ResultsInTables

Gaussian DGP

```
DF_MultiV_Full_GausDGP <- read.csv("DF_MultiV_Full_GaussianDGP.csv")[,-1]


DF_MultiV_Full_GausDGP %>%
  group_by(`F.method`, `R.method`, `Forecast.Horizon`) %>%
  summarise(E.ES = mean(`Energy.score`),
            E.VS = mean(`Variogram.score`)) -> DF_MultiV_Full_GausDGP

#DF_MultScores %>% dplyr::filter(`R.method` != "Base") -> DF_MultScore_Recon

DF_MultiV_Full_GausDGP %>%
  dplyr::filter(`F.method`=="ARIMA" | `R.method`=="Bottom up") -> DF_MultScores_AllTS_GausDGP

##--Calculate the skill scores--#



##--For ARIMA--##

DF_MultScores_AllTS_GausDGP %>%
  filter(`R.method`=="Bottom up") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.ES`) %>% as_vector() -> BU_E.ES_AllTS_GausDGP

DF_MultScores_AllTS_GausDGP %>%
  filter(`R.method`=="Bottom up") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.VS`) %>%
  as_vector() -> BU_E.VS_AllTS_GausDGP


DF_MultScores_AllTS_GausDGP %>%
  mutate(SS_E.ES = round((1-(`E.ES`/BU_E.ES_AllTS_GausDGP))*100, digits = 2),
         SS_E.VS = round((1-(`E.VS`/BU_E.VS_AllTS_GausDGP))*100, digits = 2)) -> DF_MultScore_SS_AllTS_

DF_MultScore_SS_AllTS_GausDGP %>%
  dplyr::select(-`E.ES`, -`E.VS`) -> DF_MultScore_SS_AllTS_GausDGP


# DF_MultScore_SS_AllTS_GausDGP %>%
#   dplyr::select(-`E.ES`, -`E.VS`, -`SS_E.VS`) %>%
#   spread(key = `Forecast.Horizon`, value = `SS_E.ES`) -> SS_E.ES_AllTS_GausDGP
#
# DF_MultScore_SS_AllTS_GausDGP %>%
#   dplyr::select(-`E.ES`, -`E.VS`, -`SS_E.ES`) %>%
```

```r
#   spread(key = `Forecast.Horizon`, value = `SS_E.VS`) -> SS_E.VS_AllTS_GausDGP

# View(SS_E.ES_AllTS_GausDGP)
# View(SS_E.VS_AllTS_GausDGP)



########################################
### Bottom level of the Hierarchy ###
########################################



DF_MultiV_Bot_GausDGP <- read.csv("DF_MultiV_Bot_GaussianDGP.csv")[,-1]


DF_MultiV_Bot_GausDGP %>%
  group_by(`F.method`, `R.method`, `Forecast.Horizon`) %>%
  summarise(E.LS = mean(`Variogram.score`)) -> DF_MultiV_Bot_GausDGP

#DF_MultScores %>% dplyr::filter(`R.method` != "Base") -> DF_MultScore_Recon

DF_MultiV_Bot_GausDGP %>%
  dplyr::filter(`F.method`=="ARIMA" | `R.method`=="Base") -> DF_MultScores_BotTS_GausDGP

##--Calculate the skill scores--#

DF_MultScores_BotTS_GausDGP %>%
  filter(`R.method`=="Bottom up") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.LS`) %>%
  as_vector() -> BU_E.LS_BotTS_GausDGP

DF_MultScores_BotTS_GausDGP %>%
  mutate(SS_E.LS = round((1-(`E.LS`/BU_E.LS_BotTS_GausDGP))*100, digits = 2)) -> DF_MultScore_SS_BotTS_

# DF_MultScore_SS_BotTS_GausDGP %>%
#   dplyr::select(-`E.LS`) %>%
#   spread(key = `Forecast.Horizon`, value = `SS_E.LS`) -> SS_E.LS_BotTS_GausDGP

# View(SS_E.LS_BotTS_GausDGP)


DF_MultScore_SS_BotTS_GausDGP %>%
  ungroup() %>%
  pull(SS_E.LS) -> SS_E.LS

DF_MultScore_SS_AllTS_GausDGP %>%
  ungroup() %>%
  add_column(SS_E.LS = SS_E.LS) -> SkillScore_full_hier
```

```
SkillScore_full_hier %>%
  gather(key = key, value = value, SS_E.ES, SS_E.VS, SS_E.LS) %>%
  unite(temp, Forecast.Horizon, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, `1_SS_E.LS`, `2_SS_E.LS`, `3_SS_E.LS`,
         `1_SS_E.ES`, `2_SS_E.ES`, `3_SS_E.ES`,
         `1_SS_E.VS`, `2_SS_E.VS`, `3_SS_E.VS`) %>%
  rename("1" = `1_SS_E.LS`, "2" = `2_SS_E.LS`, "3" = `3_SS_E.LS`,
         "1" = `1_SS_E.ES`, "2" = `2_SS_E.ES`, "3" = `3_SS_E.ES`,
         "1" = `1_SS_E.VS`, "2" = `2_SS_E.VS`, "3" = `3_SS_E.VS`)%>%
   kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "Log Score(%)" = 3, "Energy Score(%)" = 3, "Variogram Score(%
```

	Log Score(%)			Energy Score(%)			Variogram Score(%)		
R.method	1	2	3	1	2	3	1	2	3
Base	-0.06	-0.19	-0.03	10.00	9.04	5.90	-21.57	-40.58	-57.11
Bottom up	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MinT.Sam	1.29	2.64	4.62	19.35	20.65	17.82	2.10	2.92	3.93
MinT.Shr	1.35	2.75	4.95	19.33	20.75	18.08	2.34	2.96	4.39
OLS	0.26	1.20	1.02	15.00	15.46	12.43	0.47	-0.35	-1.85
WLS	1.05	2.70	3.87	18.00	18.99	15.92	1.61	1.69	1.55

Non Gaussian DGP

```
DF_MultiV_Full_NonGausDGP <- read.csv("DF_MultiV_Full_NonGaussianDGP.csv")[,-1]


DF_MultiV_Full_NonGausDGP %>%
  group_by(`F.method`, `R.method`, `Forecast.Horizon`) %>%
  summarise(E.ES = mean(`Energy.score`),
            E.VS = mean(`Variogram.score`)) -> DF_MultiV_Full_NonGausDGP

#DF_MultScores %>% dplyr::filter(`R.method` != "Base") -> DF_MultScore_Recon

DF_MultiV_Full_NonGausDGP %>%
  dplyr::filter(`F.method`=="ARIMA" | `R.method`=="Bottom up") -> DF_MultScores_AllTS_NonGausDGP

##--Calculate the skill scores--#



##--For ARIMA--##

DF_MultScores_AllTS_NonGausDGP %>%
  filter(`R.method`=="Bottom up") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.ES`) %>% as_vector() -> BU_E.ES_AllTS_NonGausDGP

DF_MultScores_AllTS_NonGausDGP %>%
  filter(`R.method`=="Bottom up") %>%
```

```
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.VS`) %>%
  as_vector() -> BU_E.VS_AllTS_NonGausDGP


DF_MultScores_AllTS_NonGausDGP %>%
  mutate(SS_E.ES = round((1-(`E.ES`/BU_E.ES_AllTS_NonGausDGP))*100, digits = 2),
         SS_E.VS = round((1-(`E.VS`/BU_E.VS_AllTS_NonGausDGP))*100, digits = 2)) -> DF_MultScore_SS_All

DF_MultScore_SS_AllTS_NonGausDGP %>%
  dplyr::select(-`E.ES`, -`E.VS`) -> DF_MultScore_SS_AllTS_NonGausDGP


# DF_MultScore_SS_AllTS_NonGausDGP %>%
#   dplyr::select(-`E.ES`, -`E.VS`, -`SS_E.VS`) %>%
#   spread(key = `Forecast.Horizon`, value = `SS_E.ES`) -> SS_E.ES_AllTS_NonGausDGP
#
# DF_MultScore_SS_AllTS_NonGausDGP %>%
#   dplyr::select(-`E.ES`, -`E.VS`, -`SS_E.ES`) %>%
#   spread(key = `Forecast.Horizon`, value = `SS_E.VS`) -> SS_E.VS_AllTS_NonGausDGP

# View(SS_E.ES_AllTS_NonGausDGP)
# View(SS_E.VS_AllTS_NonGausDGP)



########################################
### Bottom level of the Hierarchy ###
########################################



DF_MultiV_Bot_NonGausDGP <- read.csv("DF_MultiV_Bot_NonGaussianDGP.csv")[,-1]


DF_MultiV_Bot_NonGausDGP %>%
  group_by(`F.method`, `R.method`, `Forecast.Horizon`) %>%
  summarise(E.LS = mean(`Variogram.score`)) -> DF_MultiV_Bot_NonGausDGP

#DF_MultScores %>% dplyr::filter(`R.method` != "Base") -> DF_MultScore_Recon

DF_MultiV_Bot_NonGausDGP %>%
  dplyr::filter(`F.method`=="ARIMA" | `R.method`=="Base") -> DF_MultScores_BotTS_NonGausDGP

##--Calculate the skill scores--#

DF_MultScores_BotTS_NonGausDGP %>%
  filter(`R.method`=="Bottom up") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(`E.LS`) %>%
  as_vector() -> BU_E.LS_BotTS_NonGausDGP
```

```
DF_MultScores_BotTS_NonGausDGP %>%
  mutate(SS_E.LS = round((1-(`E.LS`/BU_E.LS_BotTS_NonGausDGP))*100, digits = 2)) -> DF_MultScore_SS_Bot

# DF_MultScore_SS_BotTS_NonGausDGP %>%
#   dplyr::select(-`E.LS`) %>%
#   spread(key = `Forecast.Horizon`, value = `SS_E.LS`) -> SS_E.LS_BotTS_NonGausDGP

# View(SS_E.LS_BotTS_NonGausDGP)


DF_MultScore_SS_BotTS_NonGausDGP %>%
  ungroup() %>%
  pull(SS_E.LS) -> SS_E.LS

DF_MultScore_SS_AllTS_NonGausDGP %>%
  ungroup() %>%
  add_column(SS_E.LS = SS_E.LS) -> SkillScore_full_hier

SkillScore_full_hier %>%
  gather(key = key, value = value, SS_E.ES, SS_E.VS, SS_E.LS) %>%
  unite(temp, Forecast.Horizon, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, `1_SS_E.LS`, `2_SS_E.LS`, `3_SS_E.LS`,
         `1_SS_E.ES`, `2_SS_E.ES`, `3_SS_E.ES`,
         `1_SS_E.VS`, `2_SS_E.VS`, `3_SS_E.VS`) %>%
  rename("1" = `1_SS_E.LS`, "2" = `2_SS_E.LS`, "3" = `3_SS_E.LS`,
         "1" = `1_SS_E.ES`, "2" = `2_SS_E.ES`, "3" = `3_SS_E.ES`,
         "1" = `1_SS_E.VS`, "2" = `2_SS_E.VS`, "3" = `3_SS_E.VS`)%>%
   kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "Log Score(%)" = 3, "Energy Score(%)" = 3, "Variogram Score(%
```

	Log Score(%)			Energy Score(%)			Variogram Score(%)		
R.method	1	2	3	1	2	3	1	2	3
Base	-0.07	0.09	0.03	8.47	8.94	9.20	-2.79	-2.09	-3.62
Bottom up	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MinT.Sam	4.40	4.30	3.42	15.02	16.94	17.88	0.59	1.02	0.64
MinT.Shr	4.52	4.55	4.01	15.04	16.98	18.00	0.69	1.34	0.66
OLS	0.65	0.47	0.10	11.26	12.27	13.12	0.17	0.48	-0.24
WLS	0.93	1.34	0.89	12.72	14.22	15.20	0.00	0.41	-0.42

Comparing univariate predictive accuracy in aggregate levels

```
DF_UniV_GausDGP <- read.csv("DF_UniV_GaussianDGP.csv")[-1]

DF_UniV_GausDGP %>%
  dplyr::select(-F.method) %>%
  group_by(Series, R.method , `Forecast.Horizon`) %>%
  summarise(E.CRPS = mean(CRPS),
            E.LS = mean(LS)) -> DF_Mean_UnivScore_GausDGP
```

```r
DF_Mean_UnivScore_GausDGP %>%
  filter(`R.method`=="Base") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(Series, `E.CRPS`, Forecast.Horizon) %>%
  spread(key = Series, value = E.CRPS) %>%
  slice(rep(1:n(), 6)) %>%
  gather(-Forecast.Horizon, key = Series, value = E.CRPS) %>%
  pull(E.CRPS) -> Base_E.CRPS_BotTS_GausDGP

DF_Mean_UnivScore_GausDGP %>%
  filter(`R.method`=="Base") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(Series, `E.LS`, Forecast.Horizon) %>%
  spread(key = Series, value = E.LS) %>%
  slice(rep(1:n(), 6)) %>%
  gather(-Forecast.Horizon, key = Series, value = E.LS) %>%
  pull(E.LS) -> Base_E.LS_BotTS_GausDGP


DF_Mean_UnivScore_GausDGP %>%
  ungroup() %>%
  mutate(SS_E.CRPS = round((1-(`E.CRPS`/Base_E.CRPS_BotTS_GausDGP))*100, digits = 2),
         SS_E.LS = round((1-(`E.LS`/Base_E.LS_BotTS_GausDGP))*100, digits = 2)) -> DF_Mean_UnivScore_SS

DF_Mean_UnivScore_SS_GausDGP %>%
  dplyr::select(-E.CRPS, -E.LS) %>%
  filter(Series %in% c("Total", "A", "B")) -> DF_Mean_UnivScore_SS_GausDGP_aggregate

DF_Mean_UnivScore_SS_GausDGP_aggregate %>%
  filter(Forecast.Horizon == 1) -> DF_Mean_UnivScore_SS_GausDGP_aggregate_h1

DF_Mean_UnivScore_SS_GausDGP_aggregate_h1 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_GausDGP_aggrega

DF_Mean_UnivScore_SS_GausDGP_aggregate %>%
  filter(Forecast.Horizon == 2) -> DF_Mean_UnivScore_SS_GausDGP_aggregate_h2

DF_Mean_UnivScore_SS_GausDGP_aggregate_h2 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_GausDGP_aggrega

DF_Mean_UnivScore_SS_GausDGP_aggregate %>%
```

```
  filter(Forecast.Horizon == 3) -> DF_Mean_UnivScore_SS_GausDGP_aggregate_h3

DF_Mean_UnivScore_SS_GausDGP_aggregate_h3 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_GausDGP_aggrega

left_join(DF_Mean_UnivScore_SS_GausDGP_aggregate_h1,
          DF_Mean_UnivScore_SS_GausDGP_aggregate_h2, by = "R.method") %>%
  left_join(DF_Mean_UnivScore_SS_GausDGP_aggregate_h3, by = "R.method") %>%
  as_tibble() %>%
  kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "Total" = 2, "A" = 2, "B" = 2,
                                 "Total" = 2, "A" = 2, "B" = 2,
                                 "Total" = 2, "A" = 2, "B" = 2))
```

	Total		A		B	
R.method	Total_SS_E.CRPS.x	Total_SS_E.LS.x	A_SS_E.CRPS.x	A_SS_E.LS.x	B_SS_E.CRPS.x	B_SS
Base	0.00	0.00	0.00	0.00	0.00	
Bottom up	-103.83	-23.31	-9.87	-2.46	-3.73	
MinT.Sam	1.08	0.29	23.92	7.47	0.67	
MinT.Shr	0.91	0.30	23.74	7.44	0.84	
OLS	-12.61	-3.92	12.55	3.71	-1.69	
WLS	-2.09	-0.76	20.26	6.19	-0.38	

```
DF_UniV_NonGausDGP <- read.csv("DF_UniV_NonGaussianDGP.csv")[-1]

DF_UniV_NonGausDGP %>%
  dplyr::select(-F.method) %>%
  group_by(Series, R.method , `Forecast.Horizon`) %>%
  summarise(E.CRPS = mean(CRPS),
            E.LS = mean(LS)) -> DF_Mean_UnivScore_NonGausDGP

DF_Mean_UnivScore_NonGausDGP %>%
  filter(`R.method`=="Base") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(Series, `E.CRPS`, Forecast.Horizon) %>%
  spread(key = Series, value = E.CRPS) %>%
  slice(rep(1:n(), 6)) %>%
  gather(-Forecast.Horizon, key = Series, value = E.CRPS) %>%
  pull(E.CRPS) -> Base_E.CRPS_BotTS_NonGausDGP

DF_Mean_UnivScore_NonGausDGP %>%
  filter(`R.method`=="Base") %>%
  slice() %>%
  ungroup() %>%
  dplyr::select(Series, `E.LS`, Forecast.Horizon) %>%
  spread(key = Series, value = E.LS) %>%
  slice(rep(1:n(), 6)) %>%
```

```
  gather(-Forecast.Horizon, key = Series, value = E.LS) %>%
  pull(E.LS) -> Base_E.LS_BotTS_NonGausDGP


DF_Mean_UnivScore_NonGausDGP %>%
  ungroup() %>%
  mutate(SS_E.CRPS = round((1-(`E.CRPS`/Base_E.CRPS_BotTS_NonGausDGP))*100, digits = 2),
         SS_E.LS = round((1-(`E.LS`/Base_E.LS_BotTS_NonGausDGP))*100, digits = 2)) -> DF_Mean_UnivScore_


DF_Mean_UnivScore_SS_NonGausDGP %>%
  dplyr::select(-E.CRPS, -E.LS) %>%
  filter(Series %in% c("Total", "A", "B")) -> DF_Mean_UnivScore_SS_NonGausDGP_aggregate

DF_Mean_UnivScore_SS_NonGausDGP_aggregate %>%
  filter(Forecast.Horizon == 1) -> DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h1

DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h1 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_NonGausDGP_aggr

DF_Mean_UnivScore_SS_NonGausDGP_aggregate %>%
  filter(Forecast.Horizon == 2) -> DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h2

DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h2 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_NonGausDGP_aggr

DF_Mean_UnivScore_SS_NonGausDGP_aggregate %>%
  filter(Forecast.Horizon == 3) -> DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h3

DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h3 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) %>%
  dplyr::select(R.method, Total_SS_E.CRPS, Total_SS_E.LS,
                A_SS_E.CRPS, A_SS_E.LS, B_SS_E.CRPS, B_SS_E.LS) -> DF_Mean_UnivScore_SS_NonGausDGP_aggr

left_join(DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h1,
          DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h2, by = "R.method") %>%
  left_join(DF_Mean_UnivScore_SS_NonGausDGP_aggregate_h3, by = "R.method") %>%
  as_tibble() %>%
  kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "Total" = 2, "A" = 2, "B" = 2,
```

```
                                  "Total" = 2, "A" = 2, "B" = 2,
                                  "Total" = 2, "A" = 2, "B" = 2))
```

	Total		A		B	
R.method	Total_SS_E.CRPS.x	Total_SS_E.LS.x	A_SS_E.CRPS.x	A_SS_E.LS.x	B_SS_E.CRPS.x	B_SS
Base	0.00	0.00	0.00	0.00	0.00	
Bottom up	-541.40	-246.37	-4.60	-1.87	-8.99	
MinT.Sam	-1.16	-0.72	0.92	0.28	11.90	
MinT.Shr	-1.16	-0.26	0.92	0.27	11.90	
OLS	-96.77	-84.90	0.55	0.08	6.48	
WLS	0.01	0.35	-1.02	-0.52	9.95	

Comparing univariate predictive accuracy in disaggregate levels

```
DF_Mean_UnivScore_SS_GausDGP %>%
  dplyr::select(-E.CRPS, -E.LS) %>%
  filter(Series %in% c("AA", "AB", "BA", "BB")) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate

DF_Mean_UnivScore_SS_GausDGP_disaggregate %>%
  filter(Forecast.Horizon == 1) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h1

DF_Mean_UnivScore_SS_GausDGP_disaggregate_h1 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h1

DF_Mean_UnivScore_SS_GausDGP_disaggregate %>%
  filter(Forecast.Horizon == 2) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h2

DF_Mean_UnivScore_SS_GausDGP_disaggregate_h2 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h2

DF_Mean_UnivScore_SS_GausDGP_disaggregate %>%
  filter(Forecast.Horizon == 3) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h3

DF_Mean_UnivScore_SS_GausDGP_disaggregate_h3 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_GausDGP_disaggregate_h3

left_join(DF_Mean_UnivScore_SS_GausDGP_disaggregate_h1,
          DF_Mean_UnivScore_SS_GausDGP_disaggregate_h2, by = "R.method") %>%
  left_join(DF_Mean_UnivScore_SS_GausDGP_disaggregate_h3, by = "R.method") %>%
  as_tibble() %>%
  kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2,
```

```
                                  "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2,
                                  "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2))
```

	AA		AB		BA	
R.method	AA_SS_E.CRPS.x	AA_SS_E.LS.x	AB_SS_E.CRPS.x	AB_SS_E.LS.x	BA_SS_E.CRPS.x	BA_
Base	0.00	0.00	0.00	0.00	0.00	
Bottom up	0.16	0.00	-0.04	0.00	0.10	
MinT.Sam	7.03	1.97	12.46	3.70	1.02	
MinT.Shr	7.13	2.00	12.21	3.61	1.18	
OLS	4.73	1.29	8.21	2.39	0.74	
WLS	6.35	1.77	10.75	3.13	1.07	

```
DF_Mean_UnivScore_SS_NonGausDGP %>%
  dplyr::select(-E.CRPS, -E.LS) %>%
  filter(Series %in% c("AA", "AB", "BA", "BB")) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate %>%
  filter(Forecast.Horizon == 1) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h1

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h1 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h1

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate %>%
  filter(Forecast.Horizon == 2) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h2

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h2 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h2

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate %>%
  filter(Forecast.Horizon == 3) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h3

DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h3 %>%
  dplyr::select(-Forecast.Horizon) %>%
  gather(key = key, value = value, SS_E.CRPS, SS_E.LS) %>%
  unite(temp, Series, key) %>%
  spread(key = temp, value = value) -> DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h3

left_join(DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h1,
          DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h2, by = "R.method") %>%
  left_join(DF_Mean_UnivScore_SS_NonGausDGP_disaggregate_h3, by = "R.method") %>%
  as_tibble() %>%
  kable(format = "latex") %>% kable_styling("striped") %>%
  kableExtra::add_header_above(c(" " = 1, "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2,
                                 "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2,
                                 "AA" = 2, "AB" = 2, "BA" = 2, "BB" = 2))
```

	AA		AB		BA	
R.method	AA_SS_E.CRPS.x	AA_SS_E.LS.x	AB_SS_E.CRPS.x	AB_SS_E.LS.x	BA_SS_E.CRPS.x	BA_
Base	0.00	0.00	0.00	0.00	0.00	
Bottom up	-0.10	0.00	-0.12	0.00	-0.02	
MinT.Sam	3.40	1.29	-0.11	-0.13	13.22	
MinT.Shr	3.40	1.31	-0.11	-0.11	13.22	
OLS	2.70	1.07	-1.46	-0.55	6.19	
WLS	2.92	1.20	-1.90	-0.74	8.50	