

Wider economic benefits from communication cost reductions: an endogenous growth approach

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Konferenz „Verkehrsökonomik und -politik“

Berlin, 2 and 3 June, 2016

Wider economic effects

- Under perfect competition, with no technological externality, the *cost of a cost is its cost*.
- That means, for a marginal exogenous shock affecting transport cost, the impact on transport cost, holding the transport quantity constant, equals the impact on any sensible moneymetric welfare indicator.
- There are no “indirect effects” on other than the transport market itself that need to be taken into consideration for CBA.
- Under market imperfections the *cost of a cost is its cost* theorem does not hold, in general.

Wider economic effects

- The marginal impact of a shock on a moneymetric welfare indicator minus the marginal impact on transport cost is called *wider economic effect*.
- Wider economic effects are often supposed to be positive (*wider economic benefits*), but may in general have both signs.
- Wider economic benefits have to be added to the benefits of a standard CBA.
- The term “indirect effect” should be avoided, because even with no wider effects all effects are eventually indirect.

Reasons for wider economic effects

- Economies of scale +
- Product diversity +
- Agglomeration effects +/-
- Reduction of market power +
- Firm selection +
- Price distortion through taxes +/-
- Price distortion through monopoly power +/-
- **Knowledge externalities +**

Knowledge externalities

„In der Technik und der Landwirthschaft, wobei so viel auf eigene Anschauung und Beobachtung ankommt, werden die Deutschen Riesenschritte machen, wenn auch der minder bemittelte Techniker diejenigen Länder und Städte des In- und Auslandes besuchen kann, wo jene Industriezweige, denen er sich besonders gewidmet hat, am vortheilhaftesten betrieben werden. ...

... sind die Eisenbahnen die größte Erfindung der alten und neuen Zeit; sie sind eigentliche Volkswohlfahrts- und **Bildungsmaschinen.**“

Friedrich List, Das deutsche National-Transport-System, Altona 1838

Knowledge externality in a static model

Model: $C = F(L_f, N_i, N_e)$

$$N_i = N_e = N(L_r, L_c)$$

$$L = L_f + L_r + L_c$$

Equilibrium: $w = \frac{\partial F}{\partial L_f} = \frac{\partial F}{\partial N_i} \frac{\partial N}{\partial L_r} = \frac{\partial F}{\partial N_i} \frac{\partial N}{\partial L_c}$

Optimum ... $\frac{\partial F}{\partial L_f} = \left(\frac{\partial F}{\partial N_i} + \frac{\partial F}{\partial N_e} \right) \frac{\partial N}{\partial L_r} = \left(\frac{\partial F}{\partial N_i} + \frac{\partial F}{\partial N_e} \right) \frac{\partial N}{\partial L_c}$

... attained with
subsidy on know-
ledge production:

$$v_m = v_f(1 + \eta) \quad \eta = \frac{\partial F}{\partial N_e} / \frac{\partial F}{\partial N_i}$$

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Second best, a subsidy on L_c : $w(1 - \zeta) = \frac{\partial F}{\partial N_i} \frac{\partial N}{\partial L_c}$

Proposition 1: $\frac{dC}{d\zeta} > 0$ at $\zeta = 0$

Knowledge externality in a multiregional endogenous growth model

Technology:

$$C_i = L_{f,i}^{1-\alpha} \sum_j N_j M_{ji}^\alpha - N_i \sum_j X_{ij}$$

$$M_{ij} = X_{ij} / \tau_{ij}$$

$$\dot{N}_i = \varphi L_{r,i}^{1-\beta} \sum_j (L_{c,ij} / \lambda_{ij})^\beta N_j$$

Preference:

$$U_i = \int_0^\infty \frac{C_i^{1-\theta} - 1}{1-\theta} \exp(-\rho t) dt$$

Resource constraint:

$$L_i = L_{f,i} + L_{r,i} + \sum_j L_{c,ij}$$

Market structure

- Labour, blueprints and final goods are immobile
- (Financial) capital is frictionless mobile
- Walrasian markets for
 - final goods
 - labour
 - capital
 - blueprints
- Monopolistic competition for intermediates
- “Travel cost” $L_{c,ij}$ is subsidised at rate $0 \leq \zeta < 1$, financed by consumers’ lumpsum payments.

Knowledge externality in a single region endogenous growth model

Proposition 2: There is a unique steady state with constant rates of growth of consumption and knowledge, constant allocation of labour and constant output per intermediate good.

Proposition 3: The steady state consumption growth rate is increasing in the stock of labour L , the production elasticity of intermediates α and the productivity of innovation ϕ and decreasing in time preference \square .

Proposition 4: Labour in knowledge production L_n (R&D plus communication) is increasing in the communication subsidy rate ζ . The effect of ζ on consumption growth and utility is generally ambiguous. For $\zeta = 0$ both, consumption growth and utility are increasing in ζ .

Knowledge externality in a multiregional endogenous growth model

Proposition 5: In a symmetrical economy propositions 2 to 4 still hold.

Conclusion

- Under plausible conditions, communication cost reductions exert a wider economic benefit in a Romer-type endogenous growth model.
- A small subsidy on communication cost is welfare enhancing.

For technical details see J. Bröcker, Wider economic benefits from communication-cost reductions: an endogenous growth approach, *Environment and Planning B* 40 (2013), 971 – 986.