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Co-investment in ultra-fast broadband access networks: Is there a role for content providers?

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ABSTRACT

In many countries, Next Generation Access networks (NGA) deployment and penetration rate proceed at a slower pace than expected. It is argued that an ex ante contractual arrangement among residential-access Internet Service Providers (ISPs) and Content Providers (CPs), which builds on the complementarity between infrastructure and content, can promote the roll out of NGA. Indeed, one such contract brings down the portion of the investment cost borne by the ISPs (for a given cost of investment), increases end users' demand for improved connectivity and internalizes investment externalities. It is studied how a departure from network neutrality (NN) regulation of the Internet, allowing the ISP to negotiate with the CP a fee for (priority) delivery of content, affects firms' investment incentives. Using a simple model, it is shown that the ISP may invest more with than without NN, since the CP may have high bargaining power ex post (after NGA investment is sunk). Instead, the CP may be more willing to co-invest when NN is abandoned, either to evade high ex post fees (if the investment cost is low), or to foster NGA deployment (if the investment cost is high and the ISP has low bargaining power ex post).

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1. Introduction

Next Generation Access networks (NGA) are widely recognized as a key factor to foster job creation and economic growth.[1] Nonetheless, in many countries, NGA deployment and penetration rate proceed at a slower pace and/or smaller extent than expected according to firms' investment plans and public targets.[2] There are three major causes for the slowdown of NGA development. First, NGA investment exhibits considerable sunk costs. Second, the return on investment is highly uncertain, depending on consumers' take up and valuation of NGA services. Third, NGA investment generates significant positive externalities to third parties, which may undermine the appropriability of returns on investment.

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[1] See e.g. the Digital Agenda for Europe (http://ec.europa.eu/information_society/digital-agenda).

[2] In the EU, NGA are much limited to urban areas (EC, 2014). Moreover, the take up of fast broadband (at least 30 Mbps) falls well below coverage. Ultra-fast broadband (at least 100 Mbps) subscriptions are at 3% of homes, far behind the target of the EU Digital Agenda (50% of homes subscribing by 2020).

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The policy issue at stake is to restore incentives to invest in NGA. For this purpose, the EU advises that the wholesale price of access should include a risk premium to compensate the investor for quantifiable risk, and could be even left to the market if there is equivalent third-party access to NGA (EC, 2010). However, the sunk cost for the investor is not affected by these provisions. As long as a high access price implies high retail prices, the uncertainty on demand for NGA services (depending on consumers' valuation of such services) even rises.

An emerging option for deploying NGA is co-investment (or risk sharing) of telecom operators, which jointly build network infrastructure and share physical access to the infrastructure. The EU supports this option as it advocates the removal of access obligations when the arrangement among co-investors ensures effective competition in relevant markets (EC, 2010). Co-investment of telecom operators reduces the sunk cost and the risk for each of the investing firms, but it does not necessarily lead to more extensive NGA coverage (Bourreau, Cambini, & Hoernig, 2013). Indeed, it may not reduce the total cost of NGA investment, which is borne entirely by the involved telecom companies. While a co-investment of telecom operators may reduce the financial risk, which lowers the cost of outside financing, it may also generate transaction costs, or require deploying more equipment than when a single operator invests. Furthermore, it may not reduce the overall risk of the investment due to demand uncertainty. For this to occur, telcos should be able to provide sufficiently differentiated services to increase demand for NGA subscriptions relative to the case of a single investor.

This paper considers an alternative model of co-investment entailing the joint participation of telecom companies, or residential-access Internet Service Providers (ISPs), and Content and applications Providers (CPs). The rationale is that there is a complementarity between content provision and demand for improved broadband connectivity.[3] Streaming video and communications applications have significantly raised web traffic, and thereby the need for higher capacity, higher speed broadband access networks to ensure quality of service provision. Thus, the business model of many commercial CPs relies on NGA deployment. On the other hand, consumers' take up of ultra-fast broadband access depends on the quality and variety of content, applications and services.[4]

It is argued that an ex ante contractual arrangement, which commits some CP(s) to an upfront payment to some residential ISP(s) before the investment is undertaken, can suitably address market failures related to NGA deployment. First, it reduces the portion of the investment cost to be borne by the ISPs (for a given cost of investment), since ISPs can share the investment cost with firms in complementary markets (i.e. CPs). Second, an ex ante contract between some ISP(s) and CP (s) reduces the risk due to demand uncertainty. Indeed, when CPs commit to participate in NGA investment ex ante, they also implicitly commit to provide complementary services that are made possible by the new network, which in turn increase NGA take up. Third, one such contract internalizes the major externalities created by NGA investment. Due to the significant growth of video services and digital distribution of content, the Internet broadband network has become a high value-generating platform for CPs. Moreover, communications applications (that are more reliable on NGA) are disrupting ISPs' reliance on legacy voice and text revenues.[5]

The paper then studies how the regime regulating the Internet affects ISPs' incentives to invest in NGA, and CPs' incentives to participate ex ante (i.e. before investment is made). Over the past few years, there has been a fierce debate concerning Network Neutrality (NN). Under NN, residential ISPs do not charge CPs for the right to deliver content to their customer base (termination fees), or to have priority in delivery speed (priority fees).[6] This implies that the burden of costs for NGA investment is ultimately shifted to the access ISPs' retail customers. Advocates of NN, which typically include CPs, argue that NN preserves plurality on the Internet, alongside incentives for content innovation. Opponents to NN, which typically include ISPs, claim instead that additional compensation from CPs is vital to foster incentives to invest in NGA, otherwise ISPs would face a typical free riding problem.[7]

It is shown that a departure from NN, which allows access ISPs to negotiate with CPs an ex post (termination or priority) fee after investment is sunk, does not stimulate NGA investment per se. Indeed, an ex post contract does not significantly

[3] From a two-sided market perspective, residential ISPs are mediating platforms between subscribers and CPs. Co-investment in infrastructure of platform providers and platform users has been observed in two-sided network industries. Fu, Homsombat, and Oum (2011) discuss several examples of joint investment in dedicated terminals by airlines and the main airports where they operate, both in the EU and the US.

[4] NGA subscriptions will increase steadily as long as customers realize that the most innovative services (such as high definition IP TV, interactive gaming, cloud computing and e-health) are best enjoyed over NGA. A study conducted in 2010 estimated that the increase in US consumers' valuation for very fast (relative to fast) broadband access was still quite low, about $3 per month (Rosston, Savage, & Waldman, 2010).

[5] In principle, there are alternative means to address (at least some of) these market failures. One such means is vertical integration between access ISPs and CPs. Unlike a specific ex ante contract, vertical integration implies an irreversible structural decision, and thereby it may be more difficult to arrange. Moreover, vertical integration would probably invite (ex ante) antitrust scrutiny, for instance, due to exclusionary concerns (e.g. the merging firms could restrict access to essential inputs to rivals). These concerns could even lead public agencies to block the merger. Instead, a simple contractual agreement might be investigated (and possibly amended) ex post, depending on the effects on competition in relevant markets. Another means to address market failures is to use public subsidies, but governments may have tight budgets or may be prevented by regulation from participating in the investment (in the EU, governments should be allowed to invest under state aid rules; see EC, 2013). In what follows, these alternative means are not considered.

[6] Some CPs (such as Netflix) have agreed to pay residential ISPs (such as Comcast and Verizon) to avoid congestion at peering ports and obtain a direct connection to ISPs' local access networks (see e.g. http://www.theverge.com/2014/5/22/5741748/google-fiber-netflix-isp-free-paid-peering). Such agreements are not touched upon by NN regulation, which only concerns local access networks.

[7] Policy makers in the EU and the US agree that access ISPs should be prevented from blocking and/or throttling web traffic selectively. However, ISPs might be allowed to use non-discriminatory traffic management practices. In the EU, ISPs might also arrange deals with *specialized service providers* to assure a certain quality of service, provided that such deals do not lead to quality degradation of the *best effort* basic Internet (see http://europa.eu/rapid/press-release_MEMO-15-5275_it.htm).

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