Assignment3

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Research Question

Twenty years since the end of Apartheid: Did the collapse of Apartheid play a significant role in reducing racial and social inequality in South Africa? Is post-apartheid South Africa better off or worse off than during the apartheid era?

Definition of Racial and social inequality

Before conducting the data analysis to find the answer for our research question, we begin by clarifying the definitions for racial and social inequality. While social inequality broadly refers to the existence of unequal opportunities for different social status/positions within a society, racial inequality can be seen as one of dimensions of social inequality. It thus indicates the discrimination based on race in access to socioeconomic opportunities or services. In our research study, we will specifically look into racial discrimination in terms of employment, education, and income levels. Because these three indicators within the capitalism society can be seen as fundamental yet significant estimators for the quality of human well-being, we decided to include them. In addition, we will try to identify drivers of unequal income distribution by controlling possible factors and variables such as unemployment rate and education level.

Literature review

In order for us to bring out more in-depth analysis, we undertook background researches by examining the past studies written by various researchers. First of all, according to Leibbrandt,(see Leibbrandt (n.d.)), Since the fall of Apartheid(1993~2008), overall (include all races) income inequality has increased and it was mainly caused by huge inequality within black African community in South-Africa. We chose this article as the first reference since it has been cited the most for the South-African Inequality Study. Second research literature is "One Kind of Freedom: Poverty Dynamics in Post-Apartheid South Africa,"(see Carter and May (2001)) which explores whether the legacy of apartheid in terms of inequality and human insecurity has been superseded by looking at the dynamics of post-apartheid income distribution based on the data from national household surveys. "Income and Non-income Inequality in Post-Apartheid South Africa: What are the Drivers and Possible Policy Interventions?" (see Unit (2009)) identifies the drivers of the reproduction of inequality in post-apartheid South Africa and argues that there had a continuous increase in inequality, strongly indicating that South African is now the one of the most consistently unequal economy in the world. Fourth background research literature is "Poverty and Well-being in Post-Apartheid South Africa: An Overview of Data, Outcomes and Policy." (see Bhorat and Kanbur (2005)) While this study provides an overview of poverty and well-being of South African during the first decade of post-apartheid, it argues that the first ten years after the end of Apartheid has rather displayed increase in income inequality and unemployment rates. "Crime and local inequality in South Africa" (see Demombynes and ??zler (2005)) examines the effects of local inequality and violent crime in South Africa in the post-apartheid era and claims that racial heterogeneity is highly correlated with all types of crime. Lastly, "Poverty and Inequality Dynamics in South Africa: Post-apartheid Developments in the Light of the Long-Run Legacy" makes a claim that the bottom half of the income distribution and poverty has been dominated by these black South Africans.

Data Gathering based on web-scraping

Closely having studied the past researches, we found that most of researchers made opposite conclusions to ours in regard to the effects of post-apartheid on the qualiaty of life in South Africa. We therefore want to

test our hypothesis in the basis of the following data analysis and compare with the past studies.

We found the data of monthly earnings among races and gender. We tried to scrape the data from the website.

```
URL <- 'http://businesstech.co.za/news/wealth/131524/this-is-the-average-salary-in-south-africa-by-race-

RaceEarningsTable <- URL %>% read_html() %>%
                     html_nodes('#container > div.content_holder > div.content > div.post_single > div.p
                     html_table() %>%
                     as.data.frame
RaceEarningsTable
```

```
##              X1     X2     X3       X4     X5     X6       X7
## 1               Median Median   Median   Mean   Mean     Mean
## 2          Race   2003   2012 Increase   2003   2012 Increase
## 3         White 14 468 16 581      15% 11 249 11 991       7%
## 4  Asian/Indian  7 825 11 701      50%  5 264  8 993      60%
## 5      Coloured  4 241  7 058      66%  2 437  3 897      60%
## 6 Black African  4 059  5 445      34%  2 437  2 998      23%
```

```
URL <- 'http://businesstech.co.za/news/wealth/131524/this-is-the-average-salary-in-south-africa-by-race-

GenderEarningsTable <- URL %>% read_html() %>%
                     html_nodes('#container > div.content_holder > div.content > div.post_single > div.p
                     html_table() %>%
                     as.data.frame
GenderEarningsTable
```

```
##       X1     X2     X3       X4    X5    X6       X7
## 1        Median Median   Median  Mean  Mean     Mean
## 2   Race   2003   2012 Increase  2003  2012 Increase
## 3   Male  5 963  8 299      39% 3 375 4 317      28%
## 4 Female  4 849  6 399      32% 2 435 3 118      28%
```

Data Cleaning and Merging

In this section, we will try to clean the data so that they can be statistically analysed.

Firstly, we used command "summary" to investigate the structure (class of variables, number of vectors) of data frames we obtained in the previous section.

```
summary(RaceEarningsTable)
```

```
##       X1                 X2                 X3
##  Length:6           Length:6           Length:6
##  Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character
##       X4                 X5                 X6
##  Length:6           Length:6           Length:6
##  Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character
```

```
##       X7
##  Length:6
##  Class :character
##  Mode  :character
```

```
summary(GenderEarningsTable)
```

```
##       X1                 X2                 X3
##  Length:4           Length:4           Length:4
##  Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character
##       X4                 X5                 X6
##  Length:4           Length:4           Length:4
##  Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character
##       X7
##  Length:4
##  Class :character
##  Mode  :character
```

As shown above, every variable has a class of "characters" even though it represents numerical data.

The data we want to have is the mean of earnings among races and gender in the year of 2003 and 2012.

We make TimeVector and IndivisualVector to lable the data.

```
TimeVector <- c(2003,2012) #numerical vector
IndivisualVector <- c("Male","Female","White","Asian/Indian","Coloured","BlackAfrican") #character vect
```

Then, we try to convert the character vector to the numerical vector.

```
male2003 <- as.numeric(gsub("([0-9]+).*$", "\\1", str_replace_all(GenderEarningsTable$X5[3], fixed(" ")
is.numeric(male2003)
```

```
## [1] TRUE
```

```
male2003
```

```
## [1] 3375
```

As you can see above, the character variables successfully converted to numerical variables. Then, we created functions, which conduct the above sequences.

```
Converter <- function(x){
y <- as.numeric(gsub("([0-9]+).*$", "\\1", str_replace_all(x, fixed(" "), "")))
return(y)
}
test <- Converter(x = GenderEarningsTable$X5[3])
is.numeric(test)
```

```
## [1] TRUE
```

```
test
```

```
## [1] 3375
```

Then, we apply this function to all data.

```
#definition of vector
Earnings2003 <- c(0,0,0,0,0,0)
Earnings2012 <- c(0,0,0,0,0,0)

#GenderEarnings
for(i in 3:4){
  Earnings2003[i-2] = Converter(x = GenderEarningsTable$X5[i])
  Earnings2012[i-2] = Converter(x = GenderEarningsTable$X6[i])
}
#RaceEarnings
for(i in 3:6){
  Earnings2003[i] = Converter(x = RaceEarningsTable$X5[i])
  Earnings2012[i] = Converter(x = RaceEarningsTable$X6[i])
}
Earnings2003
```

```
## [1]  3375  2435 11249  5264  2437  2437
```

```
Earnings2012
```

```
## [1]  4317  3118 11991  8993  3897  2998
```

```
preEarnings <- data.frame(IndivisualVector,Earnings2003, Earnings2012)
preEarnings
```

```
##   IndivisualVector Earnings2003 Earnings2012
## 1             Male         3375         4317
## 2           Female         2435         3118
## 3            White        11249        11991
## 4     Asian/Indian         5264         8993
## 5         Coloured         2437         3897
## 6     BlackAfrican         2437         2998
```

The preEarnings is messy data.

So, we are going to transform it into tidy data.

```
library(tidyr)
```

```
## Warning: package 'tidyr' was built under R version 3.3.2
```

```
Earnings <- gather(preEarnings, time, mean, Earnings2003:Earnings2012)
Earnings
```

```
##    IndivisualVector         time  mean
## 1              Male Earnings2003  3375
## 2            Female Earnings2003  2435
## 3             White Earnings2003 11249
## 4      Asian/Indian Earnings2003  5264
## 5          Coloured Earnings2003  2437
## 6      BlackAfrican Earnings2003  2437
## 7              Male Earnings2012  4317
## 8            Female Earnings2012  3118
## 9             White Earnings2012 11991
## 10     Asian/Indian Earnings2012  8993
## 11         Coloured Earnings2012  3897
## 12     BlackAfrican Earnings2012  2998
```

We successfully made the numerical vector which shows the earnings among races and genders.

Data Gathering by using Data-API

Then, we tried to gather data from World Bank by using World bank Data API.

We found the GINI index of South Africa.

```
gini <-WDI(country = "ZA", indicator = "SI.POV.GINI")
gini
```

```
##   iso2c      country SI.POV.GINI year
## 1    ZA South Africa       63.38 2011
## 2    ZA South Africa          NA 2010
## 3    ZA South Africa          NA 2009
## 4    ZA South Africa       63.01 2008
## 5    ZA South Africa          NA 2007
## 6    ZA South Africa       64.79 2006
## 7    ZA South Africa          NA 2005
```

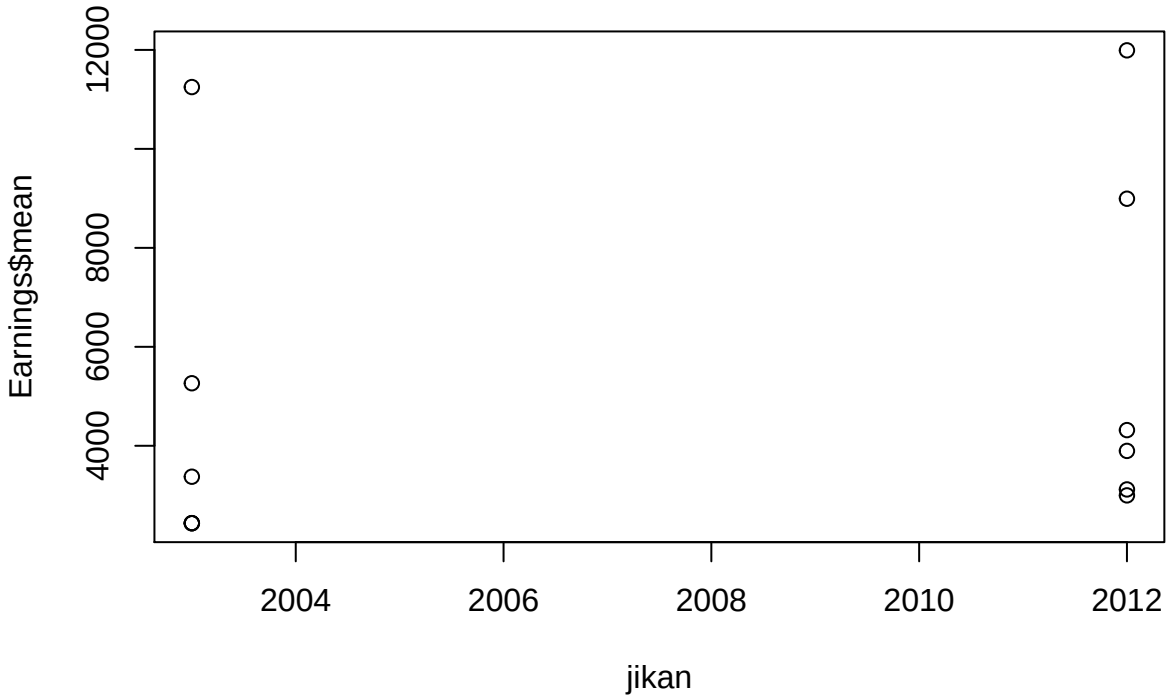
We fetched the data successfully by using WDI.

Basic descriptive statistics

The data we gathered in the previous section are statistically analysed (mean and median are already calculated). In this section, we try to figure out the trend of inequality with a graph by using descriptive statistics.

We want to plot the data frame with mean of earnings and time among indivisuals.

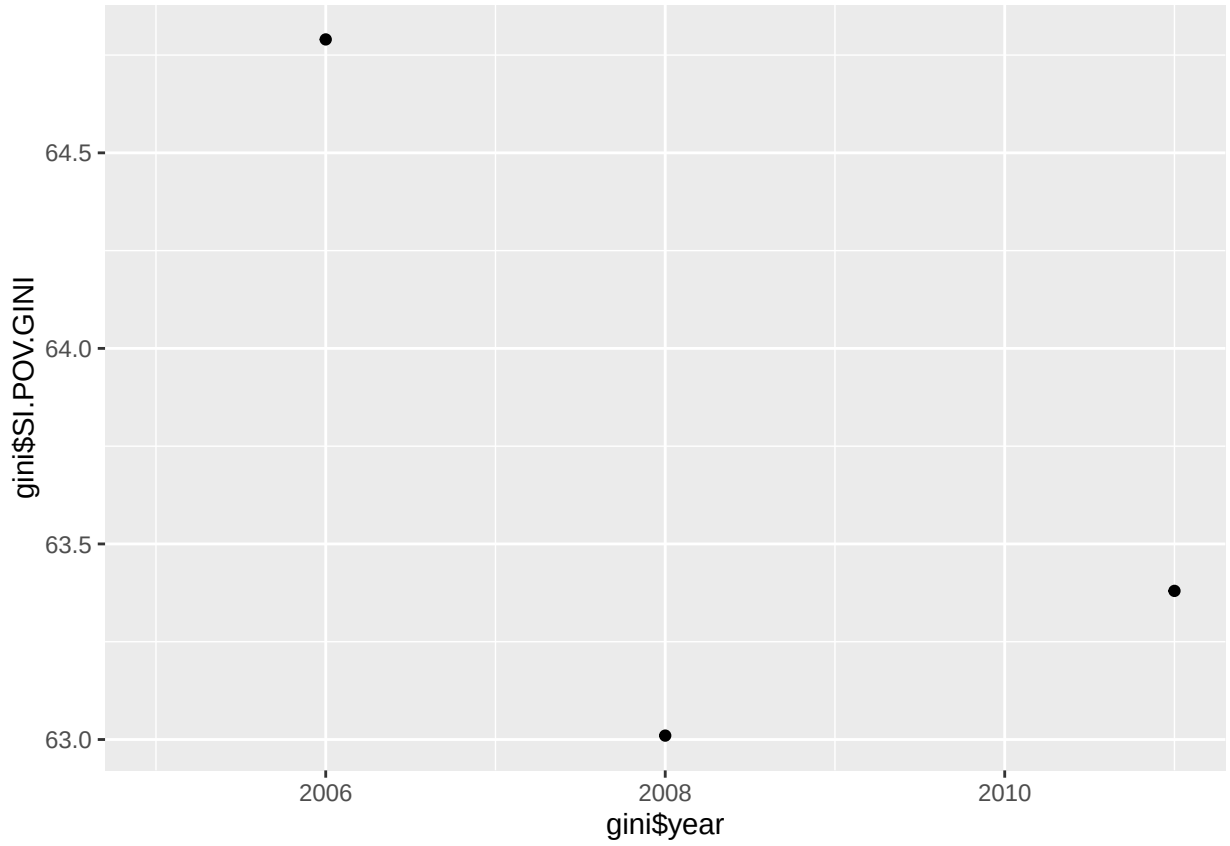
```
jikan <- c(2003,2003,2003,2003,2003,2003,2012,2012,2012,2012,2012,2012)
plot(jikan,Earnings$mean)
```



Then, We plotted the GINI coeficient of South Africa.

```
qplot(gini$year,gini$SI.POV.GINI)
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```



Brief Description

As shown in the first graph, we cannot say that the inequality has decreased. This result contradicts to our hypothesis.

In the second graph, we can see that the GINI index has slightly increased during 2008~2011. This indicates that the oveall inequality has increased during this period.

We need to gather more data for 1990~2016 to either reject or accept our hypothesis in order to make clear comparisons between before and after Apartheid.

References

Bhorat, H., and Ravi Kanbur. 2005. "Poverty and Well-Being in Post-Apartheid South Africa: An Overview of Data, Outcomes and Policy." *DPRU Working Paper 05/101*.

Carter, Michael R., and Julian May. 2001. "One Kind of Freedom: Poverty Dynamics in Post-Apartheid South Africa." *World Development* 29 (12): 1987–2006. doi:http://dx.doi.org/10.1016/S0305-750X(01)00089-4.

Demombynes, Gabriel, and Berk ??zler. 2005. "Crime and Local Inequality in South Africa." *Journal of Development Economics* 76 (2): 265–92. doi:http://dx.doi.org/10.1016/j.jdeveco.2003.12.015.

Leibbrandt, et al., <!–// //–> M. n.d. "Trends in South African Income Distribution and Poverty Since the Fall of Apartheid." OECD Publishing. doi:http://dx.doi.org/10.1787/5kmms0t7p1ms-en.

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