

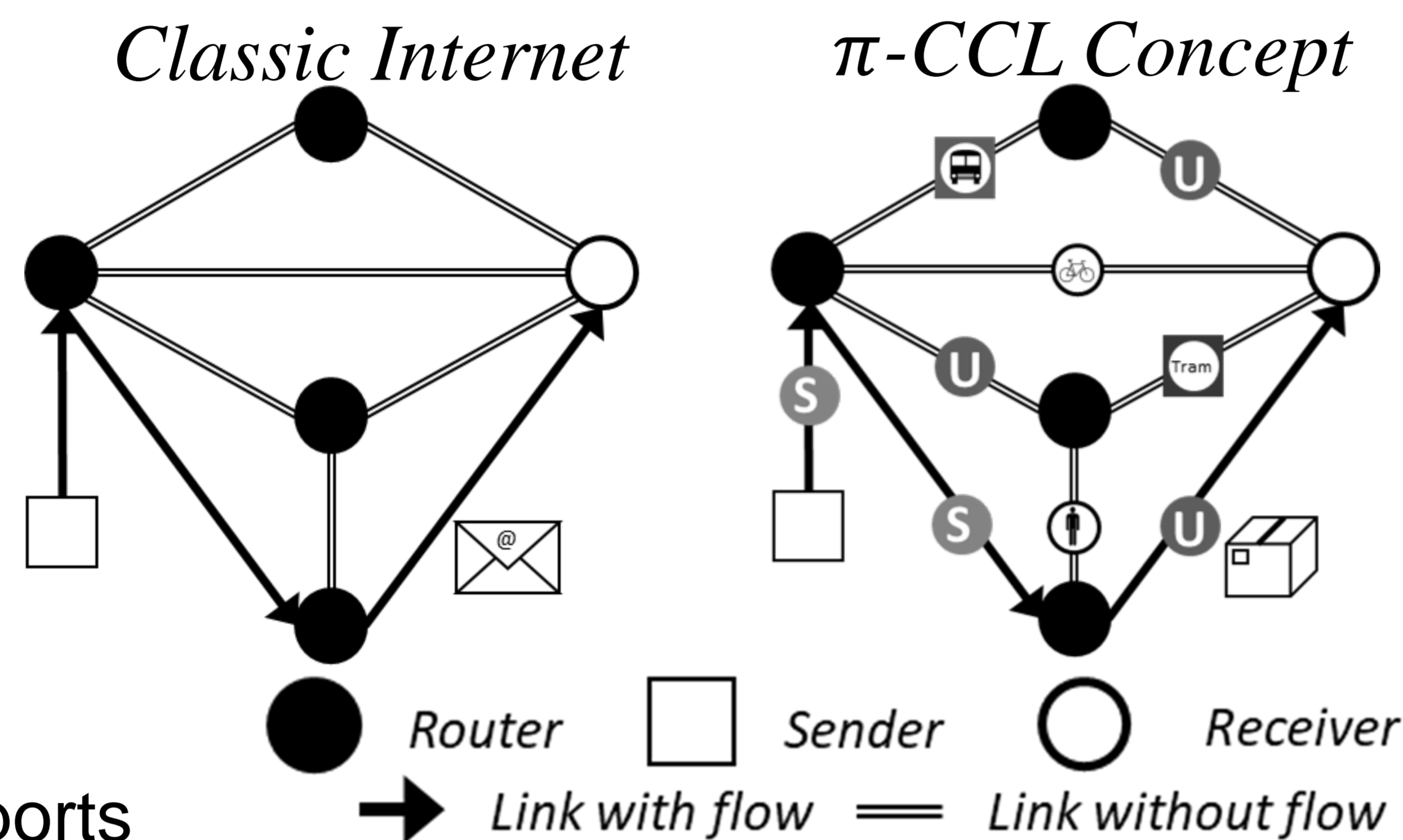
Dynamic Pricing in City Crowd Logistics Incentives to Activate the Crowd

Emanuel Herrmann

Betreuer: Prof. Dr. Stefan Minner (TUM), Prof. Dr. Oliver Kunze (HNU)

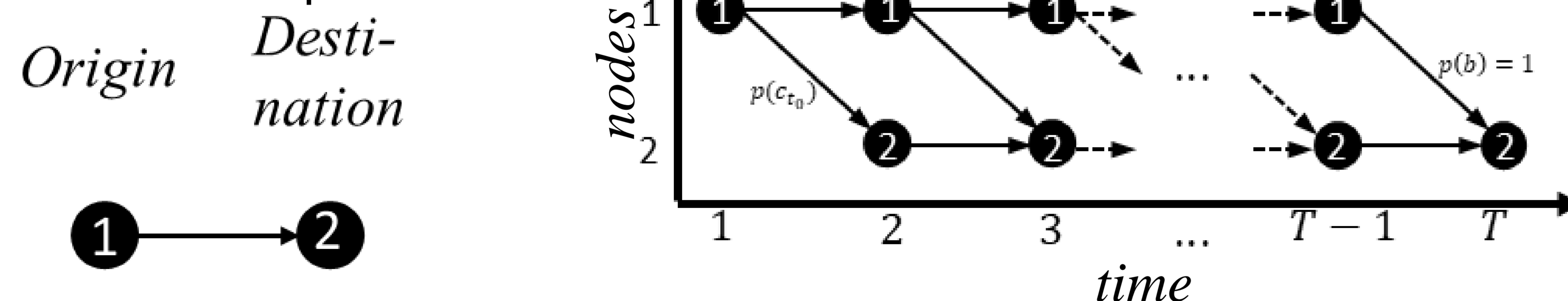
Motivation

- **E-commerce Growth:** Mean annual growth of 20% since 2000
- **Service Providers' Needs:** Profitability
- **Customers' Needs:** More demanding in terms of level of service and flexibility
 - Demand for speed
 - Delivery alternatives
 - Customers have low willingness to pay
- **Solution Concept:**
 - Incentive pricing mechanism for crowd couriers to carry out multi-legged urban transports
 - If no crowd courier commits to transport before deadline, then professional courier service is hired at a fixed price (=fallback)



Methodology

- **Stochastic Optimization Problem:** Formulation as a QCQP. Prices for each arc are determined as a function of time.
- **Analytical Approach:** Dynamic programming & backwards induction for minimalistic special cases



- **Numerical Approach:** Evaluating impact of external factors such as number of nodes, network structure, time horizon, ... on prices (brute force with Gurobi 9.10 for larger cases)

References

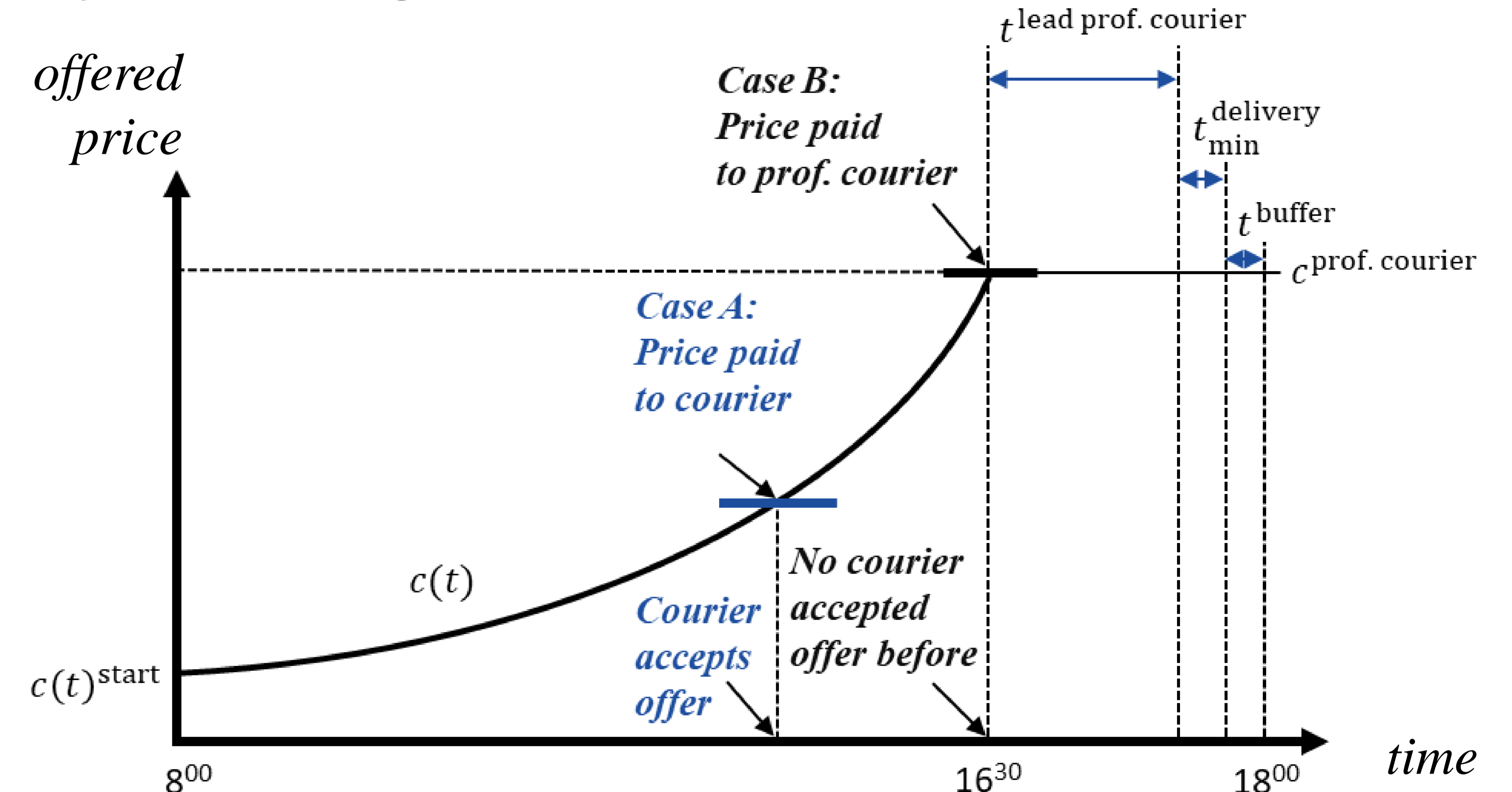
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Research Focus

- **Dynamic Pricing Mechanism for Crowd Couriers:**



- **Crowd Couriers:** Probability to carry out transports depends on offered price only

Preliminary Results

- **Analytical Results:**
 - Exact solutions for price functions (minimalistic special cases)
- **Numerical Results:**
 - Plausible impacts of external factors on prices (optimality gap still unknown with current solution procedure)
 - First analysis of profitability corridor
- **Future Research Directions:**
 - Improving solution procedure
 - Probability of crowd couriers to carry out transports depends on price and daytime