

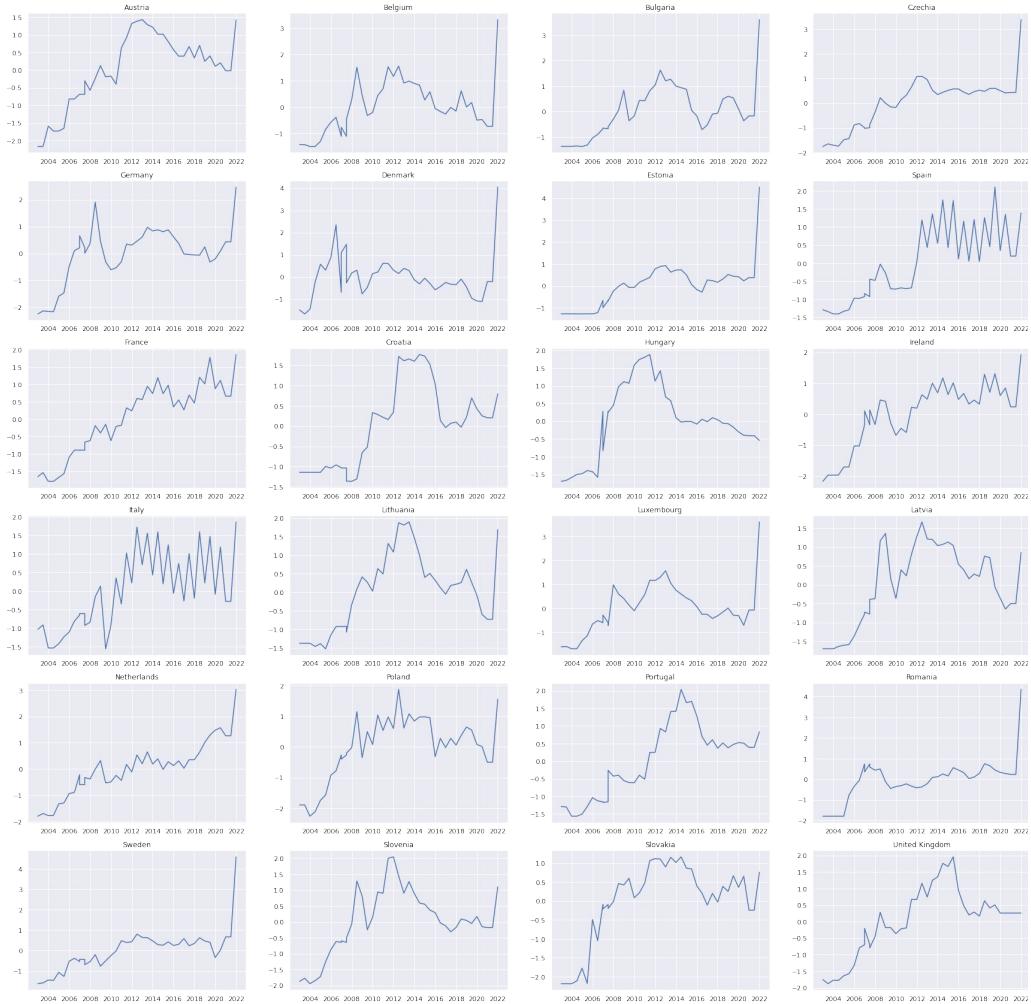
Temporal clustering of natural gas prices in Europe

Clustering report

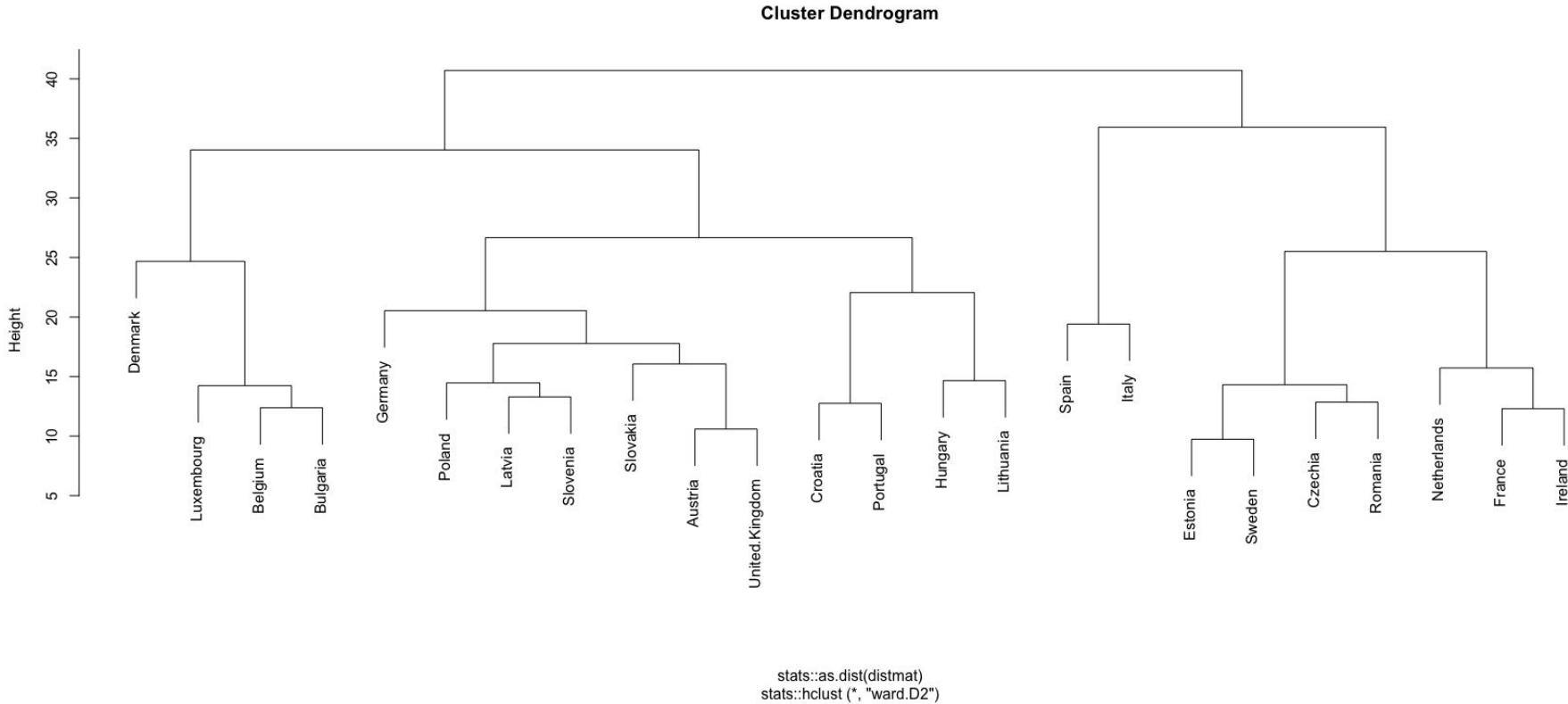
Standard Scaler

domestic

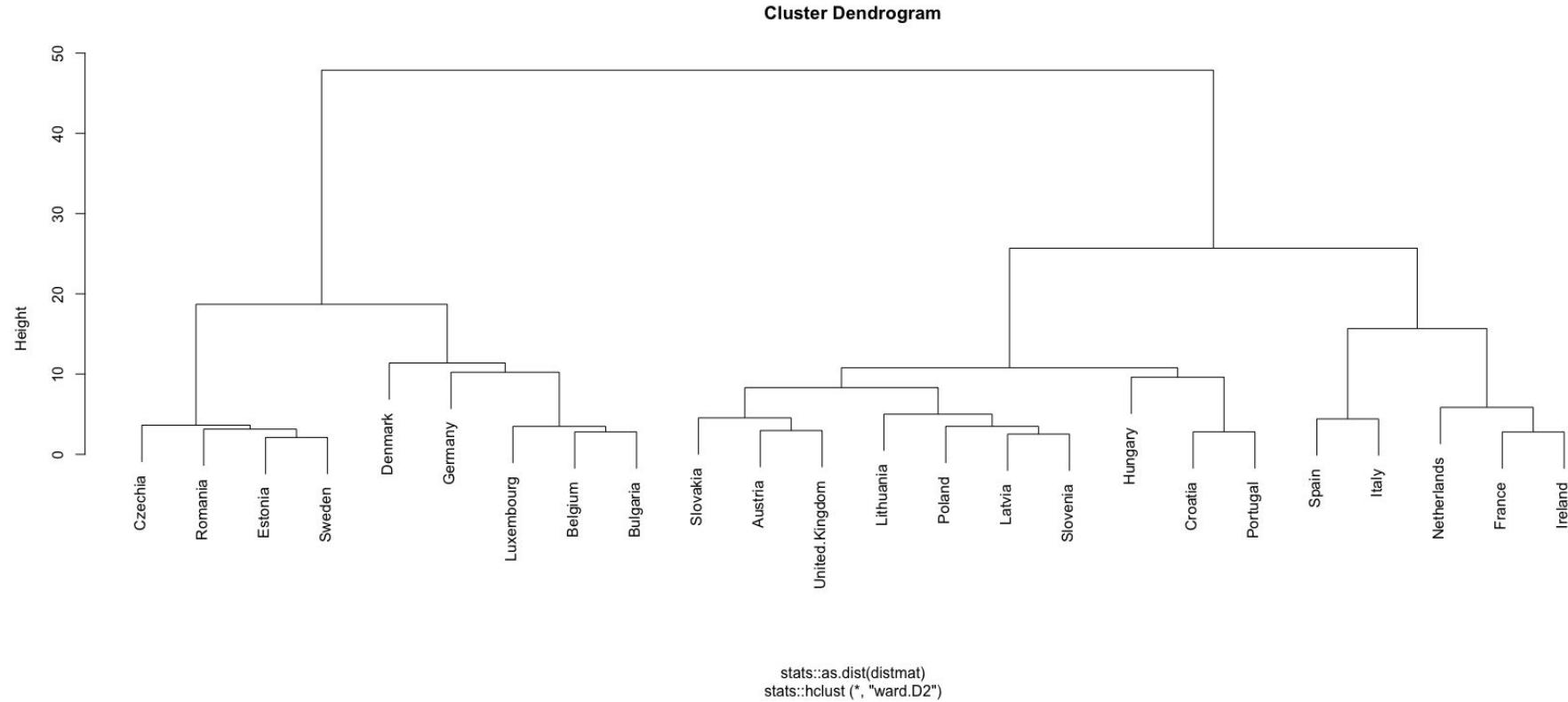
Time series



Dtwclust, hierarchical, distance: dtw



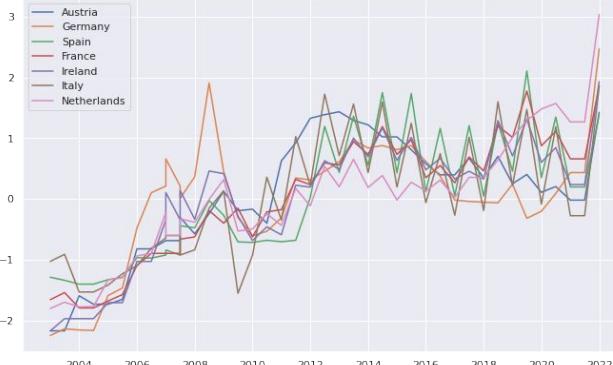
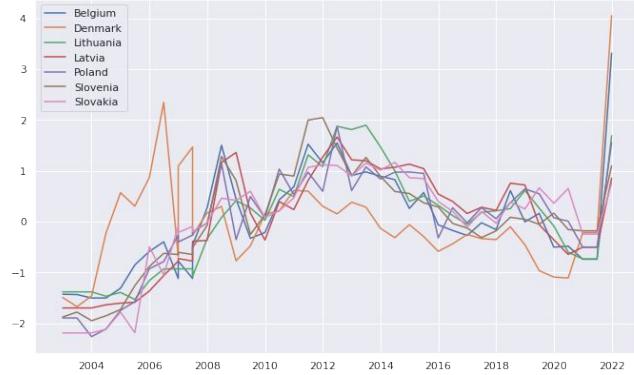
Dtwclust, hierarchical, distance: sdtw



TSlernKmeans, distance: dtw

Silhouette score: 0.13718

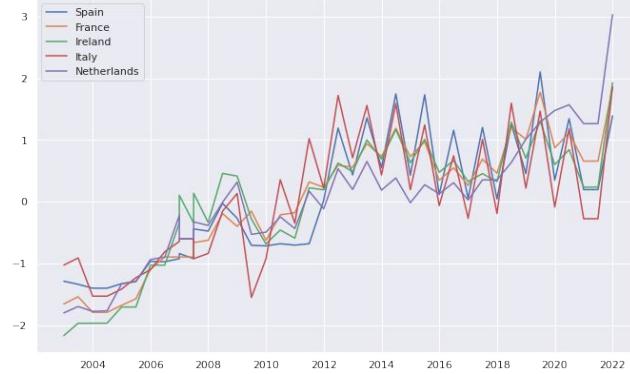
Clusters



TSlernKmeans, distance: sdtw

Silhouette score: 0.3608

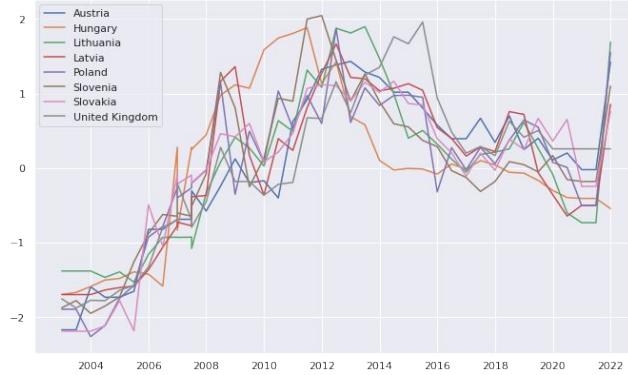
Clusters



TSlernKshape, distance: dtw, sdtw

Clusters

Silhouette score: 0.268841

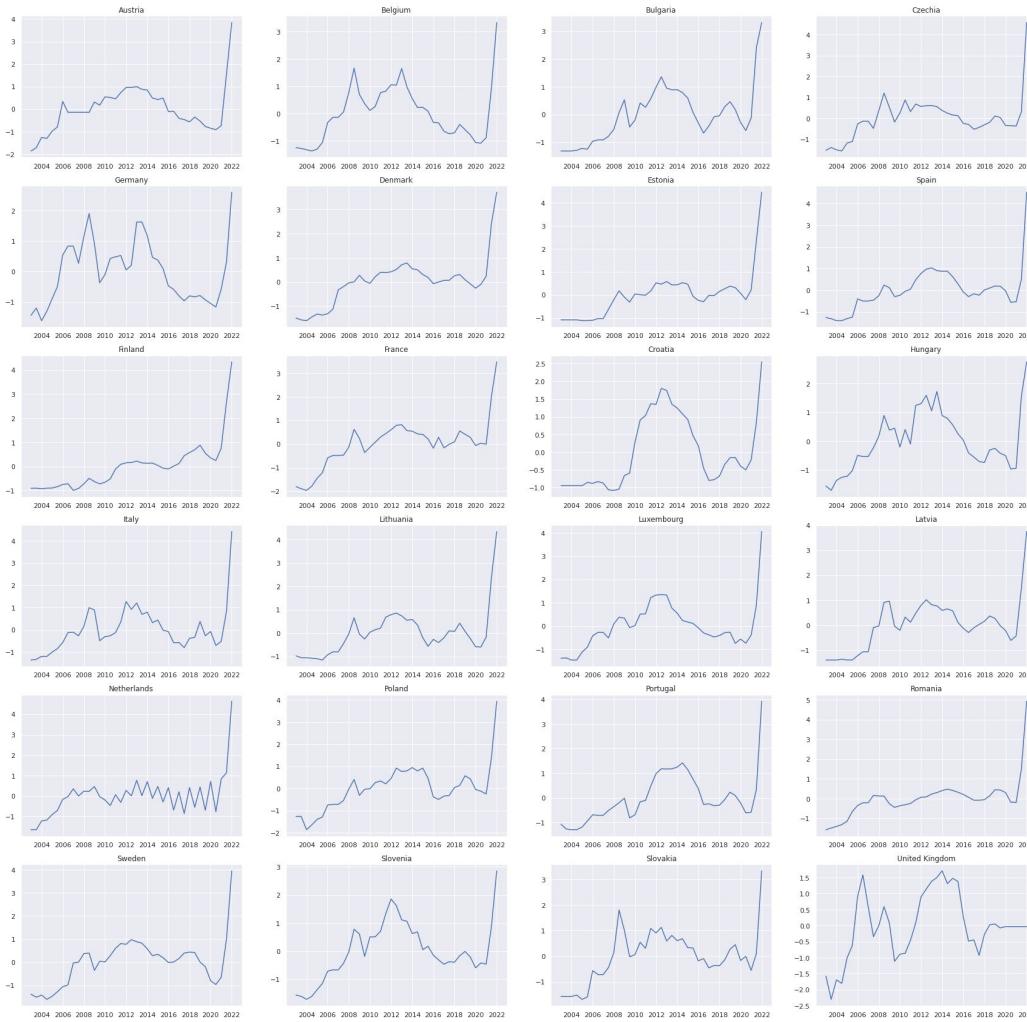


Possible clusters:

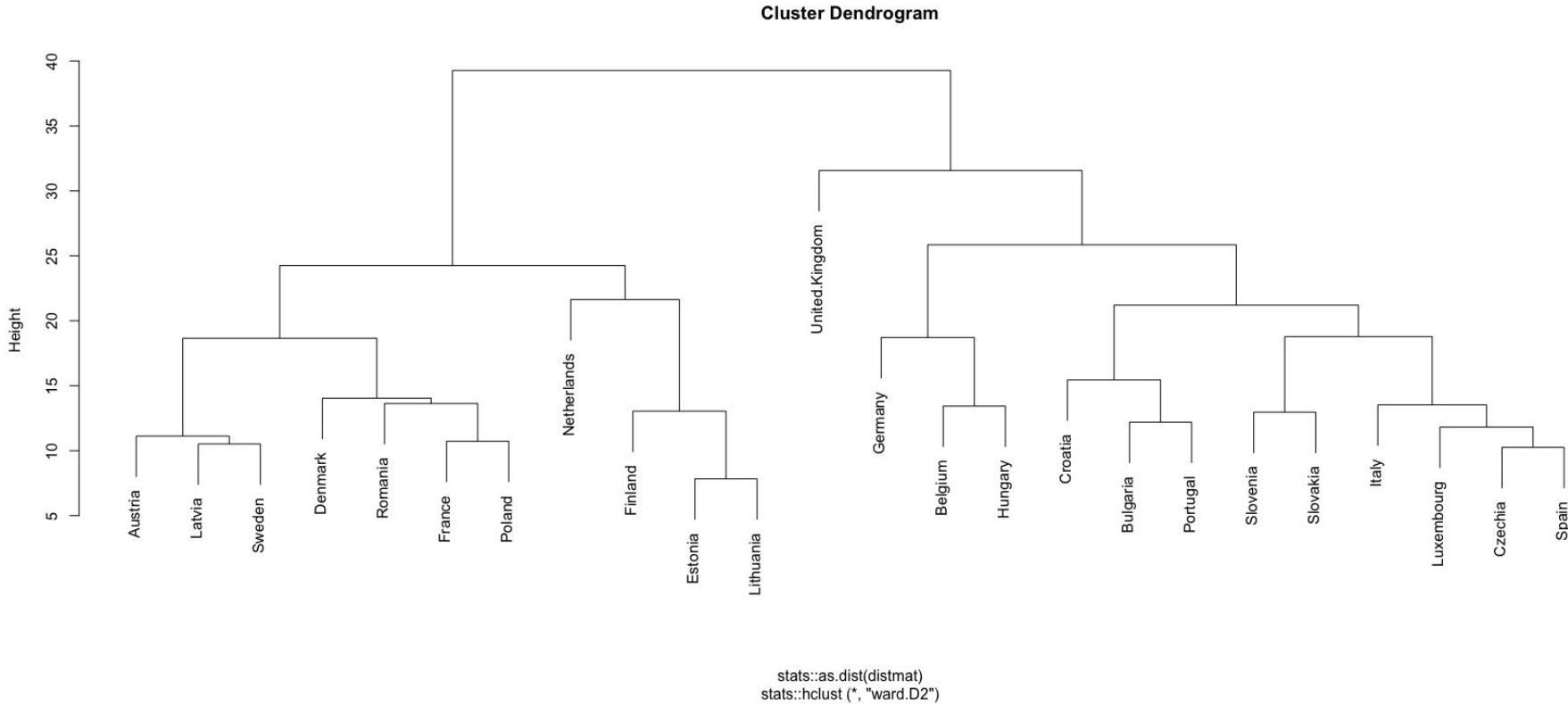


industrial

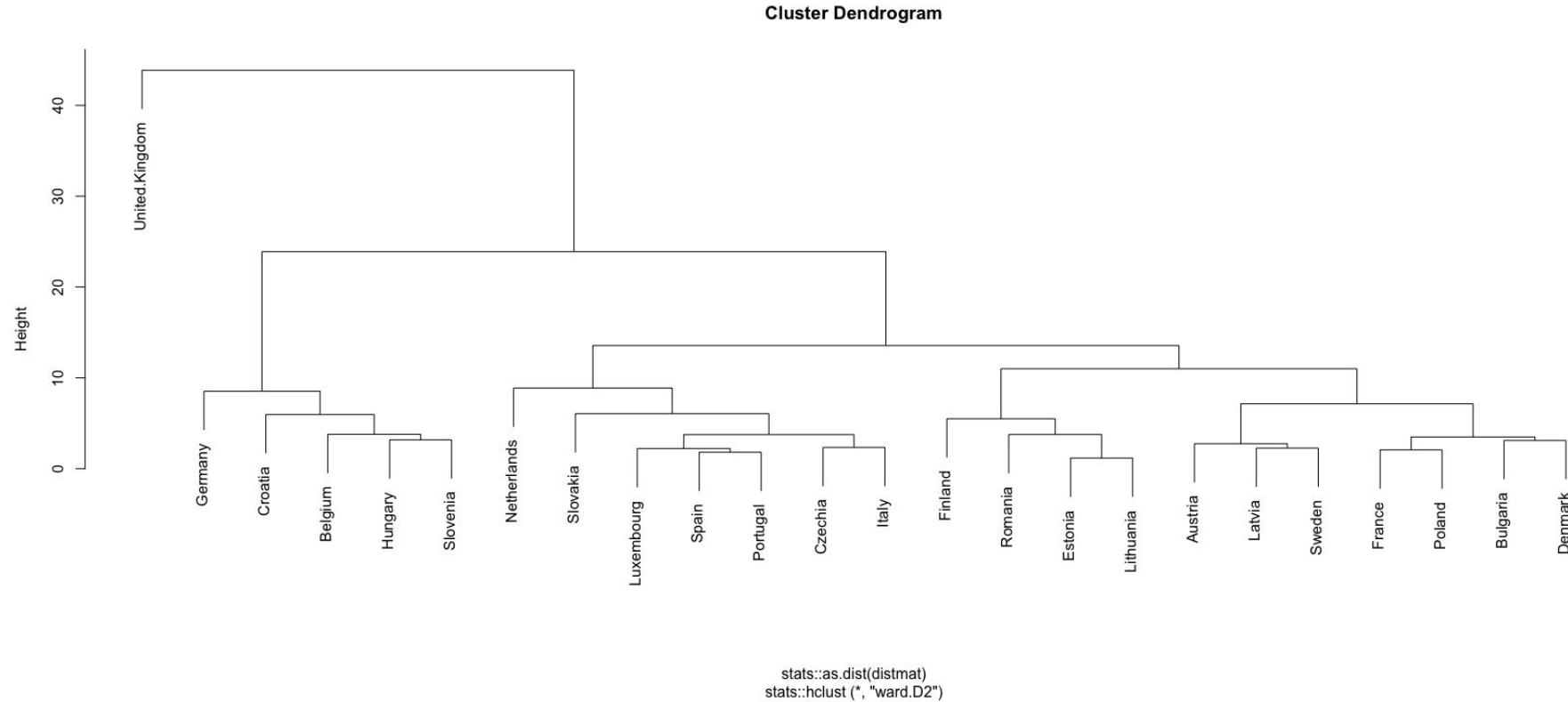
Time series



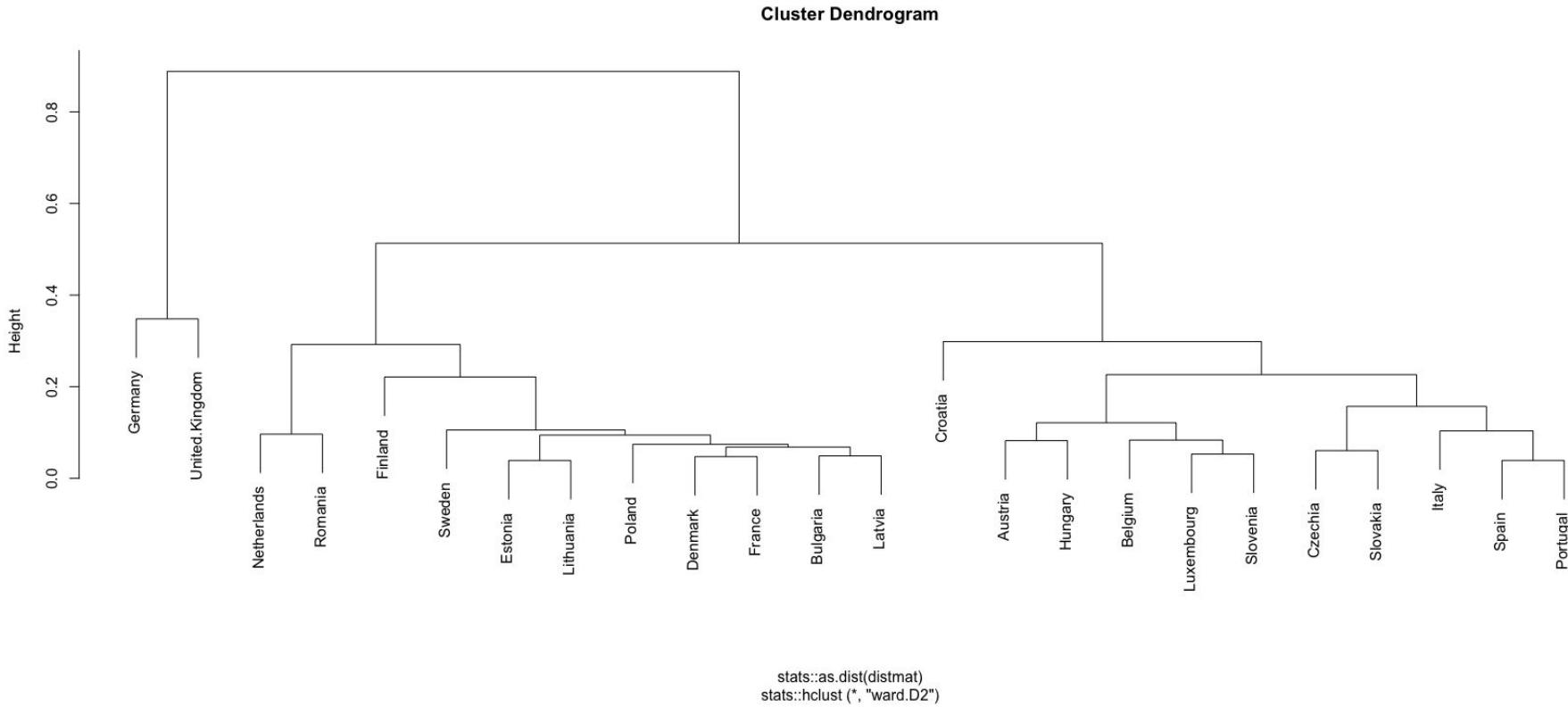
Dtwclust, hierarchical, distance: dtw



Dtwclust, hierarchical, distance: sdtw



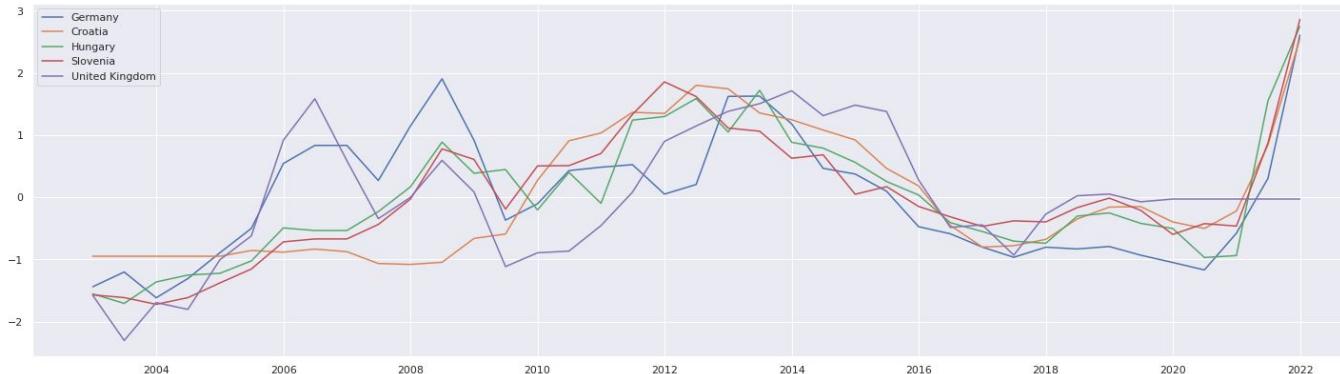
Dtwclust, hierarchical, distance: sbd (shape-based)



TSlernKmeans, distance: dtw

Clusters

Silhouette score: 0.276614



TSlearnKmeans, distance: sdtw

Clusters

Silhouette score: 0.454004



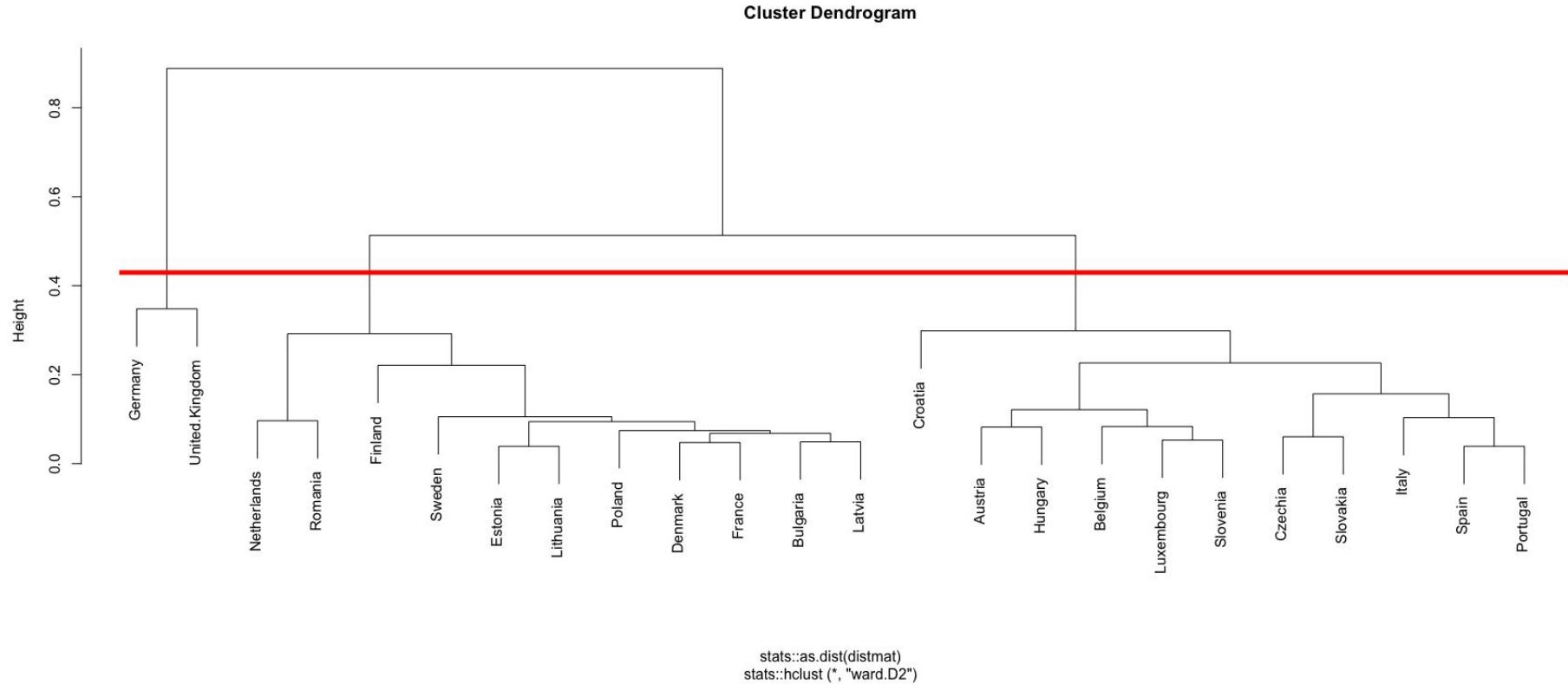
TSlernKshape, distance: dtw, sdtw

Clusters

Silhouette score: 0.490392



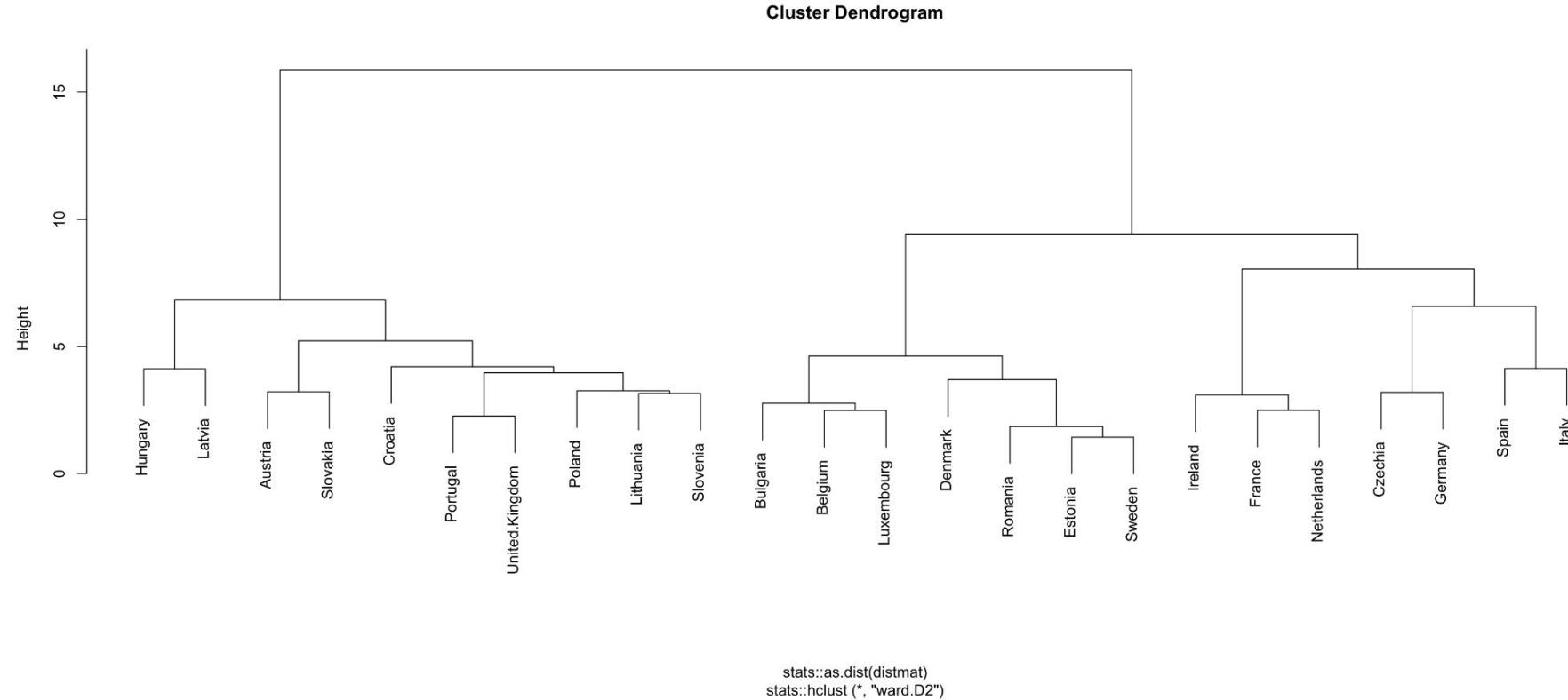
Possible clusters:



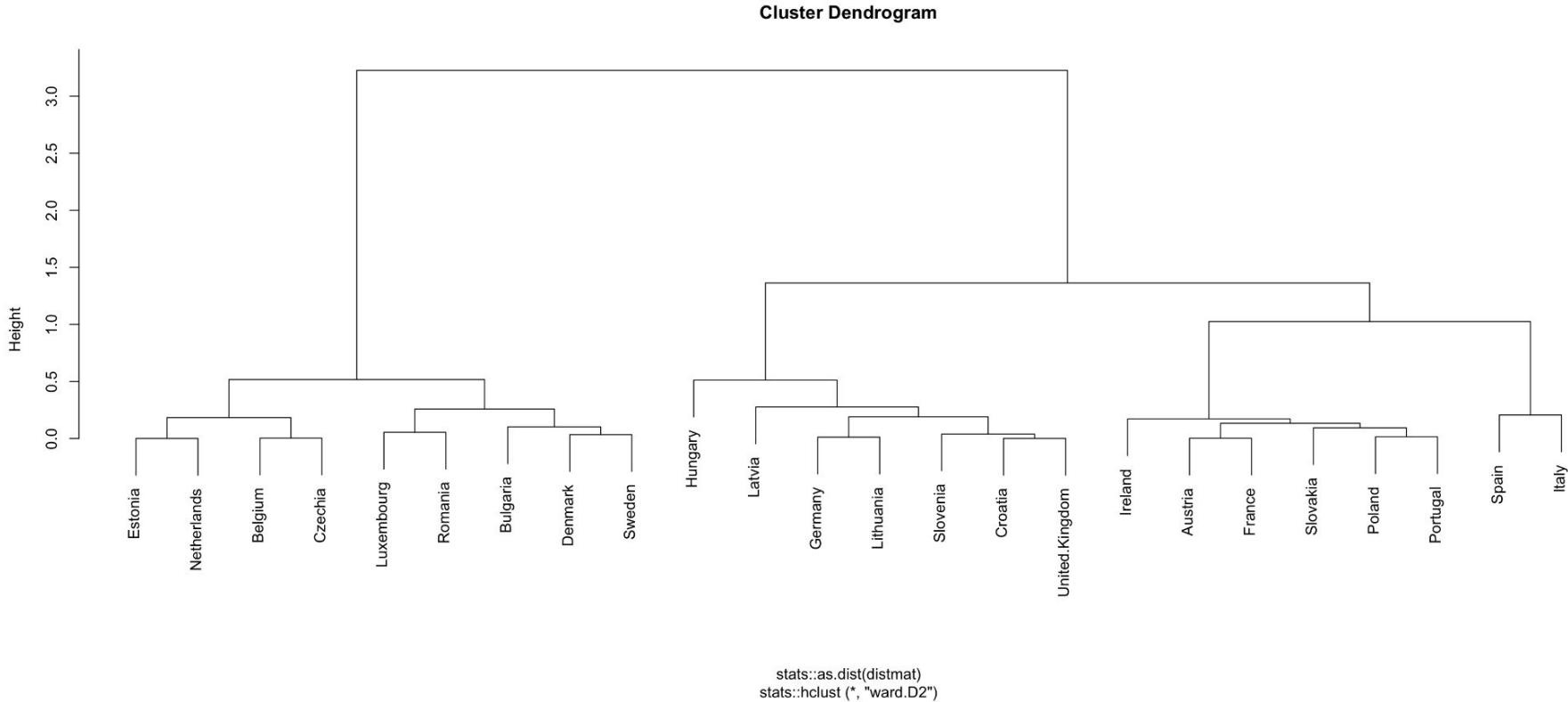
MinMax Scaler

domestic

Dtwclust, hierarchical, distance: dtw



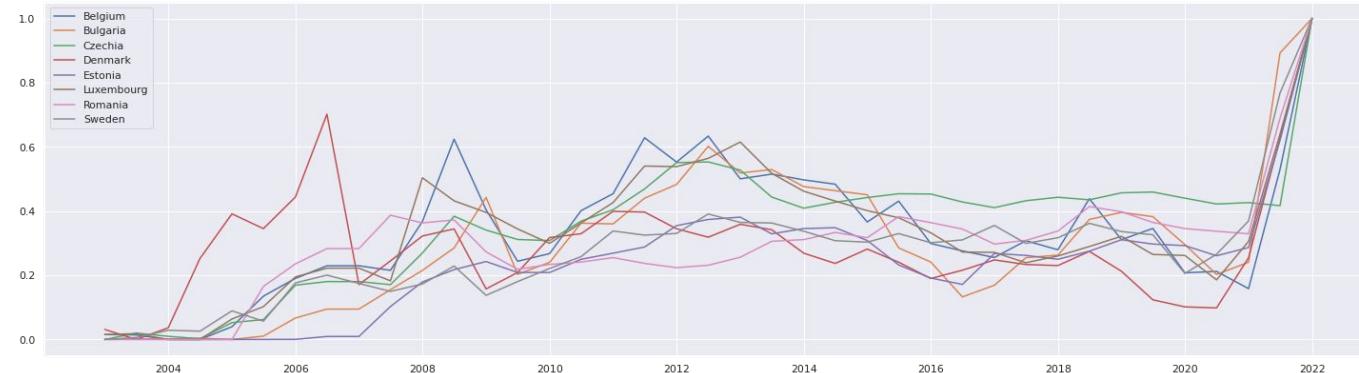
Dtwclust, hierarchical, distance: sdtw



TSlernKmeans, distance: dtw

Silhouette score: 0.321989

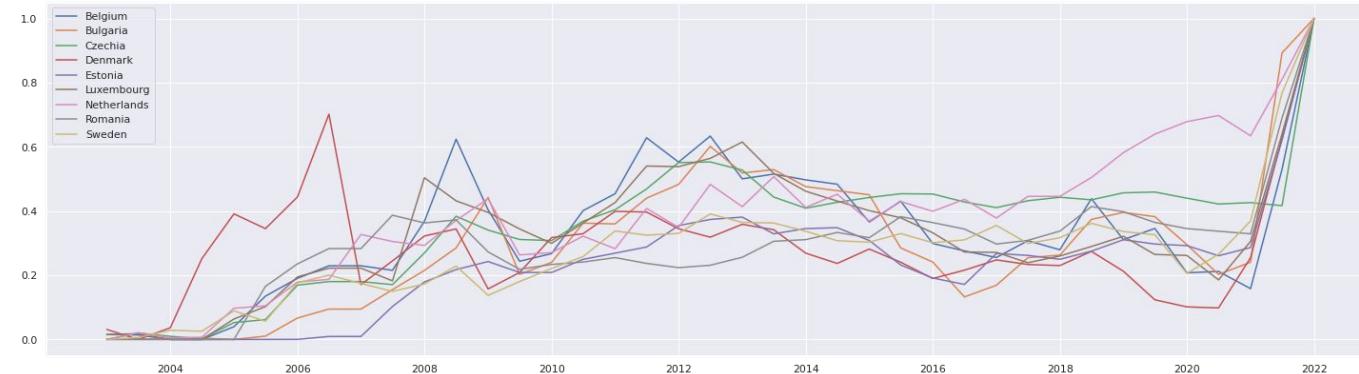
Clusters



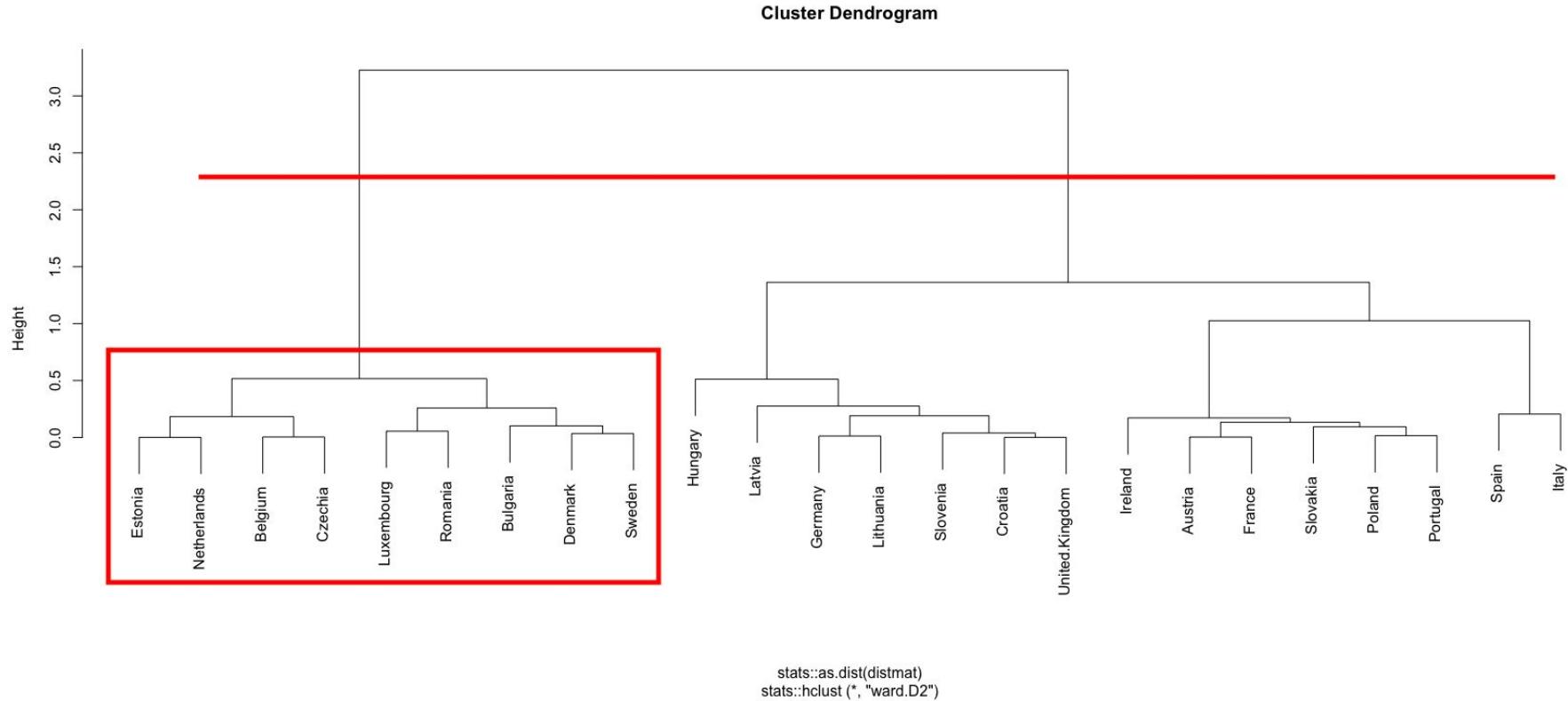
TSlernKmeans, distance: sdtw

Silhouette score: 0.666683

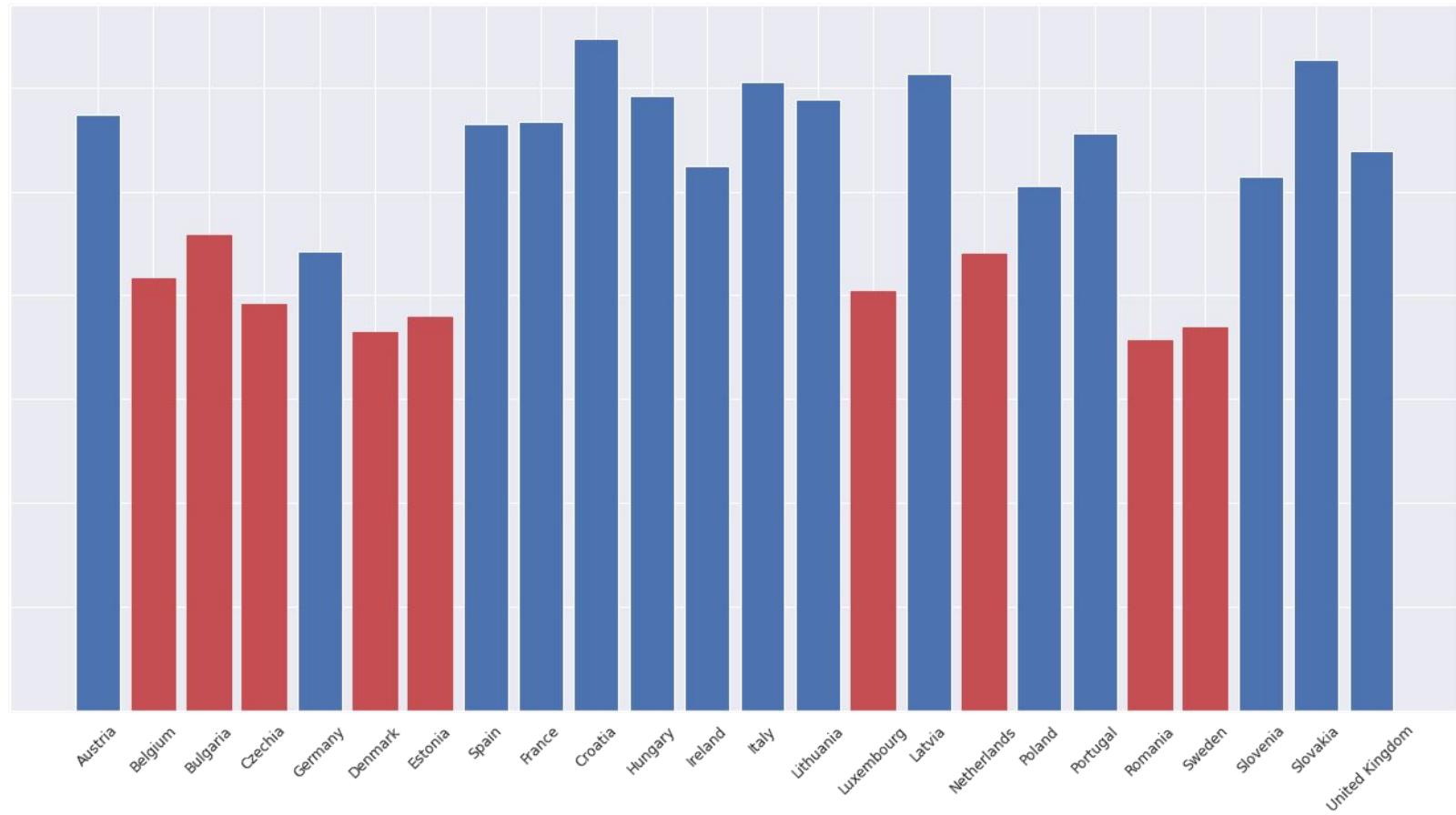
Clusters



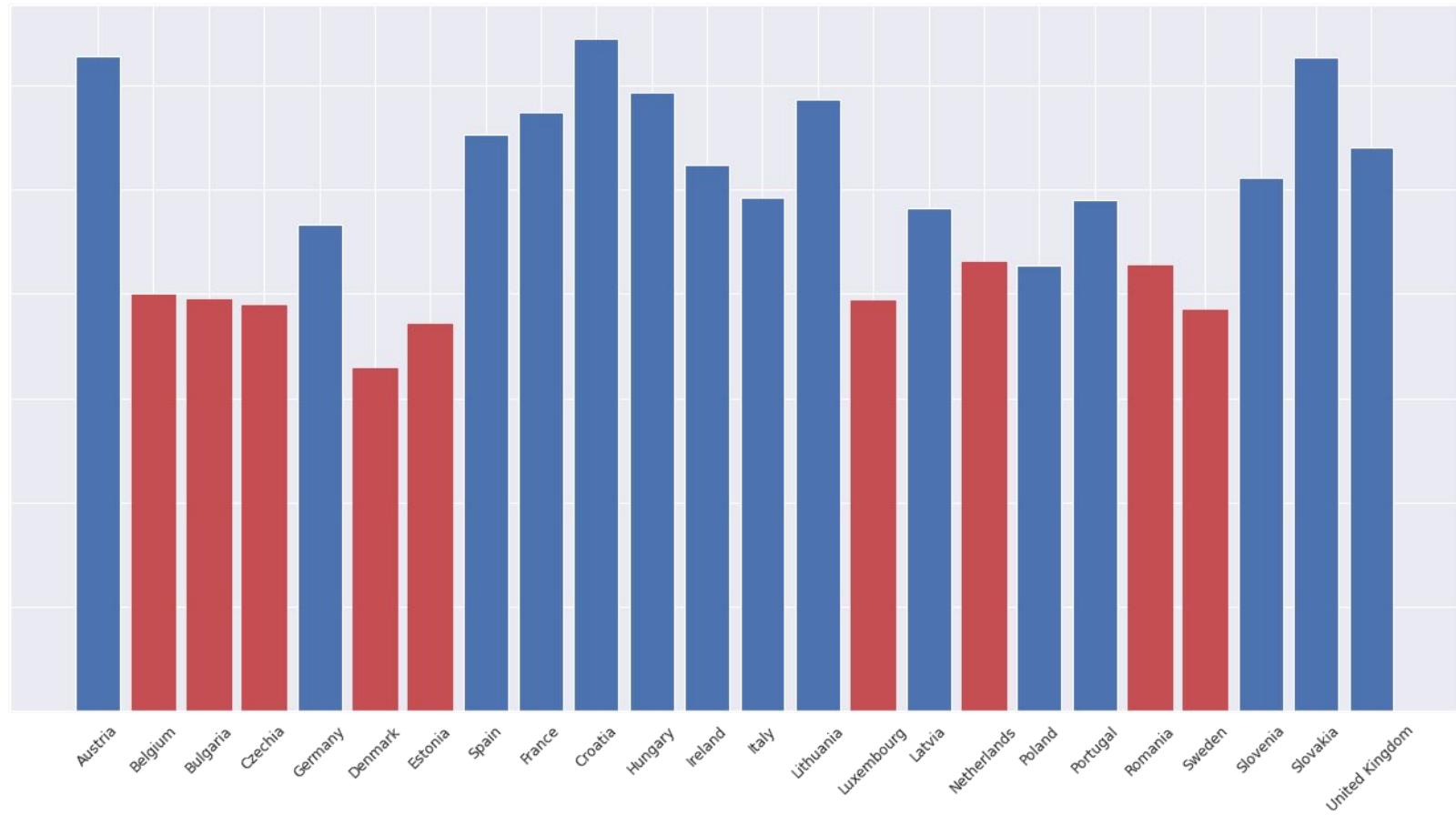
Possible clusters:



Gas prices volatility **before taxes**: std (standard deviation)

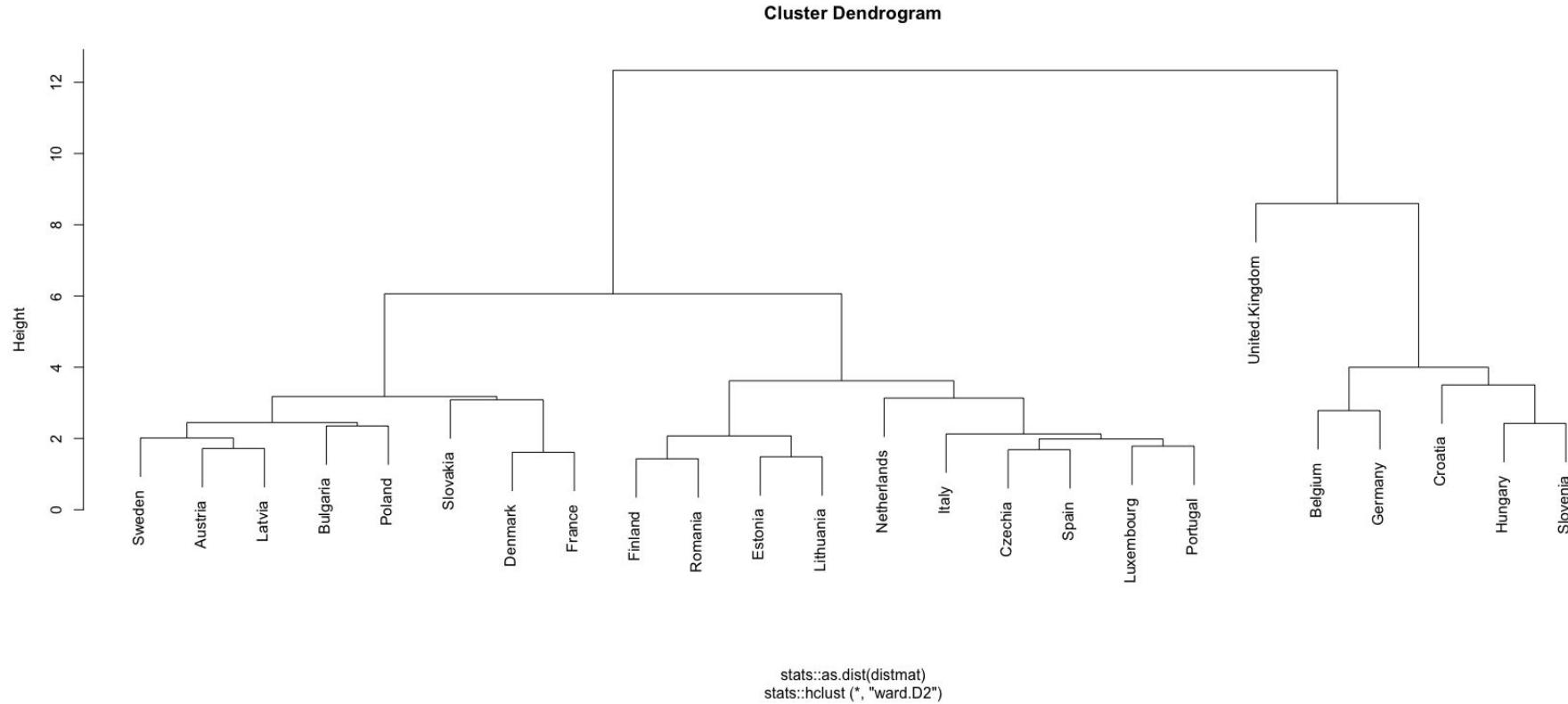


Gas prices volatility **after taxes**: std (standard deviation)

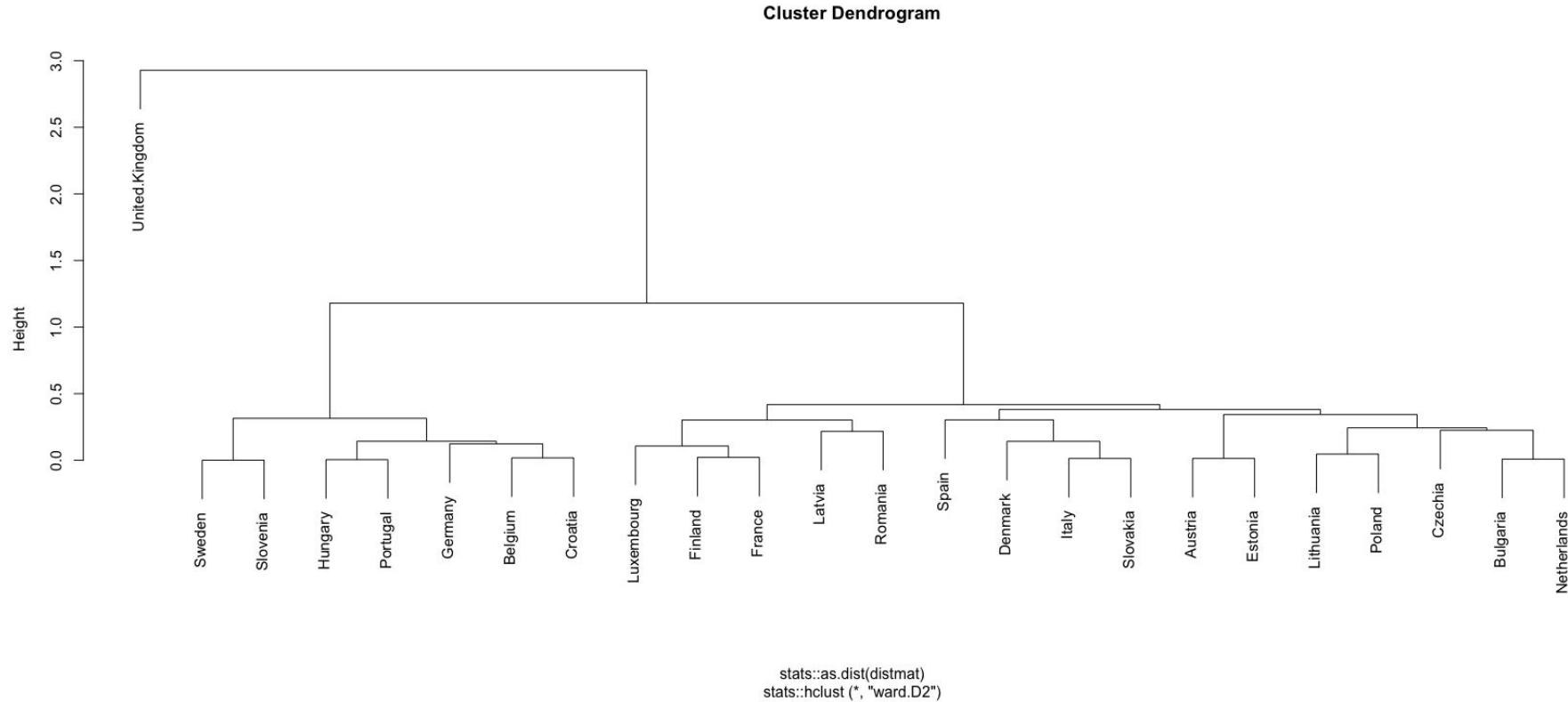


industrial

Dtwclust, hierarchical, distance: dtw



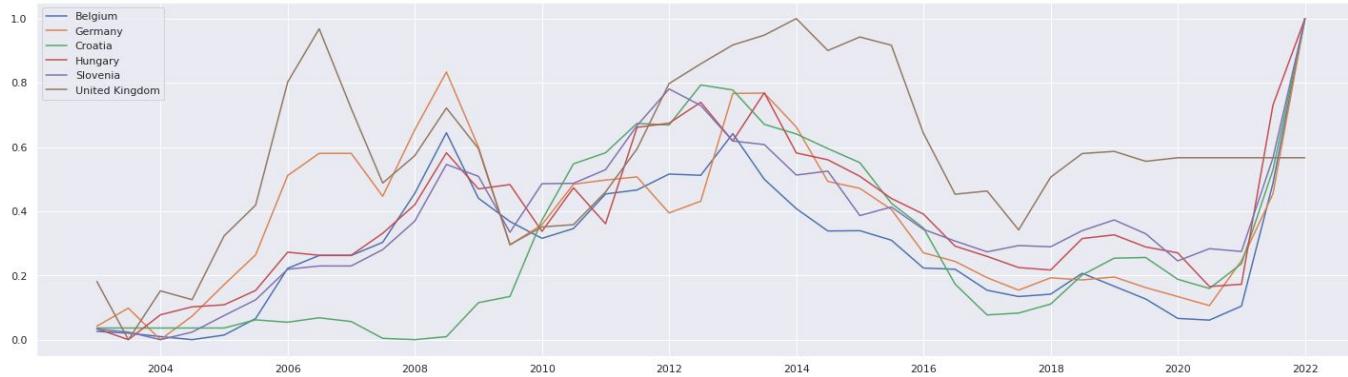
Dtwclust, hierarchical, distance: sdtw



TSlernKmeans, distance: dtw

Clusters

Silhouette score: 0.41664



TSlernKmeans. distance: sdtw

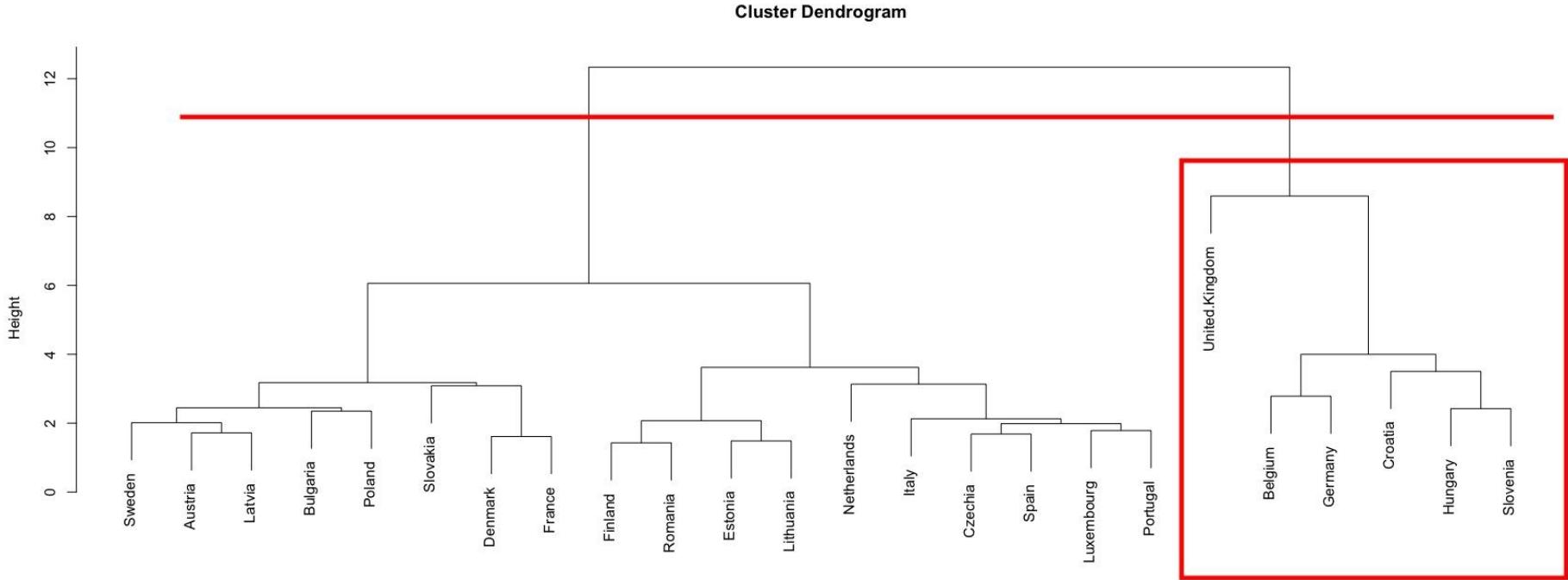
Clusters

Silhouette score: 0.489494



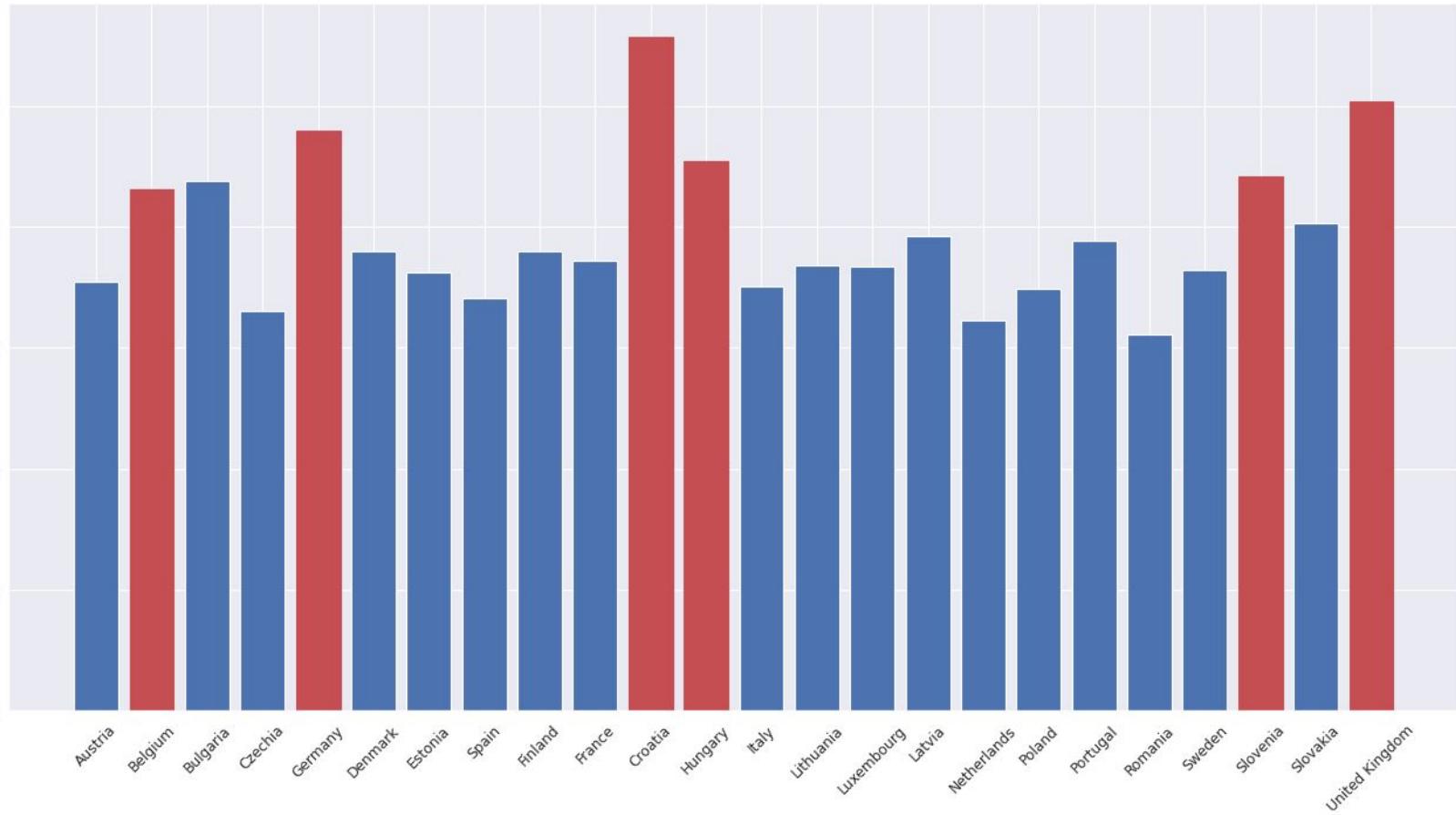
Possible clusters:

Silhouette score: 0.556553

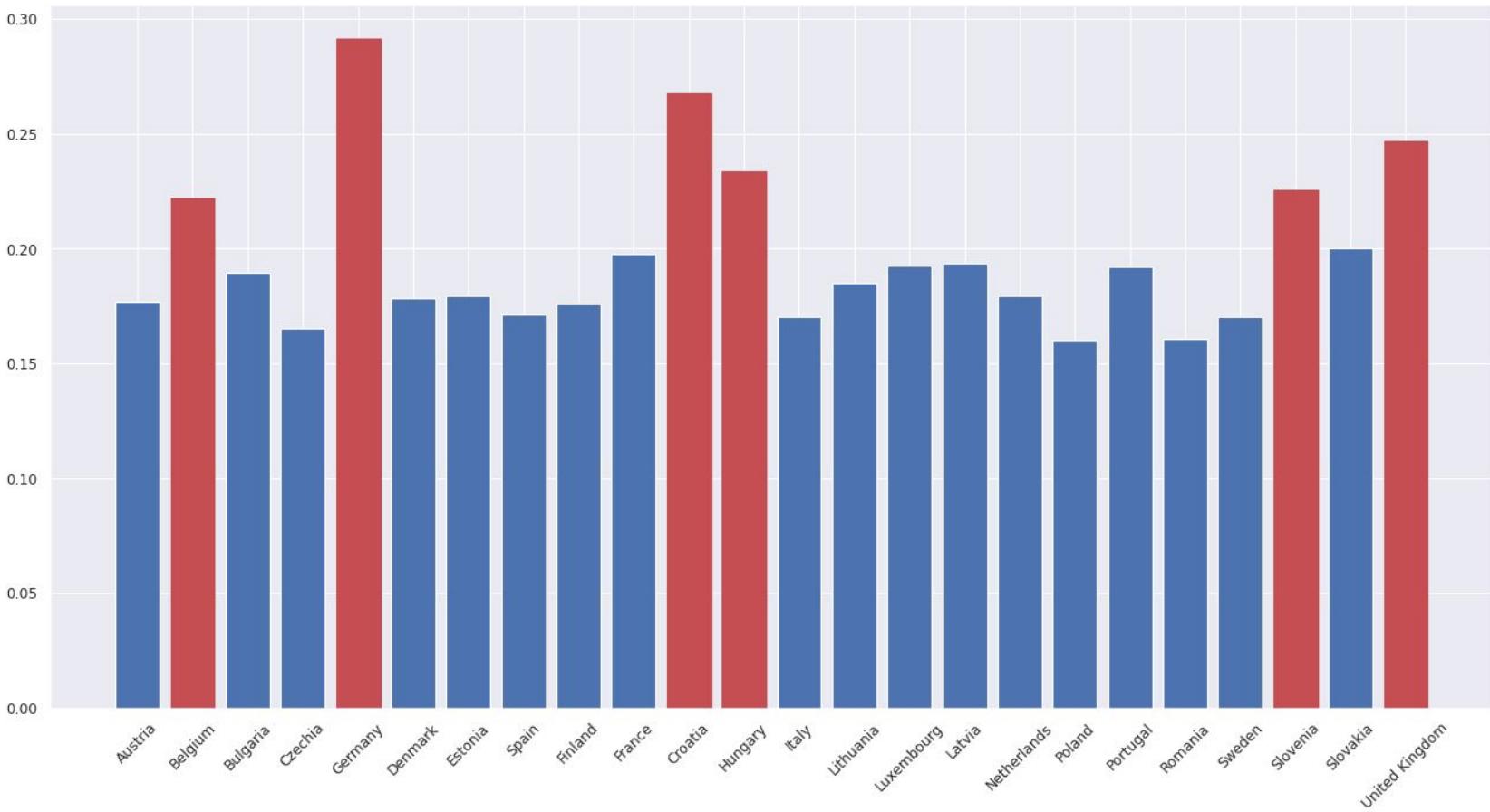


```
stats::as.dist(distmat)  
stats::hclust (*, "ward.D2")
```

Gas prices volatility **before taxes**: std (standard deviation)

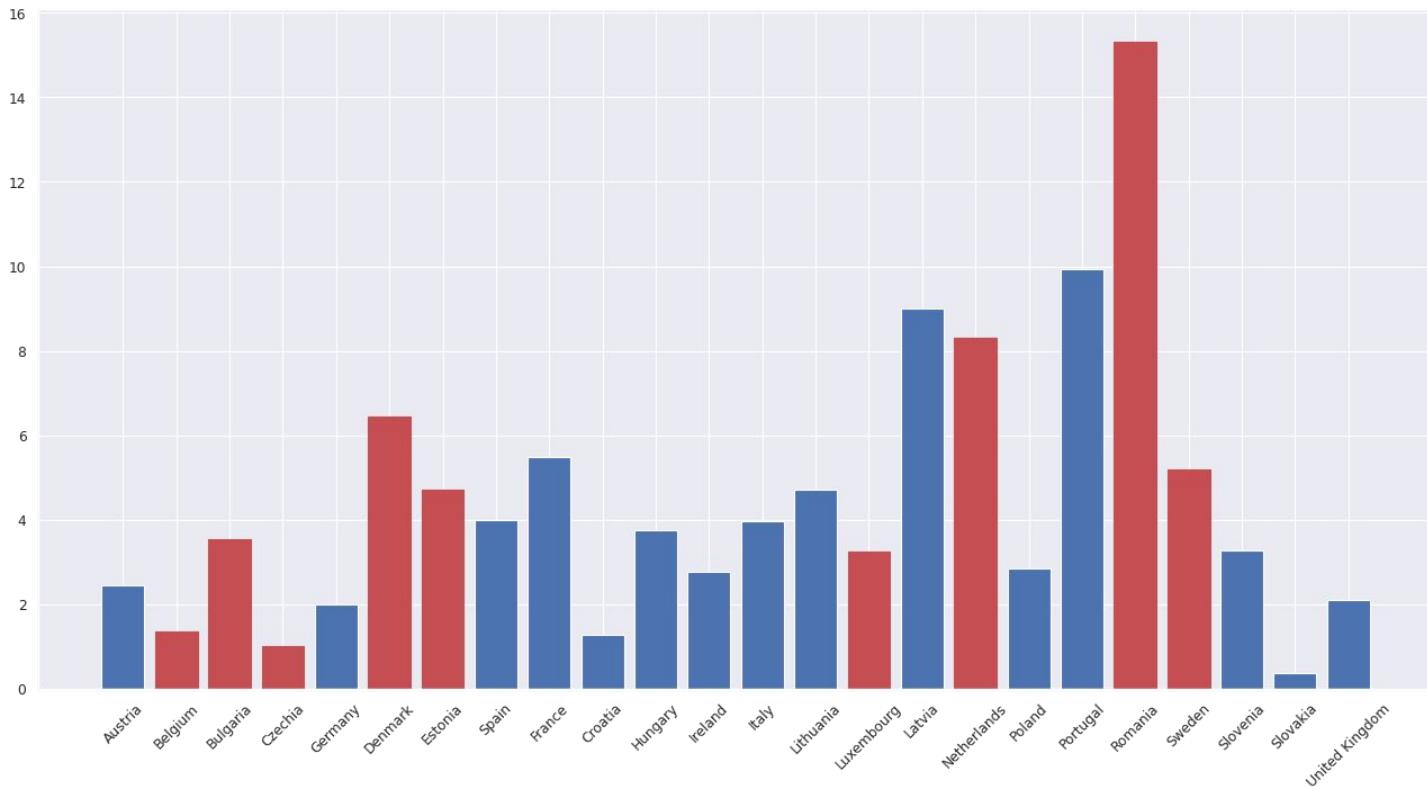


Gas prices volatility **after taxes**: std (standard deviation)



Countries characteristics

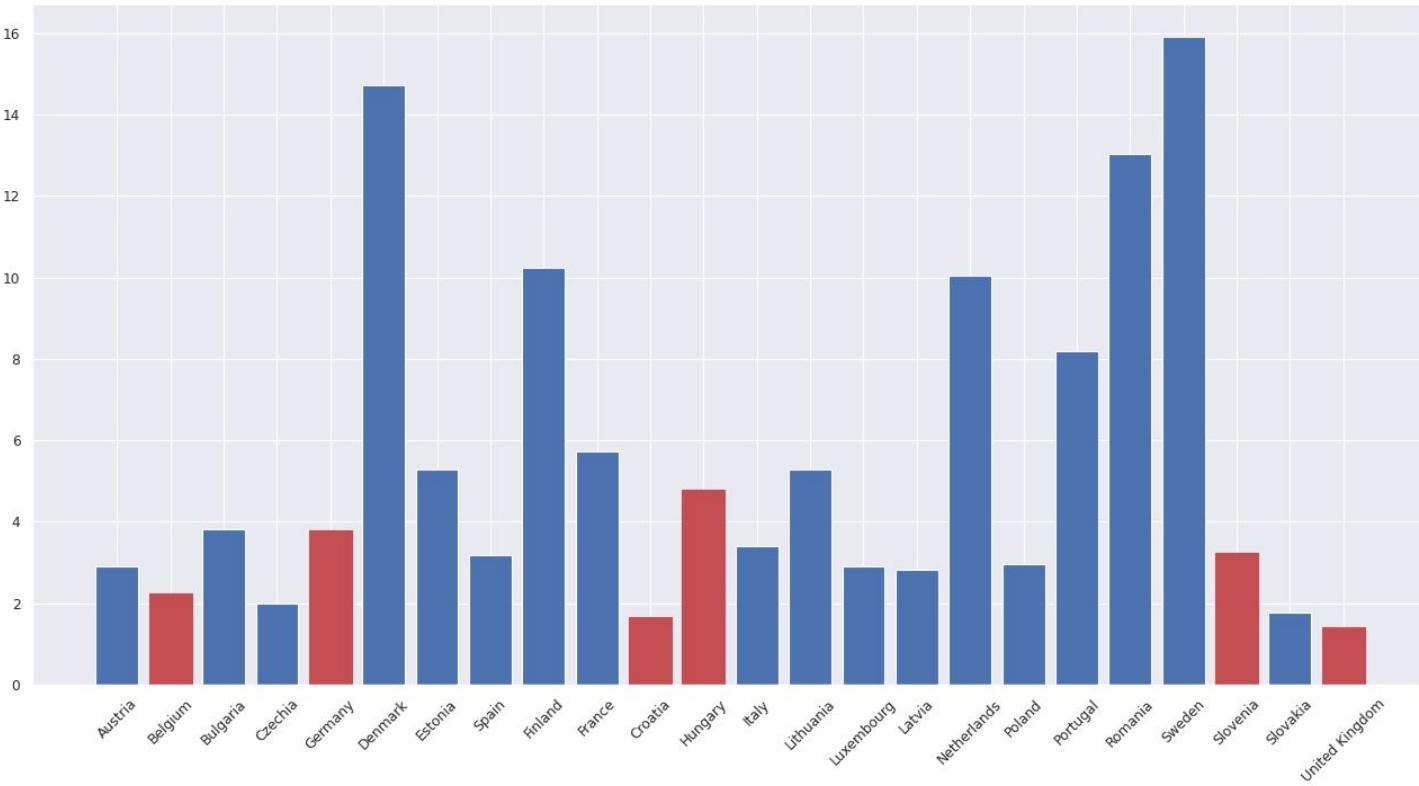
Natural gas taxes volatility for **domestic**: std (standard deviation)



Pearson Correlation
Coefficient vs prices std

domestic	-0.424
----------	--------

Natural gas taxes volatility for **industrial**: std (standard deviation)



Pearson Correlation
Coefficient vs prices std

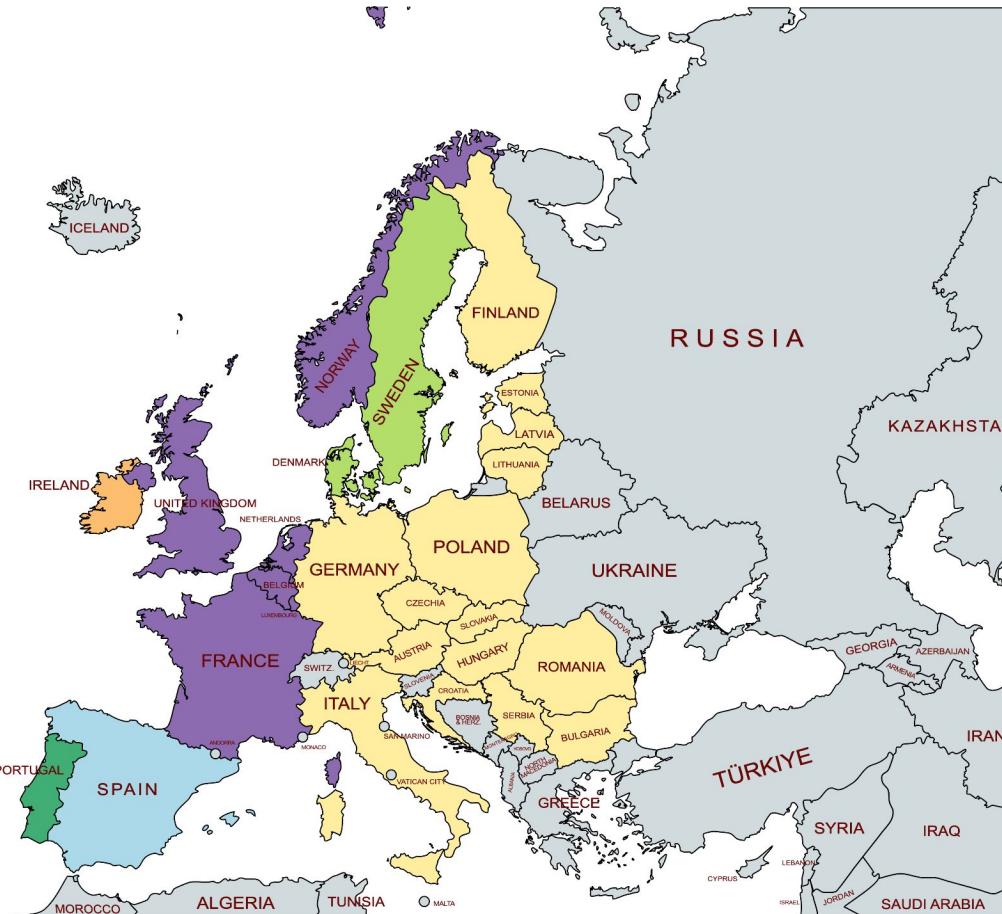
industrial	-0.304
------------	--------

Largest natural gas suppliers:

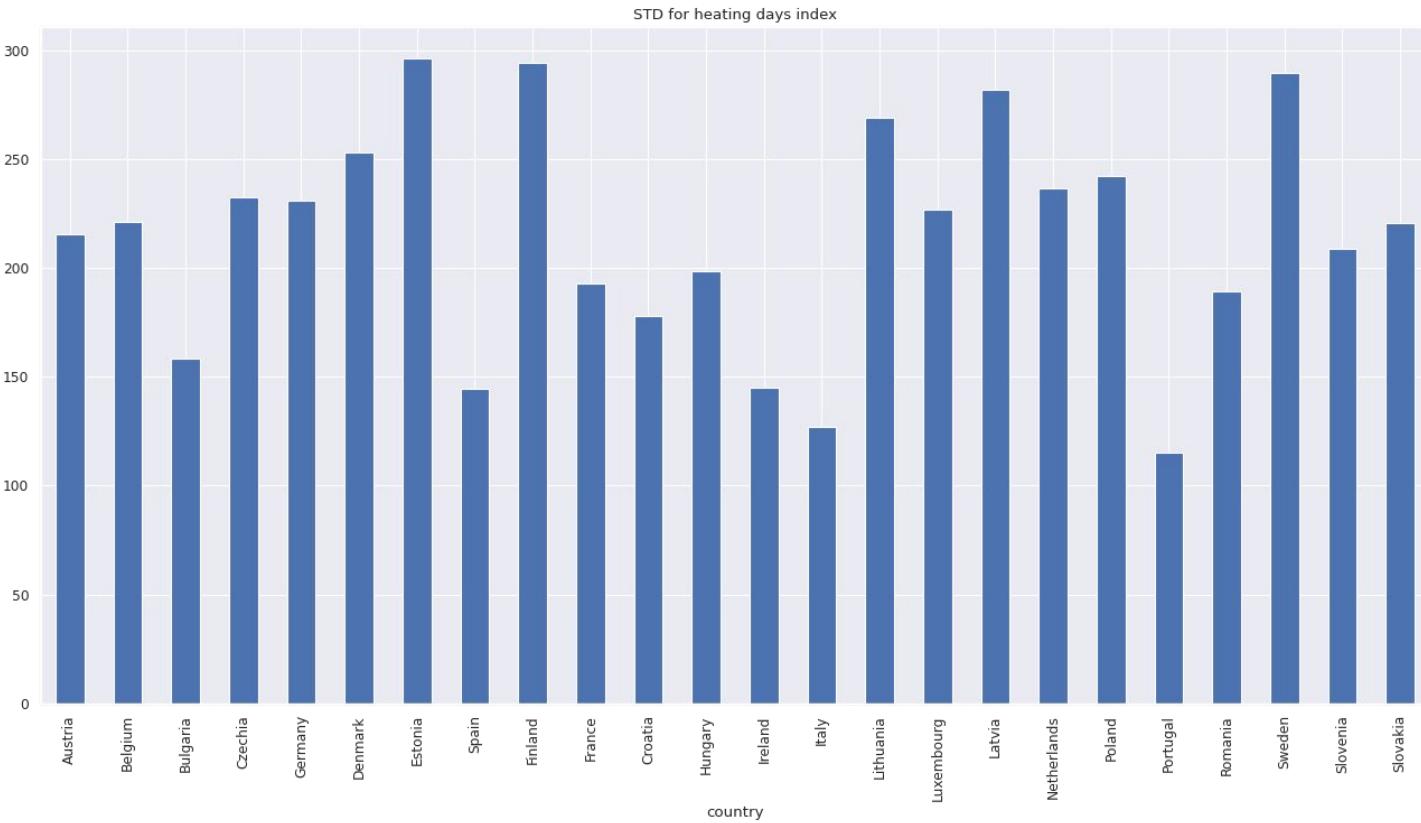
The largest suppliers of
Natural gas

- Norway
- Nigeria
- Russia
- Algeria
- United Kingdom
- Denmark

Created with mapchart.net



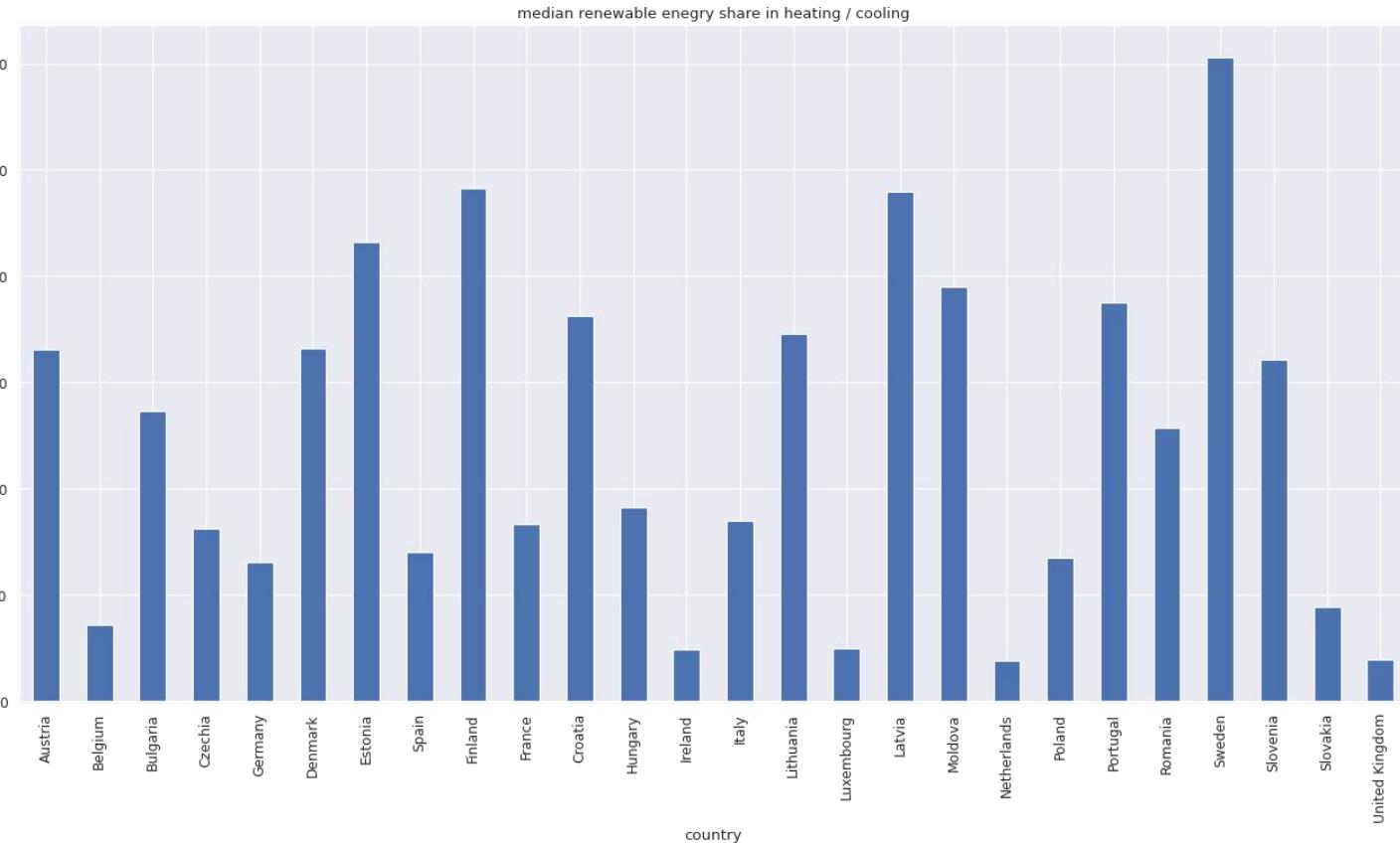
Heating days index volatility since 2004: std (standard deviation)



Pearson Correlation
Coefficient vs prices std

domestic	-0.381
industrial	-0.143

Renewable energy share in heating / cooling since 2004

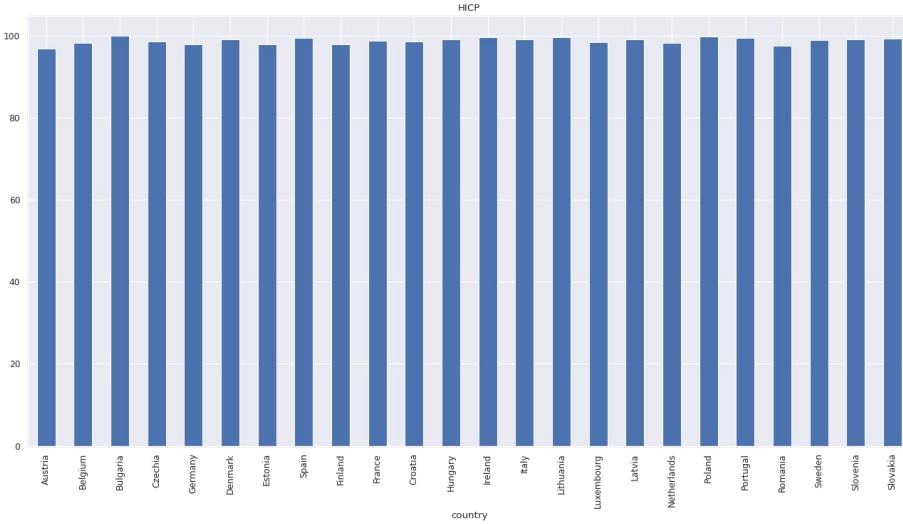


Pearson Correlation
Coefficient vs prices std

domestic	-0.043
industrial	-0.065

Harmonized prices index (inflation) since 2004 in all commodities

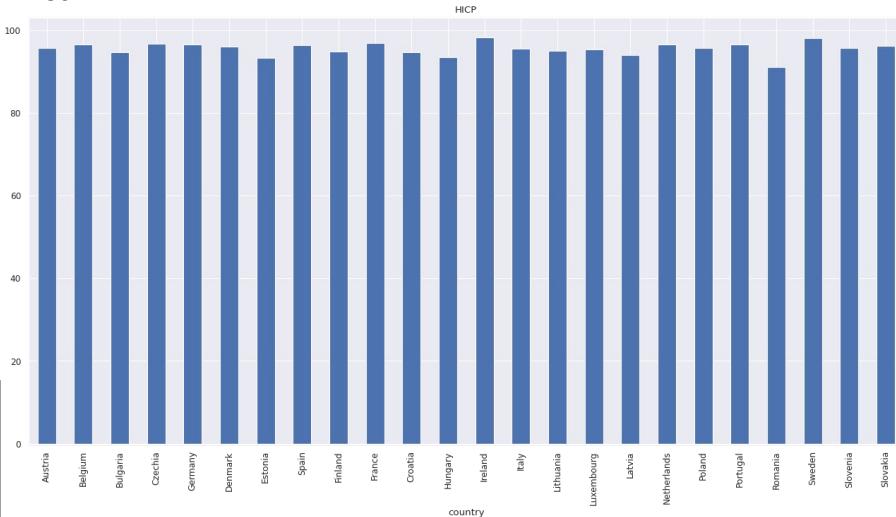
median



Pearson Correlation
Coefficient vs prices std

domestic	0.315
industrial	0.104

mean

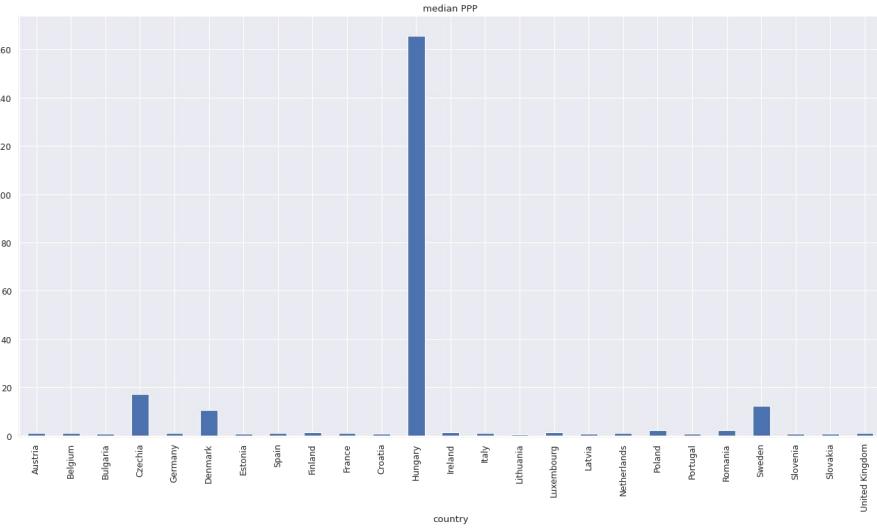


Pearson Correlation
Coefficient vs prices std

domestic	0.028
industrial	-0.007

Purchasing power parity (PPP) since 2004 in all commodities

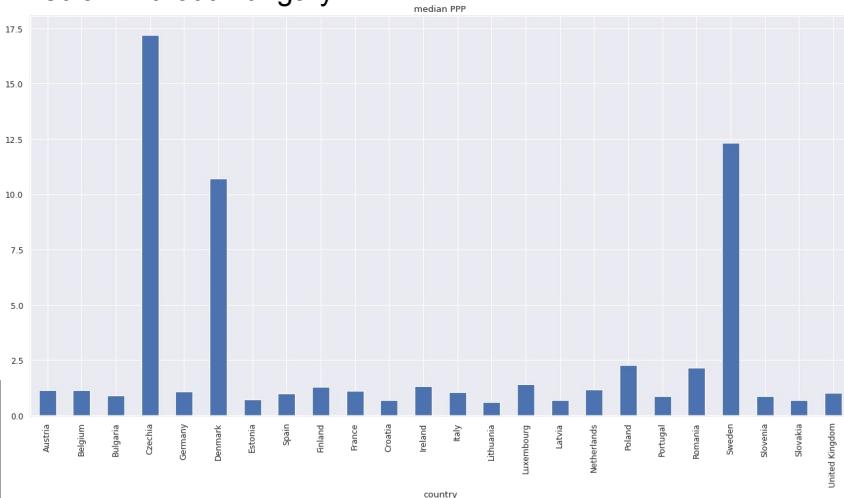
median



Pearson Correlation
Coefficient vs prices std

domestic	0.135
industrial	0.178

median without Hungary

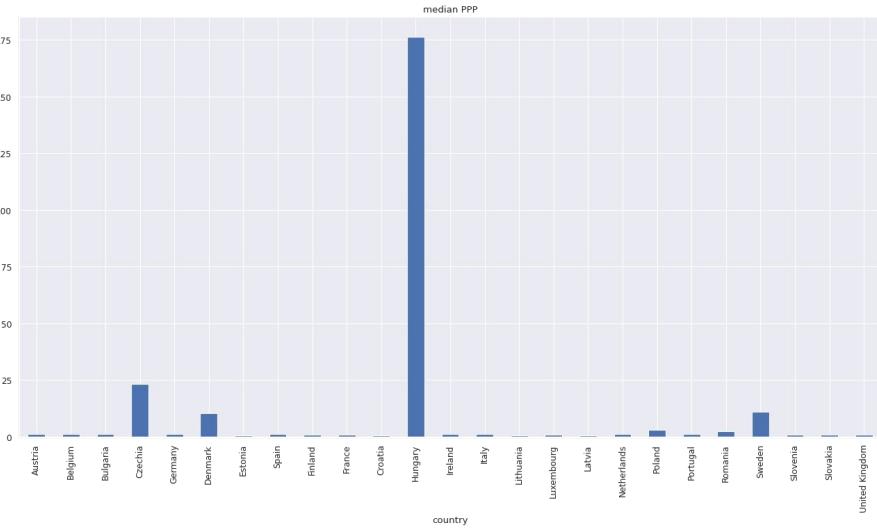


Pearson Correlation
Coefficient vs prices std

domestic	-0.528
industrial	-0.276

Purchasing power parity (PPP) since 2004 for housing, water, electricity, gas and other fuels

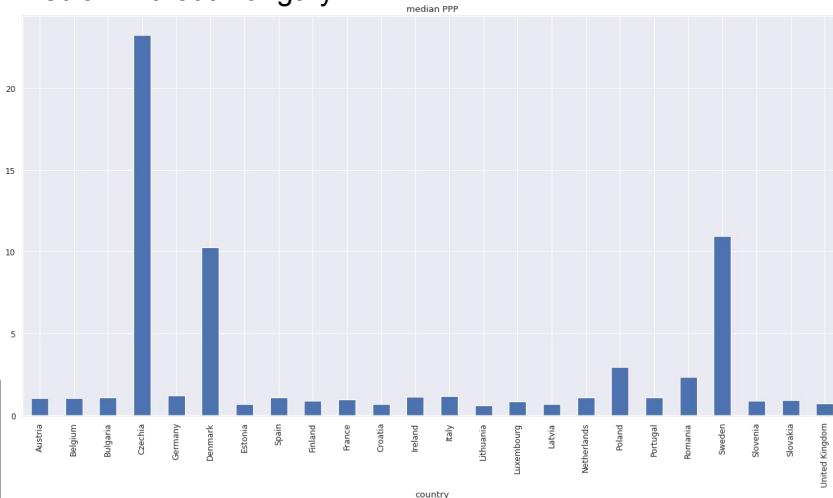
median



Pearson Correlation
Coefficient vs prices std

domestic	0.122
industrial	0.173

median without Hungary



Pearson Correlation
Coefficient vs prices std

domestic	-0.532
industrial	-0.266