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Strategic choice and broadband divergence in the transition to next generation networks: Evidence from Canada and the U.S.

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ABSTRACT

This article investigates how infrastructure competition among broadband network infrastructure operators in Canada and the U.S. has influenced their incentives to increase fixed broadband connection speeds and invest in next generation fiber-to-the-premises (FTTP) technologies. The evolution of measured broadband speeds since the late 2000s documents growing differences in the incentives of dominant broadband operators to respond to demand for higher speed connectivity by increasing connectivity speeds they deliver to their customers. Dominant network operators in Canada have shown relatively stronger incentives than their counterparts in the U.S. to invest in and increase the capacity of legacy platforms. In the U.S. FTTP deployment incentives have been somewhat stronger, but network operators have been more reluctant to upgrade legacy technologies to deliver higher speeds. Diversity of strategic choices by large operators helps explain increasing regional and local broadband infrastructure gaps within the two countries. A high dividend payout financial strategy and increasing vertical integration appear to enhance the potential for overinvestment and inefficient duplication in legacy platforms by competing infrastructure providers.

1. Introduction

In response to rapidly growing demand for high-speed (broadband) Internet connectivity, network operators in some high-income countries and regions have deployed very-high capacity fiber-to-the-premises (FTTP) broadband technologies. In most other countries, network investments have primarily been allocated to upgrading the capacity of legacy copper networks. For operators that have made substantial investments to upgrade existing copper telephone or cable TV networks to enable the delivery of high-speed connectivity, incentives to deploy next generation fiber access technologies can be limited. This article identifies and evaluates distinctive paths of infrastructure competition arising from the strategic choices of dominant broadband infrastructure operators in Canada and the U.S., two relatively mature markets where access to high-speed connectivity on legacy platforms is near ubiquitous, but deployment of very-high capacity FTTP lags the OECD average (Fig. 1).

Broadband Internet access services delivered on a "best effort" basis via legacy copper and cable networks offer sufficient capacity for basic applications such as email and simple web browsing.[1] However, competition and innovation in the global market for advanced applications in the past few years have created strong demand for higher capacity fixed and mobile network resources that can offer

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[1] Most retail Internet services are advertised on the basis of maximum speed on a "best effort" basis. Best effort means that operators do not guarantee connection quality or a minimum speed. Particularly with DSL, the gap between advertised best effort speeds and actual speeds rises rapidly with distance from the fiber node.

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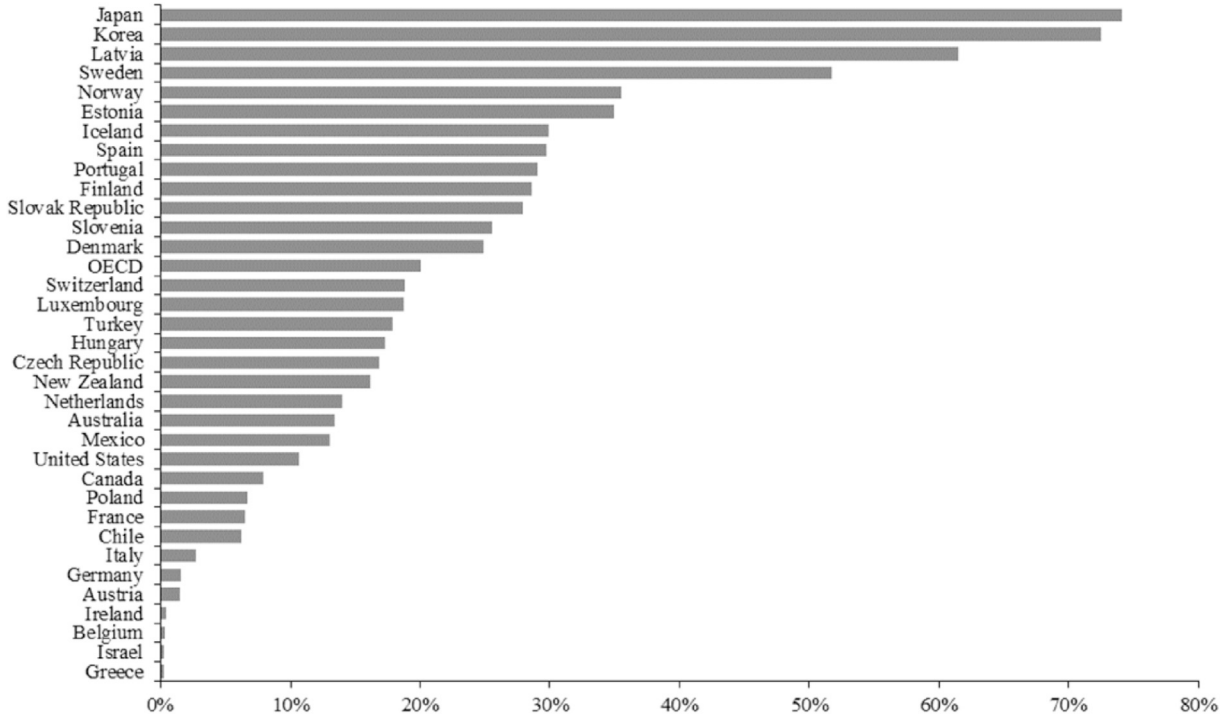

Fig. 1. Diffusion of Fiber Access Networks in High Income Countries (Percentage of fiber connections in total broadband subscriptions (OECD Broadband Statistics, Table 1.10, June 2016)).

more symmetric connections and minimum reliability standards. The extent to which legacy fixed broadband (i.e. copper/DSL, cable) infrastructure that supported the first stages of the development of the digital economy in the 1990s and 2000s can handle rapidly growing demand for more reliable and symmetric connectivity remains unclear but the capacity of next generation fiber-to-the-premises (FTTP) broadband networks to overcome the scalability and service quality limits of legacy broadband platforms is well understood.[2] However, incentives for private sector providers to transition from sunset (i.e. legacy copper and cable) to sunrise (i.e. FTTP) broadband platforms vary significantly across countries, as indicated by the percentage of FTTP connections among broadband subscriptions across the OECD (Fig. 1).

A handful of countries have experienced the fast uptake of FTTP (e.g. Japan, Korea, Sweden), but across the OECD more than 75% of broadband subscribers continue to rely on legacy DSL and cable platforms for their connectivity.[3] While the quality of experience on legacy platforms might be adequate for some users who are late adopters of more advanced and network intensive Internet applications and services, adopting these applications increasingly requires access to more symmetric and reliable connectivity that is hard to deliver on legacy technologies. As such, legacy platforms can be insufficient for the needs of early adopters of advanced applications, such as younger users and businesses. In markets where FTTP connections are not yet available (or affordable), demands placed on the legacy infrastructure by advanced users can have a significant negative externality on service quality experienced by others in the vicinity due to the congestion-prone DSL and cable networks in use. In markets where FTTP connections are available and in use (e.g. Japan and Korea), service quality is improved and the additional incremental cost for 1 Mbps (i.e. for a faster connection) tends to be substantially lower, meaning that broadband service is more affordable there than in countries where most end users have had little option but to rely on legacy DSL and cable network (e.g. The U.S., Canada, see Bischof, Bustamante, & Stanojevic, 2014).[4]

It is evident however that private sector incentives to decommission legacy technologies and extend FTTP connectivity have been limited in many high-income countries. This appears to be particularly the case in relatively mature markets where broadband adoption is already widespread and operators of legacy platforms have previously invested heavily in upgrading the capacity of their copper and

[2] A number of technological developments such as G.fast and DOCSIS 3.1 allow operators of copper-based platforms to deliver higher connection speeds on legacy platforms and have narrowed the gap with optical networks. Nonetheless, optical networks have a higher upside potential as they are cheaper to scale in response to demand growth, offer more symmetric speeds and the delivery Quality of Service (QoS) guarantees than is possible with xDSL or DOCSIS upgrades to legacy copper access networks. Due to these competing considerations, the choice between upgrading to legacy platforms to G.fast/DOCSIS 3.1 versus deploying fiber all the way to user premises is difficult one. See e.g. Maes, Guenach, Hooghe, & Timmers, 2012; Afflerbach, DeHaven, Schulhof, & Wirth, 2015; Franken, 2016.

[3] OECD Broadband Statistics, Table 1.3. OECD fixed and mobile broadband subscriptions, by technology, June 2016.

[4] Bischof et al., 2014, Fig. 10, p. 81.