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Multilevel governance and broadband infrastructure development: Evidence from Canada ☆

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ABSTRACT

This paper investigates the contributions of digital infrastructure policies of provincial governments in Canada to the development of broadband networks. Using measurements of broadband network speeds between 2007 and 2011, the paper analyzes potential causes for observed differences in network performance growth across the provinces, including geography, Internet use intensity, platform competition, and provincial broadband policies. The analysis suggests provincial policies that employed public sector procurement power to open access to essential facilities and channeled public investments in Internet backbone infrastructure were associated with the emergence of relatively high quality broadband networks. However, a weak essential facilities regime and regulatory barriers to entry at the national level limit the scope for decentralized policy solutions.

1. Introduction

Diffusion of high-speed broadband networks has a significant positive impact on business productivity and aggregate levels of economic growth (Czernich, Falck, Kretschmer, & Woessmann, 2011; Qiang, Rossotto, & Kimura, 2009). A large and growing body of cross-country studies explores the impact of competition regulations and industrial policies on broadband market outcomes such as penetration, prices and speeds (Bauer, 2010; Berkman Center for Internet and Society, 2010; Belloc, Nicita, & Rossi, 2012; Cambini & Jiang, 2009). However, there has been relatively little attention devoted to the role lower levels of government can play in stimulating competition and investment in the provision of high-speed network infrastructure. Understanding this role and evaluating the effectiveness of different local policy strategies are important particularly in large and diverse federations such as the United States, European Union, China, Russia, and Canada. When policies by the central government do not produce satisfactory results, decentralized solutions can offer additional options for addressing infrastructure access and quality problems.

This paper investigates the relationship between digital infrastructure policies of provincial governments in Canada and the development of broadband networks. The next section provides an overview of the evolution of broadband Internet connectivity in Canada. Section 3 reviews the literature, noting theoretical reasons for policy decentralization in digital infrastructure development and studies of the impact of policy on broadband. Section 4 characterizes the development of Internet connectivity in Canada using measurements of network speeds between 2007 and 2011 and evaluates potential sources of provincial variation, including geography, demand intensity, and public policy. Section 5 draws inferences from the Canadian experience for the design of broadband policy in multilevel systems of governance.

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2. Broadband in Canada

In the late 1990s and early 2000s Canadian providers expanded Internet access to a relatively larger proportion of the population more rapidly than most other advanced economies (OECD, 2012a; van Gorp & Middleton, 2010). Some observers of comparative telecommunication policy attributed this success to Canada's federal telecommunication policy regime and used Canada as an example for other countries to emulate (Atkinson, Correa, & Hedlund, 2008; Bouras, Giannaka, & Tsiatsos, 2009; Frieden, 2005; Wu, 2004).

Although Canada ranked either first or second in terms of broadband take-up during the early stages of broadband rollouts, since the mid 2000s many advanced countries have achieved higher adoption rates and Canada is now ranked thirteenth in the OECD in terms of fixed broadband subscriptions (OECD, 2012c). Despite the growing lag in aggregate adoption rates, Canada's telecommunications regulator (the Canadian Radio–television and Telecommunications Commission, (CRTC, 2012)) reports that fixed broadband connectivity is available at 100% of urban and 83% of rural premises in Canada.

Canadian federal and provincial governments define broadband as a connection that provides a minimum download speed of 1.5 Mbps. This level of performance may be sufficient for first generation Internet applications such as email and simple web browsing, but is not enough for deploying more advanced applications (e.g. multimedia, cloud computing, IPTV; CRTC, 2011a; Ezel, Atkinson, Castro, & Ou, 2009). According to user generated measures of broadband network performance from Ookla Net Metrics/Speedtest (2012), average download speeds that Canadian end users achieve are between 2 to 3 times lower than those in a number of countries in Europe and Asia. Furthermore, although physical access to DSL and cable broadband is widespread across the country, rollout of next generation fiber-to-the-premises (FTTP) technologies has been limited (Waverman, Dasgupta, & Rajala, 2011). As of mid-2012, fewer than 2% of fixed broadband connections in Canada were fiber, compared to 7% in the US and well below the OECD average of 14% (OECD, 2012b).

The relatively low network speeds and slow deployment of next generation networks in Canada are particularly puzzling given that aggregate capital expenditures on telecommunications infrastructure and the level of platform competition in Canada have been higher than average for other high income countries (ITU, 2010; OECD, 2011a). Relatively high prices in the Canadian broadband market (OECD, 2011b) attract more investment, but the capital expenditures on telecommunications infrastructure have not yet led to the emergence of an internationally competitive broadband system in terms of connectivity speeds or the diffusion of advanced fiber networks.

National policymakers have expressed concerns about Canada's comparative decline as a broadband leader. The 2006 Telecommunications Policy Review Panel (TPRP) highlighted difficulties for dominant operators to meet growing demand for Internet connectivity and outlined a number of specific reforms to the federal regulatory framework to address the problem. These included moving away from implicit subsidies for operators, relaxing regulatory barriers to international investment, and strengthening Canada's essential facilities regime. While it is not clear if these reforms would have worked, substantive elements of institutional reforms proposed by TPRP have not been implemented.

The 2010 Consultation Paper on Canada's Digital Economy Strategy also expressed concern about the pace of progress in network infrastructure development and drew attention to international broadband speed measurements to point out that "Canada ranks in the middle of the pack" (Government of Canada, 2010, p. 16). However, the federal government has not yet offered substantive solutions that could reverse broadband trends of concern to end users and the business community. Indeed, despite initiating a consultation on a digital strategy for Canada in 2010, no such strategy has been delivered by the federal government. The CRTC has set a target for broadband speeds (5 Mbps download, 1 Mbps upload to be available to all Canadians by 2015), but notes that over 80% of households already have access at these speeds and offers no specific strategy to encourage network expansion or increased speeds (CRTC, 2011b).

In contrast, the European Commission has set a target of making 30 Mbps service available to all households in the EU by 2020, with 100 Mbps service adopted by more than 50% of households by that time (European Commission, 2010). The US National Broadband Plan calls for 100 million US homes to have access to 100 Mbps download and 50 Mbps upload speeds by 2020 (Federal Communications Commission, 2010). Australia has not only set aggressive targets, it is building a national broadband network capable of delivering speeds of up to 1 Gbps to 93% of premises (Department of Broadband Communications and the Digital Economy, 2013). The government of Brazil is studying options to develop a national fiber network to provide backhaul and last mile connectivity in all its regions (Telegeography, 2013). While assessments like the Connectivity Scorecard (Waverman, Dasgupta, & Rajala, 2011) suggest that Canada is doing reasonably well when broadband speeds are compared to Western European countries, without a strategy or ambitious targets to improve speeds over time, and with take-up of FTTP technologies lagging other economies, it is not clear that Canada will maintain broadband parity with other developed nations in the next decade.

Given the lack of action at the national level, provincial and municipal governments are designing and implementing local policies aimed at improving digital infrastructure access and performance. Provincial policies in Canada have been diverse, and include direct investments in Internet backbone infrastructure, targeted private sector subsidies, public ownership, and the use of strategic procurement policy as a tool for shaping market behavior of network operators. Consequently, the Canadian experience provides a unique basis for exploring different approaches to broadband development policy and investigating the role sub-national governments can play in promoting digital infrastructure development within regulatory constraints posed by higher levels of government.