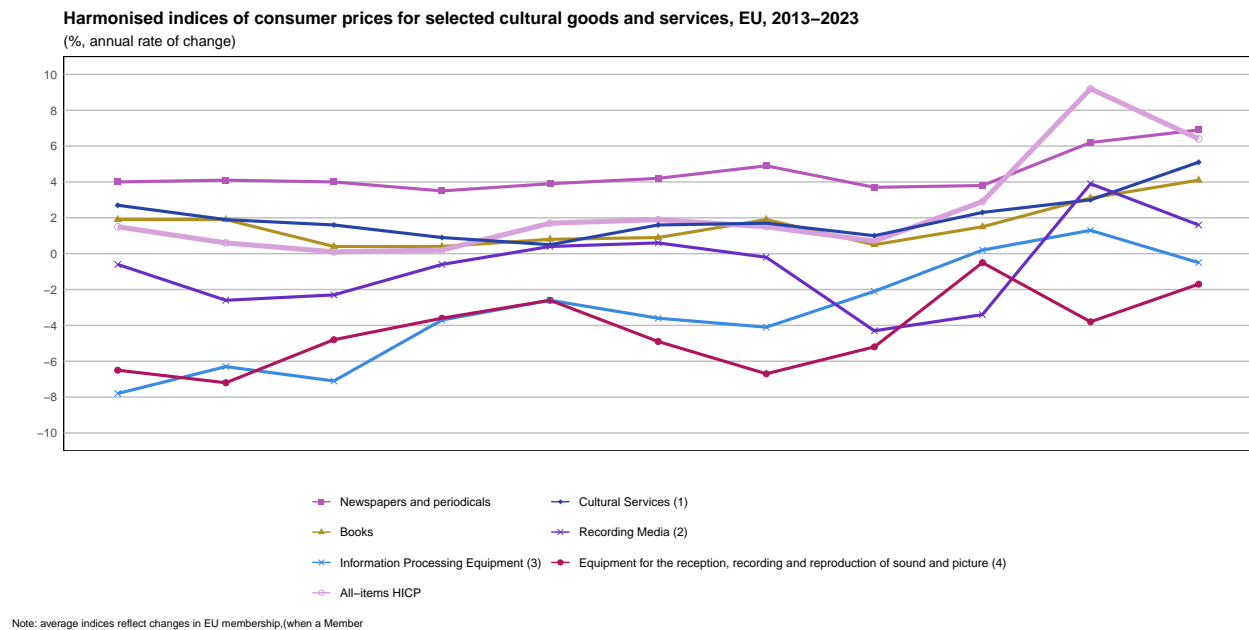# Consumer prices of cultural goods and services

HICP for cultural goods and services – trends at EU level

In addition to the headline inflation aggerate, the 'all-items HICP', there are around 400 sub-indices for different goods and services. The article focuses on six sub-indices related to culture: books; newspapers and periodicals; equipment for the reception, recording and reproduction of sound and picture; recording media; information processing equipment and cultural services.

When analysing the HICP sub-indices related to culture, some basic trends can be observed at the EU level between 2013 and 2023:

prices of newspapers and periodicals rose faster than the other cultural goods tracked by the HICP; over the last ten years, prices of books and cultural services rose at a modest pace; prices of recording media decreased slightly throughout most of the period; this sub-index recorded an increase only in 2017, 2022 and 2023; prices of information processing equipment as well as equipment for the reception, recording and reproduction of sound and picture followed a similar pattern throughout most of the period; with the exception of 2021 and 2022, when the prices of information processing equipment slightly increased. The details of these trends are shown in Figure 1.

Harmonised indices of consumer prices for selected cultural goods and services, EU, 2013–2023
(%, annual rate of change)

Note: average indices reflect changes in EU membership,(when a Member

Figure 1: The all-items HICP and HICPs for cultural goods and services, EU, 2013-2023

The annual average rate of change (indicated with darker bars in Figure 2) shows that, between 2018 and 2023, at the EU level, 'newspapers and periodicals' recorded the highest price increase among cultural products. The 'newspapers and periodicals' HICP increased by an average of 5.1 % per year, 1 percentage point higher than the all-items HICP. In other words, the prices of newspapers and periodicals rose faster than

the headline inflation. Rates of change for 'cultural services' and 'books' sub-indices were also positive but lower than the all-items HICP. Among the remaining three groups of cultural products which saw decreases, the fall in prices was the most pronounced for the 'equipment for the reception, recording, and reproduction of sound and picture' sub-index. Prices in this category of cultural products declined between 2018 and 2023 at an average annual rate of 3.6 %.

Between 2022 and 2023, prices of 'equipment for the reception, recording, and reproduction of sound and picture' decreased by 1.7 %, while prices of 'information processing equipment' decreased by 0.5 %. Among all remaining culture-related HICPs that increased, only the prices of newspapers and periodicals rose faster than the all-items HICP (see Figure 2).
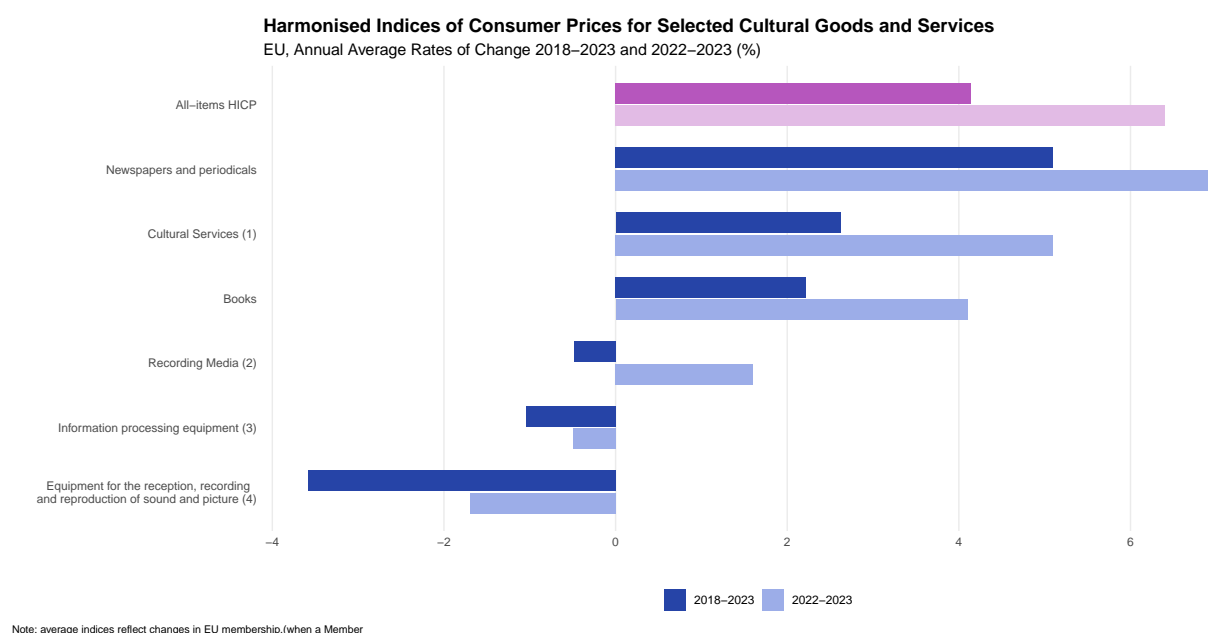
Harmonised Indices of Consumer Prices for Selected Cultural Goods and Services
EU, Annual Average Rates of Change 2018–2023 and 2022–2023 (%)

Note: average indices reflect changes in EU membership,(when a Member

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Figure 2: Harmonised indices of consumer prices for selected cultural goods and services, EU, annual average rates of change 2018-2023 and 2022-2023

HICP for cultural goods and services – focus on countries

Data on consumer price development for cultural goods and services are presented in Table 1. It shows the change in the average annual rates of cultural goods and services price indices in EU countries between 2018 and 2023 and between 2022 and 2023. In 2018-2023, the annual average rate of change of all-items HICP in the EU was 4.1 %. Nine EU countries recorded a rate of change of more than 5 % a year in their all items HICP in that period. Between 2022 and 2023, the rate of change of the all-items HICP was 6.4 % in the EU, with four Member States experiencing double-digit inflation rates during this period.

All EU countries saw a rise in newspapers prices over the past five years

In 2018-2023, all the EU countries saw a rise in 'newspapers and periodical' prices. Over that period, the annual average rate of change for this category was higher than for the headline inflation in 20 EU Member States. Between 2022 and 2023 prices of newspapers and periodicals grew faster than the headline inflation in 16 EU countries. During that one-year period, the highest price growth for newspapers and periodicals was recorded in Hungary (21.0 %) and Romania (19.6 %).

Between 2018 and 2023, the annual average rate of change for the prices of 'cultural services' was slower than the overall inflation rate in all EU Member States, except Estonia and Denmark. The fastest growth rates for cultural services prices (over 5 % per year, on average) were recorded in the Baltic Member States and Poland. Slovakia was the only country where the price index of cultural services decreased in 2023 compared with 2018. Between 2022 and 2023, the 'cultural services' sub-index grew faster compared with the all-items HICP in 9 EU Member States.

In 2023, the annual average price index for books was lower in four EU countries compared with 2018. The decline in book prices between these years was most noticeable in Portugal, where the 'Books' sub-index recorded an average decrease of 12.8 % per year. Between 2018 and 2023, average book prices rose faster than the headline inflation rate in only three EU countries – Denmark, Malta and Sweden. From 2022 to 2023, annual average book price index increased faster than the headline inflation rate in only three EU countries – Denmark, Malta and Sweden. From 2022 to 2023, annual average book price index increased faster than the headline inflation in Croatia, Belgium, Sweden, Luxembourg and Spain.

In the five-year period between 2018 and 2023, the sub-index for 'recording media' decreased in 17 EU Member States (no data for Malta). The price index for 'recording media' fell the fastest in Slovenia (-8.8 % per year, on average) and Finland (-5.1 %). However, in 2023, prices for 'recording media' increased in 18 EU Member States compared with the previous year, with the largest increases in Estonia (13.0 %) and Sweden (11.8 %).

The prices of information processing equipment returned to a downward trend

Between 2018 and 2023, the 'information processing equipment' index decreased in 16 EU Member States. The largest annual average decrease in the index was recorded in Estonia (-8.4 % per year), while the largest annual average increase of 'information processing equipment' price index occurred in Romania (2.8 %). From 2022 to 2023, the 'information processing equipment' index decreased in 14 EU Member States, with the largest decreases observed in Estonia (-10.6 %) and Spain (-6.7 %). During the same period, the largest increases in information processing equipment prices were observed in Italy (5.8 %) and Romania (5.1 %).

The index for 'equipment for the reception, recording, and reproduction of sound and picture' saw the most significant decline between 2018 and 2023 in Italy (on average -12.3 % a year). Slight increases in this index were observed in Romania, Austria and Estonia (1.6 %, 0.2 %, and 0.1 % a year on average, respectively). Between 2022 and 2023, the index for this type of equipment decreased in 20 EU countries, with the largest drops recorded in Belgium (-12.5 %), Bulgaria and Luxembourg (-12.3 % in both countries).

The all-items HICP and HICPs for cultural goods and services, annual average rates of change 2018-2023 and 2022-2023 (%)

	All-items HICP		Newspapers and periodicals		Cultural Services (1)		Books		Recording Media (2)		Information processing equipment (3)		Equipment for the reception, recording and reproduction of sound and picture (4)	
	2018-2023	2022-2023	2018-2023	2022-2023	2018-2023	2022-2023	2018-2023	2022-2023	2018-2023	2022-2023	2018-2023	2022-2023	2018-2023	2022-2023
EU	4.1	6.4	5.1	6.9	2.6	5.1	2.2	4.1	-0.5	1.6	-1.0	-0.5	-3.6	-1.7
Belgium	3.5	2.3	6.3	7.0	3.3	6.1	3.0	4.2	-1.5	-5.5	0.7	-1.3	-7.8	-12.5
Bulgaria	5.6	8.6	11.2	12.5	3.7	10.3	5.0	3.8	-3.2	-2.6	-2.4	-3.8	-9.0	-12.3
Czech Republic	7.2	12.0	6.5	12.2	4.2	7.1	4.3	6.0	1.5	5.3	1.4	3.8	-0.6	5.0
Denmark	3.0	3.4	4.9	7.0	3.5	4.8	7.7	3.3	0.0	3.8	-5.9	-1.2	-1.4	-0.8
Germany	3.9	6.0	5.2	6.6	2.0	4.2	2.8	5.5	1.6	4.1	-0.4	-2.5	-1.9	0.2
Estonia	6.9	9.1	6.3	6.4	8.0	12.8	2.4	6.6	-1.1	13.0	-8.3	-10.6	0.2	-4.4
Ireland	3.2	5.2	5.3	4.1	1.3	1.9	0.4	-4.5	2.6	4.5	-7.0	-2.6	-5.3	-1.4
Greece	2.7	4.2	0.6	2.5	1.0	3.8	-0.4	1.4	-2.0	0.3	-3.6	0.0	-6.6	-3.9
Spain	3.0	3.4	3.7	4.0	1.8	4.4	1.9	3.6	-1.8	3.9	-5.6	-6.7	-2.7	-2.8
France	3.1	5.7	4.0	5.5	2.5	4.7	1.4	2.6	-1.0	0.6	-2.5	-3.4	-3.4	-4.8
Croatia	4.5	8.4	6.9	6.4	1.5	1.3	3.6	11.9	-2.2	-2.4	1.3	2.6	-2.4	-4.7
Italy	3.4	5.9	2.1	2.9	0.9	2.6	0.6	-0.9	-2.3	-12.1	1.1	5.8	-12.1	-9.5
Cyprus	2.7	3.9	0.3	0.4	2.4	2.6	0.4	2.3	-2.8	0.3	-1.3	-2.7	-4.5	-8.9
Latvia	6.5	9.1	7.3	14.5	5.4	9.2	1.1	6.1	-1.2	-0.6	1.0	0.3	-1.8	-0.4
Lithuania	7.1	8.7	9.5	13.3	5.2	5.8	3.1	4.8	1.1	2.5	0.7	1.0	-2.0	-2.6
Luxembourg	3.2	2.9	5.2	5.2	3.1	4.6	0.0	4.0	-2.8	-0.3	-0.9	-1.6	-6.1	-12.3
Hungary	8.9	17.0	11.4	21.0	4.4	12.8	-7.0	7.6	-1.4	3.1	1.4	0.4	-1.5	-1.0
Malta	2.9	5.6	2.1	3.4	1.3	2.1	5.2	5.2	NA	NA	-2.6	1.5	-2.3	-7.9
Netherlands	4.5	4.1	4.8	5.4	3.3	5.1	2.6	2.7	5.6	7.6	0.4	0.2	-0.6	4.3
Austria	4.4	7.7	7.5	14.3	3.1	5.6	2.2	6.2	-3.7	4.4	0.4	-1.1	0.3	6.7
Poland	7.0	10.9	6.9	12.1	5.7	8.0	4.7	7.8	3.1	8.5	-1.4	-1.9	-3.4	-1.9
Portugal	2.9	5.3	5.3	3.2	2.2	7.9	-11.0	4.0	-1.5	0.1	-4.9	-3.9	-7.0	-8.0
Romania	6.4	9.7	14.0	19.6	2.4	4.1	3.6	8.0	2.6	5.2	2.8	5.1	1.6	2.7
Slovenia	4.0	7.2	6.4	12.0	2.8	4.3	0.3	1.6	-8.6	-4.1	-1.3	-2.4	-3.6	-5.4
Slovakia	6.1	11.0	9.6	9.9	-0.5	-12.5	2.8	5.4	0.9	3.8	1.7	1.3	-2.6	-1.8
Finland	3.0	4.3	3.6	3.4	2.3	3.9	1.7	2.1	-5.0	-0.5	-1.3	2.1	-4.3	6.6
Sweden	3.8	5.9	6.5	8.5	2.0	5.8	4.4	7.8	-1.1	11.8	-6.3	1.9	-4.1	7.9
Iceland	4.1	8.0	5.7	7.7	3.8	8.0	1.7	0.5	0.7	4.4	-0.4	-1.3	-0.9	-1.5
Norway	3.9	5.8	4.1	7.9	5.4	10.1	5.2	4.1	2.1	4.9	3.5	9.7	0.8	4.1
Switzerland	1.0	2.3	2.8	3.9	1.3	2.2	1.3	0.8	-1.2	-0.8	-4.5	-7.4	-4.2	0.1
Montenegro (⁵)	4.6	8.7	0.2	0.0	2.0	5.5	0.0	0.5	-0.4	-1.6	-1.6	-2.4	-4.1	-3.8
North Macedonia (⁵)	5.7	9.0	6.1	30.4	3.6	6.0	-0.4	2.0	-4.2	-4.1	-0.1	-2.6	-3.9	2.1
Albania (⁵)	3.6	5.3	0.6	2.1	1.5	2.4	2.9	4.1	0.8	2.7	-0.1	-1.2	-0.7	-3.2
Serbia (⁵)	6.3	12.1	10.8	4.6	2.8	7.8	3.2	10.1	-1.2	1.7	2.3	5.6	-3.2	-1.6
Türkiye (⁵)	34.7	54.0	41.5	111.2	30.3	72.6	28.7	55.0	NA	NA	12.7	15.3	20.9	25.7
Kosovo (⁵)(⁶)	4.6	4.9	0.0	0.0	3.2	11.0	1.0	3.3	2.9	3.9	-1.7	-5.4	-0.1	0.1

Note:

(¹) Includes cinemas, theatres, concerts; museums, libraries, zoological gardens; television and radio fees, hire of equipment and accessories for culture; and other cultural services.

(²) Includes records, CDs, DVDs, tapes, cassettes, etc.

(³) Includes personal computers, visual display units, printers and miscellaneous accessories accompanying them; also computer software packages such as operating systems, applications, languages, etc.

(⁴) Includes TV sets, CD players, stereo systems, radios, etc.

(⁵) Definition differs, see metadata here (https://ec.europa.eu/eurostat/cache/metadata/en/prc_hicp_esms.htm).

(⁶) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

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Table 1: Original dependent variable - Employment status in 5 categories

Code appendix

```r
# Load libraries
library(knitr)       # provides the kable function & chunk options
library(kableExtra)  # provides kable_styling for kable settings
library(tidyverse)   # loads amongst others dplyr, tidyr and ggplot2
library(tidymodels)  # loads several packages useful for model testing
library(grid)        # displays new grid for every plot
library(restatapi)   # accessed and uses eurostat data
library(png)         # deals with pngs (logos) on plots
library(writexl)     # saves data to excel
library(gridExtra)

# Set basic display options
options(
  digits = 3,   # limit the number of significant digits
  width  = 63   # limit the width of code output
)

# Set knitr options
opts_chunk$set(
  echo      = FALSE,    # Do not print code
  warning   = FALSE,    # Suppress warnings
  message   = FALSE,    # Suppress messages
  fig.align = "center"  # Center figures
)

# Set a default ggplot theme
theme_set(
  theme_minimal() +
  theme(plot.title = element_text(face = "bold", size = 16,
                                  hjust = 0.5),
        plot.subtitle = element_text(hjust = 0.5, size = 14),
        axis.title = element_text(face = "bold", size = 13),
        axis.text.x = element_text(vjust = 1.5),
        legend.title = element_text(face = "bold", size = 12),
        legend.text = element_text(size = 12),
        strip.background = element_rect(fill = "black"),
        strip.text = element_text(face = "bold", size = 12,
                                  color = "white")))

# Accessing the data through Eurostat API
```

```r
# Get the id and read the data through dsd
id <- "prc_hicp_aind"

# Specify the years of interest
time_EU <- seq(from = 2013, to = 2023, by = 1)

# Specify the 7 categories of interest
cult_var_names <- c("CP0952", "CP0951", "CP0913", "CP00", "CP0914", "CP0911", "CP0942")
data_api <- get_eurostat_data(id,
                              filters = list(geo = "EU", coicop = cult_var_names,
                                             unit = "RCH_A_AVG"),
                              date_filter = time_EU, label = TRUE)

# Create the dataset with left join by category (coicop)
# Now define all the variables seperately

                  ##### PLOT1 ####

time_graph1 <- unique(data_api$time)

all_hicp <- data_api %>%
  filter(coicop == "All-items HICP") %>%
  select(values)

equip <- data_api %>%
  filter(coicop ==
"Equipment for the reception, recording and reproduction of sound and picture") %>%
  select(values)

info_equip <- data_api %>%
  filter(coicop == "Information processing equipment") %>%
  select(values)

rec_media <- data_api %>%
  filter(coicop == "Recording media") %>%
  select(values)

cult_serv <- data_api %>%
  filter(coicop == "Cultural services") %>%
  select(values)

books <- data_api %>%
  filter(coicop == "Books") %>%
  select(values)

newspapers <- data_api %>%
  filter(coicop == "Newspapers and periodicals") %>%
  select(values)

# Bind cols and create a new column for data frame names
combined_cols <- bind_cols(as_tibble(time_graph1), all_hicp, equip, info_equip,
                           rec_media, cult_serv, books, newspapers)
```

```r
colnames(combined_cols) <- c("time","all_hicp","equip","info_equip",
                             "rec_media","cult_serv","books","newspapers")

#Transform to long format
combined_data_long <- combined_cols %>%
  pivot_longer(cols = -time, names_to = "variable", values_to = "value")

# Convert value column to numeric
combined_data_long$value <- as.numeric(combined_data_long$value)
combined_data_long$time <- as.numeric(combined_data_long$time)

# Create the factors for the legend
combined_data_long$variable <- factor(combined_data_long$variable,
    levels=
c("newspapers", "books", "info_equip", "all_hicp", "cult_serv", "rec_media", "equip"))
# Create the vector for legend names
labels_original <- c("Newspapers and periodicals",
"Books", "Information Processing Equipment (3)",
"All-items HICP",
"Cultural Services (1)",
"Recording Media (2)",
"Equipment for the reception, recording and reproduction of sound and picture (4)")

# Define codes for each variable with palette 2 from Eurostat apart
# from all_hicp which didn't have a colour from the palettes
color_palette <- c(
  all_hicp = "#d7a2db",
  equip = "#af155c",
  info_equip = "#388ae2",
  rec_media = "#672dc4",
  cult_serv = "#2644a7",
  books = "#b09120",
  newspapers = "#b656bd"
)

# Define the footnote
cap = paste0(c("Note: average indices reflect changes in EU membership,(when a Member",
"State joins the EU, its HICPs are chained with the aggregate index at",
"the time of the,accession).",
"(1) Includes cinemas, theatres, concerts; museums, libraries, zoological gardens;",
"television and radio fees, hire of equipment and accessories for culture; and other",
"cultural services.",
"(2) Includes records, CDs, DVDs, tapes, cassettes, etc.",
"(3) Includes personal computers, visual display units, printers",
"and miscellaneous accessories accompanying them;",
"also computer software packages",
"such as operating systems, applications, languages, etc.",
"(4) Includes TV sets, CD players, stereo systems, radios, etc.",
"Source: Eurostat (online data code: prc_hicp_aind)"))

# Create the plot
plot1 <- ggplot(combined_data_long, aes(x = time, y = value,
                                        color = variable, shape = variable,
```

```r
                                                linewidth = variable, size = variable)) +
  geom_point() +
  geom_line() +
  guides(color=guide_legend(ncol=2), shape=guide_legend(ncol=2), linewidth=F, size=F) +
  scale_shape_manual(values=c(15,17,4,21,18,4,19), labels=labels_original) +
  scale_linewidth_manual(values = c(1.1,1.1,1.1,1.8,1.1,1.1,1.1)) +
labs(title=
"Harmonised indices of consumer prices for selected cultural goods and services, EU, 2013-2023",
subtitle="(%, annual rate of change)", x = "", y = "", color = "Variable",
shape = "Variable",  cols='markers') +
  scale_x_continuous(breaks = seq(2013, 2023, by = 1)) +
  scale_y_continuous(breaks = seq(-10, 12, by = 2), limits = c(-10,10)) +
  scale_color_manual(values = color_palette, labels=labels_original) +
  scale_size_manual(values=c(1.8,1.8,1.8,2,1.8,1.8,1.8)) +
  theme_minimal() +
  theme(panel.background = element_rect(fill = "white"), # Set background to white
        panel.grid.major.y = element_line(color = "gray"), # Set major grid lines to gray
        panel.grid.minor = element_blank(),  # Remove minor grid lines
        panel.grid.major.x = element_blank(),  # Remove vertical grid lines
        panel.grid.minor.x = element_blank(),
        plot.title = element_text(face = "bold"),
        plot.caption = element_text(size = 8, hjust = 0, vjust = 5),
        legend.position = "bottom", legend.title = element_blank())


logo_file <- "logo_RGB-POS.png"  # Eurostat logo
logo <- readPNG(logo_file)
logo_grob <- rasterGrob(logo, interpolate=T)

# Create a text grob for the footnote
footnote_grob <- textGrob(cap, x = unit(0, "npc"), y = unit(1, "npc"),
                          just = c("left", "top"), gp = gpar(fontsize = 8))

# Combine the footnote and logo in a horizontal layout
footnote_with_logo <- arrangeGrob(footnote_grob, logo_grob, ncol = 2, widths = c(4, 1))

# Combine the plot and the footnote with logo in a vertical layout
combined_grob <- arrangeGrob(plot1, footnote_with_logo, ncol = 1, heights = c(4, 1))

# Display the combined plot with footnote and logo
grid.newpage()
grid.draw(combined_grob)


combined_data_wide <- combined_data_long %>%
  pivot_wider(names_from = variable, values_from = value)

# Create a mapping of numeric values to years
year_mapping <- setNames(2013:2023, 1:11)

# Replace numeric time values with years in the wide data
combined_data_wide <- combined_data_wide %>%
  mutate(time = year_mapping[as.character(time)])
```

```r
write_xlsx(combined_data_wide, path = "combined_data_long_.xlsx")

# Define a new dataset to not overwrite the previous
data_api2 <- data_api %>%
  mutate(time = as.numeric(as.character(time)))
view(data_api2)

data_api2_wide <- data_api2 %>%
  pivot_wider(names_from = time, values_from = values)

view(data_api2_wide)


write_xlsx(data_api2_wide, path = "data_for_graph2.xlsx")

# Filter 2018-2023 and 2022-2023 since that's what's required
values_2022_2023 <- data_api2 %>%
  filter(time == 2023) %>%                        # Filter for the years 2022 to 2023
  group_by(coicop) %>%                            # Group by the category column
  summarize(value = mean(values, na.rm = TRUE)) %>% # Calculate the mean for each category
  select(coicop, value) %>%
  mutate(date = rep("2022-2023", 7)) %>%
  arrange(coicop)

values_2018_2023 <- data_api2 %>%
  filter(time > 2018 & time <= 2023) %>%          # Filter for the years 2018 to 2023
  group_by(coicop) %>%                            # Group by the category column
  summarize(value = mean(values, na.rm = TRUE)) %>% # Calculate the mean for each category
  select(coicop, value) %>%
  mutate(date = rep("2018-2023", 7)) %>%
  arrange(coicop)

# Join
data_long_2 <- bind_rows(values_2018_2023, values_2022_2023)
data_long2 <- data_long_2 %>%
  mutate(Color_Group = ifelse(coicop == "All-items HICP", paste(coicop, date),
paste("Other", date))) %>% mutate_if(is.character,as.factor)

# Redefine the names of the categories as needed
var_categories <- unique(data_api$coicop) %>% as.character()
var_categories[2] <- "Equipment for the reception, recording
and reproduction of sound and picture (4)"
var_categories[3] <- "Information processing equipment (3)"
var_categories[4] <- "Recording Media (2)"
var_categories[5] <- "Cultural Services (1)"

var_cat <- bind_rows(as_tibble(var_categories), as_tibble(var_categories))
colnames(var_cat) <- "category"
data_long2 <- bind_cols(data_long2, var_cat) %>% select(-coicop)

data_long2 <- data_long2 %>%
  arrange(date) %>%
  arrange(value) %>%
```

```r
  arrange(desc(Color_Group)) %>%
  mutate_if(is.character, as.factor)

data_long2$category <- factor(data_long2$category, levels=unique(data_long2$category))

# Define second footnote
cap2 = paste0(c("Note: average indices reflect changes in EU membership,(when a Member",
"State joins the EU, its HICPs are chained with the aggregate index at",
"the time of the,accession).",
"(1) Includes cinemas, theatres, concerts; museums, libraries, zoological gardens;",
"television and radio fees, hire of equipment and accessories for culture; and other",
"cultural services.",
"(2) Includes records, CDs, DVDs, tapes, cassettes, etc.",
"(3) Includes personal computers, visual display units, printers",
"and miscellaneous accessories accompanying them; also computer software packages",
" such as operating systems, applications, languages, etc.",
"(4) Includes TV sets, CD players, stereo systems, radios, etc.",
"Source: Eurostat (online data code: prc_hicp_aind)"))


# Plot the second graph

plot2 <- ggplot(data_long2, aes(x = category, y = value, fill = Color_Group)) +
  geom_bar(stat = "identity", position = position_dodge2(width = 0.8, reverse = TRUE),
width = 0.7) +
  coord_flip() +  # This flips the axes so categories are on the y-axis
  scale_fill_manual(values = c(
    "All-items HICP 2022-2023" = "#e2bbe5",
    "All-items HICP 2018-2023" = "#b656bd",
    "Other 2022-2023" = "#9cade8",
    "Other 2018-2023" = "#2644a7"
  ),
  breaks = c("Other 2018-2023","Other 2022-2023"),
  labels = c("2018-2023","2022-2023")) +  # Customize the colors for each specific group
  labs(title =
"Harmonised Indices of Consumer Prices for Selected Cultural Goods and Services",
       subtitle = "EU, Annual Average Rates of Change 2018-2023 and 2022-2023 (%)",
       x = "",
       y = ""
      ) +
  theme_minimal() +
  theme(legend.position = "bottom", legend.title = element_blank(),
        plot.title = element_text(size = 14, face = "bold"),
        plot.subtitle = element_text(size = 12),
        plot.caption = element_text(size = 7, hjust = 0),
        panel.grid.major.y = element_blank()) +
  scale_y_continuous(breaks = c(seq(-4, 6, by = 2)), minor_breaks= c(seq(-4, 6, by = 2)))

# Display the plot with footnote and logo
footnote_grob2 <- textGrob(cap2, x = unit(0, "npc"), y = unit(1, "npc"),
                           just = c("left", "top"), gp = gpar(fontsize = 8))


# Combine the footnote and logo in a horizontal layout
footnote_with_logo2 <- arrangeGrob(footnote_grob2, logo_grob, ncol = 2, widths = c(4, 1))
```

```r
# Combine the plot and the footnote with logo in a vertical layout
combined_grob2 <- arrangeGrob(plot2, footnote_with_logo2, ncol = 1, heights = c(4, 1))

# Display the combined plot
grid.newpage()
grid.draw(combined_grob2)


write_xlsx(data_long2, path = "data_graph2_calc_.xlsx")


# Define the dataset for the table and filter to include required countries and regions
data_api_all <- get_eurostat_data(id,
                                   filters = list(coicop = cult_var_names,
                                                  unit = "RCH_A_AVG"),
                                   date_filter = time_EU, label = TRUE)

# data_api_all <- left_join(data_api_all, labels, by="coicop")
# view(data_api_all)
unique(data_api_all$geo)


data_api_all_2 <- data_api_all %>%
  filter(
    !geo %in% c("United Kingdom", "United States") &
      !str_detect(geo, "^(Euro area|European Economic|European Union -)"))

data_api_all_2 <- data_api_all_2 %>% mutate(time=as.numeric(as.character(time)))

# Sort the times again 2018-2023 and 2022-2023
values_2022_2023_all <- data_api_all_2 %>%
  filter(time == 2023) %>%
  group_by(coicop, geo) %>%
  summarize(value = mean(values, na.rm = TRUE)) %>% # Calculate the mean for each category
  select(coicop, value, geo) %>%
  mutate(date = rep("2022-2023")) %>%
  arrange(coicop)

values_2018_2023_all <- data_api_all_2 %>%
  filter(time > 2018 & time <= 2023) %>%              # Filter for the years 2018 to 2023
  group_by(coicop, geo) %>%                            # Group by the category column
  summarize(value = mean(values, na.rm = TRUE)) %>% # Calculate the mean for each category
  select(coicop, value, geo) %>%
  mutate(date = rep("2018-2023")) %>%
  arrange(coicop)

# Bind and redefine the categories as needed
combo <- bind_rows(values_2018_2023_all, values_2022_2023_all) %>%
  mutate(coicop = str_replace_all(coicop, c(
    "Equipment for the reception, recording and reproduction of sound and picture" =
"Equipment for the reception, recording  \nand reproduction of sound and picture (4)",
    "Information processing equipment" = "Information processing equipment (3)",
    "Recording media" = "Recording Media (2)",
    "Cultural services" = "Cultural Services (1)"
  )))
```

```r
#Get the elements to 13 from 7 and save in reverse order and arrange
labels_graph2 <- rev(data_long2$category[7:13])

combo$coicop <- factor(combo$coicop, levels=labels_graph2)
combo2 <- combo %>%
  arrange(date) %>%
  arrange(coicop)

levels(combo2$geo)[17] <- "EU"

country_names <- c("Albania (5)" = "Albania", "Montenegro (5)" = "Montenegro",
"North Macedonia (5)" = "North Macedonia",
"Kosovo (5)(6)" = "Kosovo*", "Serbia (5)" = "Serbia",
"Turkiye (5)" = "Turkiye", "Czech Republic" = "Czechia")

# Convert the 'geo' column to a factor and recode it
combo2$geo <- fct_recode(factor(combo2$geo), !!!country_names)

combo3 <- combo2 %>%
  pivot_wider(names_from = c(coicop, date), values_from = value)

# Specified order of country names
country_order <- c
("EU", "Belgium", "Bulgaria", "Czech Republic", "Denmark", "Germany",
"Estonia", "Ireland", "Greece", "Spain", "France", "Croatia", "Italy", "Cyprus", "Latvia",
"Lithuania", "Luxembourg", "Hungary", "Malta", "Netherlands", "Austria", "Poland",
"Portugal", "Romania", "Slovenia", "Slovakia", "Finland", "Sweden", "Iceland", "Norway",
"Switzerland", "Montenegro (5)",
"North Macedonia (5)", "Albania (5)", "Serbia (5)",
"Turkiye (5)", "Kosovo (5)(6)")

# Convert the 'geo' column to a factor with the specified levels
combo3$geo <- factor(combo3$geo, levels = country_order)

# Sort the dataset by the 'geo' column
combo3 <- combo3[order(combo3$geo), ]
colnames(combo) <- c(" ",rep(c("2018-2023","2022-2023"), times=7))


# Define the header and the footnote
header <- c(1, rep(2,7))
names(header) <- c(" ", as.character(labels_graph2))

names(header)[3] <- "Newspapers
and periodicals"
names(header)[4] <- "Cultural
Services (1)"
names(header)[6] <- "Recording
Media (2)"
names(header)[7] <- "Information
processing
equipment (3)"
names(header)[8] <- "Equipment for
```

```
the reception,
recording and
reproduction
of sound
and picture (4)"

footnote_text <- paste0(c(
"(1) Includes cinemas, theatres, concerts; museums, libraries, zoological gardens;",
"television and radio fees, hire of equipment and accessories for culture; and other",
" cultural services. (2) Includes records, CDs, DVDs, tapes, cassettes, etc.",
"(3) Includes personal computers, visual display units, printers and",
"miscellaneous accessories",
"accompanying them; also computer software packages such as operating",
"systems, applications, languages, etc.",
"(4) Includes TV sets, CD players, stereo systems, radios, etc.",
"(5) Definition differs, see metadata", "href='https://ec.europa.eu/eurostat/cache/",
"metadata/en/prc_hicp_esms.htm'",
"(6) This designation is without prejudice to positions on status, and is in line with",
"UNSCR 1244/1999 andthe ICJ Opinion on the Kosovo declaration of independence.")

# Create the table
final_table <- kable(combo3, format = "html", escape = F, digits = 1,
caption = "The all-items HICP and HICPs for cultural goods and services") %>%
  group_rows(" ", 1, 1) %>%
  group_rows(" ", 2, 28) %>%
  group_rows(" ", 29, 31) %>%
  group_rows(" ", 32, 36) %>%
  group_rows(" ", 37, 37) %>%
  add_header_above(header, background = "#f0dcf1", include_empty = F) %>%
  row_spec(row = 0, background = "#f0dcf1") %>%
  row_spec(row = 1, background = "#e1bae4") %>%
  kable_styling(bootstrap_options = c("striped", "hover", "condensed"),
                full_width = F, font_size = 12, fixed_thead = TRUE) %>%
  footnote(general = footnote_text, escape = F)

# Output the table
final_table
write_xlsx(combo3, path = "Table_HICP.xlsx")
```