Economies of Scope in Delivering Parcels and Letters Together

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Agenda

1. Introduction
2. Joint delivery in postal operations (international benchmark)
3. Cost effects of joint delivery
4. Conclusion

Introduction

- National postal operators offer both letter and parcel services
  - Historically, letters and parcels were processed in one integrated network
  - “Industrialization of postal operations” in 1990s: centralize and automate
- Current modernization and streamlining of postal networks
  - Focus on product-specific and general economies of scale
  - Economies of scope? Few studies with ambiguous results
- Demand: letter volumes decline, parcel volumes increase
  - Changing economics of combined delivery
- Differences in the extent of joint operations, particularly in delivery

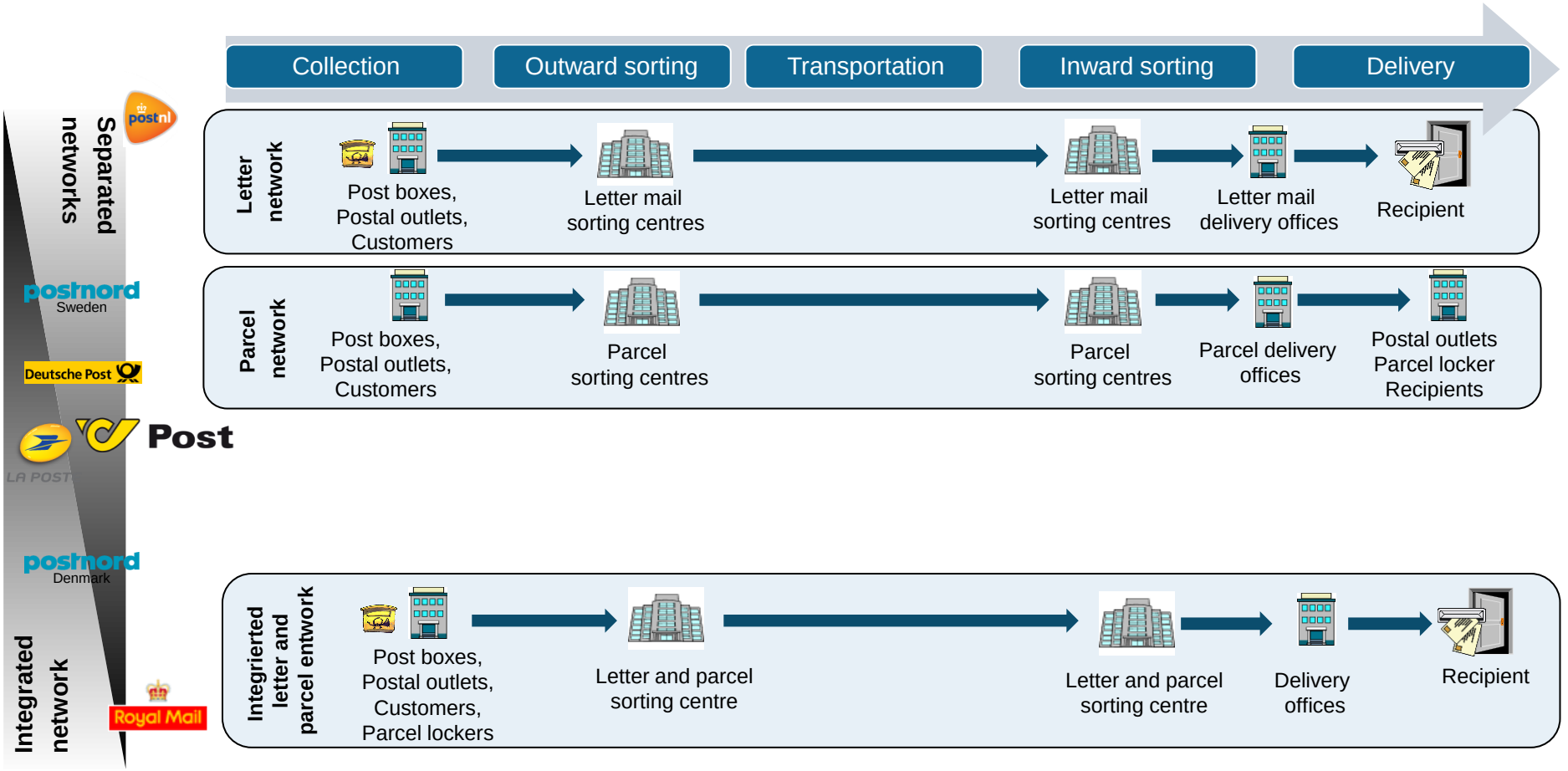
Joint Delivery in Postal Operations

International Comparison: 7 operators

	Post	Deutsche Post	La Poste	PostNL	postnord Denmark	postnord Sweden	Royal Mail
Households (mio.)	3.8	39.7	28.7	7.6	2.4	4.6	27.2
Daily letter volume per household	~2.1	~1.1	~1.5	~1.4	~0.8	~1.8	~1.5
Daily parcel volume per household	~0.08	~0.09	~0.03	~0.06	~0.07	~0.07	~0.10
Delivery days per week (letters)	5	6	6	5	6	5	6
Delivery days per week (parcel)	6	6	6	6	6	5	6
Development letter volumes (CAGR 2010-2014)	-2.0%	-1.6%	-5.0%	-9.7%	-11.4%	-4.9%	-5.1%
Development parcel volumes (CAGR 2010-2014)	7.2%	6.9%	0.8%	9.2%	4.3%	9.5%	3.1%

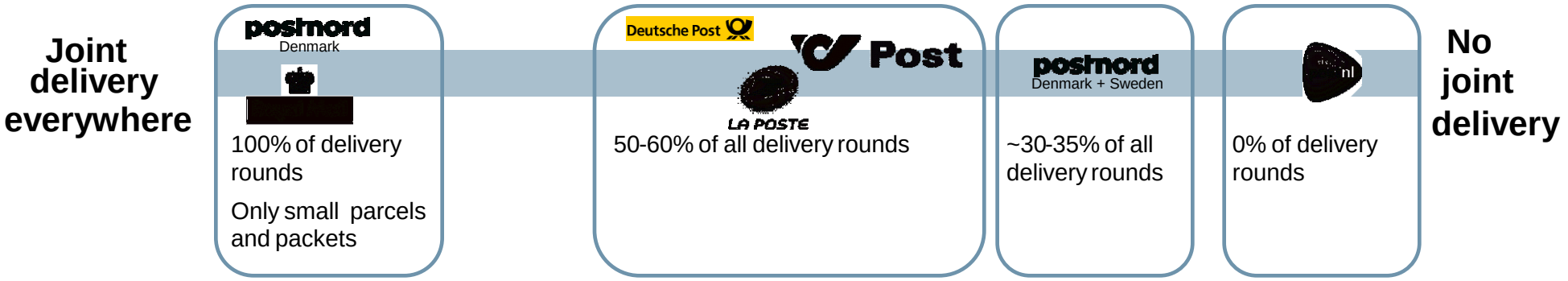
Joint Delivery in Postal Operations

Different Degrees of Operational Integration (Letters/Parcels)



Joint Delivery in Postal Operations

International comparison (cont'd)



- No joint delivery at PostNL
- Joint delivery for all posties at **Royal Mail** and **Post Danmark**
- Middle ground: Joint delivery in rural/sub-urban areas with motorized delivery vehicles
  - **Austrian Post**: Significant increase of joint delivery rounds during the last years and introduction of parcel delivery on Saturday which requires a stand-alone solution
  - **PostNord Sweden**: Low proportion of joint delivery rounds as parcels are usually delivered to postal outlets in Sweden
  - **Deutsche Post** and **La Poste** : Number of joint delivery rounds almost constant for during the last decade

Cost Effects of Joint Delivery

Modelling the Cost of Stand-alone and Joint Delivery

One postal operator (PO) delivering letters and parcels on an „aggregated“ delivery round with two different delivery networks

Letter delivery

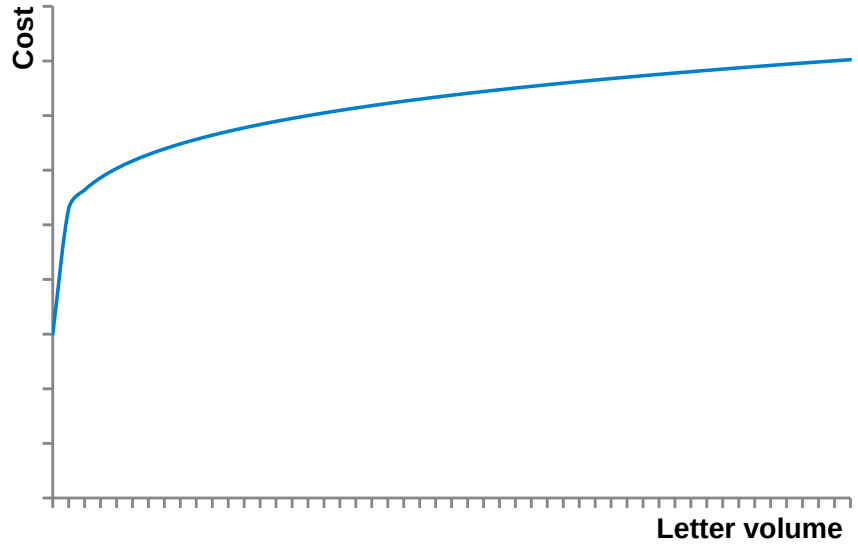
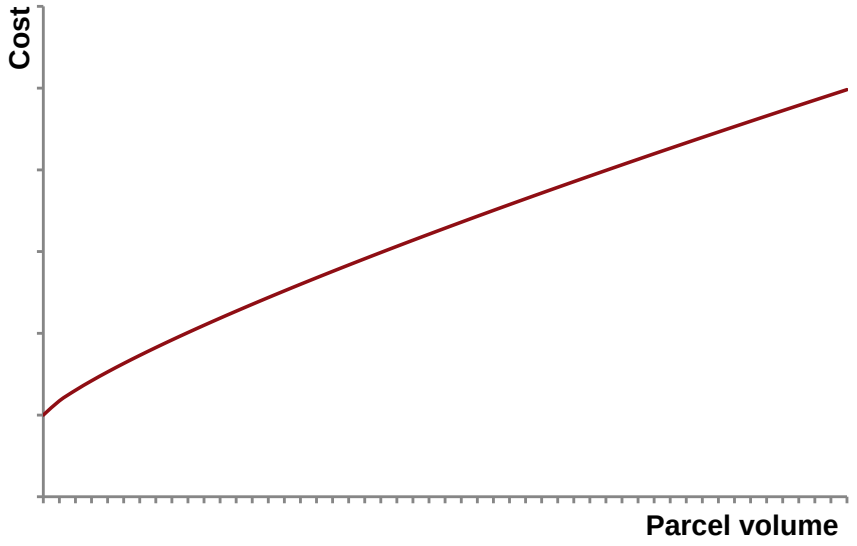
- Fixed capacity (e.g. volume) is sufficiently high to deliver all letters
- Free capacity may be used for parcels (joint delivery)

Parcel delivery

- Separate delivery of parcels (total or share of total volume)

Cost Effects of Joint Delivery

Modelling the Cost of Stand-alone and Joint Delivery (cont'd)

	Letter	Parcel
Cost functions		
Fixed costs	High (Fixed rounds independent from daily letter volume)	Low (Flexible rounds adjustable to daily parcel volume, partly outsourced)
Skalen-vorteile	High: Low effort for delivering an additional letter (delivery requires additional time but not necessarily an additional stop)	Low: Effort for delivering an additional parcel is higher

Cost Effects of Joint Delivery

Modelling the Cost of Stand-alone and Joint Delivery (cont'd)

Stand-alone cost of letter delivery

$$C_1(q_1) = c_1 * q_1^{\alpha} + F_1$$

Stand-alone cost of parcel delivery

$$C_2(q_2) = c_2 * q_2^{\beta} + F_2$$

with variable cost c_i, fixed cost F_i, returns on scale α, β and volumes q_i

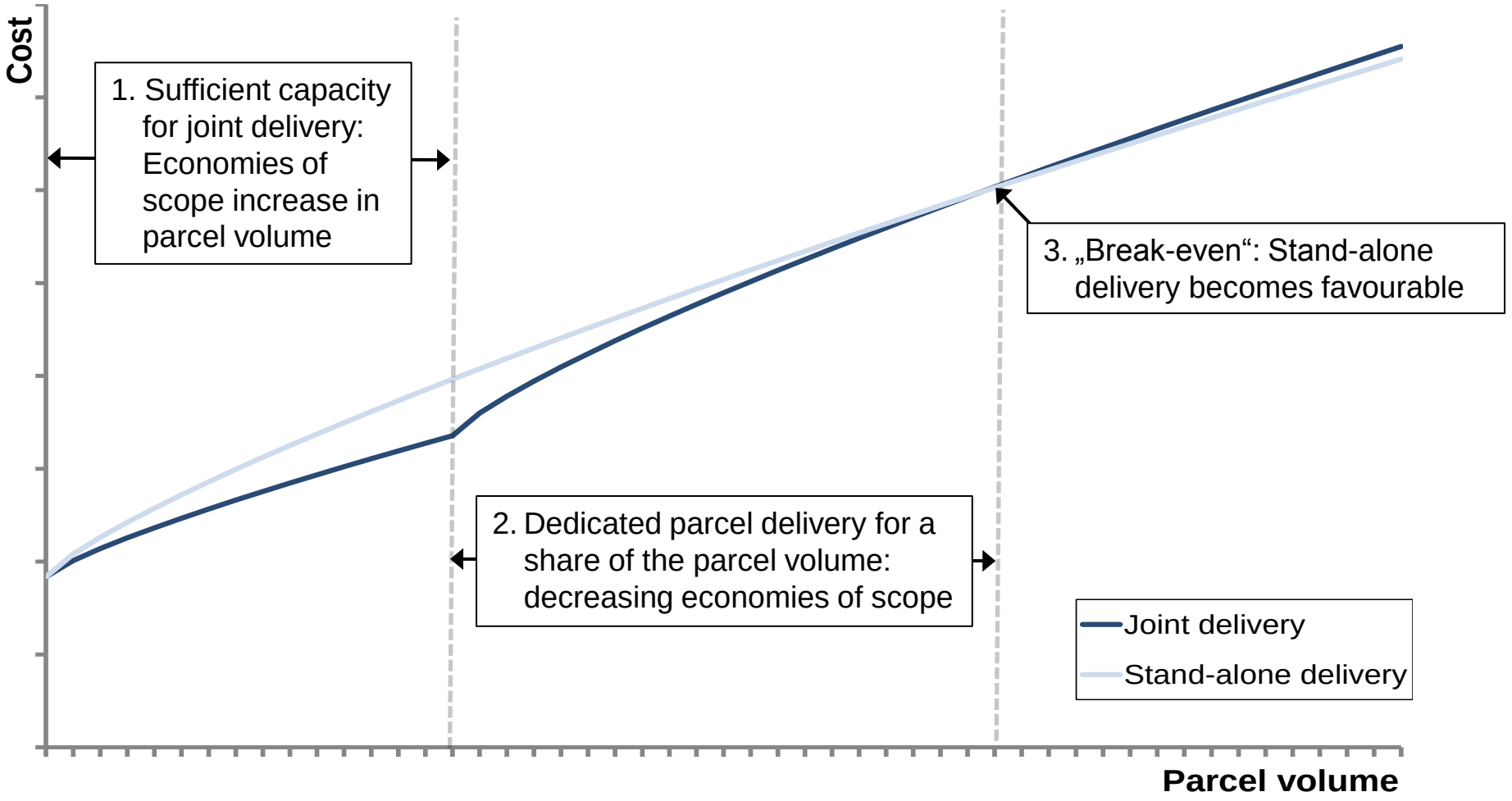
Joint delivery cost

$$C_V(q_1, q_2) = \begin{cases} c_1 * \left(q_1^{\alpha} + q_2^{\beta}\right) + F_1 & \text{up to the capacity constraint } q_2 \leq \bar{K} * (1 - \sigma) \\ c_1 * \left(q_1^{\alpha} + \left(K * (1 - \sigma)\right)^{\beta}\right) + F_1 & \\ \quad + c_2 * (q_2 - K * (1 - \sigma))^{\beta} + F_2 & \end{cases}$$

Cost Effects of Joint Delivery

Illustration of the Stand-alone and Joint Delivery Cost

Compare stand-alone and joint delivery costs for given round and fixed letter volume



Cost Effects of Joint Delivery

Numerical Simulation: Cost Savings from Joint Delivery

- Numerical simulation indicates the magnitude of cost savings from joint delivery

Cost savings from joint delivery in relation to	Scenario 1 (Free capacity 30%)	Scenario 2 (Free capacity 20%)	Scenario 3 (Free capacity 10%)
total stand-alone delivery cost	14.1%	9.1%	4.4%
stand-alone letter delivery cost	24.3%	15.7%	7.5%
stand-alone parcel delivery cost	33.6%	21.7%	10.4%

- Joint delivery allows for significant cost savings compared to stand-alone delivery
- Cost savings increase with the underutilization of the letter delivery network

Conclusions

- Considerable cost savings from joint delivery crate benefits for postal operators and customers
- Joint delivery becomes relatively more important as letter volumes decrease and parcel volumes increase
- Optimal degree depends on national circumstance and operations considerations, available capacities, products etc
- Recent trends:
  - Some postal operators increase capacities for delivery staff: introduce high-capacity trolleys / carrier bikes – leverage benefits to urban routes
  - Parallel “pure parcel” routes for heavy parcels and/or businesses, “joint delivery” routes for smaller parcels and consumer addresses.
- Challenges for cost allocation and pricing

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