Macroeconomics 1 Group Presentation

Group C4

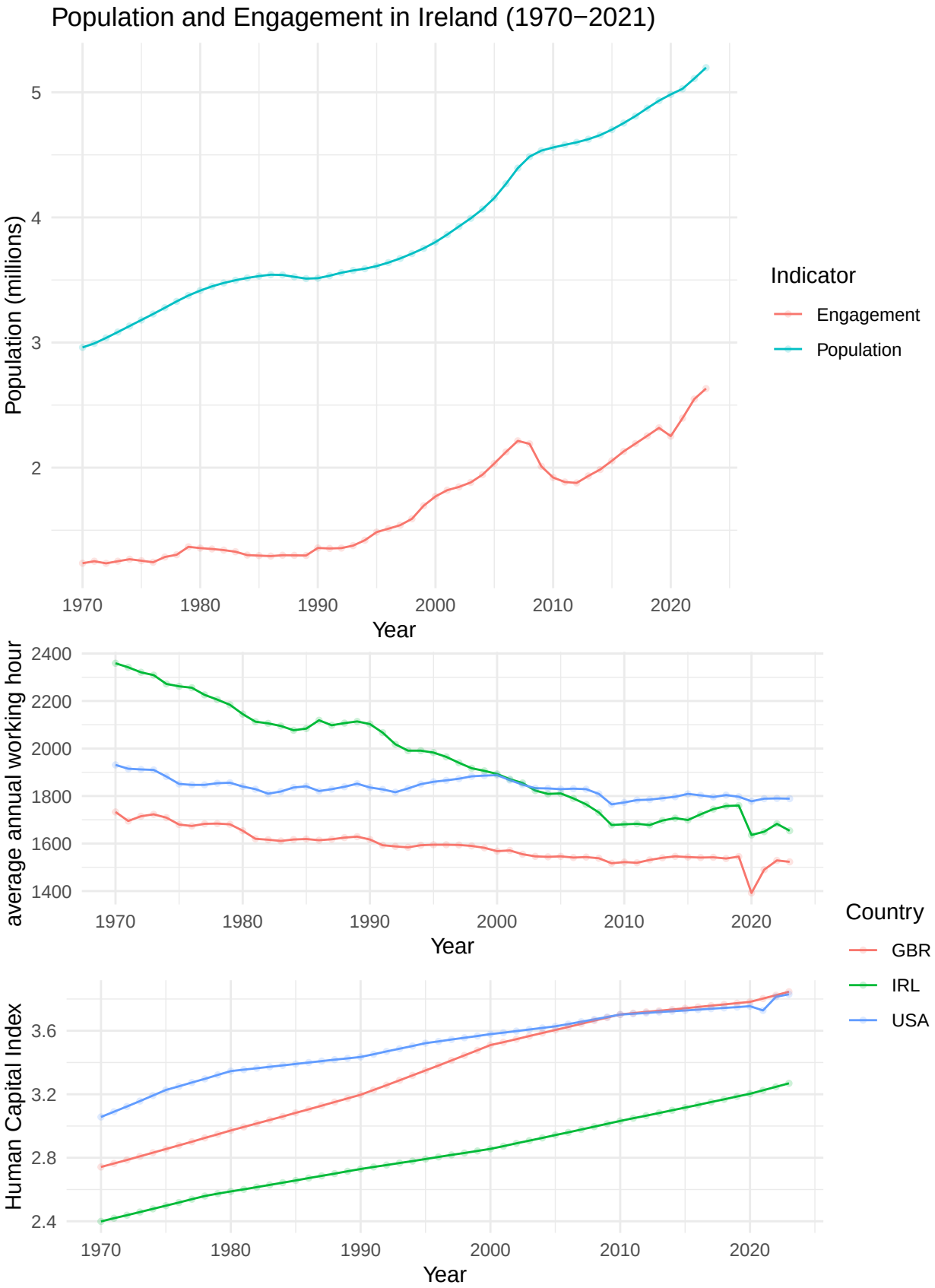
```
knitr::opts_chunk$set(echo = FALSE)
knitr::opts_chunk$set(message = FALSE)
knitr::opts_chunk$set(warning = FALSE)
library(tidyverse)
```

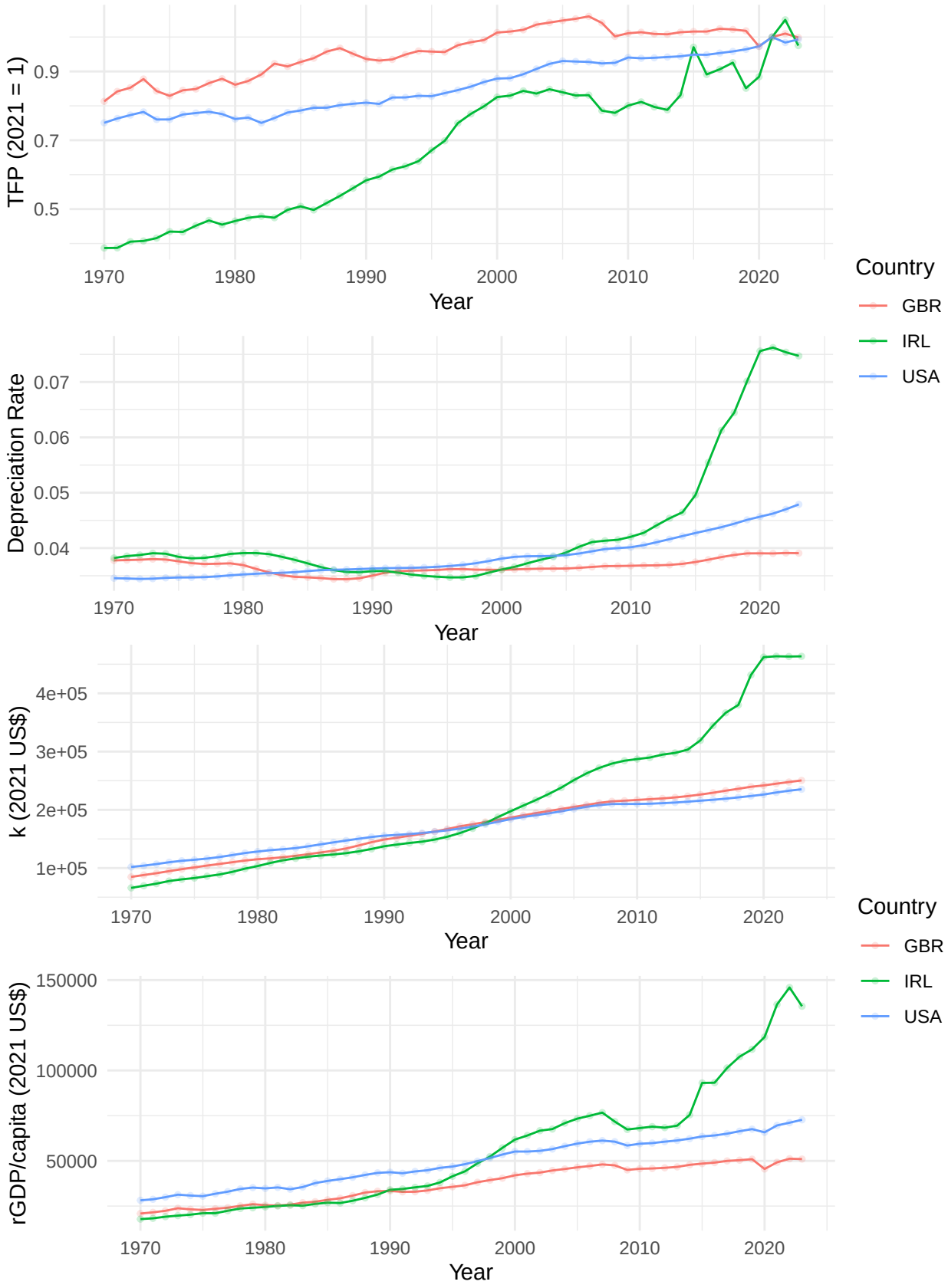
```
## Warning: package 'ggplot2' was built under R version 4.4.3
```

```
## Warning: package 'readr' was built under R version 4.4.3
```

```
library(ggplot2)
library(readr)
library(readxl)
library(ggpubr)
library(knitr)
```

Question 2


Population and Engagement in Ireland (1970−2021)
Population (millions)
5
4
3
2
1970
1980
1990
2000
2010
2020
Year
Indicator
Engagement
Population
average annual working hour
2400
2200
2000
1800
1600
1400
1970
1980
1990
2000
2010
2020
Year
Country
GBR
IRL
USA
Human Capital Index
3.6
3.2
2.8
2.4
1970
1980
1990
2000
2010
2020
Year



From the previous 4 graphs, we can primarily see the following happened in Ireland:

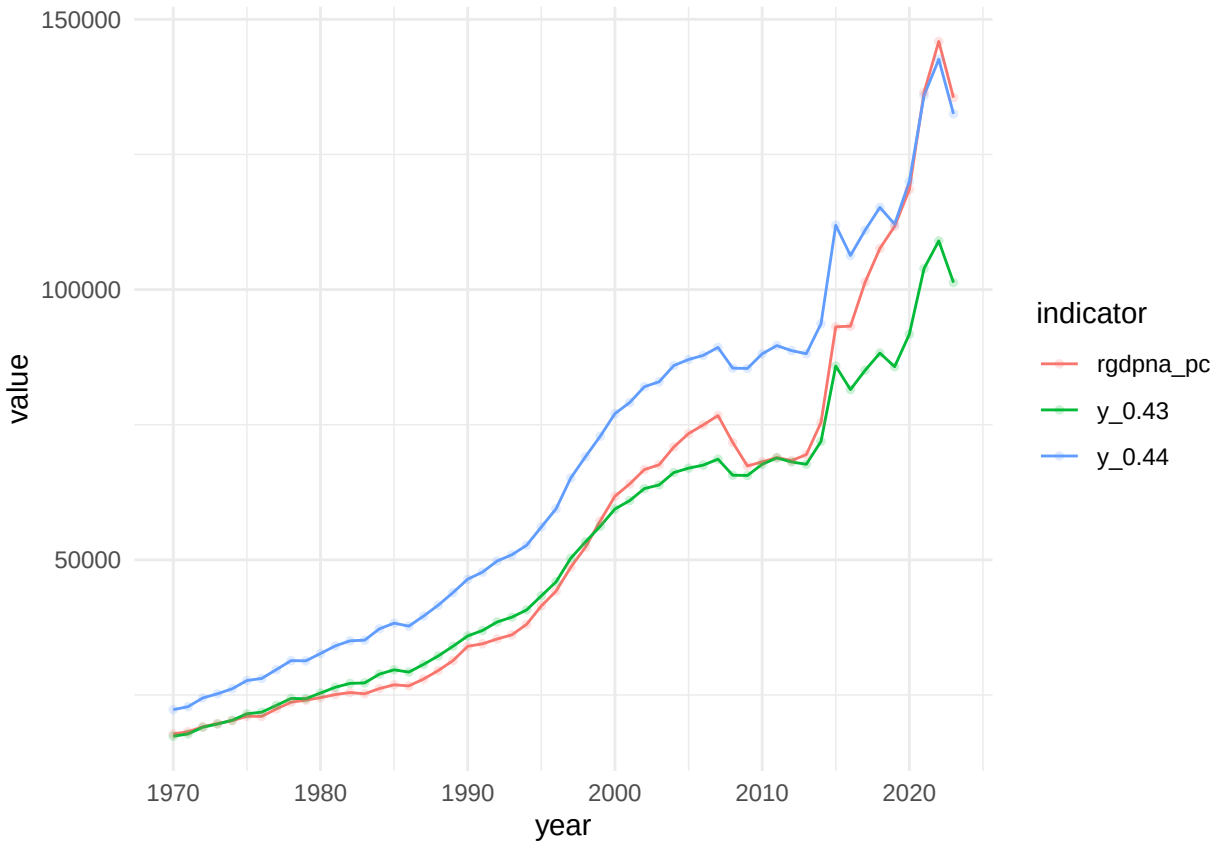
1. There is a constant increasing rate in population and HCI growth rate;
2. There is a higher falling rate in average working hours in the earlier period (1970-2000) than in the later period (2000-2021);
3. There is a higher TFP growth rate in the earlier period (1970-2000), nd remained high and fluctuated in the later period;
4. Capital stock is rising approximately at the same rate as GDP, while capital stock is not as responsive to the fall in GDP, which suggest that there could be some lags in the adjustment of capital stock to changes in GDP.
5. After 2015, the depreciation rate rise dramatically.

Then we want to see how accurate was the Solow model in estimating the GDP in Ireland.

We note that in Solow Model

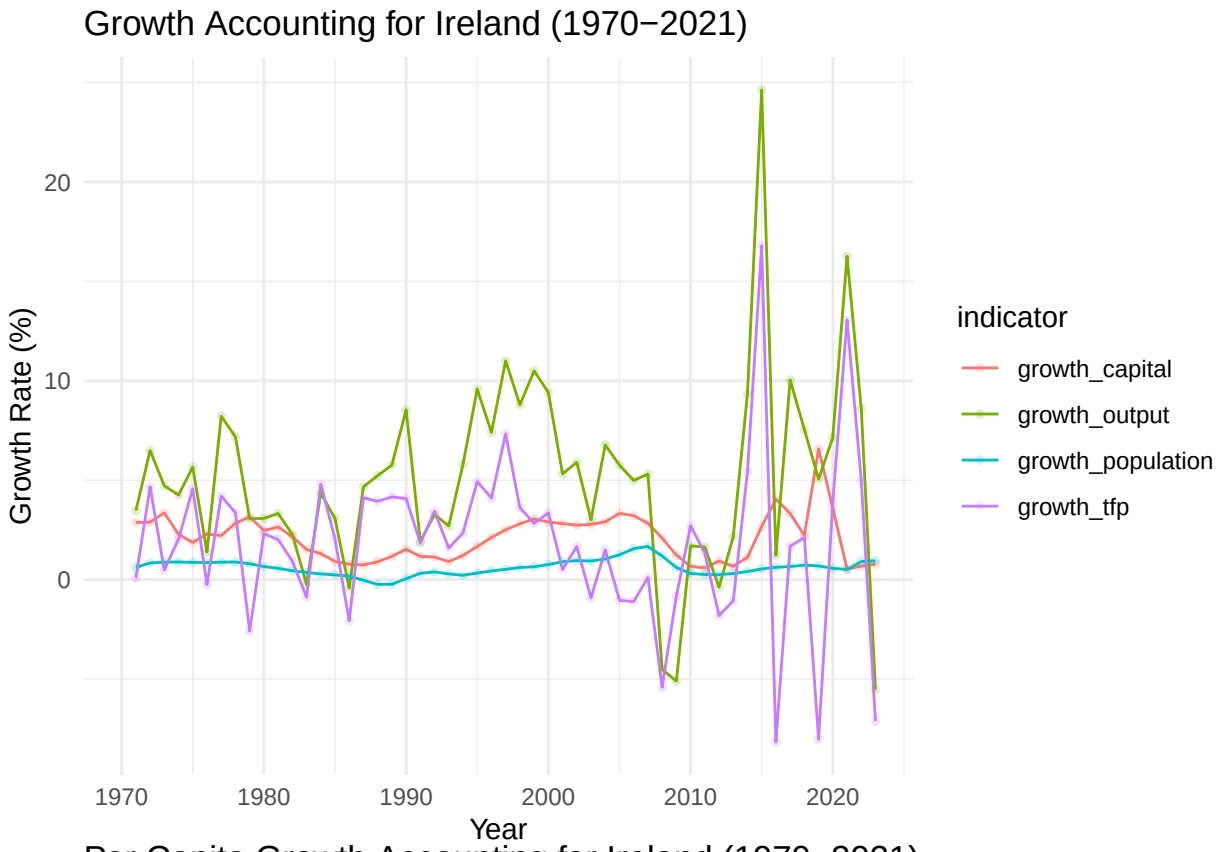
$$y_t = \bar{A}k^{\alpha}$$

so we would like to name a new variable y* to estimate the predicted per capita output level by the Solow model.



The above graph shows that the Solow model with $\alpha = 0.43$ is a good estimation of the actual per capita GDP during 1970 to around 2015, while the model with $\alpha = 0.44$ well estimated the actual per capita GDP from around 2020 onwards. however, the model fell to capture some short term fluctuations in the actual per capita GDP, such as 2000-2010 and 2015-2020. This may be due to a rapid improvement in technology or a rapid increase in capital stock during these periods, which are not explained by the Solow model.

We then find the contribution of capital and TFP to the growth of the per capita GDP growth. We use $\alpha = 0.43$ for 1970-2015, and $\alpha = 0.44$ for the following period.


Growth Accounting for Ireland (1970−2021)
Growth Rate (%)
20
10
0
1970
1980
1990
2000
2010
2020
Year
indicator
growth_capital
growth_output
growth_population
growth_tfp

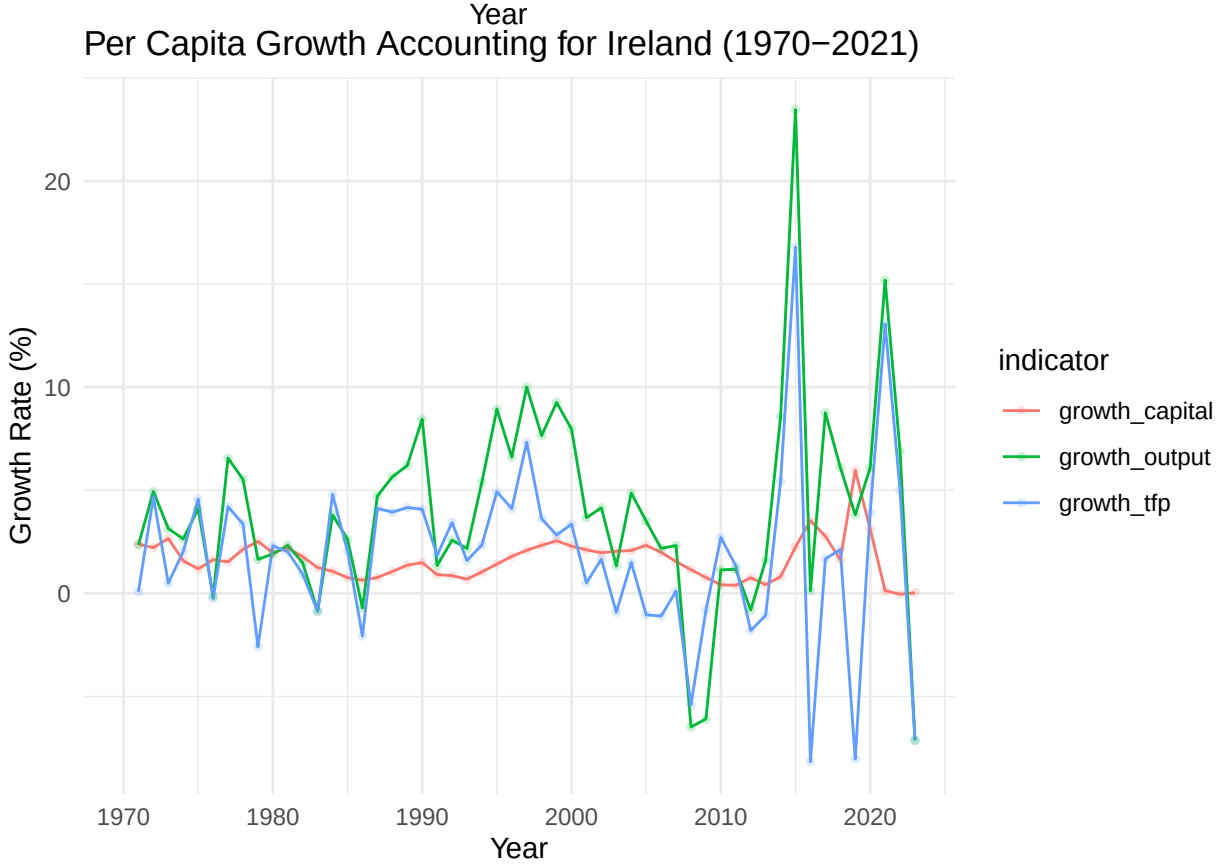

Per Capita Growth Accounting for Ireland (1970−2021)
Growth Rate (%)
20
10
0
1970
1980
1990
2000
2010
2020
Year
indicator
growth_capital
growth_output
growth_tfp

Table 1: Growth Accounting for Ireland (1970-2021)

year	growth_capital	growth_population	growth_tfp	growth_output	max_contributor
1971	2.88	0.62	0.08	3.47	growth_capital
1975	1.87	0.87	4.57	5.66	growth_tfp
1980	2.47	0.66	2.31	3.08	growth_capital
1985	0.92	0.24	2.05	3.08	growth_tfp
1990	1.53	0.05	4.08	8.54	growth_tfp
1995	1.67	0.33	4.93	9.58	growth_tfp
2000	2.90	0.76	3.36	9.41	growth_tfp
2005	3.33	1.25	-1.04	5.76	growth_capital
2010	0.67	0.31	2.71	1.70	growth_tfp
2015	2.68	0.54	16.79	24.62	growth_tfp
2020	3.60	0.57	3.91	7.15	growth_tfp

Table 2: Per Capita Growth Accounting for Ireland (1970-2021)

year	growth_capital	growth_tfp	growth_output
1971	2.39	0.08	2.36
1975	1.19	4.57	4.10
1980	1.97	2.31	1.91
1985	0.76	2.05	2.63
1990	1.49	4.08	8.45
1995	1.42	4.93	8.93
2000	2.29	3.36	7.97
2005	2.33	-1.04	3.50
2010	0.42	2.71	1.14
2015	2.25	16.79	23.46
2020	3.12	3.91	6.09