On Endogenous Timing in Trade Policy Games: ‘Excessive’ Profit Preference Leads to Indeterminacy*

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Abstract

Faced with an export subsidy by a foreign government, importing countries have to decide whether they should impose countervailing duties or not. A pioneering paper by Collie shows that an importing country will choose to commit itself not to use countervailing duties. This paper is concerned with whether Proposition 1 obtained by Collie (1994) is applicable if a home government attaches more weight, v, to a home firm’s profit than the consumer’s welfare. In the case of $1 \leq v < 7/6$, the subgame perfect equilibrium policy is one in which the home government sets its production subsidy and tariff at stage one and the foreign government sets its export subsidy at stage two. Thus proposition 1 by Collie (1994) still holds. But if $7/6 < v$, then there are typically two kinds of equilibria. In one, the home government sets its production subsidy and tariff at stage one and the foreign government sets a positive export subsidy at stage two. In the other, the home government sets its policy at stage two and the foreign government sets an export subsidy at stage one. Thus profit preference by the home government typically implies two kinds of equilibria, which leads to indeterminacy in a pure strategy game.

JEL classification: F12, F13

Key Words: Policy Timing, Strategic Trade policy

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1. Introduction

The strategic trade and industrial policy literature has established various propositions concerning the effects of alternative policies on outputs, prices and welfare. See, for example, Brander (1995) and Helpman and Krugman (1989). More recent arguments tend to maintain that both policy tools and the timing of trade policy are determined endogenously. Faced with an export subsidy by a foreign government, importing countries have to decide whether they should impose countervailing duties or not. A pioneering paper by Collie shows that an importing country will choose to commit itself not to use countervailing duties. In the model of a two-country, four-stage trade policy game, Collie (1994) demonstrates some interesting propositions, as follows. Suppose that, on the one hand, the home government can use a production subsidy to correct domestic distortions and/or a tariff to extract profit from a foreign firm. On the other hand, the foreign government can use an export subsidy to shift profit from a home firm to a foreign firm. At stage zero, each government chooses the timing of its policy, either stage one or two. The outcome will be one of the following three equilibria: the simultaneous-move trade policy game, a Stackelberg game with the home government as a leader, and a Stackelberg game with the foreign government as a leader. Taking both governments' policies as given, at stage three two firms, one in each country, supply a perfectly substitutable good into the home market in a Cournot fashion. Proposition 1 by Collie shows that the subgame perfect equilibrium is one in which the home government sets its production subsidy and tariff at stage one and the foreign government sets its positive export subsidy at stage two. This paper is concerned with whether Proposition 1, as obtained by Collie (1994), is applicable if a home government attaches more weight on a home firm's profit than the consumer's welfare. Let the weight on profit of a home firm be $v$. Then the following result is obtained.

PROPOSITION: In the case of $1 \leq v < 7/6$, the subgame perfect equilibrium policy is one in which the home government sets its production subsidy and tariff at stage one and the foreign government sets its export subsidy at stage two. But if $7/6 < v$, then there are typically two kinds of equilibria. In one, the home government sets its production subsidy and tariff at stage one and the foreign government sets a positive export subsidy at stage two. In the other, the home government sets its policy at stage two and the foreign government sets an export subsidy at stage one.
Thus if $1 \leq v < 7/6$, where, the home government’s evaluation coefficient $v$ is not too large, then proposition 1 by Collie (1994) still holds. However, profit preference by the home government, that is, a larger value of $v$, typically implies two kinds of equilibria, which leads to indeterminacy in a pure strategy game.

2. Basic model

The game considered here has four stages, as follows, and the equilibrium is the subgame perfect, obtained by a process of backward induction.

Stage 0: Each government independently chooses its policy stage
Stage 1: The leader country sets its policy variables
Stage 2: The follower country sets policy variables
Stage 3: Firms choose outputs in a Cournot fashion.

2.1 Demand for goods

The home country’s household utility function is:

$$U(x, y, z) = a(x+y) - (b/2)(x+y)^2 + z = u(x, y) + z, \quad 0 < a, \quad 0 < b$$  \hspace{1cm} (2.1.1)

where $x$, $y$ and $z$ denote consumption of the home good, that of the foreign good, and that of the numeraire good, respectively. I assume that $0 < a$ and $0 < b$. From the first order condition for utility maximization by a household, I obtain the inverse demand function, that is:

$$P = a - b (x+y),$$  \hspace{1cm} (2.1.2)

where $P$ stands for the product price in the home market. The definition of the consumer’s surplus is $CS=u(\cdot) - (Px+Py)$, and substitution obtains:

$$CS=b (x+y)^2/2 > 0.$$  \hspace{1cm} (2.1.3)

2.2 Production

In the third stage, taking the governments’ policies as given, a home firm and a foreign firm produce $x$ and $y$, respectively. It is assumed that the marginal cost to the home firm $c_x$ is greater than that to the foreign firm $c_y$. Then we have:

[Assumption 1] $c_y < c_x$.

The gross profit of each firm is:

$$\text{(3)}$$
\[ \pi_x = (P - c_x + s)x, \quad \pi_y = (P - c_y - t + e)y. \] (2.2.1)

where, \( s \), \( t \), and \( e \) denote a specific production subsidy for a home firm, a specific tariff on imports levied by the home government, and an export subsidy for the foreign firm provided by the foreign government, respectively. The behavior of firms is assumed to be Cournot competition for outputs. Under Cournot competition, assuming an interior solution, the first order condition (reaction function) of the profit maximization by each firm will be:

\[ (p - c_x + s) - bx = 0, \quad (p - c_y - t + e) - by = 0 \] (2.2.2)

Solving these equations for Cournot-Nash outputs obtains:

\[ x(s, t, e) = \frac{(AC_x - C_y + 2s + t - e)}{3b} \] (2.2.3 a)
\[ y(s, t, e) = \frac{(AC_y + C_y - 2t + 2e - s)}{3b} \] (2.2.3 b)

where, \( AC_x = a - c_x \) and \( C_y = c_y - c_y \). Further, the Cournot price will be:

\[ P(s, t, e) = \frac{(a + c_x - s + c_y + t - e)}{3}. \] (2.2.4)

In this setup of the model, the profit of each firm can be represented by:

\[ \pi_x = bx^2, \quad \pi_y = by^2. \]

The above results summarize the outputs and price at the third stage in terms of policy variables \( s \), \( t \), and \( e \).

### 2.3 Comparative statics on production and price

First, the effects of a production subsidy can be obtained as:

\[ \frac{dx}{ds} = 2/(3b) > 0, \quad \frac{dy}{ds} = -1/(3b) < 0, \quad \frac{dP}{ds} = -1/3 < 0. \]

And, second, the effects of a tariff change are:

\[ \frac{dx}{dt} = 1/(3b) > 0, \quad \frac{dy}{dt} = -2/(3b) < 0, \quad \frac{dP}{dt} = 1/3 > 0, \]

which can be the same as those of \( c_y \). Third, an export subsidy has influences on outputs and prices, so that:

\[ \frac{dx}{de} = -1/(3b) < 0, \quad \frac{dy}{de} = 2/(3b) > 0, \quad \frac{dP}{de} = -1/3 < 0, \]

which have the opposite effects of those for a tariff.
2.4 National Objective Function

The national objective function of the home country is assumed to be the weighted sum of the consumer's surplus, the gross profit of the home firm, and net government revenue $T = ty - sx$. The home country objective function is summarized as:

$$SW(s, t, e) = CS + v(P - c_x + s)x + T$$
$$= u(x, y) + (v - 1)(P - c_x + s)x - c_x x - (P - t)y,$$

where $v$ may be called a profit evaluation coefficient. Note that a similar but different issue, delegation in the trade policy, is analyzed in Collie (1997). In a delegation model, while a government attaches $v = 1$, the policymakers' $v$ could be different from 1. Partial differentiation of $SW$ with respect to policy variables yields:

$$\frac{\partial SW}{\partial j} = (v - 1) \frac{\partial}{\partial j} \left[ (P - c_x + s) x / \frac{\partial j}{\partial j} \right] + \frac{\partial y}{\partial j} - y \frac{\partial (P - t)}{\partial j}, \quad \text{where } j = s, t. \quad (2.4.2)$$

The second, third and fourth terms in these equations denote the resource allocation effects, the tariff revenue effects, and the terms of trade effects, respectively. The first term can be called profit evaluation effect on a national objective function that diminishes if $v = 1$. Putting both $\partial SW/\partial s$ and $\partial SW/\partial t$ equal to zero, and substituting for the comparative statics results, I get the reaction functions of the home government in a policy game:

$$\frac{\partial SW}{\partial s} = (4v - 1)AC_x - 4(v - 1)C_{xy} - (11 - 8v)s$$
$$- (7 - 4v)t - 4(v - 1)e/(9b) = 0 \quad (2.4.3a)$$

and

$$\frac{\partial SW}{\partial t} = (2v + 1)AC_x + (5 - 2v)C_{xy} - (7 - 4v)s$$
$$- (11 - 2v)t + (5 - 2v)e/(9b) = 0 \quad (2.4.3b)$$

Under the reaction functions of the home government, the relations

$$s = (2v - 1)bx \quad \text{and} \quad t = by \quad (2.4.4)$$

hold. If $v = 1$, then the coefficient for $e$ in (2.4.3a) vanishes. The second order

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1) In this paper I use the national objective function and national welfare as synonymous.

2) For similar treatments, see Baldwin (1987) and Rodrick (1995).
condition for the welfare maximization must be:
\[ SW_{ss} = \frac{\partial^2 SW}{\partial s^2} = -(11 - 8\nu)/(9b) < 0 \]
\[ SW_{tt} = \frac{\partial^2 SW}{\partial t^2} = -(11 - 2\nu)/(9b) < 0 \]
\[ SW_{st} = \frac{\partial^2 SW}{\partial s \partial t} = -(7 - 4\nu)/(9b) \]
\[ SW_{at} = SW_{st}^2 = 2(4 - 3\nu)/(9b^2) > 0. \]

Then we have:

[Assumption 2] \( \nu \leq 6/5. \)

The national objective (welfare) function of the foreign country is the net profit of a foreign firm, that is:
\[ SW^* (s, t, e) = (P - c_Y - t + e)y = y^2 - ey. \] (2. 4. 5)

By partially differentiating \( SW^* \) with respect to \( e \), a change in welfare resulting from a small change in \( e \) is obtained:
\[ \frac{\partial SW^*}{\partial e} = y \frac{\partial (P - c_Y - t)}{\partial e} + (P - c_Y - t) \frac{\partial y}{\partial e}. \]

The effect on welfare consists of the profit shifting effects and the terms of trade effects. Reference to the comparative statics results obtains:
\[ \frac{\partial SW^*}{\partial e} = (AC_y + C_{yx} - s - 2t - 4e)/(9b) = 0. \] (2. 4. 6)

On the reaction function of the foreign government,
\[ e = by/2 \] (2. 4. 7)

holds. The second order condition for the welfare maximization will be:
\[ \frac{\partial^2 SW^*}{\partial e^2} = -4/(9b) < 0 \]

**2.5 Free trade equilibrium**

For later reference, the free trade output of each firm and the domain of marginal cost \( c_y \) for an interior solution are shown. The superscript \( FT \) denotes a free trade variable. Putting \( s = t = e = 0 \) in (2. 2. 3a) and (2. 2. 3b) yields:
\[ x^{FT} = (a - 2c_x + c_y)/(3b) \]
\[ y^{FT} = (a + c_x - 2c_y)/(3b). \]

In order for output by each firm to be positive, \( c_y \) must be:
\[ 2c_x - a < c_y < (a + c_x)/2 \] (6)
The national welfare of each country can be denoted as:

\[ SW^{FT} = \frac{2v(AC_x - C_y)^2 + (AC_x + AC_y)^2}{18b} \]

and

\[ SW^{F*} = \frac{(AC_y + C_y)^2}{9b}. \]

### 3. National welfare under alternative policy timing

Having knowledge of the third stage Cournot competition among two firms, each government chooses the timing of the policy game. In this section, the national welfare of each country under the exogenously given sequence of policy moves is shown.

At stage zero of the game, each government decides independently to take the first move or the second. If one government, for example the home government, chooses the first move and the other chooses the second, then the policy game becomes a sequential game with the home government playing the Stackelberg leader. If both governments choose the same move, then the policy game is a simultaneous one. For the positive output of each firm in all cases, \( c_y \) must satisfy:

[Assumption 3] \[ 2c_x - a < c_y < \left( c_x - \frac{2(v-1)a}{3-2v} \right) \]

### 3.1 The simultaneous-move (Nash) policy game

We begin with a definition:

\[ \gamma(v) = 2(a - c_y) v - (2a + c_x - 3c_y) = 2(v-1)a - c_x - (2v-3)c_y < 0. \quad (3.1.1) \]

Because both governments choose the same stage of the policy game, by solving the reaction functions of the two governments simultaneously for \( s, t, \) and \( e \), the following can be obtained:

\[
\begin{align*}
  s^* &= \frac{(3a - 5c_x + 2c_y)(2v-1)}{(13-10v)} > 0 \\
  t^* &= -\gamma/(13-10v) > 0 \\
  e^* &= \gamma/(13-10v) > 0 
\end{align*}
\]

The superscript \( S \) denotes a simultaneous-move Nash policy game. Because both countries satisfy policy reaction functions,

\[ s^* = (2v-1)bx^*, \quad t^* = by^* \quad \text{and} \quad e^* = by^*/2 \]

(7)
hold. The home government sets its positive production subsidy and tariff, and the foreign government sets an export subsidy which is positive. The national welfare of each country will be:

\[ SW^s = \frac{(35 - 26v)AC_x^2 - 16(4 - 3v)(v - 1)AC_y^2 + 8(4 - 3v)C_{xy}^2}{2b(13 - 10v)^2} \tag{3.1.3} \]

and

\[ SW^* = 2\gamma^2/(b(13 - 10v)^2) \tag{3.1.4} \]

For the positive output of each firm, \( c_y \) must satisfy:

\[ (5c_x - 3a)/2 < c_y < (c_x - 2(v - 1)a)/(3 - 2v). \]

The price of a good becomes:

\[ P^s = (3c_x - (6a + 4c_y)(v - 1))/(13 - 10v) \]

that satisfies:

\[ P^s - c_x = -2(3a - 5c_x + 2c_y)(v - 1)/(13 - 10v) = -2(v - 1)b_x^* < 0, \quad \text{if } v > 1. \]

### 3.2 The case in which the home government plays the Stackelberg leader

If the home government chooses the first move and the foreign government chooses the second, then the outcome is a Stackelberg equilibrium with the home government playing the Stackelberg leader. In this case, first by solving \( \partial SW^*(s, t, e) / \partial e = 0 \) for \( e \), the reaction function of the foreign government in the second stage is obtained as a function of \( s \) and \( t \):

\[ e(s, t) = (a + c_x - 2c_y - s - 2t)/4, \tag{3.2.1} \]

with \( \partial e/\partial s = -1/4 < 0 \) and \( \partial e/\partial t = -1/2 < 0 \). By substituting \( e(s, t) \) for the Cournot outputs and price:

\[ x(s, t) = (a - 3c_x + 2c_y + 3s + 2t)/(4b) \]
\[ y(s, t) = (a + c_x - 2c_y - s - 2t)/(2b) \]
\[ P(s, t) = (a + c_x + 2c_y - s + 2t)/4 \]

are obtained. Under the foreign government reaction function,

\[ e(s, t) = by(s, t)/2 \]

holds. Differentiation of \( SW(s, t, e(s, t)) \) with respect to \( s \) and \( t \) yields:

\[ (8) \]
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\[
\frac{dSW(s, t, e(s, t))}{ds} = (6v - 1)AC_x - 2(6v - 5)C_{xy} - (23 - 18v)s - 6(3 - 2v)t / (16b) = 0 \tag{3.2.2a}
\]

and

\[
\frac{dSW(s, t, e(s, t))}{dt} = (2v + 1)AC_x + 2(3 - 2v)C_{xy} - 3(3 - 2v)s - 2(7 - 2v)t / (8b) = 0 \tag{3.2.2b}
\]

Solving (3.2.2a) and (3.2.2b) for \( s \) and \( t \) yields the policy level of the home government:

\[
s^H = (a - 2c_x + c_y)(2v - 1) / (5 - 4v) > 0
\]

\[
t^H = -\gamma / [2(5 - 4v)] > 0. \tag{3.2.3}
\]

Using these values, we get:

\[
e^H = -\gamma / [2(5 - 4v)] = t^H > 0, \tag{3.2.4}
\]

which satisfies:

\[
e^H = by^H / 2.
\]

Further we can obtain:

\[
s^H = (2v - 1)bx^H.
\]

Home and foreign welfare under a policy game with the home government playing Stackelberg leader are:

\[
SW^H = \frac{AC_x^2 - 2(v - 1)AC_x + C_{xy}^2}{2b(5 - 4v)} \tag{3.2.5}
\]

and

\[
SW^{*H} = \gamma ^2 / [2b(5 - 4v)^2]. \tag{3.2.6}
\]

In this case, positive outputs by two firms imply:

\[2c_x - a < c_y < (cx - 2(v - 1)a) / (3 - 2v).\]

The price of the good becomes:

\[P^H = (c_x - 2(a + c_x)(v - 1)) / (5 - 4v)\]

and

\[P^H - c_x = -2(a - 2c_x + c_y)(v - 1) / (5 - 4v) = -2(v - 1)bx^H < 0.
\]
3.3 The case in which the foreign government plays the Stackelberg leader

If the foreign government chooses the first move and the home government chooses the second, then a Stackelberg equilibrium with the foreign government playing the Stackelberg leader emerges. By analogous procedure, the home government’s reaction functions are obtained:

\[
\begin{align*}
    s(e) &= (2a - 3c_y + c_y - e)(2v - 1)/(2(4 - 3v)) \\
    t(e) &= (-2(1 + a + c_x - (3 - 2v)c_y + (3 - 2v)e)/(2(4 - 3v)).
\end{align*}
\]

(3.3.1)

Because the home country satisfies policy reaction functions,

\[
    s(e) = (2v - 1)bx(e) \quad \text{and} \quad t(e) = by(e)
\]

(3.3.2)

hold. Further, I can get:

\[
\begin{align*}
    ds/de &= - (2v - 1)/(2(4 - 3v)) \quad < 0 \\
    dt/de &= (3 - 2v)/(2(4 - 3v)) \quad > 0.
\end{align*}
\]

Substitution yields:

\[
dSW(s(e), t(e), e)/de = t(e)(3 - 2v)/(2b(4 - 3v)) - y(e) \quad [-(5 - 4v)/(2(4 - 3v))] = y(e) > 0.
\]

(3.3.3)

Thus, an increase in the foreign export subsidy makes the home country better off, if the domestic policies are set optimally; see Collie (1994).

Substituting \(s(e)\) and \(t(e)\) into \(SW^*(s, t, e)\) and differentiating with respect to \(e\) yields:

\[
dSW^*(s(e), t(e), e)/de = -(2a(v - 1)^2 - c_y(v - 1) + c_y(3 - 2v)(v - 1) \\
+ e(3 - 2v)(5 - 4v))/(2b(4 - 3v)^2)
\]

(3.3.4)

Setting the above expression at zero, the optimum export subsidy is obtained as:

\[
e^F = -\gamma(v - 1)/(5 - 4v)(3 - 2v) > 0.
\]

(3.3.5)

Note that if \(v = 1\), then \(e^F = 0\), which is consistent with Collie (1994). By substituting (3.3.5) into (3.3.1), the optimum value for the home policy variables can be obtained as:

\[
\begin{align*}
    s^F &= (2AC_y(4 - 3v) - C_y(3 - 2v))(2v - 1)/\{2(5 - 4v)(3 - 2v)} > 0 \\
    t^F &= -\gamma/(2(5 - 4v)) > 0.
\end{align*}
\]

(3.3.6)
which satisfy:
\[ s^F = (2v-1)bx^F \quad \text{and} \quad t^F = by^F. \]

The welfare of each country can be shown as:
\[ SW^F = \frac{2(13v^2-33v+21)AC_x^2-(6v^2-17v+12)\{2(v-1)AC_x^2-C_{xy}\}}{4b(3-2v)(5-4v)^2} \quad (3.3.7) \]
and
\[ SW^{*F} = r^2/(4b(3-2v)(5-4v)) \quad (3.3.8) \]

For the interior solution, \( c_y \) must be:
\[ \{(6a-8c_x)v-8a+11c_x\}/(3-2v) < c_y < \{c_x-2(v-1)a\}/(3-2v). \]

The price of a good is:
\[ P^F = (-2a(4-3v)(v-1)+c_x(4-3v)-c_y(3-2v)(v-1))/(3-2v)(5-4v) \]
and it satisfies:
\[ P^F - c_x = \{2(3a-4c_x+c_y)v-8a+11c_x-3c_y\}/(3-2v)(5-4v) \]
\[ = -2(v-1)bx^F < 0, \quad \text{if } v > 1. \]

4. Determination of policy timing

At stage zero, each government chooses its policy timing by comparing its national welfare (payoff) in each strategy. The national welfare (payoff) is summarized in Table 1.

For \( v \leq 6/5 \), comparison for home welfare implies:
\[ SW^S - SW^H = -r^2(3-2v)/(2b(5-4v)(13-10v)^2) < 0 \quad (4.1) \]
and
\[ SW^S - SW^F = r^2[(33-26v)(7-6v)(4-3v)]/[4b(3-2v)(5-4v)(13-10v)]^2]. \quad (4.2) \]

Further,
\[ SW^H - SW^F = r^2(6-5v)/(4b(3-2v)(5-4v)^2) \geq 0. \]

As for foreign welfare, the following relations hold:
\[ (11) \]
Table 1  Payoff in Policy Games (home welfare, foreign welfare)

<table>
<thead>
<tr>
<th>Home government</th>
<th>Foreign government</th>
</tr>
</thead>
<tbody>
<tr>
<td>stage 1</td>
<td>(SW^*, SW^H)</td>
</tr>
<tr>
<td>stage 2</td>
<td>(SW^F, SW^*F)</td>
</tr>
</tbody>
</table>

\[
SW^S - SW^H = -\gamma (23 - 18v) (3 - 2v) / [2b ((13 - 10v) (5 - 4v)] < 0 \quad (4.3)
\]
\[
SW^S - SW^F = -\gamma (7 - 6v)^2 / (4b (5 - 4v) (3 - 2v) (13 - 10v)^2) < 0 \quad (4.4)
\]

and
\[
SW^F - SW^H = -\gamma / (4b (3 - 2v) (5 - 4v)^2). \quad (4.12)
\]

In order to establish the value of \( (SW^S - SW^F) \) in (4.2), I consider two cases, separately.

Case 1: \( 1 \leq v < 7/6 \). In this case \( SW^S - SW^F > 0 \) holds. With (4.1), the home government's dominant strategy is to take the first move and it sets trade policy at stage one. For the foreign government, setting its policy at the second stage is the optimal response to this home government policy.

Case 2: \( 7/6 < v \leq 6/5 \). In this case \( SW^S - SW^F < 0 \) holds, and two equilibria are possible. In one, the home government sets its policy at stage one and the foreign government sets its policy at stage two. In the other, the home government sets its policy at stage two and the foreign government sets its policy at stage one. I can summarize the above result as:

**PROPOSITION**: In the case of \( 1 \leq v < 7/6 \), the subgame perfect equilibrium policy is one in which the home government sets its production subsidy and tariff at stage one and the foreign government sets its export subsidy at stage two. But if \( 7/6 < v \), then there are typically two kinds of equilibria. In one, the home government sets its production subsidy and tariff at stage one and the foreign government sets an export subsidy at stage two. In the other, the home government sets its policy at stage two and the foreign government sets an export subsidy at stage one.

Thus if \( v < 7/6 \), where the home government’s evaluation coefficient, \( v \), is not too large, then proposition 1 by Collie (1994) still holds. However, profit preference by the home government, that is, a larger value of \( v \), implies typically two kinds of
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Table 2 Comparison of national welfare according to the value of \( \nu \)

| assumed value \( \nu \leq 6/5 \) | the second order condition for max \( SW, \nu < 4/3 \) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| \( SW^I - SW^F \) | 7/6 | 6/5 | 5/4 | 33/26 | 23/18 | 4/3 |
| \( SW^F - SW^*F \) | + | + | - | + | + | - |
| \( SW^*F - SW^*F \) | - | - | - | + | + | + |
| \( SW^*F - SW^*F \) | - | - | - | - | - | - |

equilibria, which leads to indeterminacy in a pure strategy game. Table 2 gives national welfare comparisons for some values of \( \nu \).

5. Summary and conclusion

Suppose that the home government attaches more weight to the home firm's profit than the consumer's surplus. Let the weight on profit of the home firm be \( \nu \). In this paper, it has been shown that in the case of \( 1 \leq \nu < 7/6 \), the subgame perfect equilibrium policy is one in which the home government sets its production subsidy and tariff at stage one and the foreign government sets its export subsidy at stage two, as shown by Collie. If \( 7/6 < \nu \), however, there are typically two kinds of equilibria, which leads to indeterminacy in a pure strategy game.

References


