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Telecommunication Needs Universal Service

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Abstract: There are various universal service policies in many fields at present, in which telecommunications universal service is not the only one. Other fields which need the universal service include postal service, electricity and natural gas, etc.. Regardless of International Telecommunications Union (ITU), other international organizations such as OECD, the developed countries in the world and developing countries all implement universal service policy in the telecommunication trade. The difference between them is only in universal service contents. But with the development at full speed of the telecommunication trade in the last few years, the continual renovation of technology, especially a lot of countries have carried on a series of telecommunication reforms, the introduction of the competition, privatization and deregulation make universal service become the focus disputed. This paper proves the necessity of telecommunication universal service in terms of theory.

Key words: Universal Service; Economic Development; Transaction Costs; Network Externalities

1 Introduction

With rapid development of telecommunications industry and continual innovation of technology, the telecommunications sectors in most countries are being buffered by major changes. Introduction of competition, privatization and deregulation make universal service become the disputed focus.

Some people approve of universal service policy. Extensive telecommunication access

can make it convenient for social masses to participate into the society. In 1996, International Telecommunications Union (ITU) regarded it as people's right to access generally to basic communication and information business. Three Korean scholars Seon-Kyou Choi, Dong-Ju Kim and Hyeong-Chan Kim have proved the importance of telecommunications universal service to the sustainable development of national economy in terms of social externalities. Garry Madden and Scott J. Savage hold the view that during economic globalization, the popularization of telecommunications can offer the information of the economic trade swiftly and rapidly and reduce the transaction costs, thus bring about an economic advance. A large number of literatures have proved that telecommunications universal service reduces the difference of the areas in urban and rural areas of developing countries.

Some people are against universal service policy. Universal service policies are simply a form of wealth redistribution. Economic reforms that encourage investment and promote robust competition are more fundamental to the development of a ubiquitous infrastructure than the government subsidies. The redistribution of wealth via telecommunications can ameliorate inequalities, but it can't eliminate their causes, and advocates should stop pretending that it can. Furthermore, universal service advocates must become more aware of the political and economic risk and pitfalls that are inherent in the process of wealth redistribution (Milton Mueller，1999). There are also economic reasons — the presence of externalities — that have been advanced to explain why universal service is in need. Robert W. Crandall and Leonard Waverman (2000) studied the diffusion of household durables or consumer expenditure patterns in many wealthy countries. They found many other services (they also have network externalities like telecommunications service), including the services of what we now consider common household durable, available universally to all households in many countries without universal service policy. Furthermore, telephone service accounts for a very small share of even lower-income household's budgets in many countries; there is little need to worry that many of these households would shun the benefits of modern telephony.

Many other services are available universally to all households in wealthy countries, especially in developing countries without universal service policy. But the appearance and development of many durables are in different exterior environment. Appearance of information age makes telecommunications industry an unprecedented important status. The concern degree of the society becomes the main reason why to implement universal service. Telephone service accounts for a very small share of even lower-income household's budgets in wealthy countries, but telecommunications consumption has great uncertainty, which is main difference between it and other durable goods. Its charges mainly include monthly rent and cost of use. It is unable to be limited to use the expenses of the telephone per month among kinfolks. This characteristic causes the telephone rate is extremely sensitive to consumer.

This paper proves the necessity of telecommunication universal service from theory. The paper reaches these conclusions in the following fashion. The next section describes the relation among transaction costs, universal service and economic growth. Section 3 presents

Suppose there are no transaction costs, $T = 0$, we can derive the equilibrium quantity and price:

$$Q_1 = \frac{\alpha - a}{\beta + b}, P_1 = \frac{a\beta + \alpha b}{\beta + b}$$

When there are transaction costs, $T > 0$, we can derive the equilibrium quantity:

$$Q^* = \frac{\alpha - a - T}{\beta + b}$$

The following equations are the equilibrium prices of sellers and buyers:

$$P_s = \frac{a\beta + \alpha b - bT}{\beta + b} = P_1 - \frac{bT}{\beta + b}$$
$$P_d = \frac{a\beta + \alpha b + \beta T}{\beta + b} = P_1 + \frac{\beta T}{\beta + b}$$

We get

$$Q^* < Q_1, P_s < P_1 < P_d$$

Social welfare losses are

$$WL = \frac{1}{2} * T * (Q_1 - Q^*)$$
$$= \frac{T^2}{2(\beta + b)}$$

We can derive

$$\frac{\partial WL}{\partial T} = \frac{T}{\beta + b} > 0$$

$$\frac{\partial Q^*}{\partial T} = -1/(\beta + b) < 0$$

As transaction costs increase, the equilibrium output of market is lower, which leads to social welfare losses. Extremely, when T is equal to or greater than $\alpha - a$, Q^* will be lower than zero, namely, the market will disappear. Since the welfare of a community increases with market growth, smaller economies, with less developed telecommunications infrastructure, are limited in their ability to exploit gains from labor specialization and economies of scale. thus, economy-wide output is lower than that of otherwise comparable economies with lower

This function exhibits constant returns to scale in the private inputs L and K. For a fixed Ψ, the economy faces diminishing returns to the accumulation of aggregate capital, K. If, however, Ψ rises along with K,（1）implies that diminishing returns may not arise if η is equal to or greater than $1-\alpha$.

Suppose that the network expands in proportion to the size of the economy. Let K be a proxy for the size of the economy. Then, the following relationship holds, where μ is a positive constant:

$$\Psi = \mu K \qquad (2)$$

The conditions for profits maximization require the marginal product of capital to equal to the rental price so that the interest rate, r, is written as follows[1], where δ is the depreciation rate of capital:

$$r = \frac{\partial Y}{\partial K} = A\alpha K^{\alpha-1} L^{1-\alpha} \Psi^{\eta} - \delta \qquad (3)$$

Use Eq. (2), we can rewrite Eq. (3) as

$$r = A\alpha(\mu L)^{1-\alpha} - \delta \qquad (4)$$

As becomes clear in the above equation, the marginal product of capital is invariant with k=K/L, per capita capital stock, and increasing with L. In , we will assume L is constant. Then, per capita capital stock rises with income (w+rk) and falls with consumption (c) and, therefore, the law of motion is simplified as

$$\dot{k} = \omega + rk - c \qquad (5)$$ [2]

Assume that the utility function of a representative individual takes the following form

$$U = \int_0^{\infty} u(c) e^{-\rho t} dt = \int_0^{\infty} \frac{c^{1-\theta} - 1}{1-\theta} e^{-\rho t} dt \qquad (6)$$

Where θ>0, and the elasticity of substitution for this utility function is the constant -1/θ. A larger θ means higher tendency to keep the consumption level constant.

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[1] In deriving Eq. (3), we assume $\eta = 1-\alpha$. If η is greater than $1-\alpha$, we have unlimited growth rate, and there is no growth, if η is less than $1-\alpha$. For analytical simplicity, we assume $\eta = 1-\alpha$. This is a usual assumption in standard endogenous growth literature.

[2] $\dot{k} = \frac{d(K/L)}{dt}$

can deny that universal service policy can be interpreted in this way.

4 Conclusions

The universal service policy is an important content of the telecommunications regulation policy. This paper lists two different views on universal service and studies the relation between universal service and economic growth in terms of transaction costs and network externalities. A conclusion is drawn that telecommunication needs universal service. On the one hand, the rapid development of telecommunications industry makes the exchange swifter and more convenient , which has reduced the transaction costs greatly; On the other hand, because of network characteristic of telecommunications, the society values network expansion more than the private firms do. Using the framework of recently developed endogenous growth theory, we showed that the socially optimal growth rate can be attained by government policies that lead firms to internalize the network effects. The universal service policy may be understood as such a policy option.

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