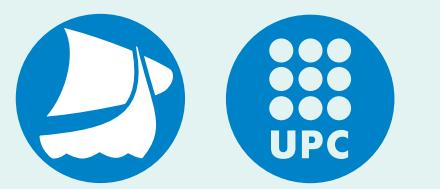


Searching for stable clusters in IBEX35

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Contribution

A correlation based hierarchical clustering is performed at different time periods in order to study the evolution of clusters among the components of the Spanish stock market IBEX35. This model can be used to design portfolios of companies with similar or dissimilar historical returns behaviour.

Model

For all components in IBEX35 we compute the cross-correlation matrix of the returns for fixed time periods. Correlations smaller in absolute value than a certain bound $a > 0$ are indistinguishable from 0 for small samples size, as can be deduced from the distribution of the statistic $\sqrt{\frac{r^2}{1-r^2}} \sim t_{n-2}$, and so, filtering w.r.to this bound we assure to consider companies that are *highly correlated*. From the correlation matrix we compute a dissimilarity matrix with respect to certain distance, and apply a hierarchical clustering algorithm to find clusters of companies on that period. We repeat the computations for further temporal intervals, and use combinatorial graphs algorithms to build a (weighted) representation of the evolution of clusters in time.

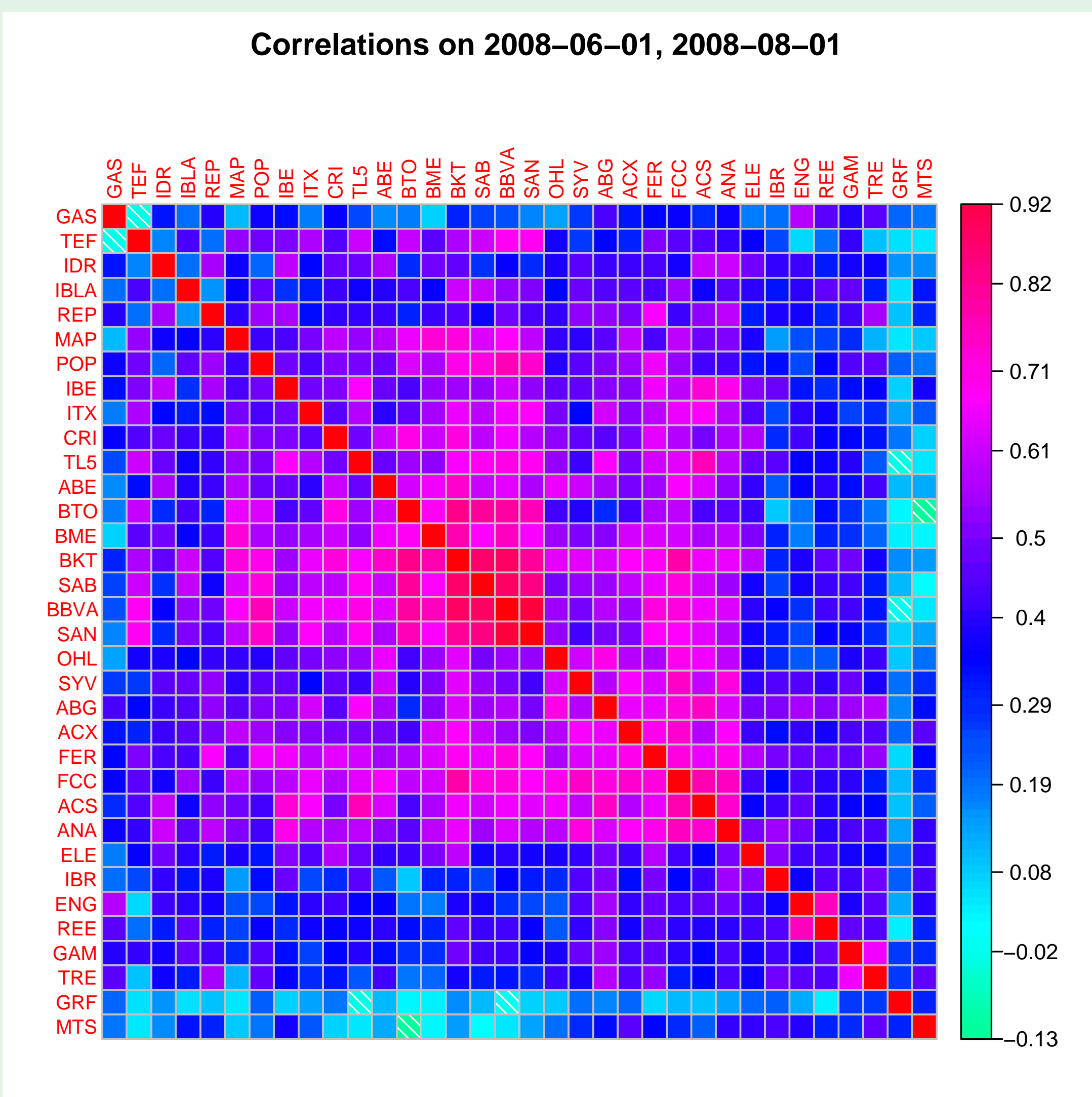
Results

We performed our computations on bimonthly periods from June 1st, 2008 to August 1st, 2009. Below we have the correlation matrix for the first period of our sample, 1-06-2008 to 1-08-2008 (the scale on the right represents the correlation val-

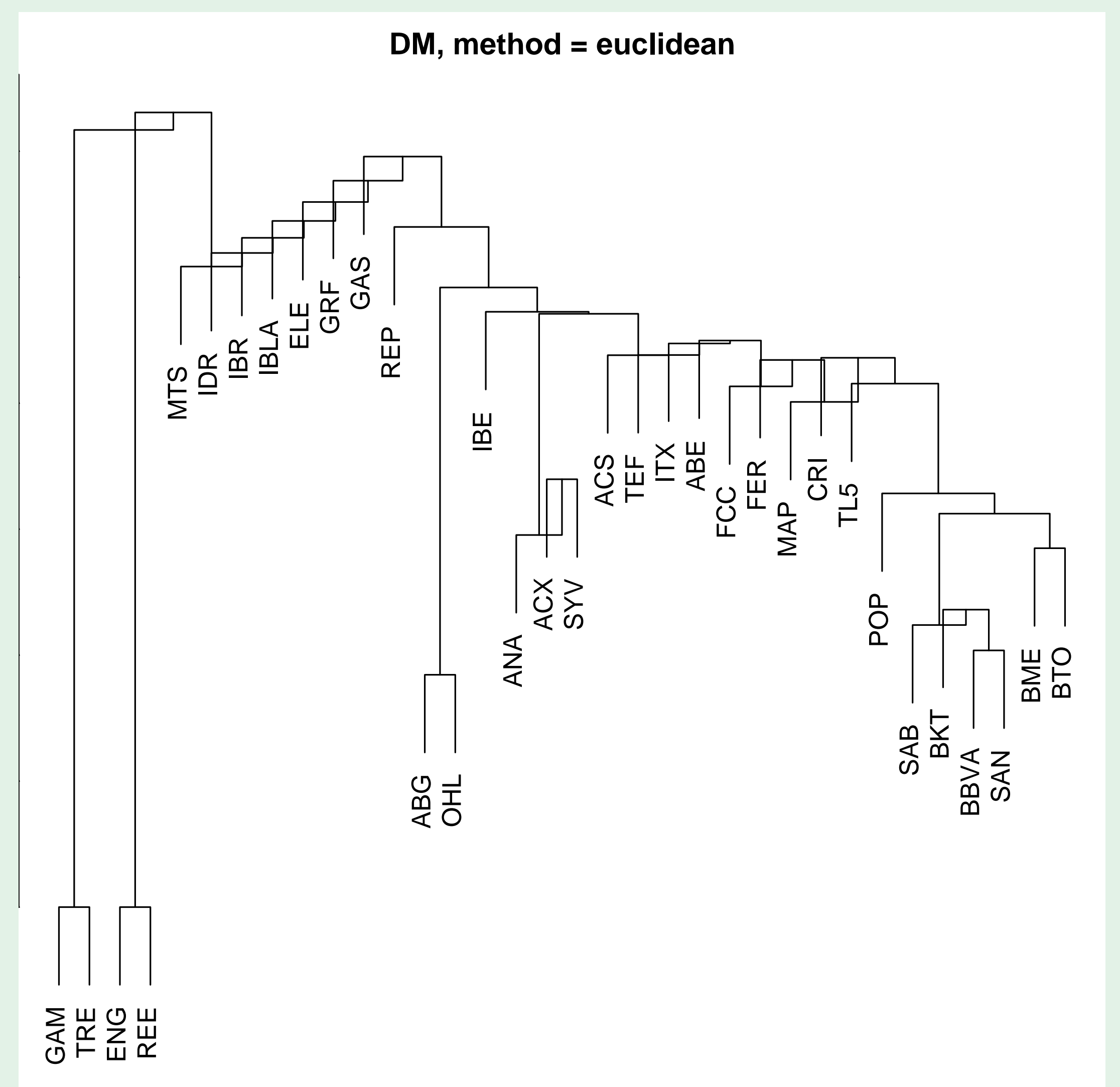
ues found). Next is the dendrogram representation of the result of applying the hierarchical clustering algorithm to the dissimilarity matrix associated to the correlation matrix. Below, the graph of clusters formed through the different time pe-

riods in the two year span: the blue boxes represent clusters; the pink boxes collect uncorrelated companies in the given period (which is written in the green boxes); the edges are weighted by the intersection measure.

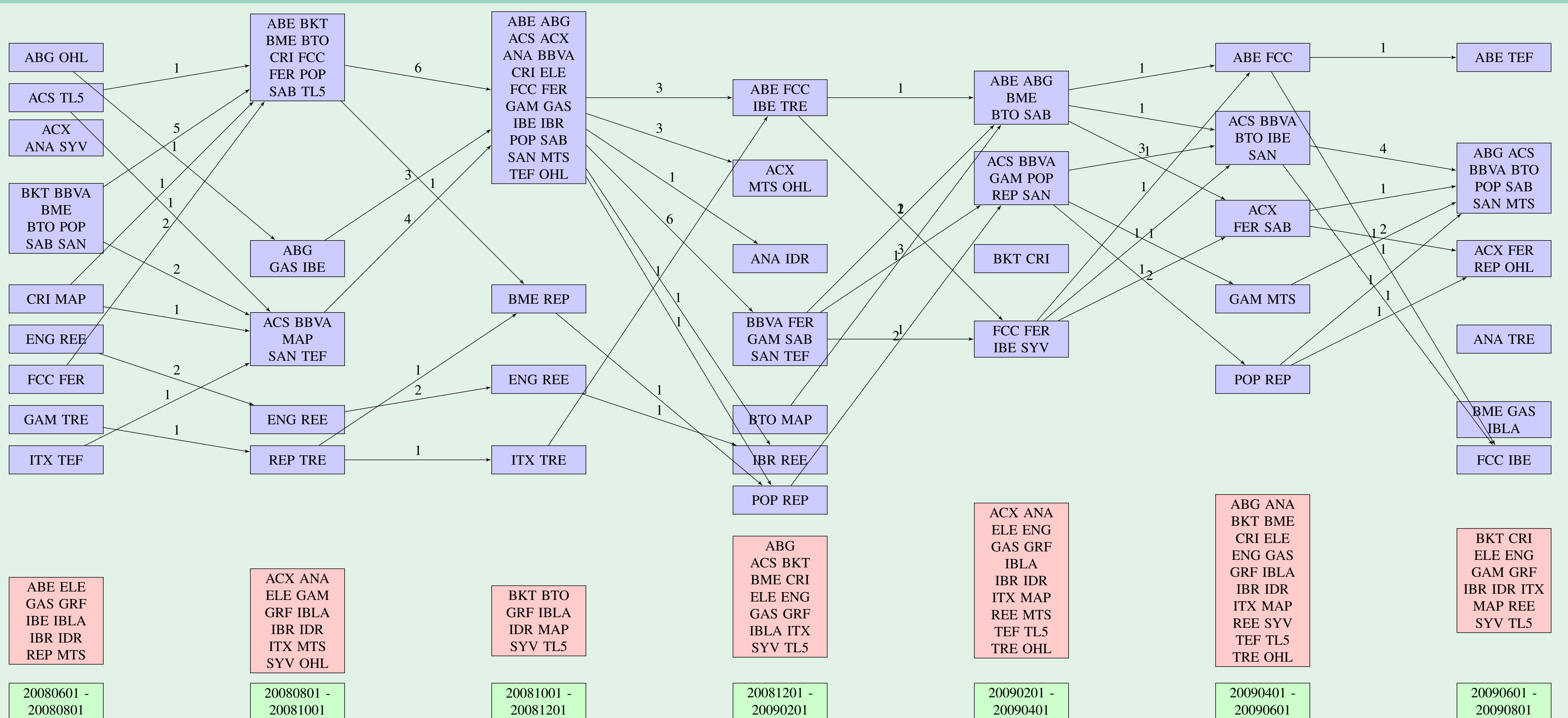
Correlation matrix



Dendrogram



Temporal Clustering Graph for Ibex35 from 1-06-2008 to 1-08-2009



Some conclusions

Our experiments confirmed a popular observation known by many brokers that the two banks, SANTANDER and BBVA, conform the most stable cluster through longer periods of time, and further we see that this duo tends to participate in the largest clusters of IBEX35 components at differ-

ent periods of time; hence being both together a driving force of the Spanish market. Other pairs of companies with persistent correlations through (shorter periods of) time can be identify, and companies that tend not to correlate at all.