

MorningStar ESG Funds analysis

Alpha-Environment Security

August 2, 2016

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Golbal Configuration

```

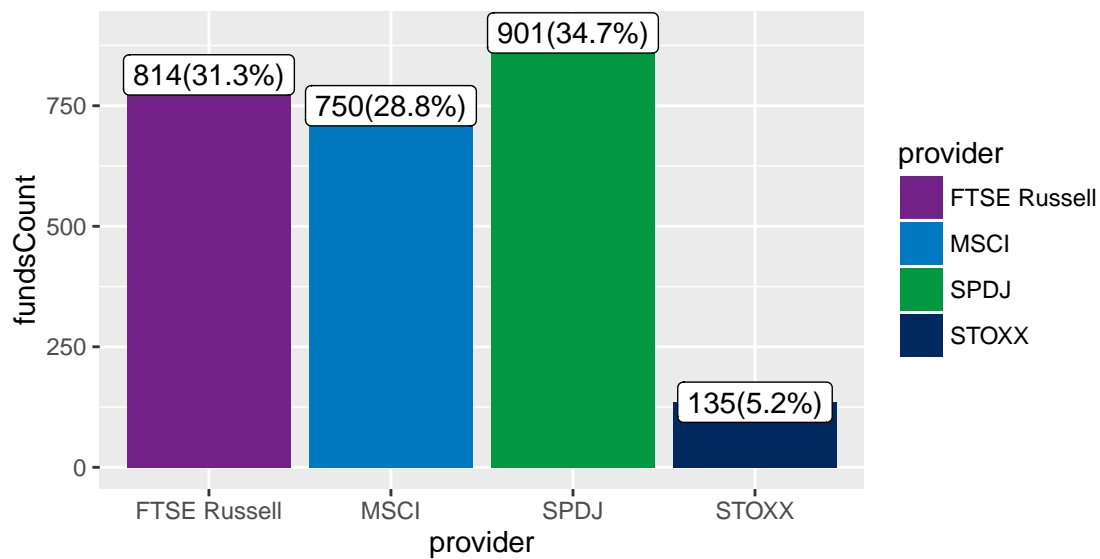
filePath <- "~/Desktop/morningstar.csv"
sysKeyword <- "(Summary|Percentile|Sum|Average|Count|Maximum|Minimum|Median|Deviation)"
msciKeyword <- "MSCI"
ftseKeyword <- "(FTSE|Russell)"
stoxxKeyword <- "STOXX"
spdjKeyword <- "(S&P|Dow|DJ)"
esgKeywords <- "(Sustain|ESG|esg|SRI|sri|Social|Governance|Catholic|Ethical)"
envKeywords <- "(Water|Carbon|Climate|Enviro|Green|Energy|Renew|Tech|Fossil|Alternative|Clean|Fuel|Pollu"
blackrockKeyword <- "(iShare|BlackRock|BLK|Blackrock)"
sumF <- function(vec) {sum(as.numeric(gsub(",", "", as.character(vec))), na.rm=TRUE)}
toP <- function(c,d) {paste(as.character(c), "(", as.character(round(d*100,digits=1)), "%)", sep="")}
"^" <- function(x,y) ifelse(y==0,0,base::"/"(x,y))
provider <- c("MSCI", "FTSE Russell", "STOXX", "SPDJ")
esgIndexTotal <- c(82,5,35,67)
envIndexTotal <- c(7,34,5,11)
myPalette <- c("#722287", "#0079C1", "#009941", "#002960")
fillTheme <- scale_fill_manual(values=myPalette)
colorTheme <- scale_color_manual(values=myPalette)

```

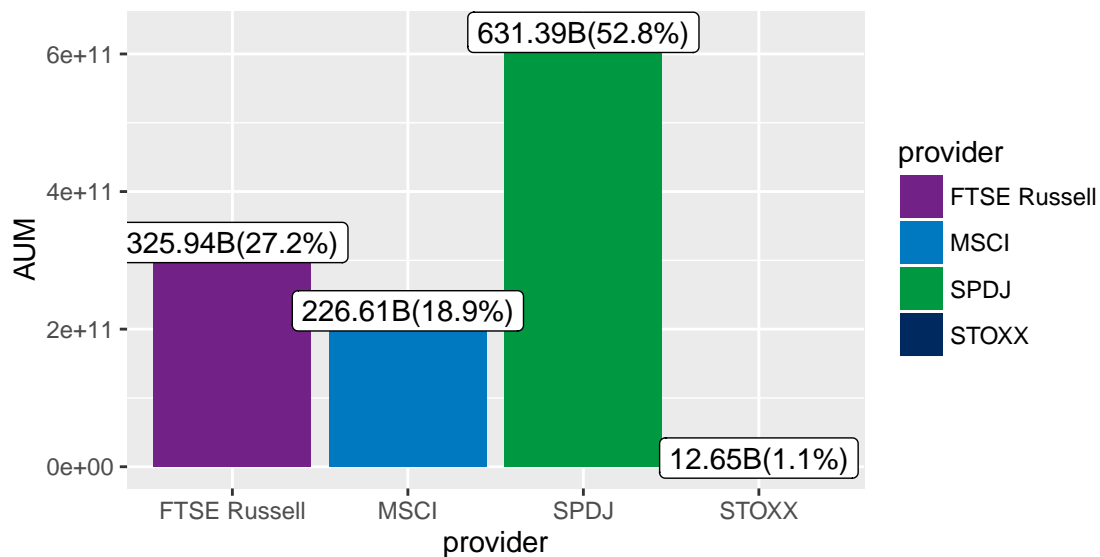
Analysis of funds tracking each provider

provider	fundsCount	fundsPercent	AUM
MSCI	750	0.2884615	226613780269
FTSE Russell	814	0.3130769	325942388219
STOXX	135	0.0519231	12645888332
SPDJ	901	0.3465385	631386740470

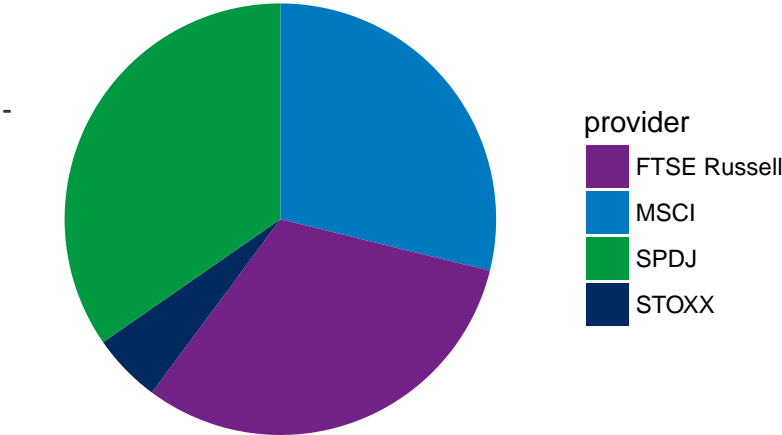
Count bar chart



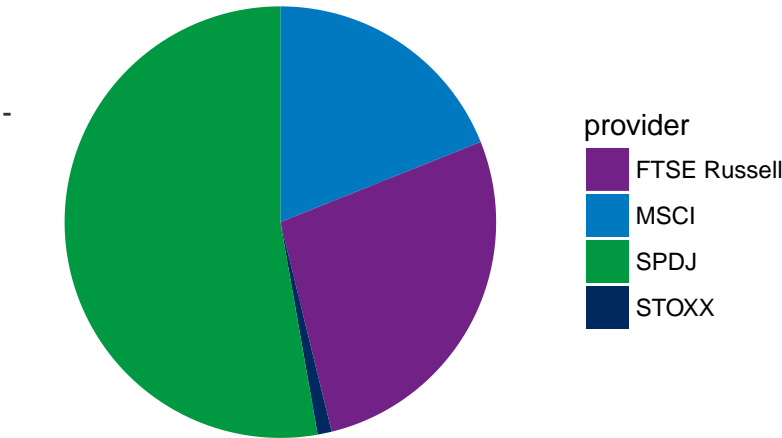
AUM bar chart



Count pie chart



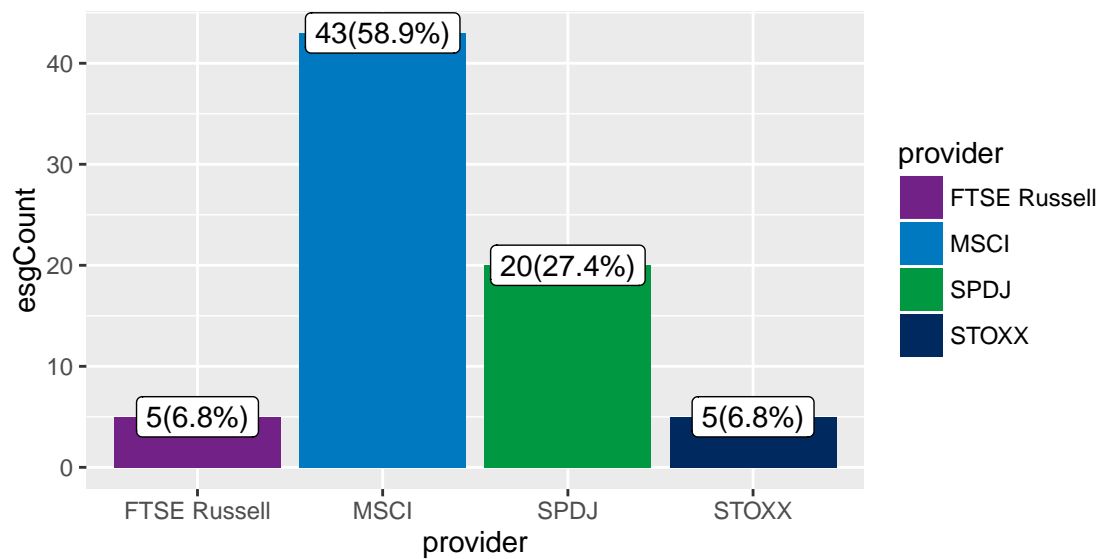
AUM pie chart



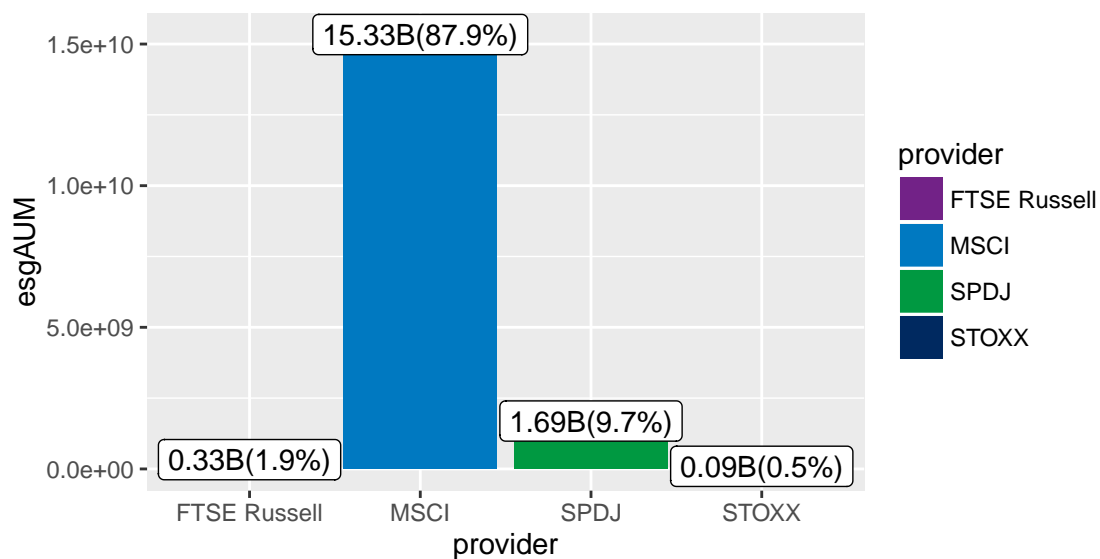
Analysis of funds tracking ESG indexes of each provider

provider	esgCount	esgPercent	esgAUM
MSCI	43	0.5890411	15334725344
FTSE Russell	5	0.0684932	328102278
STOXX	5	0.0684932	92539260
SPDJ	20	0.2739726	1691202927

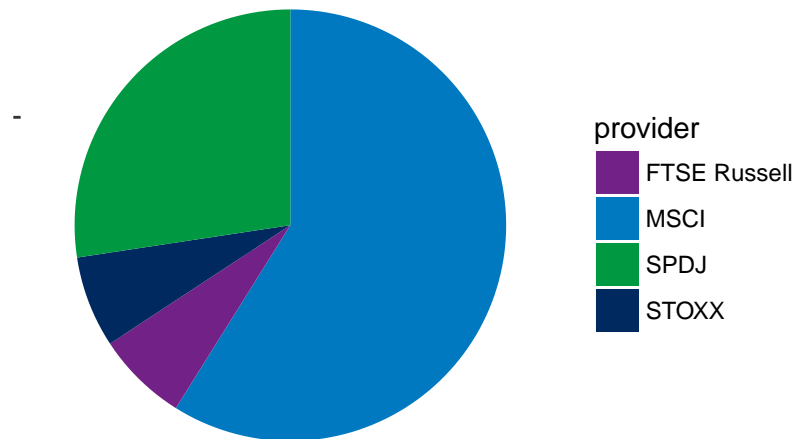
Count bar chart



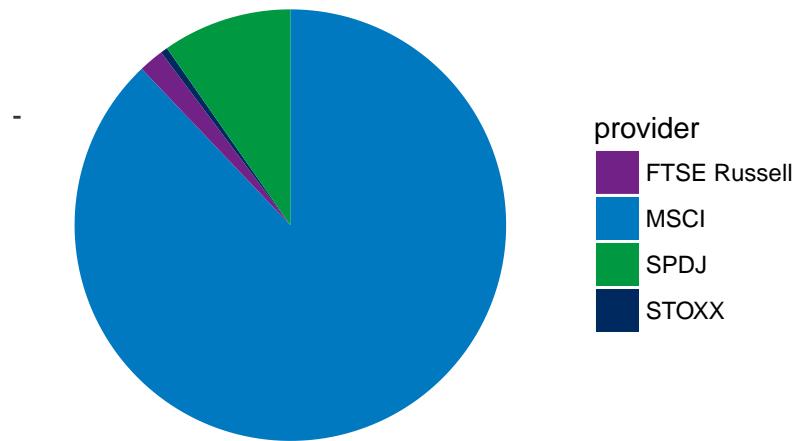
AUM bar comparison



Count pie chart



AUM pie chart



Percentage of funds tracking ESG indexes for each provider

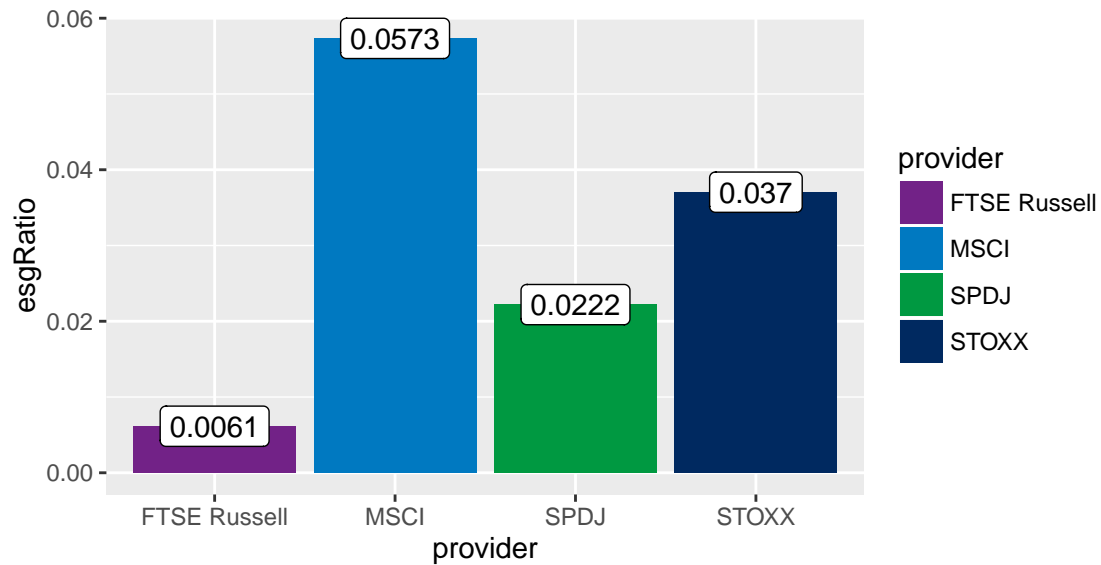
total tracking ESG count: 73

total funds count: 2600

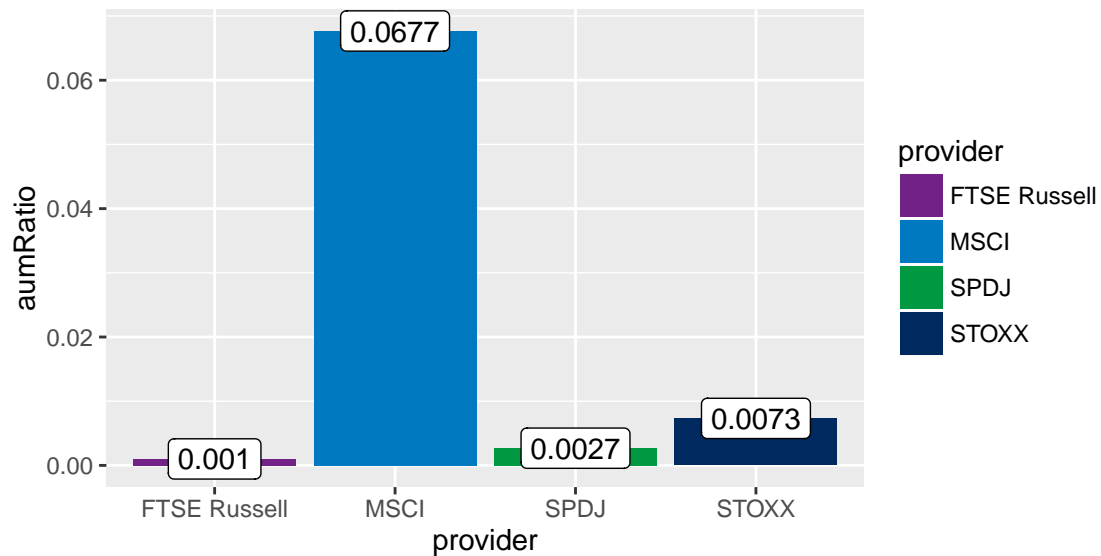
percentage count of total: 0.0280769

percentage AUM of total: 0.0145803

Count ratio for each provider



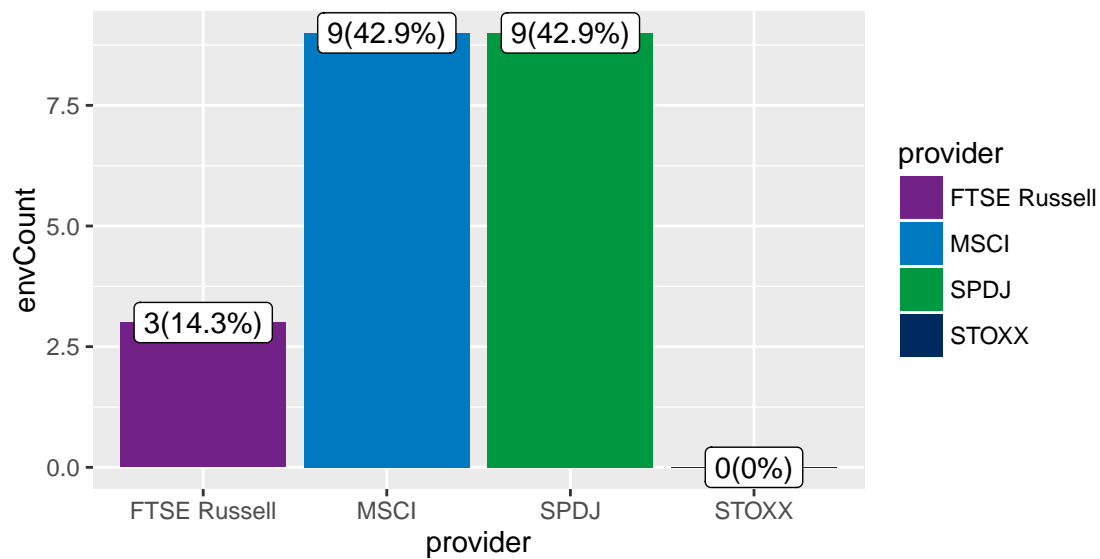
AUM ratio for each provider



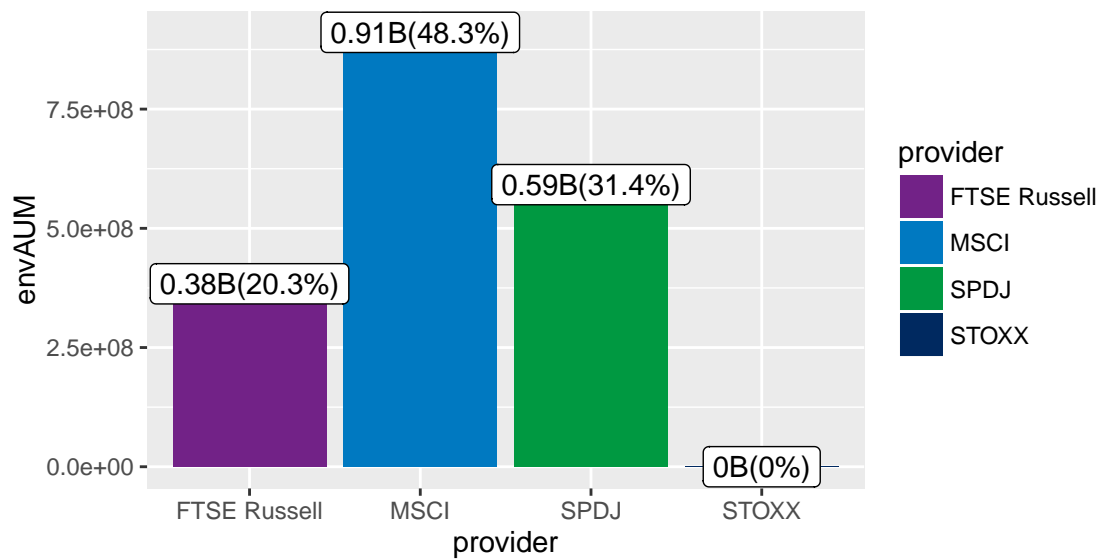
Analysis of funds tracking Environment indexes of each provider

provider	envCount	envPercent	envAUM
MSCI	9	0.4285714	910962321
FTSE Russell	3	0.1428571	383672454
STOXX	0	0.0000000	0
SPDJ	9	0.4285714	591649224

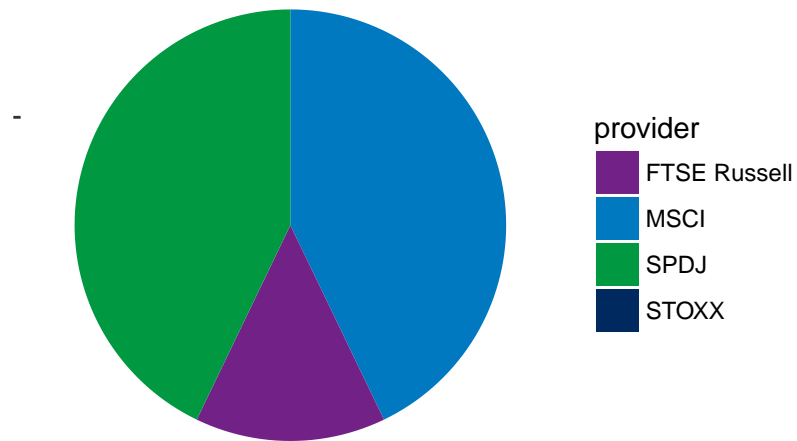
Count bar chart



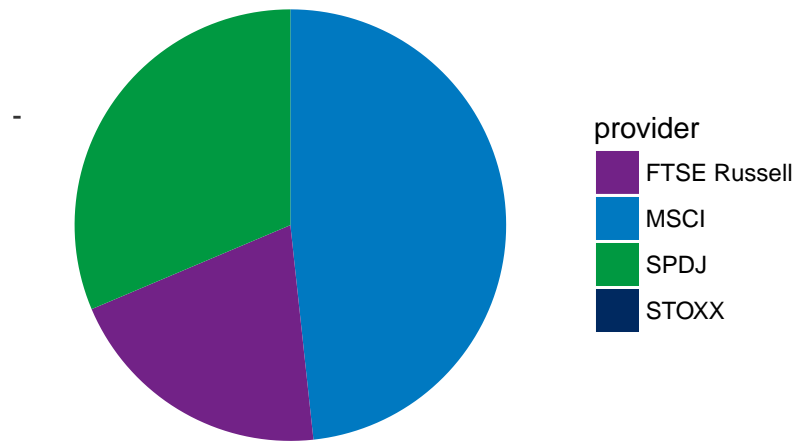
AUM bar chart



Count pie chart



AUM pie chart



Percentage of Environment funds tracking Environment indexes for each provider

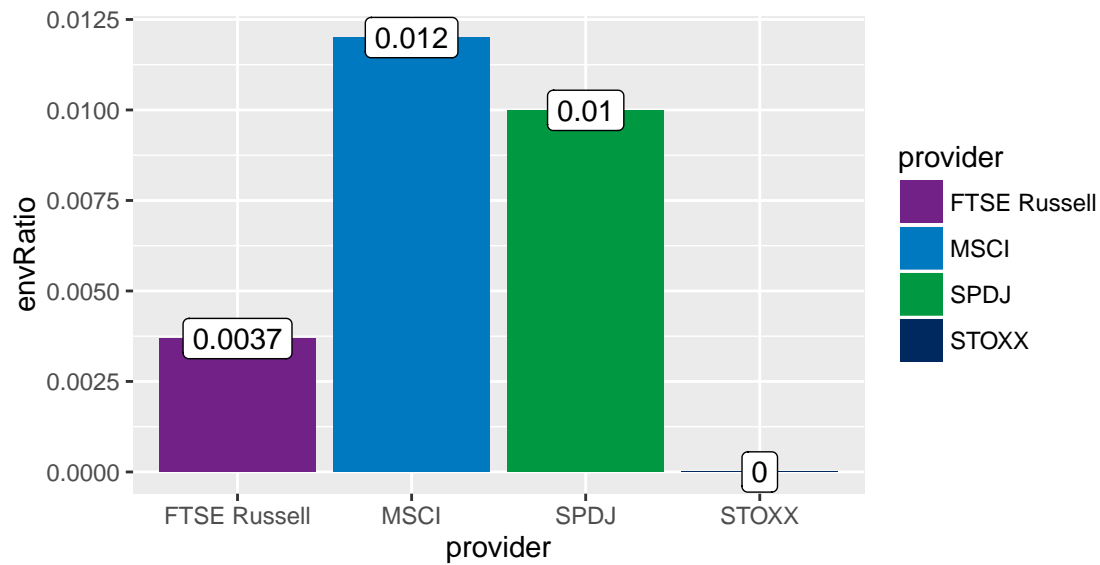
total tracking Environment count: 21

total funds count: 2600

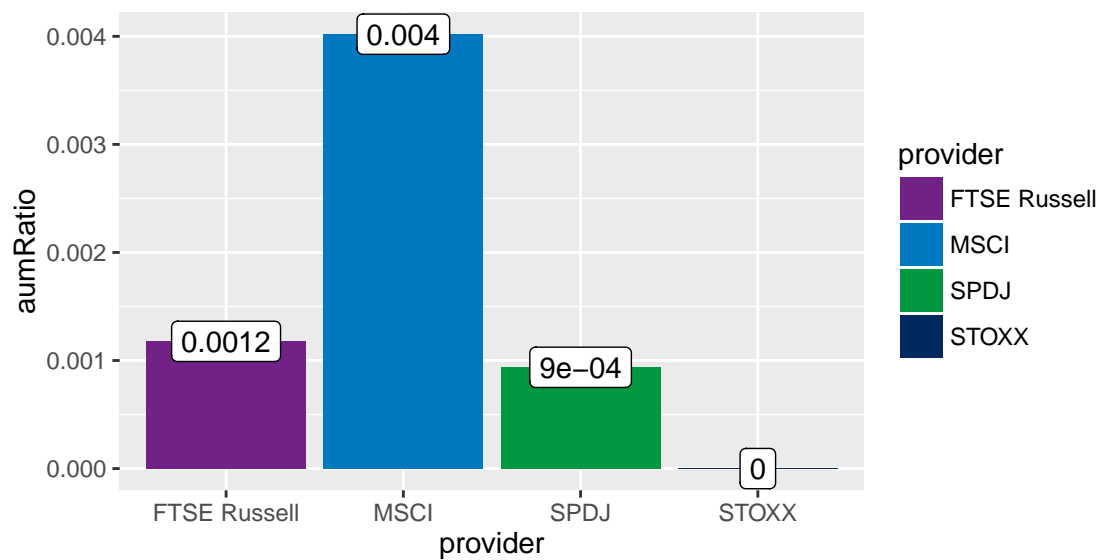
percentage count of total: 0.0080769

percentage AUM of total: 0.0015764

Count ratio for each provider

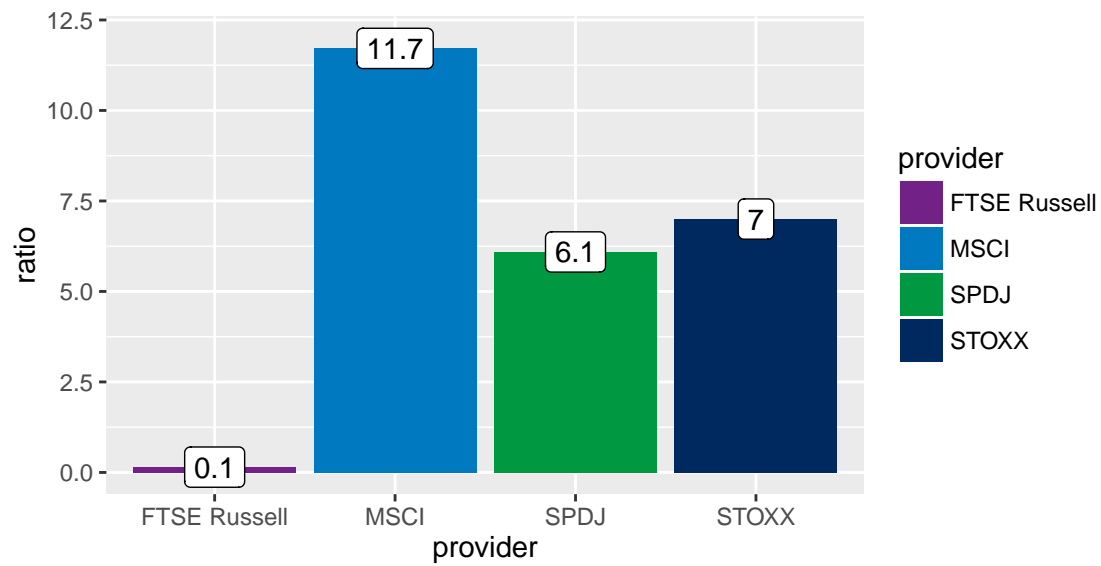


AUM ratio for each provider

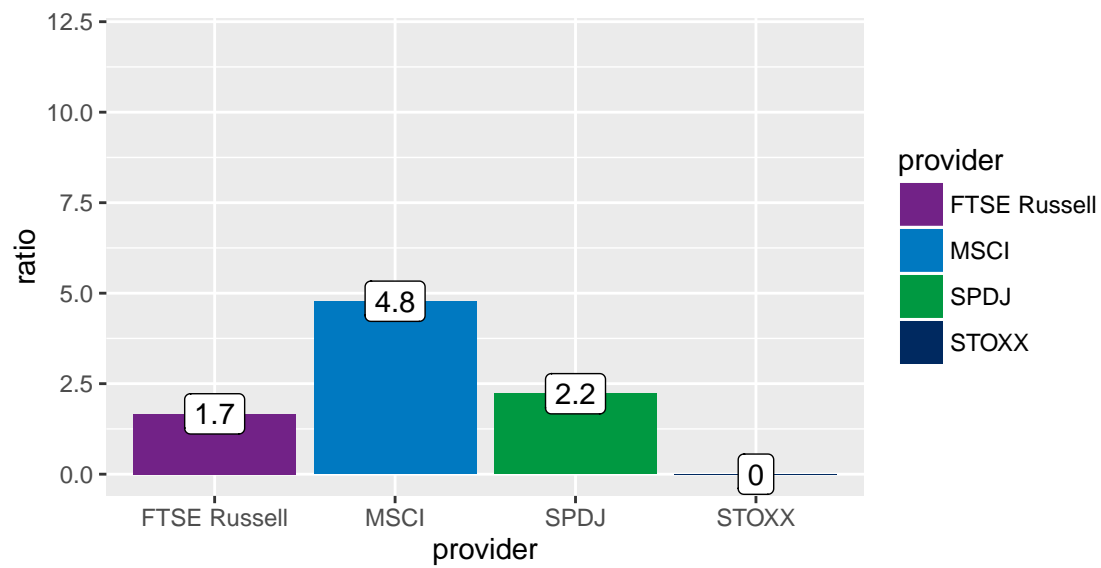


ESG & Environment cross comparison

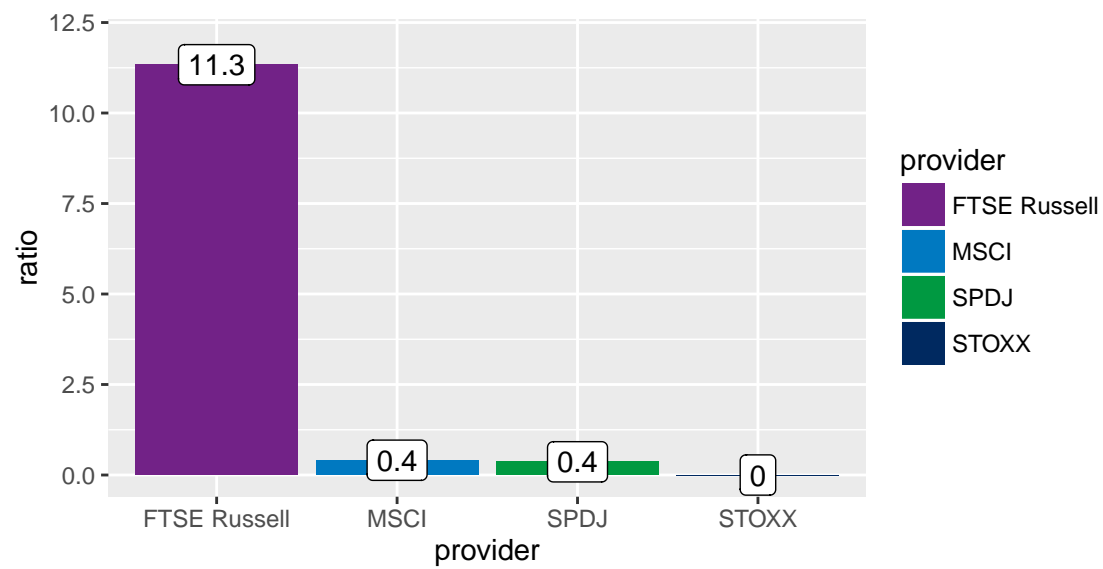
ESG/Environment (# of Indexes) Ratio



ESG/Environment (# of Indexes In Use) Ratio



ESG/Environment (% of Indexes In Use) Ratio



Function 1: get timeseries given any universe and keyword

```
getYearCountForUniverse <- function(universe, keyword="", yearLimit=1930) {
  dateU <- universe %>%
    filter(grepl(keyword, Name)) %>%
    filter(grepl("/", as.character(Inception.Date))) %>%
    mutate(date=as.character(Inception.Date))
  yearVec <- dateU$date
  for (i in 1:length(yearVec)) {
    d <- yearVec[i]
    st <- substring(d, nchar(d)-1, nchar(d))
    if (as.numeric(st) < 17) {
      yearVec[i] <- as.numeric(paste("20", st, sep=""))
    } else {
      yearVec[i] <- as.numeric(paste("19", st, sep=""))
    }
  }
  yearVec <- as.numeric(yearVec)
  yearDF <- data.frame(year=yearVec) %>%
    group_by(year) %>%
    filter(year >= yearLimit) %>%
    summarize(count=n())
  return(yearDF)
}

plotTimeSeriesForUniverse <- function(universe, keyword="", yearLimit=1930) {
  getYearCountForUniverse(universe, keyword, yearLimit) %>%
    ggplot(aes(x=year, y=count)) +
    geom_line() +
    scale_x_continuous(breaks=seq(yearLimit, 2016, 5)) +
    colorTheme
}

plotTimeSeriesForAllScope <- function(universe, esgU, envU, keyword="", yearLimit=1930) {
  yearDF <- getYearCountForUniverse(universe, keyword, yearLimit)
  esgDF <- getYearCountForUniverse(esgU, keyword, yearLimit)
  envDF <- getYearCountForUniverse(envU, keyword, yearLimit)
  colnames(esgDF) <- c('year', 'esg')
  colnames(envDF) <- c('year', 'env')
  fullYears <- yearDF %>%
    full_join(esgDF, by="year") %>%
    full_join(envDF, by="year")
  fullYears[is.na(fullYears)] <- 0
  fullYearsNarrow <- gather(fullYears, year)
  colnames(fullYearsNarrow) <- c("year", "type", "count")
  fullYearsNarrow %>%
    filter(year >= yearLimit) %>%
    ggplot(aes(x=year, y=count, group=type, col=type)) +
    geom_line() +
    colorTheme
}
```

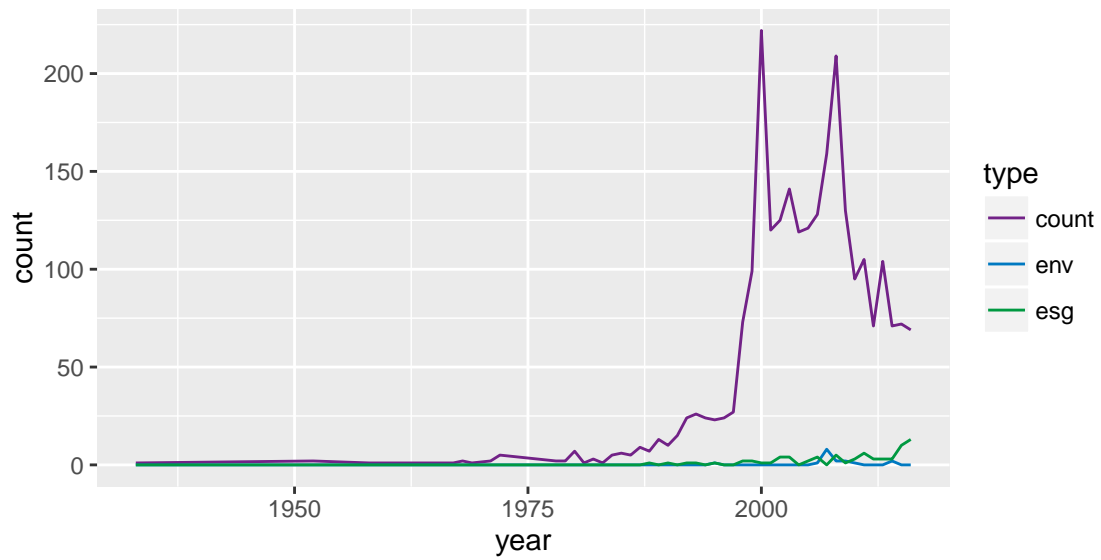
```

plotTimeSeriesForEsgEnv <- function(esgU, envU, keyword="", yearLimit=1930) {
  esgDF <- getYearCountForUniverse(esgU, keyword, yearLimit)
  envDF <- getYearCountForUniverse(envU, keyword, yearLimit)
  colnames(esgDF) <- c('year', 'esg')
  colnames(envDF) <- c('year', 'env')
  fullYears <- esgDF %>%
    full_join(envDF, by="year")
  fullYears[is.na(fullYears)] <- 0
  fullYearsNarrow <- gather(fullYears, year)
  colnames(fullYearsNarrow) <- c("year", "type", "count")
  fullYearsNarrow %>%
    filter(year >= yearLimit) %>%
    ggplot(aes(x=year, y=count, group=type, col=type)) +
    geom_line() +
    colorTheme
}

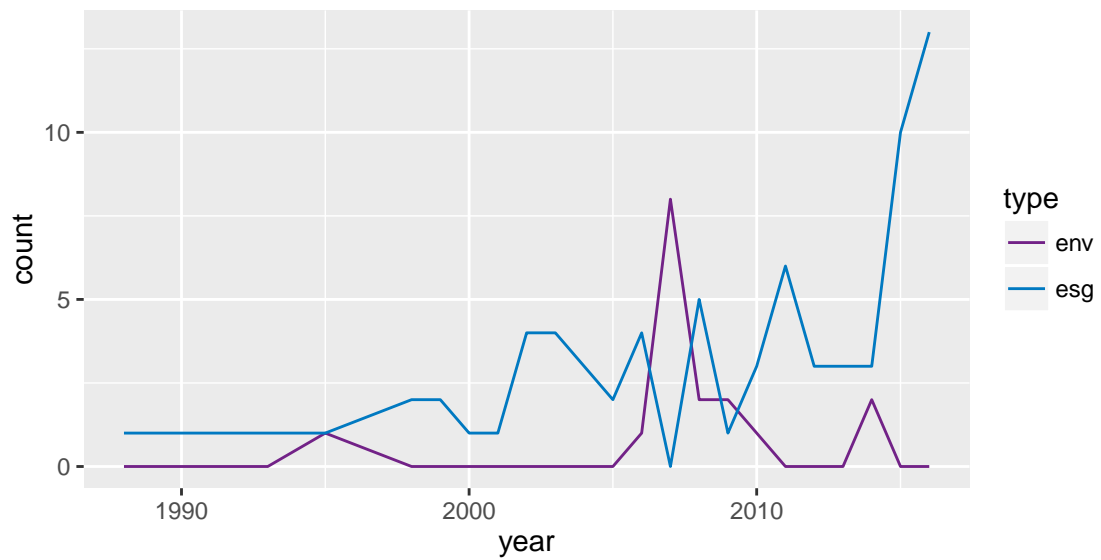
plotTimeSeriesForProviders <- function(MSCI, FTSE, SPDJ, STOXX, keyword="", yearLimit=1930) {
  msciDF <- getYearCountForUniverse(MSCI, keyword, yearLimit)
  ftseDF <- getYearCountForUniverse(FTSE, keyword, yearLimit)
  spdjDF <- getYearCountForUniverse(SPDJ, keyword, yearLimit)
  stoxxDF <- getYearCountForUniverse(STOXX, keyword, yearLimit)
  colnames(msciDF) <- c('year', 'MSCI')
  colnames(ftseDF) <- c('year', 'FTSE')
  colnames(spdjDF) <- c('year', 'SPDJ')
  colnames(stoxxDF) <- c('year', 'STOXX')
  fullYears <- msciDF %>%
    full_join(ftseDF, by="year") %>%
    full_join(spdjDF, by="year") %>%
    full_join(stoxxDF, by="year")
  fullYears[is.na(fullYears)] <- 0
  fullYearsNarrow <- gather(fullYears, year)
  colnames(fullYearsNarrow) <- c("year", "type", "count")
  fullYearsNarrow %>%
    filter(year >= yearLimit) %>%
    ggplot(aes(x=year, y=count, group=type, col=type)) +
    geom_line() +
    colorTheme
}

```

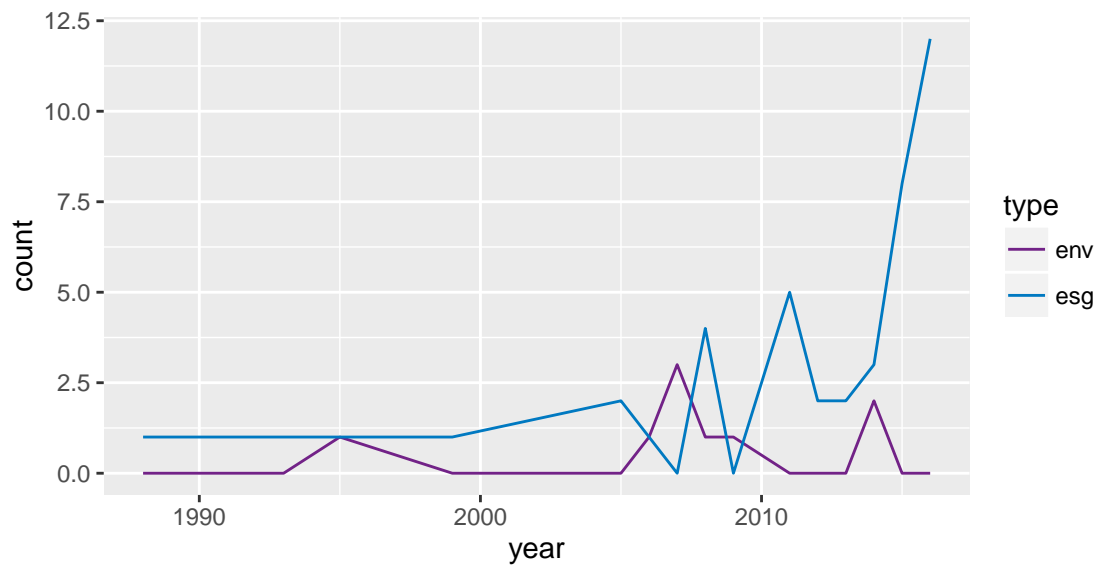
example: universe time series



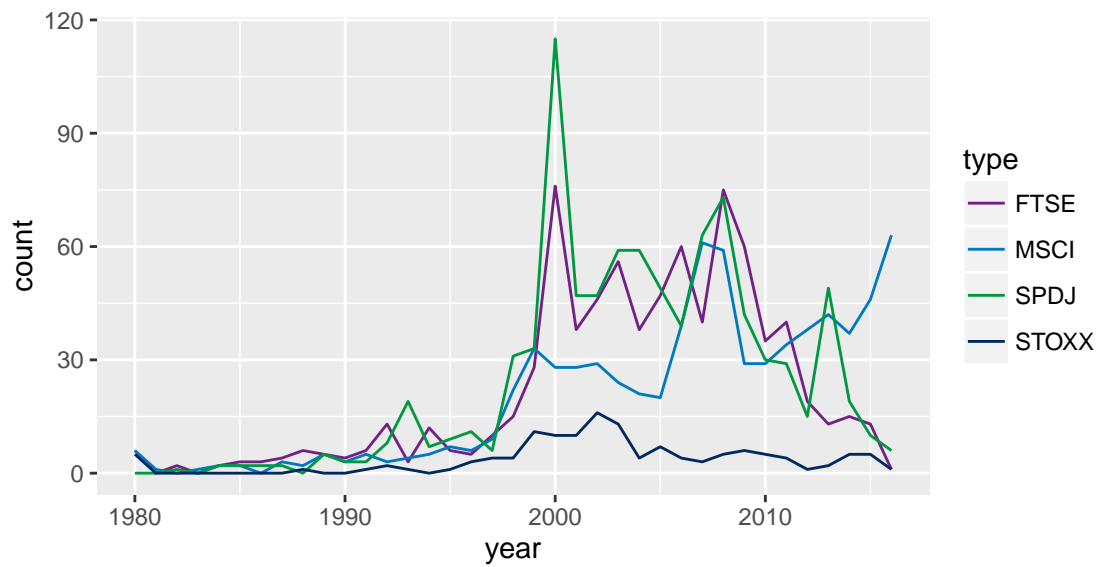
example: ESG vs ENV time series



example: MSCI ESG vs ENV time series



example: all provider time series



Function 2: check any keyword's distribution of index provider

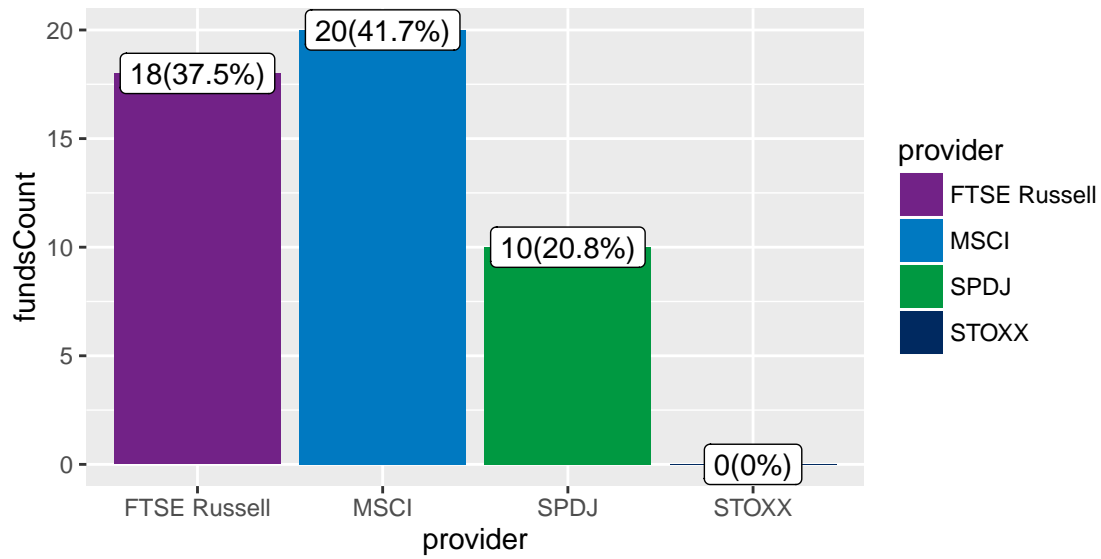
```
institutionChoice <- function(keyword, universe) {
  companyUniverse <- universe %>% filter(grepl(keyword, Name))
  MSCI <- companyUniverse %>% filter(grepl(msciKeyword,Primary.Prospectus.Benchmark))
  FTSE <- companyUniverse %>% filter(grepl(ftseKeyword,Primary.Prospectus.Benchmark))
  STOXX <- companyUniverse %>% filter(grepl(stoxxKeyword,Primary.Prospectus.Benchmark))
  SPDJ <- companyUniverse %>% filter(grepl(spdjKeyword,Primary.Prospectus.Benchmark))
  fundsCount <- c(length(MSCI$Name),length(FTSE$Name),length(STOXX$Name),length(SPDJ$Name))
  fundsPercent <- fundsCount/sum(fundsCount)
  countTable <- data.frame(provider=provider, fundsCount=fundsCount, fundsPercent=fundsPercent)
  return(countTable)
}

plotInstitutionChoice <- function(keyword, universe) {
  companyUniverse <- universe %>% filter(grepl(keyword, Name))
  MSCI <- companyUniverse %>% filter(grepl(msciKeyword,Primary.Prospectus.Benchmark))
  FTSE <- companyUniverse %>% filter(grepl(ftseKeyword,Primary.Prospectus.Benchmark))
  STOXX <- companyUniverse %>% filter(grepl(stoxxKeyword,Primary.Prospectus.Benchmark))
  SPDJ <- companyUniverse %>% filter(grepl(spdjKeyword,Primary.Prospectus.Benchmark))
  fundsCount <- c(length(MSCI$Name),length(FTSE$Name),length(STOXX$Name),length(SPDJ$Name))
  fundsPercent <- fundsCount/sum(fundsCount)
  data.frame(provider=provider, fundsCount=fundsCount, fundsPercent=fundsPercent) %>%
    ggplot(aes(x=provider, y=fundsCount, fill=provider)) +
    geom_bar(stat="identity") +
    geom_label(fill='white',aes(label=toP(fundsCount, fundsPercent))) +
    fillTheme
}

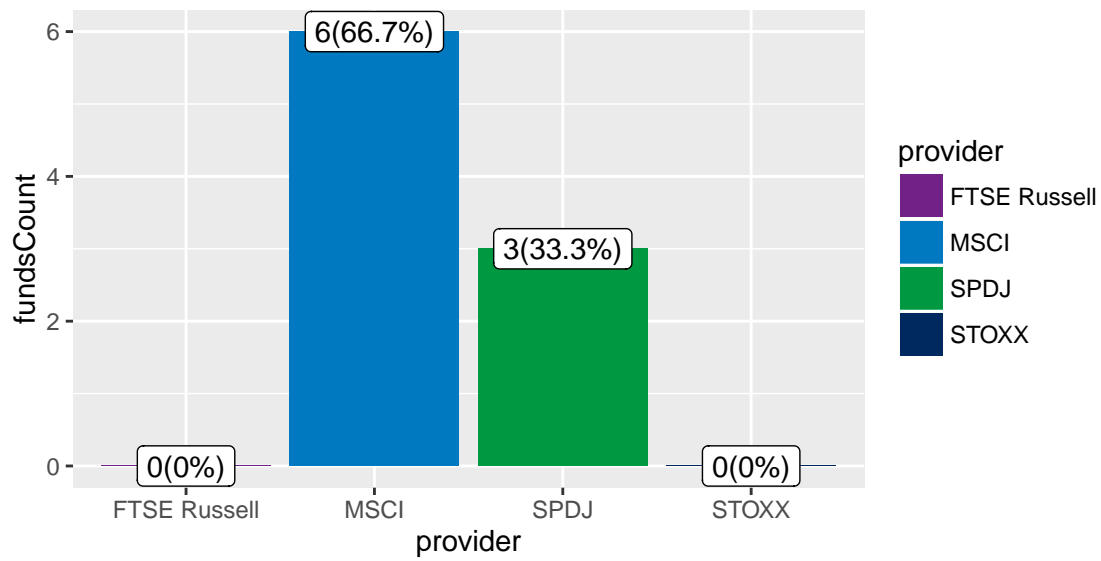
getInstitutionChoice <- function(keyword, universe) {
  companyUniverse <- universe %>% filter(grepl(keyword, Name))
  MSCI <- companyUniverse %>% filter(grepl(msciKeyword,Primary.Prospectus.Benchmark))
  FTSE <- companyUniverse %>% filter(grepl(ftseKeyword,Primary.Prospectus.Benchmark))
  STOXX <- companyUniverse %>% filter(grepl(stoxxKeyword,Primary.Prospectus.Benchmark))
  SPDJ <- companyUniverse %>% filter(grepl(spdjKeyword,Primary.Prospectus.Benchmark))
  return(list(MSCI=MSCI, FTSE=FTSE, STOXX=STOXX, SPDJ=SPDJ))
}
```

example: BlackRock

provider	fundsCount	fundsPercent
MSCI	20	0.4166667
FTSE Russell	18	0.3750000
STOXX	0	0.0000000
SPDJ	10	0.2083333

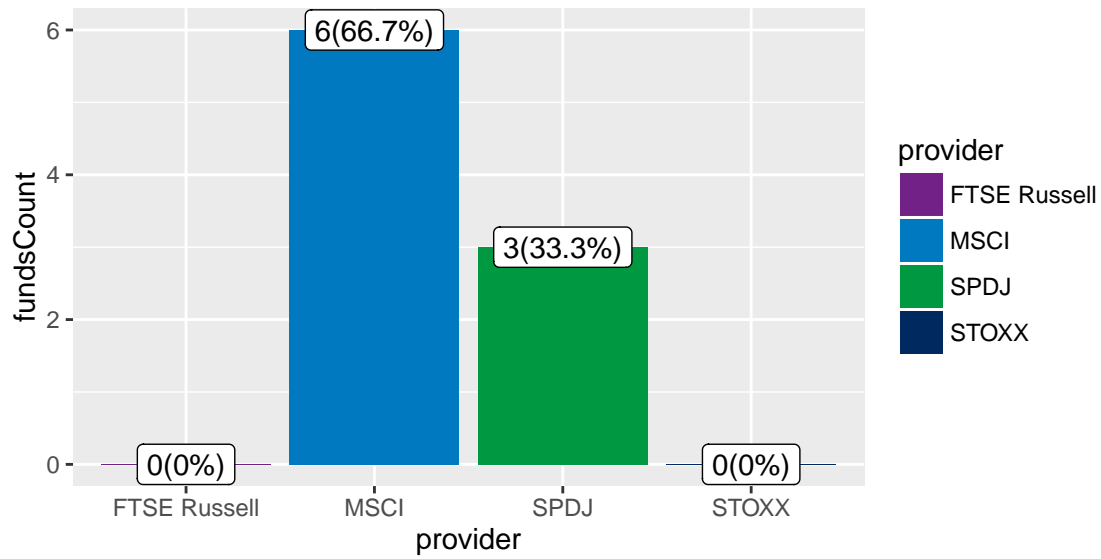


exsample: BlackRock ESG



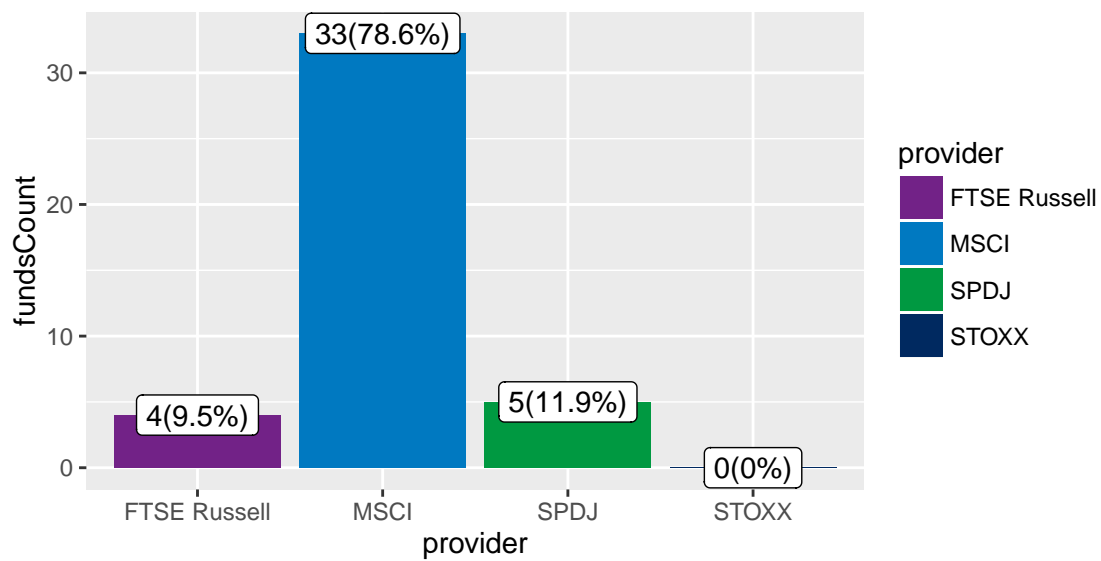
exsample: BlackRock ESG

provider	fundsCount	fundsPercent
MSCI	6	0.6666667
FTSE Russell	0	0.0000000
STOXX	0	0.0000000
SPDJ	3	0.3333333



example: ETF

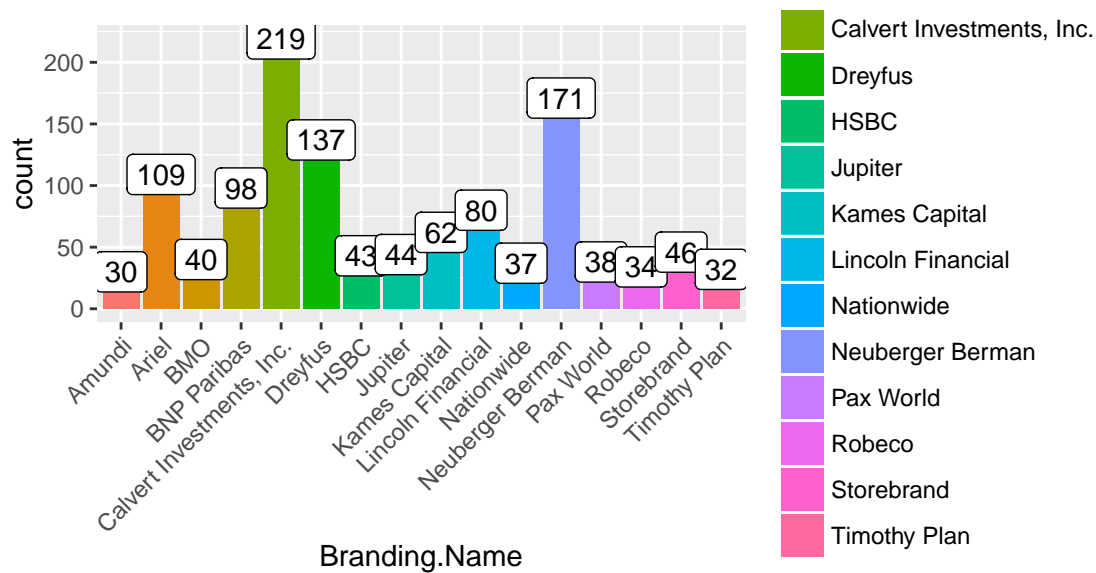
provider	fundsCount	fundsPercent
MSCI	33	0.7857143
FTSE Russell	4	0.0952381
STOXX	0	0.0000000
SPDJ	5	0.1190476



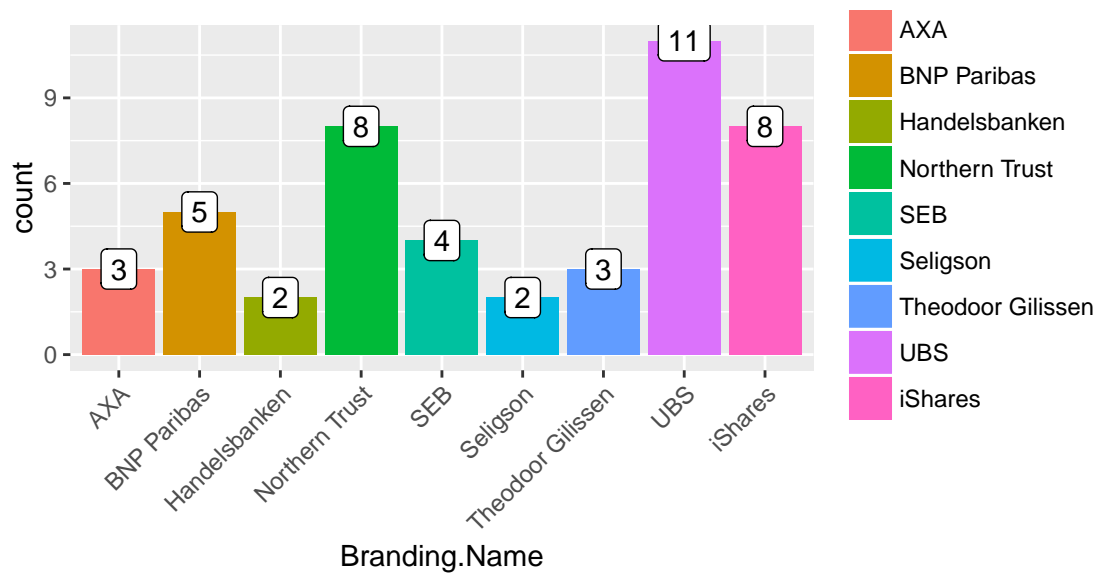
Function 3: check any company's index choice provider popularity

```
plotUniverseByBrandName <- function(universe, floor=5) {
  universe %>%
    group_by(Branding.Name) %>%
    summarize(count=n()) %>%
    filter(count >= floor) %>%
    ggplot(aes(x=Branding.Name, y=count, fill=Branding.Name)) +
    geom_bar(stat="identity") +
    geom_label(fill='white', aes(label=count)) +
    theme(axis.text.x = element_text(angle = 45, hjust = 1))
}
```

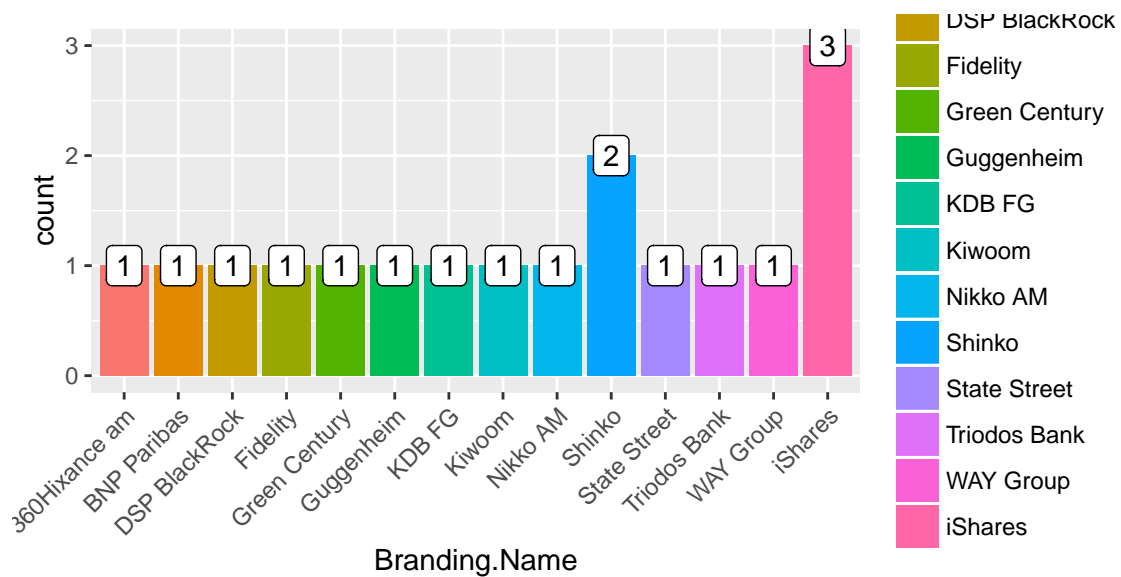
example: universe plot



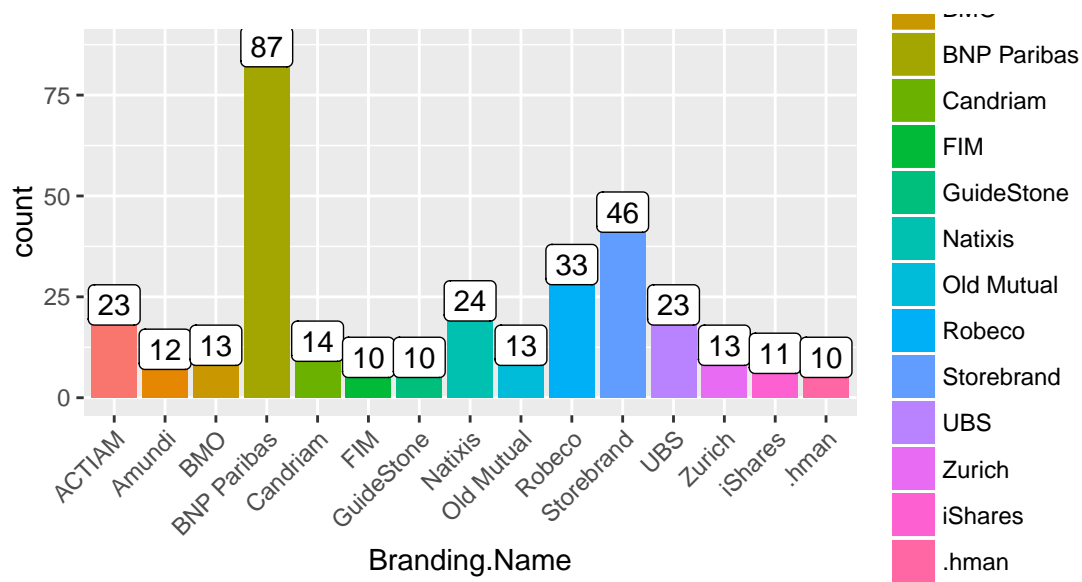
example: universe ESG plot



example: universe ENV plot



example: MSCI plot



example: MSCI ESG plot

