(7, 31)        =      1.18
       Model |  9.21532368         7  1.31647481   Prob > F        =    0.3443
    Residual |  34.6821122        31  1.11877781   R-squared       =    0.2099
-------------+----------------------------------   Adj R-squared   =    0.0315
       Total |  43.8974359        38  1.15519568   Root MSE        =    1.0577


       level | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        intl | -.5200885    .5212297    -1.00   0.326    -1.583144    .5429665
        year |  .213136     .1578286     1.35   0.187    -.1087575    .5350296
       major |  .5694367    .3620672     1.57   0.126    -.1690043    1.307878
        male |  .1083382    .3732672     0.29   0.774    -.6529453    .8696217
   intl_seek |  .1784753    .7841493     0.23   0.821    -1.420808    1.777758
        seek |  .4209843    .4784878     0.88   0.386    -.554898    1.396867
         uhc | -.0767243    .1366505    -0.56   0.579    -.3554247    .2019762
       _cons |  2.331528    .4866212     4.79   0.000     1.339058    3.323999
```

$$Y(\widehat{level}) = 2.3315 - 0.5201x_1(intl) + 0.2131x_2(year) + 0.1083x_3(male) + 0.5694x_4(major)$$
$$+ 0.421x_5(seek) - 0.0767x_6(uhc) - 0.1785x_i(intl\_seek)$$

```
.  sum level if seek == 1

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+--------------------------------------------------------
       level |         13    3.076923    .9540736          2          5
```

Summary of *level* variable for students seeking health insurance information in any resources

```
. sum level if seek == 0

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+--------------------------------------------------------
       level |         26    2.884615    1.142871          1          5
```

Summary of *level* variable for students not seeking health insurance information in any resources

Holding other factors (*year, male, major, uhc*) constant – We speculated that an international student who sought information about health insurance perceive 0.1785 + 0.4210 = 0.5995 units more than another international student who did not. We also speculated that a domestic student who sought information about health insurance perceive 0.421 units more than another domestic student who did not. An international student was expected to know 0.5201 + 0.1785 = 0.6986

units less than a domestic student did, if they both sought health insurance information from any resources. For population that did not seek for health insurance information, an international student was anticipated to understand 0.5201 units of knowledge less than a domestic student did.

5. Number of university health center visits:

```
. reg level intl year major male seek intl_uhc uhc

      Source |       SS           df       MS      Number of obs   =        39
-------------+----------------------------------   F(7, 31)        =      1.38
       Model |  10.4044647         7   1.4863521   Prob > F        =    0.2504
    Residual |  33.4929712        31  1.08041842   R-squared       =    0.2370
-------------+----------------------------------   Adj R-squared   =    0.0647
       Total |  43.8974359        38  1.15519568   Root MSE        =    1.0394

------------------------------------------------------------------------------
       level | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
        intl |  -.7903836   .5087882    -1.55   0.130    -1.828064    .2472968
        year |   .206987    .1552068     1.33   0.192    -.1095594    .5235334
       major |   .6349637   .3570632     1.78   0.085    -.0932715    1.363199
        male |   .1465296   .3671132     0.40   0.693    -.6022027    .8952618
        seek |   .437762    .3752143     1.17   0.252    -.3274925    1.203017
    intl_uhc |   .2992672   .2785511     1.07   0.291    -.2688416    .867376
         uhc |  -.179768    .1663584    -1.08   0.288    -.5190583    .1595222
       _cons |  2.387242    .4665362     5.12   0.000     1.435735    3.338749
------------------------------------------------------------------------------
```

$$Y(\widehat{level}) = 2.3872 - 0.297x_1(intl) + 0.206x_2(year) + 0.2701x_3(male) + 0.5203x_4(major)$$
$$+ 0.4961x_5(seek) - 0.0845x_6(uhc) - 0.7425x_i(intl\_uhc)$$

```
. sum uhc

    Variable |        Obs        Mean    Std. dev.       Min        Max
-------------+---------------------------------------------------------
         uhc |         39    1.153846    1.308645          0          5
```

Summary of *uhc* variable

Holding other factors (*year, male, major, seek*) constant – For international students, an additional the number of health center visits was related to a decrease in their knowledge by 0.0845 + 0.7425 = 0.827 units. For domestic students, an additional the number of health center visits was related to a decrease in their knowledge 0.0845 units. With an extra time of visiting the health center, we estimated that international students knew 0.297 + 0.7425 = 1.0395 units less than domestic students did.

Discussion and Conclusions

The findings from this study are to highlight how some important factors affect international and domestic students' understanding of health insurance, and how both types of students know the insurance information differently when certain factor impacts them. There are several noteworthy reflections from both the Results and the Literature Review, as well as the interpretations of the results.

Theoretically, as students get older, they will increase their health insurance literacy. In our results, both domestic and international students demonstrated the same pattern. International population was expected to know health insurance less than domestic population, as they both increased their age (or classification). Additionally, based on the studies in the Literature Review, male possessed less health insurance knowledge than female. In our results, international students gave the strong evidence to the studies, but domestic students did not. Nevertheless, we estimated that international students perceived less insurance knowledge than domestic students did, whether they were males or females. Thirdly, if students studied a major that involves health insurance education, then they were expected to know health insurance more than students that do not study such a major. Our results were similar as the theoretical statement for both domestic and international population. Again, international students perceived less knowledge than domestic students did, whether both types of students studied majors that included or did not include insurance education. Similar to what we have found in *major* factor, when examining the *seek* factor, we observed that students who sought health insurance information understood the insurance more than students who did not, in either domestic or international population. Domestic population was anticipated to understand more insurance knowledge than international population did, whether these two populations were both seekers or not. Finally, we predicted from Literature Review that students would learn more about health

insurance as they made use of the health center more. Our results revealed that both domestic and international students did not reflect the same pattern. When doing the comparison, we found that international students possessed less knowledge of health insurance than domestic students if there were an additional increase in the health center visits in both populations.

We used the difference when comparing health insurance literacy between domestic and international students because we wanted to address how the difference told us about these two student populations. Based on the results of the regression analysis, we found out that international students always knew less than domestic students, regardless of what factors that we considered. We also examined the expected level of knowledge for two populations and observed: the mean level of knowledge for international students was 2.5833 out of 5, while the mean level of knowledge for domestic students was 3.1111 out of 5. Considering factors like classification, gender, major, seeking, and the number of university health center visits, we found that international students acquired less information about health insurance than domestic students. Therefore, we concluded that international student population needed more education on health insurance to better increase their knowledge level and catch up with their domestic fellows. Several ways for the university to help improve international students' understanding include, but not limited to: Health insurance workshops for first-year students, hard copies of health insurance brochures, educational sessions about health insurance terms, student health status' check-in.

One limitation that we need to improve is the sample size, which we believed to cause several conflicts in what the Literature Reviews section stated and what we discovered in the Results section. We did not expand the student sample to other colleges at TCU, but instead just focusing on the Department of Mathematics and the Department of Economics. We were strongly convinced that more students from other colleges contributed to the diversity of the

sample sizes, and thus giving the study a more unbiased view. Nevertheless, the survey was not entirely biased, because the Mathematics and Economics department also included students who minored in Mathematics and Economics, so we were able to receive responses from students in other majors as well.

To wrap up, given the factors like classification, gender, major, health insurance information seeking, and the number of health center visits, international students perceive less insurance knowledge than domestic students. Increasing the health insurance literacy is necessary for international students to lessen their financial burden as well as to improve their physical and mental health. As a result, the study suggests that further actions are needed to help international population understand the basics information about their mandate insurance so that they can proactively make decisions for the sake of their health.

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