TECHNISCHE UNIVERSITÄT DRESDEN

AirMetro
Research Training Group
2947 at TU Dresden

T1: External Costs, Market

Optimal scope and structure of AAM taking into account external costs and the interaction with other modes of transport

Supervision: Georg Hirte and Regine Gerike, External advisor: Eric Verhoef

Motivation

Relevance of Advanced Air Mobility (AAM) depends on whether, how, and at which scale AAM can be economically realized. To examine this, one has to

— model demand and supply decisions (heterogeneity, uncertainty, prices and costs, technology, infrastructure) ,
— compare market outcome with socially optimal solutions (welfare analysis)
— evaluate whether public interventions are needed
— identify efficient and socially just policies

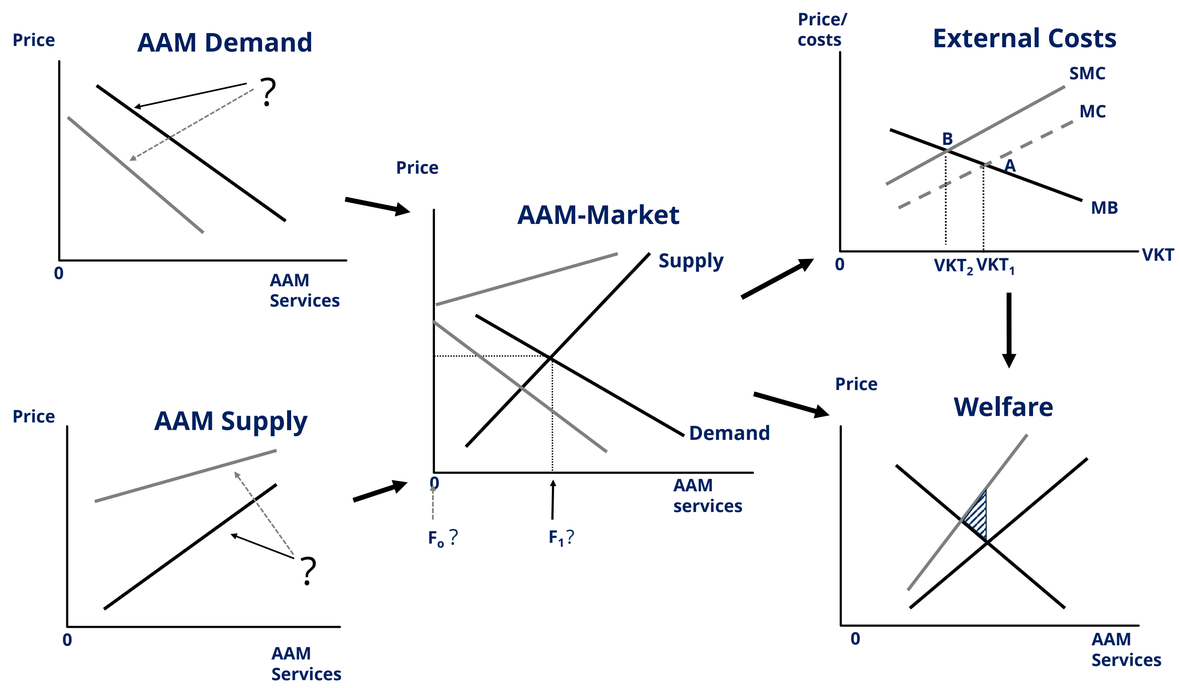

Figure 1: From demand to welfare

Methods

— Demand and supply modeling: microeconomic decision approach with the discrete choice of AAM, heterogeneous preferences, prices, alternative technologies, infrastructure costs, flight routes, and cycling time, risks [1], [2], [3].
— Extended cost-benefit analysis or welfare analysis with externalities (emissions, noise, privacy) and *Wider Economic Benefits* (Economies of agglomeration) [4].
— Monte-Carlo simulations (robustness) [3], [5].

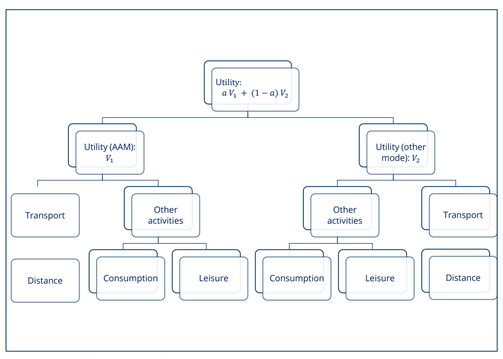

Figure 2: Decision tree of users

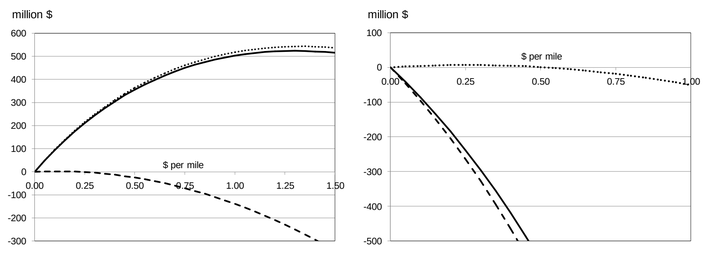

Figure 3: Welfare effects (Example: Miles Tax)

Results

— AAM-market model with exogenous cost and technology parameters, adjustable to future developments of relevant parameters.
— Modifiable approach of cost-benefit analysis or welfare analysis .
— Identification of critical cost thresholds or parameter values concerning the adaptation of AAM in markets or a positive cost-benefit ratio.

Networking in the RTG

Demand and supply modeling and the evaluation of social welfare help link the research to other subprojects in the program, for instance, by using results of other subprojects for calibrating parameters, e.g.,

— demand for AAM (T11)
— design of infrastructure(T3, T4).
— stability of flight behavior to identify risks (T6, T7, T8).

Recommendations developed in the subproject, e.g., the specific regulation, can, in turn, affect demand (T11) or restrict the die option for technology and infrastructure design (T3, T4).

References:

[1] G. M. Fetene, G. Hirte, S. Kaplan, C. G. Prato und S. Tscharaktschiew 2016., The economics of workplace charging. Transportation Research Part B: Methodological 88, 93–118.

[2] R. A. Clothier, D. A. Greer, D. G. Greer und A. M. Mehta, 2015. Risk Perception and the Public Acceptance of Drone.,Risk analysis : an official publication of the Society for Risk Analysis 35(6). 1167–1183..

[3] G. Hirte, R. Laes, and R. Gerike, 2023. Working from self-driving Cars. Transportation Research Part A 176, 103785

[4] A. Straubinger, E. T. Verhoef, H. L. de Groot, 2022. Going electric: Environmental and welfare impacts of urban ground and air transport. Transportation Research Part D: Transport and Environment 102, 103146.

[5] G. Hirte and S. Tscharaktschiew, 2020. The role of labor-supply margins in shaping optimal transport taxes. Economics of Transportation 22, 100156.

Network member in:

DRESDEN concept
SCIENCE AND INNOVATION CAMPUS

„Friedrich List“ Faculty of Transport and Traffic Sciences

VERKEHRS WISSENSCHAFTEN DER TU DRESDEN