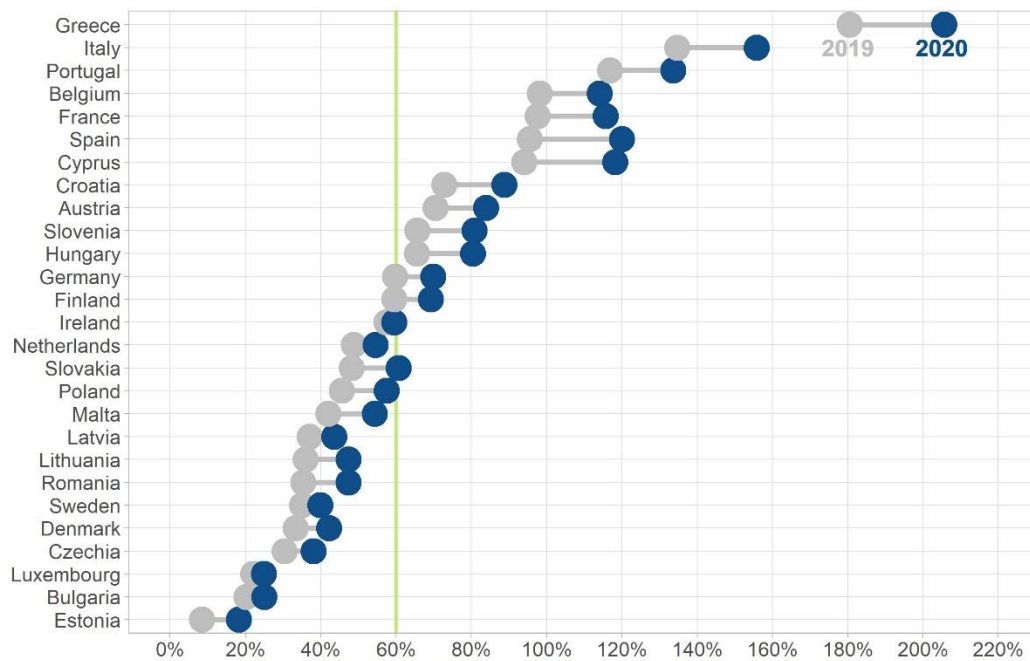


(1)

General government debt, 2019 and 2020

(General government consolidated gross debt, % of GDP)

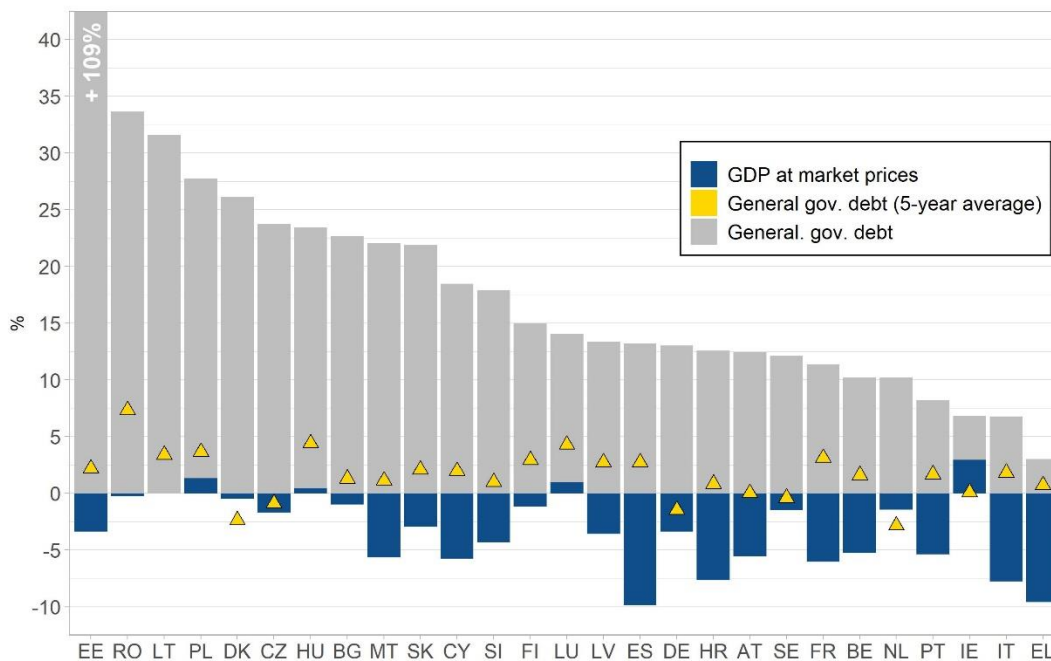


Source: Eurostat, 2021

(2)

Year-on-Year change in general government gross debt and GDP in 2020

(percentage change)

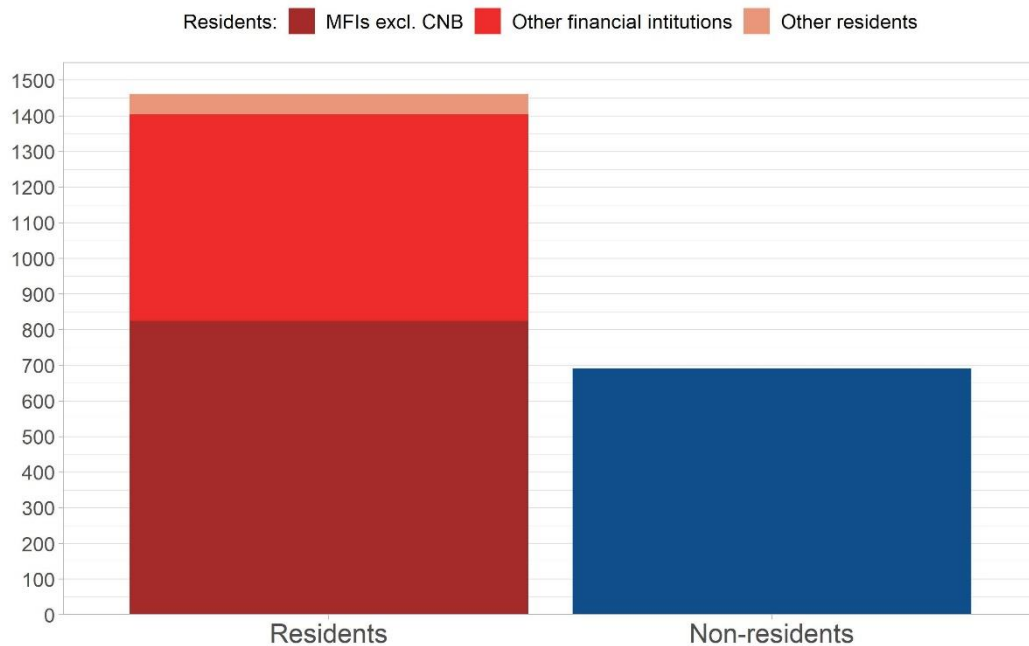


Source: Eurostat, 2021

(3)

Composition of Czech public debt by residency at the end of 2020

(billion of CZK)

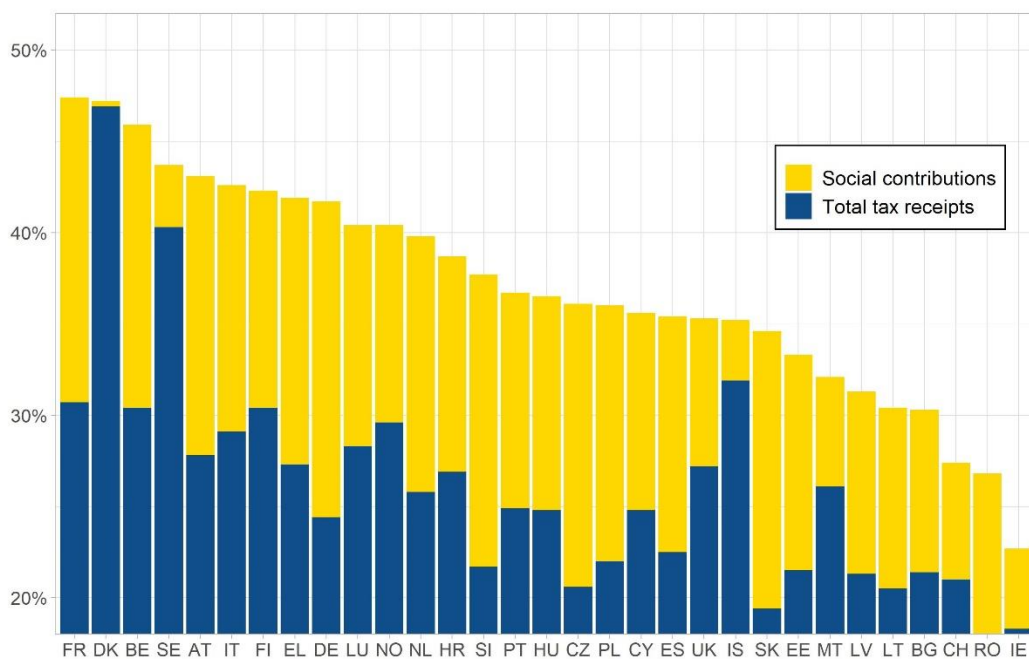


Source: ARAD (CNB), 2021
Note: MFIs = Monetary financial institutions

(4)

Total tax burden including social contributions in 2019

(percentage of GDP)



Eurostat, 2021

Commentary:

The Czech Republic belongs among European countries with the lowest public debt. This remains the case even after government spent heavily in 2020 in attempt to reduce the impact of the coronavirus spreading through Europe. With debt moving from 30% in 2019 to 38% of GDP at the end of 2020. (fig. 1)

In comparison with recent past, when Czech Republic managed to reduce its level of indebtedness, its debt in 2020 rose significantly by 23.7% from the previous year. Note also that the higher the fiscal stimulus provided, the lower the decline in economic activity countries generally achieved. In the case of the Czech Republic, output fell by 1.68% on year-on-year basis. (fig. 2)

Majority of Czech public debt is held by residents, CZK 1463 bill. (68% of total debt), of which CZK 825 bill. (38%) is held by banks. Non-residents hold the remaining CZK 691 bill. (32%). (fig. 3)

Czech citizens pay about 36% of their income on taxes and social contributions, which roughly corresponds with European average of 37%. However, total tax receipts are among the lowest in Europe. The lower can be found only in Slovakia, Romania, and Ireland. (fig. 4)

R: Figure (1) and (2)

```
library(readxl)
library(tidyverse)
library(ggalt)

# Original data -----

# General government gross debt to GDP in %
data.gov.debt.org <- read_xlsx("GOV_10DD_EDPT1__custom_11861281627826478648
.xlsx", sheet = "Sheet 1", range = "A10:U38")

data.gov.debt.org <-
  data.gov.debt.org %>%
  slice(-1) %>%
  rename(country.code = TIME...1, country.label = TIME...2) %>%
  select(!contains("..."))

data.gov.debt.org$country.label[data.gov.debt.org$country.code == "DE"] <-
"Germany"
data.gov.debt <- data.gov.debt.org %>% select(!`2011`:`2018`)

# General government gross debt (million units of national currency)
data.gov.org <- read_xlsx("GOV_10DD_EDPT1__custom_11900451627933380163.xlsx
", sheet = "Sheet 1", range = "A10:U38")

data.gov.org <-
  data.gov.org %>%
  slice(-1) %>%
  rename(country.code = TIME...1, country.label = TIME...2) %>%
  select(!contains("..."))

data.gov.org$country.label[data.gov.org$country.code == "DE"] <- "Germany"
data.gov <-
  data.gov.org %>%
  select(!`2011`:`2018`) %>%
  mutate(p.change = ((`2020` - `2019`) / `2019`) * 100)

# Gross domestic product at market prices (million units of national curren
cy)
data.gdp.org <- read_xlsx("GOV_10DD_EDPT1__custom_11900231627933259534.xlsx
", sheet = "Sheet 1", range = "A10:U38")

data.gdp.org <-
  data.gdp.org %>%
  slice(-1) %>%
  rename(country.code = TIME...1, country.label = TIME...2) %>%
  select(!contains("..."))
```

```

data.gdp.org$country.label[data.gdp.org$country.code == "DE"] <- "Germany"
data.gdp <-
  data.gdp.org %>%
  select(!`2011`:`2018`) %>%
  mutate(p.change = ((`2020` - `2019`) / `2019`) * 100)

# General government debt change time series
data.gov.time <-
  data.gov.org %>%
  select(!`2011`:`2013`, -`2020`) %>%
  mutate(`2019` = (`2019` / `2018`),
         `2018` = (`2018` / `2017`),
         `2017` = (`2017` / `2016`),
         `2016` = (`2016` / `2015`),
         `2015` = (`2015` / `2014`),
         `2014` = NULL) %>%
  mutate(average = ((`2019` * `2018` * `2017` * `2016` * `2015`)^(1/5) - 1) * 100)
# geometric mean

# EDA -----
...
# -----
plot.gov.debt <-
  ggplot(data.gov.debt) +
  geom_vline(xintercept = 60, color = "darkolivegreen2", size = 1) +
  geom_dumbbell(aes(y = reorder(country.label, `2019`), x = `2019`, xend =
`2020`), size = 1.5, color = "gray", size_x = 7, size_xend = 7,
               colour_x = "gray", colour_xend = "dodgerblue4") +

  # Legend
  geom_text(aes(x = 180, y = "Italy", label = "2019"), color = "gray", font
face = "bold", size = 5) +
  geom_text(aes(x = 205, y = "Italy", label = "2020"), color = "dodgerblue4",
fontface = "bold", size = 5) +

  # Labels
  labs(x = "",
       y = "",
       title = "General government debt, 2019 and 2020",
       subtitle = "(General government consolidated gross debt, % of GDP)\n",
       caption = "Source: Eurostat, 2021") +

  # Scales
  scale_x_continuous(breaks = seq(0, 220, by = 20), limits = c(0, 220), lab
els = function(x) paste0(x, "%")) +

  # Theme
  theme_light() +
  theme(panel.grid.minor.x = element_blank(),
        plot.title.position = "plot",
        plot.title = element_text(size = 16),
        axis.text = element_text(size = 12))

```

```

# -----

plot.gov.gdp <-
  ggplot() +
    geom_bar(aes(reorder(country.code, -p.change), p.change, fill = "General.
gov. debt"), data.gov, stat = "identity") +
    geom_bar(aes(country.code, p.change, fill = "GDP at market prices"), data
.gdp, stat = "identity") +
    geom_text(aes(x = "EE", y = 38,
                  label = data.gov$p.change[data.gov$country.code == "EE"] %>
% round(0) %>% paste0("+ ", ., "%")
                  ), angle = 90, fontface = "bold", color = "white", size = 5
) +
    geom_point(aes(country.code, average, fill = "General gov. debt (5-year a
verage)"), data = data.gov.time, size = 3, pch = 24) +

  # Labels
  labs(x = "",
       y = "%",
       title = "Year-on-Year change in general government gross debt and GD
P in 2020",
       subtitle = "(percentage change)\n",
       caption = "Source: Eurostat, 2021") +

  # Scales
  scale_fill_manual(name = NULL, values = c("dodgerblue4", "gold", "gray"))
+
  coord_cartesian(ylim = c(-10, 40)) +
  scale_y_continuous(breaks = seq(-20, 50, by = 5)) +

  # Guides
  guides(fill=guide_legend(override.aes=list(shape=NA))) +

  # Theme
  theme_light() +
  theme(panel.grid.major.x = element_blank(),
        plot.title.position = "plot",
        plot.title = element_text(size = 16),
        axis.text = element_text(size = 12),
        legend.position = c(0.8, 0.7),
        legend.background = element_rect(color = "black"),
        legend.text = element_text(size = 12))

```

R: Figure (4)

```
# Plot -----

plot.tax <-
ggplot() +
  geom_bar(aes(reorder(country.code, -tax.burden), tax.burden, fill = "Social contributions"), data.tax.burden, stat = "identity") +
  geom_bar(aes(reorder(country.code, -tax.receipts), tax.receipts, fill = "Total tax receipts"), data.tax.receipts, stat = "identity") +

  labs(x = "", y = "",
        title = "Total tax burden including social contributions in 2019",
        subtitle = "(percentage of GDP)\n",
        caption = "Eurostat, 2021") +

  coord_cartesian(ylim = c(18, 52)) +
  scale_y_continuous(expand = c(0,0), breaks = seq(0, 60, by = 10), labels = function(x) paste0(x, "%")) +
  scale_fill_manual("", values = c("gold", "dodgerblue4")) +

  theme_light() +
  theme(plot.title.position = "plot",
        plot.title = element_text(size = 16),
        axis.text = element_text(size = 11),
        legend.position = c(0.85, 0.72),
        legend.background = element_rect(color = "black"),
        legend.title = element_blank(),
        legend.text = element_text(size = 12))
```

R: Figure (3)

```
library(tidyverse)

# Original data -----

# Importing data
data.debt.info <-
  read.delim(file = "https://www.cnb.cz/cnb/STAT.ARADY_PKG.VYSTUP?p_period=
12&p_sort=2&p_des=50&p_sestuid=57025&p_uka=1%2C2%2C3%2C4%2C5%2C6%2C7%2C8%2C
9%2C10%2C11%2C12%2C13%2C14%2C15%2C16%2C17%2C18%2C19%2C20%2C21%2C22%2C23%2C2
4%2C25%2C26%2C27%2C28%2C29%2C30&p_strid=ABE&p_od=199512&p_do=202012&p_lang=
CS&p_format=2&p_decsep=.",
            sep = "|",
            encoding = "UTF-8") %>%
  as_tibble()

data.debt.info %>% glimpse() # million of CZK

# Creating metadata table
metadata.debt.info <-
  names(data.debt.info)[-1] %>%
  str_split_fixed("\\.", n = 2) %>%
  as_tibble() %>%
  rename("Zkratka" = V1, "Legenda" = V2)

# Cleaning data
names(data.debt.info)[-1] <- paste0("UK", 1:30)
data.debt.info$Období <- as.Date(data.debt.info$Období, format = "%d.%m.%Y"
)

data.debt.info %>% glimpse()

# Extracting data for 2020
data.debt.info <- data.debt.info %>% filter(Období == "2020-12-31")

# Converting to billions of CZK
data.debt.info[, -1] <- data.debt.info[, -1] %>% mutate_all(~./1000)

# -----
data.debt.info.adj <-
  data.debt.info %>%
  select(UK9:UK11) %>%
  pivot_longer(everything(), names_to = "Group", values_to = "Values")

data.debt.info.adj$Group <-
  factor(data.debt.info.adj$Group, levels = c("UK9", "UK10", "UK11"))

plot.debt.composition <-
  data.debt.info.adj %>%
  ggplot() +
  geom_bar(aes("1", Values, fill = Group), stat = "identity", position = po
```



```

sition_stack(reverse = TRUE)) +
  geom_bar(aes("2", UK12), data = data.debt.info, stat = "identity", fill =
"dodgerblue4") +
  scale_x_discrete(labels = c("Residents", "Non-residents")) +
  scale_y_continuous(breaks = seq(0, 1600, by = 100), expand = c(0,0), limi
ts = c(0, 1550)) +
  scale_fill_manual("Residents:",
                    values = c("brown", "firebrick2", "darksalmon"),
                    labels = c("MFIs excl. CNB", "Other financial intitutio
ns", "Other residents"),
                    ) +

  labs(x = "", y = "",
       title = "Composition of Czech public debt by residency at the end of
2020",
       subtitle = "(billion of CZK)",
       caption = "Source: ARAD (CNB), 2021 \nNote: MFIs = Monetary financia
l institutions") +
  theme_light() +
  theme(panel.grid.major.x = element_blank(),
        plot.title.position = "plot",
        plot.title = element_text(size = 16),
        axis.text = element_text(size = 12),
        axis.text.x = element_text(size = 16),
        legend.text = element_text(size = 12),
        legend.title = element_text(size = 12),
        legend.position = "top"
        )

```