

ST308 Project

About the data set

“<https://www.kaggle.com/datasets/zynicide/wine-reviews?resource=download>”

The data I’ve chosen to use is from ‘Kaggle’ and was scraped from ‘WineEnthusiast’ during the week of June 15th, 2017. It contains data about: country, description, designation, points (quality), price, province, region_1, region_2, taster_name, taster_twitter_handle, title, variety, winery.

— Importing necessary libraries (and setting working directory) —

```
library(rstanarm)
```

```
## Warning: package 'rstanarm' was built under R version 4.3.3
```

```
## Loading required package: Rcpp
```

```
## Warning: package 'Rcpp' was built under R version 4.3.3
```

```
## This is rstanarm version 2.32.1
```

```
## - See https://mc-stan.org/rstanarm/articles/priors for changes to default priors!
```

```
## - Default priors may change, so it's safest to specify priors, even if equivalent to the defaults.
```

```
## - For execution on a local, multicore CPU with excess RAM we recommend calling
```

```
##   options(mc.cores = parallel::detectCores())
```

```
library(rstan)
```

```
## Warning: package 'rstan' was built under R version 4.3.3
```

```
## Loading required package: StanHeaders
```

```
## Warning: package 'StanHeaders' was built under R version 4.3.3
```

```
##
```

```
## rstan version 2.32.7 (Stan version 2.32.2)
```

```
## For execution on a local, multicore CPU with excess RAM we recommend calling
## options(mc.cores = parallel::detectCores()).
## To avoid recompilation of unchanged Stan programs, we recommend calling
## rstan_options(auto_write = TRUE)
## For within-chain threading using 'reduce_sum()' or 'map_rect()' Stan functions,
## change 'threads_per_chain' option:
## rstan_options(threads_per_chain = 1)

## Do not specify '-march=native' in 'LOCAL_CPPFLAGS' or a Makevars file
```

```
library(MASS)
library(glmnet)
```

```
## Warning: package 'glmnet' was built under R version 4.3.3
```

```
## Loading required package: Matrix
```

```
## Loaded glmnet 4.1-8
```

```
library(ggplot2)
```

— Data cleaning —

Importing wine data

```
wine <- read.csv("wine_data.csv", fileEncoding = "UTF-8")
colnames(wine)[c(1, 3, 5, 11, 12)] <- c("id", "desc", "rating", "twitter",
                                         "review_title")
print("columns (variables):")
```

```
## [1] "columns (variables):"
```

```
colnames(wine)
```

```
## [1] "id"          "country"     "desc"        "designation" "rating"
## [6] "price"       "province"    "region_1"    "region_2"    "taster_name"
## [11] "twitter"     "review_title" "variety"     "winery"
```

```
print("dimensions:")
```

```
## [1] "dimensions:"
```

```
dim(wine)
```

```
## [1] 129971      14
```

Selecting chosen categories

```
# assessing null or empty values
na_or_empty_count <- sapply(wine, function(x) sum(is.na(x) | x == ""))
result <- data.frame(
  variables = names(na_or_empty_count),
  na_or_empty_count = as.vector(na_or_empty_count),
  stringsAsFactors = FALSE
)
result <- result[order(-result$na_or_empty_count), ]
print(result)
```

```
##      variables na_or_empty_count
## 9      region_2          79460
## 4    designation          37465
## 11     twitter          31213
## 10   taster_name          26244
## 8      region_1          21247
## 6        price           8996
## 2        country           63
## 7      province           63
## 13     variety            1
## 1         id             0
## 3         desc             0
## 5         rating            0
## 12  review_title            0
## 14        winery            0
```

```
# selecting only necessary categories (which have sufficiently low levels of missing data)
wine <- subset(wine, select=c("country", "rating", "price", "province", "variety"))

# removing null or empty values
wine <- wine[apply(wine, 1, function(row) all(!is.na(row) & row != "")), ]

# creating a centered rating to speed up convergence
wine$rating <- as.numeric(as.character(wine$rating))
wine$rating_c <- wine$rating - mean(wine$rating)

# creating log_price to reduce the influence of higher priced outliers and make
# a more linear relationship with ratings
wine$price <- as.numeric(wine$price)
wine$log_price <- log2(wine$price) # base 2 chosen based on exploration of data

# creating lists of columns which are continuous, and categorical / discrete
cont_vars = c("price", "log_price", "rating", "rating_c")
cat_vars = c("country", "province", "variety")

# converting 'country', 'province', and 'region_1' to factors
for (var in cat_vars) {
  wine[[var]] <- factor(wine[[var]])
}
```

```

# removing provinces with less than 10 values
wine <- wine[table(wine$province)[wine$province] >= 10, ]
wine$province <- droplevels(wine$province)

# removing countries with less than 10 values
wine <- wine[table(wine$country)[wine$country] >= 10, ]
wine$country <- droplevels(wine$country)

# reviewing changes to data
print("chosen variables:")

```

```
## [1] "chosen variables:"
```

```
colnames(wine)
```

```
## [1] "country" "rating" "price" "province" "variety" "rating_c"
## [7] "log_price"
```

```
print("new dimensions:")
```

```
## [1] "new dimensions:"
```

```
dim(wine)
```

```
## [1] 120245      7
```

— Data Exploration (EDA) —

```

# data structure
str(wine)

```

```

## 'data.frame': 120245 obs. of 7 variables:
## $ country : Factor w/ 33 levels "Argentina","Australia",...: 25 33 33 33 29 17 11 13 11 33 ...
## $ rating : num 87 87 87 87 87 87 87 87 87 87 ...
## $ price : num 15 14 13 65 15 16 24 12 27 19 ...
## $ province : Factor w/ 224 levels "Aconcagua Costa",...: 53 136 110 136 132 169 6 157 6 30 ...
## $ variety : Factor w/ 691 levels "Abouriou","Agiorgitiko",...: 444 431 473 435 580 184 207 207 431 ...
## $ rating_c : num -1.42 -1.42 -1.42 -1.42 -1.42 ...
## $ log_price: num 3.91 3.81 3.7 6.02 3.91 ...

```

```

# viewing summary stats for continuous variables
summary(wine[, cont_vars])

```

```

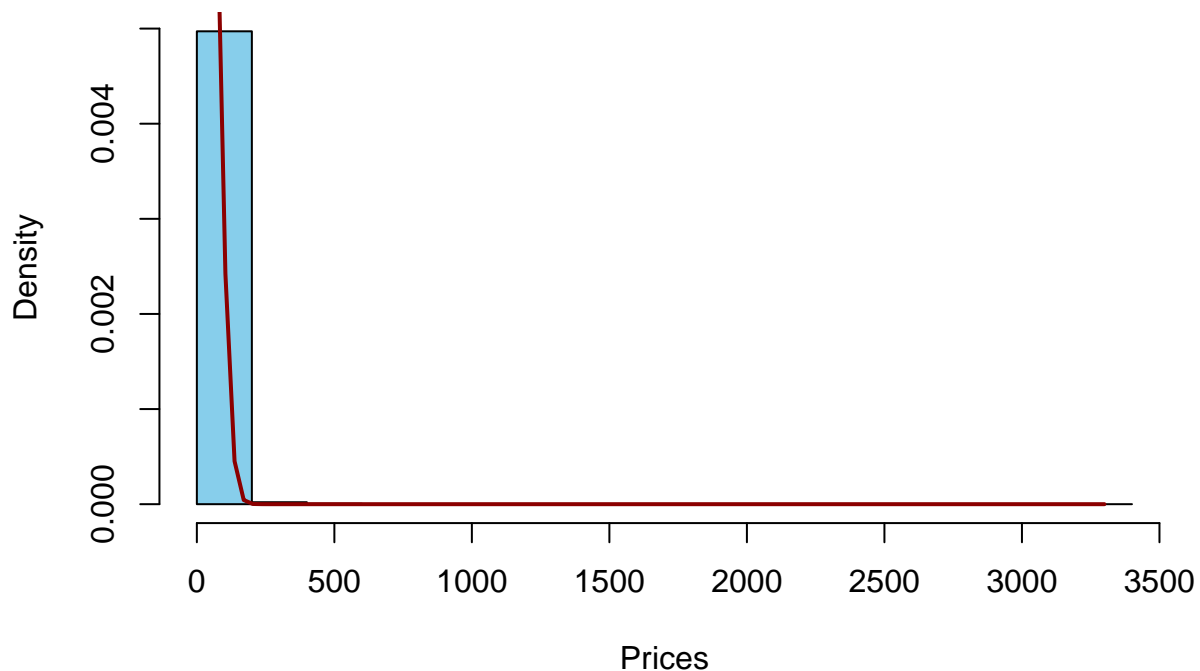
##      price      log_price      rating      rating_c
## Min.   : 4.00   Min.   : 2.000   Min.   : 80.00   Min.   : -8.421726
## 1st Qu.: 17.00   1st Qu.: 4.087   1st Qu.: 86.00   1st Qu.: -2.421726
## Median : 25.00   Median : 4.644   Median : 88.00   Median : -0.421726
## Mean   : 35.42   Mean   : 4.784   Mean   : 88.43   Mean   : 0.006974
## 3rd Qu.: 42.00   3rd Qu.: 5.392   3rd Qu.: 91.00   3rd Qu.: 2.578274
## Max.   :3300.00   Max.   :11.688   Max.   :100.00   Max.   :11.578274

```

```
cat("\n")

# histogram of wine prices to show why log price is needed
hist(wine$price, freq = FALSE, col = "skyblue", border = "black",
     main = "Histogram of Wine Prices with Normal Curve",
     xlab = "Prices")
mean_price <- mean(wine$price)
sd_price <- sd(wine$price)
x_vals <- seq(min(wine$price), max(wine$price), length = 100)
y_vals <- dnorm(x_vals, mean = mean_price, sd = sd_price)
lines(x_vals, y_vals, col = "darkred", lwd = 2)
```

Histogram of Wine Prices with Normal Curve

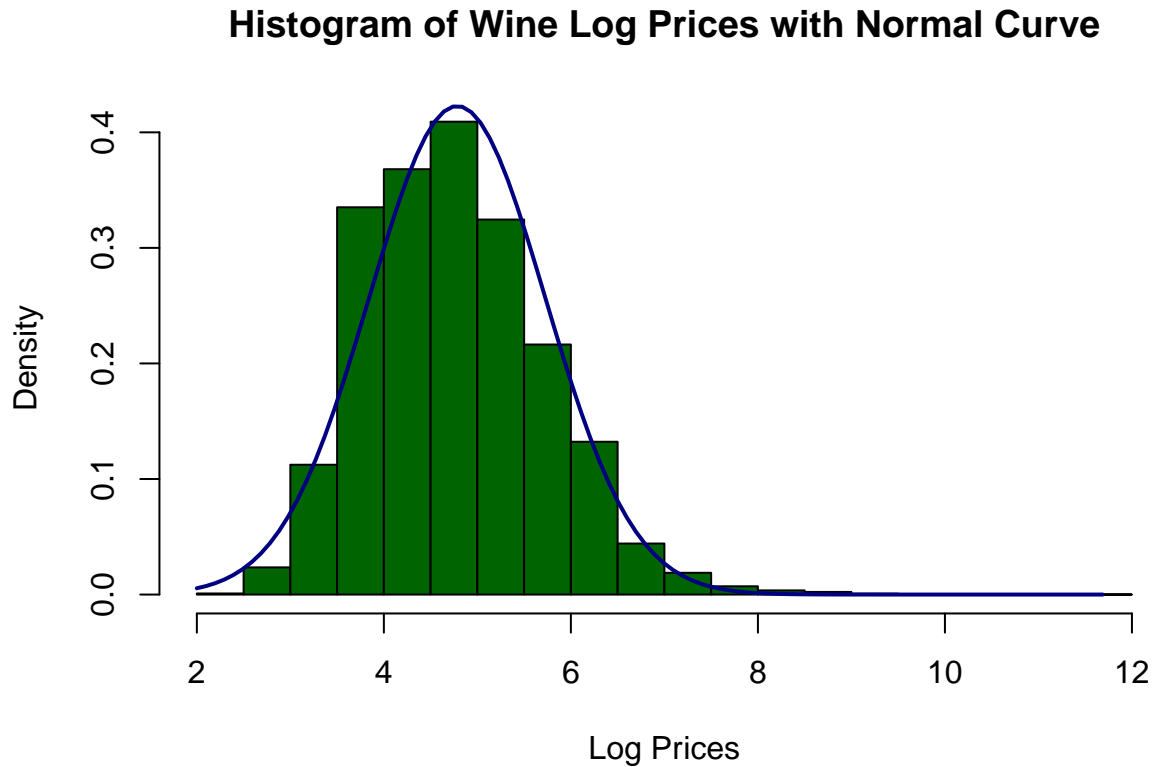


```
cat("The prices have mean average, ", mean_price, ", and standard deviation, ",
    sd_price, ". ", "\n")
```

```
## The prices have mean average, 35.41894 , and standard deviation, 41.07865 .
```

```
# histogram of log prices
hist(wine$log_price, freq = FALSE, col = "darkgreen", border = "black",
     main = "Histogram of Wine Log Prices with Normal Curve",
     xlab = "Log Prices")
mean_logprice <- mean(wine$log_price)
sd_logprice <- sd(wine$log_price)
x_vals <- seq(min(wine$log_price), max(wine$log_price), length = 100)
```

```
y_vals <- dnorm(x_vals, mean = mean_logprice, sd = sd_logprice)
lines(x_vals, y_vals, col = "navy", lwd = 2)
```



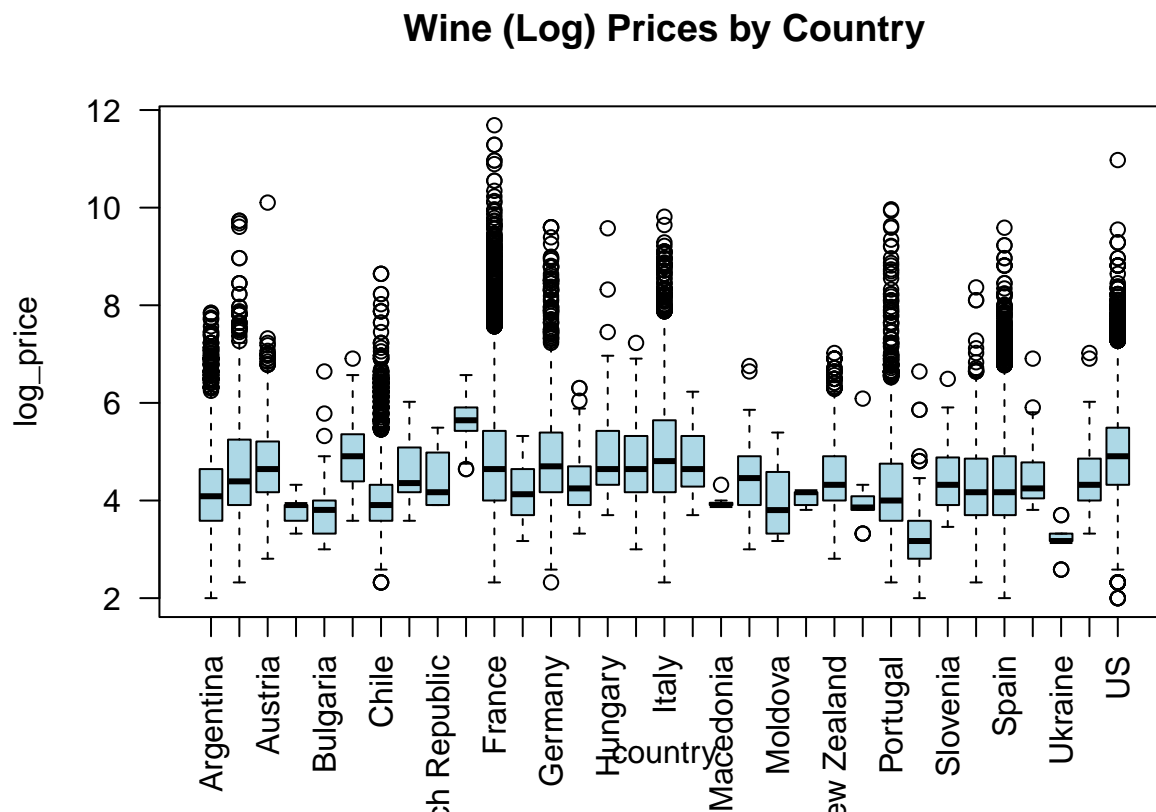
```
cat("The log prices seem to roughly follow a normal distribution around",
    mean_logprice, "in the histogram, with a standard deviation of",
    sd_logprice, ".")
```

```
## The log prices seem to roughly follow a normal distribution around 4.784408 in the histogram, with a
```

```
# viewing number of unique values of categorical variables
unique_counts <- sapply(cat_vars, function(var) {
  length(unique(wine[[var]]))
})
unique_counts_df <- data.frame(
  category = names(unique_counts),
  unique_count = as.integer(unique_counts),
  stringsAsFactors = FALSE
)
unique_counts_df <- unique_counts_df[order(-unique_counts_df$unique_count), ]
print(unique_counts_df)
```

```
##   category unique_count
## 3  variety          668
## 2 province          224
## 1  country           33
```

```
# boxplot of log prices by country for relative comparison
boxplot(log_price ~ country, data = subset(wine),
        las = 2, col = "lightblue", main = "Wine (Log) Prices by Country")
```



```
# removing variety as it has a very high count of unique values which will make interpretation more dif
wine <- wine[, !names(wine) %in% "variety"]
cat_vars = c("country", "province")
dim(wine)
```

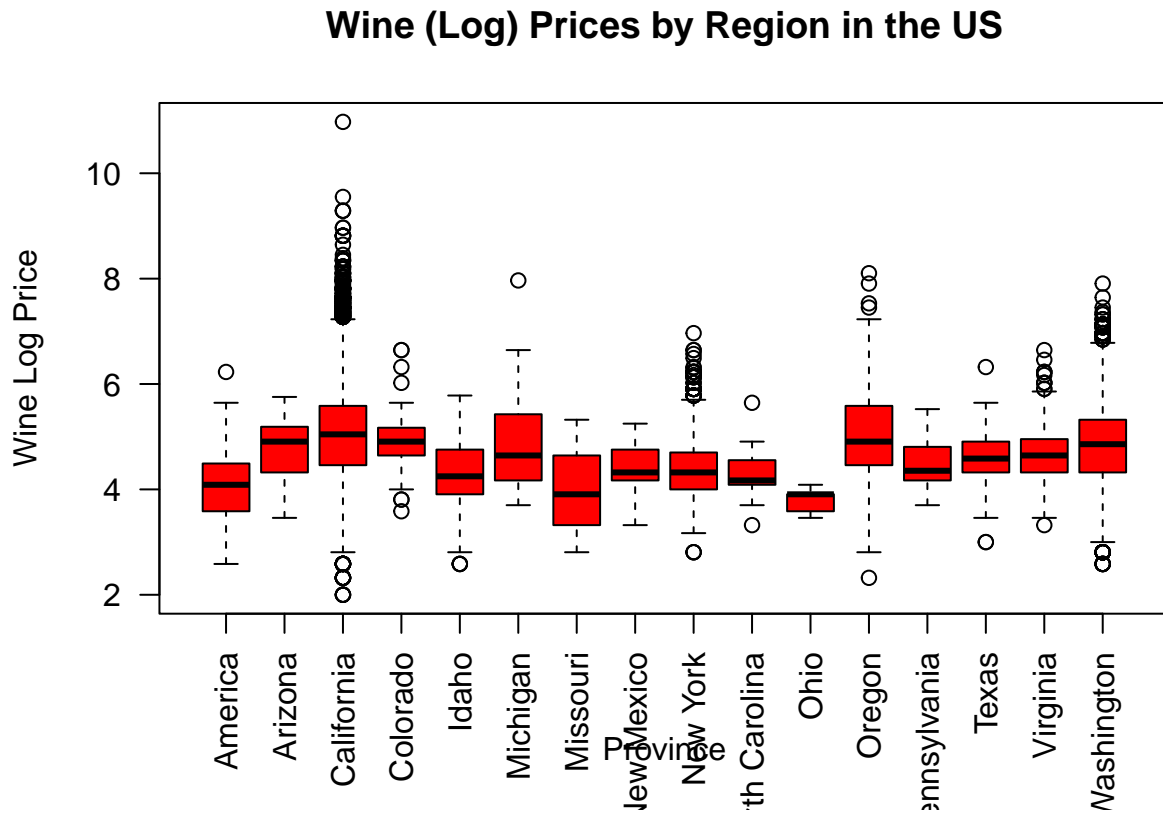
```
## [1] 120245      6
```

```
# find countries with the highest level of data
country_counts <- table(wine$country)
top_countries <- sort(country_counts, decreasing = TRUE)[1:5]
print(top_countries)
```

```
##
##      US      France      Italy      Spain Portugal
##  54220    17776    16914    6573      4804
```

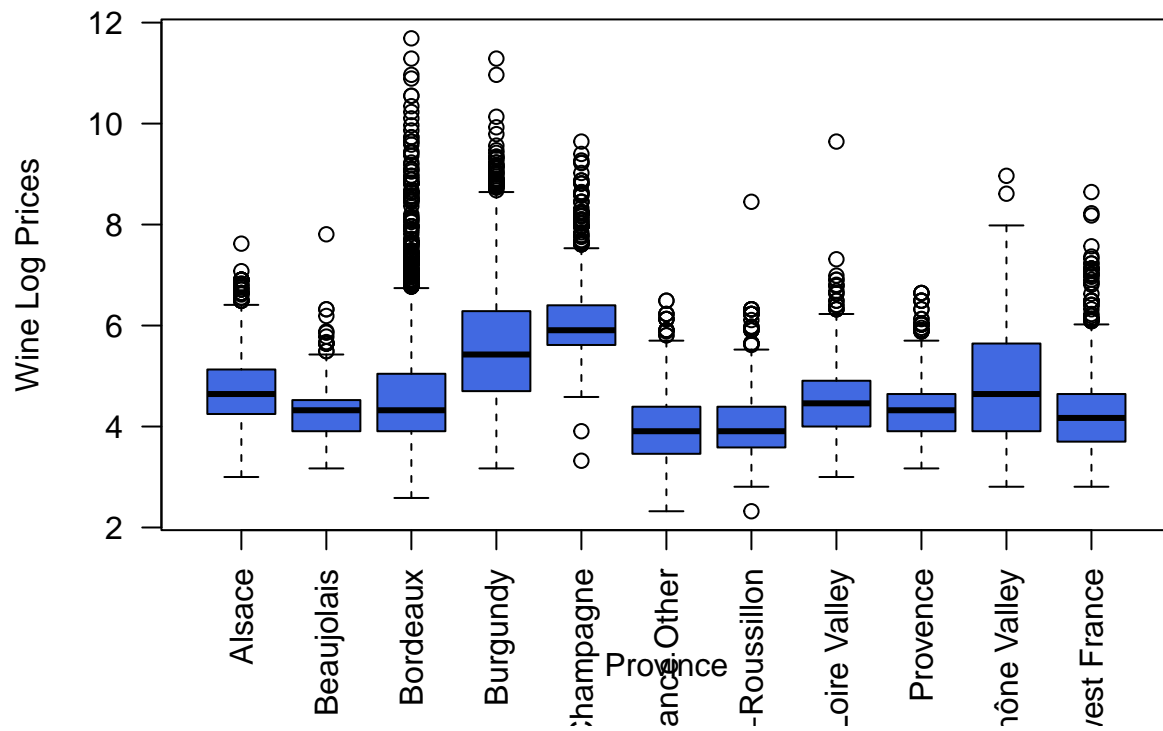
```
# filter for US provinces and drop unused factor levels
us_data <- subset(wine, country == 'US')
us_data$province <- droplevels(us_data$province)
# create boxplot for only USA provinces
```

```
boxplot(log_price ~ province, data = us_data, col="red",
        las = 2, main = "Wine (Log) Prices by Region in the US",
        xlab = "Province", ylab = "Wine Log Price")
```



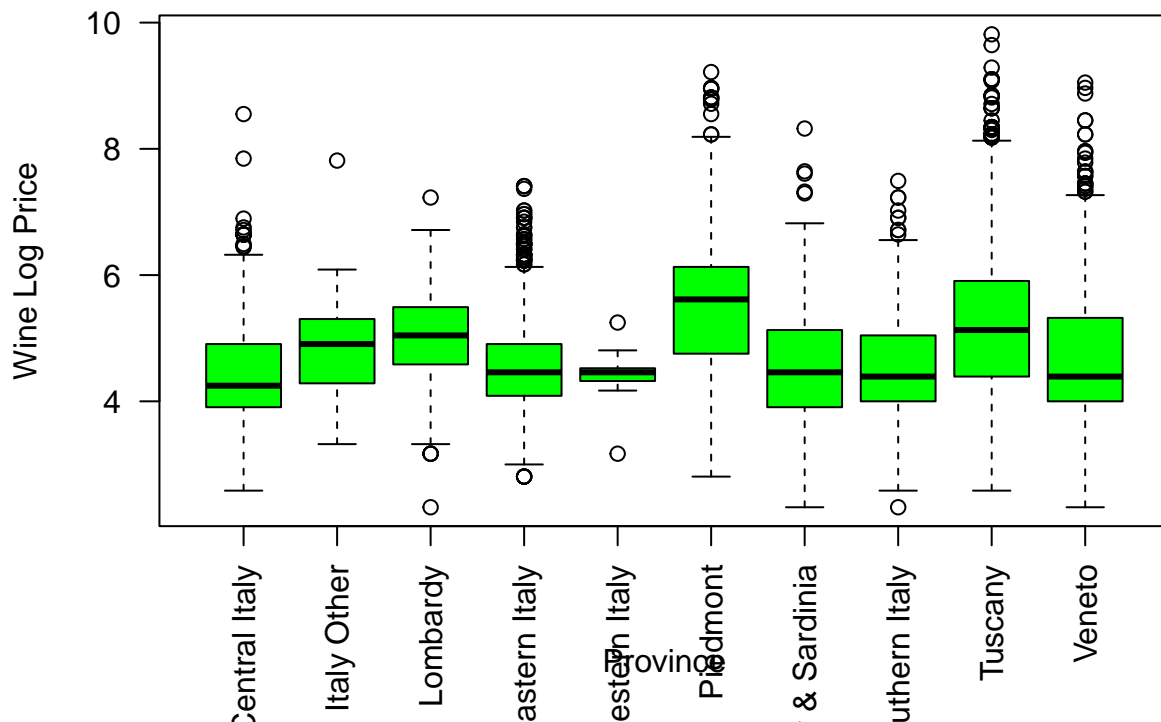
```
# filter for French provinces and drop unused factor levels
france_data <- subset(wine, country == 'France')
france_data$province <- droplevels(france_data$province)
# create boxplot for only French provinces
boxplot(log_price ~ province, data = france_data, col="royalblue",
        las = 2, main = "Wine (Log) Prices by Region in France",
        xlab = "Province", ylab = "Wine Log Prices")
```


Wine (Log) Prices by Region in France



```
# filter for Italian provinces and drop unused factor levels
italy_data <- subset(wine, country == 'Italy')
italy_data$province <- droplevels(italy_data$province)
# create boxplot for only Italian provinces
boxplot(log_price ~ province, data = italy_data, col="green",
        las = 2, main = "Wine (Log) Prices by Region in Italy",
        xlab = "Province", ylab = "Wine Log Price")
```

Wine (Log) Prices by Region in Italy



Lasso and Ridge regression modelling

```
set.seed(42)

# creating design matrix (X) and response vector (y)
X <- model.matrix(log_price ~ rating_c + country + province, data = wine)[, -1]
y <- wine$log_price

# splitting data into training and test sets (80:20)
train_idx <- sample(seq_along(y), size = 0.8 * length(y))
X_train <- X[train_idx, ]
X_test <- X[-train_idx, ]
y_train <- y[train_idx]
y_test <- y[-train_idx]

# grid of lambda values
lambda_grid <- 10^seq(4, -2, length = 100)

# ridge
ridge_model <- cv.glmnet(X_train, y_train, alpha = 0, lambda = lambda_grid)
ridge_best_lambda <- ridge_model$lambda.min
cat("Ridge best lambda:", ridge_best_lambda, "\n")
```

```
## Ridge best lambda: 0.01
```

```
ridge_pred <- predict(ridge_model, s = ridge_best_lambda, newx = X_test)
ridge_mse <- mean((ridge_pred - y_test)^2)
cat("Ridge test MSE:", ridge_mse, "\n\n")
```

```
## Ridge test MSE: 0.4631729
```

```
# lasso
lasso_model <- cv.glmnet(X_train, y_train, alpha = 1, lambda = lambda_grid)
lasso_best_lambda <- lasso_model$lambda.min
cat("Lasso best lambda:", lasso_best_lambda, "\n")
```

```
## Lasso best lambda: 0.01
```

```
lasso_pred <- predict(lasso_model, s = lasso_best_lambda, newx = X_test)
lasso_mse <- mean((lasso_pred - y_test)^2)
cat("Lasso test MSE:", lasso_mse, "\n")
```

```
## Lasso test MSE: 0.4690743
```

```
# view number of selected coefficients for lasso
cat("\n", length(coef(lasso_model, s = lasso_best_lambda)[coef(lasso_model, s = lasso_best_lambda) != 0],
    "out of", length(coef(lasso_model, s = lasso_best_lambda)), "coefficients were selected (had non-zero values)"
```

```
##
```

```
## 65 out of 257 coefficients were selected (had non-zero values) by lasso.
```

```
print(print(coef(lasso_model, s = lasso_best_lambda)[coef(lasso_model, s = lasso_best_lambda)[, 1] != 0])
```

```
##              (Intercept)              rating_c
##          4.6190783719          0.1735027614
## countryAustria          countryBulgaria
##      -0.1280131303          -0.5278818047
##      countryChile          countryEngland
##      -0.1625324251          0.0735364424
##      countryItaly          countryMexico
##      0.0513721093          0.0374459617
## countryMoldova          countryPortugal
##      -0.0768202326          -0.3320500068
## countryRomania          countrySouth Africa
##      -0.5168270329          -0.0201511385
##      countryUS          provinceArizona
##      0.1230318786          0.1025328806
## provinceAustralia Other          provinceBaden
##      -0.4015406940          0.1070295701
##      provinceBeaujolais          provinceBordeaux
##      -0.1836784810          0.0068802781
##      provinceBurgundy          provinceCalifornia
##      0.6943071570          0.2281010539
```

##	provinceCentral Otago	provinceCentral Spain
##	0.1636668042	-0.1066308748
##	provinceCentral Valley	provinceChampagne
##	-0.1184972491	1.0364812638
##	provinceCoastal Region	provinceColorado
##	-0.1112462899	0.1622313229
##	provinceCuricó Valley	provinceEngland
##	-0.0023731343	0.0007865319
##	provinceFrance Other	provinceFranken
##	-0.1273830090	0.0752520775
##	provinceJudean Hills	provinceLanguedoc-Roussillon
##	0.1399000124	-0.1534047771
##	provinceLevante	provinceLisboa
##	-0.1354817037	-0.1797428589
##	provinceLoire Valley	provinceLombardy
##	-0.0375746575	0.1289016565
##	provinceMadeira	provinceMarlborough
##	0.3289245751	-0.0767703573
##	provinceMartinborough	provinceMichigan
##	0.0513774525	0.0701178784
##	provinceMosel	provinceNew York
##	-0.0220697606	-0.0631177272
##	provinceNiederösterreich	provinceOntario
##	-0.0620085330	0.1230702283
##	provinceOregon	provincePiedmont
##	0.1019046567	0.5338355032
##	provincePort	provinceProvence
##	0.7512557021	-0.1132850778
##	provincePuente Alto	provinceRapel Valley
##	0.2775022029	-0.0530366517
##	provinceRheingau	provinceRheinhessen
##	0.2926234325	-0.0536615945
##	provinceRhône Valley	provinceRobertson
##	0.0023466178	-0.0809032813
##	provinceSicily & Sardinia	provinceSouthwest France
##	-0.0145472553	-0.2613825192
##	provinceTejo	provinceTuscany
##	-0.0443951687	0.3490052336
##	provinceValle de Guadalupe	provinceVeneto
##	0.0008346682	0.0653176565
##	provinceVictoria	provinceViile Timisului
##	0.0582378002	-0.1930234820
##	provinceVinho Verde	provinceVirginia
##	-0.1996180311	0.2864878561
##	provinceWestern Cape	
##	-0.2554015814	
##	(Intercept)	rating_c
##	4.6190783719	0.1735027614
##	countryAustria	countryBulgaria
##	-0.1280131303	-0.5278818047
##	countryChile	countryEngland
##	-0.1625324251	0.0735364424
##	countryItaly	countryMexico
##	0.0513721093	0.0374459617

##	countryMoldova	countryPortugal
##	-0.0768202326	-0.3320500068
##	countryRomania	countrySouth Africa
##	-0.5168270329	-0.0201511385
##	countryUS	provinceArizona
##	0.1230318786	0.1025328806
##	provinceAustralia Other	provinceBaden
##	-0.4015406940	0.1070295701
##	provinceBeaujolais	provinceBordeaux
##	-0.1836784810	0.0068802781
##	provinceBurgundy	provinceCalifornia
##	0.6943071570	0.2281010539
##	provinceCentral Otago	provinceCentral Spain
##	0.1636668042	-0.1066308748
##	provinceCentral Valley	provinceChampagne
##	-0.1184972491	1.0364812638
##	provinceCoastal Region	provinceColorado
##	-0.1112462899	0.1622313229
##	provinceCuricó Valley	provinceEngland
##	-0.0023731343	0.0007865319
##	provinceFrance Other	provinceFranken
##	-0.1273830090	0.0752520775
##	provinceJudean Hills	provinceLanguedoc-Roussillon
##	0.1399000124	-0.1534047771
##	provinceLevante	provinceLisboa
##	-0.1354817037	-0.1797428589
##	provinceLoire Valley	provinceLombardy
##	-0.0375746575	0.1289016565
##	provinceMadeira	provinceMarlborough
##	0.3289245751	-0.0767703573
##	provinceMartinborough	provinceMichigan
##	0.0513774525	0.0701178784
##	provinceMosel	provinceNew York
##	-0.0220697606	-0.0631177272
##	provinceNiederösterreich	provinceOntario
##	-0.0620085330	0.1230702283
##	provinceOregon	provincePiedmont
##	0.1019046567	0.5338355032
##	provincePort	provinceProvence
##	0.7512557021	-0.1132850778
##	provincePuente Alto	provinceRapel Valley
##	0.2775022029	-0.0530366517
##	provinceRheingau	provinceRheinhessen
##	0.2926234325	-0.0536615945
##	provinceRhône Valley	provinceRobertson
##	0.0023466178	-0.0809032813
##	provinceSicily & Sardinia	provinceSouthwest France
##	-0.0145472553	-0.2613825192
##	provinceTejo	provinceTuscany
##	-0.0443951687	0.3490052336
##	provinceValle de Guadalupe	provinceVeneto
##	0.0008346682	0.0653176565
##	provinceVictoria	provinceViile Timisului
##	0.0582378002	-0.1930234820

```
##           provinceVinho Verde           provinceVirginia
##           -0.1996180311           0.2864878561
##           provinceWestern Cape
##           -0.2554015814
```

— Creating models —

```
model_logprice <- stan_glmer(
  log_price ~ rating_c + (1 | country/province),
  data = wine,
  family = gaussian(),
  prior = normal(0, 1),
  prior_intercept = normal(mean(wine$log_price), 1),
  seed = 42,
  chains = 4,
  cores = 8,
  iter = 2000
)
```

```
## Warning: Bulk Effective Samples Size (ESS) is too low, indicating posterior means and medians may be
## Running the chains for more iterations may help. See
## https://mc-stan.org/misc/warnings.html#bulk-ess
```

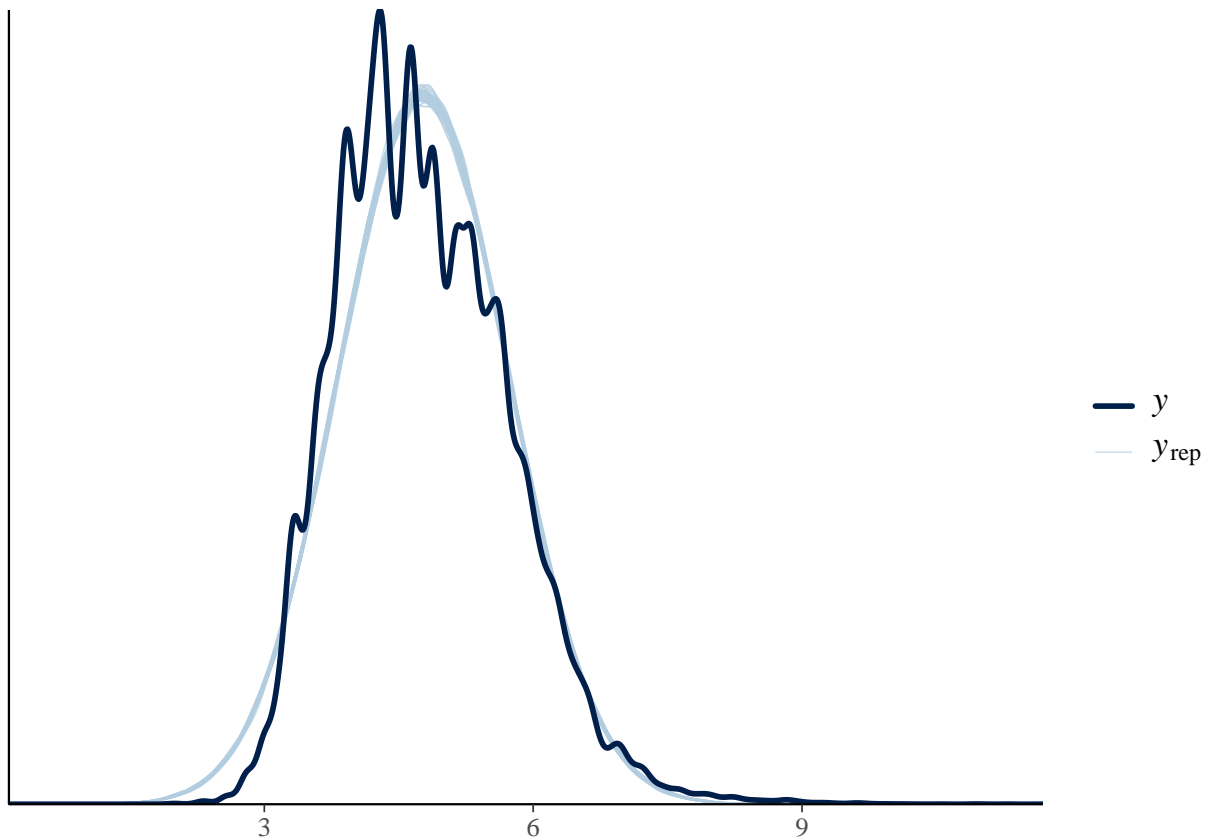
```
# saving the model
if (file.exists("model_logprice.rds") == FALSE) {
  saveRDS(model_logprice, file = "model_logprice.rds")
}
```

```
# loading the model
if (file.exists("model_logprice.rds")) {
  model_logprice <- readRDS("model_logprice.rds")
  cat("Model loaded successfully.")
}
```

```
## Model loaded successfully.
```

— Posterior Predictive Check —

```
pp_check(model_logprice)
```



— Convergence Diagnostics —

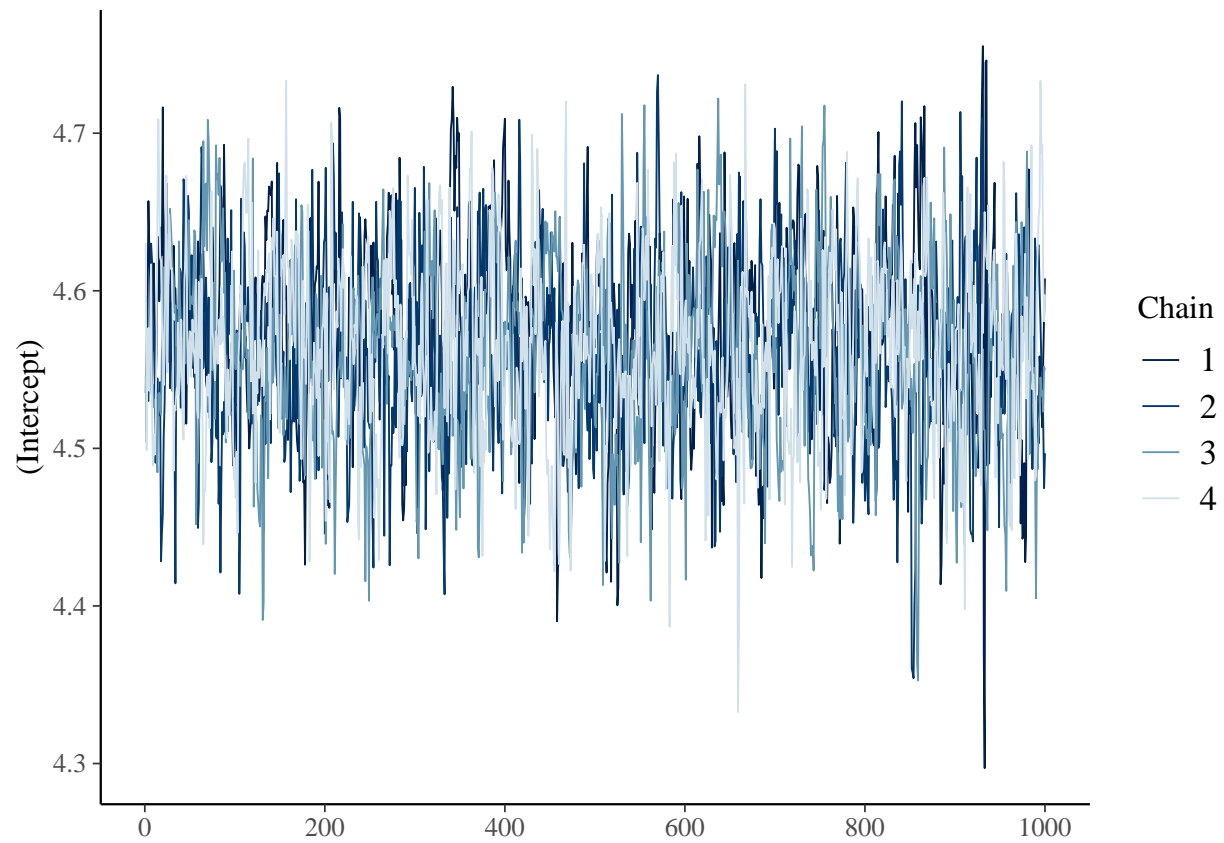
```
# check r-hat values (should be close to 1)
model_summary <- summary(model_logprice)
rhat_vals <- model_summary[, "Rhat"]
cat("\n", "summary of rhat values: ", "\n")
```

```
##
## summary of rhat values:
```

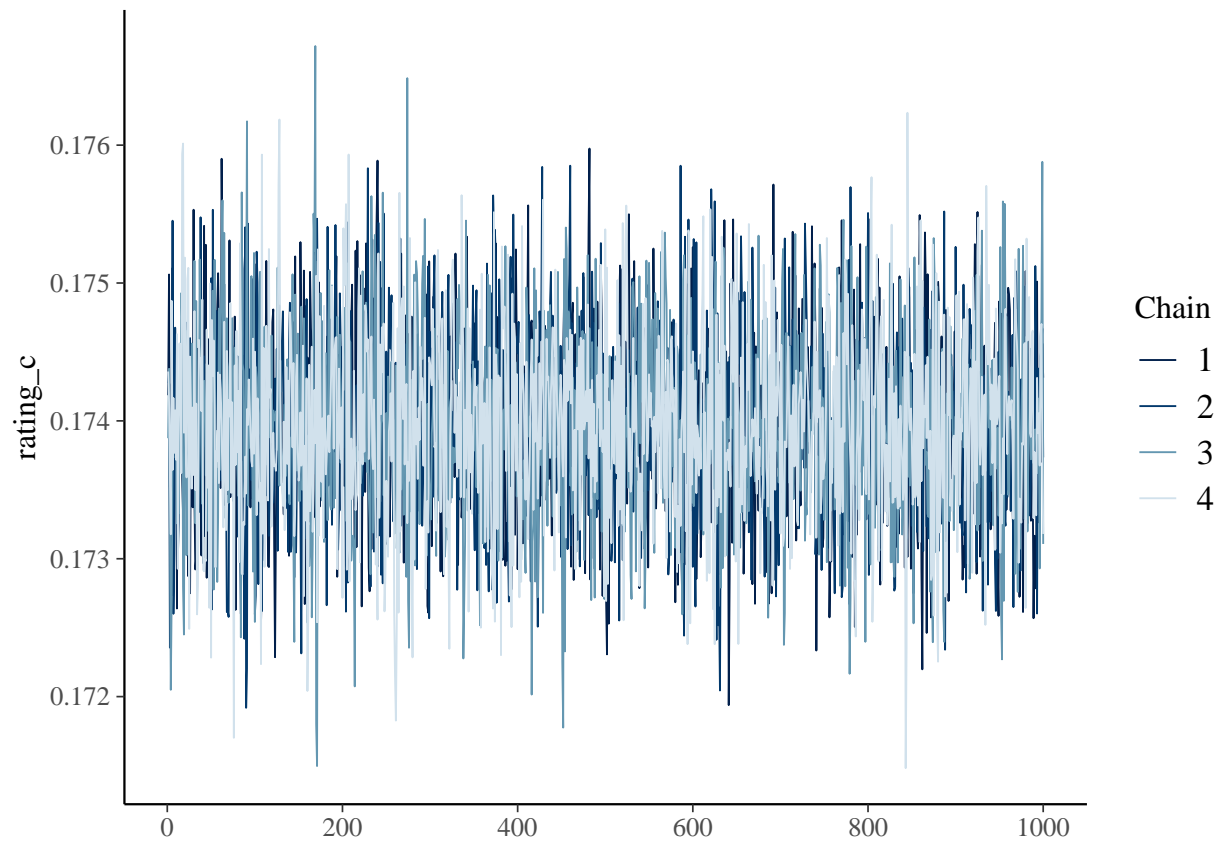
```
print(summary(rhat_vals))
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## 0.9993  1.0004  1.0016  1.0032  1.0052  1.0210
```

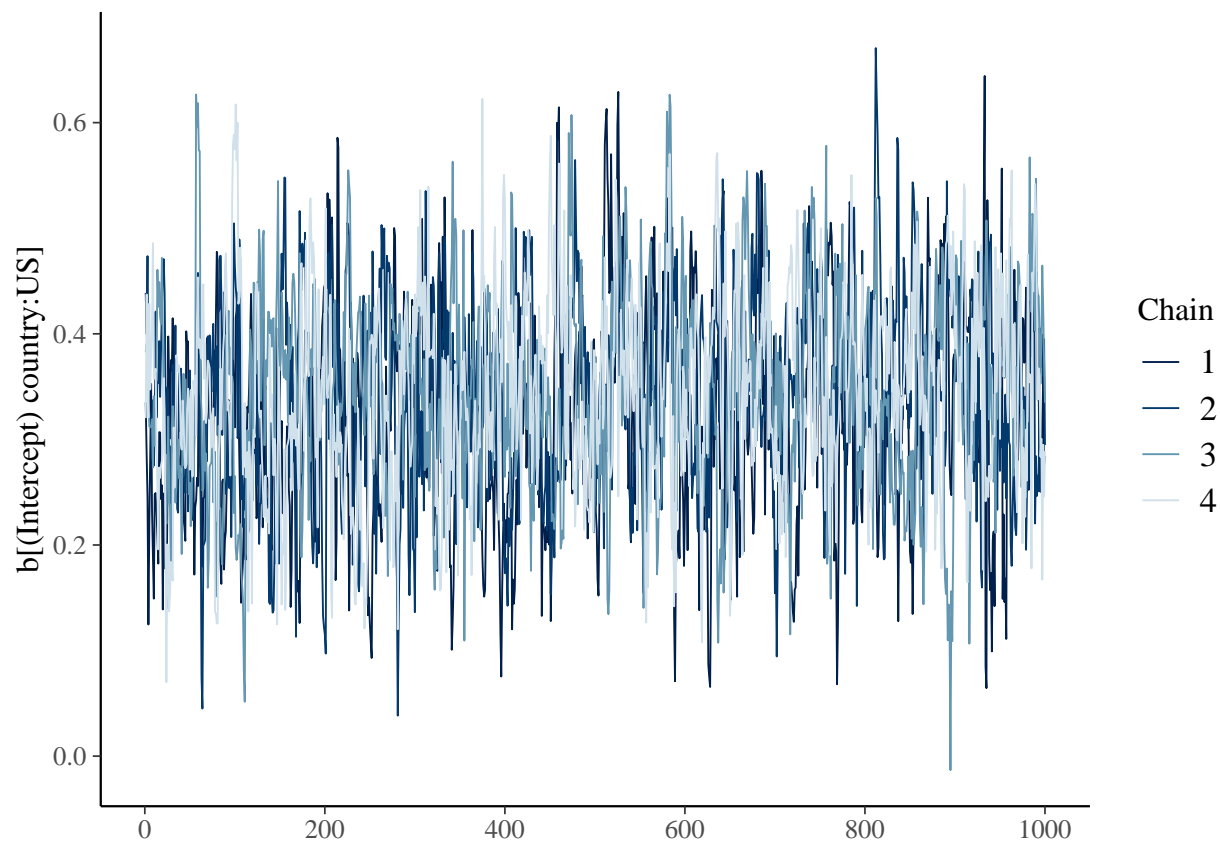
```
# trace plots for
plot(model_logprice, plotfun = "trace", pars = c("(Intercept)"))
```



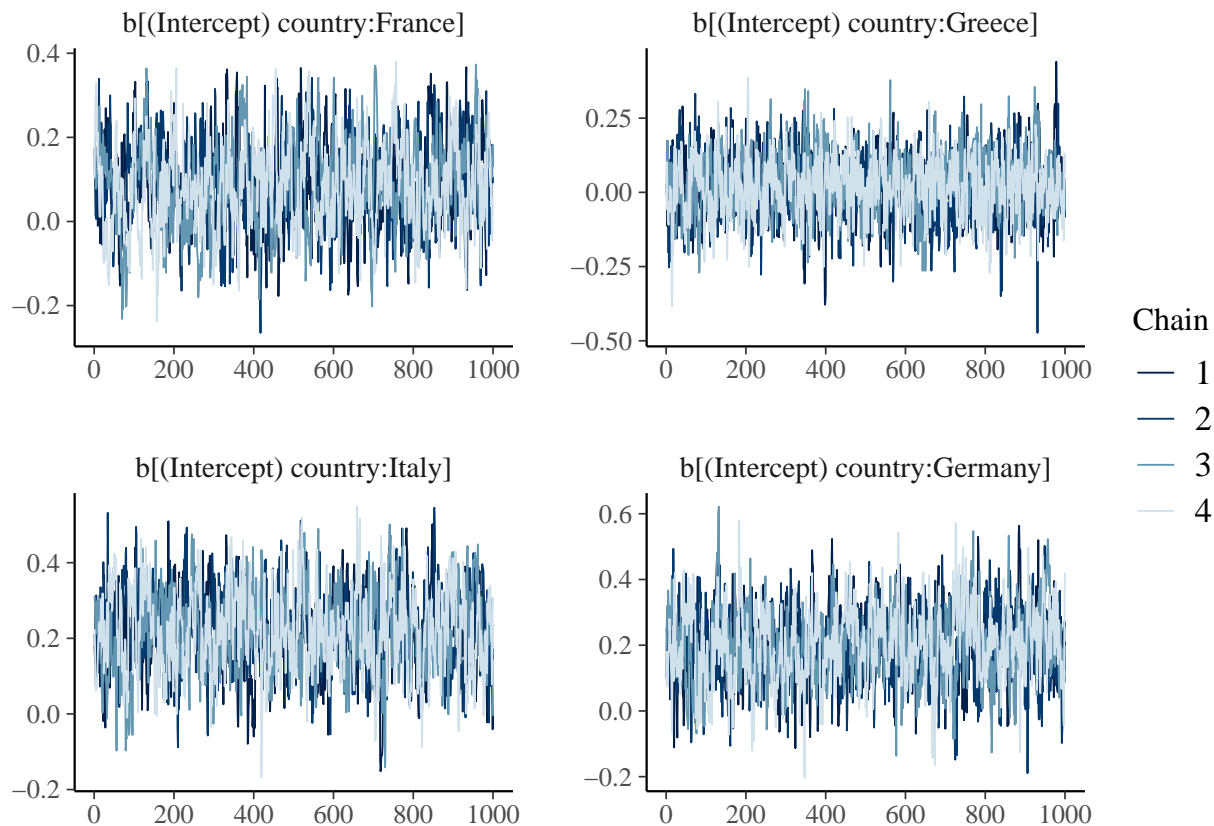
```
plot(model_logprice, plotfun = "trace", pars = c("rating_c"))
```

```
plot(model_logprice, plotfun = "trace", pars = c("b[(Intercept) country:US]"))
```



```
plot(model_logprice, plotfun = "trace", pars = c("b[(Intercept) country:France]",  
"b[(Intercept) country:Greece]",  
"b[(Intercept) country:Italy]",  
"b[(Intercept) country:Germany]"))
```



— Posterior Analysis —

```
options(max.print = 10000)

# summary of model, including credible intervals
print(summary(model_logprice, probs = c(0.05, 0.5, 0.95)), digits = 2)

##
## Model Info:
## function:      stan_glmer
## family:        gaussian [identity]
## formula:       log_price ~ rating_c + (1 | country/province)
## algorithm:     sampling
## sample:        4000 (posterior sample size)
## priors:        see help('prior_summary')
## observations:  120245
## groups:        province:country (224), country (33)
##
## Estimates:
##                                     mean
## (Intercept)                        4.57
## rating_c                           0.17
## b[(Intercept) province:country:Aconcagua_Costa:Chile] 0.02
```

## b[(Intercept) province:country:Aconcagua_Valley:Chile]	0.25
## b[(Intercept) province:country:Aegean:Turkey]	0.17
## b[(Intercept) province:country:Alentejano:Portugal]	-0.02
## b[(Intercept) province:country:Alentejo:Portugal]	0.01
## b[(Intercept) province:country:Alsace:France]	-0.10
## b[(Intercept) province:country:America:US]	-0.42
## b[(Intercept) province:country:Andalucia:Spain]	-0.03
## b[(Intercept) province:country:Ankara:Turkey]	-0.02
## b[(Intercept) province:country:Apalta:Chile]	0.26
## b[(Intercept) province:country:Arizona:US]	0.42
## b[(Intercept) province:country:Atalanti_Valley:Greece]	-0.04
## b[(Intercept) province:country:Australia_Other:Australia]	-0.59
## b[(Intercept) province:country:Austria:Austria]	0.24
## b[(Intercept) province:country:Awatere_Valley:New_Zealand]	-0.30
## b[(Intercept) province:country:Baden:Germany]	0.44
## b[(Intercept) province:country:Bairrada:Portugal]	0.06
## b[(Intercept) province:country:Beaujolais:France]	-0.34
## b[(Intercept) province:country:Beira_Atlantico:Portugal]	-0.13
## b[(Intercept) province:country:Beira_Interior:Portugal]	-0.29
## b[(Intercept) province:country:Beiras:Portugal]	-0.07
## b[(Intercept) province:country:Bekaa_Valley:Lebanon]	0.07
## b[(Intercept) province:country:Bío_Bío_Valley:Chile]	-0.16
## b[(Intercept) province:country:Bordeaux:France]	0.03
## b[(Intercept) province:country:British_Columbia:Canada]	-0.06
## b[(Intercept) province:country:Bucelas:Portugal]	-0.23
## b[(Intercept) province:country:Burgenland:Austria]	-0.08
## b[(Intercept) province:country:Burgundy:France]	0.73
## b[(Intercept) province:country:Cachapoal_Valley:Chile]	0.02
## b[(Intercept) province:country:California:US]	0.08
## b[(Intercept) province:country:Canelones:Uruguay]	-0.01
## b[(Intercept) province:country:Canterbury:New_Zealand]	0.03
## b[(Intercept) province:country:Cappadocia:Turkey]	0.00
## b[(Intercept) province:country:Carnuntum:Austria]	-0.21
## b[(Intercept) province:country:Casablanca_Valley:Chile]	-0.12
## b[(Intercept) province:country:Catalonia:Spain]	0.09
## b[(Intercept) province:country:Central_Italy:Italy]	-0.19
## b[(Intercept) province:country:Central_Otago:New_Zealand]	0.40
## b[(Intercept) province:country:Central_Spain:Spain]	-0.19
## b[(Intercept) province:country:Central_Valley:Chile]	-0.35
## b[(Intercept) province:country:Champagne:France]	1.09
## b[(Intercept) province:country:Chile:Chile]	0.00
## b[(Intercept) province:country:Coastal_Region:South_Africa]	-0.30
## b[(Intercept) province:country:Colchagua_Costa:Chile]	0.01
## b[(Intercept) province:country:Colchagua_Valley:Chile]	-0.13
## b[(Intercept) province:country:Colorado:US]	0.38
## b[(Intercept) province:country:Constantia:South_Africa]	-0.16
## b[(Intercept) province:country:Crete:Greece]	-0.07
## b[(Intercept) province:country:Curicó_Valley:Chile]	-0.28
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	-0.28
## b[(Intercept) province:country:Đão:Portugal]	-0.10
## b[(Intercept) province:country:Dealu_Mare:Romania]	0.36
## b[(Intercept) province:country:Douro:Portugal]	0.15
## b[(Intercept) province:country:Drama:Greece]	-0.08
## b[(Intercept) province:country:Durbanville:South_Africa]	-0.13

## b[(Intercept) province:country:Duriense:Portugal]	0.34
## b[(Intercept) province:country:Eger:Hungary]	0.11
## b[(Intercept) province:country:Eisenberg:Austria]	0.03
## b[(Intercept) province:country:Elgin:South_Africa]	0.16
## b[(Intercept) province:country:Elqui_Valley:Chile]	-0.06
## b[(Intercept) province:country:England:England]	0.28
## b[(Intercept) province:country:Epanomi:Greece]	0.50
## b[(Intercept) province:country:Estremadura:Portugal]	-0.34
## b[(Intercept) province:country:Florina:Greece]	-0.06
## b[(Intercept) province:country:France_Other:France]	-0.28
## b[(Intercept) province:country:Franken:Germany]	0.39
## b[(Intercept) province:country:Franschhoek:South_Africa]	0.07
## b[(Intercept) province:country:Galicia:Spain]	-0.07
## b[(Intercept) province:country:Galil:Israel]	0.35
## b[(Intercept) province:country:Galilee:Israel]	-0.04
## b[(Intercept) province:country:Georgia:Georgia]	-0.04
## b[(Intercept) province:country:Germany:Germany]	-0.34
## b[(Intercept) province:country:Gisborne:New_Zealand]	-0.06
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	0.18
## b[(Intercept) province:country:Greece:Greece]	0.06
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	0.07
## b[(Intercept) province:country:Hemel_en_Aarde:South_Africa]	0.31
## b[(Intercept) province:country:Ica:Peru]	0.12
## b[(Intercept) province:country:Idaho:US]	-0.34
## b[(Intercept) province:country:Israel:Israel]	-0.05
## b[(Intercept) province:country:Istria:Croatia]	-0.13
## b[(Intercept) province:country:Italy_Other:Italy]	0.09
## b[(Intercept) province:country:Itata_Valley:Chile]	0.26
## b[(Intercept) province:country:Juanico:Uruguay]	0.47
## b[(Intercept) province:country:Judean_Hills:Israel]	0.37
## b[(Intercept) province:country:Kakheti:Georgia]	-0.15
## b[(Intercept) province:country:Kamptal:Austria]	-0.07
## b[(Intercept) province:country:Kremstal:Austria]	-0.14
## b[(Intercept) province:country:Kumeu:New_Zealand]	0.20
## b[(Intercept) province:country:Languedoc-Roussillon:France]	-0.33
## b[(Intercept) province:country:Lebanon:Lebanon]	0.16
## b[(Intercept) province:country:Leithaberg:Austria]	0.29
## b[(Intercept) province:country:Levante:Spain]	-0.22
## b[(Intercept) province:country:Leyda_Valley:Chile]	0.00
## b[(Intercept) province:country:Limarí_Valley:Chile]	-0.04
## b[(Intercept) province:country:Lisboa:Portugal]	-0.28
## b[(Intercept) province:country:Loire_Valley:France]	-0.15
## b[(Intercept) province:country:Lolol_Valley:Chile]	0.08
## b[(Intercept) province:country:Lombardy:Italy]	0.18
## b[(Intercept) province:country:Loncomilla_Valley:Chile]	0.08
## b[(Intercept) province:country:Lontué_Valley:Chile]	-0.37
## b[(Intercept) province:country:Madeira:Portugal]	0.86
## b[(Intercept) province:country:Maipo_Valley:Chile]	-0.05
## b[(Intercept) province:country:Mantinia:Greece]	-0.46
## b[(Intercept) province:country:Marchigue:Chile]	-0.10
## b[(Intercept) province:country:Marlborough:New_Zealand]	-0.22
## b[(Intercept) province:country:Martinborough:New_Zealand]	0.36
## b[(Intercept) province:country:Maule_Valley:Chile]	-0.20
## b[(Intercept) province:country:Mendoza_Province:Argentina]	0.00

## b[(Intercept) province:country:Michigan:US]	0.25
## b[(Intercept) province:country:Minho:Portugal]	-0.05
## b[(Intercept) province:country:Missouri:US]	-0.09
## b[(Intercept) province:country:Mittelburgenland:Austria]	0.04
## b[(Intercept) province:country:Moldova:Moldova]	-0.24
## b[(Intercept) province:country:Montevideo:Uruguay]	-0.09
## b[(Intercept) province:country:Moravia:Czech_Republic]	0.04
## b[(Intercept) province:country:Mosel:Germany]	-0.26
## b[(Intercept) province:country:Mosel-Saar-Ruwer:Germany]	0.12
## b[(Intercept) province:country:Nahe:Germany]	0.01
## b[(Intercept) province:country:Naoussa:Greece]	-0.03
## b[(Intercept) province:country:Nelson:New_Zealand]	-0.09
## b[(Intercept) province:country:Nemea:Greece]	0.14
## b[(Intercept) province:country:Neusiedlersee:Austria]	0.13
## b[(Intercept) province:country:New_Mexico:US]	0.24
## b[(Intercept) province:country:New_South_Wales:Australia]	-0.09
## b[(Intercept) province:country:New_York:US]	-0.29
## b[(Intercept) province:country:New_Zealand:New_Zealand]	-0.20
## b[(Intercept) province:country:Niederösterreich:Austria]	-0.21
## b[(Intercept) province:country:North_Carolina:US]	0.06
## b[(Intercept) province:country:North_Dalmatia:Croatia]	0.09
## b[(Intercept) province:country:Northeastern_Italy:Italy]	-0.15
## b[(Intercept) province:country:Northern_Spain:Spain]	0.10
## b[(Intercept) province:country:Northwestern_Italy:Italy]	-0.09
## b[(Intercept) province:country:Ohio:US]	-0.27
## b[(Intercept) province:country:Ontario:Canada]	0.29
## b[(Intercept) province:country:Oregon:US]	-0.01
## b[(Intercept) province:country:Österreichischer_Sekt:Austria]	0.25
## b[(Intercept) province:country:Other:Argentina]	-0.02
## b[(Intercept) province:country:Paarl:South_Africa]	0.08
## b[(Intercept) province:country:Palmela:Portugal]	-0.25
## b[(Intercept) province:country:Pangeon:Greece]	0.49
## b[(Intercept) province:country:Peljesac:Croatia]	0.20
## b[(Intercept) province:country:Peloponnese:Greece]	-0.36
## b[(Intercept) province:country:Península_de_Setúbal:Portugal]	-0.02
## b[(Intercept) province:country:Pennsylvania:US]	0.17
## b[(Intercept) province:country:Peumo:Chile]	0.24
## b[(Intercept) province:country:Pfalz:Germany]	-0.27
## b[(Intercept) province:country:Piedmont:Italy]	0.48
## b[(Intercept) province:country:Port:Portugal]	0.93
## b[(Intercept) province:country:Portuguese_Table_Wine:Portugal]	-0.21
## b[(Intercept) province:country:Progreso:Uruguay]	-0.03
## b[(Intercept) province:country:Provence:France]	-0.25
## b[(Intercept) province:country:Puerto_Alto:Chile]	0.76
## b[(Intercept) province:country:Rapel_Valley:Chile]	-0.38
## b[(Intercept) province:country:Recas:Romania]	-0.28
## b[(Intercept) province:country:Rheingau:Germany]	0.32
## b[(Intercept) province:country:Rheinhessen:Germany]	-0.40
## b[(Intercept) province:country:Rhône_Valley:France]	0.07
## b[(Intercept) province:country:Ribatejano:Portugal]	-0.29
## b[(Intercept) province:country:Ribatejo:Portugal]	-0.36
## b[(Intercept) province:country:Robertson:South_Africa]	-0.38
## b[(Intercept) province:country:Romania:Romania]	-0.41
## b[(Intercept) province:country:Samson:Israel]	-0.12

## b[(Intercept) province:country:San_Antonio:Chile]	0.16
## b[(Intercept) province:country:Santorini:Greece]	-0.01
## b[(Intercept) province:country:Serra_Gaúcha:Brazil]	-0.02
## b[(Intercept) province:country:Setubal:Portugal]	-0.20
## b[(Intercept) province:country:Shomron:Israel]	-0.20
## b[(Intercept) province:country:Sicily_&_Sardinia:Italy]	-0.19
## b[(Intercept) province:country:Simonsberg-Stellenbosch:South_Africa]	0.24
## b[(Intercept) province:country:South_Australia:Australia]	0.07
## b[(Intercept) province:country:South_Island:New_Zealand]	-0.16
## b[(Intercept) province:country:Southern_Italy:Italy]	-0.12
## b[(Intercept) province:country:Southwest_France:France]	-0.37
## b[(Intercept) province:country:Spain_Other:Spain]	0.06
## b[(Intercept) province:country:Spanish_Islands:Spain]	0.28
## b[(Intercept) province:country:Štajerska:Slovenia]	-0.21
## b[(Intercept) province:country:Steiermark:Austria]	-0.09
## b[(Intercept) province:country:Stellenbosch:South_Africa]	0.05
## b[(Intercept) province:country:Südoststeiermark:Austria]	0.16
## b[(Intercept) province:country:Südsteiermark:Austria]	0.10
## b[(Intercept) province:country:Swartland:South_Africa]	-0.13
## b[(Intercept) province:country:Tasmania:Australia]	0.27
## b[(Intercept) province:country:Tejo:Portugal]	-0.14
## b[(Intercept) province:country:Texas:US]	0.21
## b[(Intercept) province:country:Thermenregion:Austria]	0.05
## b[(Intercept) province:country:Thrace:Turkey]	0.03
## b[(Intercept) province:country:Thracian_Valley:Bulgaria]	-0.31
## b[(Intercept) province:country:Tikves:Macedonia]	-0.15
## b[(Intercept) province:country:Tokaj:Hungary]	-0.25
## b[(Intercept) province:country:Tokaji:Hungary]	0.02
## b[(Intercept) province:country:Traisental:Austria]	-0.16
## b[(Intercept) province:country:Tulbagh:South_Africa]	0.61
## b[(Intercept) province:country:Turkey:Turkey]	-0.23
## b[(Intercept) province:country:Tuscany:Italy]	0.29
## b[(Intercept) province:country:Ukraine:Ukraine]	-0.30
## b[(Intercept) province:country:Upper_Galilee:Israel]	-0.15
## b[(Intercept) province:country:Uruguay:Uruguay]	-0.09
## b[(Intercept) province:country:Valle_de_Guadalupe:Mexico]	0.28
## b[(Intercept) province:country:Veneto:Italy]	0.02
## b[(Intercept) province:country:Victoria:Australia]	0.29
## b[(Intercept) province:country:Vienna:Austria]	-0.14
## b[(Intercept) province:country:Viile_Timisului:Romania]	-0.55
## b[(Intercept) province:country:Villány:Hungary]	0.41
## b[(Intercept) province:country:Vinho_Espumante_de_Qualidade:Portugal]	0.54
## b[(Intercept) province:country:Vinho_Verde:Portugal]	-0.31
## b[(Intercept) province:country:Virginia:US]	0.25
## b[(Intercept) province:country:Wachau:Austria]	0.19
## b[(Intercept) province:country:Wagram:Austria]	-0.24
## b[(Intercept) province:country:Wagram-Donauland:Austria]	0.08
## b[(Intercept) province:country:Waiheke_Island:New_Zealand]	0.20
## b[(Intercept) province:country:Waipara:New_Zealand]	-0.09
## b[(Intercept) province:country:Waipara_Valley:New_Zealand]	0.08
## b[(Intercept) province:country:Wairau_Valley:New_Zealand]	-0.09
## b[(Intercept) province:country:Walker_Bay:South_Africa]	0.09
## b[(Intercept) province:country:Washington:US]	-0.18
## b[(Intercept) province:country>Weinland_Österreich:Austria]	-0.14

```

## b[(Intercept) province:country:Weinviertel:Austria] -0.13
## b[(Intercept) province:country:Wellington:South_Africa] -0.12
## b[(Intercept) province:country:Western_Australia:Australia] 0.06
## b[(Intercept) province:country:Western_Cape:South_Africa] -0.43
## b[(Intercept) province:country:Wiener_Gemischter_Satz:Austria] -0.11
## b[(Intercept) province:country:Württemberg:Germany] 0.24
## b[(Intercept) province:country:Zenata:Morocco] -0.27
## b[(Intercept) country:Argentina] 0.00
## b[(Intercept) country:Australia] 0.04
## b[(Intercept) country:Austria] -0.09
## b[(Intercept) country:Brazil] 0.00
## b[(Intercept) country:Bulgaria] -0.43
## b[(Intercept) country:Canada] 0.17
## b[(Intercept) country:Chile] -0.05
## b[(Intercept) country:Croatia] 0.14
## b[(Intercept) country:Czech_Republic] 0.03
## b[(Intercept) country:England] 0.22
## b[(Intercept) country:France] 0.08
## b[(Intercept) country:Georgia] -0.13
## b[(Intercept) country:Germany] 0.20
## b[(Intercept) country:Greece] 0.02
## b[(Intercept) country:Hungary] 0.22
## b[(Intercept) country:Israel] 0.12
## b[(Intercept) country:Italy] 0.22
## b[(Intercept) country:Lebanon] 0.17
## b[(Intercept) country:Macedonia] -0.13
## b[(Intercept) country:Mexico] 0.21
## b[(Intercept) country:Moldova] -0.21
## b[(Intercept) country:Morocco] -0.21
## b[(Intercept) country:New_Zealand] 0.06
## b[(Intercept) country:Peru] 0.10
## b[(Intercept) country:Portugal] -0.34
## b[(Intercept) country:Romania] -0.65
## b[(Intercept) country:Slovenia] -0.03
## b[(Intercept) country:South_Africa] -0.01
## b[(Intercept) country:Spain] -0.02
## b[(Intercept) country:Turkey] -0.03
## b[(Intercept) country:Ukraine] -0.23
## b[(Intercept) country:Uruguay] 0.19
## b[(Intercept) country:US] 0.34
## sigma 0.68
## Sigma[province:country:(Intercept),(Intercept)] 0.09
## Sigma[country:(Intercept),(Intercept)] 0.07
## sd
## (Intercept) 0.06
## rating_c 0.00
## b[(Intercept) province:country:Aconcagua_Costa:Chile] 0.13
## b[(Intercept) province:country:Aconcagua_Valley:Chile] 0.09
## b[(Intercept) province:country:Aegean:Turkey] 0.17
## b[(Intercept) province:country:Alentejano:Portugal] 0.07
## b[(Intercept) province:country:Alentejo:Portugal] 0.08
## b[(Intercept) province:country:Alsace:France] 0.09
## b[(Intercept) province:country:America:US] 0.10
## b[(Intercept) province:country:Andalucia:Spain] 0.10

```


## b[(Intercept) province:country:Ankara:Turkey]	0.17
## b[(Intercept) province:country:Apalta:Chile]	0.17
## b[(Intercept) province:country:Arizona:US]	0.12
## b[(Intercept) province:country:Atalanti_Valley:Greece]	0.17
## b[(Intercept) province:country:Australia_Other:Australia]	0.12
## b[(Intercept) province:country:Austria:Austria]	0.14
## b[(Intercept) province:country:Awatere_Valley:New_Zealand]	0.14
## b[(Intercept) province:country:Baden:Germany]	0.12
## b[(Intercept) province:country:Bairrada:Portugal]	0.08
## b[(Intercept) province:country:Beaujolais:France]	0.09
## b[(Intercept) province:country:Beira_Atlantico:Portugal]	0.16
## b[(Intercept) province:country:Beira_Interior:Portugal]	0.12
## b[(Intercept) province:country:Beiras:Portugal]	0.16
## b[(Intercept) province:country:Bekaa_Valley:Lebanon]	0.20
## b[(Intercept) province:country:Bío_Bío_Valley:Chile]	0.11
## b[(Intercept) province:country:Bordeaux:France]	0.09
## b[(Intercept) province:country:British_Columbia:Canada]	0.17
## b[(Intercept) province:country:Bucelas:Portugal]	0.15
## b[(Intercept) province:country:Burgenland:Austria]	0.07
## b[(Intercept) province:country:Burgundy:France]	0.09
## b[(Intercept) province:country:Cachapoal_Valley:Chile]	0.08
## b[(Intercept) province:country:California:US]	0.08
## b[(Intercept) province:country:Canelones:Uruguay]	0.15
## b[(Intercept) province:country:Canterbury:New_Zealand]	0.19
## b[(Intercept) province:country:Cappadocia:Turkey]	0.19
## b[(Intercept) province:country:Carnuntum:Austria]	0.09
## b[(Intercept) province:country:Casablanca_Valley:Chile]	0.07
## b[(Intercept) province:country:Catalonia:Spain]	0.10
## b[(Intercept) province:country:Central_Italy:Italy]	0.09
## b[(Intercept) province:country:Central_Otago:New_Zealand]	0.10
## b[(Intercept) province:country:Central_Spain:Spain]	0.10
## b[(Intercept) province:country:Central_Valley:Chile]	0.07
## b[(Intercept) province:country:Champagne:France]	0.09
## b[(Intercept) province:country:Chile:Chile]	0.11
## b[(Intercept) province:country:Coastal_Region:South_Africa]	0.10
## b[(Intercept) province:country:Colchagua_Costa:Chile]	0.17
## b[(Intercept) province:country:Colchagua_Valley:Chile]	0.07
## b[(Intercept) province:country:Colorado:US]	0.11
## b[(Intercept) province:country:Constantia:South_Africa]	0.15
## b[(Intercept) province:country:Crete:Greece]	0.14
## b[(Intercept) province:country:Curicó_Valley:Chile]	0.08
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	0.20
## b[(Intercept) province:country:Dão:Portugal]	0.08
## b[(Intercept) province:country:Dealul_Mare:Romania]	0.18
## b[(Intercept) province:country:Douro:Portugal]	0.07
## b[(Intercept) province:country:Drama:Greece]	0.13
## b[(Intercept) province:country:Durbanville:South_Africa]	0.17
## b[(Intercept) province:country:Duriense:Portugal]	0.14
## b[(Intercept) province:country:Eger:Hungary]	0.19
## b[(Intercept) province:country:Eisenberg:Austria]	0.15
## b[(Intercept) province:country:Elgin:South_Africa]	0.12
## b[(Intercept) province:country:Elqui_Valley:Chile]	0.11
## b[(Intercept) province:country:England:England]	0.21
## b[(Intercept) province:country:Epanomi:Greece]	0.16

## b[(Intercept) province:country:Estremadura:Portugal]	0.12
## b[(Intercept) province:country:Florina:Greece]	0.17
## b[(Intercept) province:country:France_Other:France]	0.09
## b[(Intercept) province:country:Franken:Germany]	0.13
## b[(Intercept) province:country:Franschhoek:South_Africa]	0.15
## b[(Intercept) province:country:Galicia:Spain]	0.10
## b[(Intercept) province:country:Galil:Israel]	0.18
## b[(Intercept) province:country:Galilee:Israel]	0.12
## b[(Intercept) province:country:Georgia:Georgia]	0.20
## b[(Intercept) province:country:Germany:Germany]	0.18
## b[(Intercept) province:country:Gisborne:New_Zealand]	0.18
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	0.19
## b[(Intercept) province:country:Greece:Greece]	0.17
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	0.10
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## b[(Intercept) province:country:Istria:Croatia]	0.18
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## b[(Intercept) province:country:Kakheti:Georgia]	0.18
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## b[(Intercept) province:country:Kremstal:Austria]	0.07
## b[(Intercept) province:country:Kumeu:New_Zealand]	0.14
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## b[(Intercept) province:country:Lolol_Valley:Chile]	0.14
## b[(Intercept) province:country:Lombardy:Italy]	0.10
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## b[(Intercept) province:country:Ontario:Canada]	0.17
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## b[(Intercept) country:Bulgaria]	0.19
## b[(Intercept) country:Canada]	0.17
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## b[(Intercept) country:Croatia]	0.16
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## Sigma[country:(Intercept),(Intercept)]	0.03
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## b[(Intercept) province:country:Alentejano:Portugal]	-0.13
## b[(Intercept) province:country:Alentejo:Portugal]	-0.13
## b[(Intercept) province:country:Alsace:France]	-0.24
## b[(Intercept) province:country:America:US]	-0.58
## b[(Intercept) province:country:Andalucia:Spain]	-0.20
## b[(Intercept) province:country:Ankara:Turkey]	-0.31
## b[(Intercept) province:country:Apalta:Chile]	-0.02
## b[(Intercept) province:country:Arizona:US]	0.22
## b[(Intercept) province:country:Atalanti_Valley:Greece]	-0.32
## b[(Intercept) province:country:Australia_Other:Australia]	-0.78
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## b[(Intercept) province:country:Awatere_Valley:New_Zealand]	-0.54

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## b[(Intercept) province:country:Bairrada:Portugal]	-0.08
## b[(Intercept) province:country:Beaujolais:France]	-0.48
## b[(Intercept) province:country:Beira_Atlantico:Portugal]	-0.41
## b[(Intercept) province:country:Beira_Interior:Portugal]	-0.49
## b[(Intercept) province:country:Beiras:Portugal]	-0.33
## b[(Intercept) province:country:Bekaa_Valley:Lebanon]	-0.25
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## b[(Intercept) province:country:Bordeaux:France]	-0.11
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## b[(Intercept) province:country:Bucelas:Portugal]	-0.47
## b[(Intercept) province:country:Burgenland:Austria]	-0.20
## b[(Intercept) province:country:Burgundy:France]	0.59
## b[(Intercept) province:country:Cachapoal_Valley:Chile]	-0.11
## b[(Intercept) province:country:California:US]	-0.05
## b[(Intercept) province:country:Canelones:Uruguay]	-0.27
## b[(Intercept) province:country:Canterbury:New_Zealand]	-0.29
## b[(Intercept) province:country:Cappadocia:Turkey]	-0.31
## b[(Intercept) province:country:Carnuntum:Austria]	-0.36
## b[(Intercept) province:country:Casablanca_Valley:Chile]	-0.24
## b[(Intercept) province:country:Catalonia:Spain]	-0.08
## b[(Intercept) province:country:Central_Italy:Italy]	-0.34
## b[(Intercept) province:country:Central_Otago:New_Zealand]	0.24
## b[(Intercept) province:country:Central_Spain:Spain]	-0.35
## b[(Intercept) province:country:Central_Valley:Chile]	-0.47
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## b[(Intercept) province:country:Chile:Chile]	-0.19
## b[(Intercept) province:country:Coastal_Region:South_Africa]	-0.46
## b[(Intercept) province:country:Colchagua_Costa:Chile]	-0.28
## b[(Intercept) province:country:Colchagua_Valley:Chile]	-0.24
## b[(Intercept) province:country:Colorado:US]	0.20
## b[(Intercept) province:country:Constantia:South_Africa]	-0.41
## b[(Intercept) province:country:Crete:Greece]	-0.30
## b[(Intercept) province:country:Curicó_Valley:Chile]	-0.42
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	-0.62
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## b[(Intercept) province:country:Elgin:South_Africa]	-0.03
## b[(Intercept) province:country:Elqui_Valley:Chile]	-0.25
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## b[(Intercept) province:country:Estremadura:Portugal]	-0.54
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## b[(Intercept) province:country:Galil:Israel]	0.05

## b[(Intercept) province:country:Galilee:Israel]	-0.24
## b[(Intercept) province:country:Georgia:Georgia]	-0.37
## b[(Intercept) province:country:Germany:Germany]	-0.64
## b[(Intercept) province:country:Gisborne:New_Zealand]	-0.36
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	-0.13
## b[(Intercept) province:country:Greece:Greece]	-0.22
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	-0.09
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## b[(Intercept) province:country:Idaho:US]	-0.49
## b[(Intercept) province:country:Israel:Israel]	-0.34
## b[(Intercept) province:country:Istria:Croatia]	-0.44
## b[(Intercept) province:country:Italy_Other:Italy]	-0.08
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## b[(Intercept) province:country:Kakheti:Georgia]	-0.44
## b[(Intercept) province:country:Kamptal:Austria]	-0.19
## b[(Intercept) province:country:Kremstal:Austria]	-0.27
## b[(Intercept) province:country:Kumeu:New_Zealand]	-0.03
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## b[(Intercept) province:country:Levante:Spain]	-0.39
## b[(Intercept) province:country:Leyda_Valley:Chile]	-0.13
## b[(Intercept) province:country:Limarí_Valley:Chile]	-0.18
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## b[(Intercept) province:country:North_Carolina:US]	-0.18
## b[(Intercept) province:country:North_Dalmatia:Croatia]	-0.24
## b[(Intercept) province:country:Northeastern_Italy:Italy]	-0.31
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## b[(Intercept) province:country:Ohio:US]	-0.55
## b[(Intercept) province:country:Ontario:Canada]	0.01
## b[(Intercept) province:country:Oregon:US]	-0.14
## b[(Intercept) province:country:Österreichischer_Sekt:Austria]	0.08
## b[(Intercept) province:country:Other:Argentina]	-0.30
## b[(Intercept) province:country:Paarl:South_Africa]	-0.10
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## b[(Intercept) province:country:San_Antonio:Chile]	0.00
## b[(Intercept) province:country:Santorini:Greece]	-0.22
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## b[(Intercept) province:country:Bekaa_Valley:Lebanon] 0.07

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## b[(Intercept) country:Macedonia]	-0.12
## b[(Intercept) country:Mexico]	0.21
## b[(Intercept) country:Moldova]	-0.20
## b[(Intercept) country:Morocco]	-0.20
## b[(Intercept) country:New_Zealand]	0.06
## b[(Intercept) country:Peru]	0.10
## b[(Intercept) country:Portugal]	-0.33
## b[(Intercept) country:Romania]	-0.66
## b[(Intercept) country:Slovenia]	-0.02
## b[(Intercept) country:South_Africa]	-0.01
## b[(Intercept) country:Spain]	-0.02
## b[(Intercept) country:Turkey]	-0.03
## b[(Intercept) country:Ukraine]	-0.23
## b[(Intercept) country:Uruguay]	0.19
## b[(Intercept) country:US]	0.34
## sigma	0.68
## Sigma[province:country:(Intercept),(Intercept)]	0.09
## Sigma[country:(Intercept),(Intercept)]	0.07
##	95%
## (Intercept)	4.66
## rating_c	0.18
## b[(Intercept) province:country:Aconcagua_Costa:Chile]	0.23
## b[(Intercept) province:country:Aconcagua_Valley:Chile]	0.39
## b[(Intercept) province:country:Aegean:Turkey]	0.45
## b[(Intercept) province:country:Alentejano:Portugal]	0.10
## b[(Intercept) province:country:Alentejo:Portugal]	0.15
## b[(Intercept) province:country:Alsace:France]	0.04
## b[(Intercept) province:country:America:US]	-0.25
## b[(Intercept) province:country:Andalucia:Spain]	0.15
## b[(Intercept) province:country:Ankara:Turkey]	0.26
## b[(Intercept) province:country:Apalta:Chile]	0.55
## b[(Intercept) province:country:Arizona:US]	0.61
## b[(Intercept) province:country:Atalanti_Valley:Greece]	0.23
## b[(Intercept) province:country:Australia_Other:Australia]	-0.39
## b[(Intercept) province:country:Austria:Austria]	0.47
## b[(Intercept) province:country:Awatere_Valley:New_Zealand]	-0.07
## b[(Intercept) province:country:Baden:Germany]	0.64
## b[(Intercept) province:country:Bairrada:Portugal]	0.20
## b[(Intercept) province:country:Beaujolais:France]	-0.19
## b[(Intercept) province:country:Beira_Atlantico:Portugal]	0.13
## b[(Intercept) province:country:Beira_Interior:Portugal]	-0.10
## b[(Intercept) province:country:Beiras:Portugal]	0.20
## b[(Intercept) province:country:Bekaa_Valley:Lebanon]	0.40
## b[(Intercept) province:country:Bío_Bío_Valley:Chile]	0.02
## b[(Intercept) province:country:Bordeaux:France]	0.17
## b[(Intercept) province:country:British_Columbia:Canada]	0.22
## b[(Intercept) province:country:Bucelas:Portugal]	0.01
## b[(Intercept) province:country:Burgenland:Austria]	0.04
## b[(Intercept) province:country:Burgundy:France]	0.86
## b[(Intercept) province:country:Cachapoal_Valley:Chile]	0.15

## b[(Intercept) province:country:California:US]	0.20
## b[(Intercept) province:country:Canelones:Uruguay]	0.24
## b[(Intercept) province:country:Canterbury:New_Zealand]	0.35
## b[(Intercept) province:country:Cappadocia:Turkey]	0.32
## b[(Intercept) province:country:Carnuntum:Austria]	-0.06
## b[(Intercept) province:country:Casablanca_Valley:Chile]	-0.01
## b[(Intercept) province:country:Catalonia:Spain]	0.25
## b[(Intercept) province:country:Central_Italy:Italy]	-0.04
## b[(Intercept) province:country:Central_Otago:New_Zealand]	0.57
## b[(Intercept) province:country:Central_Spain:Spain]	-0.03
## b[(Intercept) province:country:Central_Valley:Chile]	-0.23
## b[(Intercept) province:country:Champagne:France]	1.24
## b[(Intercept) province:country:Chile:Chile]	0.19
## b[(Intercept) province:country:Coastal_Region:South_Africa]	-0.14
## b[(Intercept) province:country:Colchagua_Costa:Chile]	0.29
## b[(Intercept) province:country:Colchagua_Valley:Chile]	-0.01
## b[(Intercept) province:country:Colorado:US]	0.55
## b[(Intercept) province:country:Constantia:South_Africa]	0.07
## b[(Intercept) province:country:Crete:Greece]	0.17
## b[(Intercept) province:country:Curicó_Valley:Chile]	-0.16
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	0.05
## b[(Intercept) province:country:Dão:Portugal]	0.02
## b[(Intercept) province:country:Dealul_Mare:Romania]	0.65
## b[(Intercept) province:country:Douro:Portugal]	0.26
## b[(Intercept) province:country:Drama:Greece]	0.13
## b[(Intercept) province:country:Durbanville:South_Africa]	0.15
## b[(Intercept) province:country:Duriense:Portugal]	0.56
## b[(Intercept) province:country:Eger:Hungary]	0.43
## b[(Intercept) province:country:Eisenberg:Austria]	0.29
## b[(Intercept) province:country:Elgin:South_Africa]	0.36
## b[(Intercept) province:country:Elqui_Valley:Chile]	0.12
## b[(Intercept) province:country:England:England]	0.62
## b[(Intercept) province:country:Epanomi:Greece]	0.76
## b[(Intercept) province:country:Estremadura:Portugal]	-0.14
## b[(Intercept) province:country:Florina:Greece]	0.23
## b[(Intercept) province:country:France_Other:France]	-0.14
## b[(Intercept) province:country:Franken:Germany]	0.61
## b[(Intercept) province:country:Franschhoek:South_Africa]	0.31
## b[(Intercept) province:country:Galicia:Spain]	0.10
## b[(Intercept) province:country:Galil:Israel]	0.63
## b[(Intercept) province:country:Galilee:Israel]	0.15
## b[(Intercept) province:country:Georgia:Georgia]	0.29
## b[(Intercept) province:country:Germany:Germany]	-0.04
## b[(Intercept) province:country:Gisborne:New_Zealand]	0.24
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	0.49
## b[(Intercept) province:country:Greece:Greece]	0.34
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	0.24
## b[(Intercept) province:country:Hemel_en_Aarde:South_Africa]	0.61
## b[(Intercept) province:country:Ica:Peru]	0.48
## b[(Intercept) province:country:Idaho:US]	-0.20
## b[(Intercept) province:country:Israel:Israel]	0.23
## b[(Intercept) province:country:Istria:Croatia]	0.16
## b[(Intercept) province:country:Italy_Other:Italy]	0.27
## b[(Intercept) province:country:Itata_Valley:Chile]	0.54

## b[(Intercept) province:country:Juanico:Uruguay]	0.79
## b[(Intercept) province:country:Judean_Hills:Israel]	0.58
## b[(Intercept) province:country:Kakheti:Georgia]	0.16
## b[(Intercept) province:country:Kamptal:Austria]	0.06
## b[(Intercept) province:country:Kremstal:Austria]	-0.02
## b[(Intercept) province:country:Kumeu:New_Zealand]	0.43
## b[(Intercept) province:country:Languedoc-Roussillon:France]	-0.19
## b[(Intercept) province:country:Lebanon:Lebanon]	0.50
## b[(Intercept) province:country:Leithaberg:Austria]	0.50
## b[(Intercept) province:country:Levante:Spain]	-0.06
## b[(Intercept) province:country:Leyda_Valley:Chile]	0.13
## b[(Intercept) province:country:Limarí_Valley:Chile]	0.11
## b[(Intercept) province:country:Lisboa:Portugal]	-0.16
## b[(Intercept) province:country:Loire_Valley:France]	-0.01
## b[(Intercept) province:country:Lolol_Valley:Chile]	0.30
## b[(Intercept) province:country:Lombardy:Italy]	0.33
## b[(Intercept) province:country:Loncomilla_Valley:Chile]	0.32
## b[(Intercept) province:country:Lontué_Valley:Chile]	-0.15
## b[(Intercept) province:country:Madeira:Portugal]	1.15
## b[(Intercept) province:country:Maipo_Valley:Chile]	0.06
## b[(Intercept) province:country:Mantinia:Greece]	-0.23
## b[(Intercept) province:country:Marchigue:Chile]	0.12
## b[(Intercept) province:country:Marlborough:New_Zealand]	-0.07
## b[(Intercept) province:country:Martinborough:New_Zealand]	0.53
## b[(Intercept) province:country:Maule_Valley:Chile]	-0.08
## b[(Intercept) province:country:Mendoza_Province:Argentina]	0.27
## b[(Intercept) province:country:Michigan:US]	0.41
## b[(Intercept) province:country:Minho:Portugal]	0.13
## b[(Intercept) province:country:Missouri:US]	0.13
## b[(Intercept) province:country:Mittelburgenland:Austria]	0.28
## b[(Intercept) province:country:Moldova:Moldova]	0.12
## b[(Intercept) province:country:Montevideo:Uruguay]	0.23
## b[(Intercept) province:country:Moravia:Czech_Republic]	0.41
## b[(Intercept) province:country:Mosel:Germany]	-0.10
## b[(Intercept) province:country:Mosel-Saar-Ruwer:Germany]	0.32
## b[(Intercept) province:country:Nahe:Germany]	0.20
## b[(Intercept) province:country:Naoussa:Greece]	0.22
## b[(Intercept) province:country:Nelson:New_Zealand]	0.12
## b[(Intercept) province:country:Nemea:Greece]	0.34
## b[(Intercept) province:country:Neusiedlersee:Austria]	0.41
## b[(Intercept) province:country:New_Mexico:US]	0.43
## b[(Intercept) province:country:New_South_Wales:Australia]	0.12
## b[(Intercept) province:country:New_York:US]	-0.17
## b[(Intercept) province:country:New_Zealand:New_Zealand]	0.08
## b[(Intercept) province:country:Niederösterreich:Austria]	-0.09
## b[(Intercept) province:country:North_Carolina:US]	0.30
## b[(Intercept) province:country:North_Dalmatia:Croatia]	0.42
## b[(Intercept) province:country:Northeastern_Italy:Italy]	0.00
## b[(Intercept) province:country:Northern_Spain:Spain]	0.26
## b[(Intercept) province:country:Northwestern_Italy:Italy]	0.19
## b[(Intercept) province:country:Ohio:US]	0.01
## b[(Intercept) province:country:Ontario:Canada]	0.57
## b[(Intercept) province:country:Oregon:US]	0.11
## b[(Intercept) province:country:Österreichischer_Sekt:Austria]	0.41

## b[(Intercept) province:country:Other:Argentina]	0.25
## b[(Intercept) province:country:Paarl:South_Africa]	0.26
## b[(Intercept) province:country:Palmela:Portugal]	0.00
## b[(Intercept) province:country:Pangeon:Greece]	0.76
## b[(Intercept) province:country:Peljesac:Croatia]	0.52
## b[(Intercept) province:country:Peloponnese:Greece]	-0.16
## b[(Intercept) province:country:Península_de_Setúbal:Portugal]	0.13
## b[(Intercept) province:country:Pennsylvania:US]	0.42
## b[(Intercept) province:country:Peumo:Chile]	0.43
## b[(Intercept) province:country:Pfalz:Germany]	-0.10
## b[(Intercept) province:country:Piedmont:Italy]	0.63
## b[(Intercept) province:country:Port:Portugal]	1.05
## b[(Intercept) province:country:Portuguese_Table_Wine:Portugal]	0.02
## b[(Intercept) province:country:Progreso:Uruguay]	0.29
## b[(Intercept) province:country:Provence:France]	-0.11
## b[(Intercept) province:country:Puerto_Alto:Chile]	1.03
## b[(Intercept) province:country:Rapel_Valley:Chile]	-0.24
## b[(Intercept) province:country:Recas:Romania]	0.05
## b[(Intercept) province:country:Rheingau:Germany]	0.49
## b[(Intercept) province:country:Rheinhessen:Germany]	-0.24
## b[(Intercept) province:country:Rhône_Valley:France]	0.21
## b[(Intercept) province:country:Ribatejano:Portugal]	-0.02
## b[(Intercept) province:country:Ribatejo:Portugal]	-0.09
## b[(Intercept) province:country:Robertson:South_Africa]	-0.22
## b[(Intercept) province:country:Romania:Romania]	-0.10
## b[(Intercept) province:country:Samson:Israel]	0.20
## b[(Intercept) province:country:San_Antonio:Chile]	0.32
## b[(Intercept) province:country:Santorini:Greece]	0.20
## b[(Intercept) province:country:Serra_Gaúcha:Brazil]	0.35
## b[(Intercept) province:country:Setubal:Portugal]	0.06
## b[(Intercept) province:country:Shomron:Israel]	0.05
## b[(Intercept) province:country:Sicily_&_Sardinia:Italy]	-0.04
## b[(Intercept) province:country:Simonsberg-Stellenbosch:South_Africa]	0.44
## b[(Intercept) province:country:South_Australia:Australia]	0.26
## b[(Intercept) province:country:South_Island:New_Zealand]	0.13
## b[(Intercept) province:country:Southern_Italy:Italy]	0.04
## b[(Intercept) province:country:Southwest_France:France]	-0.23
## b[(Intercept) province:country:Spain_Other:Spain]	0.25
## b[(Intercept) province:country:Spanish_Islands:Spain]	0.51
## b[(Intercept) province:country:Štajerska:Slovenia]	0.12
## b[(Intercept) province:country:Steiermark:Austria]	0.18
## b[(Intercept) province:country:Stellenbosch:South_Africa]	0.20
## b[(Intercept) province:country:Südoststeiermark:Austria]	0.37
## b[(Intercept) province:country:Südsteiermark:Austria]	0.26
## b[(Intercept) province:country:Swartland:South_Africa]	0.05
## b[(Intercept) province:country:Tasmania:Australia]	0.50
## b[(Intercept) province:country:Tejo:Portugal]	-0.02
## b[(Intercept) province:country:Texas:US]	0.37
## b[(Intercept) province:country:Thermenregion:Austria]	0.20
## b[(Intercept) province:country:Thrace:Turkey]	0.32
## b[(Intercept) province:country:Thracian_Valley:Bulgaria]	0.02
## b[(Intercept) province:country:Tikves:Macedonia]	0.23
## b[(Intercept) province:country:Tokaj:Hungary]	0.02
## b[(Intercept) province:country:Tokaji:Hungary]	0.28

## b[(Intercept) province:country:Traisental:Austria]	0.02
## b[(Intercept) province:country:Tulbagh:South_Africa]	0.92
## b[(Intercept) province:country:Turkey:Turkey]	0.06
## b[(Intercept) province:country:Tuscany:Italy]	0.44
## b[(Intercept) province:country:Ukraine:Ukraine]	0.06
## b[(Intercept) province:country:Upper_Galilee:Israel]	0.10
## b[(Intercept) province:country:Uruguay:Uruguay]	0.19
## b[(Intercept) province:country:Valle_de_Guadalupe:Mexico]	0.61
## b[(Intercept) province:country:Veneto:Italy]	0.17
## b[(Intercept) province:country:Victoria:Australia]	0.48
## b[(Intercept) province:country:Vienna:Austria]	0.03
## b[(Intercept) province:country:Viile_Timisului:Romania]	-0.24
## b[(Intercept) province:country:Villány:Hungary]	0.70
## b[(Intercept) province:country:Vinho_Espumante_de_Qualidade:Portugal]	0.82
## b[(Intercept) province:country:Vinho_Verde:Portugal]	-0.19
## b[(Intercept) province:country:Virginia:US]	0.38
## b[(Intercept) province:country:Wachau:Austria]	0.31
## b[(Intercept) province:country:Wagram:Austria]	-0.07
## b[(Intercept) province:country:Wagram-Donauland:Austria]	0.28
## b[(Intercept) province:country:Waiheke_Island:New_Zealand]	0.51
## b[(Intercept) province:country:Waipara:New_Zealand]	0.14
## b[(Intercept) province:country:Waipara_Valley:New_Zealand]	0.36
## b[(Intercept) province:country:Wairau_Valley:New_Zealand]	0.21
## b[(Intercept) province:country:Walker_Bay:South_Africa]	0.35
## b[(Intercept) province:country:Washington:US]	-0.06
## b[(Intercept) province:country>Weinland_Österreich:Austria]	0.11
## b[(Intercept) province:country>Weinviertel:Austria]	0.02
## b[(Intercept) province:country:Wellington:South_Africa]	0.11
## b[(Intercept) province:country:Western_Australia:Australia]	0.25
## b[(Intercept) province:country:Western_Cape:South_Africa]	-0.28
## b[(Intercept) province:country:Wiener_Gemischter_Satz:Austria]	0.12
## b[(Intercept) province:country:Württemberg:Germany]	0.50
## b[(Intercept) province:country:Zenata:Morocco]	0.09
## b[(Intercept) country:Argentina]	0.29
## b[(Intercept) country:Australia]	0.24
## b[(Intercept) country:Austria]	0.05
## b[(Intercept) country:Brazil]	0.35
## b[(Intercept) country:Bulgaria]	-0.12
## b[(Intercept) country:Canada]	0.46
## b[(Intercept) country:Chile]	0.10
## b[(Intercept) country:Croatia]	0.40
## b[(Intercept) country:Czech_Republic]	0.39
## b[(Intercept) country:England]	0.58
## b[(Intercept) country:France]	0.25
## b[(Intercept) country:Georgia]	0.15
## b[(Intercept) country:Germany]	0.38
## b[(Intercept) country:Greece]	0.18
## b[(Intercept) country:Hungary]	0.47
## b[(Intercept) country:Israel]	0.33
## b[(Intercept) country:Italy]	0.39
## b[(Intercept) country:Lebanon]	0.48
## b[(Intercept) country:Macedonia]	0.23
## b[(Intercept) country:Mexico]	0.58
## b[(Intercept) country:Moldova]	0.12

```

## b[(Intercept) country:Morocco] 0.14
## b[(Intercept) country:New_Zealand] 0.23
## b[(Intercept) country:Peru] 0.46
## b[(Intercept) country:Portugal] -0.19
## b[(Intercept) country:Romania] -0.38
## b[(Intercept) country:Slovenia] 0.27
## b[(Intercept) country:South_Africa] 0.15
## b[(Intercept) country:Spain] 0.16
## b[(Intercept) country:Turkey] 0.20
## b[(Intercept) country:Ukraine] 0.11
## b[(Intercept) country:Uruguay] 0.43
## b[(Intercept) country:US] 0.49
## sigma 0.68
## Sigma[province:country:(Intercept),(Intercept)] 0.11
## Sigma[country:(Intercept),(Intercept)] 0.13
##
## Fit Diagnostics:
##      mean    sd   5%   50%   95%
## mean_PPD 4.78  0.00 4.78 4.78 4.79
##
## The mean_ppd is the sample average posterior predictive distribution of the outcome variable (for de
##
## MCMC diagnostics
##
##                                     mcse Rhat
## (Intercept) 0.00 1.01
## rating_c 0.00 1.00
## b[(Intercept) province:country:Aconcagua_Costa:Chile] 0.00 1.00
## b[(Intercept) province:country:Aconcagua_Valley:Chile] 0.00 1.00
## b[(Intercept) province:country:Aegean:Turkey] 0.00 1.00
## b[(Intercept) province:country:Alentejano:Portugal] 0.00 1.00
## b[(Intercept) province:country:Alentejo:Portugal] 0.00 1.00
## b[(Intercept) province:country:Alsace:France] 0.00 1.01
## b[(Intercept) province:country:America:US] 0.00 1.01
## b[(Intercept) province:country:Andalucia:Spain] 0.00 1.01
## b[(Intercept) province:country:Ankara:Turkey] 0.00 1.00
## b[(Intercept) province:country:Apalta:Chile] 0.00 1.00
## b[(Intercept) province:country:Arizona:US] 0.00 1.01
## b[(Intercept) province:country:Atalanti_Valley:Greece] 0.00 1.00
## b[(Intercept) province:country:Australia_Other:Australia] 0.00 1.00
## b[(Intercept) province:country:Austria:Austria] 0.00 1.00
## b[(Intercept) province:country:Awatere_Valley:New_Zealand] 0.00 1.00
## b[(Intercept) province:country:Baden:Germany] 0.00 1.00
## b[(Intercept) province:country:Bairrada:Portugal] 0.00 1.00
## b[(Intercept) province:country:Beaujolais:France] 0.00 1.01
## b[(Intercept) province:country:Beira_Atlantico:Portugal] 0.00 1.00
## b[(Intercept) province:country:Beira_Interior:Portugal] 0.00 1.00
## b[(Intercept) province:country:Beiras:Portugal] 0.00 1.00
## b[(Intercept) province:country:Bekaa_Valley:Lebanon] 0.00 1.00
## b[(Intercept) province:country:Bío_Bío_Valley:Chile] 0.00 1.00
## b[(Intercept) province:country:Bordeaux:France] 0.00 1.01
## b[(Intercept) province:country:British_Columbia:Canada] 0.00 1.00
## b[(Intercept) province:country:Bucelas:Portugal] 0.00 1.00
## b[(Intercept) province:country:Burgenland:Austria] 0.00 1.02
## b[(Intercept) province:country:Burgundy:France] 0.00 1.01

```

## b[(Intercept) province:country:Cachapoal_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:California:US]	0.00	1.01
## b[(Intercept) province:country:Canelones:Uruguay]	0.00	1.00
## b[(Intercept) province:country:Canterbury:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Cappadocia:Turkey]	0.00	1.00
## b[(Intercept) province:country:Carnuntum:Austria]	0.00	1.01
## b[(Intercept) province:country:Casablanca_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Catalonia:Spain]	0.00	1.01
## b[(Intercept) province:country:Central_Italy:Italy]	0.00	1.01
## b[(Intercept) province:country:Central_Otago:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Central_Spain:Spain]	0.00	1.00
## b[(Intercept) province:country:Central_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Champagne:France]	0.00	1.01
## b[(Intercept) province:country:Chile:Chile]	0.00	1.00
## b[(Intercept) province:country:Coastal_Region:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Colchagua_Costa:Chile]	0.00	1.00
## b[(Intercept) province:country:Colchagua_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Colorado:US]	0.00	1.01
## b[(Intercept) province:country:Constantia:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Crete:Greece]	0.00	1.00
## b[(Intercept) province:country:Curicó_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	0.01	1.00
## b[(Intercept) province:country:Dão:Portugal]	0.00	1.00
## b[(Intercept) province:country:Dealul_Mare:Romania]	0.00	1.00
## b[(Intercept) province:country:Douro:Portugal]	0.00	1.00
## b[(Intercept) province:country:Drama:Greece]	0.00	1.00
## b[(Intercept) province:country:Durbanville:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Duriense:Portugal]	0.00	1.00
## b[(Intercept) province:country:Eger:Hungary]	0.00	1.00
## b[(Intercept) province:country:Eisenberg:Austria]	0.00	1.00
## b[(Intercept) province:country:Elgin:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Elqui_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:England:England]	0.00	1.00
## b[(Intercept) province:country:Epanomi:Greece]	0.00	1.00
## b[(Intercept) province:country:Estremadura:Portugal]	0.00	1.00
## b[(Intercept) province:country:Florina:Greece]	0.00	1.00
## b[(Intercept) province:country:France_Other:France]	0.00	1.01
## b[(Intercept) province:country:Franken:Germany]	0.00	1.00
## b[(Intercept) province:country:Franschhoek:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Galicia:Spain]	0.00	1.01
## b[(Intercept) province:country:Galil:Israel]	0.00	1.00
## b[(Intercept) province:country:Galilee:Israel]	0.00	1.00
## b[(Intercept) province:country:Georgia:Georgia]	0.00	1.00
## b[(Intercept) province:country:Germany:Germany]	0.00	1.00
## b[(Intercept) province:country:Gisborne:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	0.00	1.00
## b[(Intercept) province:country:Greece:Greece]	0.00	1.00
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Hemel_en_Aarde:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Ica:Peru]	0.00	1.00
## b[(Intercept) province:country:Idaho:US]	0.00	1.01
## b[(Intercept) province:country:Israel:Israel]	0.00	1.00
## b[(Intercept) province:country:Istria:Croatia]	0.00	1.00
## b[(Intercept) province:country:Italy_Other:Italy]	0.00	1.00

## b[(Intercept) province:country:Itata_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Juanico:Uruguay]	0.00	1.00
## b[(Intercept) province:country:Judean_Hills:Israel]	0.00	1.00
## b[(Intercept) province:country:Kakheti:Georgia]	0.00	1.00
## b[(Intercept) province:country:Kamptal:Austria]	0.00	1.02
## b[(Intercept) province:country:Kremstal:Austria]	0.00	1.02
## b[(Intercept) province:country:Kumeu:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Languedoc-Roussillon:France]	0.00	1.01
## b[(Intercept) province:country:Lebanon:Lebanon]	0.00	1.00
## b[(Intercept) province:country:Leithaberg:Austria]	0.00	1.00
## b[(Intercept) province:country:Levante:Spain]	0.00	1.00
## b[(Intercept) province:country:Leyda_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Limarí_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Lisboa:Portugal]	0.00	1.00
## b[(Intercept) province:country:Loire_Valley:France]	0.00	1.01
## b[(Intercept) province:country:Lolol_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Lombardy:Italy]	0.00	1.01
## b[(Intercept) province:country:Loncomilla_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Lontué_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Madeira:Portugal]	0.00	1.00
## b[(Intercept) province:country:Maipo_Valley:Chile]	0.00	1.01
## b[(Intercept) province:country:Mantinia:Greece]	0.00	1.00
## b[(Intercept) province:country:Marchigue:Chile]	0.00	1.00
## b[(Intercept) province:country:Marlborough:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Martinborough:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Maule_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Mendoza_Province:Argentina]	0.00	1.00
## b[(Intercept) province:country:Michigan:US]	0.00	1.01
## b[(Intercept) province:country:Minho:Portugal]	0.00	1.00
## b[(Intercept) province:country:Missouri:US]	0.00	1.00
## b[(Intercept) province:country:Mittelburgenland:Austria]	0.00	1.00
## b[(Intercept) province:country:Moldova:Moldova]	0.00	1.00
## b[(Intercept) province:country:Montevideo:Uruguay]	0.00	1.00
## b[(Intercept) province:country:Moravia:Czech_Republic]	0.00	1.00
## b[(Intercept) province:country:Mosel:Germany]	0.00	1.01
## b[(Intercept) province:country:Mosel-Saar-Ruwer:Germany]	0.00	1.01
## b[(Intercept) province:country:Nahe:Germany]	0.00	1.01
## b[(Intercept) province:country:Naoussa:Greece]	0.00	1.00
## b[(Intercept) province:country:Nelson:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Nemea:Greece]	0.00	1.00
## b[(Intercept) province:country:Neusiedlersee:Austria]	0.00	1.00
## b[(Intercept) province:country:New_Mexico:US]	0.00	1.01
## b[(Intercept) province:country:New_South_Wales:Australia]	0.00	1.00
## b[(Intercept) province:country:New_York:US]	0.00	1.01
## b[(Intercept) province:country:New_Zealand:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Niederösterreich:Austria]	0.00	1.02
## b[(Intercept) province:country:North_Carolina:US]	0.00	1.00
## b[(Intercept) province:country:North_Dalmatia:Croatia]	0.00	1.00
## b[(Intercept) province:country:Northeastern_Italy:Italy]	0.00	1.01
## b[(Intercept) province:country:Northern_Spain:Spain]	0.00	1.01
## b[(Intercept) province:country:Northwestern_Italy:Italy]	0.00	1.00
## b[(Intercept) province:country:Ohio:US]	0.00	1.00
## b[(Intercept) province:country:Ontario:Canada]	0.00	1.00
## b[(Intercept) province:country:Oregon:US]	0.00	1.01

## b[(Intercept) province:country:Österreichischer_Sekt:Austria]	0.00	1.01
## b[(Intercept) province:country:Other:Argentina]	0.00	1.00
## b[(Intercept) province:country:Paarl:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Palmela:Portugal]	0.00	1.00
## b[(Intercept) province:country:Pangeon:Greece]	0.00	1.00
## b[(Intercept) province:country:Peljesac:Croatia]	0.00	1.00
## b[(Intercept) province:country:Peloponnese:Greece]	0.00	1.00
## b[(Intercept) province:country:Península_de_Setúbal:Portugal]	0.00	1.00
## b[(Intercept) province:country:Pennsylvania:US]	0.00	1.00
## b[(Intercept) province:country:Peumo:Chile]	0.00	1.00
## b[(Intercept) province:country:Pfalz:Germany]	0.00	1.01
## b[(Intercept) province:country:Piedmont:Italy]	0.00	1.01
## b[(Intercept) province:country:Port:Portugal]	0.00	1.00
## b[(Intercept) province:country:Portuguese_Table_Wine:Portugal]	0.00	1.00
## b[(Intercept) province:country:Progreso:Uruguay]	0.00	1.00
## b[(Intercept) province:country:Provence:France]	0.00	1.01
## b[(Intercept) province:country:Puerto_Alto:Chile]	0.00	1.00
## b[(Intercept) province:country:Rapel_Valley:Chile]	0.00	1.00
## b[(Intercept) province:country:Recas:Romania]	0.00	1.00
## b[(Intercept) province:country:Rheingau:Germany]	0.00	1.01
## b[(Intercept) province:country:Rheinhessen:Germany]	0.00	1.01
## b[(Intercept) province:country:Rhône_Valley:France]	0.00	1.01
## b[(Intercept) province:country:Ribatejano:Portugal]	0.00	1.00
## b[(Intercept) province:country:Ribatejo:Portugal]	0.00	1.00
## b[(Intercept) province:country:Robertson:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Romania:Romania]	0.00	1.00
## b[(Intercept) province:country:Samson:Israel]	0.00	1.00
## b[(Intercept) province:country:San_Antonio:Chile]	0.00	1.00
## b[(Intercept) province:country:Santorini:Greece]	0.00	1.00
## b[(Intercept) province:country:Serra_Gaúcha:Brazil]	0.00	1.00
## b[(Intercept) province:country:Setubal:Portugal]	0.00	1.00
## b[(Intercept) province:country:Shomron:Israel]	0.00	1.00
## b[(Intercept) province:country:Sicily_&_Sardinia:Italy]	0.00	1.01
## b[(Intercept) province:country:Simonsberg-Stellenbosch:South_Africa]	0.00	1.00
## b[(Intercept) province:country:South_Australia:Australia]	0.00	1.00
## b[(Intercept) province:country:South_Island:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Southern_Italy:Italy]	0.00	1.01
## b[(Intercept) province:country:Southwest_France:France]	0.00	1.01
## b[(Intercept) province:country:Spain_Other:Spain]	0.00	1.00
## b[(Intercept) province:country:Spanish_Islands:Spain]	0.00	1.00
## b[(Intercept) province:country:Štajerska:Slovenia]	0.00	1.00
## b[(Intercept) province:country:Steiermark:Austria]	0.00	1.00
## b[(Intercept) province:country:Stellenbosch:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Südoststeiermark:Austria]	0.00	1.01
## b[(Intercept) province:country:Südsteiermark:Austria]	0.00	1.01
## b[(Intercept) province:country:Swartland:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Tasmania:Australia]	0.00	1.00
## b[(Intercept) province:country:Tejo:Portugal]	0.00	1.00
## b[(Intercept) province:country:Texas:US]	0.00	1.01
## b[(Intercept) province:country:Thermenregion:Austria]	0.00	1.01
## b[(Intercept) province:country:Thrace:Turkey]	0.00	1.00
## b[(Intercept) province:country:Thracian_Valley:Bulgaria]	0.01	1.00
## b[(Intercept) province:country:Tikves:Macedonia]	0.00	1.00
## b[(Intercept) province:country:Tokaj:Hungary]	0.00	1.00

## b[(Intercept) province:country:Tokaji:Hungary]	0.00	1.00
## b[(Intercept) province:country:Traisental:Austria]	0.00	1.01
## b[(Intercept) province:country:Tulbagh:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Turkey:Turkey]	0.00	1.00
## b[(Intercept) province:country:Tuscany:Italy]	0.00	1.01
## b[(Intercept) province:country:Ukraine:Ukraine]	0.00	1.00
## b[(Intercept) province:country:Upper_Galilee:Israel]	0.00	1.00
## b[(Intercept) province:country:Uruguay:Uruguay]	0.00	1.00
## b[(Intercept) province:country:Valle_de_Guadalupe:Mexico]	0.00	1.00
## b[(Intercept) province:country:Veneto:Italy]	0.00	1.01
## b[(Intercept) province:country:Victoria:Australia]	0.00	1.00
## b[(Intercept) province:country:Vienna:Austria]	0.00	1.01
## b[(Intercept) province:country:Viile_Timisului:Romania]	0.01	1.00
## b[(Intercept) province:country:Villány:Hungary]	0.00	1.00
## b[(Intercept) province:country:Vinho_Espumante_de_Qualidade:Portugal]	0.00	1.00
## b[(Intercept) province:country:Vinho_Verde:Portugal]	0.00	1.00
## b[(Intercept) province:country:Virginia:US]	0.00	1.01
## b[(Intercept) province:country:Wachau:Austria]	0.00	1.02
## b[(Intercept) province:country:Wagram:Austria]	0.00	1.01
## b[(Intercept) province:country:Wagram-Donauland:Austria]	0.00	1.01
## b[(Intercept) province:country:Waiheke_Island:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Waipara:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Waipara_Valley:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Wairau_Valley:New_Zealand]	0.00	1.00
## b[(Intercept) province:country:Walker_Bay:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Washington:US]	0.00	1.01
## b[(Intercept) province:country>Weinland_Österreich:Austria]	0.00	1.00
## b[(Intercept) province:country>Weinviertel:Austria]	0.00	1.01
## b[(Intercept) province:country:Wellington:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Western_Australia:Australia]	0.00	1.00
## b[(Intercept) province:country:Western_Cape:South_Africa]	0.00	1.00
## b[(Intercept) province:country:Wiener_Gemischter_Satz:Austria]	0.00	1.00
## b[(Intercept) province:country:Württemberg:Germany]	0.00	1.00
## b[(Intercept) province:country:Zenata:Morocco]	0.00	1.00
## b[(Intercept) country:Argentina]	0.00	1.00
## b[(Intercept) country:Australia]	0.00	1.01
## b[(Intercept) country:Austria]	0.00	1.02
## b[(Intercept) country:Brazil]	0.00	1.00
## b[(Intercept) country:Bulgaria]	0.01	1.00
## b[(Intercept) country:Canada]	0.00	1.00
## b[(Intercept) country:Chile]	0.00	1.01
## b[(Intercept) country:Croatia]	0.00	1.00
## b[(Intercept) country:Czech_Republic]	0.00	1.00
## b[(Intercept) country:England]	0.00	1.00
## b[(Intercept) country:France]	0.00	1.01
## b[(Intercept) country:Georgia]	0.00	1.00
## b[(Intercept) country:Germany]	0.00	1.01
## b[(Intercept) country:Greece]	0.00	1.00
## b[(Intercept) country:Hungary]	0.00	1.00
## b[(Intercept) country:Israel]	0.00	1.00
## b[(Intercept) country:Italy]	0.00	1.01
## b[(Intercept) country:Lebanon]	0.00	1.00
## b[(Intercept) country:Macedonia]	0.00	1.00
## b[(Intercept) country:Mexico]	0.00	1.00

## b[(Intercept) country:Moldova]	0.00	1.00
## b[(Intercept) country:Morocco]	0.00	1.00
## b[(Intercept) country:New_Zealand]	0.00	1.00
## b[(Intercept) country:Peru]	0.00	1.00
## b[(Intercept) country:Portugal]	0.00	1.01
## b[(Intercept) country:Romania]	0.01	1.00
## b[(Intercept) country:Slovenia]	0.00	1.00
## b[(Intercept) country:South_Africa]	0.00	1.00
## b[(Intercept) country:Spain]	0.00	1.00
## b[(Intercept) country:Turkey]	0.00	1.00
## b[(Intercept) country:Ukraine]	0.00	1.00
## b[(Intercept) country:Uruguay]	0.00	1.00
## b[(Intercept) country:US]	0.00	1.02
## sigma	0.00	1.00
## Sigma[province:country:(Intercept),(Intercept)]	0.00	1.00
## Sigma[country:(Intercept),(Intercept)]	0.00	1.00
## mean_PPD	0.00	1.00
## log-posterior	0.61	1.00
##	n_eff	
## (Intercept)	891	
## rating_c	4220	
## b[(Intercept) province:country:Aconcagua_Costa:Chile]	1844	
## b[(Intercept) province:country:Aconcagua_Valley:Chile]	816	
## b[(Intercept) province:country:Aegean:Turkey]	2577	
## b[(Intercept) province:country:Alentejano:Portugal]	500	
## b[(Intercept) province:country:Alentejo:Portugal]	729	
## b[(Intercept) province:country:Alsace:France]	399	
## b[(Intercept) province:country:America:US]	1063	
## b[(Intercept) province:country:Andalucia:Spain]	851	
## b[(Intercept) province:country:Ankara:Turkey]	2543	
## b[(Intercept) province:country:Apalta:Chile]	2870	
## b[(Intercept) province:country:Arizona:US]	1423	
## b[(Intercept) province:country:Atalanti_Valley:Greece]	3342	
## b[(Intercept) province:country:Australia_Other:Australia]	972	
## b[(Intercept) province:country:Austria:Austria]	1855	
## b[(Intercept) province:country:Awatere_Valley:New_Zealand]	2188	
## b[(Intercept) province:country:Baden:Germany]	953	
## b[(Intercept) province:country:Bairrada:Portugal]	675	
## b[(Intercept) province:country:Beaujolais:France]	395	
## b[(Intercept) province:country:Beira_Atlantico:Portugal]	2433	
## b[(Intercept) province:country:Beira_Interior:Portugal]	1643	
## b[(Intercept) province:country:Beiras:Portugal]	3014	
## b[(Intercept) province:country:Bekaa_Valley:Lebanon]	2001	
## b[(Intercept) province:country:Bío_Bío_Valley:Chile]	1487	
## b[(Intercept) province:country:Bordeaux:France]	385	
## b[(Intercept) province:country:British_Columbia:Canada]	1769	
## b[(Intercept) province:country:Bucelas:Portugal]	2603	
## b[(Intercept) province:country:Burgenland:Austria]	505	
## b[(Intercept) province:country:Burgundy:France]	389	
## b[(Intercept) province:country:Cachapoal_Valley:Chile]	714	
## b[(Intercept) province:country:California:US]	598	
## b[(Intercept) province:country:Canelones:Uruguay]	2089	
## b[(Intercept) province:country:Canterbury:New_Zealand]	2954	
## b[(Intercept) province:country:Cappadocia:Turkey]	3618	

## b[(Intercept) province:country:Carnuntum:Austria]	793
## b[(Intercept) province:country:Casablanca_Valley:Chile]	564
## b[(Intercept) province:country:Catalonia:Spain]	741
## b[(Intercept) province:country:Central_Italy:Italy]	480
## b[(Intercept) province:country:Central_Otago:New_Zealand]	1041
## b[(Intercept) province:country:Central_Spain:Spain]	755
## b[(Intercept) province:country:Central_Valley:Chile]	581
## b[(Intercept) province:country:Champagne:France]	396
## b[(Intercept) province:country:Chile:Chile]	1372
## b[(Intercept) province:country:Coastal_Region:South_Africa]	1172
## b[(Intercept) province:country:Colchagua_Costa:Chile]	3560
## b[(Intercept) province:country:Colchagua_Valley:Chile]	523
## b[(Intercept) province:country:Colorado:US]	1115
## b[(Intercept) province:country:Constantia:South_Africa]	2581
## b[(Intercept) province:country:Crete:Greece]	2441
## b[(Intercept) province:country:Curicó_Valley:Chile]	654
## b[(Intercept) province:country:Danube_River_Plains:Bulgaria]	1439
## b[(Intercept) province:country:Dão:Portugal]	598
## b[(Intercept) province:country:Dealu_Mare:Romania]	1375
## b[(Intercept) province:country:Douro:Portugal]	513
## b[(Intercept) province:country:Drama:Greece]	2074
## b[(Intercept) province:country:Durbanville:South_Africa]	3255
## b[(Intercept) province:country:Duriense:Portugal]	2013
## b[(Intercept) province:country:Eger:Hungary]	2679
## b[(Intercept) province:country:Eisenberg:Austria]	2634
## b[(Intercept) province:country:Elgin:South_Africa]	1849
## b[(Intercept) province:country:Elqui_Valley:Chile]	1294
## b[(Intercept) province:country:England:England]	2125
## b[(Intercept) province:country:Epanomi:Greece]	2418
## b[(Intercept) province:country:Estremadura:Portugal]	1335
## b[(Intercept) province:country:Florina:Greece]	3375
## b[(Intercept) province:country:France_Other:France]	413
## b[(Intercept) province:country:Franken:Germany]	1232
## b[(Intercept) province:country:Franschhoek:South_Africa]	2477
## b[(Intercept) province:country:Galicia:Spain]	785
## b[(Intercept) province:country:Galil:Israel]	3088
## b[(Intercept) province:country:Galilee:Israel]	1414
## b[(Intercept) province:country:Georgia:Georgia]	2863
## b[(Intercept) province:country:Germany:Germany]	2998
## b[(Intercept) province:country:Gisborne:New_Zealand]	3965
## b[(Intercept) province:country:Goriska_Brda:Slovenia]	2592
## b[(Intercept) province:country:Greece:Greece]	3460
## b[(Intercept) province:country:Hawke's_Bay:New_Zealand]	1084
## b[(Intercept) province:country:Hemel_en_Aarde:South_Africa]	3803
## b[(Intercept) province:country:Ica:Peru]	2942
## b[(Intercept) province:country:Idaho:US]	768
## b[(Intercept) province:country:Israel:Israel]	2498
## b[(Intercept) province:country:Istria:Croatia]	2625
## b[(Intercept) province:country:Italy_Other:Italy]	632
## b[(Intercept) province:country:Itata_Valley:Chile]	3247
## b[(Intercept) province:country:Juanico:Uruguay]	3165
## b[(Intercept) province:country:Judean_Hills:Israel]	1550
## b[(Intercept) province:country:Kakheti:Georgia]	2193
## b[(Intercept) province:country:Kamptal:Austria]	519

## b[(Intercept) province:country:Kremstal:Austria]	577
## b[(Intercept) province:country:Kumeu:New_Zealand]	1838
## b[(Intercept) province:country:Languedoc-Roussillon:France]	407
## b[(Intercept) province:country:Lebanon:Lebanon]	2581
## b[(Intercept) province:country:Leithaberg:Austria]	1898
## b[(Intercept) province:country:Levante:Spain]	745
## b[(Intercept) province:country:Leyda_Valley:Chile]	694
## b[(Intercept) province:country:Limarí_Valley:Chile]	880
## b[(Intercept) province:country:Lisboa:Portugal]	537
## b[(Intercept) province:country:Loire_Valley:France]	383
## b[(Intercept) province:country:Lolol_Valley:Chile]	2369
## b[(Intercept) province:country:Lombardy:Italy]	491
## b[(Intercept) province:country:Loncomilla_Valley:Chile]	2284
## b[(Intercept) province:country:Lontué_Valley:Chile]	2352
## b[(Intercept) province:country:Madeira:Portugal]	3604
## b[(Intercept) province:country:Maipo_Valley:Chile]	536
## b[(Intercept) province:country:Mantinia:Greece]	2590
## b[(Intercept) province:country:Marchigue:Chile]	1935
## b[(Intercept) province:country:Marlborough:New_Zealand]	817
## b[(Intercept) province:country:Martinborough:New_Zealand]	1128
## b[(Intercept) province:country:Maule_Valley:Chile]	554
## b[(Intercept) province:country:Mendoza_Province:Argentina]	1468
## b[(Intercept) province:country:Michigan:US]	882
## b[(Intercept) province:country:Minho:Portugal]	1499
## b[(Intercept) province:country:Missouri:US]	1652
## b[(Intercept) province:country:Mittelburgenland:Austria]	1920
## b[(Intercept) province:country:Moldova:Moldova]	2159
## b[(Intercept) province:country:Montevideo:Uruguay]	3369
## b[(Intercept) province:country:Moravia:Czech_Republic]	3213
## b[(Intercept) province:country:Mosel:Germany]	620
## b[(Intercept) province:country:Mosel-Saar-Ruwer:Germany]	805
## b[(Intercept) province:country:Nahe:Germany]	929
## b[(Intercept) province:country:Naoussa:Greece]	2951
## b[(Intercept) province:country:Nelson:New_Zealand]	1612
## b[(Intercept) province:country:Nemea:Greece]	1839
## b[(Intercept) province:country:Neusiedlersee:Austria]	3078
## b[(Intercept) province:country:New_Mexico:US]	1357
## b[(Intercept) province:country:New_South_Wales:Australia]	1078
## b[(Intercept) province:country:New_York:US]	612
## b[(Intercept) province:country:New_Zealand:New_Zealand]	2886
## b[(Intercept) province:country:Niederösterreich:Austria]	505
## b[(Intercept) province:country:North_Carolina:US]	2053
## b[(Intercept) province:country:North_Dalmatia:Croatia]	2769
## b[(Intercept) province:country:Northeastern_Italy:Italy]	462
## b[(Intercept) province:country:Northern_Spain:Spain]	729
## b[(Intercept) province:country:Northwestern_Italy:Italy]	1979
## b[(Intercept) province:country:Ohio:US]	2853
## b[(Intercept) province:country:Ontario:Canada]	1767
## b[(Intercept) province:country:Oregon:US]	605
## b[(Intercept) province:country:Österreichischer_Sekt:Austria]	1018
## b[(Intercept) province:country:Other:Argentina]	1488
## b[(Intercept) province:country:Paarl:South_Africa]	1534
## b[(Intercept) province:country:Palmela:Portugal]	2970
## b[(Intercept) province:country:Pangeon:Greece]	2980

## b[(Intercept) province:country:Peljesac:Croatia]	3010
## b[(Intercept) province:country:Peloponnese:Greece]	1826
## b[(Intercept) province:country:Península_de_Setúbal:Portugal]	818
## b[(Intercept) province:country:Pennsylvania:US]	2220
## b[(Intercept) province:country:Peumo:Chile]	1727
## b[(Intercept) province:country:Pfalz:Germany]	758
## b[(Intercept) province:country:Piedmont:Italy]	453
## b[(Intercept) province:country:Port:Portugal]	575
## b[(Intercept) province:country:Portuguese_Table_Wine:Portugal]	1985
## b[(Intercept) province:country:Progreso:Uruguay]	3492
## b[(Intercept) province:country:Provence:France]	398
## b[(Intercept) province:country:Puerto_Alto:Chile]	2324
## b[(Intercept) province:country:Rapel_Valley:Chile]	761
## b[(Intercept) province:country:Recas:Romania]	1841
## b[(Intercept) province:country:Rheingau:Germany]	697
## b[(Intercept) province:country:Rheinhessen:Germany]	703
## b[(Intercept) province:country:Rhône_Valley:France]	392
## b[(Intercept) province:country:Ribatejano:Portugal]	2942
## b[(Intercept) province:country:Ribatejo:Portugal]	2968
## b[(Intercept) province:country:Robertson:South_Africa]	1331
## b[(Intercept) province:country:Romania:Romania]	1497
## b[(Intercept) province:country:Samson:Israel]	3344
## b[(Intercept) province:country:San_Antonio:Chile]	1076
## b[(Intercept) province:country:Santorini:Greece]	1961
## b[(Intercept) province:country:Serra_Gaúcha:Brazil]	3233
## b[(Intercept) province:country:Setubal:Portugal]	2499
## b[(Intercept) province:country:Shomron:Israel]	2405
## b[(Intercept) province:country:Sicily_&_Sardinia:Italy]	455
## b[(Intercept) province:country:Simonsberg-Stellenbosch:South_Africa]	1816
## b[(Intercept) province:country:South_Australia:Australia]	890
## b[(Intercept) province:country:South_Island:New_Zealand]	2986
## b[(Intercept) province:country:Southern_Italy:Italy]	481
## b[(Intercept) province:country:Southwest_France:France]	380
## b[(Intercept) province:country:Spain_Other:Spain]	1146
## b[(Intercept) province:country:Spanish_Islands:Spain]	1675
## b[(Intercept) province:country:Štajerska:Slovenia]	2679
## b[(Intercept) province:country:Steiermark:Austria]	3399
## b[(Intercept) province:country:Stellenbosch:South_Africa]	970
## b[(Intercept) province:country:Südoststeiermark:Austria]	1537
## b[(Intercept) province:country:Südsteiermark:Austria]	918
## b[(Intercept) province:country:Swartland:South_Africa]	1559
## b[(Intercept) province:country:Tasmania:Australia]	1301
## b[(Intercept) province:country:Tejo:Portugal]	546
## b[(Intercept) province:country:Texas:US]	1036
## b[(Intercept) province:country:Thermenregion:Austria]	745
## b[(Intercept) province:country:Thrace:Turkey]	2986
## b[(Intercept) province:country:Thracian_Valley:Bulgaria]	1103
## b[(Intercept) province:country:Tikves:Macedonia]	3312
## b[(Intercept) province:country:Tokaj:Hungary]	1829
## b[(Intercept) province:country:Tokaji:Hungary]	1857
## b[(Intercept) province:country:Traisental:Austria]	1279
## b[(Intercept) province:country:Tulbagh:South_Africa]	3763
## b[(Intercept) province:country:Turkey:Turkey]	2721
## b[(Intercept) province:country:Tuscany:Italy]	459

## b[(Intercept) province:country:Ukraine:Ukraine]	2628
## b[(Intercept) province:country:Upper_Galilee:Israel]	2008
## b[(Intercept) province:country:Uruguay:Uruguay]	2330
## b[(Intercept) province:country:Valle_de_Guadalupe:Mexico]	2723
## b[(Intercept) province:country:Veneto:Italy]	461
## b[(Intercept) province:country:Victoria:Australia]	927
## b[(Intercept) province:country:Vienna:Austria]	1067
## b[(Intercept) province:country:Viile_Timisului:Romania]	1368
## b[(Intercept) province:country:Villány:Hungary]	2247
## b[(Intercept) province:country:Vinho_Espumante_de_Qualidade:Portugal]	3016
## b[(Intercept) province:country:Vinho_Verde:Portugal]	586
## b[(Intercept) province:country:Virginia:US]	647
## b[(Intercept) province:country:Wachau:Austria]	539
## b[(Intercept) province:country:Wagram:Austria]	1038
## b[(Intercept) province:country:Wagram-Donauland:Austria]	1258
## b[(Intercept) province:country:Waiheke_Island:New_Zealand]	3767
## b[(Intercept) province:country:Waipara:New_Zealand]	2011
## b[(Intercept) province:country:Waipara_Valley:New_Zealand]	2720
## b[(Intercept) province:country:Wairau_Valley:New_Zealand]	3160
## b[(Intercept) province:country:Walker_Bay:South_Africa]	2841
## b[(Intercept) province:country:Washington:US]	604
## b[(Intercept) province:country:Weinland_Österreich:Austria]	2872
## b[(Intercept) province:country>Weinviertel:Austria]	862
## b[(Intercept) province:country:Wellington:South_Africa]	2409
## b[(Intercept) province:country:Western_Australia:Australia]	930
## b[(Intercept) province:country:Western_Cape:South_Africa]	998
## b[(Intercept) province:country:Wiener_Gemischter_Satz:Austria]	1935
## b[(Intercept) province:country:Württemberg:Germany]	1697
## b[(Intercept) province:country:Zenata:Morocco]	2585
## b[(Intercept) country:Argentina]	1491
## b[(Intercept) country:Australia]	862
## b[(Intercept) country:Austria]	557
## b[(Intercept) country:Brazil]	3224
## b[(Intercept) country:Bulgaria]	1208
## b[(Intercept) country:Canada]	1600
## b[(Intercept) country:Chile]	625
## b[(Intercept) country:Croatia]	1804
## b[(Intercept) country:Czech_Republic]	3022
## b[(Intercept) country:England]	2014
## b[(Intercept) country:France]	509
## b[(Intercept) country:Georgia]	1934
## b[(Intercept) country:Germany]	670
## b[(Intercept) country:Greece]	998
## b[(Intercept) country:Hungary]	1351
## b[(Intercept) country:Israel]	1242
## b[(Intercept) country:Italy]	504
## b[(Intercept) country:Lebanon]	2044
## b[(Intercept) country:Macedonia]	2892
## b[(Intercept) country:Mexico]	2503
## b[(Intercept) country:Moldova]	2407
## b[(Intercept) country:Morocco]	2359
## b[(Intercept) country:New_Zealand]	859
## b[(Intercept) country:Peru]	2770
## b[(Intercept) country:Portugal]	508

```
## b[(Intercept) country:Romania] 1050
## b[(Intercept) country:Slovenia] 2335
## b[(Intercept) country:South_Africa] 875
## b[(Intercept) country:Spain] 785
## b[(Intercept) country:Turkey] 1670
## b[(Intercept) country:Ukraine] 2468
## b[(Intercept) country:Uruguay] 1581
## b[(Intercept) country:US] 631
## sigma 7421
## Sigma[province:country:(Intercept),(Intercept)] 655
## Sigma[country:(Intercept),(Intercept)] 693
## mean_PPD 4000
## log-posterior 695
##
## For each parameter, mcse is Monte Carlo standard error, n_eff is a crude measure of effective sample
```

— Examining random effects —

```
# random effects
ranef_model <- ranef(model_logprice)
print(ranef_model)
```

```
## $'province:country'
## (Intercept)
## Aconcagua Costa:Chile 0.016088520
## Aconcagua Valley:Chile 0.255616088
## Aegean:Turkey 0.176076083
## Alentejano:Portugal -0.015205070
## Alentejo:Portugal 0.009189754
## Alsace:France -0.096024813
## America:US -0.421876411
## Andalucia:Spain -0.025540560
## Ankara:Turkey -0.027019134
## Apalta:Chile 0.254792924
## Arizona:US 0.415366770
## Atalanti Valley:Greece -0.043900333
## Australia Other:Australia -0.589999727
## Austria:Austria 0.236911782
## Awatere Valley:New Zealand -0.299875224
## Baden:Germany 0.433182206
## Bairrada:Portugal 0.064579968
## Beaujolais:France -0.339020007
## Beira Atlantico:Portugal -0.133369169
## Beira Interior:Portugal -0.292713389
## Beiras:Portugal -0.070850147
## Bekaa Valley:Lebanon 0.074314039
## Bío Bío Valley:Chile -0.158415484
## Bordeaux:France 0.027039011
## British Columbia:Canada -0.064041959
## Bucelas:Portugal -0.226577446
## Burgenland:Austria -0.077951135
```

## Burgundy:France	0.726462470
## Cachapoal Valley:Chile	0.024518851
## California:US	0.078364894
## Canelones:Uruguay	-0.010187842
## Canterbury:New Zealand	0.033809572
## Cappadocia:Turkey	0.001876942
## Carnuntum:Austria	-0.209380320
## Casablanca Valley:Chile	-0.122197787
## Catalonia:Spain	0.086769292
## Central Italy:Italy	-0.190007467
## Central Otago:New Zealand	0.404107285
## Central Spain:Spain	-0.191813510
## Central Valley:Chile	-0.350673097
## Champagne:France	1.094304417
## Chile:Chile	0.002350389
## Coastal Region:South Africa	-0.297773860
## Colchagua Costa:Chile	0.013005588
## Colchagua Valley:Chile	-0.125184142
## Colorado:US	0.374294534
## Constantia:South Africa	-0.160837579
## Crete:Greece	-0.067512738
## Curicó Valley:Chile	-0.283484006
## Danube River Plains:Bulgaria	-0.283919525
## Dão:Portugal	-0.099484019
## Dealu Mare:Romania	0.356100462
## Douro:Portugal	0.150923102
## Drama:Greece	-0.083928715
## Durbanville:South Africa	-0.131091632
## Duriense:Portugal	0.338139590
## Eger:Hungary	0.113928714
## Eisenberg:Austria	0.032526780
## Elgin:South Africa	0.163670831
## Elqui Valley:Chile	-0.062995226
## England:England	0.280102748
## Epanomi:Greece	0.501185186
## Estremadura:Portugal	-0.333461432
## Florina:Greece	-0.061230142
## France Other:France	-0.282196700
## Franken:Germany	0.392322594
## Franschoek:South Africa	0.069476456
## Galicia:Spain	-0.065983059
## Galil:Israel	0.350722439
## Galilee:Israel	-0.044085590
## Georgia:Georgia	-0.040483073
## Germany:Germany	-0.342883499
## Gisborne:New Zealand	-0.059052541
## Goriska Brda:Slovenia	0.179255975
## Greece:Greece	0.054908510
## Hawke's Bay:New Zealand	0.072971622
## Hemel en Aarde:South Africa	0.307083208
## Ica:Peru	0.125718933
## Idaho:US	-0.338115947
## Israel:Israel	-0.053066042
## Istria:Croatia	-0.129631379

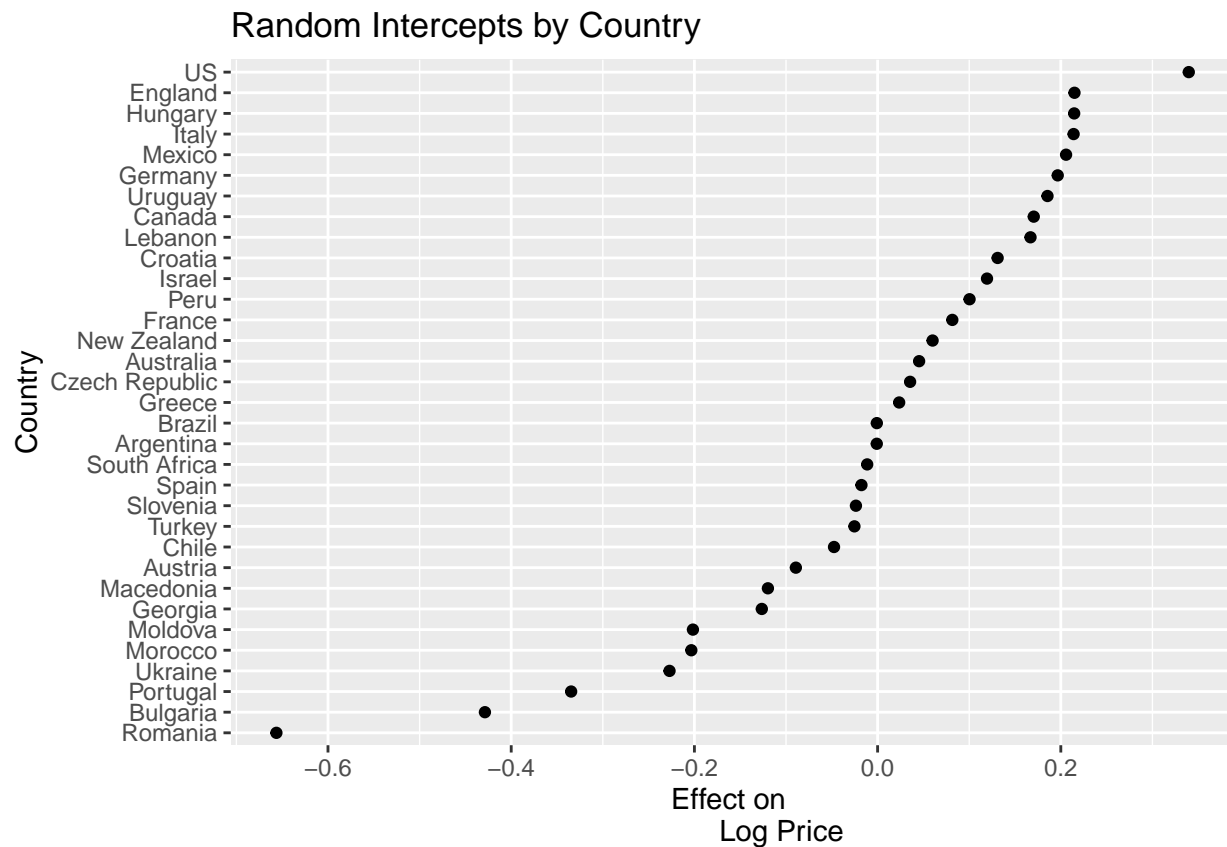
## Italy Other:Italy	0.089090564
## Itata Valley:Chile	0.263671912
## Juanico:Uruguay	0.468397596
## Judean Hills:Israel	0.373329192
## Kakheti:Georgia	-0.149426657
## Kamptal:Austria	-0.066776964
## Kremstal:Austria	-0.141102472
## Kumeu:New Zealand	0.200862463
## Languedoc-Roussillon:France	-0.329299933
## Lebanon:Lebanon	0.156135800
## Leithaberg:Austria	0.291591314
## Levante:Spain	-0.218689413
## Leyda Valley:Chile	0.005598678
## Limarí Valley:Chile	-0.033265104
## Lisboa:Portugal	-0.282618750
## Loire Valley:France	-0.147804062
## Lolol Valley:Chile	0.079833805
## Lombardy:Italy	0.178208572
## Loncomilla Valley:Chile	0.084723508
## Lontué Valley:Chile	-0.368636800
## Madeira:Portugal	0.855816100
## Maipo Valley:Chile	-0.047644377
## Mantinia:Greece	-0.460661645
## Marchigue:Chile	-0.101637302
## Marlborough:New Zealand	-0.220318324
## Martinborough:New Zealand	0.362051445
## Maule Valley:Chile	-0.199895948
## Mendoza Province:Argentina	0.003417252
## Michigan:US	0.252188932
## Minho:Portugal	-0.049894975
## Missouri:US	-0.086659665
## Mittelburgenland:Austria	0.033656423
## Moldova:Moldova	-0.250797950
## Montevideo:Uruguay	-0.096142891
## Moravia:Czech Republic	0.042543447
## Mosel:Germany	-0.259128371
## Mosel-Saar-Ruwer:Germany	0.123336742
## Nahe:Germany	0.011682807
## Naoussa:Greece	-0.021431574
## Nelson:New Zealand	-0.090303179
## Nemea:Greece	0.138325299
## Neusiedlersee:Austria	0.129203489
## New Mexico:US	0.240160282
## New South Wales:Australia	-0.087079223
## New York:US	-0.295664796
## New Zealand:New Zealand	-0.198295682
## Niederösterreich:Austria	-0.209840218
## North Carolina:US	0.055331780
## North Dalmatia:Croatia	0.091071787
## Northeastern Italy:Italy	-0.154617918
## Northern Spain:Spain	0.097271749
## Northwestern Italy:Italy	-0.095892662
## Ohio:US	-0.264482475
## Ontario:Canada	0.288840210

## Oregon:US	-0.014673667
## Österreichischer Sekt:Austria	0.245365088
## Other:Argentina	-0.022259679
## Paarl:South Africa	0.080640480
## Palmela:Portugal	-0.243843017
## Pangeon:Greece	0.491415319
## Peljesac:Croatia	0.204421811
## Peloponnese:Greece	-0.361003735
## Península de Setúbal:Portugal	-0.016690179
## Pennsylvania:US	0.176167492
## Peumo:Chile	0.235830169
## Pfalz:Germany	-0.270261792
## Piedmont:Italy	0.483374185
## Port:Portugal	0.928624310
## Portuguese Table Wine:Portugal	-0.209312892
## Progreso:Uruguay	-0.025372319
## Provence:France	-0.253276775
## Puente Alto:Chile	0.755724463
## Rapel Valley:Chile	-0.375834107
## Recas:Romania	-0.277747425
## Rheingau:Germany	0.323766372
## Rheinhessen:Germany	-0.404335894
## Rhône Valley:France	0.069416862
## Ribatejano:Portugal	-0.291292645
## Ribatejo:Portugal	-0.360227697
## Robertson:South Africa	-0.383672002
## Romania:Romania	-0.406131284
## Samson:Israel	-0.119272323
## San Antonio:Chile	0.159320875
## Santorini:Greece	-0.007681385
## Serra Gaúcha:Brazil	-0.019743630
## Setubal:Portugal	-0.197082501
## Shomron:Israel	-0.204314822
## Sicily & Sardinia:Italy	-0.194861306
## Simonsberg-Stellenbosch:South Africa	0.237247417
## South Australia:Australia	0.074212803
## South Island:New Zealand	-0.157239027
## Southern Italy:Italy	-0.116796744
## Southwest France:France	-0.373644568
## Spain Other:Spain	0.062413468
## Spanish Islands:Spain	0.276196589
## Štajerska:Slovenia	-0.209056878
## Steiermark:Austria	-0.085557825
## Stellenbosch:South Africa	0.052108120
## Südoststeiermark:Austria	0.155345339
## Südsteiermark:Austria	0.100814017
## Swartland:South Africa	-0.125857697
## Tasmania:Australia	0.267393369
## Tejo:Portugal	-0.139344782
## Texas:US	0.206804992
## Thermenregion:Austria	0.053023934
## Thrace:Turkey	0.027431266
## Thracian Valley:Bulgaria	-0.310148673
## Tikves:Macedonia	-0.153921896

## Tokaj:Hungary	-0.246859284
## Tokaji:Hungary	0.016695301
## Traisental:Austria	-0.160504849
## Tulbagh:South Africa	0.604782600
## Turkey:Turkey	-0.226579236
## Tuscany:Italy	0.286691028
## Ukraine:Ukraine	-0.302430218
## Upper Galilee:Israel	-0.153483555
## Uruguay:Uruguay	-0.087379271
## Valle de Guadalupe:Mexico	0.291403700
## Veneto:Italy	0.021304109
## Victoria:Australia	0.292511835
## Vienna:Austria	-0.141091487
## Viile Timisului:Romania	-0.548699322
## Villány:Hungary	0.411941358
## Vinho Espumante de Qualidade:Portugal	0.540060756
## Vinho Verde:Portugal	-0.314123291
## Virginia:US	0.253156571
## Wachau:Austria	0.189493631
## Wagram:Austria	-0.234097563
## Wagram-Donauland:Austria	0.075682604
## Waiheke Island:New Zealand	0.204362638
## Waipara:New Zealand	-0.086027304
## Waipara Valley:New Zealand	0.082845372
## Wairau Valley:New Zealand	-0.087818906
## Walker Bay:South Africa	0.093759634
## Washington:US	-0.182961201
## Weinland Österreich:Austria	-0.135499962
## Weinviertel:Austria	-0.133213925
## Wellington:South Africa	-0.125338749
## Western Australia:Australia	0.054693866
## Western Cape:South Africa	-0.424840240
## Wiener Gemischter Satz:Austria	-0.103175046
## Württemberg:Germany	0.239285816
## Zenata:Morocco	-0.269620878
##	
## \$country	
##	(Intercept)
## Argentina	-0.0009080232
## Australia	0.0453178708
## Austria	-0.0892237558
## Brazil	-0.0008524222
## Bulgaria	-0.4286642525
## Canada	0.1704633988
## Chile	-0.0475767046
## Croatia	0.1310262170
## Czech Republic	0.0354781621
## England	0.2149334068
## France	0.0815671742
## Georgia	-0.1264133087
## Germany	0.1966360180
## Greece	0.0235432048
## Hungary	0.2146135897
## Israel	0.1194425849

```
## Italy          0.2139692420
## Lebanon        0.1669119996
## Macedonia     -0.1197486331
## Mexico         0.2057493116
## Moldova       -0.2016126455
## Morocco       -0.2033667518
## New Zealand    0.0600093614
## Peru           0.1003797618
## Portugal       -0.3345663557
## Romania        -0.6563208884
## Slovenia       -0.0236561099
## South Africa   -0.0113750620
## Spain          -0.0176377021
## Turkey         -0.0253209879
## Ukraine        -0.2271692373
## Uruguay        0.1854719601
## US             0.3396900833
##
## with conditional variances for "province:country" "country"
```

```
# plotting variation in random intercepts for countries
country_effects <- ranef_model$country
country_df <- data.frame(country = rownames(country_effects), effect =
  country_effects[,1])
ggplot(country_df, aes(x = reorder(country, effect), y = effect)) +
  geom_point() +
  coord_flip() +
  labs(title = "Random Intercepts by Country", x = "Country", y = "Effect on
    Log Price")
```



```
# plotting variation in random intercepts for province
province_effects <- ranef_model$province
print(province_effects)
```

```
##                                (Intercept)
## Aconcagua Costa:Chile           0.016088520
## Aconcagua Valley:Chile          0.255616088
## Aegean:Turkey                   0.176076083
## Alentejano:Portugal             -0.015205070
## Alentejo:Portugal               0.009189754
## Alsace:France                   -0.096024813
## America:US                      -0.421876411
## Andalucia:Spain                 -0.025540560
## Ankara:Turkey                  -0.027019134
## Apalta:Chile                    0.254792924
## Arizona:US                     0.415366770
## Atalanti Valley:Greece          -0.043900333
## Australia Other:Australia       -0.589999727
## Austria:Austria                 0.236911782
## Awatere Valley:New Zealand      -0.299875224
## Baden:Germany                   0.433182206
## Bairrada:Portugal               0.064579968
## Beaujolais:France               -0.339020007
## Beira Atlantico:Portugal         -0.133369169
## Beira Interior:Portugal         -0.292713389
## Beiras:Portugal                 -0.070850147
```

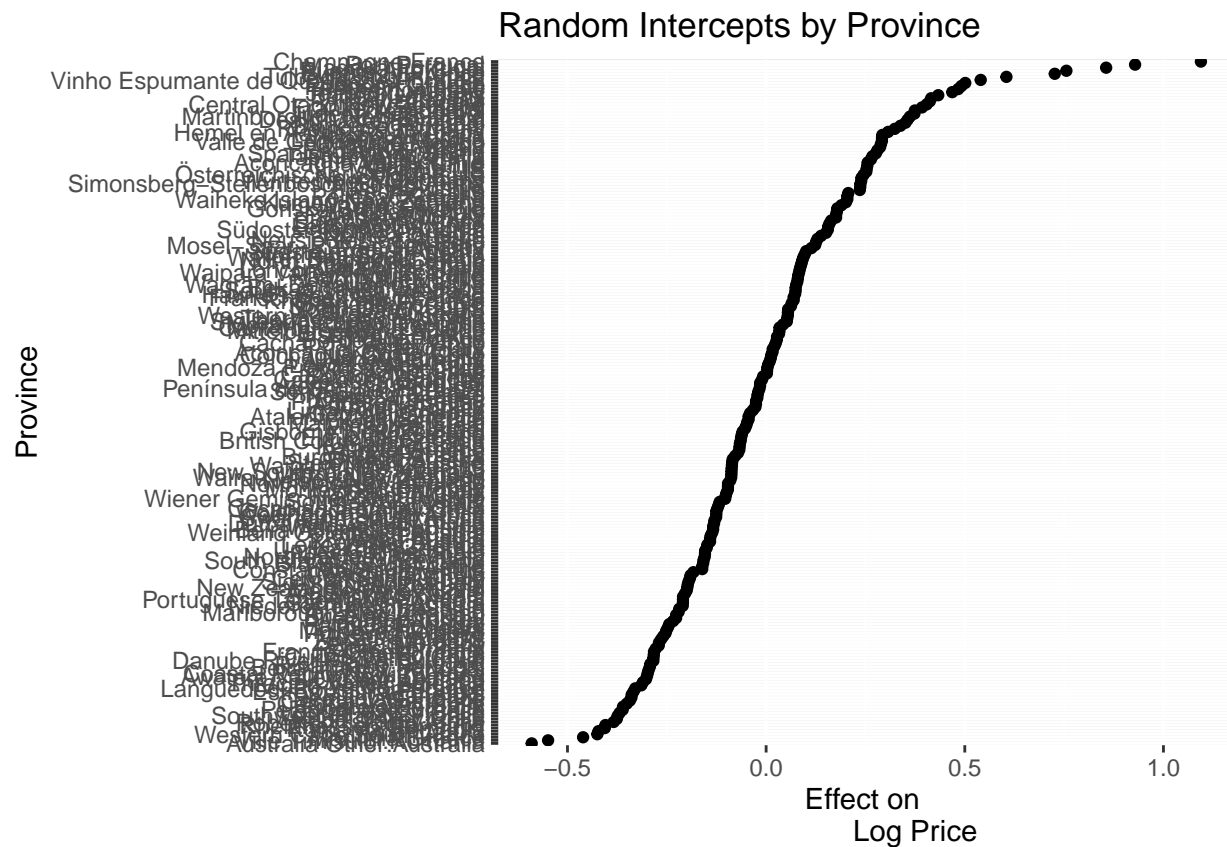
## Bekaa Valley:Lebanon	0.074314039
## Bio Bío Valley:Chile	-0.158415484
## Bordeaux:France	0.027039011
## British Columbia:Canada	-0.064041959
## Bucelas:Portugal	-0.226577446
## Burgenland:Austria	-0.077951135
## Burgundy:France	0.726462470
## Cachapoal Valley:Chile	0.024518851
## California:US	0.078364894
## Canelones:Uruguay	-0.010187842
## Canterbury:New Zealand	0.033809572
## Cappadocia:Turkey	0.001876942
## Carnuntum:Austria	-0.209380320
## Casablanca Valley:Chile	-0.122197787
## Catalonia:Spain	0.086769292
## Central Italy:Italy	-0.190007467
## Central Otago:New Zealand	0.404107285
## Central Spain:Spain	-0.191813510
## Central Valley:Chile	-0.350673097
## Champagne:France	1.094304417
## Chile:Chile	0.002350389
## Coastal Region:South Africa	-0.297773860
## Colchagua Costa:Chile	0.013005588
## Colchagua Valley:Chile	-0.125184142
## Colorado:US	0.374294534
## Constantia:South Africa	-0.160837579
## Crete:Greece	-0.067512738
## Curicó Valley:Chile	-0.283484006
## Danube River Plains:Bulgaria	-0.283919525
## Dão:Portugal	-0.099484019
## Dealu Mare:Romania	0.356100462
## Douro:Portugal	0.150923102
## Drama:Greece	-0.083928715
## Durbanville:South Africa	-0.131091632
## Duriense:Portugal	0.338139590
## Eger:Hungary	0.113928714
## Eisenberg:Austria	0.032526780
## Elgin:South Africa	0.163670831
## Elqui Valley:Chile	-0.062995226
## England:England	0.280102748
## Epanomi:Greece	0.501185186
## Estremadura:Portugal	-0.333461432
## Florina:Greece	-0.061230142
## France Other:France	-0.282196700
## Franken:Germany	0.392322594
## Franschhoek:South Africa	0.069476456
## Galicia:Spain	-0.065983059
## Galil:Israel	0.350722439
## Galilee:Israel	-0.044085590
## Georgia:Georgia	-0.040483073
## Germany:Germany	-0.342883499
## Gisborne:New Zealand	-0.059052541
## Goriska Brda:Slovenia	0.179255975
## Greece:Greece	0.054908510

## Hawke's Bay:New Zealand	0.072971622
## Hemel en Aarde:South Africa	0.307083208
## Ica:Peru	0.125718933
## Idaho:US	-0.338115947
## Israel:Israel	-0.053066042
## Istria:Croatia	-0.129631379
## Italy Other:Italy	0.089090564
## Itata Valley:Chile	0.263671912
## Juanico:Uruguay	0.468397596
## Judean Hills:Israel	0.373329192
## Kakheti:Georgia	-0.149426657
## Kamptal:Austria	-0.066776964
## Kremstal:Austria	-0.141102472
## Kumeu:New Zealand	0.200862463
## Languedoc-Roussillon:France	-0.329299933
## Lebanon:Lebanon	0.156135800
## Leithaberg:Austria	0.291591314
## Levante:Spain	-0.218689413
## Leyda Valley:Chile	0.005598678
## Limarí Valley:Chile	-0.033265104
## Lisboa:Portugal	-0.282618750
## Loire Valley:France	-0.147804062
## Lolol Valley:Chile	0.079833805
## Lombardy:Italy	0.178208572
## Loncomilla Valley:Chile	0.084723508
## Lontué Valley:Chile	-0.368636800
## Madeira:Portugal	0.855816100
## Maipo Valley:Chile	-0.047644377
## Mantinia:Greece	-0.460661645
## Marchigue:Chile	-0.101637302
## Marlborough:New Zealand	-0.220318324
## Martinborough:New Zealand	0.362051445
## Maule Valley:Chile	-0.199895948
## Mendoza Province:Argentina	0.003417252
## Michigan:US	0.252188932
## Minho:Portugal	-0.049894975
## Missouri:US	-0.086659665
## Mittelburgenland:Austria	0.033656423
## Moldova:Moldova	-0.250797950
## Montevideo:Uruguay	-0.096142891
## Moravia:Czech Republic	0.042543447
## Mosel:Germany	-0.259128371
## Mosel-Saar-Ruwer:Germany	0.123336742
## Nahe:Germany	0.011682807
## Naoussa:Greece	-0.021431574
## Nelson:New Zealand	-0.090303179
## Nemea:Greece	0.138325299
## Neusiedlersee:Austria	0.129203489
## New Mexico:US	0.240160282
## New South Wales:Australia	-0.087079223
## New York:US	-0.295664796
## New Zealand:New Zealand	-0.198295682
## Niederösterreich:Austria	-0.209840218
## North Carolina:US	0.055331780

## North Dalmatia:Croatia	0.091071787
## Northeastern Italy:Italy	-0.154617918
## Northern Spain:Spain	0.097271749
## Northwestern Italy:Italy	-0.095892662
## Ohio:US	-0.264482475
## Ontario:Canada	0.288840210
## Oregon:US	-0.014673667
## Österreichischer Sekt:Austria	0.245365088
## Other:Argentina	-0.022259679
## Paarl:South Africa	0.080640480
## Palmela:Portugal	-0.243843017
## Pangeon:Greece	0.491415319
## Peljesac:Croatia	0.204421811
## Peloponnese:Greece	-0.361003735
## Península de Setúbal:Portugal	-0.016690179
## Pennsylvania:US	0.176167492
## Peumo:Chile	0.235830169
## Pfalz:Germany	-0.270261792
## Piedmont:Italy	0.483374185
## Port:Portugal	0.928624310
## Portuguese Table Wine:Portugal	-0.209312892
## Progreso:Uruguay	-0.025372319
## Provence:France	-0.253276775
## Puente Alto:Chile	0.755724463
## Rapel Valley:Chile	-0.375834107
## Recas:Romania	-0.277747425
## Rheingau:Germany	0.323766372
## Rheinhessen:Germany	-0.404335894
## Rhône Valley:France	0.069416862
## Ribatejano:Portugal	-0.291292645
## Ribatejo:Portugal	-0.360227697
## Robertson:South Africa	-0.383672002
## Romania:Romania	-0.406131284
## Samson:Israel	-0.119272323
## San Antonio:Chile	0.159320875
## Santorini:Greece	-0.007681385
## Serra Gaúcha:Brazil	-0.019743630
## Setubal:Portugal	-0.197082501
## Shomron:Israel	-0.204314822
## Sicily & Sardinia:Italy	-0.194861306
## Simonsberg-Stellenbosch:South Africa	0.237247417
## South Australia:Australia	0.074212803
## South Island:New Zealand	-0.157239027
## Southern Italy:Italy	-0.116796744
## Southwest France:France	-0.373644568
## Spain Other:Spain	0.062413468
## Spanish Islands:Spain	0.276196589
## Štajerska:Slovenia	-0.209056878
## Steiermark:Austria	-0.085557825
## Stellenbosch:South Africa	0.052108120
## Südoststeiermark:Austria	0.155345339
## Südsteiermark:Austria	0.100814017
## Swartland:South Africa	-0.125857697
## Tasmania:Australia	0.267393369

```
## Tejo:Portugal -0.139344782
## Texas:US 0.206804992
## Thermenregion:Austria 0.053023934
## Thrace:Turkey 0.027431266
## Thracian Valley:Bulgaria -0.310148673
## Tikves:Macedonia -0.153921896
## Tokaj:Hungary -0.246859284
## Tokaji:Hungary 0.016695301
## Traisental:Austria -0.160504849
## Tulbagh:South Africa 0.604782600
## Turkey:Turkey -0.226579236
## Tuscany:Italy 0.286691028
## Ukraine:Ukraine -0.302430218
## Upper Galilee:Israel -0.153483555
## Uruguay:Uruguay -0.087379271
## Valle de Guadalupe:Mexico 0.291403700
## Veneto:Italy 0.021304109
## Victoria:Australia 0.292511835
## Vienna:Austria -0.141091487
## Viile Timisului:Romania -0.548699322
## Villány:Hungary 0.411941358
## Vinho Espumante de Qualidade:Portugal 0.540060756
## Vinho Verde:Portugal -0.314123291
## Virginia:US 0.253156571
## Wachau:Austria 0.189493631
## Wagram:Austria -0.234097563
## Wagram-Donauland:Austria 0.075682604
## Waiheke Island:New Zealand 0.204362638
## Waipara:New Zealand -0.086027304
## Waipara Valley:New Zealand 0.082845372
## Wairau Valley:New Zealand -0.087818906
## Walker Bay:South Africa 0.093759634
## Washington:US -0.182961201
## Weinland Österreich:Austria -0.135499962
## Weinviertel:Austria -0.133213925
## Wellington:South Africa -0.125338749
## Western Australia:Australia 0.054693866
## Western Cape:South Africa -0.424840240
## Wiener Gemischter Satz:Austria -0.103175046
## Württemberg:Germany 0.239285816
## Zenata:Morocco -0.269620878
```

```
us_province_effects <- subset(province_effects, )
province_df <- data.frame(province = rownames(province_effects), effect =
  province_effects[,1])
ggplot(province_df, aes(x = reorder(province, effect), y = effect)) +
  geom_point() +
  coord_flip() +
  labs(title = "Random Intercepts by Province", x = "Province", y = "Effect on
  Log Price")
```

— Prior Summary —

```
prior_summary(model_logprice)
```

```
## Priors for model 'model_logprice'
## -----
## Intercept (after predictors centered)
## ~ normal(location = 4.8, scale = 1)
##
## Coefficients
## ~ normal(location = 0, scale = 1)
##
## Auxiliary (sigma)
## Specified prior:
## ~ exponential(rate = 1)
## Adjusted prior:
## ~ exponential(rate = 1.1)
##
## Covariance
## ~ decov(reg. = 1, conc. = 1, shape = 1, scale = 1)
## -----
## See help('prior_summary.stanreg') for more details
```