



ETC5513 Project

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**Econometrics and Business
Statistics**
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Introduction

Motivation

Labour Force Analysis

This section of the report will focus on analysing various aspects of the Israeli labour force. The Israeli labour force has come a long way from being male dominated to being almost equally divided between men and women. The transition of the Israeli labour force shall be explored through the years 1991-2019 in this section of the report.

```
israel_labour <- data_long %>% dplyr::filter(Series %in% c("Labor force, female (% of total labo
                                                 "Ratio of female to male labor force part
                                                 "Labor force participation rate, female (
Year %in% c(1991:2019))
```

```
israel_display <- israel_labour %>% pivot_wider(names_from = Series, values_from = value)

kable(head(israel_display), caption = "Variables Summary") %>%
kable_styling(bootstrap_options = c("striped", "hover", full_width = F)) %>%
row_spec(0, angle = -90)
```

Table 1 exhibits the variables that have been used in this section of the report and displays the first 5 rows. The ratio of self-employed females and female labour force participation are the explanatory variable and the ratio of female to male participation rate is the response variable. The table gives a brief overview of how the variables change from the period 1991-1996.

```
israel_labour$Year <- as.numeric(as.character(israel_labour$Year))
```

Table 1: *Variables Summary*

	Labor force participation rate, female (% of female population ages 15-64) (modeled ILO estimate)	Labor force participation rate, male (% of male population ages 15-64) (modeled ILO estimate)	Wage and salaried workers, female (% of female employment) (modeled ILO estimate)	Self-employed, female (% of female employment) (modeled ILO estimate)	Ratio of female to male labor force participation rate (%) (national estimate)	Labor force, female (% of total labor force)	Year
1991	40.15476	64.92514	5.907	94.093	78.995	53.404	
1992	41.07230	67.01756	5.932	94.068	78.643	55.041	
1993	41.16972	66.97746	5.900	94.100	80.463	56.408	
1994	42.01045	69.15992	5.895	94.105	80.645	58.274	
1995	42.60488	70.61269	5.909	94.091	80.267	59.313	
1996	43.00450	71.47999	6.159	93.841	79.046	59.308	

1 Overview

```
plot_1 <- israel_labour %>% dplyr::filter(Series == "Labor force, female (% of total labor force)")

ggplot(aes(x = Year, y = value, color = Series))+
  geom_line()+
  xlab("Year")+
  ylab("Total Labour force(%)")+
  theme(legend.position="bottom")

plot_1
```

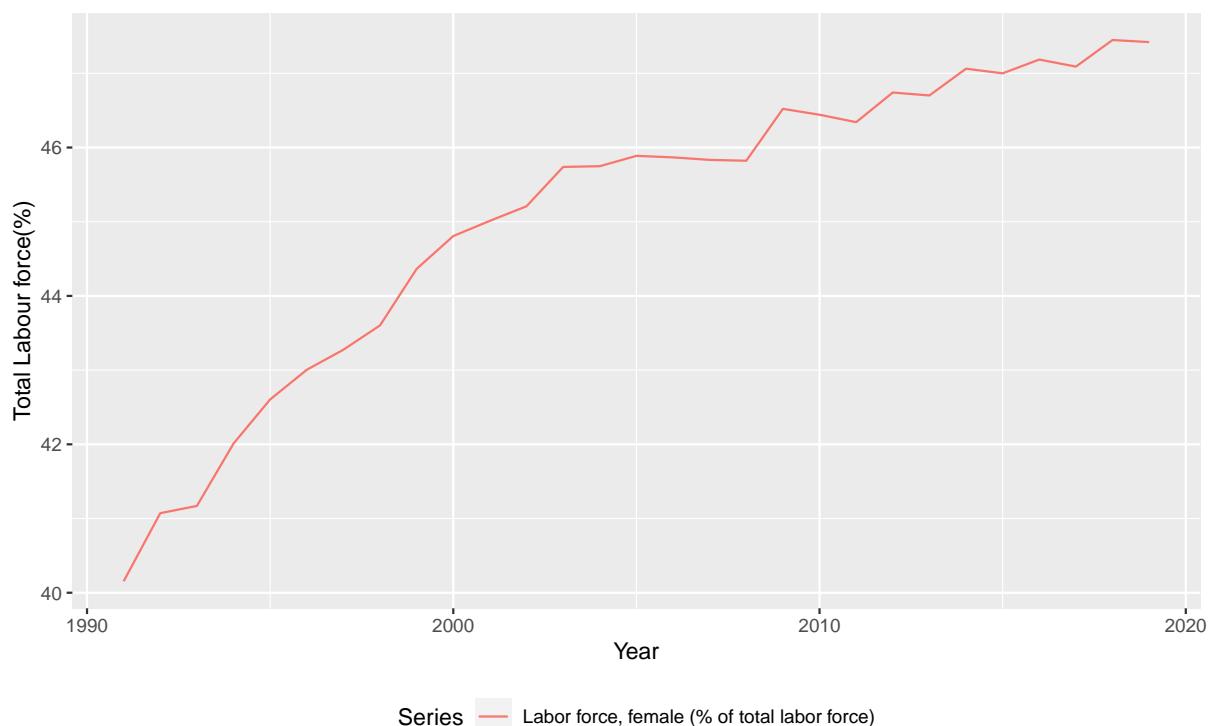


Figure 1: % Female labour force out of total labour force

Figure 1 depicts the gentle rise in the female labour force which was around 40% of the total labour force in 1990 to around 47% around 2020. One of the main reasons behind the surge in female participation is due to the educational attainment of women in Israel. Also, in 2006 and 2007 numerous amendments were made to women employment law to protect the rights of women at

workplace and provide equal employment opportunities which has proved to be pivotal in increasing female participation in the labour force. [Source](#)

2 Self-employed v/s wage & salaried women

```
plot_2 <- israel_labour %>% dplyr::filter(Series %in% c("Self-employed, female (% of female emp)", "Wage and salaried workers, female (% of female emp)"))

ggplot(aes(x = Year, y = value, fill = Series)) +
  geom_col() +
  xlab("Year") +
  ylab("Total female employment (%)") +
  theme(legend.position="bottom")

plot_2
```

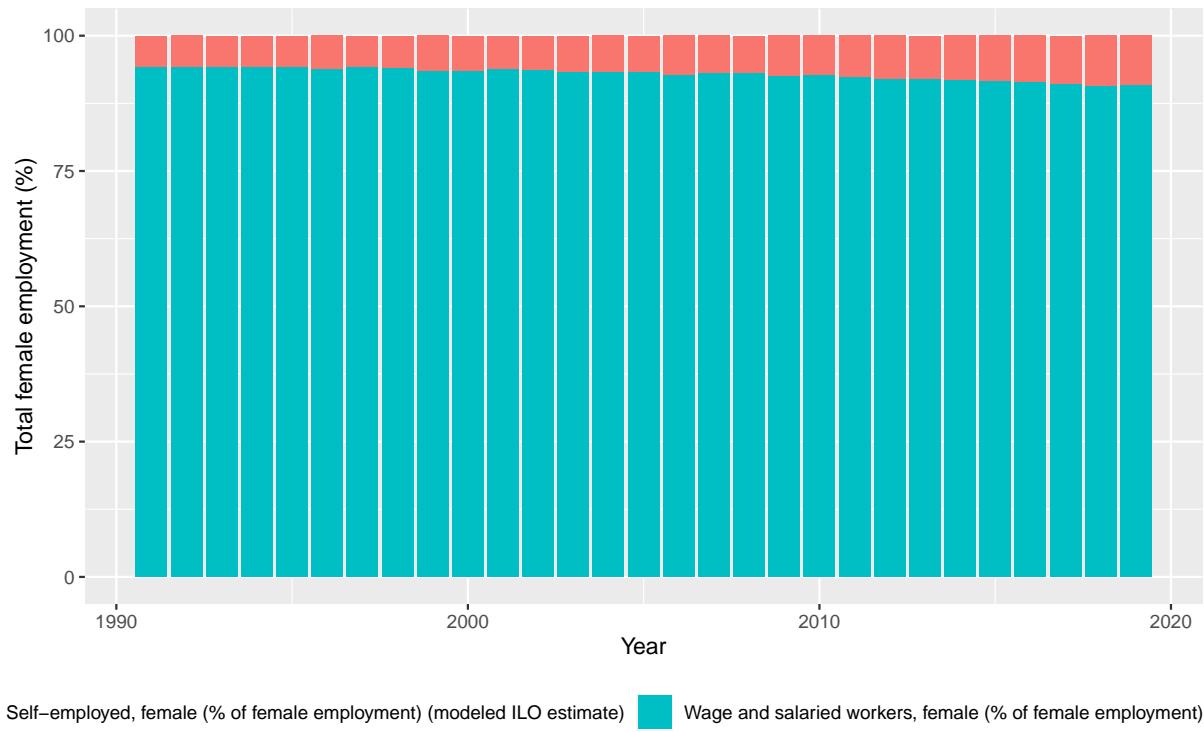


Figure 2: Self-employed v/s Wage & salaried female workers

Figure 2 shows the slow but gradual increase in the percentage of self-employed females in the female labour workforce. The female labour workforce comprises of self-employed women and wage and

salaried women. The percentage of self-employed women in Israel has increased from 5.9 to 9.2 in 3 decades. The gradual change can be attributed to strong family orientation present in the Israeli culture and the fact that a working mother has to always give priorities to family responsibilities. But the main contributing factor to the increase was achievement motivations and economic necessities more than educational attainment or previous entrepreneurial experience.

3 Female v/s Male labour force participation

```
plot_3 <- israel_labour %>% dplyr::filter(Series %in% c("Labor force participation rate, female (% of female population ages 15-64) (modeled ILO estimate)", "Labor force participation rate, male (% of male population ages 15-64) (modeled ILO estimate)"))

ggplot(aes(x=Year, y=value, color = Series))+
  geom_line()+
  xlab("Year")+
  ylab("Labour force participation rate")+
  theme(legend.position="bottom")

plot_3
```

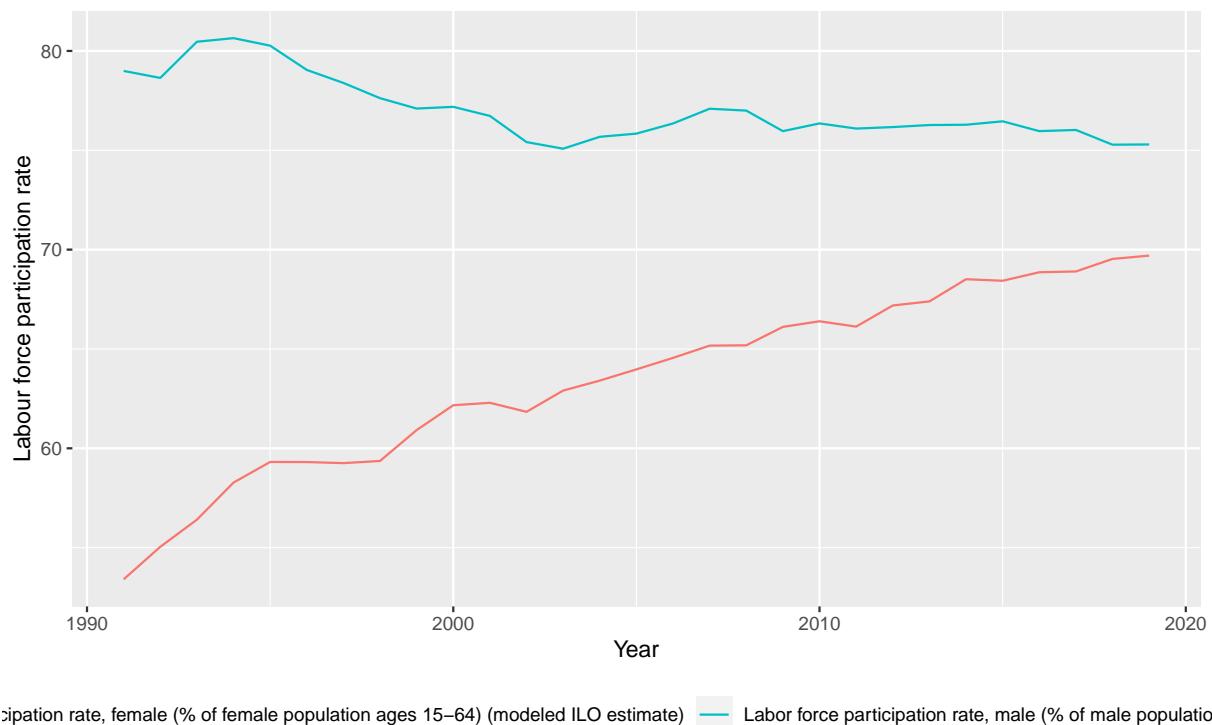


Figure 3: Female v/s Male labour force participation

Figure 3 compares the female v/s male labour force participation amongst the total population in the age group of 15-64 females and males respectively. It depicts the percentage of the population that is engaged in the labour force in the working age population. This is a very good representation of the increased number of participation of women in the labour force which has increased almost 20% in the past 30 years. This shows that Israeli women are more willing and motivated to be involved in the labour force than they ever were.

4 Female labour force v/s female-male participation rate

```
plot_4 <- israel_labour %>% dplyr::filter(Series %in% c("Ratio of female to male labor force pa
  ggplot(aes(x=Year,y=value, color = Series))+
  geom_line()+
  xlab("Year")+
  ylab("Female to male Partcipation rate(% of total)")+
  theme(legend.position="bottom")

grid.arrange(plot_1,plot_4, ncol=2)

## Warning: Removed 1 row(s) containing missing values (geom_path).
```

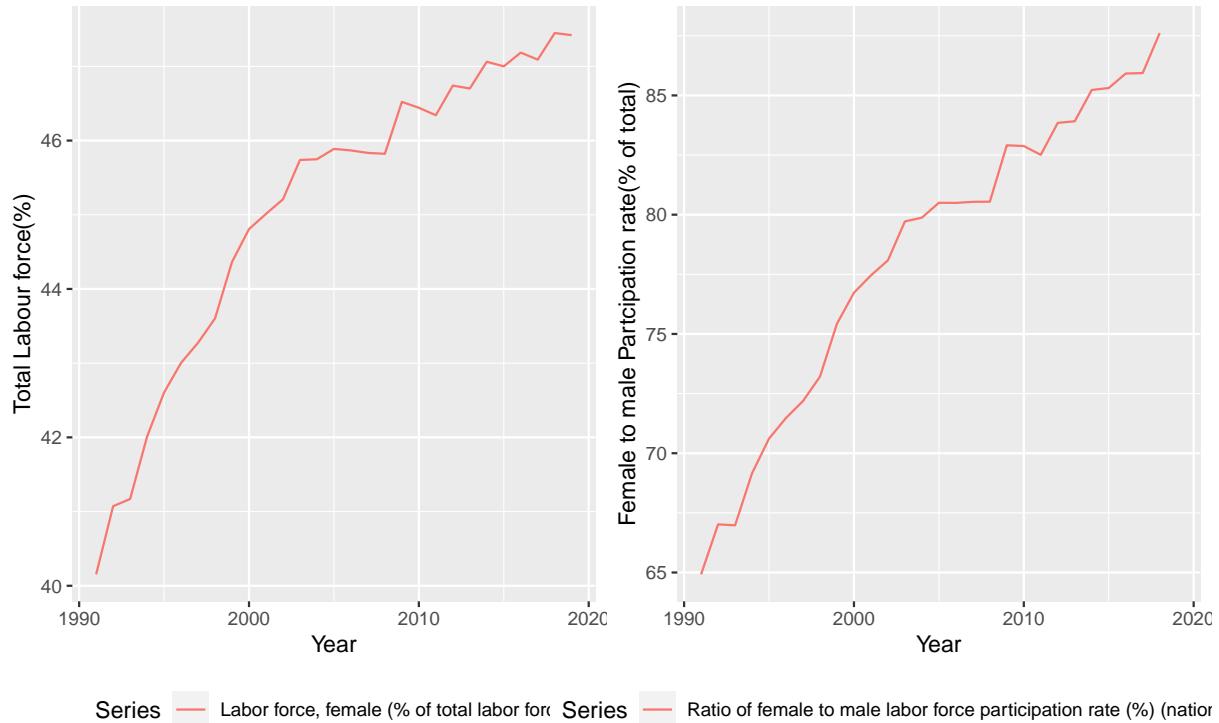


Figure 4: Comparing female labour force with female-male participation rate

Figure 4 verifies that the percentage of females in the total labour force is positively correlated with the female to male labour force participation rate as both show a positive trend over time and have increased significantly since 1991 to 2019.

Model

Conclusion