

USO Design in a Competitive Environment

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Introduction

- Universal service has a long tradition in the postal sector
- But its future is now under debate...
- Diminishing mail flows handled by the USP
 - Market liberalization
 - Digitalization / e-substitution
- May bring a reform of the universal service on the agenda

Universal service, postal sector

- Defined along three dimensions
 - Products
 - Affordable price
 - Quality
 - Ubiquity
 - Transit time
 - Accessibility
 - Delivery frequency (5-6 days a week)
 - Truly ubiquitous as (almost) everyone has a postal address
- Delivery frequency is the dimension of quality that we will focus on

Introduction

- The main competitor of the traditional post is...
... the internet
- Convergence between technologies that become more and more substitute
 - Newspaper
 - Advertisement
 - Commercial
 - Billing
 - ...

Universal service, telecom sector

- Make available to all users **on request** a set of basic service, independently of their geographical location at an affordable rate
- Difference between **availability** and **use** of the service
- Broadband internet is not included as part of the universal service
 - In project: Finland, Swiss, UK?

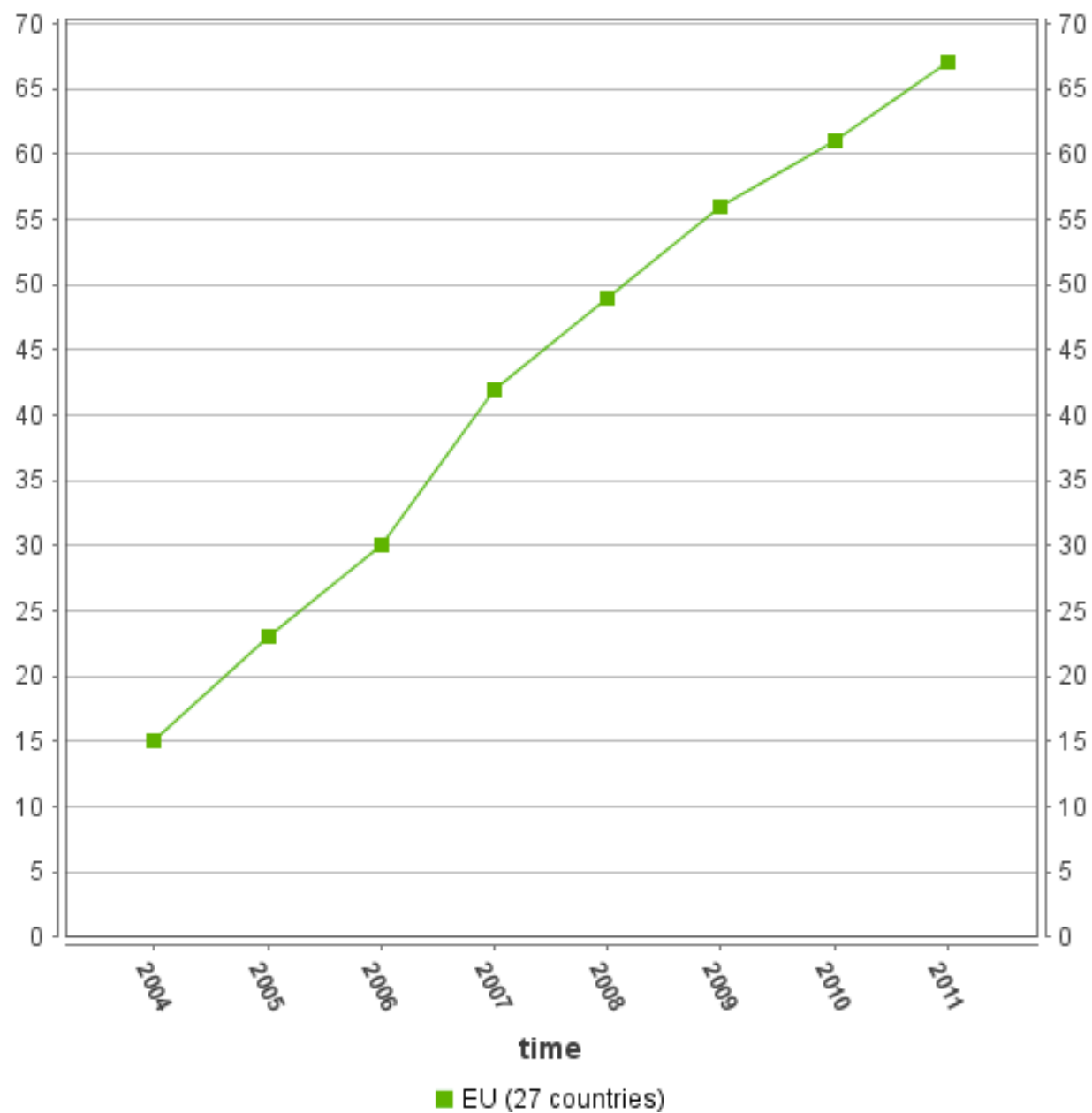
Broadband penetration rate

- Despite a rapid growth, internet is far from being ubiquitous
- Reasons for not being connected are numerous
 - Lack of interest
 - Lack of competence (digital illiteracy)
 - Cost of the service/cost of the equipment
 - Lack of infrastructure
 - ...

Households having access to the Internet, by type of connection

As % of all households

Household Internet connection type: broadband



Lack of infrastructure

Population density	2007	2009
.> 500 hab/km ²	10	9
100<.<499 hab/km ²	20	22
.<100 hab/km ²	34	30

Households without broadband connection because it is not available in the area (Source: Eurostat)

Expressed as a percentage of households without broadband access

- Less densely populated regions are not (yet?) covered by high-speed telecom infrastructures because **construction costs are too high**

Model

- Consider competition between two firms
- Each firm is identified by a communication technology:
 - A postal firm (firm 1)
 - An internet firm (firm 2)
- Services are imperfect substitutes
 - Different quality
 - Different territorial coverage

Quality

- Quality of the service is identified with the delivery speed (or transit time) for which the internet has a clear advantage
- Internet provides quality x_2
- Postal firm provides quality $x_1 < x_2$
- Quality x_1 is flexible
- Providing a higher quality x_1 is costly

Territorial coverage

- Two regions
 - Urban, size n^U
 - High population density
 - Postal coverage
 - Cost of quality x_1 in the urban region is $C^U(x_1)=1/2k^U(x_1)^2$
 - Broadband coverage
 - Infrastructure cost $F^U=0$
 - Rural size n^R
 - Low population density
 - Postal coverage
 - Cost of quality x_1 in the urban region is $C^R(x_1)=1/2k^R(x_1)^2$
 - No internet coverage
 - Infrastructure costs F^R are too high
- $C^R(x_1) > C^U(x_1)$

Consumers

- In each region $k=U,R$, there is a continuum of mass n^k of consumers
- Consumers are characterized by a taste for quality parameter θ , uniformly distributed on the $[\theta^-, \theta^+]$ interval
 - $\Delta\theta=1$
 - $\theta^- > 0$
- The utility of a consumer of type θ when he consumes the good k is

$$U(\theta)=\theta x_k - p_k$$

- Standard vertical differentiation model

Universal service obligations

- The universal service obligations are imposed on the postal firm

1. **Ubiquity**: Postal service must be everywhere
2. **Uniform quality**: The postal service must have the same quality x_1 in the two regions
3. **Affordable pricing** : Postal services must be affordable to all consumers

$$U(\theta) = \theta x_1 - p \geq 0 \iff \theta x_1 \geq p$$

- The USO involves a specific cost f to the firm

Research question #1: Postal USO

- What is the optimal quality x_1 for the universal service in a competitive environment?
- Should the quality be lowered compared to the current standards?
- Focus on the welfare-maximizing sustainable quality

$$\text{Max } x_1 \text{ } W \text{ subject to } \pi_1 \geq 0$$

Research question #2: communication USO

- Broaden the definition of the USO to include the two technologies
- Consider the following alternatives
 1. **Shared-financing**: the internet contributes to the financing of the postal USO
 2. **Change of technology**: the USO constraints (Ubiquity, affordability, uniform quality) are imposed on the internet firm
 3. **A broader USO**: Postal USO+ ubiquity for the internet
 4. **(Technological mix)**

Related literature

- Reforming postal USO after the entry of a lower quality postal competitor
 - Reduce the quality requirement for the USP
 - Economies of scale (Crew & Kleindorfer, 06)
 - Financial constraints (Gautier & Wauthy, 12)
 - Higher quality (Calzada, IEP 09)
- Combining electronic and postal technologies to redefine USO
 - Jaag & Trincker (2011)

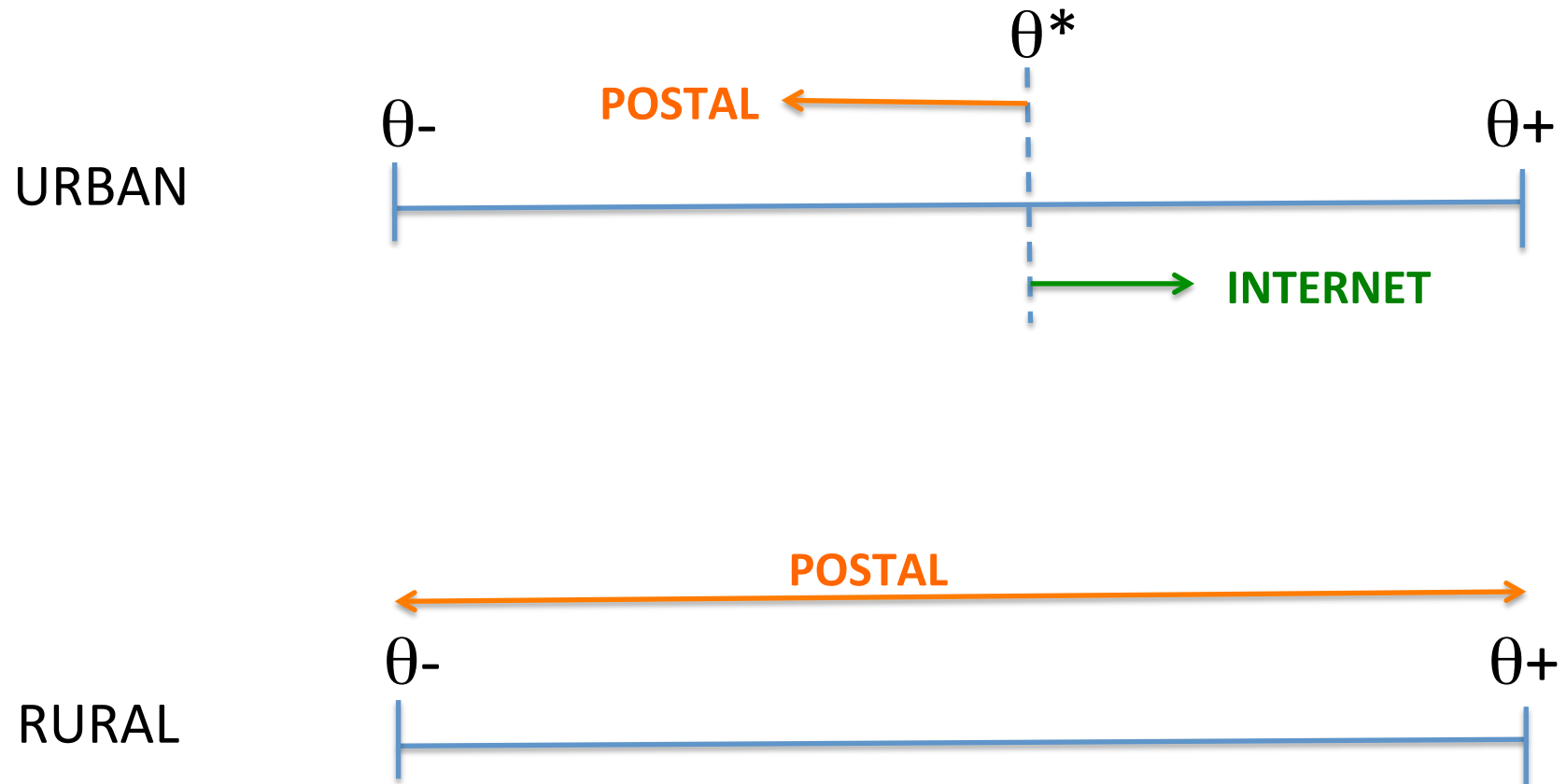
Postal USO

- A benchmark: the USO in the ‘old days’
- The welfare-max quality for the USO trades-off
 - Consumers’ willingness to pay for quality
Average taste for quality: $(n^U + n^R)(\theta^- + \theta^+)/2$
 - Cost of providing quality
- Quality might be reduced below the optimal level to meet the sustainability constraint

Postal USO

- Competition between firms/technologies
- The internet skims the most-profitable part of the urban market
- Postal price decreases (for a given quality) in the urban region
- The rural region is still 'monopolized' by the postal firm

Market shares



Postal USO

- The welfare-max quality for the postal USO is lower than in the benchmark case
 - Lower willingness to pay due to cream-skimming of the high valuation consumers in the urban market
- Average taste for quality (postal consumers):
$$n^U(\theta^- + \theta^*)/2 + n^R(\theta^- + \theta^+)/2$$
 - Lower profits and stronger sustainability constraints
- USO most likely to be reduced further for financial reasons

Postal USO

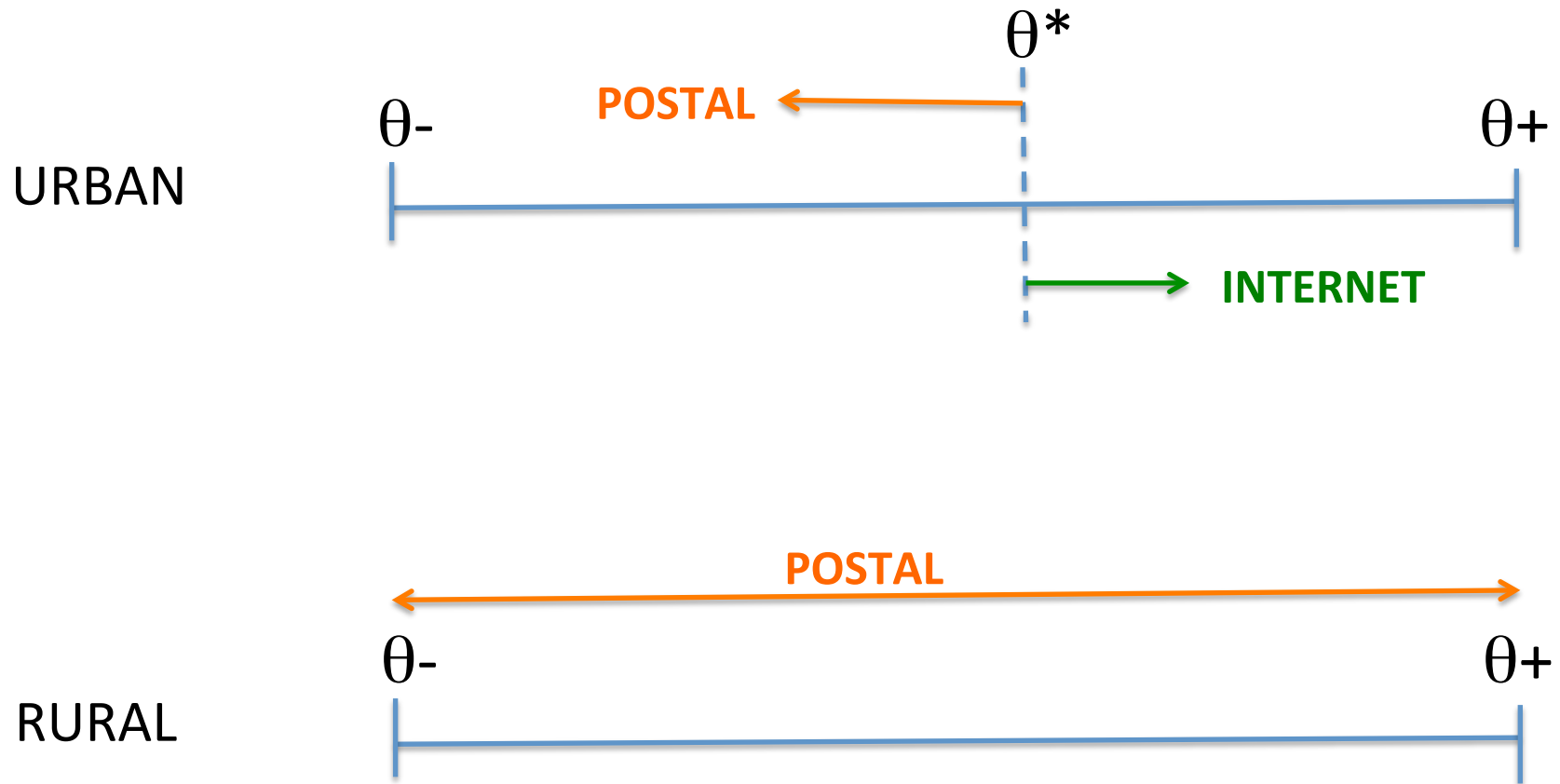
- Different impacts on consumers
- Consumers in the urban region
 - Two qualities offered: a higher and a lower one
 - Lower prices (competition)
- Consumers in the rural region
 - One lower quality offered
 - Price remains at the affordable level
- **Regional divide**

Communication USO

1. Shared financing

- Impose a lump-sum tax on the firms active in the urban market to finance the postal USO
 - The internet contributes to the financing of the postal USO
- Relax the sustainability constraint
- The postal firm can supply a higher quality
- Beneficial to all consumers
 - Higher quality in the rural area
 - Higher quality and lower prices in the urban area

Market shares

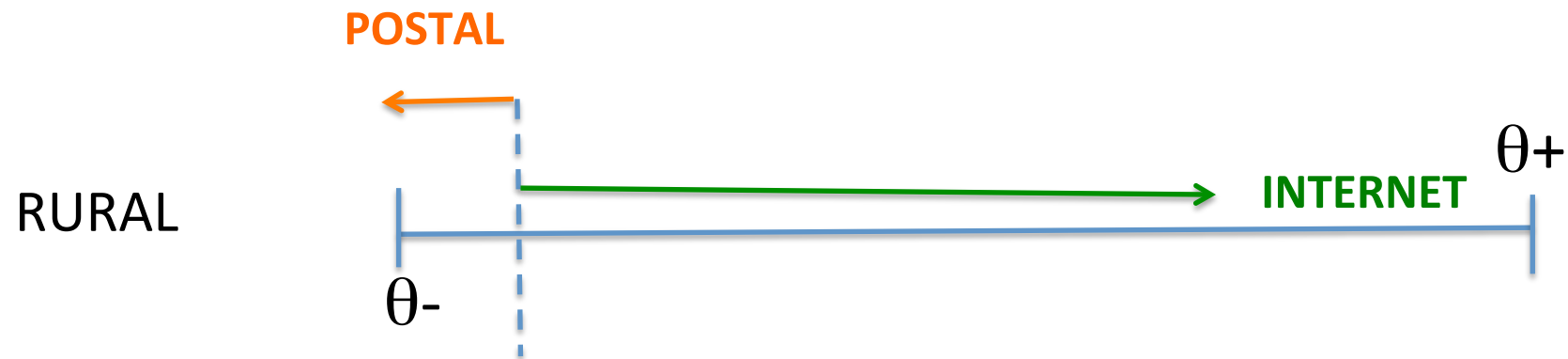
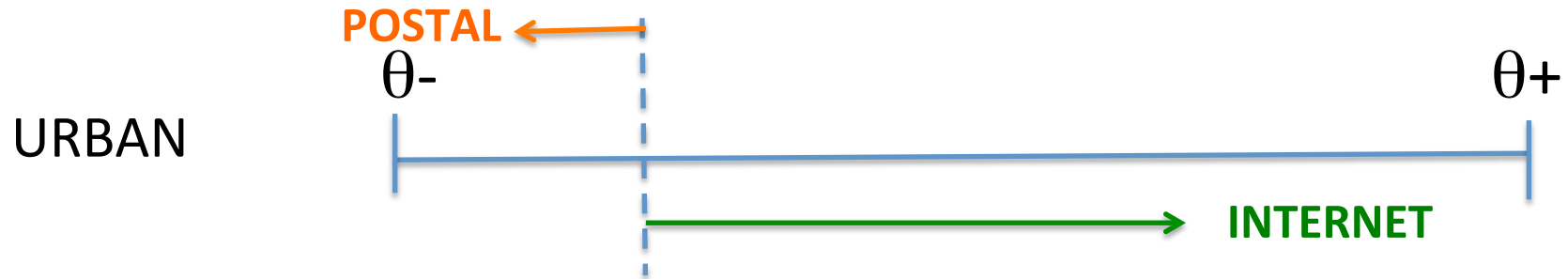


Communication USO

2. Change of technology

- Impose the ubiquity and affordability constraints on the internet
 - Larger coverage
 - Lower prices
- Suppress the USO for the postal firm
- The postal firm offers a low quality product
 - Not the same quality in the two regions
- This strategy may be **non sustainable**
 - The ubiquity constraint requires an investment F to connect the rural region
 - The affordability constraint requires a huge price decreases

Market shares

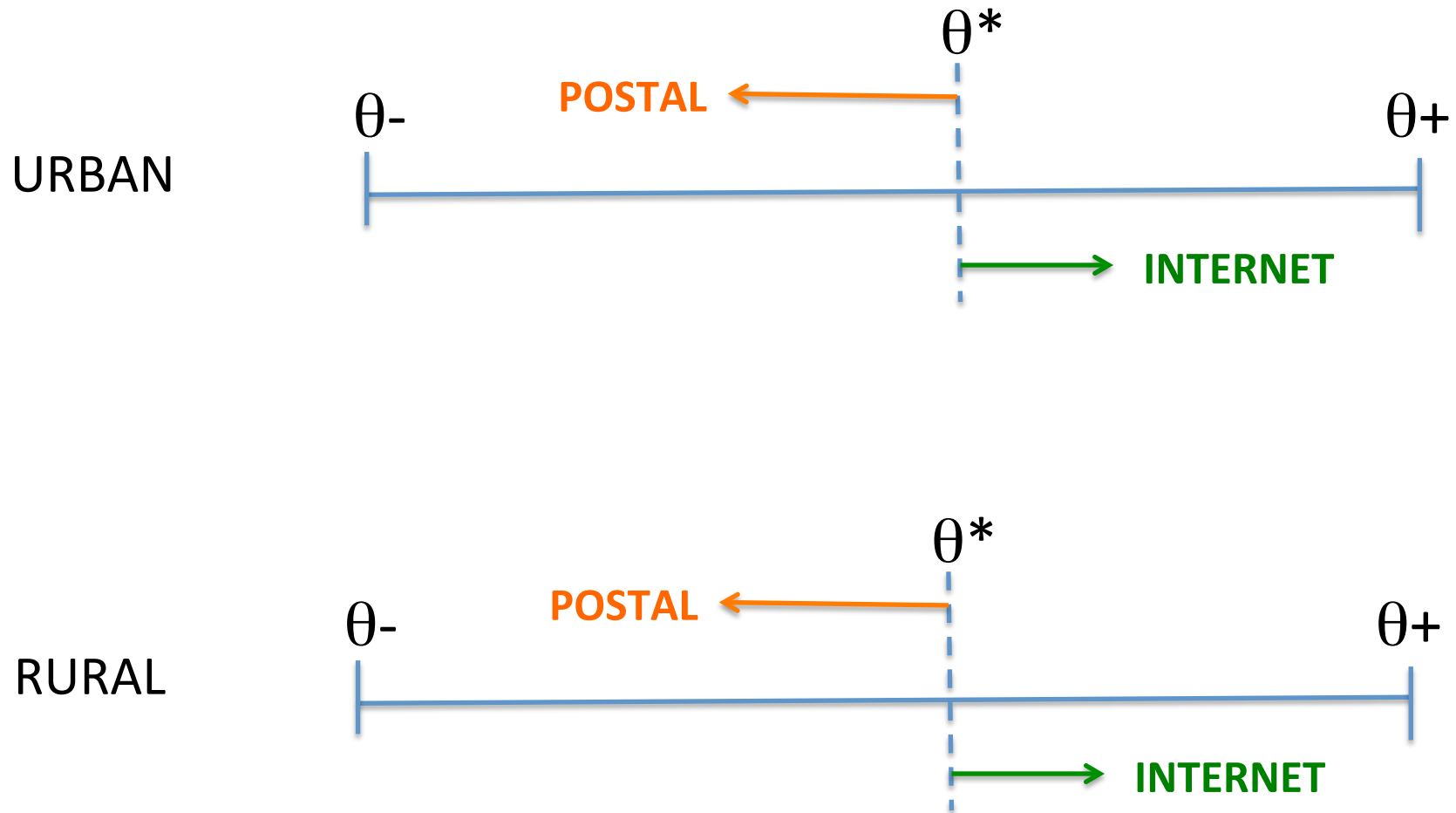


Communication USO

3. Broader USO

- Impose the **ubiquity** and **affordability** constraints on the postal firm
- Impose the **ubiquity** constraint on the internet firm
- More likely to be sustainable
- Optimal quality for the postal firm declines compare to the postal USO scenario
 - Average taste for quality is lower

Market shares



Conclusions #1: postal USO

- Consider competition between postal services and the internet
 - Universal Vs. partial territorial coverage
 - Internet is the high quality competitor (by assumption)
- Lower taste for quality because of cream-skimming of the urban region
- Stronger financial pressures on the USP
- Calls for a lighter USO
- Create a regional divide between regions
 - Lower prices, larger offer of services in U
 - Higher price, lower quality in R

Conclusion #2: communication USO

	Coverage internet	Quality of postal service	Financial constraint
Shared financing	U	+++	Light
Change of technology	U and R	+	Heavy
Broader USO	U and R	++	Medium

Conclusion #2: communication USO

- This paper has focused on the consequences on the market outcome of different reform scenarios
- Significant variations in
 - Territorial coverage for the internet
 - Quality of postal services
 - Profits
 - Welfare difference between urban and rural region
- Complete welfare analysis to be performed
- Other possible reforms combining the two technologies (USO 2.0)