# STRATEGIC INTERACTION, TRADE POLICY, AND NATIONAL WELFARE

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## Summary

All countries in the modern world need a framework for engaging in interactions across national boundaries. As far as international trade is concerned, the implicit format of this framework comes under the heading of strategic policy making. It involves various types of interventions able to deal with various dynamics of the international trading world such as research and development rivalry, international economies of scale, and national and international spillovers. The timing and the availability of information are also important in this strategic trade policy. Although the robustness of strategic policy choice depends on assumptions about production and consumption, it is clear that this facilitates the opportunity for relevant governments to affect interactions between producers and consumers beyond national boundaries.

## 1. Introduction

A negotiation framework to manage interactions between countries is crucial. These interactions are sometimes explicit, at other times implicit. One form of implicit interaction is strategic trade policy. This strategic trade policy might take the form of an interaction between the governments of a number of countries, or between a country's government and the firms in that country or in different countries, or it could be

between firms of different countries. In this article the focus will be mainly on strategic trade policy as a framework for managing the interaction between nations.

In order to explain various trends in post-World War II trade, the traditional analysis using perfect competition has been replaced by the analysis that incorporates an imperfect market structure. Either one very big firm (a monopoly) or a few large firms producing slightly differentiated products can represent this imperfect market structure. Monopoly clearly does not need any interaction on the production side with anybody else in the market. A few firms producing slightly differentiated products do not compete with each other because there is a symmetry in production and consumption, but an important element of imperfect market structure is the strategic interaction between firms in different countries **(see *Economies of Scale and Imperfect Competition*)**.

Strategic trade policy alters, or conditions, the strategic relationship between firms. Firms understand this strategic interdependence. More specifically, the product or payoffs to a firm depend on the strategic choices made by other firms. This type of analysis helps us to understand very recent phenomena of learning by doing, research and development (R&D), and interfirm strategic rivalries. In this article we will use a game theoretic approach to analyze strategy choice that will provide insights into strategic trade policy, which sometimes comes in the form of intervention to alter the strategic interaction between oligopolistic firms.

It is important to clarify at this point that economists use the term "strategic trade policy" differently from the way it is used in political debates, where it might carry very different implications. In the economists' use, the term does not imply that trade policy is strategic from a military standpoint or that it is the policy for a strategic industry of the economy. Nevertheless, the industry that appears strategic from our game theoretic analysis might also be strategic when evaluated using those two definitions. This article will focus on the trade policies of a government intending to maximize national welfare.

## 2. Game Theoretic Structure of Strategic Trade Policy

The basic idea of game theoretic structure is that the parties become involved in a game of strategies. Each party wants to maximize its own gain, and they are non-cooperative. It is as if each party behaves like a player in a game. The result, or the equilibrium solution, of the game is called Nash Equilibrium (N.E.), after the famous mathematician John Nash. N.E. obtains when all players or parties in the game choose strategies that maximize their own payoff, given the strategies chosen by the other players. This type of solution can be obtained when all players try simultaneously to decide on price and output or it might be a solution describing some sort of contingent behavior, where decisions are taken sequentially.

Since N.E. is the building block of any strategy game, it is prudent to look into the concept. N.E. is usually viewed as a rationality concept. If I am a rational player in a game of strategies, in selecting my own strategy I will try to anticipate my rival's strategy and select my best strategy accordingly. My rival will do the same. We are both therefore trying to anticipate each other's behavior and we are both aware of this. Thus N.E. has no element of surprise since each player adopts the strategy anticipated by their

rival. N.E. is very general in the sense that the strategies can be defined in many ways; they may be a single move, such as one-shot output or price decision by a firm, or they could be a complex rule describing repeated games.

To gain an idea of how games of strategy choice are played, consider a game with two firms and a government. The government's objective is to maximize domestic welfare. Its possible strategies include imposing an import tariff, an import quota, a voluntary export restriction, an R&D subsidy, or any other of the wide range of policies that could change the payoff to oligopolistic firms. Assume that the government is either for "intervention" or for "non-intervention." The two firms can be described as a domestic firm ($X$), and a foreign firm ($y$), and their choices can be "high output" versus "low output." Thus, for firm $X$ the choices are $X_1$ and $X_2$ and for $y$ they are $y_1$ and $y_2$, as illustrated in Table 1.

| | | Intervention | | | | Non-intervention | |
| | | Firm $y$ | | | | Firm $y$ | |
| | | $y_1$ | $y_2$ | | | $y_1$ | $y_2$ |
| Firm $X$ | $X_1$ | 2,0; -1 | 0,2; -1 | Firm $X$ | $X_1$ | 1,1; 0 | 0,2; 0* |
| | $X_2$ | 3,0; 2* | 1,-1; 0 | | $X_2$ | 2,0; 3 | -2,1; 1 |

Table 1. Government and firm gains

In this game, it is assumed that the government acts first; the firms then choose, simultaneously. So this is sequential strategy making. The numbers in the boxes are the payoffs. The first number is firm $X$'s payoff, the second number is firm $y$'s payoff, and the third number is the government's payoff. The entry (2,0; -1) implies that firm $X$'s payoff is 2, firm $y$'s is 0, and -1 is the government's payoff. If government policy is intervention then the lower left-hand number with the asterisk is the best solution. This is because when government intervenes $X_2$ is the best policy for firm $X$ and, knowing that firm $X$ will go for $X_2$, firm $y$ will choose $y_1$ because $0 > -1$. Similarly, if government does not intervene then (0,2; 0*) is the best solution. In this type of strategy making, the best choice from each category results is $(X_2, y_1)$ and $(X_1, y_2)$ as the outcomes.

To move in the reverse sequence, the government decides to choose whichever of these two is better for its objective of maximizing domestic welfare. (This is called the backward induction method.) This process assumes that government correctly anticipates how firms will react to each of its choices.

The point to note is that every cell in the left-hand payoff matrix has a lower domestic welfare (payoff for the government) than the corresponding cell in the right-hand matrix. Thus government intervention has a direct price. If the government is going for "intervention," it implies that this policy of intervention maximizes welfare. The government will therefore choose to intervene because the benefit results from its ability

to alter the strategic interaction between the two firms. The effects of these changed strategies more than offset the direct inefficiency of the government's policy of intervention as compared to its policy of non-intervention. Furthermore, as we consider negotiations in trade policy, we should remember that this example is a very general one. Firms' strategies could be about price, output, R&D investment, or something else. There could be more firms, more governments, or the structure of the game could be more complicated. There could also be elements of uncertainty when strategies are being adopted. Not all types of games will give equal payoffs but we can be sure of one thing: strategic interaction between firms creates an opportunity for government action to modify the terms of those interactions. The government wants to utilize this opportunity to increase domestic welfare. One necessary assumption in this type of sequential game is that government needs to pre-commit to its policy, as reflected in the government being the first player in the entire game of strategic decision making.

## 3. Export Subsidy in a "Third Market"

The main purpose of strategic interaction is profit making or profit shifting. By adding a third market to the model, we allow firms from a domestic country to compete with firms from another country in this third market.

These firms want to choose their own output level as a conjecture about their rival's output levels so that their own profit is maximized. The domestic firms cannot do anything to stop the action of the foreign firms. In this scenario, the best trade policy is an export subsidy whose direct effect is to help domestic firms vis-à-vis their foreign rivals.

The trade policy is selected in two stages. In the first stage the domestic government sets a subsidy level, and in the second stage the domestic and foreign firms simultaneously choose the output or export level for the third market.

An export subsidy brings in a terms of trade loss but there will be profit shifting from the rival foreign country to the home country. This motivates the government because it more than offsets the terms of trade loss. Profit shifting can therefore be viewed as a rationale for trade policy intervention quite distinct from terms of trade effects or scale effects.

It is important to note that when the government of only one country gets involved in formulating strategic trade policy, that country's firms add the subsidy gain to their profit. Note that all firms (irrespective of whether they are from the foreign country or the home country) make their decisions subject to the subsidy provided by the government.

If the governments of both trading countries get involved then subsidy gains comes to both the domestic firms and the foreign firms. However, the crucial point is that each government then plays a strategic game not only with the firms but also with its rival government. This might result in a prisoners' dilemma type situation, where each government knows that free trade is the best solution, but still they settle for a second-best situation because each has a unilateral incentive to intervene.

## 4. Subsidy Dollars versus Profit Dollars

So far we have treated the subsidy dollar and the profit dollar equally. In reality the provision of subsidies has costs and if the gain from subsidies is not large enough then a nation's welfare decreases. For example, giving a subsidy to the firms actually helps their shareholders. If some of these shareholders are foreigners, then their share of profits will not count towards national welfare. A subsidy payment also means distributing income from taxpayers to shareholders. In this case, government policy also should take into account the distribution of weights on taxpayers' welfare versus shareholders' welfare.

In addition to dealing with a duopoly (two firms), a government's strategic trade negotiations might involve a number of firms, both domestically and in the foreign country. In that case, an individual firm's profit resulting from the subsidy would be less than that of a duopoly firm, because this individual firm would have to compete with all its rivals in the domestic market. In this case, if the number of domestic firms is higher than the number of foreign firms, then an export tax instead of an export subsidy will be more desirable. When the number of foreign firms is very high, a subsidy to the domestic firms will be more desirable.

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**Biographical Sketch**

**Bharati Basu** received her Ph.D. from the University of Rochester in New York, USA. She specialized in the areas of international trade and economic development. She has published various types of works in these fields in reputable journals and books. She is on the editorial board and associate editor of the journal *Feminist Economics*.