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Strategic trade policy under asymmetric information with screening ☆

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ABSTRACT

The design of strategic rent-extracting trade policies requires information that may be private, such as the cost structure of an industry or parameters of the demand function. As a consequence, under asymmetric information, the design of these policies is problematic. We propose screening menus consisting of different instruments (tariff vs. quota) designed to solve this informational issue. We first use a simple model that examines a Cournot duopoly between a domestic firm and a foreign firm with linear demand and cost functions, with both firms supplying a homogeneous good on the domestic market. In this scenario, if the government does not have information regarding the demand parameter, which is known by both firms, a menu consisting of a rent-extracting tariff for a low demand parameter and a rent-extracting quota for a high demand parameter maximizes the government's objective function. This menu leads the domestic firm to reveal private information. We then generalize this framework to a scenario with imperfect information regarding the firms' marginal cost. Finally, we discuss the issue of quotas generating public revenues and study the case of a menu consisting of a tariff and a free quota.

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1. Introduction

It is well known that the implementation of strategic rent-extracting trade policies requires information regarding demand and production costs.[1] For example, in a Cournot duopoly with one domestic firm and one foreign firm supplying the domestic market, the rent-extracting tariff, which maximizes the sum of domestic profits, consumers' surplus and public revenue depends on demand parameters and the firms' marginal costs (see for example Matschke, 2003). However these parameters may include private information that is not readily available to the government; this implies that asymmetric information and policies implemented in this scenario may not maximize the government's objective function. In this paper we show that this informational issue can be addressed through the implementation of a menu of different trade policy instruments (e.g. tariff vs. quota). With this menu, the domestic firm selects the instrument that reveals private information and the trade policy implemented is then able to maximize the government's objective.

The theory of asymmetric information has been extensively applied in labor economics, industrial economics and financial economics; however, applications to international economics have been relatively limited. After noting that "informational asymmetries between firms and policymakers are often quite acute in trade policy" (p. 34), Brainard and Martimort (1992) introduce asymmetric information in the well-known model of Brander and Spencer (1985). In this model, information regarding firms' cost of production is private, which undermines the government's ability to commit to a specific policy and reduces the optimal subsidy. Under the same theoretical framework, Qiu (1994) studies a case in which the domestic firm's marginal cost is unknown to both the domestic government and the foreign firm; a menu of policies (combining an export subsidy and a lump-sum tax) reveals this information to the government, but it also reveals it to the foreign firm (see also Okajima, 2003). Under the same informational asymmetry, Collie and Hviid (1993) show that the domestic government must increase its export subsidy above the traditional level (as defined by Brander and Spencer, 1985) in order to signal domestic firm's efficiency to the foreign firm and decrease its supply on the domestic market. The same authors (Collie and Hviid, 1994) study the case of a foreign monopoly which is not perfectly informed regarding the demand parameter in the domestic market while the domestic government is perfectly informed; this scenario results in a signaling game and excessive import taxation. Wright (1998) studies a Brander and Spencer (1985) model on two consecutive periods in which the domestic firm's marginal costs are private information and the first-period output signals this private information not only to the foreign competitor but also to the domestic government. The main focus of Wright (1998) is to show how output in the first period can be manipulated by the domestic firm to misrepresent its marginal cost and modify domestic government's policy in the second period. Kolev and Prusa (1999a) utilize the theoretical framework

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[1] (Creane and Miyagiwa, 2008).

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of Brander and Spencer (1984) in which a government extracts the rent of a foreign monopolistic firm; they introduce asymmetric information on the cost of production. The solution is a pooling equilibrium under which the foreign firm exports the same quantity, whatever its degree of technical efficiency. In a duopolistic framework, Kolev and Prusa (1999b) show that the possible introduction of an anti-dumping duty can urge the foreign firm to use VER (voluntary export restraints), this trade policy signals low efficiency and prevents the introduction of the anti-dumping duty. Matschke (2003) studies the equivalence of tariffs and quotas under asymmetric information and determines screening menus of different tariffs with different prices paid by a firm to its government. More recently Sun and Yao (2011) introduce asymmetric information in an international duopoly under the World Trade Organization (WTO) framework in which countries self-declare as either developed or developing countries and in which developing countries are provided better market access. This study provides conclusions regarding potential misreporting and collusion incentives. Martimort and Verdier (2012) study the impact of domestic incentive regulations under asymmetric information in an open economy and shows that under this framework free trade may be Pareto-dominated by autarky.

Our paper is in line with this literature in that we study the design of strategic rent-extracting policies under asymmetric information with screening. In this sense our paper is close to those of Qiu (1994) and Matschke (2003). However, while the former studies how menus of trade and tax policy (a lump sum tax) can help the government to design trade policies, we study how menus of different trade policy instruments imply separating equilibria. Similarly, while the latter investigates the equivalence of tariffs and quotas in a Cournot duopoly when firms have private information regarding demand (see also Fishelson and Flatters, 1975; Hwang and Mai, 1988), we are interested in the design of rent-extracting trade policies. Moreover, Matschke (2003) focuses on screening menus consisting of different tariffs with different prices, or menus consisting of different quotas with different prices (costly menus) while we study the possibility of screening based on menus consisting of different costless instruments, e.g. a tariff and a quota without any price paid by the firm to its government. Finally our paper is more general since in our model, duopolistic firms' marginal costs are different.

We first propose a simple screening model in a Cournot duopoly consisting in a domestic and a foreign firm offering an identical good on the domestic market: demand and cost functions are linear. In this framework, as already shown by Matschke (2003) under identical marginal cost, if information is asymmetric on the demand parameter (with this parameter potentially taking two values which leads to two rent-extracting tariffs of two rent-extracting quotas), the design of trade policy is problematic. If the government is risk-neutral, it may implement an intermediate tariff which would lead to overprotection if the demand parameter is low and under-protection if the demand parameter is high. On the other hand, the government may implement an intermediate quota which would lead to under-protection if the demand parameter is low and overprotection if the demand parameter is high. If the government proposes a menu consisting of different levels of tariffs or a menu consisting of different levels of quotas, the policy would lead to over-protection in one state: for example the government may propose a menu of tariffs, a strategic rent-extracting tariff when the demand parameter is high (relatively high tariff) and a strategic rent-extracting tariff when demand parameter is low (relatively low tariff). This would lead to the domestic firm choosing the higher tariff, whatever its type since it implies higher profits; thus the incentive constraint is not filled in one state.

Matschke (2003) solves this problem by proposing a menu of different tariffs with different prices attached to each. While this solves the informational asymmetry, we think that this policy option is not realistic. On the one hand, the domestic government is benevolent since it maximizes a social function which includes with equal weights consumers' surplus, producers' profit and public revenue; on the other side the domestic government is "greedy" since it makes the domestic firm pay for trade protection. A situation in which protection is "for sale" is more consistent with the political economy literature, such as the Grossman and Helpman (1994) model.

To solve this informational problem, we propose a tariff–quota policy menu, proposed by the government to the domestic firm. Within this menu each instrument (tariff or quota) is costless. The domestic firm selects the policy that maximizes its profit. When the menu consists of a strategic rent-extracting tariff for a low demand parameter and a strategic rent-extracting quota for a high demand parameter, the domestic firm reveals its demand parameter to the government and the trade policy then maximizes the government's objective function.

We then generalize this model, to a case in which the asymmetric information is regarding the foreign firm's marginal cost (as it will be demonstrated the case in which asymmetric information is regarding the domestic firm's marginal cost is trivial).

In the theoretical framework that we propose, two assumptions deserve special consideration. First we only consider asymmetric information situations in which policymakers are *ex ante* uninformed regarding parameters which are firm-specific (marginal cost) or sector specific (demand parameter) while firms receive perfect information. We think that this assumption is more plausible than situations in which firms are uninformed and governments are perfectly informed. In the case of asymmetric information on the foreign firm's marginal cost this situation appears all the more realistic since this parameter reflects the state of technology which should be common knowledge of all producers in a sector, and in particular the domestic firm. In the case of demand parameters, this key information conditions a firm's strategy and thus its profitability; in this case, it is plausible that a firm would be willing to pay for this information. However, this is less the case for a government.[2] Other informational asymmetries are also plausible such as perfect information for the firm and imperfect information for the government on demand parameters *and* marginal cost structures. These asymmetries are discussed in our conclusion. Finally it is worth noting that the informational structure we study is the structure prioritized in the literature (see for example Brainard and Martimort, 1992; Qiu, 1994; Matschke, 2003).

We think that the possibility of a government offering a menu of potential protection to domestic firms which then have to select the protection they prefer is a realistic assumption. For example a government may implement different types of trade policy instruments like *ad valorem* import duties, specific import duties, export subsidies, domestic support, anti-dumping duties, safeguard mechanisms, or sanitary and phyto-sanitary rules, … It may also negotiate VER with foreign countries. The choice of the protection instrument which will be finally adopted depends on the exchange of information between a sector and a government, and in particular the value of parameters provided to a government by private firms. Therefore it is realistic to represent the whole process as if a domestic firm selects an instrument of protection from among various instruments proposed by the government.

The remainder of the paper is organized as follows. In Section 2 we present the basic model, first under perfect information and with only

[2] It is also quite common to consider that firms are better informed about the rivals' costs than policymakers (see for example Fershtman and Judd, 1987); Toyota is better informed about GM's production costs than the U.S. government (Creane and Miyagiwa, 2008). These authors also state that: "Even if governments actually possess…[complete information about the economy], it still begs the question of how or from where they obtain such information. A natural candidate for the source of this information must be firms, but one may wonder if firms could ever have an incentive to share their information with the governments." (Creane and Miyagiwa, 2008).

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