

Homework 1

I am so proud of this document :)

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4/11/2021

Part A : Short Answer questions (25 points total)

1. (7 points) On January 25, 2021, President Biden signed an Executive Order ("Made in America") to ensure that "when the federal government spends taxpayer dollars, they are spent on American made goods by American workers and with American-made component parts." From an economics perspective, what is concerning about this idea of limiting international trade in order to rely more on national production?

Economists are concerned about this signed executive order wherein America obliged to limit international trade in order to rely more on their own national production. The wellbeing of citizens is subject to change following globalization and international trade restrictions. To efficiently allocate resources and capital in America, we must use our resources to producing goods of comparative advantage. This is because of the lower opportunity cost associated with comparative advantage production and the benefits of domestic and international trade markets. If the US Government decides to produce too wide of a range of goods outside the scope of comparative advantage, then they are misallocating resources. This in turn affects the social welfare of the entire country. Although trade decisions do not lead to long run unemployment, this agreement that President Biden signed raises potential, problematic unemployment in the short run due to the change in the mix of output because of labor reallocation.

On one extreme, if we solely rely on domestic production, then we dismiss the benefits created by absolute advantage and comparative advantage created by globalization. We know it is more economically beneficial for the whole world to determine their production level dependent upon a country's specialization in comparative advantage. The risks include the fact that trade surplus/deficits may destroy jobs in import competing sectors, without a proportional increase in job creation. In Stephen Golub's article, "Does Trade with Low-Wage Countries Hurt American Workers?" he discusses how such huge minimum wage differences encourage industries to move their production overseas. Competition in international markets affect worker wages across countries because this competition affects the prices of goods which in turn affect wages. However, the price of goods has to be equal across all markets if they want to be in a competitive market. and then wages determine productivity level dependent on things like employee motivation, job satisfaction, and energy. The problem with all of this is that wages should not determine what types of goods or specialization a country produces. Companies that produce goods in foreign countries to take advantage of cheap labor should not be permitted to dictate the wages paid to American workers" (Golub). Globalization and trade does lead to wage inequality and less than optimal economic conditions.

2. (6 points) Kept within sustainable bounds, trade deficits are not considered harmful by international economists. Why? To answer, define the trade balance equation of a country, and explain the economic justification of a country's trade deficit. (Hint: use the current account algebra to justify your answer).

trade deficits are not considered harmful by international economists because they are not unprecedented and may in fact not be harmful to an economy. We have some equilibrium equations to guide our trade decisions, one being the balanced budget condition wherein:

$TradeBalance < 0$ (Exports - Imports) = Domestic Savings(S) - Domestic Investment(I) When domestic savings minus the domestic investments equals anything less than zero, we have a trade deficit. This in turn means Domestic Savings is less than Domestic Investment ($S < I$). Our balanced budget condition states that output is equivalent to income. From this, we gather our Current Account(CA) information, which is considered about equivalent to the trade balance.

$CurrentAccount(CA) = net \quad exports = trade \quad balance$

```
stargazer(reg_girl_outlier,se=list(se_go),omit=c("chagcharan"),
  dep.var.labels = c("Formal Enrollment, Girls (Outliers)"))
```

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlvac at fas.harvard.edu %
Date and time: Sat, May 01, 2021 - 23:13:12

```
stargazer(reg_boy_outlier,se=list(se_bo),omit=c("chagcharan"),
  dep.var.labels = c("Formal Enrollment, Boys (Outliers)"))
```

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlvac at fas.harvard.edu %
Date and time: Sat, May 01, 2021 - 23:13:12

Column 2 (With Controls):

```
reg_girl_con <- lm(data=girl_data,f07_formal_school ~ treatment + chagcharan
  + f07_heads_child_cnt + f07_girl_cnt + f07_age_cnt
  + f07_duration_village_cnt + f07_farsi_cnt + f07_tajik_cnt
  + f07_farmer_cnt + f07_age_head_cnt + f07_yrs_ed_head_cnt
  + f07_num_ppl_hh_cnt + f07_jeribs_cnt + f07_num_sheep_cnt
  + f07_nearest_scl)

reg_boy_con <- lm(data=boy_data,f07_formal_school ~ treatment + chagcharan
  + f07_heads_child_cnt + f07_girl_cnt + f07_age_cnt
  + f07_duration_village_cnt + f07_farsi_cnt + f07_tajik_cnt
  + f07_farmer_cnt + f07_age_head_cnt + f07_yrs_ed_head_cnt
  + f07_num_ppl_hh_cnt + f07_jeribs_cnt + f07_num_sheep_cnt
  + f07_nearest_scl)

se_girl_con <- sqrt(diag(vcovHC(reg_girl_con, type = "HC1")))

se_boy_con <- sqrt(diag(vcovHC(reg_boy_con, type = "HC1")))
```

2.

```
stargazer(reg_form_no,reg_girl_con,se=list(se_form_no,se_girl_con), omit=c("chagcharan", "f07_heads_child_cnt", "f07_girl_cnt", "f07_age_cnt", "f07_duration_village_cnt", "f07_farsi_cnt", "f07_tajik_cnt", "f07_farmer_cnt", "f07_age_head_cnt", "f07_yrs_ed_head_cnt", "f07_num_ppl_hh_cnt", "f07_jeribs_cnt", "f07_num_sheep_cnt", "f07_nearest_scl"),
  dep.var.labels = c("Fall '07 Formal Enrollment, Girls"))
```

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlvac at fas.harvard.edu %
Date and time: Sat, May 01, 2021 - 23:13:12

4.

```
stargazer(reg_form_no_boys,reg_boy_con,se=list(se_form_boy_no,se_boy_con),
  omit=c("chagcharan", "f07_heads_child_cnt", "f07_girl_cnt", "f07_age_cnt",
    "f07_duration_village_cnt", "f07_farsi_cnt", "f07_tajik_cnt",
    "f07_farmer_cnt", "f07_age_head_cnt", "f07_yrs_ed_head_cnt",
    "f07_num_ppl_hh_cnt", "f07_jeribs_cnt", "f07_num_sheep_cnt",
    "f07_nearest_scl"),dep.var.labels = c("Fall '07 Formal Enrollment
, Boys"))
```

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlvac at fas.harvard.edu %
Date and time: Sat, May 01, 2021 - 23:13:12

Column 3:

The CA is related to the size and direction of borrowing of a country: it tracks capital flow. International capital flow determines trade surplus. Ideally, that a country has a current account surplus. This in turn would mean that the country has a positive trade surplus(given our equations), but it also means there's more savings to be lent to foreign borrowers. Capital flows into the country when one borrows more from abroad than they give. It is an indicator of whether capital is flowing into a country or out. However, it is an important fact that no international capital flow occurs when investments are being met with domestic money. However, these current investments lead to higher output and overall positive, economic growth in the future.

3. (6 points) Describe two ways in which economists measure the degree of financial market integration. Provide a brief explanation for their use.

Economists measure the degree of financial market integration using two separate methods with perspectives that yield different financial integration levels. These two measures of capital mobility are defined as follows:

1. Current account as a fraction of GDP.
2. Correlation of domestic savings and domestic investments.

The Current Account method calculates the total income of a country to maintain a balanced budget where the value of output is equivalent to the value of input. When domestic savings and investment have perfect correlation, there's no capital flying in or out of the country and perfect capital mobility equals zero. When there exists no imports or exports, really no international trade at all, there's no correlation and capital mobility is equal to one. When the CA is closer to 1, it tells us the country is borrowing(lending) a lot(not a lot) relative to their GDP economic size. Correlation of domestic savings and domestic investments tells us a country saves. A low correlation coefficient means a country does not invest all savings domestically, but they invest in the location of the place that yields the highest payoff. This information is important because country's do not want prolonged capital flow in the long run as economic health seems supported by the International Financial market.

4. (6 points) Define the two waves of globalization. Explain three factors that played a key role in determining the first wave of globalization. What factors have influenced the second wave of globalization?

Globalization is a broad concept with several dimensions that work to integrate world markets. This includes the flow of goods and services across borders, the movement of people (labor) and firms (capital) across national borders, the interconnection between financial markets, the spread of culture and ideas between countries, and the international Policies and Global Governance. Given our understanding of what globalization is, we can classify the dimensions into two defined waves. The first wave of globalization occurred before World War One (WWI) defined by the years 1870 – 1914. The main factors that pushed the first wave's existence were the **transportation revolution, communication revolution, and the Industrial revolution's affect being a dramatic increase in labor productivity.** Industrial revolution increased the scale of production resulting in supplier surplus required for trade. The industrial revolution brought around huge progress in terms of how we move goods and produce them with machine tools. That allowed integration between different parts of the world outside of the internet and communication. International trade became a feasible option with increased labor productivity yielding in increased output/surplus and the expansion of national communication. In 1870, they laid down a cable in the Atlantic ocean that allowed for telegraph invention which was a huge deal. These factors unified the globe by inventing an extensive transportation network and a common language across nations. For the first time ever, cultures experienced declining economic distances, and increased economic integration. The second wave of globalization is ongoing, but officially took place after the second world war(WWII) in 1960. This time gap between the two waves of globalization is synchronous with WWI and WWII's time gap. This is due to the fact that the whole world had to focus on rebuilding their homeland. According to Bernanke's 2006 article "Global Economic Integration: What's New and What's Not?" the traditional distinction between the core and the periphery is becoming increasingly less relevant, as the mature industrial economies and the emerging-market economies become more integrated and interdependent"(Bernanke). This duration of time demanded reconstruction after WWI and before the second war, wherein new advancements were introduced, resulting in the start of the second wave of globalization. As WWII ramped up, further developments that influenced the second wave of globalization were made in the areas of **communication, transportation, technology.** Although

these inventions were beneficial to soldiers, these factors simultaneously worked to advance economic integration and globalization.

#graphic from lecture

#knitr::include_graphics("/Users/devin3/Desktop/globalization.png")

Part B : Trade Protection (45 points total) :

The demand for microchips in the United States is given by $Q = 200 - P$, where Q indicates the number of microchips purchased and P is the price. Suppose that there are no microchips produced in the U.S., but they can be imported from either Costa Rica or Korea. The price of microchips in Costa Rica is 40, and the price of microchips in Korea is 30. In each country, microchips are produced with a horizontal supply curve so that these prices are fixed and will not change with changes in the U.S. trade policy. The U.S. tariff on microchips is a specific tariff in the amount of 20 per unit imported. **Now answer the following questions:**

5. (10 points) If there is no free trade agreement between any countries, so that every country must pay the same tariff when exporting to the U.S., from where will U.S. consumers import microchips: Costa Rica or Korea? Compute the equilibrium price of microchips in the U.S., the quantity imported and consumed, and the U.S. consumer surplus and tariff revenue.

Assuming that no free trade exists between countries, and assuming the tariff amounts are all the same, the US should import the microchips from Korea. This is because Korea is the lowest cost of production compared to Costa Rica with the same tariff. From our equilibrium equations, we have:

$$P = 30 + 20 = 50 \quad (\text{Price in Korea plus the tariff})$$

$$Q = 200 - P = 200 - 50 = 150$$

$$CS = (1/2)(150)(150) = 11,250$$

$$TR = 150(20) = 3,000$$

Interpretation of new equilibrium: For price, we have $P^* = 50$, and $Q^* = 150$ for the quantity imported and consumed $CS = 11,250$, and for the tariff revenue $TR = 3,000$.

6. (10 points) Now, suppose the U.S. signs a free trade agreement with Costa Rica that eliminates the tariff on microchips imported from there, but leaves the tariff on microchips imported from any other country unchanged. How will the market equilibrium change? Answer the same questions as in the previous question (5) but under this new policy regime. Now we are assuming the U.S. signs a free trade agreement with Costa Rica that eliminates the tariff on microchips imported from there, but leaves the tariff on microchips imported from any other country unchanged. Using the same logic as before, the US would import microchips from Costa Rica inclusive of the tariff.

$$P = 40 \quad (\text{Costa Rica's lowest price})$$

$$Q = 200 - 40 = 160$$

$$CS = (1/2)(160)(160) = 12,800$$

$$TR = (160)(0) = 0$$

Interpretation of new equilibrium: Importing from Costa Rica would result in a zero dollar tariff revenue collection. The equilibrium price will fall to 40 dollars and the quantity will increase up to 160 units. Naturally, consumption will increase as lower prices leads to more purchases. Thus, consumer surplus will increase to 12,800 dollars as compared to the previous 11,250.

7. (10 points) Identify the welfare change due to trade creation, and the welfare change due to trade diversion. Does the free trade agreement raise or lower U.S. welfare?

We have two equations for our two measurements of welfare change:

For welfare associated with trade creation: $TC = (10)(10)/2 = 50$

For welfare associated with trade diversion: $TD = (40 - 30)150 = 1500$

We can calculate the total change in welfare to be given by $TC - TD = 50 - 1500 = -1450$.

Interpretation Trade creation and diversion both lower the welfare of the United States from the given trade creation agreement. Since the net change in welfare is negative, the US is worse off with the signed agreement.

8. (10 points) Now, how would your answer to question (7) change if the tariff had been \$70? Explain using the necessary calculations for trade creation and trade diversion.

Assuming the new tariff is Seventy dollars, then the price of microchips would come from Korea at $P = 100$. Then this free trade agreement would lower the total import price of microchips to be $P = 40$.

$TC = (1/2)(100 - 40)(160 - 100) = 1,800$

$TD = (40 - 30)(100) = 1,000$

We can calculate the total change in welfare to be given by $TC - TD = 1,800 - 1000 = 800$.

Interpretation The welfare would thus overall increase because trade creation leads to economic stimulation, growth and overall health. Thus, the US is better off with this signed agreement in place.

9. (5 points) Now, how would your answer change if the tariff had been \$5? No calculation is needed.

We know can presume a 5 dollar tariff would create the economic environment wherein trade creation would be greater than trade diversion. Extremely low tariffs like this encourage foreign producers to take advantage and send more imports to the US. This tariff is too low and will force imports to change from Korea to Costa Rica. The trade agreement could not change the amount of trade exchanges nor the trade routes. Therefore, welfare would have a zero net change.

Part C : Reading(30points) :

Read the attached article "Sense and Nonsense in the Globalization Debate" by Dani Rodrik, and **answer the following questions:**

10. (10 points) The article provides evidence of a direct relationship between the growth of trade and the growth of government. What is the explanation behind this empirical finding? Also, what is the challenge that governments face in accumulating more revenue to the treasury?

The relationship between an expansion of trade and an expansion of government has to do with the rise in costs of social services and safety nets. The evidence in the article finds trade and government growth positively associated. When a country becomes more involved (international trade) in the global economy, there is an increase in their social spending on social protections(government). Governments face the threats from the negative effects that come from increasing trade. Funding for these new social costs and safety nets alongside maintaining their services has increased capital mobility. This creates a less reliable tax base, since capital/output is transferring into outside, multinational economies. However, countries would need to lower tariffs in order to create an influx of trade. This is problematic(potentially life threatening in LICs) since most governments gain their income/revenues from import tariffs.

11. (10 points) Explain the following statement: “trade exerts pressure towards another kind of arbitrage as well: arbitrage in national norms and social institutions.” (p. 27). Why are differences in national practices and institutions a possible source of comparative advantage?

A difference in social norms and business standards may allow integrated firms in the global market to move their production location nationally. Economic environments, laws and regulations are contingent upon geographical location. Henceforth, firms located in a strict economy want to outsource their work and production internationally so as to lower their production costs. However, even though labor might be cheaper elsewhere, that does not mean the quality of labor will be matched. Allowing this arbitrage in national norms and social institutions has resulted in national production outsourcing. As increased business standards, policies, and practices advance, we see a resulting reallocation of labor production from higher costs to lower. This is due to the fact that companies obtain higher profit margins when they move their production location overseas where labor and environmental restrictions are considerably lower. This allows for workers who earn less pay and have less protection under a court of law to form unionizations. This allows nations to gain a comparative advantage in producing goods that more restrictive countries would not be able to have access to even make (lack of local resources). Social institutions and national practices need to be treated as any other country's comparative advantage cost differential.

12. (10 points) The article mentions several misconceptions about trade and globalization. Name and briefly explain three of these misconceptions.

The first misconception this article sheds light on is that globalization and free trade are driven by international low wages. The wages are unfair but governments are still able to implement their own policies and legislation in their own manner.

The second misconception is that the US has a trade deficit caused by the strict commercial policies wherein it seems opportunity is taken from countries involved in the global market. In actuality, opportunity exists for those who are skilled and driven. We've seen that lower skilled workers take the hardest hit on job employment following globalization and international trade.

The third misconception is that globalization of trade and foreign investment will lead to excess global capital capacity resulting in a sort of destruction of the world. The lack of laws and regulations for foreign, low skilled worker problem is abused by large industry globalization. The wage inequality of low skill workers and high skill workers is widened and leads to unequal job opportunity.

Part D : For EC582 Students ONLY (60 points) :

*This is a data exercise where you will analyze the impact of NAFTA on U.S. workers in the short run. At the time NAFTA went into effect, U.S. import tariffs for goods coming from Mexico fell to zero. You will be using the drop in tariff levels (d_tariff) across manufacturing industries to measure the degree of trade liberalization experienced by particular manufacturing industries in the U.S. You will correlate these tariff changes to employment changes ($d_employment$) in those respective industries over the period 1990-2000. The dataset that you will use for this empirical exercise is posted on Canvas and is called “nafta.dta”. A description of the dataset is provided at the end of this assignment. You can use STATA, R or any other statistical package you are familiar with to answer the questions below. When submitting your answers, please make sure to attach a copy of your code/do-file and a copy of your log file or R output (all in one pdf document that includes your homework answers). **Using the available data set, please answer the following questions:***

13. (5 points) Create a histogram of the change in U.S. import tariffs for goods coming from Mexico. Identify and report the top 5 industries with the largest tariff cuts following NAFTA.

This is a cross-section dataset that contains 44,264 observations covering 710 locations within the US (called commuting zones) and 356 manufacturing industries observed over the period of 10-year period 1990-2000.

```

#load our libraries
library(pacman)
p_load(readr,dplyr, tidyverse, ggplot2, skimr, haven, stargazer, tidymodels, skimr
, janitor, magrittr, datasets, rpart.plot, baguette, glmnet, tune, haven, ranger,
data.table, parallel,sandwich, modelsummary)
#Consider install tinytex to try pdf output?
#tinytex::install_tinytex()

#load data from downloads since Rconsole cannot download ".dta" files
nafta_df <- read_dta("~/Downloads/nafta.dta")

#Just glimpse at the data to start
#glimpse(nafta_df)

#Skim the data to gain further information
nafta_df %>% skim()

```











Data summary

Name	Piped data
Number of rows	44264
Number of columns	11
Column type frequency:	
character	1
numeric	10
Group variables	
None	

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
sicname	0	1	5	42	0	356	0

Variable type: numeric

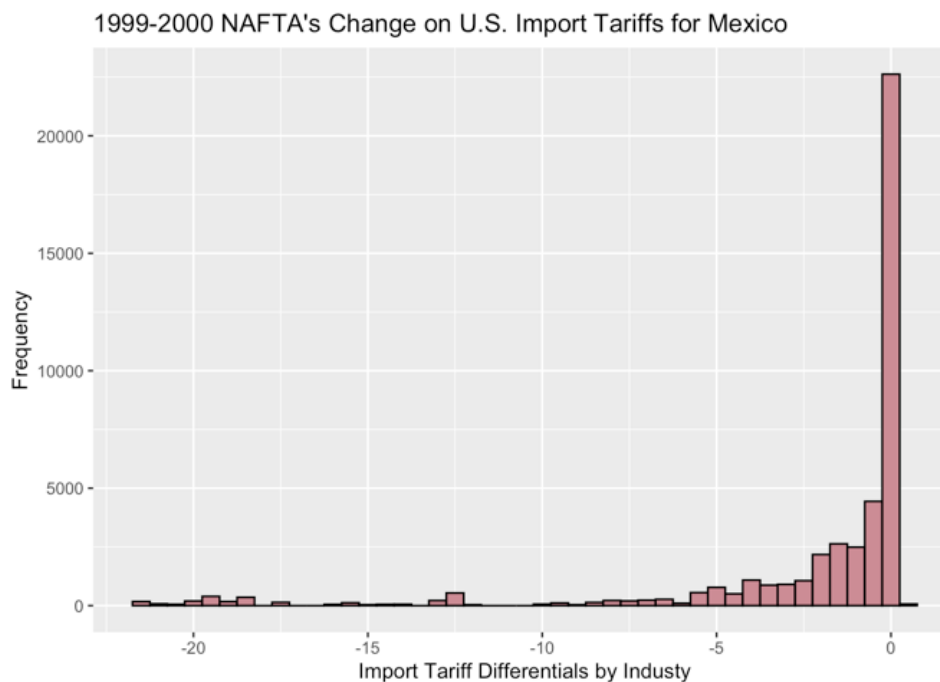
skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
location	0	1	19693.75	11301.45	100.00	10700.00	19500.00	29402.00	39400.00	
sic4	0	1	3067.09	604.40	2011.00	2448.00	3273.00	3564.00	3999.00	
indsize	0	1	63.42	78.41	0.70	19.00	36.30	76.60	423.30	
rvadd	0	1	3797.20	5079.45	28.36	1059.28	2073.48	4157.01	37093.33	
skill_intensity	0	1	0.29	0.12	0.04	0.20	0.26	0.35	0.77	
kl_ratio	0	1	62.26	59.09	5.67	30.86	46.70	72.80	552.76	
d_tariff	0	1	-2.07	4.24	-21.65	-2.00	-0.22	0.00	0.44	
dln_tariff	0	1	-0.02	0.04	-0.20	-0.02	0.00	0.00	0.00	
d_employment	0	1	-13.79	628.31	-58658.78	-35.44	0.24	39.64	17743.21	
dln_employment	0	1	0.01	1.83	-12.19	-0.67	0.02	0.75	10.72	

```
#there's only 11 columns in our data set so let's look at our variable names
names(nafta_df)
```

```
[1] "location" "sic4" "sicname" "indsize"
[5] "rvadd" "skill_intensity" "kl_ratio" "d_tariff"
[9] "dln_tariff" "d_employment" "dln_employment"
```

```
#Now we want to create a histogram for this question
```

```
ggplot(data = nafta_df, aes(d_tariff, color = "lightpink3")) + geom_histogram( aes
(d_tariff, color = "lightpink3"), stat = "bin", binwidth = 0.5, bins = NULL, posi
on = "stack", na.rm = FALSE, show.legend = NA, inherit.aes = TRUE, fill= "lightpin
k3", color = "black") + labs(title="1999-2000 NAFTA's Change on U.S. Import Tariff
s for Mexico", y = "Frequency", x = "Import Tariff Differentials by Industry")
```



```
#find the top 5 industries with the largest tariff cuts following NAFTA. (Top 5 mo
st negative d_tariff values separated by industry)
```

```
n <- nafta_df %>% arrange(desc(d_tariff))
tail(unique(n$sicname))
```

```
[1] " Women's and misses' outerwear, n.e.c."
[2] " Men's and boys' shirts"
[3] " Bras, girdles, and allied garments"
[4] " Men's and boys' underwear and nightwear" [5] " Knit outerwear mills"
[6] " Women's and misses' blouses and shirts"
```

```
#Done. Report below.
```

- Biggest negative change in d_tariff are:
 1. Women's and misses' blouses and shirts (-21.65)
 2. Knit outerwear mills (-21.22)
 3. Men's and boys' underwear and nightwear (-20.41)
 4. Bras, girdles, and allied garments (20.15)
 5. Men's and boys' shirts (-19.79)

14. (3 points) Construct the natural log variables for the following industry characteristics in the dataset: i) industry size (call this variable "ln_indsize"); ii) real value added (call this variable "ln_rvadd"); iii) skill intensity (call this variable "ln_skill_intensity"); iv) capital-to-labor ration (call this variable "ln_kl_ratio").

```
#arrange in ascending order
nafta_df %>% arrange(unique(nafta_df))
```

```
## # A tibble: 44,264 x 11
##   location  sic4 sicname      indsize rvadd skill_intensity kl_ratio d_tariff
##   <dbl> <dbl> <chr>      <dbl> <dbl>      <dbl>      <dbl>      <dbl>
##
## 1      100  2011 " Meat packin...  118.  5560.      0.154      58.5     -1.40
## 2      100  2026 " Fluid milk"    69.6  4957.      0.506     101.     -1.92
## 3      100  2033 " Canned frui...   68   5729.      0.145     85.5     -4.23
## 4      100  2041 " Flour and o...  12.3  1091.      0.262    144.     -0.630
## 5      100  2048 " Prepared fe...  35.8  2561.      0.423     99.2     -1.21
## 6      100  2051 " Bread, cake...  149   8773.      0.454     53.8        0
## 7      100  2064 " Candy and o...  49.2  4101.      0.191     63.6     0.167
## 8      100  2086 " Bottled and...  82.4  8273.      0.613    120.     0.026
## 9      100  2096 " Potato chip...  32.3  2597.      0.321     64.4     -2.59
## 10     100  2099 " Food prepar...  55.7  4989.      0.309     55.6     -0.045
## # ... with 44,254 more rows, and 3 more variables: dln_tariff <dbl>,
## #   d_employment <dbl>, dln_employment <dbl>
```

```
#make new variables using mutate and update the data set
nafta_df <- nafta_df %>% mutate(ln_indsize = log(nafta_df$indsize),
                                ln_rvadd = log(nafta_df$rvadd),
                                ln_skill_intensity = log(nafta_df$skill_intensity)
                                ,
                                ln_kl_ratio = log(kl_ratio))
```

15. (10 points) Estimate the following regression model and implement robust standard errors to account for heteroskedasticity

```
#make the first regression
reg1 <- lm(nafta_df$dln_employment ~ dln_tariff + ln_indsize + ln_rvadd + ln_skill_intensity, data = nafta_df)

#implement robust standard errors
summary(reg1, robust = TRUE)
```

```
##
## Call:
## lm(formula = nafta_df$dln_employment ~ dln_tariff + ln_indsize +
##     ln_rvadd + ln_skill_intensity, data = nafta_df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.3214  -0.6997  -0.0267   0.7212  10.6568
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.23910    0.11608   2.060  0.0394 *
## dln_tariff      6.43527    0.24194  26.599 <2e-16 ***
## ln_indsize      0.04008    0.02278   1.759  0.0785 .
```

```
## ln_rvadd          -0.03663    0.02184  -1.677    0.0935 .
## ln_skill_intensity -0.02719    0.02662  -1.021    0.3070
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.815 on 44259 degrees of freedom
## Multiple R-squared:  0.01763,    Adjusted R-squared:  0.01754
## F-statistic: 198.6 on 4 and 44259 DF,  p-value: < 2.2e-16
```

16. (5 points) Report the estimation results in a nicely formatted table with the independent variable coefficients reported by row and the dependent variable listed at the top of the column. List the standard errors in parentheses below the regression coefficients. Mark with stars the coefficients that are statistically significant at 5 percent confidence level.

```
library(modelsummary)
```

```
#using just the summary function, we cannot display a pretty graph. I can only do
so if I choose type = 'text', but modelsummary is a pretty package too
modelsummary(reg1, robust_se = TRUE, title = "Regression Report")
```

Regression Report

	Model 1
(Intercept)	0.239
	(0.116)
dln_tariff	6.435
	(0.242)
ln_indsize	0.040
	(0.023)
ln_rvadd	-0.037
	(0.022)
ln_skill_intensity	-0.027
	(0.027)
Num.Obs.	44264
R2	0.018
R2 Adj.	0.018
AIC	178402.8
BIC	178455.0
Log.Lik.	-89195.401
F	198.553

```
#Some alternatives I tried out that also work but modelsummary makes it look nicer
:
#robust_se <- sqrt(vcovHC(reg1, type = "HC1"))
#stargazer(reg1, title = "Regression Report", align = TRUE, type = 'text')
```

17. (5 points) Interpret the coefficient b1 for $\ln(\text{Tariff})_k$. What is the effect of a 1 percent drop in import tariffs on labor employment in a given metropolitan area? Is the sign of the coefficient as expected? Justify your answer.

The interpretation of our b1 coefficient can be described as follows: A one percent decrease in import tariffs will result in a 6.435 percent decrease in labor employment. Tariffs were positively correlated with domestic labor employment. The positive sign of the coefficient was to be expected. The coefficient is also significant at the 99% confidence level. Intuitively, when tariffs are lowered, there's a flux in imports and production is encouraged by profit maximization to relocate in lesser developed country. Without proper labor laws, the costs of production could decrease which in turn decreases domestic labor employment.

18. (5 points) Discuss the sign and the statistical significance of all the other coefficients estimated in question 15. Are the signs of the variables as expected? Explain.

All of the other variables are significant at least at the 10% confidence level and were to be expected, which suggests potential strong correlation. At the five percent confidence interval, Industry size and real value added are significant. These two variables also display the expected, sensible positive or negative sign. The coefficient for Industry Size is negative, indicating the respective size of the industry would increase with a drop in tariffs. Ideally, the result of borrowed revenue from imports. Real value added decreases with tariff drops because the production switches to a country of lower absolute advantage, and lower productivity. Skill intensity is significant at the 10% confidence interval and has a negative coefficient when regressed against tariffs. This indicates the share of skilled workers in the industry would increase as tariffs drop. Domestic, lower skilled workers will watch their jobs move abroad while the more skilled workers will maintain their status. The capital to labor ratio is highly significant at the 1% confidence interval and displays a negative correlation with tariffs. Decreases in tariffs cause more accumulation of capital in unison with labor and results in a surge of short run job loss of the lower skilled workers whose jobs move abroad.

19. (10 points) Construct an interaction variable between the (natural log) industry tariff change and the (natural log) skill intensity of the industry. Call this variable "dln_tariff_skill". Re- estimate the regression model from question 15 by adding this interaction variable to the rest of the right-hand side variables. Report the regression coefficients in a nicely formatted table as done for question 2.

```
#make my variables
skim(nafta_df)
```

Data summary

Name	nafta_df
Number of rows	44264
Number of columns	15
Column type frequency:	
character	1
numeric	14
Group variables	None

Variable type: character

skim_variablen_missingcomplete_rateminmaxemptyn_uniquewhitespace	0	1	5	42	0	356	0
sicname	0	1	5	42	0	356	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
location	0	1	119693.75	11301.45	100.00	10700.00	19500.00	29402.00	39400.00	
sic4	0	1	3067.09	604.40	2011.00	2448.00	3273.00	3564.00	3999.00	
indsize	0	1	63.42	78.41	0.70	19.00	36.30	76.60	423.30	
rvadd	0	1	3797.20	5079.45	28.36	1059.28	2073.48	4157.01	37093.33	
skill_intensity	0	1	0.29	0.12	0.04	0.20	0.26	0.35	0.77	
kl_ratio	0	1	62.26	59.09	5.67	30.86	46.70	72.80	552.76	
d_tariff	0	1	-2.07	4.24	-21.65	-2.00	-0.22	0.00	0.44	
dln_tariff	0	1	-0.02	0.04	-0.20	-0.02	0.00	0.00	0.00	
d_employment	0	1	-13.79	628.31	-58658.78	-35.44	0.24	39.64	17743.21	
dln_employment	0	1	0.01	1.83	-12.19	-0.67	0.02	0.75	10.72	
ln_indsize	0	1	3.63	1.02	-0.36	2.94	3.59	4.34	6.05	
ln_rvadd	0	1	7.65	1.09	3.34	6.97	7.64	8.33	10.52	
ln_skill_intensity	0	1	-1.33	0.40	-3.26	-1.59	-1.35	-1.04	-0.26	
ln_kl_ratio	0	1	3.84	0.75	1.74	3.43	3.84	4.29	6.31	

```
ln_indsize = log(nafta_df$indsize)
nafta_df <- nafta_df %>% mutate()

#make new variables using mutate and update the data set
nafta_df <- nafta_df %>% mutate(ln_indsize = log(nafta_df$indsize),
                                ln_rvadd = log(nafta_df$rvadd),
                                ln_skill_intensity = log(nafta_df$skill_intensity)
                                ,
                                ln_kl_ratio = log(kl_ratio),
                                dln_tariff_skill = dln_tariff*ln_skill_intensity)

reg2 <- lm(dln_employment ~ dln_tariff + ln_indsize + ln_rvadd + ln_skill_intensity + dln_tariff_skill, data = nafta_df)

robust_se2 <- sqrt(diag(vcov(reg2, type="HC1")))
```

```
#display the table using stargazer to make it look like the sample
#stargazer(reg2, se = list(robust_se2), title = "Second Regression Report", type =
'text')

#Again I have decided I like modelsummary package better
modelsummary(reg2, robust=TRUE)
```

Model 1	
(Intercept)	0.073
	(0.117)
dln_tariff	-3.238
	(1.044)
ln_indsize	0.046
	(0.023)
ln_rvadd	-0.038
	(0.022)
ln_skill_intensity	-0.130
	(0.029)

dln_tariff_skill	-5.359
	(0.563)
Num.Obs.	44264
R2	0.020
R2 Adj.	0.020
AIC	178314.1
BIC	178375.0
Log.Lik.	-89150.066
F	177.314

20. (7 points) The (natural log) average skill intensity among the manufacturing industries in the sample is -1.354. The top quartile industry has a skill intensity level of -1.039. The bottom quartile industry has a skill intensity level of -1.585 (Note: you can verify these sample statistics for your own information). Using these sample statistics for skill intensity, explain what is the effect on industry labor employment of a 1% fall in import tariffs in an industry with the average level of skill intensity? What is the effect for an industry at the top quartile of skill intensity? How about the bottom quartile of skill intensity? Justify all your answers.

Given the second regression coefficient estimates, we can see that $\ln_skill_intensity$'s variable coefficient is -0.130. This means a 1% decrease in import tariffs will result in a 0.130 percent increase in skill intensity. The calculations below display the effect a 1% tariff decrease would have on the percent change on the average, top and bottom quartiles: The signs of the numbers below dictate the correlation between employment and skill intensity.

```
#Look at separation groups here
summary(nafta_df$d_tariff, stats = "common")
```

```
##      Min.   1st Qu.   Median     Mean  3rd Qu.    Max.
## -21.6546  -2.0000   -0.2177   -2.0725   0.0000   0.4368
```

```
average <- -3.816 + (-1.354*-5.988)
top <- - 3.816 + (-1.039*-5.988)
bottom <- -3.816 + (-1.585*-5.988)

#print results
average
```

```
## [1] 4.291752
```

bottom

[1] 5.67498

The sample mean effect is 4.29

The top quartile marginal effect is 2.40 / The bottom quartile marginal effect is 5.67

Thus, a 1% tariff decrease results in correlation with their respective coefficient values.

21.(10 points) The signing of NAFTA triggered lots of conflicting policy debates about the labor market implications of signing a free trade agreement with a low wage country like Mexico. Based on your data analysis for this exercise, what can you conclude about this important policy debate? Has the agreement been detrimental to workers? Does your answer differ depending on the skill level of workers? If you were an economic adviser to the U.S. government, would you recommend the signing on NAFTA based on your regression estimations? Briefly explain your answers.

Based on my results I have gotten throughout this whole study, and given the articles we have read in class, I would choose to sign the NAFTA agreement, but perhaps with a few conditions. Having free trade brings opportunity and benefits that outweigh the latter. This assignment focused on skill levels and tariffs tied with globalization and we can see from our regression analysis that show us the benefits of NAFTAs similar globalization (like an increase in manufacturing employment). Overall, the result of this agreement would have a small percentage decrease in welfare from jobloss in the short run. The percentage wouldn't have a devastating hit on the economy and there are more net positives. The negatives we study today can be lessened by proposed new social safety nets and social services like making insurance and training subsidies for new skills available. Although the debate has both positives and negatives, I would sign NAFTA as a US consumer and with the programs in place to support low skilled workers who take the hardest hit.