Reputation and learning: Japanese car exports to the United States ☆

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ABSTRACT

This paper incorporates learning and reputation building into a simple dynamic stochastic model with asymmetric information. We use the model to study a bilateral trade flow influenced significantly by learning and reputation, namely U.S. imports of Japanese cars over the period 1961–2004. Numerical simulations replicate the trade flow in a robust fashion. Including the Voluntary Export Restraint in our simulations predicts U.S. imports decreased by 2.46 million cars over the years 1981–1984. Since learning and reputation building require time, predicted short run trade patterns can be quite different than those predicted in the long run. We apply this idea to understand the change in Japanese market share in the U.S. automobile market. We also explore the importance of sectorial differences in the speed of learning and reputation building on predicted trade patterns. Lastly, we examine how the extent of asymmetric information existing between importers and exporters changes under different trade policies.

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1. Introduction

This paper studies how asymmetric information affects international trade patterns and how learning and building up a reputation may be crucial in reducing information problems in international trade. In the framework we develop, asymmetric information exists regarding producers' (exporters') characteristics.[1] Consumers (importers) cannot completely observe the characteristics of exporters and have imperfect information about them, whereas exporters fully know their own characteristics. These informational asymmetries create frictions in the business dealings between importers and exporters which inhibit the flow of goods internationally. Since learning (for importers) and reputation building (for exporters) requires time, we find predicted short run trade patterns can be quite different than those predicted in the long run. Our framework provides new tools for analyzing data on international trade flows. We apply these tools to the case of Japanese car exports to the U.S., finding that numerical simulations of our model are capable of replicating the trade flow in a robust fashion.

Since the publication of Akerlof (1970), it has been well understood how asymmetric information can cause adverse selection in markets. We argue asymmetric information problems are crucial in international markets, even more so than closed economies, since information regarding foreign exporters is potentially less available and more difficult to access. For instance, inspection of foreign exporters may be difficult and costly to undertake. As a result, asymmetric information problems about a foreign exporter's productivity or the quality of a foreign exporter's good can be more severe in international markets. Additional factors, such as culture, language, or religion, have further effects on international markets with informational asymmetries. These factors can either exacerbate the problem by building prejudices between groups who differ in these respects or alleviate it by networking

[1] In general, the characteristics we discuss here can be thought of as affecting the consumers' beliefs, such as producers' productivity, quality, reliability, etc. For simplicity, we later narrow our concept of characteristics to be just productivity in our model.

geographically dispersed groups together who are similar in these respects.[2]

In environments with informational asymmetries, Spence (1973) demonstrates how signaling can improve the market outcome, and Shapiro (1983) shows how building up a reputation can be important as well. Similarly, in international markets, exporters can use signals to build their reputations and alleviate problems caused by asymmetric information. Falvey (1989) extends the framework used in Shapiro (1983) to study the effects of commercial trade policies, such as origin labeling requirements, in a world in which reputation matters.

In parallel to the above findings, we argue that all these concepts—asymmetric information, learning, signaling, and reputation building—are important in international trade and should be incorporated into models in the international trade literature. The international trade literature usually implicitly assumes perfect information among agents, and, hence, asymmetric information plays no role.[3] Since the main goal of this paper is to emphasize the idea that reputation building and learning are important in determining trade patterns, we focus our attention on developing a simple mechanism which clearly shows the relation between these forces. Our model is not based on traditional trade theory models and excludes some features of standard models. In particular, we take trade incentives as given and then narrow our attention to how asymmetric information, reputation, and learning affect international trade. Given the dynamic nature of the problem we are interested in, we do not nest our model into a static model of international trade. Also, our model considers a partial equilibrium, whereas standard trade models typically consider a general equilibrium. Future research can incorporate these ideas into existing trade models.

We use our model to study U.S. imports of Japanese cars over the period 1961–2004. Very few Japanese cars were exported to the U.S. before the 1970s. Before that time, big American cars ruled the road. American consumers showed little interest in the lightweight compact cars slowly trickling into the American market from Asia. The oil crises of the 1970s changed all that, though, as Americans began to show an interest in the fuel efficient Japanese cars. As American consumers learned more about the new Japanese cars, they discovered that not only were the Asian imports fuel efficient, but they were well-built and reliable vis-à-vis their American rivals. Japanese cars established a good reputation, as evidenced by such publications as *Consumer Reports* and *J.D. Power Report*. Japanese car imports to the U.S. increased dramatically thereafter. This narrative is heard over and over in the popular press. Consider Crandall and Winston (2005)[4]:

> The high gasoline prices caused by the first OPEC oil imbroglios led American consumers to look seriously at the small, fuel-efficient Japanese cars for the first time. What they saw was not only fuel efficiency but reliability. Japanese cars, even in the 1970s, would have fewer repair problems than their American-produced counterparts. As a result, even after oil prices began to fall, Japanese car imports continued to grow.

Wojcik (2001) documents total sales of Japanese cars in the U.S. as increasing by 427 percent over the years 1971–1990, while total new car sales increased by only 9 percent. Total sales numbers for Japanese cars from 1971 to 1990 are primarily being driven by imports, since Japanese manufactures did not begin setting up factories in the U.S. until the mid-1980s.

Previous micro-level studies in the literature provide direct motivation for why a model with asymmetric information is necessary for understanding the experience of Japanese car exports to the U.S.[5] Mannering and Winston (1991) and Train and Winston (2007) show brand loyalty and reliability, both measures of a good reputation, explain a significant fraction of the increase in Japanese market share in the U.S. market. Wojcik (2001) studies American consumer learning and draws the conclusion:

> This study has shown that learning by consumers about the quality of Japanese cars had a substantial impact on the demand for these cars. Learning about the particular model, learning about the make, and learning about Japanese cars as a whole were all found to be significant factors in the market share of individual models.

We view the results of these three studies as strong evidence suggesting asymmetric information, learning, and reputation are essential for understanding the history of U.S. imports of Japanese cars, and, as a result, these three studies provide motivation for our modeling decision. However, these three studies apply econometric techniques to micro-level data to show their findings, whereas our approach of numerical simulation resembles that commonly used when applying models in macroeconomics and international trade.

In addition to the direct evidence motivating reputation and learning, Barber et al. (1999) acknowledges (1) the shocks during the oil crises opened up the U.S. market to Japanese imports but concludes (2) other variables and firm-specific policies account for the bulk of the changes in market share.[6] However, Barber et al. (1999) provides no conclusive evidence for what *other variables and firm-specific policies* might actually be. Our argument is consistent with both points 1 and 2. Our main contribution is to argue *other variables and firm-specific policies* largely consists of *reputation and learning*, which began changing only after the oil crises. We build on the results in Barber et al. (1999) by showing simulations of a dynamic model with reputation and learning are capable of replicating the time series of U.S. imports of Japanese cars.[7]

In order to show this, we propose a mechanism which works as follows: There are two types of agents, exporters and importers. Exporters have private information about their characteristics. Importers only have beliefs about these characteristics. Importers wish to exchange their endowments for the output produced by exporters. The importers make offers to exporters in exchange for shipments of exporters' goods. These offers are based on beliefs importers hold about exporters' characteristics. Importers' beliefs, in turn, depend on the export

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[2] See, for example, Guiso et al. (2009) for a study involving a set of European Union countries on how culture effects trust between citizens of different countries and how these bilateral trust relations affect international trade, portfolio investment, and foreign direct investment. See Gould (1994), Greif (1989), and Rauch and Trindade (2002) for examples of ethnic-based networks as means to alleviate asymmetric information problems and facilitate international trade.

[3] See, however, Nieuwerburgh and Veldkamp (2009) for a recent treatment of asymmetric information and learning in the international finance literature.

[4] Or, as Barber et al. (1999) cites, a typical article from *Fortune* regarding the role of the oil crises: "Beginning with the gasoline crisis of 1973, Japan opened up a substantial market in the U.S. for its fuel-efficient, trouble-free cars. A second gasoline shortage in 1979–1980 added momentum, and by 1982 the Japanese had 20 percent of the U.S. car market."

[5] Articles from the popular press echo the findings in the literature. See, for example, Crandall and Winston (2005) and Gertner (2007).

[6] They derive their conclusions by first building a dynamic model of imperfect competition and then constructing a structural vector autoregression, which they identify from a reduced-form vector autoregression. This allows Barber et al. (1999) to analyze the contribution various macroeconomic shocks, such as income, exchange rate, oil price, and firm-specific shocks, make to changes in market share. Barber et al. (1999) find macroeconomic shocks only moderately explain changes in market share of Japanese cars in the U.S. market since the 1970s.

[7] To be clear, we are not suggesting our theory is the only possible theory capable of replicating the experience of Japanese car exports to the U.S. Rather, the available evidence in the literature and popular press lead us to conclude our theory is the appropriate one. Any alternative theory should be consistent with this evidence.