

Guest Editor's Foreword

Infrastructure services, such as transport, energy and telecommunications, play a vital role in modern economies. These industries underwent significant changes in the 1990s including privatisation, corporatisation and vertical separation. The separation of natural monopoly components from segments where competition could be introduced was accomplished either by actual separation or by requirements that vertically integrated firms should unbundle the goods and services they provide.

The natural monopoly segments were re-regulated with the introduction of industry specific access regimes and the establishment of independent regulators. Competitive segments were subjected to industry specific regulatory frameworks and, of course, were also subjected to competition law.

For example, the electricity industry, which was previously characterised by vertically integrated firms, was restructured and divided into generation, transmission, distribution and retail businesses. The natural monopoly elements of the industry, distribution and transmission, were subjected to price regulation and, in principle, the other two elements of the industry, generation and retail, were de-regulated with the requirement that generators sell and retailers buy their electricity through the electricity spot market (the pool). Unbundling requirements and some degree of vertical separation are also predominant in the gas and telecommunications industries.

More than a decade after these reforms, many infrastructure industries are still subjected to a large degree of vertical integration and some are experiencing vertical reintegration. For example, in electricity, there is some degree of reintegration between retail (supply) and generation of electricity only. There may well be very good reasons why we have not seen more vertical disintegration and why we are seeing indeed some vertical reintegration.¹ However, this trend poses some challenging questions for regulators. For example, what are the effects of reintegration on the development of competitive energy markets? How does vertical integration affect competition between different networks? Can the traditional regulatory tools that deal with vertical integration in telecommunications (e.g., mandated open access) work in the regulation of content? What are the welfare implications of mergers of Internet and content providers? This special issue of the *Review of Network Economics* is devoted to providing preliminary answers to some of these questions.

In the first paper entitled, "Vertical Integration and Competition between Networks," de Fontenay and Gans provide a stylised model of network competition. In particular, the authors set up a model in which a network is a backbone provider to a fixed number of downstream firms, with each of which it can (at some cost) integrate or deal at arms length, providing a service at a price to be determined by bilateral negotiations. There are a fixed number of competing networks.

The authors investigate whether open access to the network is enough to ensure competitive outcomes; the paper shows that under some specific conditions it is not. The

¹ For example, there might be economies of scope or it might be that vertical integration minimises the sum of production and transaction costs for a particular firm and, therefore, is the efficient governance structure.

reason is that the outcome of the negotiations between the network and the downstream firms depends on inframarginal effects: each downstream firm's settlement affects the upstream firm's bargain with other firms. Thus, in this model, integration is simply a means of reducing downstream firms' bargaining power. The paper also shows that the more one upstream firm integrates the more a rival will be inclined to do so.

The second paper by Hogendorn entitled, "Regulating Vertical Integration in Broadband: Open Access versus Common Carriage," makes a novel point about the need to assess openness in all parts of the vertical chain before making a full assessment of any policy. In particular, the paper stresses that there are two vertical relationships involved in the provision of broadband Internet services: the Internet Service Provider (ISP) must gain access to both a physical conduit and content. This introduces a complication in implementing open access policies; openness typically refers to a lack of vertical foreclosure, but since there are two vertical relationships, there are two types of openness: open access refers to the ability of any ISP to access the conduit, while open content describes an ISP that is neutral with respect to content.

Open access regulation typically requires vertically integrated firms to offer access to their conduit. However, no such rules apply to the ISP-content relationship and, thus, Hogendorn argues that open access does not play the same role that the common carriage notion has traditionally played in telecommunications. This is because ISPs have incentives to create vertical restrictions on content as by doing so they are able to offer a better product – this is regardless of whether ISPs are vertically integrated with conduits. When both vertical relationships are considered together, it is not clear that conduits foreclosing ISPs necessarily leads to ISPs placing greater restrictions on content. Indeed, the author describes a model where open access regulation, by blocking foreclosure of the conduit market, leads to an increase in the incentives to discriminate against content provided by competitors.

In the third paper, "Diagonal Mergers and Foreclosure in the Internet," Giovannetti examines the merger between two ISPs, one a wireless retail only ISP in two origination markets, and the second, a vertically integrated wired retailer in one market and an upstream provider in the other.

Prior to the merger, node prices are higher and market share is smaller for the wireless operator in the market where it competes against the vertically integrated fixed access provider. The author then considers a merger in one of the retail markets, between the vertically integrated fixed access provider and the wireless provider. For very low differentiation the merger implies a partial foreclosure of the wireless activity of the merged provider; it is only partial as the wireless price induces a zero demand in the market where the merger is vertical, maintaining however, a positive demand for wireless access in the other market, where the merger is horizontal. Post merger prices are lower than pre-merger ones if there is low differentiation. Consumer welfare diminishes as a result of the merger if there is not enough differentiation, while industry profits will usually increase. Moreover, with high differentiation, there are incentives for a merger that results in positive consumers' welfare effects; while with low differentiation the incentives for the merger are also positive but the welfare consequences are negative. The main

policy lesson from this paper is that the degree of differentiation between merger candidates should be carefully assessed.

Lanzi and Marzo, in the fourth paper entitled, “Content Delivery and Vertical Integration in On-line Content Markets,” also look at the economics of vertical integration between conduit and content in the provision of on-line content. The authors, based on computer science theories, distinguish between alternative architectures for content delivery: A pull model in which consumers wish to purchase a single unit of content (e.g., a video interview with a particular artist) and contact a network provider, who then sets a price; and a push model in which content providers offer content to consumers at set prices.

The authors find that vertical integration between conduit and content providers is always profitable under a push model. Vertical integration is also profitable under a pull model for low quality content. For the high quality content case, vertical integration under a pull model is profitable if a small portion of active network services costs is paid by content consumers. Underlining these results is the notion that vertical integration internalises vertical price externalities – linear wholesale prices are assumed – and mitigates double marginalisation effects.

In the final paper, “Price Regulation in a Vertically Integrated Natural Gas Industry: The Case of Mexico,” Brito and Rosellón examine the netback rule that is used by the Mexican regulator to set the price of natural gas at Ciudad Pemex in Southwest Mexico. The Netback rule establishes that the price of gas in Ciudad Pemex is equal to the price at Houston (Texas) plus transport costs from Houston to the arbitrage point minus transport costs from the arbitrage point to Ciudad Pemex. This formula is an implementation of the Little-Mirrlees method: the price of natural gas in Houston measures the opportunity cost to Mexico of consuming the gas rather than exporting it to the United States.

The authors show that under some general conditions such a rule is Pareto optimal. However, for this rule to work it is essential that the quantity (imported or exported) of gas can adjust to clear the market. This is where vertical integration plays a role – the industry structure in Mexico is characterised by a vertically integrated state-owned monopoly, PEMEX. This structure allows PEMEX to control pipeline capacity to circumvent the netback formula – when there is not enough pipeline capacity, the gas movements would not clear the market, generating rents and an inefficient outcome.

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* All views are personal and do not necessarily reflect those of affiliated organizations.