Proyecto Riesgo

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```
tickers <- c("TLT","EEM","SPY")

e <- new.env()

getSymbols(tickers, env=e, from="1970-01-01")
```

```
## [1] "TLT" "EEM" "SPY"
```

```
e <- eapply(e,to.monthly)

port <- do.call(merge,lapply(e,Ad))

colnames(port) <- names(e)

port <- ROC(port,type = "discrete")

port[is.na(port)] <- 0

port <- reclass(coredata(port) %*% c(rep(1/ncol(port), ncol(port))), match.to = port)

colnames(port) <- "port"

m.idx <- index(port)

rm(e,tickers)

getPortRisk <- function(port){

  dat <- new.env()

  ii <- 1
  #Market Risk
  bm <- "^GSPC"

  RISK <- ROC(Ad(to.monthly(getSymbols(bm, from="1970-01-01", auto.assign = F),name = bm)),type="discre

  RISK <- RISK[m.idx]

  tmp <- merge(port,RISK)

  tmp[is.na(tmp)] <- 0

  LM <- lm(tmp[,1]~tmp[,2])
```

```
ALPHA <- round(as.numeric(coef(LM)[1]*12),4)

BETA <- round(as.numeric(coef(LM)[2]),4)

COR <- round(as.numeric(cor(tmp[,1],tmp[,2])),4)

PVAL <- cbind(round(cbind(as.numeric(summary(LM)$coefficients[,4][1]),as.numeric(summary(LM)$coefficie

assign(paste0("RISK",ii), as.data.frame(cbind(BETA,COR,ALPHA,PVAL,bm,"Market Risk")), envir = dat)

ii <- ii + 1

rm(RISK,ALPHA,BETA,COR,LM,tmp)

#Federal Funds RAte : Interest Rate Risk

bm = "FEDFUNDS"

RISK <- ROC(getSymbols.FRED(bm,env=.GlobalEnv, auto.assign=F),type = "discrete")
RISK <- RISK[m.idx]

tmp <- merge(port,RISK)

tmp[is.na(tmp)] <- 0

LM <- lm(tmp[,1]~tmp[,2])

ALPHA <- round(as.numeric(coef(LM)[1]*12),4)

BETA <- round(as.numeric(coef(LM)[2]),4)

COR <- round(as.numeric(cor(tmp[,1],tmp[,2])),4)

PVAL <- cbind(round(cbind(as.numeric(summary(LM)$coefficients[,4][1]),as.numeric(summary(LM)$coefficie

assign(paste0("RISK",ii), as.data.frame(cbind(BETA,COR,ALPHA,PVAL,bm,"Fed Funds Rate")), envir = dat)

ii <- ii + 1

rm(RISK,ALPHA,BETA,COR,LM,tmp)

#Sector Risk: Technology

bm <- "XLK"
RISK <- ROC(Ad(to.monthly(getSymbols(bm,from="1970-01-01", auto.assign = F), name=bm)),type="discrete

RISK <- RISK[m.idx]

tmp <- merge(port,RISK)

tmp[is.na(tmp)] <- 0

LM <- lm(tmp[,1]~tmp[,2])
```

```
  ALPHA <- round(as.numeric(coef(LM)[1]*12),4)

  BETA <- round(as.numeric(coef(LM)[2]),4)

  COR <- round(as.numeric(cor(tmp[,1],tmp[,2])),4)

  PVAL <- cbind(round(cbind(as.numeric(summary(LM)$coefficients[,4][1]),as.numeric(summary(LM)$coefficie

  assign(paste0("RISK",ii), as.data.frame(cbind(BETA,COR,ALPHA,PVAL,bm,"Technology Sector")), envir = da

  ii <- ii + 1

  rm(RISK,ALPHA,BETA,COR,LM,tmp)

  ALL <- do.call(rbind,mget(names(dat), envir=dat))

  colnames(ALL)[4:7] <- c("pval.ALPHA","pval.BETA","BM","RISK TYPE")

  ALL
}

ALL <- getPortRisk(port)

ALL <- ALL[order(ALL$ALPHA, decreasing = T),]

ALL %>% kbl(caption="Modelo CAPM para cada tipo de riesgo",
      format="latex",
      col.names = c("Beta","Correlación","Alfa", "p-value Alfa", "p-value Beta","Benchamark","Tipo de Ri
  footnote(general = "Elaboración propia con datos extraídos de Yahoo Finance") %>% kable_styling(latex_
```

Table 1: Modelo CAPM para cada tipo de riesgo

	Beta	Correlación	Alfa	p-value Alfa	p-value Beta	Benchamark	Tipo de Riesgo
RISK2	-0.0107	-0.0694	0.0715	0	0.19	FEDFUNDS	Fed Funds Rate
RISK3	0.2978	0.6357	0.0461	0	0	XLK	Technology Sector
RISK1	0.5196	0.7991	0.0249	0.02	0	^GSPC	Market Risk

Note:
Elaboración propia con datos extraídos de Yahoo Finance

```
#plot_ly(x=~ALL$BETA, y=~ALL$COR, z=~ALL$ALPHA, type="scatter3d", mode="markers", color = ALL$`RISK TYP

#Expected return : Expected return market; Risk free rate; Beta
ExpRet <- function(ERm, Rf, Beta){

  #CAPM
  ERp <- Rf + Beta*(ERm - Rf)
  round(ERp,4)
}

#Stress test
```

```
ERm <- -0.25

ALL$DN <- ExpRet(ERm=ERm, Rf = 0.0075, Beta=as.numeric(ALL$BETA))

View(ALL)


#What would make my portfolio lose 50%

EL <- function(ERp, Rf, Beta){

  ERm = ((Beta-1)*Rf + ERp)/ Beta
  round(ERm, 4)
}


ERp = -0.5

ALL$DN <- EL(ERp=ERp, Rf=0.0075, Beta = as.numeric(ALL$BETA))

View(ALL)
```