Lessons learned and way forward

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Outline

• What was the project about?
• What did we do?
  – Problem setting
  – Scenarios and models
• What are the main conclusions and way forward?
  – Collaboration and performance
  – Regulation and performance
  – Liberalisation and performance
What was the project about?

• Starting point:
  – Implementation of SES initiatives has so far not met expectations
  – Up to now solution seemed to be regulation-orientated
    (cf. also Impact Assessment 2013)

• Research questions:
  – What has led to current inefficiencies in air navigation provision? Is central implementation the way forward?
  – Potential paths for change in ATM in Europe: Can change come from within the sector?

• Methodology
  – Economic and numerical modelling
What did we do?

**WP1: Taking stock of parallel experiences**
- Models of liberalisation
- Introduction of new technologies

**WP2: Air transport sector specificities**
- Airlines
- Airports
- ANSPs

**WP3: Selection of scenarios**
- Ingredients (agents, incentives, technologies)
- Development of scenarios

**WP4: Quantitative and qualitative assessment**
- A network congestion game
- A union bargaining model
- A public utility model
- And its extension to a simple network setting

**WP5: Conclusions and Caveats**
Problem setting

- Reasons for slower than expected change
  - National organisation -> Fragmentation
  - Home bias
  - Geographic monopoly -> incumbent inertia
  - Network character -> problems of coordination
  - Weak incentives + split incentives
WP3: Scenarios

3 types of collaboration
- None
- Horizontal (between ANSPs)
- Vertical (multi-stakeholder)

3 types of pricing
- no regulation
- regulatory pricing (cost-plus, price cap, incentive based)
- peak load and congestion pricing

Technological packages
PCP
SESAR step 1
Model 1: Network congestion game

• Two stage game:
  – Stage 1: ANSPS set charges according to profit maximisation
    • Price-caps
    • Profit maximisation
    • Peak/Off peak price-caps
  – Stage 2: Airlines choose flight paths given schedules
    • 3 cost components: operational, congestion and ATC en-route charges
    • Revenue loss if they fly off-peak
    • Option “not to fly”
    • Two solutions for second stage
      – User optimal: airlines set flight paths to minimize own costs
      – System optimal: central planner set flight paths to minimize sum of airline costs

• Basecase + 5 scenarios (*4)
Model 1: Network congestion game

- Case study of Europe – 6 ANSPs
Model 2: Union-bargaining model

• Economic agents
  – Airlines:
    • Homogenous; Inelastic demand if price is below threshold
    • Perfect competition
  – ATC:
    • Use a certain technology that combines other costs with input of controllers
    • Technology determines
      – capital/labour mix
      – the minimum labour/flight
      – Bargaining power ATC union
  – ATC Unions
    • Negotiate on wage and employment
      – Higher wage means a better salary than market for same qualification
      – More labour means more relaxed work conditions, less hours per week, etc.
    • Labour union power (eg. Strikes)
  – Regulator
    • Regulates ATC
    • Bargains with Union
    • Wants to maximise consumer surplus of flights and own revenues (= minimize costs of ATC)
Model 2: Union-bargaining model

- Two-stage game
  - Stage 1: choice of technology
  - Stage 2: choice of wage and employment – asymmetric Nash bargaining solution

- Scenarios
  - Explaining inefficiencies in
    - Cost+ regime
    - Price-cap
  - Will ATC invest in new technologies
    - Operational innovation
    - Drastic innovation
  - Incentives for ATC to adopt time of day pricing

- Empirical validation - estimation of
  - bargaining power parameter
  - Union preference parameter (wage vs. Labour)
Model 3: Public efficiency model

- No network: analyse the behaviour of 1 individual ANSP
- Interaction ANSP- regulator with imperfect information
- Investigate effectiveness of performance regulation on ANSP incentives for
  - Cost-efficiency
  - Quality of service (mainly related to capacity)
  - Technology adoption
- Numerical illustration
Model 4: Simple network model

• Integration labour union model and efficiency model

• 2 models:
  – Vertical cooperation between airport and ANSP (regional forerunner)
  – Horizontal cooperation between ANSPs (en-route ATM)

• Goal:
  – Effects on cost-efficiency incentives
  – Effects on technology adoption (efficiency-enhancing, capacity-enhancing)
  – Effect of on detours and environmental targets

• Empirical illustration
Way forward

- Collaboration and performance
  -> we need a balance between collaboration and competition as a leverage for market-oriented change
  - ANSP collaboration
    - Potential of such collaboration is small due to limited incentives (cf. inelastic demand)
    - Performance regulation can help, but extend is limited by presence special interest groups (labour unions)
    - Top down regulation will probably lead to (pro-forma) collaboration, but limited performance improvements
    - Need for market based incentives
  - Multi-Stakeholder collaboration
    - Introducing competition (between airlines and airports) within goal ANSP
    - Modelling showed improvement in performance
Way forward

• Regulation and performance
  – Cost-plus versus price-cap regulation
  – Price cap gives more incentives than cost-plus regulation but
    • Quality might deteriorate
    • Limited incentives to invest in new technologies
  -> hybrid price caps to include quality

- Problem of interest groups and hidden subsidies
Way forward

• Liberalisation and performance (disclaimer – less related to ACCHANGE)
  – Liberalisation as a tool to introduce competition
  – Different pathways possible – not all bring benefits
  1) Open tenders
     - Variety of forms with respect to geographical coverage and length
     - Minimum target levels
     - Problems of practical implementation and acceptability
  2) Unbundling of part of ATC functions
     - Support services such as ARFM, ATC
     - Cf. idea of centralised services but it might be more realistic to start unbundling at national level? + tendering
       -> over time consolidation with few providers benefitting from economies of scale, but with competition
  3) Virtual centers
     - As a game-changer in current status quo
     - In the modelling: impact bargaining power (even if not used)
       -> facilitate implementation contingency services
Conclusion

- Introduction of performance incentives will be key driver for stimulating market-oriented changes

- Price regulation and charging regimes will continue to be a cornerstone for change but they are likely to be insufficient

- Multi-Stakeholder cooperation will help

- But partial liberalisation might be needed