



Export restraints in a model of trade with capital accumulation

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Abstract

This paper examines the impact of voluntary export restraints (VERs) in an international duopoly modeled as a differential game. With a Ramsey capital accumulation dynamics, the game admits multiple steady states, and a VER cannot be ‘voluntarily’ employed by the foreign firm in case of Cournot behavior in demand substitutes. Hence, the dynamic framework confirms the results of the VERs literature with static interaction in output levels. In the case of price behavior, the adoption of an export restraint may increase the profits of both firms if products are substitutes and the steady state is ‘market-driven’. However, contrary to the acquired wisdom based upon the static approach, the dynamic analysis also admits an equilibrium outcome, identified by the Ramsey golden rule, where the incentive to adopt a VER is ruled out, irrespective of whether firms are quantity- or price-setters.

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1. Introduction

Voluntary export restraints (VERs) are often considered as coordinating or quasi-collusive devices (see for example Harris, 1985; Krishna, 1989 and more recently Berry et al., 1999). Indeed, most of the existing theoretical literature justifies this view only insofar as firms are price setters. Harris (1985) first analyzed VERs in a static duopoly model. He showed that when firms compete *à la* Bertrand on differentiated products, then a VER at the free trade level of imports increases profits of both domestic and foreign firms. This result is consistent with what has been found by Mai and Hwang (1988) in a more general analysis based on a conjectural variation static approach. However, their paper shows that with Cournot competition VER is ineffective, and in more collusive settings (i.e., those with positive quantity conjectures) it hurts the foreign firm and fails to be a ‘voluntary’ strategic trade policy. In general, the consequences of quantity restrictions are known to depend on whether imports are strategic and/or demand substitutes or complements for domestic products. This, in turn, depends on whether market interaction takes place in outputs or prices. When firms set quantities (prices) and goods are demand substitutes (complements), output restrictions impede the ability of the foreign firm to compete in the domestic market, thereby acting to facilitate collusion and raise prices and profits (see Krishna, 1989).¹ This view is reinforced by Suzumura and Ishikawa (1997), who explore the implications of a voluntary export restraint agreement on profits and welfare in a duopoly model with product differentiation and conjectural variations. They assume that the imposition of a VER makes the domestic firm into a Stackelberg leader, and show that a VER introduced at the free-trade equilibrium level of export is welfare-improving for the importing country if and only if the foreign exporter is forced to comply with the restraint involuntarily.

The main limit of the existing literature on strategic trade policy is its essentially static nature, as Brander (1995) well pointed out. Nevertheless, long-term interactions characterizing international oligopolistic markets are at odds with the one-shot static games generally employed and one may well expect that introducing real time in these models substantially affects firms’ behavior.

This paper analyzes VERs in a dynamic setting where oligopolistic firms interact participating in a differential game. Introducing real time in the analysis we are in a position to explicitly account for the fact that firms strategically interact along several dimensions, not only prices or quantities but also capacities, investment (or capital accumulation) and growth, following the literature initiated by Spence (1979). Hence, an important novelty in our paper is that we explicitly model firms’ dynamic capital accumulation which is certainly one of the most important strategic decisions firms are confronted with in a dynamic context. Indeed, in many industries (such as automotive, electronics and aircraft) supply cannot be expanded at will and some form of accumulation of capacity or capital investment is first required. We then deal with the effects of VERs over profits and equilibrium quantities using the

¹See also Pomfret (1989) for a detailed survey on VERs.

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