The Rotterdam model is a model in nominal prices and real income. Barten (1964) and Theil (1965) proposed the model, and if you see historically on demand systems this model is seen as a turning point. The model's simplicity, transparency and evident generality have caused to its influential place in demand analysis. (Clements & Gao, 2015)

When we are to estimate the model for time series, continuous changes are replaced by discrete changes. Originally we find the Rotterdam model with continuous changes to be:

$$R_i d\ln q_i = \sum_{j \epsilon N} \theta_{ij} d\ln p_j + \mu_i d\ln Q$$

In the model used, intercepts (α) and a weekly dummy variable (D_j) were added to capture possible trends and seasonality. We therefore ended up with the following Rotterdam model including trend effects and seasonality:

$$\overline{R}_{i,t} \Delta\ln q_{i,t} = \alpha_i + \sum_{j=1}^{50} \delta_{ij} D_j + \sum_{j=1}^{n} \theta_{ij} \Delta\ln p_{j,t} + \mu_i \Delta Q_t$$

Where:

$$\Delta\ln q_{i,t} = q_{i,t} - q_{i,t-1}$$
$$\Delta\ln p_{i,t} = p_{i,t} - p_{i,t-1}$$

Average budget shares must be used instead of the budget share variable:

$$\overline{R}_{i,t} = \frac{R_{i,t} + R_{i,t-1}}{2}$$

As a result, we then have the finite change version of Divisa Volume Index that plays the role of real income.

$$\Delta Q_t = \sum_i \overline{R}_i \Delta\ln q_{i,t}$$

In the weekly seasonality $\sum_{j=1}^{50} \delta_{ij} D_j$, the δ_{ij} are restricted to sum to zero in each equation. To avoid singularity one month is omitted, this month is therefore used as the reference month. In our model we have that paracetamol, ibuprofen, aspirin and combined are denoted i = 1, 2, 3 and 4, respectively. The general restrictions for the Rotterdam model are used and tested:

Symmetry:	$\theta_{ij} = \theta_{ji}$
Homogeneity:	$\sum_j \theta_{ij} = 0$
Adding-up:	$\sum_i \mu_i = 1$ (Engel) and $\sum_i \theta_{ij} = 0$ (Cournot)

The adding-up restriction is used to avoid matrix singularity when testing for homogeneity and symmetry. We have tested the data on both homogeneity and symmetry and chose to use the model including both restrictions.