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Fixed voice telephony in economies of different sizes: When industry policy meets technological change

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ABSTRACT

The diffusion of fixed voice telephony has traditionally been backed by regulatory policies advocating industrial change, private involvement, and industry supervision. In the light of great ambiguity in the outcomes of such measures, this paper calls for consideration of the effect of technological change reflected in mobile telephony diffusion and the moderating role of economy size that depicts market and economic conditions. Based on an econometric analysis of data for 168 economies for the period 1980–2008, the research findings indicate that existing studies have overvalued the effects of industry policy measures on fixed voice diffusion. Technological change challenges policy's role as it shows a much more consistent leverage for fixed voice diffusion. The relationship between the two communication technologies and the outcomes of certain industry policies are moderated by economy size.

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1. Introduction

The diffusion of fixed voice telephony has been closely linked with economic growth [1] and societal welfare gains [2] as it facilitates exploitation of network externalities, information sharing, infrastructure development, and income redistribution [3]. A credible means of achieving diffusion is through universal service policies, which aim at making basic services carried through the fixed line network accessible by all society members at uniform prices and quality. Policy makers pursuing universal service objectives, take such measures as opening the relevant markets to competition, reorganising the governance of state-owned providers, and establishing independent regulatory authorities responsible to oversee the reform. In the light of great ambiguity in the outcomes of these measures, this paper calls for consideration of the effect of technological change reflected in mobile

telephony diffusion and the moderating role of the economy's size that depicts market and economic conditions.

The opening of fixed voice market to new entrants stems from the confident expectation that competition will urge the incumbent monopolist to acquire more efficient technologies, increase its productivity, and minimise costs of service [4]. Yet, expansion of service coverage and reductions on customers' bills can be challenged if new entrants rather focus on cream-skimming in the most profitable markets of long-distance and urban areas [5]. Similar arguments, along with the need to reduce national debt, have driven governments to privatise state-owned operators [6]. To orchestrate the whole process of market restructuring and industry reform, governments put in place a national regulatory authority that often is independent from political intervention. The empirical evidence though shows that the outcomes of these measures have been largely ambiguous.

Moreover, the existing objectives of universal service receive increasing criticism on the grounds of continuous technological change. Designed to guarantee access to the basic telephone service over PSTN² rather than access to any

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² Public Switch Telephone System.

electronic communications mode, universal service in its current form is challenged by the migration to IP³ networks and competition from mobile telephony [7]. These developments put much strain on the subsidies used for fixed voice diffusion. Nevertheless, favourable arguments in support of fixed voice universal service continue to pervade the telecommunications industry to the detriment of business, the public, and potential competitors [8].

On another level, the sustainability of universal service is prone to failure in resource constrained and developing economies [7]. Herein lies the importance of economy size as it reflects market size, resource availability, and growth potential [9], which can condition the effective pursuit of the highly subsidised universal service. Economy size can determine firms' capacity to implement growth strategies and also their long-term viability [10]. In particular, small economies suffer from small local markets and a lack of economies of scale, which are crucial for the bearing of large fixed and sunk costs embodied in the universal service objective. The literature on small economies suggests that small economies should strive to attain social goals that are efficiently attainable [9]. That is consistent with evolving arguments in the telecommunications literature that universal service be technology neutral, cost effective and efficient [7]. In effect, small and developing economies may turn to more cost effective technologies, such as mobile telephony.

This paper aims to advance the importance of market and economic conditions and technological change to the attainment of universal service in fixed voice telephony. It draws on the econometric analysis of data for 168 economies for the period 1980–2008 by accounting for the effects of major policy measures such as the opening of the markets of fixed voice and mobile telephony to competition, the privatisation of state-owned incumbent operators, and the establishment of regulatory authorities.

The results suggest that the outcomes of certain industry policies on fixed voice diffusion are highly moderated by economy size and technological change has a more consistent explanatory power than the examined policies. Particularly, we find that opening the market of mobile telephony to competition affects fixed voice diffusion in a negative fashion and this effect is even greater for smaller economies, indicating that smaller market environments propel cross-platform competition.⁴ In addition, mobile telephony diffusion initially exhibits a positive (complementary) and then a negative (substitution) effect on fixed voice diffusion. The level of mobile telephony diffusion at which the substitution effect occurs is found to be lower for smaller economies, further supporting the finding that cross-platform competition is more intense in smaller market environments. After controlling for reverse causality and endogeneity concerns, the inclusion of mobile diffusion in the analysis renders most industry policy effects statistically insignificant. This implies that disregarding the effects of technological change can lead to an overestimation of the importance of policy effects, while it lends support

to mobile telephony as a critical contributor to universal service. Throughout the analysis, we find that a strong institutional framework is essential for network development and expansion that is in line with the existing literature.

This paper makes two important contributions to the literature. First, it advances the current understanding of the impact that major telecommunication policies can have on the attainment of fixed voice universal service. It does this by showing that policy directed toward promoting universal service through access to a specific communication technology can have unanticipated outcomes when the emergence of a superior and more attractive to consumers' communication technology is being neglected. Second, it bridges the literatures on telecommunication policy and development studies by elucidating the moderating effects that economic and market conditions can have on the outcomes of related policies. A new definition of the social goal of universal service that takes into consideration technological changes, economic and market conditions, becomes more critical for small and developing economies where the leapfrogging of fixed voice by mobile telephony is more intensive. Since mobile networks are continuously advancing, they can be installed more rapidly and less costly than fixed networks, can alleviate waiting time for subscribers and reduce unsatisfied demand [11]. The shifting of the universal service obligation of service providers towards mobile telephony and related technologies becomes increasingly essential.

The remainder of the paper is organised as follows. The next section provides an overview of the literature. A subsequent section discusses the research methodology, including model development and data collection, ending with the empirical results. The last section elaborates on the research findings.

2. Literature review

2.1. Universal service in fixed voice and technological change

Universal service in fixed voice is a policy target that aims at the alleviation of social inequality and economic underdevelopment [12]. It mainly concentrates on extending basic services⁵ carried through the PSTN network to underserved populations without discrimination and making electronic communications affordable.

Evolving criticism in the literature stresses that the modern concept of universal service should address the changing nature of available services through the telecom networks and the ambiguous delineation of what is considered as "basic services" [7,13]. Rapid technological change dictates that current basic services be redefined to include access to new generations of services available through mobile networks, the Internet or their successors [8]. Due to advancements in communication technologies, traditional barriers of distance are permeable, costs of provision are declining, and providers can offer multiple modes of communication access. Continuous technological convergence unavoidably blurs the market boundaries and poses new challenges for universal service [14]. The transition to IP-enabled next generation networks jeopardises the revenues

³ Internet Protocol.

⁴ We use the term cross-platform competition to refer to competition between the two technologies for electronic communication under study: fixed voice and mobile telephony. By this, we distinguish it from competition between telecommunication service providers.

⁵ Basic services refer to someone's access to a mainline that can support the use of fax and low speed data transmission, emergency and directory inquiry services.

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