Markets, networks and productivity: Some suggestions

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Overview

• Goods markets and infrastructure networks

• Personal activity spaces and infrastructure networks

• Social networks and travel

• Research issues
Markets: “road-based” - Switzerland (1950)

Scherer, 2004
Markets: “rail-based” - Switzerland (1950)
Markets: “rail-based” - Switzerland (2000)
Markets: price deflation in transport

- Real railroad revenues per passenger mile
- Real airline revenues per passenger mile
- Real passenger automobiles costs per mile
- Average airline speed
Markets: price deflation for cars

![Graph showing a line chart of quality-adjusted price index over time (1900 to 2010). The x-axis represents the years, and the y-axis represents the quality-adjusted price index (2004 = 100) in percentage. There are two lines on the chart:

- Red line: Frei, 2004
- Blue dashed line: Raff und Trajtenberg, 1990

The chart indicates a significant decrease in the quality-adjusted price index over time, with a steep decline in the early 20th century and a more gradual decrease thereafter.]
Markets: price deflation for telecommunication

US International and interstate average revenue per minute
Size of goods markets and productivity: A hypothesis

- **Economies of scale**
- **Economies of scope**

**GDP**
- Activity
- Fleet comfort
- Slots
- vtt's et al.
- Energy costs

**Market size**
- Tours
- t/pkm
- vkm
- k

+ Elasticity > 0
- Elasticity < 0

**Slots**: possibilities to move goods or people

For a given infrastructure and commercial and private fleet
Size of goods markets and productivity: A hypothesis

Economies of scale
Economies of scope

Innovation

Market size

Transport system and demand

Prices

GDP

Capital/Wages

Monopolies

Energy costs

Elastizität > 0 k: Generalisierte
Elastizität < 0 Kosten
Evidence: Western European productivity growth

Nach Galor und Weil (2000)
Evidence: speeds = f(vkm, fleet size, regulation)
Evidence: \( \text{VTTS} = f(\text{income}, \text{distance}) \) (CH, commuters)

Value of travel time savings [CHF/h]

Income [CHF/Jahr]

König, Axhausen und Abay, 2004
Evidence: car demand = f(purchasing power) (CH)
Evidence: market size (Swiss commuter sheds)

Nach Botte, 2003
First summary

Decoupling commercial traffic from economic growth is difficult

Transport system and economic system co-evolve to lower generalised cost of transport

Dematerialisation of the economy lowers costs of transport further

Dematerialisation will increase the importance of face-to-face to contacts
Size of activity spaces: A hypothesis

Activities $\rightarrow$ Wages

Fleet comfort $\rightarrow$ Wages

Housing consumption $\rightarrow$ Wages

Activities $\rightarrow$ Tours

Tours $\rightarrow$ pkm

Energy costs $\rightarrow$ k: personal short term generalised costs of travel

Elasticity > 0
Elasticity < 0

vtts et al. $\rightarrow$ k

Migration $\rightarrow$ Activity space

Specialisation $\rightarrow$ Wages

k: personal short term generalised costs of travel
Example of local activity space

Female, 24
Full time
Single
216 trips / 6 weeks
Example of a local activity space

Male, 50  
Full time  
1 child  
120 trips / 6 weeks
Position: Person as a network member

Individual

„contacts“

Household members
Position: Person as a member of networks

Individual

„contacts“

Household member
Definition of a social network

The topology of a social network describes

- Which person/firm (node) is linked to which other persons/firms
- By contacts (links) of a certain quality (impedance or cost)

Closeness \( \sim \frac{1}{\text{Impedance}} \)
Social networks: Hypothesis 1

The size of spread (geography) of the social networks is inversely proportional to the generalised costs of communication (travel and telecommunication)

Additional result: Small geographies make it more likely that any two persons are linked through multiple networks

Corollary: The feeling of personal safety (“eyes on the street”) is proportional to the density of local links
Locally coherent networks (of the past ?)
Spatially non-coherent networks (today ?)

Scales could be different!
Social networks: Hypotheses 2a and b

Persons belong to more networks today
Persons keep more contacts alive then earlier

- More leisure time over the life cycle
- Drastically reduced costs of communication
- Copying of messages has become nearly free
Social networks: Hypotheses 3

Contacts have become more selective

- No need to make do with the „neighbours“
Social networks: Hypothesis 4

The distribution of contacts intensity has become more left skewed

- Selectivity of contacts

- Time requirements for acquiring the background knowledge about the references of the other persons

- Less gossip

- Fewer random meetings
Shift in contact intensity

![Graph showing the relationship between rank of member and effort expended on each member. The x-axis represents the rank of the member, ranging from 1 to 1000, and the y-axis represents the effort expended, ranging from 1000.000 to 0.010. There are two lines, one solid blue and one dashed red, indicating different levels of effort expenditure.]
Social networks: Hypothesis 5

The average knowledge about the contacts of one’s contacts is reduced by the increasing skew of the contact intensity:

- Less knowledge about everyday life and contact
- Lower visibility of many technologically enabled contacts

Corollary 1: The impact of gossip/news can be less well predicted

Corollary 2: The distance decay of “network supervision” should be less steep then in the past; the friends of ones friends are likely to be present in the same milieus independent of location.
Social networks: Assumption

The selectivity is being increased by the general availability of mobile phones:

- More spontaneous patterns of time use
- Fewer predictable availabilities at certain (time-space) locations
Expected impacts: Travel behaviour

Activity spaces should be larger than earlier

Regular long distance travel is required

Fast modes will remain popular
Distance and meeting frequency

Meeting frequency

Relationship
- Friend
- "Kollege"
- Acquaintance
- Children
- Parents
- Siblings
- Other family

Median distance between homes

0 10 20 30 40 50
More than weekly More than monthly Up to more than year
Expected impacts: localised anomie

Reduced number and intensity of local contacts should reduce the local level of trust:

- Growing investment into safeguarding the person and the home
- Reduced exposure to risk during travel, i.e. less travel by public transport, cycling and walking
Expected impacts: Improved welfare

The social networks should be more homogeneous and therefore more productive for their members

But, the selectivity excludes the „less attractive“ persons who are disadvantaged through a reduced ability to travel or a reduced ability to participate in activities
Summary

- Migration
- Message costs
- Number of networks
- Left skew of intensity distribution
- Network geography
- Network overlap
- Personal activity space
- Local anomie

Elasticity > 0
Elasticity < 0
Research issues

- Measurement of the activity spaces (geographies, markets)

- Estimate of historical activity spaces ...

- Connection between welfare and the size of the activity spaces

- Stability of the geographies under pressure

- Elasticities to policy (or environmental) change

- Time to trend change
When will the marginal benefits become zero?

…. the localised anomie stresses the other mechanism of social inclusion too strongly

…. the costs of private protection become too high

…. the environmental impacts become too threatening

…. the trend in the costs of travel changes
Back to the future?


Literature and references


