

01.c Tarea de repaso de Estadística descriptiva

Equipo 3

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Descarga de datos

Por favor, genera un documento en Quarto y descargua los históricos de los últimos 3 años de Yahoo Finance:

1. Acciones mexicanas: ALFAA.MX, BIMBOA.MX, GFNORTEO.MX, GRUMAB.MX, LACOMERUBC.MX y VOLARA.MX.
 2. Acciones de EEUU: AAPL, GOOGL, META, GRMN, ARKF y ARKX.
 3. Índices bursátiles: IPC(MXX), Dow Jones(DJI) y S&P500(GSPC).
 4. Futuros: Pétroleo(WIT), Maíz(ZC=F), Azúcar(SF=F) y Oro(GC=F).

Estadística descriptiva

De estos, con el rendimiento continuo y el P/L haga una tabla de resumen (para cada uno) que tenga:

1. Media
 2. Mediana
 3. Desviación Estandar

4. Quantil 5%
5. Quantil 95%
6. Maximo
7. Mínimo
8. Conteo

```
tablaResumenPL=data.frame(Accion=names(Datos$tablaPL)[-1],
                           Media = colMeans(Datos$tablaPL[,-1]),
                           Mediana = apply(Datos$tablaPL[,-1],2,median),
                           DesviacionEstandar=apply(Datos$tablaPL[,-1],2,sd),
                           q5=apply(Datos$tablaPL[,-1],2, quantile, probs =0.05),
                           q95=apply(Datos$tablaPL[,-1],2, quantile, probs=0.95),
                           max=apply(Datos$tablaPL[,-1],2,max),
                           min=apply(Datos$tablaPL[,-1],2,min),
                           Conteo=apply(Datos$tablaPL[,-1],2,length)
                           )

tablaResumenPL
```

	Accion	Media	Mediana	DesviacionEstandar	q5
ALFAA.MX	ALFAA.MX	1.0003903	1.0000000	0.022002690	0.9693341
BIMBOA.MX	BIMBOA.MX	0.9999898	0.9993030	0.018443849	0.9718172
GFNORTEO.MX	GFNORTEO.MX	1.0009004	1.0009611	0.019263244	0.9723992
GRUMAB.MX	GRUMAB.MX	1.0005814	0.9999378	0.016184030	0.9757095
LACOMERUBC.MX	LACOMERUBC.MX	1.0005137	0.9997429	0.018173140	0.9726380
VOLARA.MX	VOLARA.MX	0.9996494	0.9994121	0.029264139	0.9526370
AAPL	AAPL	1.0007631	1.0007151	0.018299698	0.9718383
GOOGL	GOOGL	1.0013314	1.0015733	0.020621926	0.9677640
META	META	1.0024617	1.0013282	0.027430851	0.9660328
GRMN	GRMN	1.0014743	1.0006718	0.019707189	0.9767089
ARKF	ARKF	1.0018172	1.0015656	0.023598179	0.9639834
ARKX	ARKX	1.0009813	1.0007269	0.016569166	0.9750808
MXX	MXX	1.0004154	1.0003421	0.009701279	0.9858688
DJI	DJI	1.0004739	1.0001799	0.010797907	0.9841524
GSPC	GSPC	1.0006793	1.0000205	0.011786452	0.9827629
WTI	WTI	0.9986912	0.9987199	0.035813504	0.9445657
ZCF	ZCF	0.9938273	0.9987167	0.075983795	0.9744683
GCF	GCF	0.9969826	1.0006383	0.065252526	0.9815922
SBF	SBF	0.9972287	0.9992328	0.055499905	0.9707338
	q95	max	min	Conteo	
ALFAA.MX	1.032818	1.171763	0.7503124	727	

BIMBOA.MX	1.029665	1.081600	0.9294955	727
GFNORTEO.MX	1.031353	1.090320	0.8876342	727
GRUMAB.MX	1.026037	1.071046	0.9202622	727
LACOMERUBC.MX	1.032006	1.078481	0.9411463	727
VOLARA.MX	1.046157	1.129916	0.8627027	727
AAPL	1.025957	1.125465	0.8929354	727
GOOGL	1.032284	1.102244	0.9082925	727
META	1.037034	1.215815	0.7505434	727
GRMN	1.025737	1.233994	0.8362299	727
ARKF	1.037555	1.123841	0.9024319	727
ARKX	1.028520	1.094125	0.9313202	727
MXX	1.016325	1.043943	0.9388957	727
DJI	1.017003	1.052679	0.9447715	727
GSPC	1.018200	1.068732	0.9362868	727
WTI	1.059374	1.113085	0.8194198	727
ZCF	1.027409	1.076400	0.0000000	727
GCF	1.020355	1.051465	0.0000000	727
SBF	1.029498	1.068146	0.0000000	727

```

tablaResumenRendimientos=data.frame(Accion=names(Datos$tablaRendimientosCont)[-1],
                                      Media = colMeans(Datos$tablaRendimientosCont[,-1]),
                                      Mediana = apply(Datos$tablaRendimientosCont[,-1],2,median),
                                      DesviacionEstandar=apply(Datos$tablaRendimientosCont[,-1],2,sd),
                                      q5=apply(Datos$tablaRendimientosCont[,-1],2, quantile, probs =0.05),
                                      q95=apply(Datos$tablaRendimientosCont[,-1],2, quantile, probs=0.95),
                                      max=apply(Datos$tablaRendimientosCont[,-1],2,max),
                                      min=apply(Datos$tablaRendimientosCont[,-1],2,min),
                                      Conteо=apply(Datos$tablaRendimientosCont[,-1],2,length)
                                     )
tablaResumenRendimientos

```

	Accion	Media	Mediana	DesviacionEstandar
ALFAA.MX	ALFAA.MX	0.01423555	0.000000000	2.2453239
BIMBOA.MX	BIMBOA.MX	-0.01797120	-0.069727804	1.8418110
GFNORTEO.MX	GFNORTEO.MX	0.07147033	0.096060161	1.9274096
GRUMAB.MX	GRUMAB.MX	0.04507688	-0.006220073	1.6164361
LACOMERUBC.MX	LACOMERUBC.MX	0.03492464	-0.025711890	1.8131267
VOLARA.MX	VOLARA.MX	-0.07783034	-0.058807581	2.9269843
AAPL	AAPL	0.05963652	0.071483300	1.8245845
GOOGL	GOOGL	0.11183150	0.157204443	2.0629987
META	META	0.20842216	0.132734776	2.7434649
GRMN	GRMN	0.12836405	0.067157455	1.9406907

ARKF	ARKF	0.15394266	0.156439105	2.3501335
ARKX	ARKX	0.08443393	0.072661666	1.6523447
MXX	MXX	0.03683066	0.034202492	0.9710938
DJI	DJI	0.04156986	0.017990300	1.0790037
GSPC	GSPC	0.06098809	0.002052497	1.1770186
WTI	WTI	-0.19582743	-0.128093770	3.6147797
ZCF	ZCF	-0.08239619	-0.119445863	1.7580791
GCF	GCF	0.10420567	0.063806087	1.1539086
SBF	SBF	-0.01869902	-0.071119381	1.8281765
		q5	q95	max min Conteo
ALFAA.MX		-3.114590	3.229076	15.850907 -28.726557 727
BIMBOA.MX		-2.858763	2.923356	7.844146 -7.311327 727
GFNORTEO.MX		-2.798887	3.087110	8.647152 -11.919557 727
GRUMAB.MX		-2.459034	2.570429	6.863548 -8.309661 727
LACOMERUBC.MX		-2.774335	3.150477	7.555352 -6.065672 727
VOLARA.MX		-4.852138	4.512306	12.214371 -14.768514 727
AAPL		-2.856580	2.562621	11.819588 -11.324101 727
GOOGL		-3.276717	3.177375	9.734791 -9.618886 727
META		-3.455747	3.636431	19.541446 -28.695784 727
GRMN		-2.356665	2.541181	21.025615 -17.885176 727
ARKF		-3.668122	3.686668	11.675212 -10.266204 727
ARKX		-2.523491	2.812119	8.995501 -7.115217 727
MXX		-1.423196	1.619296	4.300527 -6.305086 727
DJI		-1.597447	1.685964	5.133873 -5.681221 727
GSPC		-1.738744	1.803593	6.647327 -6.583347 727
WTI		-5.703004	5.767804	10.713554 -19.915871 727
ZCF		-2.494058	2.704053	7.362193 -19.132787 727
GCF		-1.735323	2.015106	5.018448 -3.806412 727
SBF		-2.930079	2.907175	6.592482 -8.728411 727

Haga una gráfica en plotly que tenga 3 paneles con las siguientes figuras:

1. Precios base 100 a la fecha inicial.
2. P/L.
3. Rendimiento continuo.

```
DatosGraficaPL=Datos$tablaPL %>%
  pivot_longer(cols=-Date,names_to="Ticker",values_to="PL")
#DatosGraficaPL
```

```

base100Calc=function(x){
  return((x/x[1])*100)
}

preciosB100=Datos$tablaPrecios[,-1]

preciosB100=apply(preciosB100,2,base100Calc)

preciosB100=cbind(data.frame(Date=Datos$tablaPrecios$date),
                    preciosB100)

DatosGraficaPreciosB100=preciosB100 %>%
  pivot_longer(cols=-Date,names_to="Ticker",values_to="PrecioBase100")

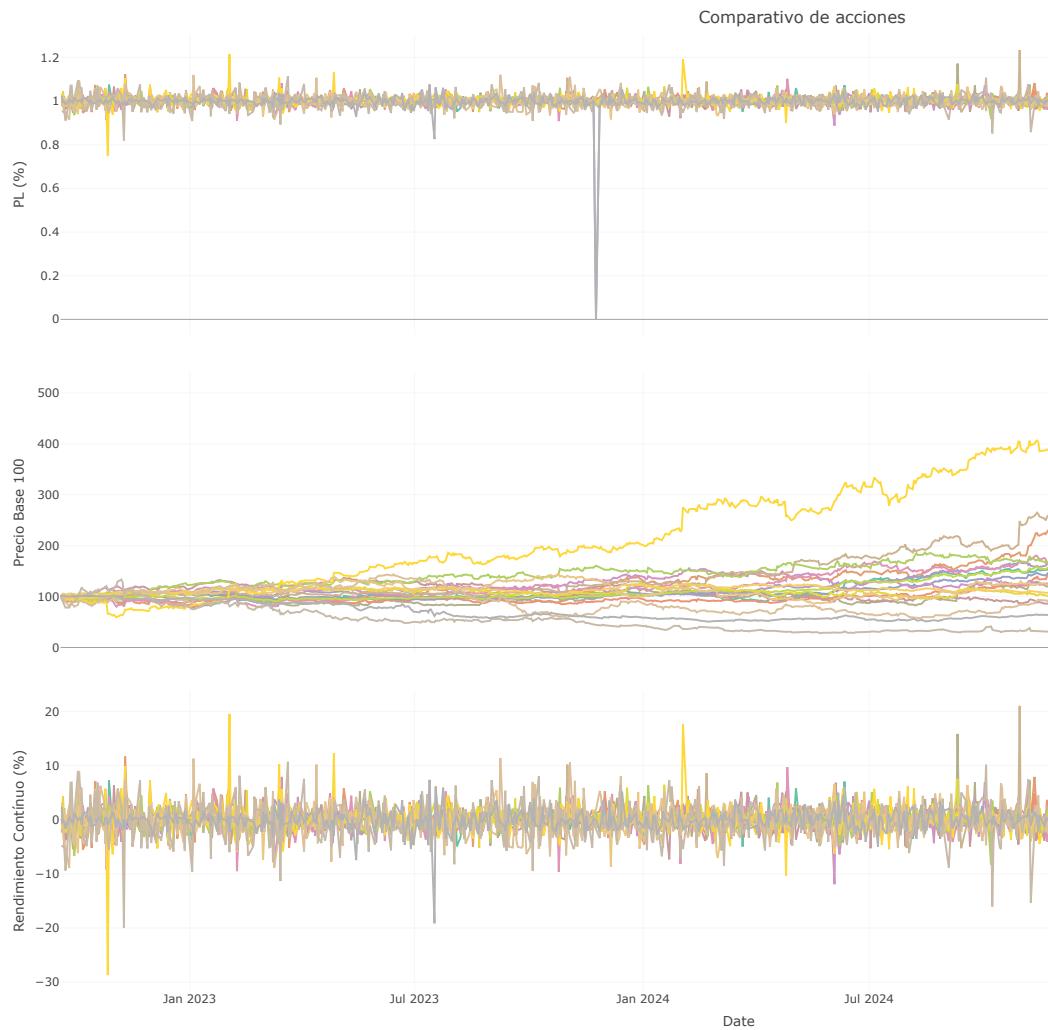
DatosGraficaRendimientos=Datos$tablaRendimientosCont %>%
  pivot_longer(cols=-Date,names_to="Ticker",values_to="RendimientoCont")
#DatosGraficaRendimientos

fig1a=plot_ly()%>%
  add_trace(data=DatosGraficaPL,
            x=~Date,
            y=~PL,
            color=~Ticker,
            type="scatter",
            mode="lines")
fig1b=plot_ly()%>%
  add_trace(data=DatosGraficaPreciosB100,
            x=~Date,
            y=~PrecioBase100,
            color=~Ticker,
            type="scatter",
            mode="lines")
fig1c=plot_ly()%>%
  add_trace(data=DatosGraficaRendimientos,
            x=~Date,
            y=~RendimientoCont,
            color=~Ticker,
            type="scatter",
            mode="lines")

```

```
fig1=subplot(fig1a,fig1b,fig1c,
             nrows=3,
             shareX=TRUE,
             titleY=TRUE) %>%
layout(title="Comparativo de acciones",
       yaxis=list(title="PL (%)"),
       yaxis2=list(title="Precio Base 100"),
       yaxis3=list(title="Rendimiento Continuo (%)))
```

fig1



Matriz de dispersión

Haga una matriz de dispersión (<https://plotly.com/r/splom/>).

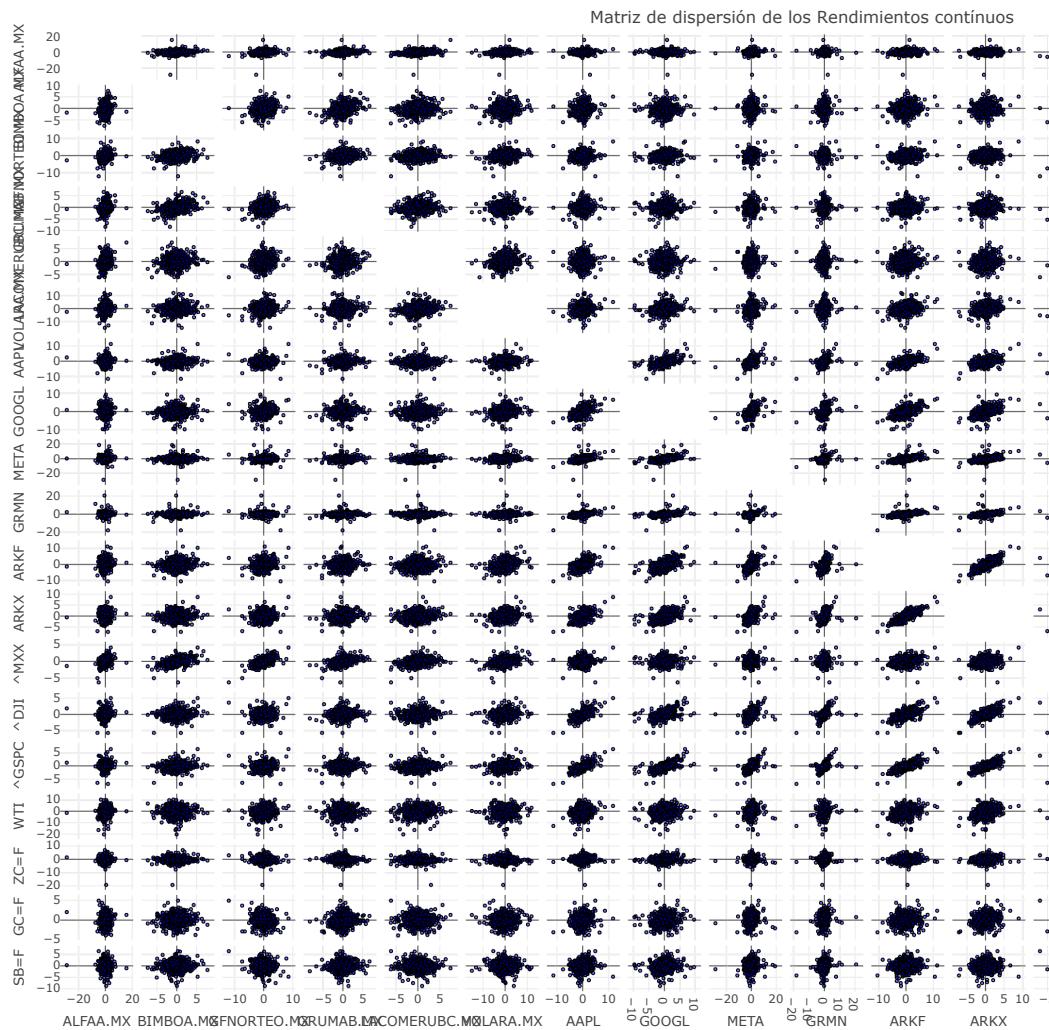
- Matriz de dispersión de los Rendimientos continuos:

```
figScatter=plot_ly(type="splom",
                    dimensions=list(
                        list(label="ALFAA.MX", values=Datos$tablaRendimientosCont$ALFAA.MX),
                        list(label="BIMBOA.MX", values=Datos$tablaRendimientosCont$BIMBOA.MX),
                        list(label="GFNORTEO.MX", values=Datos$tablaRendimientosCont$GFNORTEO.MX),
                        list(label="GRUMAB.MX", values=Datos$tablaRendimientosCont$GRUMAB.MX),
                        list(label="LACOMERUBC.MX", values=Datos$tablaRendimientosCont$LACOMERUBC.MX),
                        list(label="VOLARA.MX", values=Datos$tablaRendimientosCont$VOLARA.MX),
                        list(label="AAPL", values=Datos$tablaRendimientosCont$AAPL),
                        list(label="GOOGL", values=Datos$tablaRendimientosCont$GOOGL),
                        list(label="META", values=Datos$tablaRendimientosCont$META),
                        list(label="GRMN", values=Datos$tablaRendimientosCont$GRMN),
                        list(label="ARKF", values=Datos$tablaRendimientosCont$ARKF),
                        list(label="ARKX", values=Datos$tablaRendimientosCont$ARKX),
                        list(label="^MXX", values=Datos$tablaRendimientosCont$MXX),
                        list(label="^DJI", values=Datos$tablaRendimientosCont$DJI),
                        list(label="^GSPC", values=Datos$tablaRendimientosCont$GSPC),
                        list(label="WTI", values=Datos$tablaRendimientosCont$WTI),
                        list(label="ZC=F", values=Datos$tablaRendimientosCont$ZCF),
                        list(label="GC=F", values=Datos$tablaRendimientosCont$GCF),
                        list(label="SB=F", values=Datos$tablaRendimientosCont$SBF)
                    ),
                    marker=list(size=3,
                                color='rgba(0, 0, 255, 0.5)',
                                line=list(width=1,
                                          color='rgb(0, 0, 0'))),
                    diagonal=list(visible=FALSE)
) %>%
layout(title="Matriz de dispersión de los Rendimientos continuos")
```



```
figScatter
```

file:///C:/Users/morel/AppData/Local/Temp/Rtmp2hDrRL/file52a43a3155dd/widget52a41e2125b1.htm



- Matriz de dispersión de P/L:

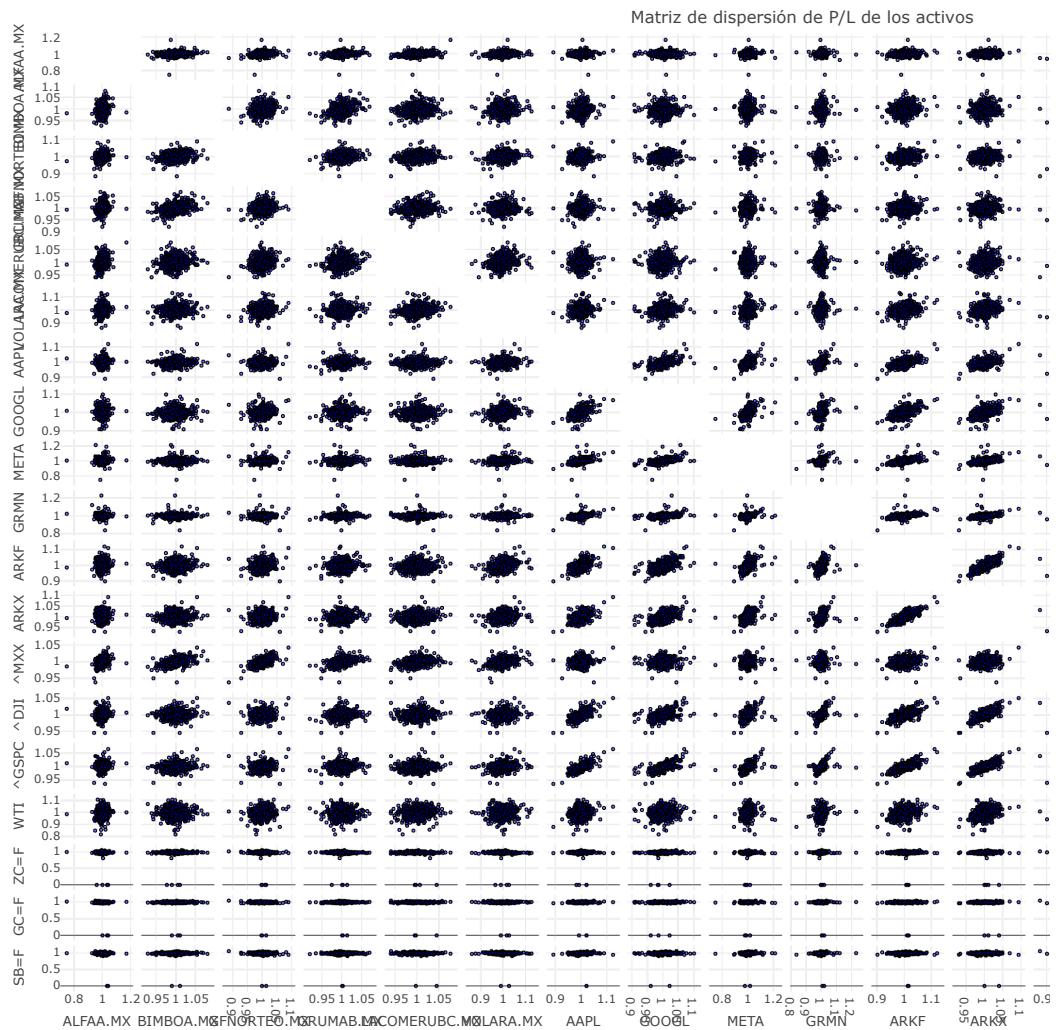
```

figScatter2 = plot_ly(type="splom",
                      dimensions=list(
                        list(label="ALFAA.MX", values=Datos$tablaPL$ALFAA.MX),
                        list(label="BIMBOA.MX", values=Datos$tablaPL$BIMBOA.MX),
                        list(label="GFNORTEO.MX", values=Datos$tablaPL$GFNORTEO.MX),
                        list(label="GRUMAB.MX", values=Datos$tablaPL$GRUMAB.MX),
                        list(label="LACOMERUBC.MX", values=Datos$tablaPL$LACOMERUBC.MX),
                        list(label="VOLARA.MX", values=Datos$tablaPL$VOLARA.MX),
                        list(label="AAPL", values=Datos$tablaPL$AAPL),
                        list(label="GOOGL", values=Datos$tablaPL$GOOGL),
                        list(label="META", values=Datos$tablaPL$META),
                        list(label="GRMN", values=Datos$tablaPL$GRMN),
                        list(label="ARKF", values=Datos$tablaPL$ARKF),
                        list(label="ARKX", values=Datos$tablaPL$ARKX),
                        list(label="^MXX", values=Datos$tablaPL$MXX),
                        list(label="^DJI", values=Datos$tablaPL$DJI),
                        list(label="^GSPC", values=Datos$tablaPL$GSPC),
                        list(label="WTI", values=Datos$tablaPL$WTI),
                        list(label="ZC=F", values=Datos$tablaPL$ZCF),
                        list(label="GC=F", values=Datos$tablaPL$GCF),
                        list(label="SB=F", values=Datos$tablaPL$SBF)
                      ),
                      marker=list(size=3,
                                  color='rgba(0, 0, 255, 0.5)',
                                  line=list(width=1,
                                            color='rgb(0, 0, 0'))),
                      diagonal=list(visible=FALSE)
                    ) %>%
layout(title="Matriz de dispersión de P/L de los activos")

figScatter2

```

file:///C:/Users/morel/AppData/Local/Temp/Rtmp2hDrRL/file52a44eb72b33/widget52a45e293b39.htm



Covarianzas y correlaciones:

- Covarianzas de los rendimientos:

```
covarianzasRC=cov(Datos$tablaRendimientosCont[,-1])
covarianzasRC
```

	ALFAA.MX	BIMBOA.MX	GFnORTEO.MX	GRUMAB.MX	LACOMERUBC.MX
ALFAA.MX	5.0414792	0.849678846	1.08415524	0.75112341	0.95627847
BIMBOA.MX	0.8496788	3.392267909	0.95343467	1.07901496	0.59834301
GFnORTEO.MX	1.0841552	0.953434668	3.71490791	0.60989201	0.80743227
GRUMAB.MX	0.7511234	1.079014962	0.60989201	2.61286581	0.44931273
LACOMERUBC.MX	0.9562785	0.598343006	0.80743227	0.44931273	3.28742855
VOLARA.MX	1.0752063	0.655601661	1.04571195	0.43291622	1.19492086
AAPL	0.2079378	0.359807642	0.31536644	0.24178453	0.03649839
GOOGL	0.1235570	0.141018753	0.43145512	0.07600797	0.15541995
META	0.2596326	0.053278266	0.54721430	0.25918759	0.21843045
GRMN	-0.0698368	0.270465921	0.06735572	0.18378748	-0.03408408
ARKF	0.6013214	0.534299151	0.74245456	0.44515578	0.55874890
ARKX	0.4558199	0.326721048	0.48615577	0.30962543	0.34846679
MXX	0.8786053	0.876870229	1.20984036	0.66423878	0.63475556
DJI	0.1512596	0.212803986	0.21552383	0.18223489	0.08915210
GSPC	0.2210861	0.248483267	0.30940082	0.18779620	0.15314959
WTI	0.7668003	0.075509975	0.90251377	0.17749657	0.81350814
ZCF	-0.1078998	0.004291537	-0.20627057	-0.18673382	-0.12324910
GCF	-0.0506104	0.137570796	-0.13997284	0.13819100	0.06354217
SBF	-0.1358100	0.053564864	-0.31751950	0.15103953	-0.02984639
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	1.07520628	0.20793781	0.12355705	0.25963259	-0.06983680
BIMBOA.MX	0.65560166	0.35980764	0.14101875	0.05327827	0.27046592
GFnORTEO.MX	1.04571195	0.31536644	0.43145512	0.54721430	0.06735572
GRUMAB.MX	0.43291622	0.24178453	0.07600797	0.25918759	0.18378748
LACOMERUBC.MX	1.19492086	0.03649839	0.15541995	0.21843045	-0.03408408
VOLARA.MX	8.56723718	0.98318344	1.17909533	1.58566489	0.79592511
AAPL	0.98318344	3.32910842	2.11532873	2.44163889	1.69826563
GOOGL	1.17909533	2.11532873	4.25596366	3.10449898	1.59833056
META	1.58566489	2.44163889	3.10449898	7.52659951	1.80349504
GRMN	0.79592511	1.69826563	1.59833056	1.80349504	3.76628033
ARKF	2.27770389	2.33780440	2.66241209	3.36887217	2.17933916
ARKX	1.43907412	1.55552204	1.73290212	2.09940103	1.62957596
MXX	0.98937396	0.33473573	0.23957410	0.28252444	0.16698129
DJI	0.65990316	1.31627696	1.14871215	1.36938910	1.27784465

GSPC	0.91014256	1.62323719	1.60057517	1.97380950	1.41534656	
WTI	1.40399121	1.61625564	1.30221108	1.38815618	1.44942183	
ZCF	-0.42903243	0.35321323	0.46970595	0.25216162	0.36378444	
GCF	0.01844961	0.41482145	0.48817087	0.45456145	0.46082464	
SBF	-0.04255858	0.49829167	0.46098650	0.60853494	0.41690157	
	ARKF	ARKX	MXX	DJI	GSPC	WTI
ALFAA.MX	0.6013214	0.4558199	0.8786053	0.1512596	0.2210861	0.76680032
BIMBOA.MX	0.5342992	0.3267210	0.8768702	0.2128040	0.2484833	0.07550997
GFNORTEO.MX	0.7424546	0.4861558	1.2098404	0.2155238	0.3094008	0.90251377
GRUMAB.MX	0.4451558	0.3096254	0.6642388	0.1822349	0.1877962	0.17749657
LACOMERUBC.MX	0.5587489	0.3484668	0.6347556	0.0891521	0.1531496	0.81350814
VOLARA.MX	2.2777039	1.4390741	0.9893740	0.6599032	0.9101426	1.40399121
AAPL	2.3378044	1.5555220	0.3347357	1.3162770	1.6232372	1.61625564
GOOGL	2.6624121	1.7329021	0.2395741	1.1487121	1.6005752	1.30221108
META	3.3688722	2.0994010	0.2825244	1.3693891	1.9738095	1.38815618
GRMN	2.1793392	1.6295760	0.1669813	1.2778446	1.4153466	1.44942183
ARKF	5.5231274	3.0819941	0.6094896	1.5860109	2.0660343	2.64639499
ARKX	3.0819941	2.7302431	0.3788131	1.2905145	1.5329595	2.00877903
MXX	0.6094896	0.3788131	0.9430231	0.1867599	0.2495121	0.58465586
DJI	1.5860109	1.2905145	0.1867599	1.1642490	1.1814283	1.38029785
GSPC	2.0660343	1.5329595	0.2495121	1.1814283	1.3853727	1.49558302
WTI	2.6463950	2.0087790	0.5846559	1.3802979	1.4955830	13.06663236
ZCF	0.2426252	0.3300276	-0.1380114	0.4836553	0.4471617	0.49686117
GCF	0.4135618	0.4047574	0.0102543	0.4364976	0.4489706	0.61620510
SBF	0.3809141	0.2055996	-0.1787059	0.3600284	0.3862293	0.62706686
	ZCF	GCF	SBF			
ALFAA.MX	-0.107899780	-0.05061040	-0.13581004			
BIMBOA.MX	0.004291537	0.13757080	0.05356486			
GFNORTEO.MX	-0.206270567	-0.13997284	-0.31751950			
GRUMAB.MX	-0.186733825	0.13819100	0.15103953			
LACOMERUBC.MX	-0.123249095	0.06354217	-0.02984639			
VOLARA.MX	-0.429032428	0.01844961	-0.04255858			
AAPL	0.353213226	0.41482145	0.49829167			
GOOGL	0.469705952	0.48817087	0.46098650			
META	0.252161625	0.45456145	0.60853494			
GRMN	0.363784445	0.46082464	0.41690157			
ARKF	0.242625195	0.41356176	0.38091406			
ARKX	0.330027590	0.40475740	0.20559963			
MXX	-0.138011360	0.01025430	-0.17870593			
DJI	0.483655288	0.43649756	0.36002837			
GSPC	0.447161732	0.44897060	0.38622928			
WTI	0.496861170	0.61620510	0.62706686			
ZCF	3.090842272	0.52116487	0.54838416			

GCF	0.521164872	1.33150496	0.40846569
SBF	0.548384157	0.40846569	3.34222919

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	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX
ALFAA.MX	4.841184e-04	8.443864e-05	1.064434e-04	7.517246e-05
BIMBOA.MX	8.443864e-05	3.401755e-04	9.572223e-05	1.081977e-04
GFNORTEO.MX	1.064434e-04	9.572223e-05	3.710726e-04	6.078698e-05
GRUMAB.MX	7.517246e-05	1.081977e-04	6.078698e-05	2.619228e-04
LACOMERUBC.MX	9.690831e-05	5.936694e-05	8.012673e-05	4.475266e-05
VOLARA.MX	1.066418e-04	6.527142e-05	1.040885e-04	4.201223e-05
AAPL	2.317509e-05	3.663390e-05	3.302463e-05	2.358522e-05
GOOGL	1.398331e-05	1.422352e-05	4.381134e-05	7.553862e-06
META	2.726897e-05	6.389598e-06	5.526320e-05	2.492809e-05
GRMN	-5.174701e-06	2.740022e-05	8.446634e-06	1.765563e-05
ARKF	6.054695e-05	5.442639e-05	7.572527e-05	4.426129e-05
ARKX	4.613108e-05	3.309444e-05	4.954786e-05	3.074319e-05
MXX	8.706485e-05	8.777285e-05	1.203853e-04	6.625108e-05
DJI	1.632704e-05	2.154800e-05	2.203135e-05	1.788791e-05
GSPC	2.349044e-05	2.517049e-05	3.158116e-05	1.846975e-05
WTI	7.473333e-05	7.634069e-06	9.025052e-05	1.631082e-05
ZCF	-6.485346e-05	1.876312e-05	-4.851767e-05	-9.844875e-06
GCF	-1.119304e-04	2.091178e-06	-2.921593e-05	-1.188280e-05
SBF	-1.181946e-04	2.409449e-06	-4.961818e-05	8.874482e-06
	LACOMERUBC.MX	VOLARA.MX	AAPL	GOOGL
ALFAA.MX	9.690831e-05	1.066418e-04	2.317509e-05	1.398331e-05
BIMBOA.MX	5.936694e-05	6.527142e-05	3.663390e-05	1.422352e-05
GFNORTEO.MX	8.012673e-05	1.040885e-04	3.302463e-05	4.381134e-05
GRUMAB.MX	4.475266e-05	4.201223e-05	2.358522e-05	7.553862e-06
LACOMERUBC.MX	3.302630e-04	1.191674e-04	3.989810e-06	1.572102e-05
VOLARA.MX	1.191674e-04	8.563899e-04	9.894426e-05	1.180669e-04
AAPL	3.989810e-06	9.894426e-05	3.348789e-04	2.125103e-04
GOOGL	1.572102e-05	1.180669e-04	2.125103e-04	4.252638e-04
META	2.097269e-05	1.602034e-04	2.445988e-04	3.118270e-04
GRMN	-2.525275e-06	8.024104e-05	1.678656e-04	1.609646e-04
ARKF	5.613979e-05	2.293497e-04	2.354637e-04	2.680857e-04
ARKX	3.516309e-05	1.443358e-04	1.564033e-04	1.743135e-04
MXX	6.307647e-05	9.877834e-05	3.387135e-05	2.431972e-05
DJI	9.135488e-06	6.621531e-05	1.319796e-04	1.154133e-04
GSPC	1.554763e-05	9.122171e-05	1.629624e-04	1.607526e-04

WTI	8.024786e-05	1.411895e-04	1.587276e-04	1.287210e-04
ZCF	-7.752548e-05	-5.757727e-05	1.222698e-05	1.159312e-04
GCF	-4.867832e-05	-5.456331e-05	-6.338065e-06	9.461771e-05
SBF	-6.412579e-05	-3.466835e-05	-9.197936e-06	7.162195e-05
	META	GRMN	ARKF	ARKX
ALFAA.MX	2.726897e-05	-5.174701e-06	6.054695e-05	4.613108e-05
BIMBOA.MX	6.389598e-06	2.740022e-05	5.442639e-05	3.309444e-05
GFNORTEO.MX	5.526320e-05	8.446634e-06	7.572527e-05	4.954786e-05
GRUMAB.MX	2.492809e-05	1.765563e-05	4.426129e-05	3.074319e-05
LACOMERUBC.MX	2.097269e-05	-2.525275e-06	5.613979e-05	3.516309e-05
VOLARA.MX	1.602034e-04	8.024104e-05	2.293497e-04	1.443358e-04
AAPL	2.445988e-04	1.678656e-04	2.354637e-04	1.564033e-04
GOOGL	3.118270e-04	1.609646e-04	2.680857e-04	1.743135e-04
META	7.524516e-04	1.798518e-04	3.423804e-04	2.117494e-04
GRMN	1.798518e-04	3.883733e-04	2.170855e-04	1.619752e-04
ARKF	3.423804e-04	2.170855e-04	5.568740e-04	3.102887e-04
ARKX	2.117494e-04	1.619752e-04	3.102887e-04	2.745373e-04
MXX	2.816360e-05	1.688245e-05	6.147221e-05	3.803902e-05
DJI	1.374850e-04	1.271394e-04	1.593328e-04	1.294551e-04
GSPC	1.983706e-04	1.409044e-04	2.076577e-04	1.538544e-04
WTI	1.350807e-04	1.401757e-04	2.624941e-04	1.984228e-04
ZCF	5.083504e-05	-1.410788e-06	-3.924995e-05	-4.236317e-05
GCF	6.635119e-05	4.014134e-06	-1.285442e-05	-2.883971e-05
SBF	6.529096e-05	4.492344e-06	-1.980733e-06	-3.431376e-05
	MXX	DJI	GSPC	WTI
ALFAA.MX	8.706485e-05	1.632704e-05	2.349044e-05	7.473333e-05
BIMBOA.MX	8.777285e-05	2.154800e-05	2.517049e-05	7.634069e-06
GFNORTEO.MX	1.203853e-04	2.203135e-05	3.158116e-05	9.025052e-05
GRUMAB.MX	6.625108e-05	1.788791e-05	1.846975e-05	1.631082e-05
LACOMERUBC.MX	6.307647e-05	9.135488e-06	1.554763e-05	8.024786e-05
VOLARA.MX	9.877834e-05	6.621531e-05	9.122171e-05	1.411895e-04
AAPL	3.387135e-05	1.319796e-04	1.629624e-04	1.587276e-04
GOOGL	2.431972e-05	1.154133e-04	1.607526e-04	1.287210e-04
META	2.816360e-05	1.374850e-04	1.983706e-04	1.350807e-04
GRMN	1.688245e-05	1.271394e-04	1.409044e-04	1.401757e-04
ARKF	6.147221e-05	1.593328e-04	2.076577e-04	2.624941e-04
ARKX	3.803902e-05	1.294551e-04	1.538544e-04	1.984228e-04
MXX	9.411482e-05	1.870934e-05	2.503133e-05	5.801474e-05
DJI	1.870934e-05	1.165948e-04	1.183811e-04	1.363282e-04
GSPC	2.503133e-05	1.183811e-04	1.389205e-04	1.477580e-04
WTI	5.801474e-05	1.363282e-04	1.477580e-04	1.282607e-03
ZCF	-3.285107e-06	3.931072e-05	3.897669e-05	1.735165e-04
GCF	-2.206254e-06	2.069183e-05	2.705384e-05	1.468165e-04

SBF	-2.474243e-05	1.677231e-05	2.038830e-05	1.262174e-04	
	ZCF	GCF	SBF		
ALFAA.MX	-6.485346e-05	-1.119304e-04	-1.181946e-04		
BIMBOA.MX	1.876312e-05	2.091178e-06	2.409449e-06		
GFNORTEO.MX	-4.851767e-05	-2.921593e-05	-4.961818e-05		
GRUMAB.MX	-9.844875e-06	-1.188280e-05	8.874482e-06		
LACOMERUBC.MX	-7.752548e-05	-4.867832e-05	-6.412579e-05		
VOLARA.MX	-5.757727e-05	-5.456331e-05	-3.466835e-05		
AAPL	1.222698e-05	-6.338065e-06	-9.197936e-06		
GOOGL	1.159312e-04	9.461771e-05	7.162195e-05		
META	5.083504e-05	6.635119e-05	6.529096e-05		
GRMN	-1.410788e-06	4.014134e-06	4.492344e-06		
ARKF	-3.924995e-05	-1.285442e-05	-1.980733e-06		
ARKX	-4.236317e-05	-2.883971e-05	-3.431376e-05		
MXX	-3.285107e-06	-2.206254e-06	-2.474243e-05		
DJI	3.931072e-05	2.069183e-05	1.677231e-05		
GSPC	3.897669e-05	2.705384e-05	2.038830e-05		
WTI	1.735165e-04	1.468165e-04	1.262174e-04		
ZCF	5.773537e-03	4.165411e-03	2.813382e-03		
GCF	4.165411e-03	4.257892e-03	2.800629e-03		
SBF	2.813382e-03	2.800629e-03	3.080239e-03		

- Correlaciones Pearson:

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	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX	LACOMERUBC.MX
ALFAA.MX	1.00000000	0.205461636	0.25051772	0.20695396	0.234896868
BIMBOA.MX	0.20546164	1.000000000	0.26857887	0.36242975	0.179174824
GFNORTEO.MX	0.25051772	0.268578869	1.00000000	0.19575838	0.231048904
GRUMAB.MX	0.20695396	0.362429752	0.19575838	1.00000000	0.153307008
LACOMERUBC.MX	0.23489687	0.179174824	0.23104890	0.15330701	1.000000000
VOLARA.MX	0.16360343	0.121611481	0.18536069	0.09150080	0.225159662
AAPL	0.05075636	0.107068407	0.08967626	0.08197964	0.011032693
GOOGL	0.02667409	0.037113579	0.10850822	0.02279301	0.041550826
META	0.04214837	0.010544005	0.10348657	0.05844620	0.043912243
GRMN	-0.01602688	0.075667809	0.01800711	0.05858697	-0.009686506
ARKF	0.11395545	0.123437433	0.16390920	0.11718201	0.131128165
ARKX	0.12286087	0.107357250	0.15265139	0.11592508	0.116314153
MXX	0.40295232	0.490262961	0.64638738	0.42315990	0.360509890
DJI	0.06243397	0.107080837	0.10363306	0.10448406	0.045570151

GSPC	0.08365640	0.114622206	0.13638422	0.09870631	0.071763625
WTI	0.09447599	0.011341681	0.12953823	0.03037733	0.124122898
ZCF	-0.02733400	0.001325346	-0.06087302	-0.06570918	-0.038664924
GCF	-0.01953392	0.064730623	-0.06293589	0.07408833	0.030371236
SBF	-0.03308528	0.015908045	-0.09011109	0.05111095	-0.009004207
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	0.163603430	0.05075636	0.02667409	0.04214837	-0.016026881
BIMBOA.MX	0.121611481	0.10706841	0.03711358	0.01054401	0.075667809
GFNORTEO.MX	0.185360694	0.08967626	0.10850822	0.10348657	0.018007115
GRUMAB.MX	0.091500803	0.08197964	0.02279301	0.05844620	0.058586971
LACOMERUBC.MX	0.225159662	0.01103269	0.04155083	0.04391224	-0.009686506
VOLARA.MX	1.000000000	0.18409847	0.19526732	0.19746567	0.140118503
AAPL	0.184098474	1.000000000	0.56197234	0.48777334	0.479606796
GOOGL	0.195267321	0.56197234	1.000000000	0.54852088	0.399219114
META	0.197465674	0.48777334	0.54852088	1.000000000	0.338734340
GRMN	0.140118503	0.47960680	0.39921911	0.33873434	1.000000000
ARKF	0.331119179	0.54519476	0.54914090	0.52250758	0.477832814
ARKX	0.297551474	0.51595465	0.50836356	0.46312192	0.508180065
MXX	0.348079872	0.18891956	0.11958584	0.10604628	0.088603384
DJI	0.208947358	0.66859078	0.51604709	0.46259883	0.610237381
GSPC	0.264183514	0.75584840	0.65916449	0.61125513	0.619616763
WTI	0.132697322	0.24505538	0.17462266	0.13997713	0.206612523
ZCF	-0.083374128	0.11011198	0.12950564	0.05228067	0.106622628
GCF	0.005462548	0.19702704	0.20506971	0.14358921	0.205782279
SBF	-0.007953323	0.14938312	0.12222812	0.12132994	0.117505745
	ARKF	ARKX	MXX	DJI	GSPC
ALFAA.MX	0.11395545	0.12286087	0.402952323	0.06243397	0.08365640
BIMBOA.MX	0.12343743	0.10735725	0.490262961	0.10708084	0.11462221
GFNORTEO.MX	0.16390920	0.15265139	0.646387384	0.10363306	0.13638422
GRUMAB.MX	0.11718201	0.11592508	0.423159901	0.10448406	0.09870631
LACOMERUBC.MX	0.13112817	0.11631415	0.360509890	0.04557015	0.07176362
VOLARA.MX	0.33111918	0.29755147	0.348079872	0.20894736	0.26418351
AAPL	0.54519476	0.51595465	0.188919563	0.66859078	0.75584840
GOOGL	0.54914090	0.50836356	0.119585836	0.51604709	0.65916449
META	0.52250758	0.46312192	0.106046283	0.46259883	0.61125513
GRMN	0.47783281	0.50818006	0.088603384	0.61023738	0.61961676
ARKF	1.000000000	0.79366751	0.267062309	0.62544727	0.74689867
ARKX	0.79366751	1.000000000	0.236082128	0.72383451	0.78821865
MXX	0.26706231	0.23608213	1.000000000	0.17823769	0.21829669
DJI	0.62544727	0.72383451	0.178237687	1.000000000	0.93025307
GSPC	0.74689867	0.78821865	0.218296692	0.93025307	1.000000000
WTI	0.31151596	0.33631766	0.166554857	0.35388980	0.35151622
ZCF	0.05872255	0.11360859	-0.080837941	0.25496149	0.21609409

GCF	0.15250232	0.21228668	0.009151103	0.35058029	0.33056981
SBF	0.08865768	0.06806182	-0.100660637	0.18251379	0.17949145
	WTI	ZCF	GCF	SBF	
ALFAA.MX	0.09447599	-0.027333997	-0.019533918	-0.033085277	
BIMBOA.MX	0.01134168	0.001325346	0.064730623	0.015908045	
GFNORTEO.MX	0.12953823	-0.060873015	-0.062935887	-0.090111093	
GRUMAB.MX	0.03037733	-0.065709175	0.074088334	0.051110952	
LACOMERUBC.MX	0.12412290	-0.038664924	0.030371236	-0.009004207	
VOLARA.MX	0.13269732	-0.083374128	0.005462548	-0.007953323	
AAPL	0.24505538	0.110111979	0.197027044	0.149383125	
GOOGL	0.17462266	0.129505641	0.205069705	0.122228121	
META	0.13997713	0.052280673	0.143589209	0.121329945	
GRMN	0.20661252	0.106622628	0.205782279	0.117505745	
ARKF	0.31151596	0.058722555	0.152502321	0.088657678	
ARKX	0.33631766	0.113608588	0.212286679	0.068061819	
MXX	0.16655486	-0.080837941	0.009151103	-0.100660637	
DJI	0.35388980	0.254961491	0.350580289	0.182513790	
GSPC	0.35151622	0.216094092	0.330569811	0.179491449	
WTI	1.00000000	0.078183445	0.147731142	0.094888570	
ZCF	0.07818344	1.000000000	0.256900719	0.170619382	
GCF	0.14773114	0.256900719	1.000000000	0.193627069	
SBF	0.09488857	0.170619382	0.193627069	1.000000000	

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ALFAA.MX	1.00000000	0.208072136	0.25113872	0.211103919	0.242356834
BIMBOA.MX	0.20807214	1.000000000	0.26942126	0.362476346	0.177118173
GFNORTEO.MX	0.25113872	0.269421262	1.00000000	0.194981982	0.228885375
GRUMAB.MX	0.21110392	0.362476346	0.19498198	1.000000000	0.152160596
LACOMERUBC.MX	0.24235683	0.177118173	0.22888537	0.152160596	1.000000000
VOLARA.MX	0.16562118	0.120930466	0.18464502	0.088706068	0.224074207
AAPL	0.05755748	0.108539455	0.09368383	0.079635979	0.011997158
GOOGL	0.03081803	0.037396092	0.11028791	0.022633573	0.041948984
META	0.04518077	0.012629400	0.10458449	0.056151711	0.042071204
GRMN	-0.01193397	0.075383758	0.02224998	0.055356918	-0.007051053
ARKF	0.11661059	0.125048788	0.16658386	0.115893459	0.130906831
ARKX	0.12653690	0.108293622	0.15523686	0.114646706	0.116776771
MXX	0.40788533	0.490545881	0.64419136	0.421965790	0.357773664
DJI	0.06872143	0.108197173	0.10591855	0.102360728	0.046554556
GSPC	0.09058001	0.115786276	0.13909631	0.096825807	0.072585699

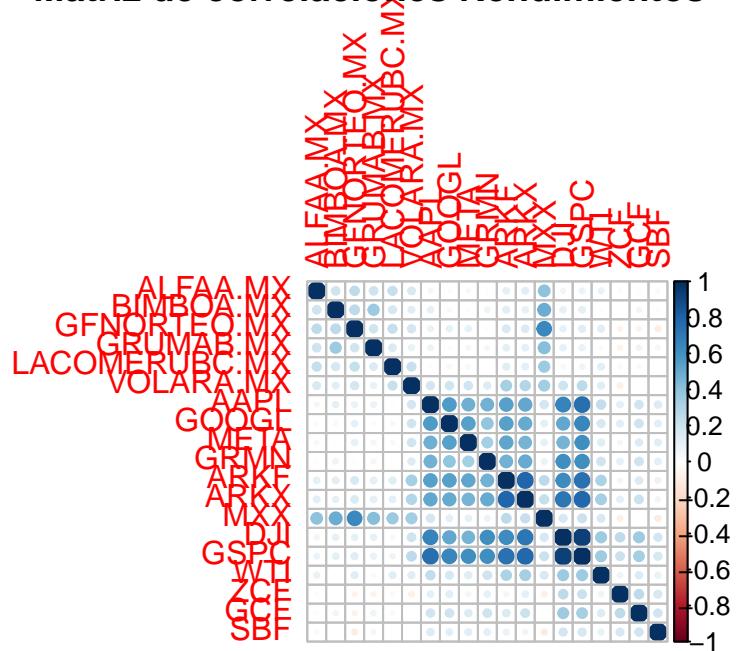
WTI	0.09484004	0.011557335	0.13081981	0.028141182	0.123298183
ZCF	-0.03879148	0.013388520	-0.03314741	-0.008005759	-0.056142729
GCF	-0.07796058	0.001737569	-0.02324304	-0.011252126	-0.041049540
SBF	-0.09678981	0.002353824	-0.04641082	0.009880162	-0.063578534
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	0.16562118	0.057557483	0.03081803	0.04518077	-0.0119339654
BIMBOA.MX	0.12093047	0.108539455	0.03739609	0.01262940	0.0753837583
GFNORTEO.MX	0.18464502	0.093683826	0.11028791	0.10458449	0.0222499766
GRUMAB.MX	0.08870607	0.079635979	0.02263357	0.05615171	0.0553569185
LACOMERUBC.MX	0.22407421	0.011997158	0.04194898	0.04207120	-0.0070510527
VOLARA.MX	1.00000000	0.184761263	0.19564247	0.19957072	0.1391349099
AAPL	0.18476126	1.000000000	0.56312765	0.48727153	0.4654713981
GOOGL	0.19564247	0.563127654	1.00000000	0.55124578	0.3960740703
META	0.19957072	0.487271532	0.55124578	1.00000000	0.3326985115
GRMN	0.13913491	0.465471398	0.39607407	0.33269851	1.0000000000
ARKF	0.33211149	0.545257462	0.55089133	0.52892139	0.4667966309
ARKX	0.29767169	0.515823611	0.51015391	0.46588878	0.4960472538
MXX	0.34793405	0.190791758	0.12156269	0.10583268	0.0883042819
DJI	0.20954779	0.667918327	0.51830688	0.46416939	0.5974697686
GSPC	0.26447178	0.755545010	0.66137184	0.61355696	0.6066200847
WTI	0.13471623	0.242192999	0.17429030	0.13750145	0.1986100854
ZCF	-0.02589371	0.008793345	0.07398612	0.02438950	-0.0009421415
GCF	-0.02857377	-0.005307811	0.07031466	0.03706910	0.0031215466
SBF	-0.02134544	-0.009056371	0.06257844	0.04288660	0.0041072968
	ARKF	ARKX	MXX	DJI	GSPC
ALFAA.MX	0.11661059	0.12653690	0.407885327	0.06872143	0.09058001
BIMBOA.MX	0.12504879	0.10829362	0.490545881	0.10819717	0.11578628
GFNORTEO.MX	0.16658386	0.15523686	0.644191356	0.10591855	0.13909631
GRUMAB.MX	0.11589346	0.11464671	0.421965790	0.10236073	0.09682581
LACOMERUBC.MX	0.13090683	0.11677677	0.357773664	0.04655456	0.07258570
VOLARA.MX	0.33211149	0.29767169	0.347934049	0.20954779	0.26447178
AAPL	0.54525746	0.51582361	0.190791758	0.66791833	0.75554501
GOOGL	0.55089133	0.51015391	0.121562686	0.51830688	0.66137184
META	0.52892139	0.46588878	0.105832684	0.46416939	0.61355696
GRMN	0.46679663	0.49604725	0.088304282	0.59746977	0.60662008
ARKF	1.00000000	0.79357291	0.268516731	0.62529799	0.74659728
ARKX	0.79357291	1.00000000	0.236646268	0.72356700	0.78781836
MXX	0.26851673	0.23664627	1.000000000	0.17860344	0.21891317
DJI	0.62529799	0.72356700	0.178603441	1.00000000	0.93016444
GSPC	0.74659728	0.78781836	0.218913171	0.93016444	1.00000000
WTI	0.31059479	0.33438285	0.166979254	0.35253267	0.35004268
ZCF	-0.02188969	-0.03364859	-0.004456557	0.04791268	0.04352120
GCF	-0.00834789	-0.02667429	-0.003485212	0.02936716	0.03517616

	SBF	WTI	ZCF	GCF	SBF
ALFAA.MX	0.09484004	-0.0387914829	-0.077960576	-0.096789814	
BIMBOA.MX	0.01155734	0.0133885205	0.001737569	0.002353824	
GFNORTEO.MX	0.13081981	-0.0331474058	-0.023243045	-0.046410815	
GRUMAB.MX	0.02814118	-0.0080057594	-0.011252126	0.009880162	
LACOMERUBC.MX	0.12329818	-0.0561427289	-0.041049540	-0.063578534	
VOLARA.MX	0.13471623	-0.0258937115	-0.028573773	-0.021345443	
AAPL	0.24219300	0.0087933453	-0.005307811	-0.009056371	
GOOGL	0.17429030	0.0739861216	0.070314658	0.062578436	
META	0.13750145	0.0243895025	0.037069103	0.042886595	
GRMN	0.19861009	-0.0009421415	0.003121547	0.004107297	
ARKF	0.31059479	-0.0218896926	-0.008347890	-0.001512360	
ARKX	0.33438285	-0.0336485869	-0.026674293	-0.037314306	
MXX	0.16697925	-0.0044565572	-0.003485212	-0.045953768	
DJI	0.35253267	0.0479126791	0.029367162	0.027987304	
GSPC	0.35004268	0.0435212024	0.035176160	0.031167773	
WTI	1.00000000	0.0637636380	0.062824755	0.063500937	
ZCF	0.06376364	1.00000000000	0.840116514	0.667137688	
GCF	0.06282475	0.8401165139	1.000000000	0.773331941	
SBF	0.06350094	0.6671376880	0.773331941	1.000000000	

Se hace un diagrama de calor (heatmap) de las covarianzas de los rendimientos:

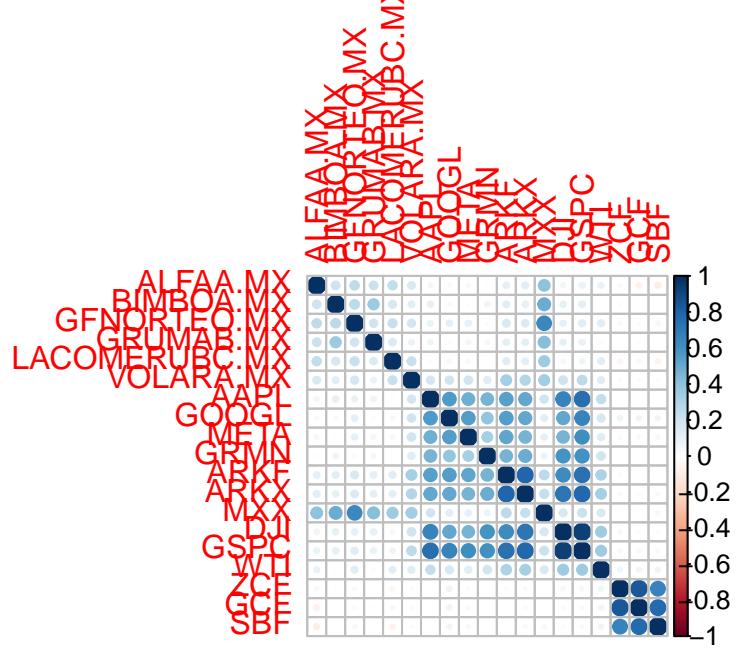
```
fig3a = corrplot(covarianzasRC, title = "Matriz de covarianzas Rendimientos")
```

MATRIZ DE CORRELACIONES RENAMEROS



```
fig3b = corrplot(corrrelacionesPL, title = "Matriz de correlaciones P/L")
```

MATRIZ DE CORRELACIONES P/L



Conclusiones

Gracias al análisis estadístico descriptivo realizado, podemos sacar algunas de las siguientes conclusiones:

- Si hubieramos invertido hace 3 años en las acciones analizadas sin hacer ningún movimiento, a dia de hoy el máximo rendimiento que hubieramos sacado sería el de META, y el que nos hubiera generado más perdidas sería el futuro en petroleo WIT.
- Sí se hubiera sacado el rendimiento el dia del mayor rendimiento reportado, meta queda en 2do lugar con 19.54%, mientras que Garmin nos hubiera proporcionado un 21.02%.
- El activo con mayor volatilidad es el futuro del petroleo, WTI, mientras que el menos volátil es el indicie bursátil IPC.
- Las acciones americanas en general tuvieron mejor desempeño que las mexicanas.
- Algunos de los activos analizados tienen una relación directa muy fuerte, como es el caso de los futuros del oro y Dow Jones, o los índices bursátiles Dow Jones y S&P500.
- Vemos que el sector teconológico, y en general las acciones americanas tienen una relación directa fuerte entre ellas, así como sus indices busatiles, y como es de esperarse, el IPC tiene una relación directa con los activos mexicanos.
- Hay una relación que probablemente sea espuria, que es el futuro del maíz y del oro, y que sería interesante agregar al análisis algunas pruebas de cointegración, para verificar que esta realción es real.