

# 01.c Tarea de repaso de Estadística descriptiva

Por Abigail Sampedro Gutierrez y Diego Pedraza Barajas

Universidad Michoacana de San Nicolas de Hidalgo



Lic. en Actuaría y Ciencia de Datos



2105944a@umich.mx

2105940x@umich.mx

## Descarga de los datos

ademas de descargarlos también los pasamos a pesos en caso de ser necesario

```
tickerV=c("ALFAA.MX","BIMBOA.MX","GFNORTEO.MX","GRUMAB.MX","LACOMERUBC.MX","VOLARA.MX","AAPL
deD=Sys.Date()-365
hastaD=Sys.Date()
per="D"
paridadFX="USDMXN=X"
convertirFX=c(FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,TRUE,TRUE,TRUE,TRUE,TRUE,TRUE,FALSE,TRUE,T
Datos=historico_multiples_precios(tickers=tickerV,de=deD,hasta=hastaD,periodicidad=per,fxRat
```

```
[1] "Extrayendo RIC 1 de 19 (ALFAA.MX), periodicidad D"
[1] "Extrayendo ALFAA.MX..."
[1] "ALFAA.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 2 de 19 (BIMBOA.MX), periodicidad D"
[1] "Extrayendo BIMBOA.MX..."
[1] "BIMBOA.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 3 de 19 (GFNORTEO.MX), periodicidad D"
[1] "Extrayendo GFNORTEO.MX..."
[1] "GFNORTEO.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 4 de 19 (GRUMAB.MX), periodicidad D"
[1] "Extrayendo GRUMAB.MX..."
[1] "GRUMAB.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 5 de 19 (LACOMERUBC.MX), periodicidad D"
[1] "Extrayendo LACOMERUBC.MX..."
[1] "LACOMERUBC.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 6 de 19 (VOLARA.MX), periodicidad D"
[1] "Extrayendo VOLARA.MX..."
[1] "VOLARA.MX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 7 de 19 (AAPL), periodicidad D"
[1] "Extrayendo AAPL..."
[1] "Convirtiendo AAPL con paridad cambiaria USDMXN=X..."
[1] "AAPL extraído de Yahoo Finance..."
```

```

[1] "Extrayendo RIC 8 de 19 (GOOGL), periodicidad D"
[1] "Extrayendo GOOGL..."
[1] "Convirtiendo GOOGL con paridad cambiaria USDMXN=X..."
[1] "GOOGL extraído de Yahoo Finance..."

[1] "Extrayendo RIC 9 de 19 (META), periodicidad D"
[1] "Extrayendo META..."
[1] "Convirtiendo META con paridad cambiaria USDMXN=X..."
[1] "META extraído de Yahoo Finance..."

[1] "Extrayendo RIC 10 de 19 (GRMN), periodicidad D"
[1] "Extrayendo GRMN..."
[1] "Convirtiendo GRMN con paridad cambiaria USDMXN=X..."
[1] "GRMN extraído de Yahoo Finance..."

[1] "Extrayendo RIC 11 de 19 (ARKF), periodicidad D"
[1] "Extrayendo ARKF..."
[1] "Convirtiendo ARKF con paridad cambiaria USDMXN=X..."
[1] "ARKF extraído de Yahoo Finance..."

[1] "Extrayendo RIC 12 de 19 (ARKX), periodicidad D"
[1] "Extrayendo ARKX..."
[1] "Convirtiendo ARKX con paridad cambiaria USDMXN=X..."
[1] "ARKX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 13 de 19 (^MXX), periodicidad D"
[1] "Extrayendo ^MXX..."
[1] "MXX extraído de Yahoo Finance..."

[1] "Extrayendo RIC 14 de 19 (^DJI), periodicidad D"
[1] "Extrayendo ^DJI..."
[1] "Convirtiendo ^DJI con paridad cambiaria USDMXN=X..."
[1] "DJI extraído de Yahoo Finance..."

[1] "Extrayendo RIC 15 de 19 (^GSPC), periodicidad D"
[1] "Extrayendo ^GSPC..."
[1] "Convirtiendo ^GSPC con paridad cambiaria USDMXN=X..."
[1] "GSPC extraído de Yahoo Finance..."

[1] "Extrayendo RIC 16 de 19 (CL=F), periodicidad D"
[1] "Extrayendo CL=F..."
[1] "Convirtiendo CL=F con paridad cambiaria USDMXN=X..."

```

```

[1] "CLF extraído de Yahoo Finance..."

[1] "Extrayendo RIC 17 de 19 (ZC=F), periodicidad D"
[1] "Extrayendo ZC=F..."
[1] "Convirtiendo ZC=F con paridad cambiaria USDMXN=X..."
[1] "ZCF extraído de Yahoo Finance..."

[1] "Extrayendo RIC 18 de 19 (SB=F), periodicidad D"
[1] "Extrayendo SB=F..."
[1] "Convirtiendo SB=F con paridad cambiaria USDMXN=X..."
[1] "SBF extraído de Yahoo Finance..."

[1] "Extrayendo RIC 19 de 19 (GC=F), periodicidad D"
[1] "Extrayendo GC=F..."
[1] "Convirtiendo GC=F con paridad cambiaria USDMXN=X..."
[1] "GCF extraído de Yahoo Finance..."

[1] "Se terminó de extraer y procesar un total de 19 tickers desde las BD de Yahoo Finance.."
[1] "Tickers procesados: ALFAA.MX, BIMBOA.MX, GFNORTEO.MX, GRUMAB.MX, LACOMERUBC.MX, VOLARA.MX"

```

## tabla de resumen con el rendimiento continuo

```

# Vector de medias:
mediaAcciones=colMeans(Datos$tablaRendimientosCont[,-1])
# Vector de desviaciones estándar:
desvAcciones=apply(Datos$tablaRendimientosCont[,-1],2,sd)
# Vector de medianas:
medianaAcciones = apply(Datos$tablaRendimientosCont[,-1], 2, median)
# Quantil 5%
q5Acciones = apply(Datos$tablaRendimientosCont[,-1], 2, quantile, probs = 0.05)
# Quantil 95%
q95Acciones = apply(Datos$tablaRendimientosCont[,-1], 2, quantile, probs = 0.95)
# Conteo (número de observaciones)
conteoAcciones = nrow(Datos$tablaRendimientosCont)

# Tabla de resumen:
tablaResumen=data.frame(Accion=names(Datos$tablaRendimientosCont)[-1],
                        Media=mediaAcciones,
                        DesviacionEstandar=desvAcciones,
                        Mediana = medianaAcciones,
                        Q5 = q5Acciones,

```

```

Q95 = q95Acciones,
min=apply(Datos$tablaRendimientosCont[, -1], 2, min),
max=apply(Datos$tablaRendimientosCont[, -1], 2, max),
Conteo = conteoAcciones
)

tablaResumen

```

		Accion	Media	DesviacionEstandar	Mediana
ALFAA.MX		ALFAA.MX	0.03690162	2.8644804	-0.067005848
BIMBOA.MX		BIMBOA.MX	-0.01379173	1.9037057	-0.059198383
GFNORTEO.MX		GFNORTEO.MX	0.14809994	1.9518733	0.139175410
GRUMAB.MX		GRUMAB.MX	-0.05169426	1.5249180	0.061059788
LACOMERUBC.MX		LACOMERUBC.MX	0.05139940	1.7372835	0.116101804
VOLARA.MX		VOLARA.MX	-0.04966683	3.0028286	0.000000000
AAPL		AAPL	0.02033296	2.0688116	0.065237782
GOOGL		GOOGL	0.17110894	2.0781705	0.274883910
META		META	0.10135897	2.3695369	0.036042953
GRMN		GRMN	0.13117611	2.5927318	0.196363638
ARKF		ARKF	0.24286100	2.3888625	0.238694188
ARKX		ARKX	0.20539243	1.9883661	0.180095252
MXX		MXX	0.06192207	0.9749648	0.043914603
DJI		DJI	0.02841007	1.2091807	0.045900985
GSPC		GSPC	0.04691656	1.2985356	0.008236398
CLF		CLF	-0.11695483	2.2043893	0.000000000
ZCF		ZCF	-0.01795020	1.4700079	-0.032664675
SBF		SBF	-0.16790272	1.6991450	-0.282644666
GCF		GCF	0.13847652	1.2604136	0.213525209
		Q5	Q95	min	max Conteo
ALFAA.MX		-3.347869	3.659915	-28.726557	7.687803 241
BIMBOA.MX		-3.152749	2.924189	-6.261139	7.844146 241
GFNORTEO.MX		-2.742098	3.302179	-7.269047	8.647152 241
GRUMAB.MX		-2.089239	2.079446	-8.309661	5.392831 241
LACOMERUBC.MX		-2.729822	2.980185	-6.065672	4.906029 241
VOLARA.MX		-4.516285	4.556395	-14.768514	12.214371 241
AAPL		-3.056870	2.578967	-11.324087	11.819580 241
GOOGL		-3.406097	3.219079	-7.748379	8.624849 241
META		-3.648039	3.489677	-11.007972	11.321291 241
GRMN		-2.710822	2.563191	-17.885173	21.025611 241
ARKF		-3.337372	3.563468	-10.266204	10.821014 241
ARKX		-3.046881	3.501795	-7.115217	8.995501 241
MXX		-1.384417	1.626235	-4.997251	4.300527 241
DJI		-1.736869	1.800110	-5.681221	5.133873 241

GSPC	-1.872912	1.793038	-6.583347	6.647327	241
CLF	-3.575039	3.147607	-8.691264	7.008970	241
ZCF	-2.212691	2.316077	-4.017489	5.397764	241
SBF	-3.227857	2.692313	-6.563223	4.377565	241
GCF	-2.082740	2.101247	-3.806412	4.453128	241

### tabla resumen para datos ganancias/perdidas (PL)

```
# 1. Calcular la tabla de P/L diaria (diferencia de precios)
# Usamos la función diff() que calcula la diferencia entre un valor y su anterior.
# Se aplica a cada columna de la tabla de precios (excepto la primera que es la fecha).
tablaPL = as.data.frame(apply(Datos$tablaPrecios[,-1], 2, diff))

# 2. Calcular las mismas métricas descriptivas para la tabla de P/L
# Vector de medias P/L:
mediaPL = colMeans(tablaPL)
# Vector de desviaciones estándar P/L:
desvPL = apply(tablaPL, 2, sd)
# Vector de medianas P/L:
medianaPL = apply(tablaPL, 2, median)
# Quantil 5% P/L:
q5PL = apply(tablaPL, 2, quantile, probs = 0.05)
# Quantil 95% P/L:
q95PL = apply(tablaPL, 2, quantile, probs = 0.95)
# Conteo (número de observaciones). Será n-1 respecto a los precios.
conteoPL = nrow(tablaPL)

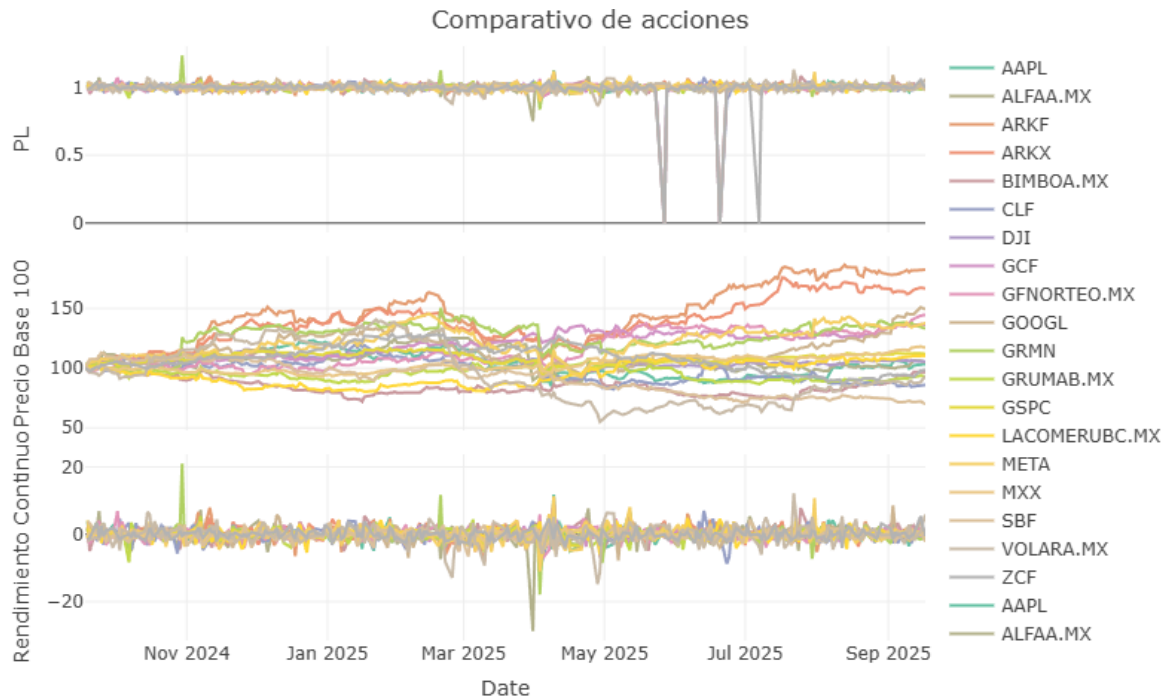
# 3. Crear la tabla de resumen para P/L
tablaResumenPL = data.frame(Accion = names(tablaPL),
                           Media_PL = mediaPL,
                           DesviacionEstandar_PL = desvPL,
                           Mediana_PL = medianaPL,
                           Q5_PL = q5PL,
                           Q95_PL = q95PL,
                           min_PL = apply(tablaPL, 2, min),
                           max_PL = apply(tablaPL, 2, max),
                           Conteo = conteoPL
                           )

# 4. Mostrar la tabla resultante
tablaResumenPL
```

		Accion	Media_PL	DesviacionEstandar_PL	Mediana_PL	
ALFAA.MX		ALFAA.MX	0.002765418	4.208177e-01	-0.009988785	
BIMBOA.MX		BIMBOA.MX	-0.009403719	1.107385e+00	-0.029998779	
GFNORTEO.MX		GFNORTEO.MX	0.238884700	2.802925e+00	0.197509766	
GRUMAB.MX		GRUMAB.MX	-0.107770864	5.336986e+00	0.268768311	
LACOMERUBC.MX		LACOMERUBC.MX	0.016771657	6.417047e-01	0.039302826	
VOLARA.MX		VOLARA.MX	-0.003526969	3.517675e-01	0.000000000	
AAPL		AAPL	0.615174026	8.856424e+01	3.865096051	
GOOGL		GOOGL	6.251371576	7.458932e+01	9.668012780	
META		META	16.080044836	2.936134e+02	16.813048425	
GRMN		GRMN	4.431765357	1.030959e+02	6.998245460	
ARKF		ARKF	1.901035836	1.811200e+01	1.972362320	
ARKX		ARKX	0.809972470	7.874510e+00	0.772922072	
MXX		MXX	37.399750389	5.260480e+02	24.000000000	
DJI		DJI	181.903703817	1.015328e+04	354.229237050	
GSPC		GSPC	52.797497681	1.466104e+03	-9.263671202	
CLF		CLF	-0.796372380	2.974702e+01	1.139813399	
ZCF		ZCF	-0.538615262	1.307669e+02	-2.574177742	
SBF		SBF	-0.509063871	6.616266e+00	-1.088602194	
GCF		GCF	74.427321645	7.695612e+02	117.911636353	
		Q5_PL	Q95_PL	min_PL	max_PL	Conteo
ALFAA.MX		-5.093966e-01	5.093975e-01	-4.157365	1.098698	241
BIMBOA.MX		-1.778965e+00	1.729824e+00	-4.019875	4.080002	241
GFNORTEO.MX		-3.959991e+00	4.620834e+00	-10.120941	11.804642	241
GRUMAB.MX		-7.386902e+00	7.456604e+00	-28.811005	19.233856	241
LACOMERUBC.MX		-9.727650e-01	1.051369e+00	-2.266697	2.020000	241
VOLARA.MX		-4.899998e-01	5.300007e-01	-1.929999	1.089999	241
AAPL		-1.372839e+02	1.127839e+02	-484.419072	449.641060	241
GOOGL		-1.170828e+02	1.159407e+02	-281.523953	356.234815	241
META		-4.539033e+02	4.049898e+02	-1232.119431	1490.956160	241
GRMN		-1.203490e+02	1.036717e+02	-717.569714	767.420735	241
ARKF		-2.505692e+01	2.962569e+01	-68.507699	69.507363	241
ARKX		-1.244413e+01	1.351711e+01	-25.252762	31.399010	241
MXX		-7.333516e+02	8.924531e+02	-2636.550781	2211.082031	241
DJI		-1.431827e+04	1.555599e+04	-47243.216906	41321.338434	241
GSPC		-2.137042e+03	2.079959e+03	-7319.645058	7135.948458	241
CLF		-4.413761e+01	4.264039e+01	-118.638172	93.283100	241
ZCF		-2.021949e+02	2.078363e+02	-357.681927	439.747570	241
SBF		-1.167078e+01	1.056146e+01	-25.354507	16.061380	241
GCF		-1.360260e+03	1.308027e+03	-2411.920822	2830.143670	241

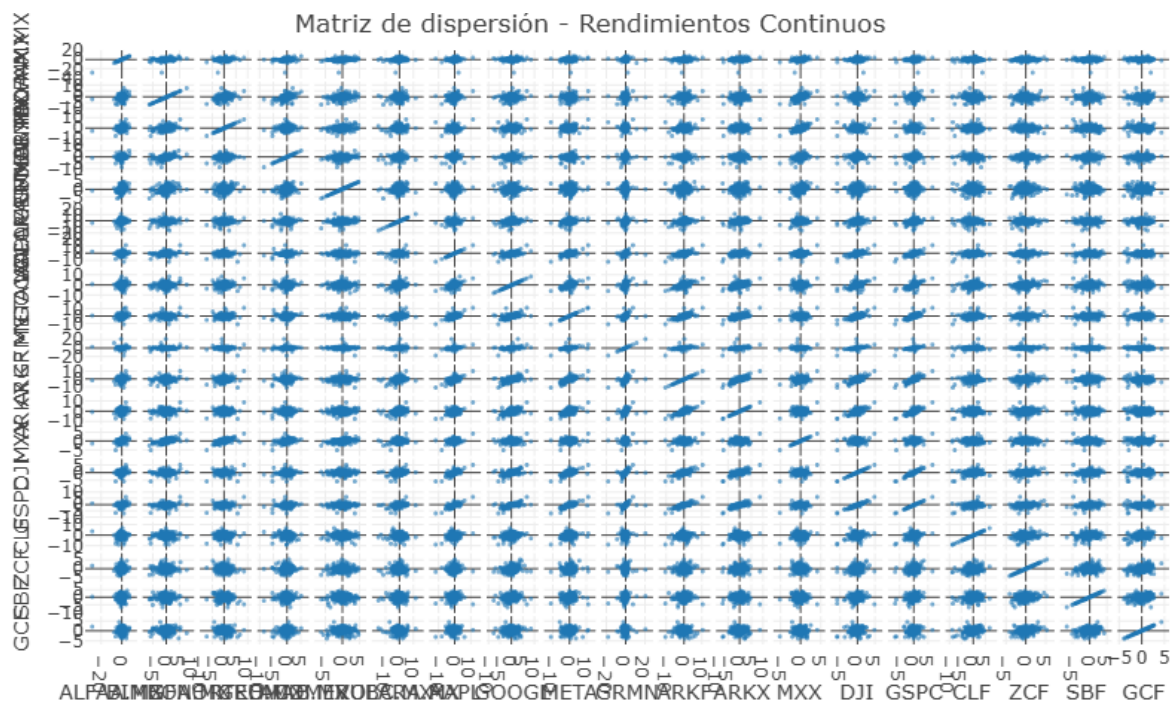
## Grafica en plotly para los siguientes tres casos

1. Ganancias/perdidas.
2. precios base 100 a la fecha inicial.
3. Rendimiento continuo.

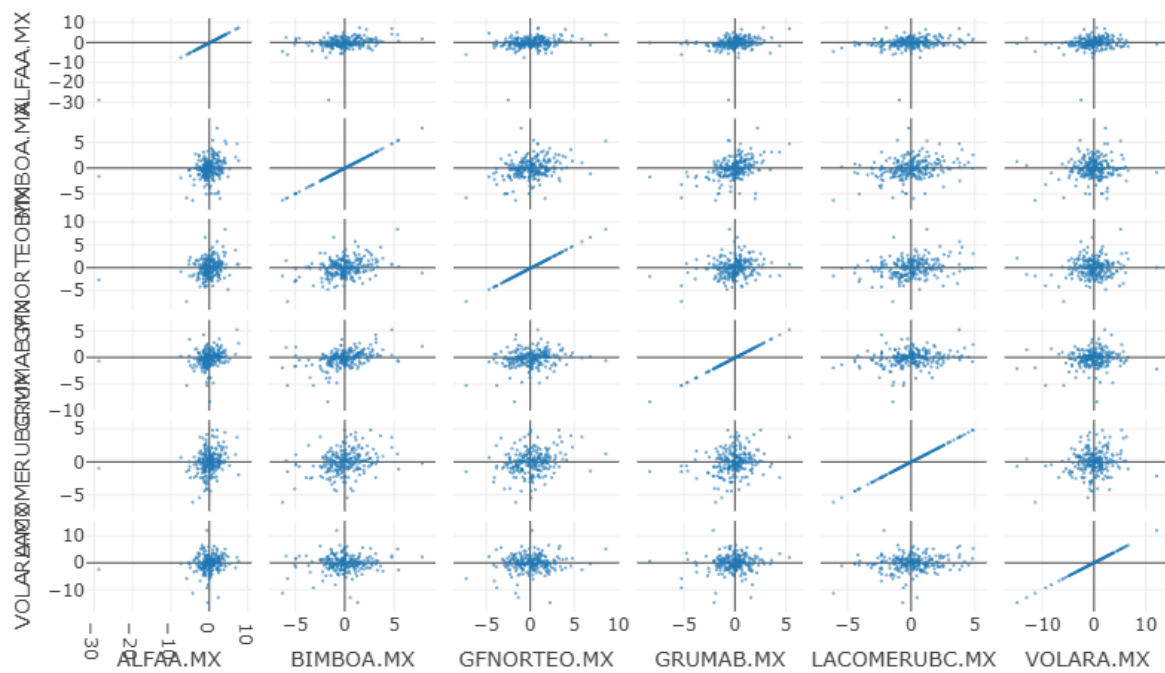




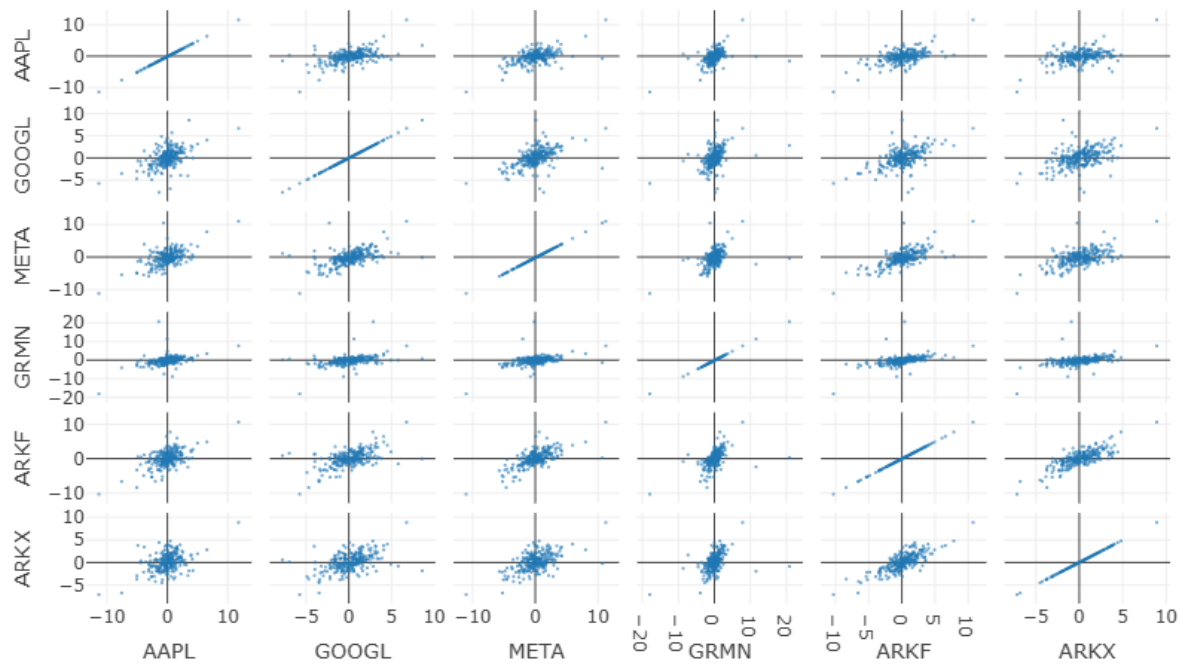
## Mtrriz de dispersión para rendimientos continuos



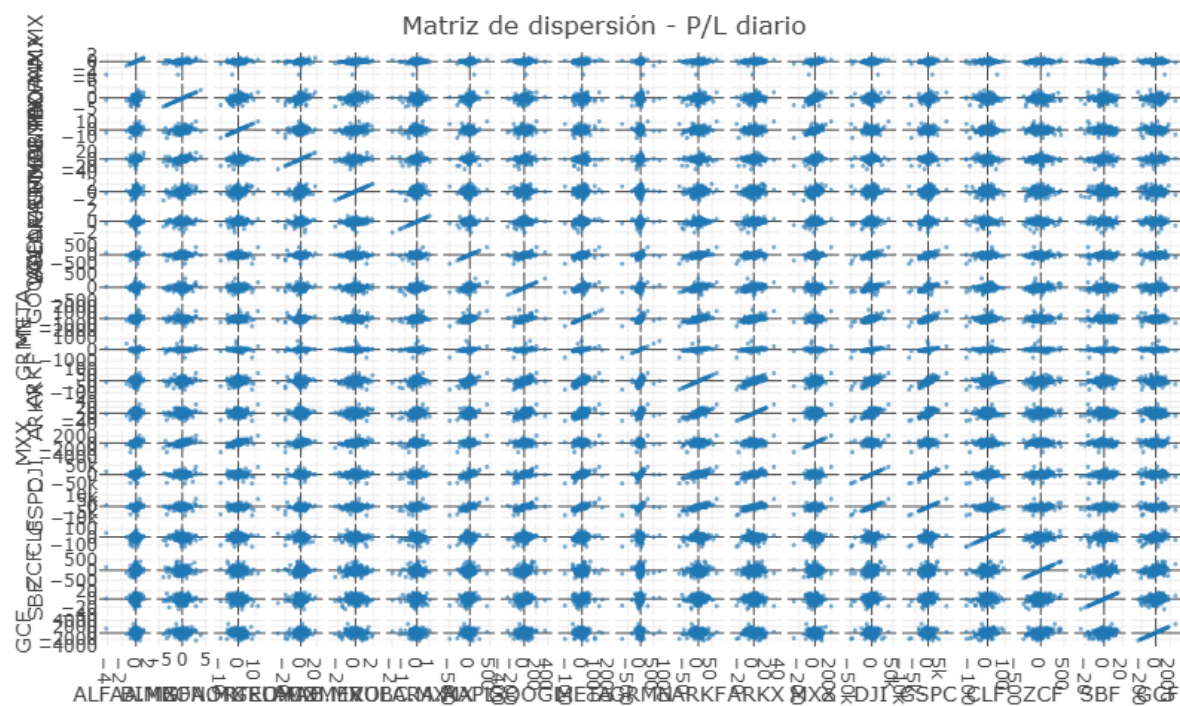
## Acciones Mexicanas:



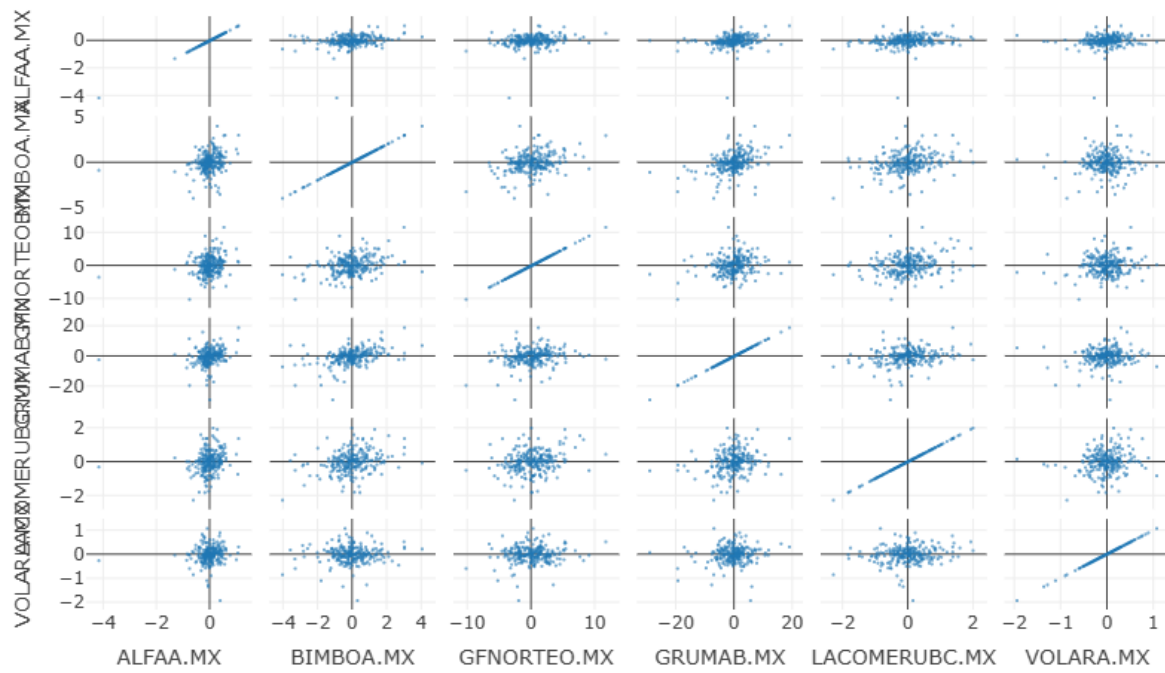
## Acciones de EEUU:



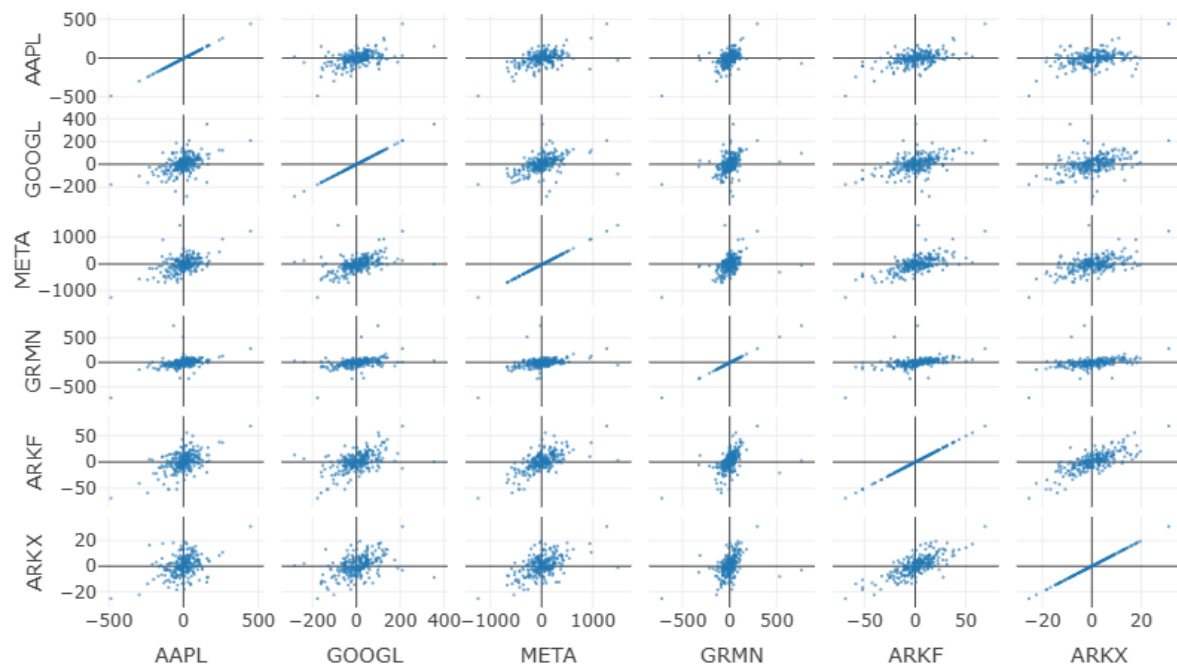
# Matriz de dispersion para P/L diario



## Acciones Mexicanas:



## Acciones de EEUU:



## Covarianzas para rendimientos continuos

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

	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX	LACOMERUBC.MX
ALFAA.MX	8.20524800	1.31842708	1.2664566	0.95169245	1.08508983
BIMBOA.MX	1.31842708	3.62409544	1.2000596	1.21591121	0.95717702
GFNORTEO.MX	1.26645662	1.20005962	3.8098093	0.58072465	0.79173028
GRUMAB.MX	0.95169245	1.21591121	0.5807247	2.32537501	0.57415336
LACOMERUBC.MX	1.08508983	0.95717702	0.7917303	0.57415336	3.01815408
VOLARA.MX	1.15644154	0.45891002	0.5397047	0.49840660	0.86633653
AAPL	0.46769232	0.74817508	0.4329916	0.38177765	-0.12010397
GOOGL	0.16650036	0.47420293	0.3174641	0.27335412	0.04064474
META	0.71637211	0.19955262	0.4766907	0.12892602	-0.15123045
GRMN	-0.31371480	0.40429682	-0.2128433	0.25112086	-0.24590287
ARKF	0.90211679	0.54249463	0.7010543	0.34390238	0.45380432
ARKX	0.70859799	0.40966680	0.4362499	0.29024725	0.16724972
MXX	1.11091644	1.05999983	1.3059096	0.60991360	0.64702773
DJI	0.27222837	0.31236091	0.1587218	0.27922315	0.03176058
GSPC	0.35233824	0.40032796	0.3065575	0.28432023	0.04415132

CLF	-0.26702478	0.04765234	0.1271271	-0.17619887	-0.10552559
ZCF	-0.05335509	0.01639363	-0.2712291	-0.05559692	0.21086017
SBF	0.15943853	-0.01994001	-0.4418330	0.14346533	0.06819285
GCF	-0.22830399	0.12332448	-0.1570258	0.28728082	0.07292863
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	1.15644154	0.4676923	0.16650036	0.7163721	-0.3137148
BIMBOA.MX	0.45891002	0.7481751	0.47420293	0.1995526	0.4042968
GFNORTEO.MX	0.53970474	0.4329916	0.31746409	0.4766907	-0.2128433
GRUMAB.MX	0.49840660	0.3817777	0.27335412	0.1289260	0.2511209
LACOMERUBC.MX	0.86633653	-0.1201040	0.04064474	-0.1512304	-0.2459029
VOLARA.MX	9.01697967	1.0428709	1.69571495	1.9151899	1.1881330
AAPL	1.04287092	4.2799813	2.21398148	2.8585965	2.4887943
GOOGL	1.69571495	2.2139815	4.31879279	2.6824746	2.2221361
META	1.91518988	2.8585965	2.68247456	5.6147052	2.7068048
GRMN	1.18813302	2.4887943	2.22213605	2.7068048	6.7222580
ARKF	2.18145067	2.8729280	2.77142332	3.9719795	3.0540495
ARKX	1.65372652	1.8518544	1.98875957	2.7145404	2.2454747
MXX	0.60084324	0.5549663	0.25662299	0.3608186	0.1596797
DJI	0.96905775	1.7497311	1.27548091	1.8438282	1.7876454
GSPC	1.16911763	2.0356421	1.69292128	2.3362333	1.9522951
CLF	-0.16541927	1.1146576	1.01240426	1.0737745	0.9654037
ZCF	-0.03493543	0.3293109	0.62334717	0.3212091	0.1006939
SBF	0.03979669	0.3874838	0.57428764	0.5787060	0.5849111
GCF	-0.14647287	0.2523467	0.26185191	0.1897569	0.3116605
	ARKF	ARKX	MXX	DJI	GSPC
ALFAA.MX	0.90211679	0.708597994	1.11091644	0.27222837	0.35233824
BIMBOA.MX	0.54249463	0.409666796	1.05999983	0.31236091	0.40032796
GFNORTEO.MX	0.70105434	0.436249931	1.30590962	0.15872180	0.30655754
GRUMAB.MX	0.34390238	0.290247248	0.60991360	0.27922315	0.28432023
LACOMERUBC.MX	0.45380432	0.167249718	0.64702773	0.03176058	0.04415132
VOLARA.MX	2.18145067	1.653726524	0.60084324	0.96905775	1.16911763
AAPL	2.87292800	1.851854447	0.55496628	1.74973115	2.03564210
GOOGL	2.77142332	1.988759572	0.25662299	1.27548091	1.69292128
META	3.97197947	2.714540416	0.36081863	1.84382821	2.33623331
GRMN	3.05404946	2.245474708	0.15967972	1.78764541	1.95229507
ARKF	5.70666413	3.769768825	0.58601279	2.08886930	2.51716488
ARKX	3.76976882	3.953599609	0.31367495	1.69955049	1.96135198
MXX	0.58601279	0.313674951	0.95055630	0.23099874	0.30055337
DJI	2.08886930	1.699550488	0.23099874	1.46211788	1.47745033
GSPC	2.51716488	1.961351981	0.30055337	1.47745033	1.68619482
CLF	0.91210981	0.590506254	0.13578146	0.67114875	0.87430619
ZCF	0.36839882	0.353832311	-0.10545246	0.39256276	0.38867992
SBF	0.27572175	0.008242583	-0.11675748	0.30030866	0.37443122

GCF	0.08057071	0.076203664	0.04368477	0.24549468	0.28773721
	CLF	ZCF	SBF	GCF	
ALFAA.MX	-0.26702478	-0.05335509	0.159438526	-0.22830399	
BIMBOA.MX	0.04765234	0.01639363	-0.019940014	0.12332448	
GFNORTEO.MX	0.12712709	-0.27122908	-0.441832995	-0.15702580	
GRUMAB.MX	-0.17619887	-0.05559692	0.143465326	0.28728082	
LACOMERUBC.MX	-0.10552559	0.21086017	0.068192850	0.07292863	
VOLARA.MX	-0.16541927	-0.03493543	0.039796691	-0.14647287	
AAPL	1.11465764	0.32931094	0.387483788	0.25234673	
GOOGL	1.01240426	0.62334717	0.574287645	0.26185191	
META	1.07377451	0.32120912	0.578705962	0.18975687	
GRMN	0.96540373	0.10069385	0.584911092	0.31166052	
ARKF	0.91210981	0.36839882	0.275721745	0.08057071	
ARKX	0.59050625	0.35383231	0.008242583	0.07620366	
MXX	0.13578146	-0.10545246	-0.116757477	0.04368477	
DJI	0.67114875	0.39256276	0.300308656	0.24549468	
GSPC	0.87430619	0.38867992	0.374431223	0.28773721	
CLF	4.85933200	0.63789870	0.741719932	0.87788922	
ZCF	0.63789870	2.16092319	0.379827547	0.52537211	
SBF	0.74171993	0.37982755	2.887093575	0.44478108	
GCF	0.87788922	0.52537211	0.444781077	1.58864251	

## Correlaciones para rendimientos continuos

```
correlacionesRC=cor(Datos$tablaRendimientosCont[, -1])
correlacionesRC
```

	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX	LACOMERUBC.MX
ALFAA.MX	1.00000000	0.241774473	0.22651285	0.21787343	0.21804651
BIMBOA.MX	0.24177447	1.000000000	0.32296197	0.41884713	0.28941547
GFNORTEO.MX	0.22651285	0.322961975	1.00000000	0.19510668	0.23348282
GRUMAB.MX	0.21787343	0.418847134	0.19510668	1.00000000	0.21672585
LACOMERUBC.MX	0.21804651	0.289415473	0.23348282	0.21672585	1.00000000
VOLARA.MX	0.13444581	0.080278119	0.09208186	0.10884456	0.16606778
AAPL	0.07892116	0.189968892	0.10722768	0.12101608	-0.03341687
GOOGL	0.02796972	0.119862472	0.07826396	0.08625771	0.01125777
META	0.10554298	0.044237863	0.10306747	0.03568047	-0.03673712
GRMN	-0.04224074	0.081911131	-0.04205822	0.06351535	-0.05459279
ARKF	0.13183349	0.119290119	0.15035189	0.09440555	0.10934697
ARKX	0.12441070	0.108226748	0.11240546	0.09572498	0.04841705
MXX	0.39778336	0.571106444	0.68623455	0.41023518	0.38199992



DJI	0.07859526	0.135695573	0.06725023	0.15143063	0.01511912
GSPC	0.09472400	0.161943020	0.12095018	0.14358444	0.01957127
CLF	-0.04228803	0.011355236	0.02954597	-0.05241654	-0.02755490
ZCF	-0.01267098	0.005858084	-0.09452898	-0.02480188	0.08256656
SBF	0.03275797	-0.006164463	-0.13322205	0.05536943	0.02310137
GCF	-0.06323457	0.051396838	-0.06382728	0.14946759	0.03330537
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	0.134445813	0.07892116	0.02796972	0.10554298	-0.04224074
BIMBOA.MX	0.080278119	0.18996889	0.11986247	0.04423786	0.08191113
GFNORTEO.MX	0.092081856	0.10722768	0.07826396	0.10306747	-0.04205822
GRUMAB.MX	0.108844562	0.12101608	0.08625771	0.03568047	0.06351535
LACOMERUBC.MX	0.166067779	-0.03341687	0.01125777	-0.03673712	-0.05459279
VOLARA.MX	1.000000000	0.16787232	0.27173221	0.26916452	0.15260787
AAPL	0.167872316	1.000000000	0.51495807	0.58313410	0.46399198
GOOGL	0.271732209	0.51495807	1.000000000	0.54474211	0.41241255
META	0.269164519	0.58313410	0.54474211	1.000000000	0.44059124
GRMN	0.152607870	0.46399198	0.41241255	0.44059124	1.000000000
ARKF	0.304105094	0.58131650	0.55825231	0.70170142	0.49309128
ARKX	0.276972598	0.45018350	0.48128769	0.57615122	0.43556627
MXX	0.205230408	0.27514190	0.12665591	0.15618400	0.06316889
DJI	0.266887307	0.69945406	0.50757659	0.64352553	0.57020707
GSPC	0.299829105	0.75775117	0.62733816	0.75927457	0.57987448
CLF	-0.024990058	0.24441749	0.22099604	0.20557075	0.16891301
ZCF	-0.007914361	0.10828432	0.20404650	0.09221567	0.02641957
SBF	0.007799845	0.11023060	0.16263644	0.14373550	0.13277058
GCF	-0.038700230	0.09677511	0.09996811	0.06353616	0.09536985
	ARKF	ARKX	MXX	DJI	GSPC
ALFAA.MX	0.13183349	0.124410696	0.39778336	0.07859526	0.09472400
BIMBOA.MX	0.11929012	0.108226748	0.57110644	0.13569557	0.16194302
GFNORTEO.MX	0.15035189	0.112405461	0.68623455	0.06725023	0.12095018
GRUMAB.MX	0.09440555	0.095724976	0.41023518	0.15143063	0.14358444
LACOMERUBC.MX	0.10934697	0.048417053	0.38199992	0.01511912	0.01957127
VOLARA.MX	0.30410509	0.276972598	0.20523041	0.26688731	0.29982910
AAPL	0.58131650	0.450183500	0.27514190	0.69945406	0.75775117
GOOGL	0.55825231	0.481287693	0.12665591	0.50757659	0.62733816
META	0.70170142	0.576151224	0.15618400	0.64352553	0.75927457
GRMN	0.49309128	0.435566266	0.06316889	0.57020707	0.57987448
ARKF	1.00000000	0.793646709	0.25160949	0.72315088	0.81145909
ARKX	0.79364671	1.000000000	0.16180598	0.70688137	0.75963562
MXX	0.25160949	0.161805982	1.000000000	0.19594288	0.23739896
DJI	0.72315088	0.706881368	0.19594288	1.000000000	0.94095276
GSPC	0.81145909	0.759635618	0.23739896	0.94095276	1.00000000
CLF	0.17320790	0.134722419	0.06317762	0.25179048	0.30543682

ZCF	0.10490771	0.121054652	-0.07357803	0.22085043	0.20361913
SBF	0.06792809	0.002439701	-0.07047991	0.14616595	0.16970231
GCF	0.02675919	0.030406499	0.03554905	0.16107858	0.17580413
	CLF	ZCF	SBF	GCF	
ALFAA.MX	-0.04228803	-0.012670985	0.032757970	-0.06323457	
BIMBOA.MX	0.01135524	0.005858084	-0.006164463	0.05139684	
GFNORTEO.MX	0.02954597	-0.094528978	-0.133222045	-0.06382728	
GRUMAB.MX	-0.05241654	-0.024801878	0.055369426	0.14946759	
LACOMERUBC.MX	-0.02755490	0.082566560	0.023101369	0.03330537	
VOLARA.MX	-0.02499006	-0.007914361	0.007799845	-0.03870023	
AAPL	0.24441749	0.108284318	0.110230600	0.09677511	
GOOGL	0.22099604	0.204046496	0.162636440	0.09996811	
META	0.20557075	0.092215668	0.143735500	0.06353616	
GRMN	0.16891301	0.026419568	0.132770576	0.09536985	
ARKF	0.17320790	0.104907712	0.067928095	0.02675919	
ARKX	0.13472242	0.121054652	0.002439701	0.03040650	
MXX	0.06317762	-0.073578027	-0.070479911	0.03554905	
DJI	0.25179048	0.220850427	0.146165954	0.16107858	
GSPC	0.30543682	0.203619125	0.169702309	0.17580413	
CLF	1.00000000	0.196853784	0.198025553	0.31596454	
ZCF	0.19685378	1.000000000	0.152067485	0.28355301	
SBF	0.19802555	0.152067485	1.000000000	0.20768388	
GCF	0.31596454	0.283553010	0.207683877	1.00000000	

## Covarianza para P/L

```
covarianzasPL=cov(Datos$tablaPL[, -1])
covarianzasPL
```

	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX
ALFAA.MX	7.403052e-04	1.307382e-04	1.235198e-04	9.556877e-05
BIMBOA.MX	1.307382e-04	3.627147e-04	1.199466e-04	1.213543e-04
GFNORTEO.MX	1.235198e-04	1.199466e-04	3.849450e-04	5.667449e-05
GRUMAB.MX	9.556877e-05	1.213543e-04	5.667449e-05	2.294101e-04
LACOMERUBC.MX	1.074364e-04	9.510898e-05	8.002011e-05	5.704989e-05
VOLARA.MX	1.106502e-04	4.351119e-05	5.274966e-05	4.723177e-05
AAPL	5.322873e-05	7.657333e-05	4.626479e-05	3.662152e-05
GOOGL	2.049481e-05	4.807483e-05	3.201959e-05	2.647611e-05
META	7.639282e-05	2.180234e-05	5.139875e-05	1.182614e-05
GRMN	-2.623785e-05	4.010901e-05	-1.803143e-05	2.328116e-05
ARKF	9.092267e-05	5.530790e-05	7.252919e-05	3.270712e-05

ARKX	7.164939e-05	4.157671e-05	4.529768e-05	2.813265e-05
MXX	1.093490e-04	1.058052e-04	1.308943e-04	6.021981e-05
DJI	3.058072e-05	3.150695e-05	1.623553e-05	2.705092e-05
GSPC	3.841681e-05	4.051260e-05	3.123804e-05	2.751744e-05
CLF	-3.377423e-04	-5.661600e-06	-3.746349e-05	-4.498603e-05
ZCF	-1.559020e-04	8.340239e-05	-1.124090e-04	6.734256e-05
SBF	-2.970411e-04	-1.194873e-05	-9.390329e-05	-1.271682e-05
GCF	-3.347083e-04	3.213563e-06	-6.506120e-05	1.511447e-06
	LACOMERUBC.MX	VOLARA.MX	AAPL	GOOGL
ALFAA.MX	1.074364e-04	1.106502e-04	5.322873e-05	2.049481e-05
BIMBOA.MX	9.510898e-05	4.351119e-05	7.657333e-05	4.807483e-05
GFNORTEO.MX	8.002011e-05	5.274966e-05	4.626479e-05	3.201959e-05
GRUMAB.MX	5.704989e-05	4.723177e-05	3.662152e-05	2.647611e-05
LACOMERUBC.MX	3.017781e-04	8.462247e-05	-1.107471e-05	4.134976e-06
VOLARA.MX	8.462247e-05	8.828695e-04	1.036985e-04	1.663385e-04
AAPL	-1.107471e-05	1.036985e-04	4.281754e-04	2.221503e-04
GOOGL	4.134976e-06	1.663385e-04	2.221503e-04	4.330291e-04
META	-1.374988e-05	1.905132e-04	2.861419e-04	2.686476e-04
GRMN	-2.206689e-05	1.189264e-04	2.395590e-04	2.226598e-04
ARKF	4.646442e-05	2.133680e-04	2.867475e-04	2.775365e-04
ARKX	1.748856e-05	1.636583e-04	1.852413e-04	1.991805e-04
MXX	6.475148e-05	5.821015e-05	5.633669e-05	2.578429e-05
DJI	3.342018e-06	9.613086e-05	1.739457e-04	1.275169e-04
GSPC	4.508014e-06	1.155474e-04	2.027983e-04	1.693313e-04
CLF	-1.942727e-04	-1.113591e-04	-7.416404e-05	1.807171e-04
ZCF	-1.936675e-04	3.696979e-05	-7.586971e-05	2.173084e-04
SBF	-1.774588e-04	-8.715658e-05	-1.442453e-04	1.384923e-04
GCF	-1.765095e-04	-1.045671e-04	-1.563426e-04	1.083753e-04
	META	GRMN	ARKF	ARKX
ALFAA.MX	7.639282e-05	-2.623785e-05	9.092267e-05	7.164939e-05
BIMBOA.MX	2.180234e-05	4.010901e-05	5.530790e-05	4.157671e-05
GFNORTEO.MX	5.139875e-05	-1.803143e-05	7.252919e-05	4.529768e-05
GRUMAB.MX	1.182614e-05	2.328116e-05	3.270712e-05	2.813265e-05
LACOMERUBC.MX	-1.374988e-05	-2.206689e-05	4.646442e-05	1.748856e-05
VOLARA.MX	1.905132e-04	1.189264e-04	2.133680e-04	1.636583e-04
AAPL	2.861419e-04	2.395590e-04	2.867475e-04	1.852413e-04
GOOGL	2.686476e-04	2.226598e-04	2.775365e-04	1.991805e-04
META	5.682968e-04	2.622567e-04	3.961262e-04	2.718406e-04
GRMN	2.622567e-04	6.990851e-04	2.983996e-04	2.194467e-04
ARKF	3.961262e-04	2.983996e-04	5.711194e-04	3.776816e-04
ARKX	2.718406e-04	2.194467e-04	3.776816e-04	3.973205e-04
MXX	3.715318e-05	1.588426e-05	5.899313e-05	3.152201e-05
DJI	1.835129e-04	1.751244e-04	2.084156e-04	1.697625e-04

GSPC	2.331291e-04	1.909332e-04	2.509023e-04	1.958936e-04
CLF	1.080335e-04	-1.857691e-05	-2.717610e-05	-9.870037e-05
ZCF	4.664781e-05	-8.608641e-05	-1.045234e-04	-1.334987e-04
SBF	6.101074e-05	-5.327721e-05	-8.804340e-05	-1.548653e-04
GCF	2.260662e-05	-7.986619e-05	-1.075334e-04	-1.476000e-04
	MXX	DJI	GSPC	CLF
ALFAA.MX	1.093490e-04	3.058072e-05	3.841681e-05	-3.377423e-04
BIMBOA.MX	1.058052e-04	3.150695e-05	4.051260e-05	-5.661600e-06
GFNORTEO.MX	1.308943e-04	1.623553e-05	3.123804e-05	-3.746349e-05
GRUMAB.MX	6.021981e-05	2.705092e-05	2.751744e-05	-4.498603e-05
LACOMERUBC.MX	6.475148e-05	3.342018e-06	4.508014e-06	-1.942727e-04
VOLARA.MX	5.821015e-05	9.613086e-05	1.155474e-04	-1.113591e-04
AAPL	5.633669e-05	1.739457e-04	2.027983e-04	-7.416404e-05
GOOGL	2.578429e-05	1.275169e-04	1.693313e-04	1.807171e-04
META	3.715318e-05	1.835129e-04	2.331291e-04	1.080335e-04
GRMN	1.588426e-05	1.751244e-04	1.909332e-04	-1.857691e-05
ARKF	5.899313e-05	2.084156e-04	2.509023e-04	-2.717610e-05
ARKX	3.152201e-05	1.697625e-04	1.958936e-04	-9.870037e-05
MXX	9.501969e-05	2.299358e-05	3.001608e-05	-5.873654e-06
DJI	2.299358e-05	1.454766e-04	1.469226e-04	4.949325e-06
GSPC	3.001608e-05	1.469226e-04	1.677716e-04	2.803622e-05
CLF	-5.873654e-06	4.949325e-06	2.803622e-05	8.728126e-03
ZCF	1.322533e-05	2.096164e-05	1.805487e-05	8.191496e-03
SBF	-3.059966e-05	-3.030533e-05	-2.002181e-05	8.316044e-03
GCF	-1.444503e-05	-3.568490e-05	-2.840124e-05	8.355054e-03
	ZCF	SBF	GCF	
ALFAA.MX	-1.559020e-04	-2.970411e-04	-3.347083e-04	
BIMBOA.MX	8.340239e-05	-1.194873e-05	3.213563e-06	
GFNORTEO.MX	-1.124090e-04	-9.390329e-05	-6.506120e-05	
GRUMAB.MX	6.734256e-05	-1.271682e-05	1.511447e-06	
LACOMERUBC.MX	-1.936675e-04	-1.774588e-04	-1.765095e-04	
VOLARA.MX	3.696979e-05	-8.715658e-05	-1.045671e-04	
AAPL	-7.586971e-05	-1.442453e-04	-1.563426e-04	
GOOGL	2.173084e-04	1.384923e-04	1.083753e-04	
META	4.664781e-05	6.101074e-05	2.260662e-05	
GRMN	-8.608641e-05	-5.327721e-05	-7.986619e-05	
ARKF	-1.045234e-04	-8.804340e-05	-1.075334e-04	
ARKX	-1.334987e-04	-1.548653e-04	-1.476000e-04	
MXX	1.322533e-05	-3.059966e-05	-1.444503e-05	
DJI	2.096164e-05	-3.030533e-05	-3.568490e-05	
GSPC	1.805487e-05	-2.002181e-05	-2.840124e-05	
CLF	8.191496e-03	8.316044e-03	8.355054e-03	
ZCF	1.255987e-02	8.273357e-03	8.301127e-03	

SBF	8.273357e-03	8.525321e-03	8.308095e-03
GCF	8.301127e-03	8.308095e-03	8.447365e-03

## Correlaciones para P/L

```
correlacionesPL=cor(Datos$tablaPL[, -1])
correlacionesPL
```

	ALFAA.MX	BIMBOA.MX	GFNORTEO.MX	GRUMAB.MX	LACOMERUBC.MX
ALFAA.MX	1.00000000	0.252298484	0.23138316	0.231901926	0.22730149
BIMBOA.MX	0.25229848	1.000000000	0.32100082	0.420694102	0.28747170
GFNORTEO.MX	0.23138316	0.321000821	1.00000000	0.190713774	0.23477723
GRUMAB.MX	0.23190193	0.420694102	0.19071377	1.000000000	0.21682268
LACOMERUBC.MX	0.22730149	0.287471701	0.23477723	0.216822680	1.00000000
VOLARA.MX	0.13686699	0.076890055	0.09048407	0.104949338	0.16394326
AAPL	0.09454310	0.194305053	0.11395684	0.116847453	-0.03080900
GOOGL	0.03619762	0.121304422	0.07842561	0.084001947	0.01143854
META	0.11777675	0.048021186	0.10989188	0.032752843	-0.03320226
GRMN	-0.03647185	0.079651576	-0.03475889	0.058134425	-0.04804324
ARKF	0.13983096	0.121518155	0.15468567	0.090359246	0.11192144
ARKX	0.13211028	0.109520919	0.11582602	0.093182410	0.05050562
MXX	0.41228996	0.569924630	0.68440721	0.407874285	0.38238342
DJI	0.09318494	0.137159938	0.06860733	0.148074110	0.01595028
GSPC	0.10900759	0.164228425	0.12292078	0.140262819	0.02003467
CLF	-0.13286776	-0.003181970	-0.02043847	-0.031791490	-0.11970369
ZCF	-0.05112742	0.039075401	-0.05112216	0.039672617	-0.09947649
SBF	-0.11823765	-0.006794914	-0.05183536	-0.009093201	-0.11063649
GCF	-0.13384450	0.001835877	-0.03607963	0.001085741	-0.11055127
	VOLARA.MX	AAPL	GOOGL	META	GRMN
ALFAA.MX	0.13686699	0.09454310	0.03619762	0.11777675	-0.036471850
BIMBOA.MX	0.07689005	0.19430505	0.12130442	0.04802119	0.079651576
GFNORTEO.MX	0.09048407	0.11395684	0.07842561	0.10989188	-0.034758889
GRUMAB.MX	0.10494934	0.11684745	0.08400195	0.03275284	0.058134425
LACOMERUBC.MX	0.16394326	-0.03080900	0.01143854	-0.03320226	-0.048043243
VOLARA.MX	1.00000000	0.16866045	0.26902087	0.26896089	0.151378806
AAPL	0.16866045	1.00000000	0.51591411	0.58007346	0.437861402
GOOGL	0.26902087	0.51591411	1.00000000	0.54154789	0.404686054
META	0.26896089	0.58007346	0.54154789	1.00000000	0.416077244
GRMN	0.15137881	0.43786140	0.40468605	0.41607724	1.000000000
ARKF	0.30048134	0.57986301	0.55808218	0.69531643	0.472247678
ARKX	0.27632445	0.44911400	0.48019507	0.57207923	0.416383465

MXX	0.20097574	0.27930174	0.12711295	0.15988273	0.061630426
DJI	0.26823657	0.69695761	0.50805715	0.63823751	0.549142369
GSPC	0.30022917	0.75664860	0.62823106	0.75500487	0.557515887
CLF	-0.04011596	-0.03836384	0.09295660	0.04850764	-0.007520523
ZCF	0.01110213	-0.03271636	0.09318058	0.01746028	-0.029052070
SBF	-0.03176849	-0.07549798	0.07207949	0.02771809	-0.021823331
GCF	-0.03829006	-0.08220644	0.05666453	0.01031781	-0.032865280
	ARKF	ARKX	MXX	DJI	GSPC
ALFAA.MX	0.13983096	0.13211028	0.412289957	0.093184938	0.10900759
BIMBOA.MX	0.12151816	0.10952092	0.569924630	0.137159938	0.16422842
GFNORTEO.MX	0.15468567	0.11582602	0.684407205	0.068607328	0.12292078
GRUMAB.MX	0.09035925	0.09318241	0.407874285	0.148074110	0.14026282
LACOMERUBC.MX	0.11192144	0.05050562	0.382383418	0.015950282	0.02003467
VOLARA.MX	0.30048134	0.27632445	0.200975742	0.268236569	0.30022917
AAPL	0.57986301	0.44911400	0.279301739	0.696957612	0.75664860
GOOGL	0.55808218	0.48019507	0.127112946	0.508057147	0.62823106
META	0.69531643	0.57207923	0.159882732	0.638237513	0.75500487
GRMN	0.47224768	0.41638346	0.061630426	0.549142369	0.55751589
ARKF	1.00000000	0.79285165	0.253239333	0.723053151	0.81055405
ARKX	0.79285165	1.00000000	0.162232010	0.706113984	0.75873592
MXX	0.25323933	0.16223201	1.000000000	0.195570409	0.23773217
DJI	0.72305315	0.70611398	0.195570409	1.000000000	0.94044358
GSPC	0.81055405	0.75873592	0.237732167	0.940443582	1.00000000
CLF	-0.01217204	-0.05300145	-0.006449723	0.004392269	0.02316860
ZCF	-0.03902631	-0.05976049	0.012106179	0.015507301	0.01243777
SBF	-0.03990047	-0.08414497	-0.033998085	-0.027212414	-0.01674128
GCF	-0.04895752	-0.08056665	-0.016123190	-0.032190470	-0.02385709
	CLF	ZCF	SBF	GCF	
ALFAA.MX	-0.132867758	-0.05112742	-0.118237652	-0.133844500	
BIMBOA.MX	-0.003181970	0.03907540	-0.006794914	0.001835877	
GFNORTEO.MX	-0.020438474	-0.05112216	-0.051835359	-0.036079634	
GRUMAB.MX	-0.031791490	0.03967262	-0.009093201	0.001085741	
LACOMERUBC.MX	-0.119703688	-0.09947649	-0.110636488	-0.110551267	
VOLARA.MX	-0.040115956	0.01110213	-0.031768486	-0.038290057	
AAPL	-0.038363835	-0.03271636	-0.075497984	-0.082206444	
GOOGL	0.092956602	0.09318058	0.072079493	0.056664532	
META	0.048507642	0.01746028	0.027718090	0.010317806	
GRMN	-0.007520523	-0.02905207	-0.021823331	-0.032865280	
ARKF	-0.012172035	-0.03902631	-0.039900468	-0.048957517	
ARKX	-0.053001455	-0.05976049	-0.084144968	-0.080566647	
MXX	-0.006449723	0.01210618	-0.033998085	-0.016123190	
DJI	0.004392269	0.01550730	-0.027212414	-0.032190470	
GSPC	0.023168601	0.01243777	-0.016741284	-0.023857090	

CLF	1.000000000	0.78236644	0.964052944	0.973034323
ZCF	0.782366441	1.00000000	0.799528406	0.805905176
SBF	0.964052944	0.79952841	1.000000000	0.979006233
GCF	0.973034323	0.80590518	0.979006233	1.000000000