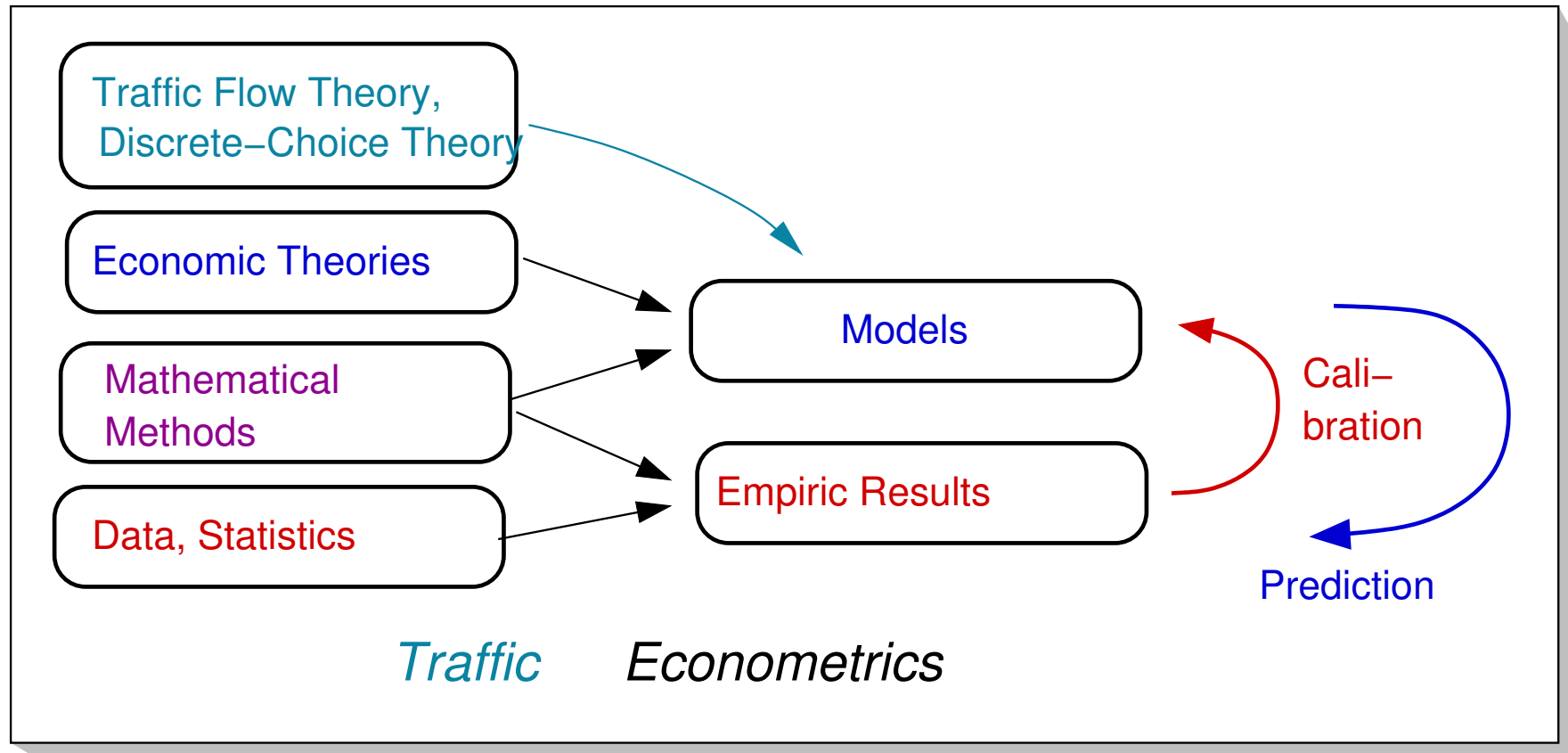
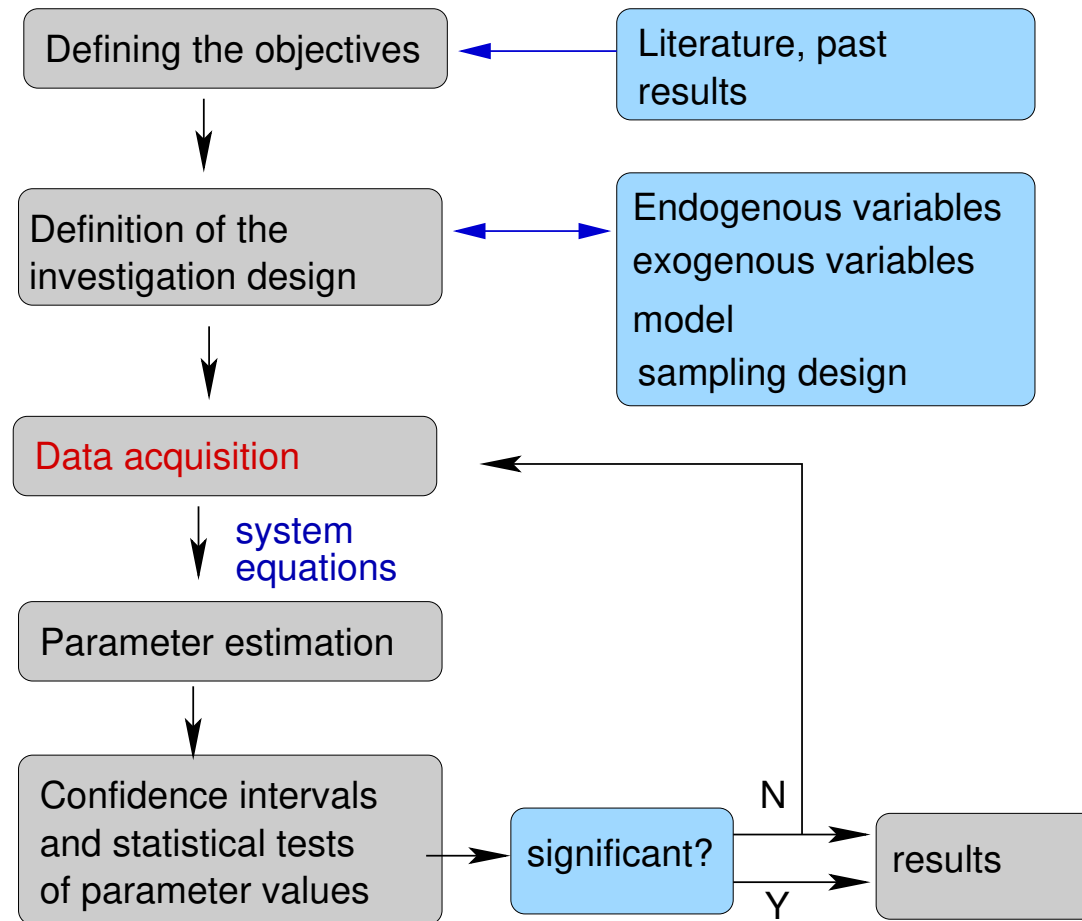


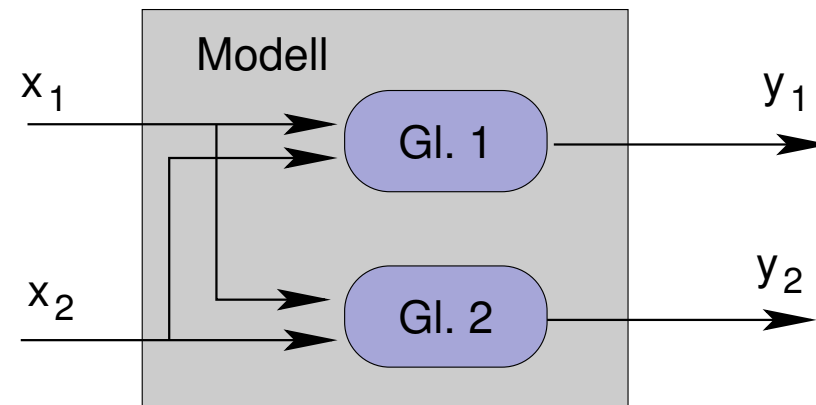
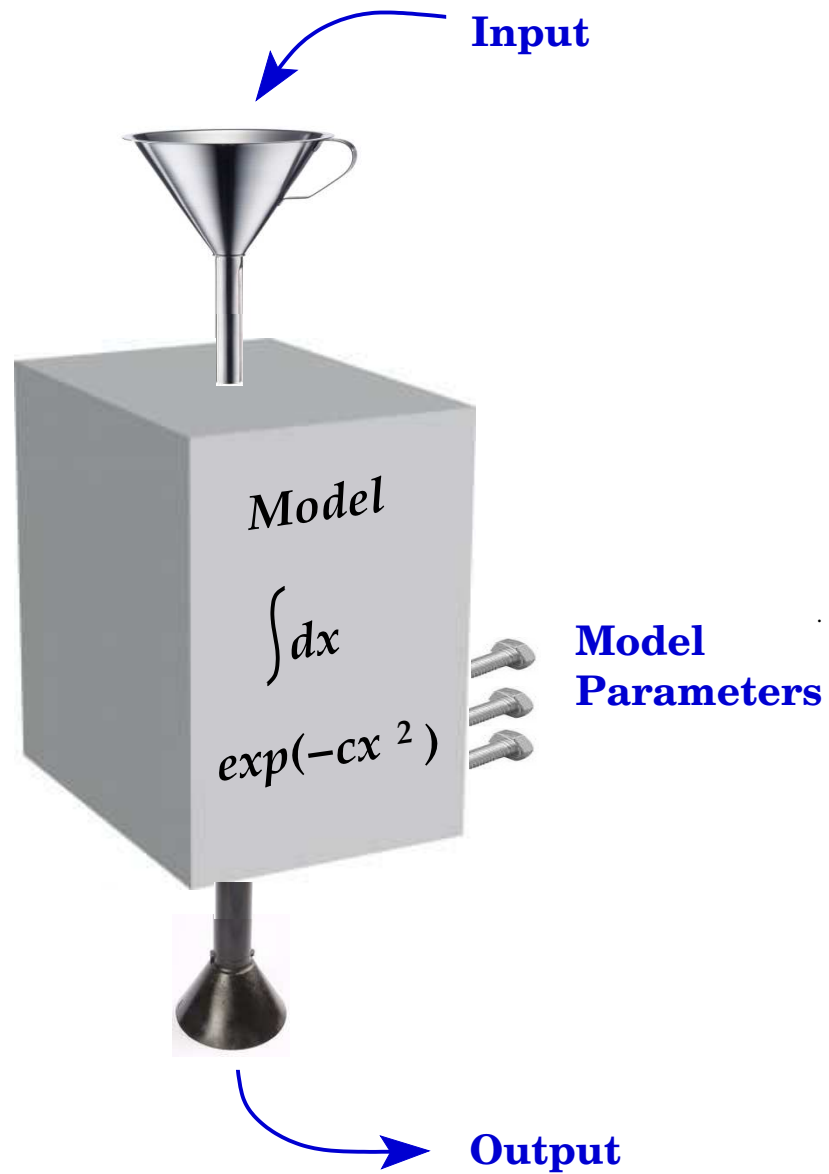
Scope of econometrics – from a mathematical point of view



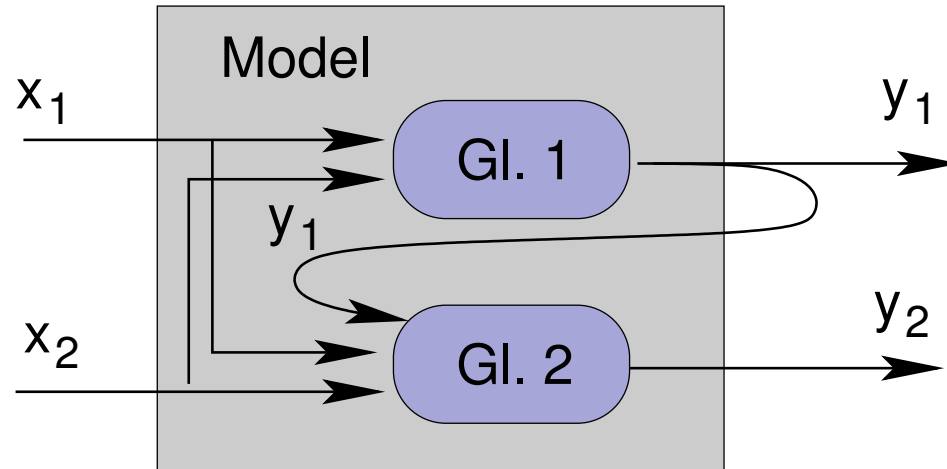
General procedure of an econometric analysis



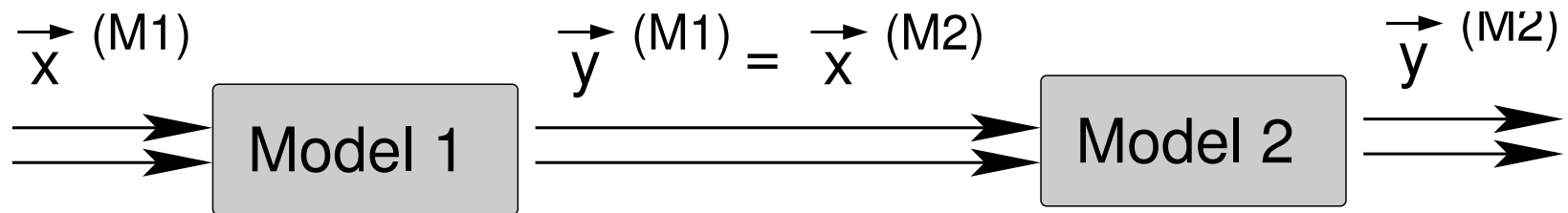
Flow chart of a “classical” econometric model



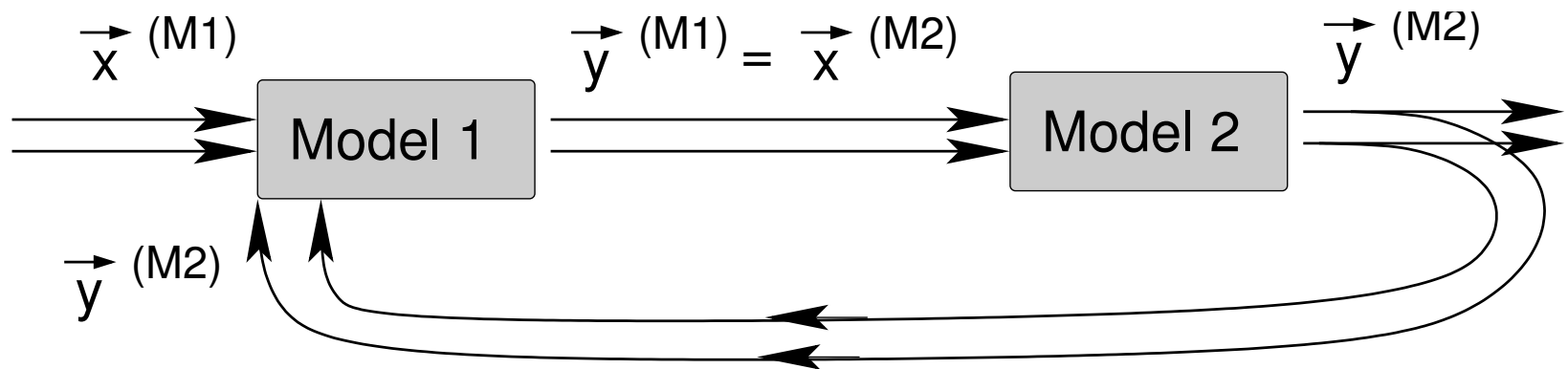
Linking



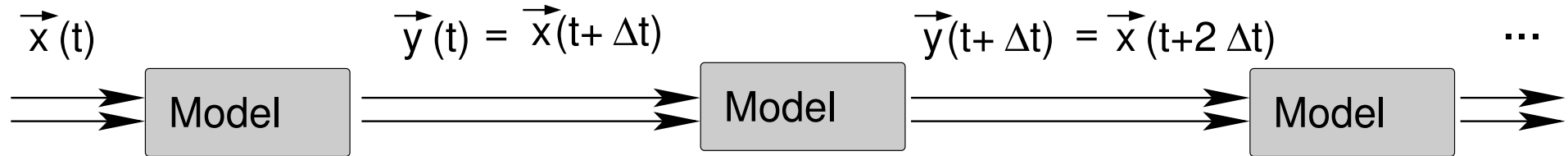
Chain-linking



Feedback



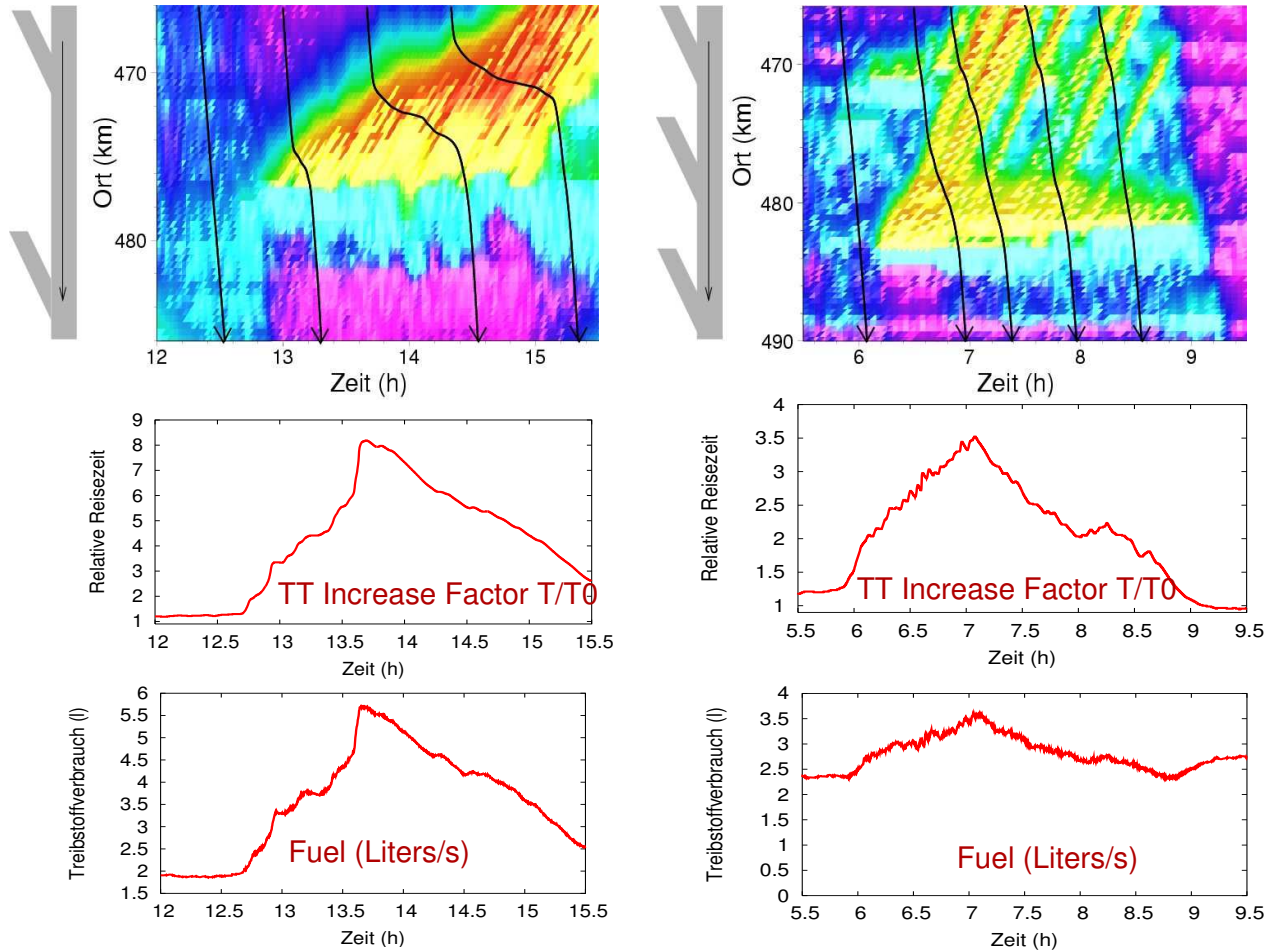
Models of time evolution (“dynamic models”)



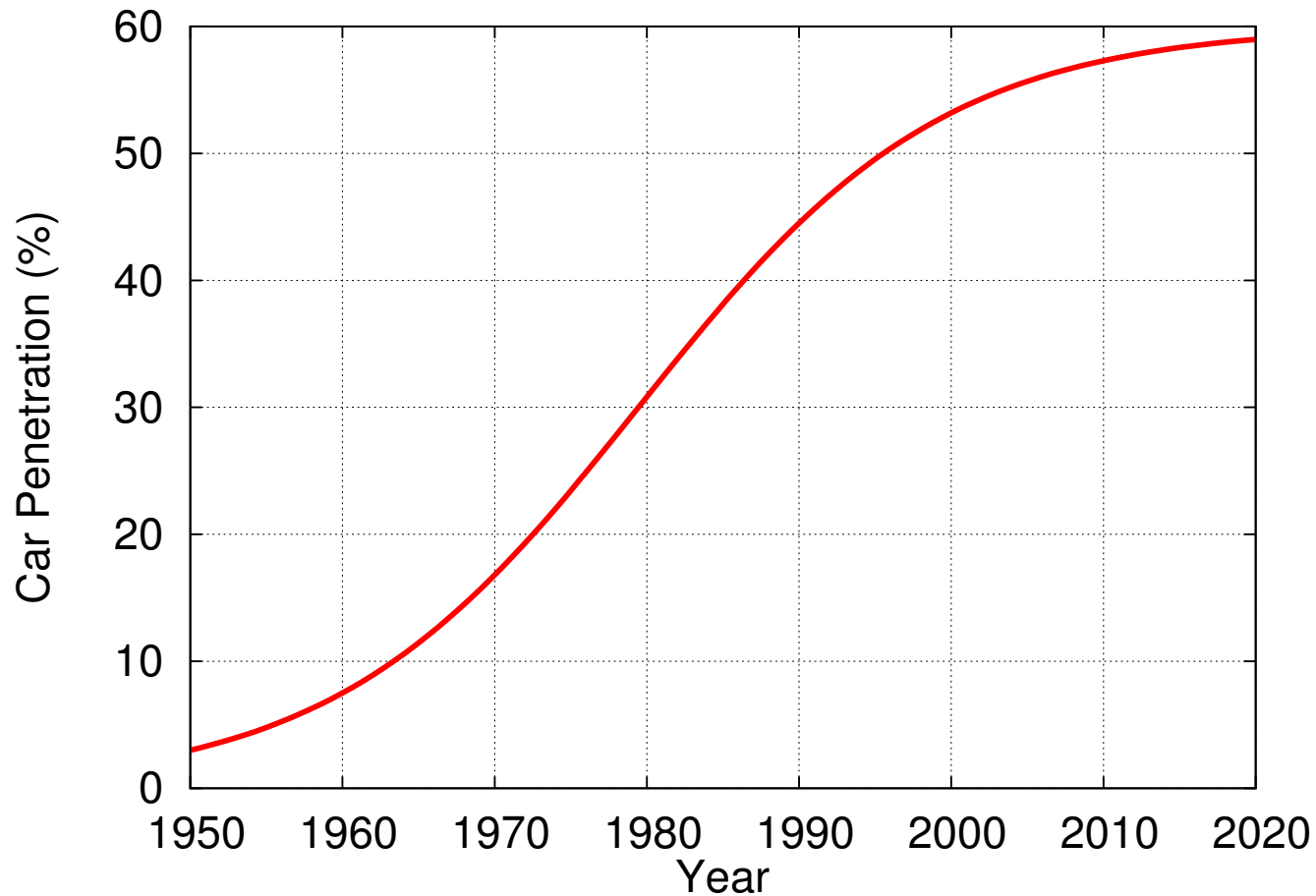
Flow chart of chain-linking for dynamic models. The model itself stays generally the same in all steps, often with unchanged parameters (*autonomous* dynamic model), sometimes with time dependent parameters (*non-autonomous* model)

Application: Calculating the external costs of road traffic

A5-Nord: Homogeneous Congestion (Stop-and-Go) and Go waves (Oscillations)

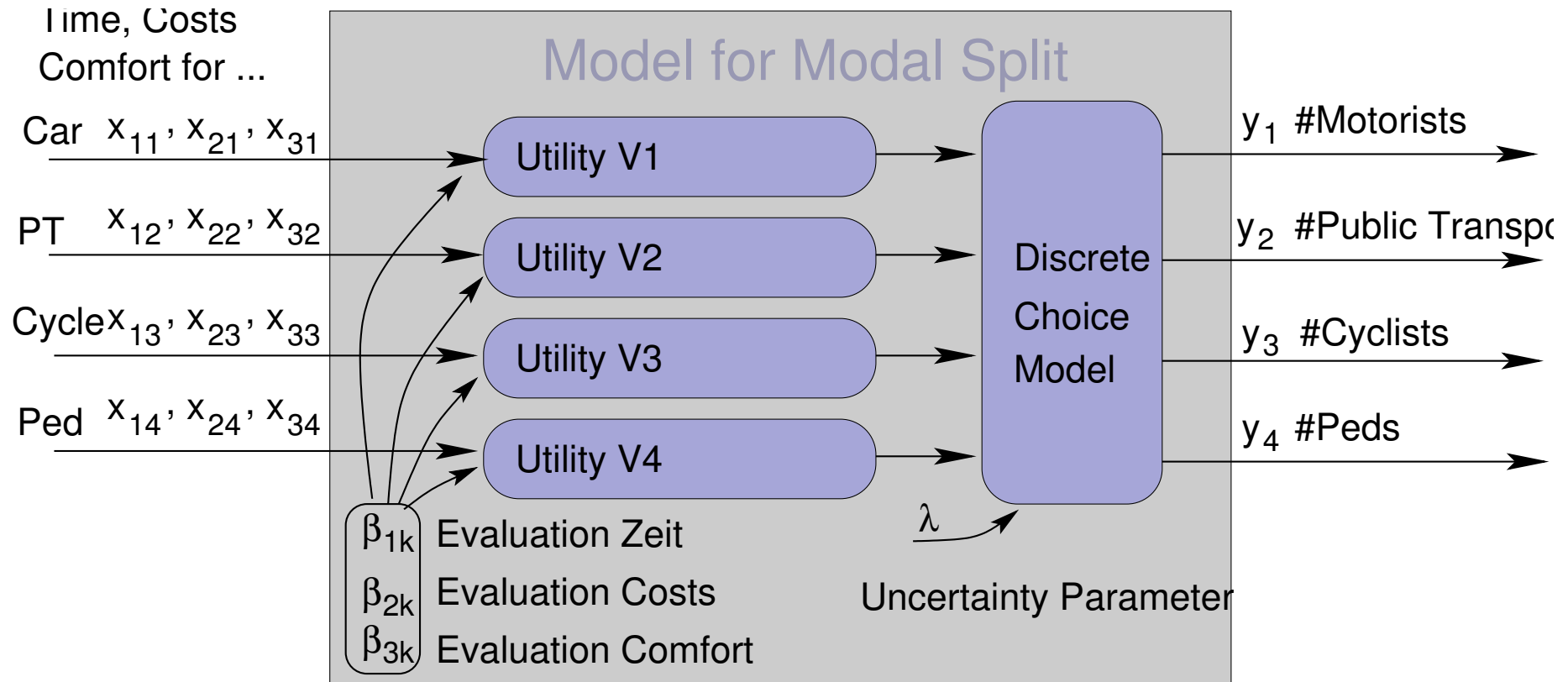


Model for limited growth



Limited growth according to the solution of the differential equation $\frac{dy}{dt} = \frac{1}{\tau} \left(1 - \frac{y(t)}{y_s} \right)$ for the initial value $y_0 = 3$ at the moment in time $t_0 = 1950$ and the model parameters growth time constant $\tau = 10$ and saturation $y_s = 60$. The result might represent the penetration rate for passenger cars per person in %.

Structure of a modal split model



Exogenous variables x_{kj} : influencing factors j for mode k

Endogenous variables y_k : frequency of utilization for mode k

Example of exogenous and endogenous variables for two alternatives: per foot or by bike

Height	Age	Sex	time needed bike	costs bike	total travel time PT	costs PT	choice bike	choice PT
Variables	x_1	x_2	x_3	x_4	x_5	x_6	y_{1i}	y_{2i}
Person 1	30	w	20 min	0 €	30 min	1.00 €	0	1
Person 2	24	m	11 min	0 €	20 min	2.00 €	1	0
Person 3	27	m	34 min	0 €	15 min	2.00 €	0	1
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

These data can be obtained from interviews.