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Japan and the World Economy
18 (2006) 221–229



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Investment in transport and communication technology in a Cournot duopoly with trade

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Received 10 December 2002; received in revised form 9 August 2004; accepted 27 August 2004

Abstract

We investigate the role of R&D investment in transport and communication (TCRD) in a Cournot duopoly with trade. We consider countries of different size and show that the firm located in the smaller country has a higher incentive to invest than the rival in the larger country. We also prove that social incentives are aligned with private ones. As for the terms of trade, any improvement of TC technology favours the smaller country, all else equal.

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JEL Classification: F1; I1; B4

Keywords: Transport; Communication; R&D; Trade; Duopoly

1. Introduction

Transport and communication (TC) costs are at the heart of international trade either in perfectly competitive or in imperfectly competitive markets. TC costs introduce a logistic and economic wedge between transactions across borders vis à vis inland exchanges because of distance and differences of various kind among countries (language, administrative procedures, technical requirements, etc.).

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Despite their crucial role in international economics, TC costs mostly have had a marginal role in theoretical models, even though they are at the heart of several “home bias effects”, not just in trade (Krugman, 1991a,b), but also in open macroeconomics and finance (Obstfeld and Rogoff, 2000).

So far, the literature has emphasized the role of public infrastructure in reducing TC costs both on the domestic market and in cross border trade (Barro, 1990). Agglomeration of economic activity and the surge of cluster of firms is partly associated with the public investment in infrastructure and the economies of scale that make initially convenient to establish economic entities in one particular region (Krugman, 1991a,b). Trade then appears as the exchange of goods and services between agglomeration points, when *latu sensu* distance is taken into account. The large literature on geography and trade covers most of the aspects of the effect of better TC facilities on trade and geographic concentration.

The transport cost issue has been dealt in a different framework also, mainly due to Hotelling (1929) or, to be more precise and just, to Launhardt (1885, 1993), as a recent contribution of Dos Santos Ferreira and Thisse (1996) has made it clear. In this set of models, the distance between sellers becomes synonymous of differentiation. In the original Launhardt (1993) model, the adoption of a particular transport technology can be interpreted as a choice of quality or, in other words, a vertical differentiation commitment. Last, but not least, there is no cost associated with the quality and/or transport technology chosen by a firm.

The question of TC costs can also be addressed by an analysis confined to a domestic scenario (Lambertini et al., 2003) with a set of results that are partially relevant for trade also. A parallel distinction, yet, between public infrastructures facilitating domestic trade vis à vis international trade, may be found in Martin and Rogers (1995).

So far, there has been no attempt to investigate the role of strategic investment to reduce the burden of TC costs on firms.¹

This should actually be on the agenda because most of the new technologies related to the Internet are going to reduce private TC costs according to the investment effort of each firm and make cross border trade less expensive only for those firms that are better equipped as a result of a commitment on TC (see Freund and Weinhold, 2004).

Our main focus is on private investment in TC in a strategic environment. To this aim, we analyze the largely unexplored field of investment undertaken by firms to reduce the *latu sensu* distance between themselves and customers when products are homogeneous, transport and communication are costly and markets are oligopolistic.

To this purpose, we investigate the issue of investment in R&D devoted to the improvement of the TC technology (TCRD) in a Cournot duopoly setting where each firm sells in two markets, the domestic and the foreign one.

Whenever a firm ships an item to its customers, the profitability of its action is influenced by both the state of public infrastructures and by the technology it adopts for TC. We take as exogenous the given state of public infrastructure, and we dwell on the

¹ In the existing literature, iceberg transportation costs are taken as given (see for exhaustive surveys Helpman and Krugman, 1985; Grossman, 1992), while R&D investment for process innovation has been largely investigated in Spencer and Brander (1983), Beath et al. (1989) and Clemenz (1990).

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