Antidumping Policies in Intermediate Good Markets

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Presented at University of Tokyo
27 January 2016

Motivation

- What is antidumping?
  - *"It is simply another form of protection." (Blonigen and Prusa, 2003)*
  - The main purpose of AD policies is to prevent firms to engage in international price discrimination.

Motivation

- Many new users are now (from mid 90s) particularly active:
  - Brazil, China, India, Mexico, South Africa, South Korea …
  - EU, USA, Canada, Australia are not anymore the only players!

Motivation

- *Why is AD so popular?*
  - the liberalization of tariffs
  - the lack of satisfactory provisions to safeguard products
  - weak antidumping standards
  - more selective
  - less transparent

Literature

- This issue has been extensively studied:
  - Welfare effects (Reitzes, 1993)
  - Protection effects(Veugeler and Vandenbussche, 1999; Vandenbussche et al., 2001; Belderbos et al., 2004; Falvey and Wittayarungruangsri, 2006)
  - Collusive effects (Collie and Mai Le, 2010)
  - Substitute for tariffs (Dinlersoz and Dogan, 2009)
  - Retaliation effects (Prusa and Teh , 2010)
  - R&D (Gao and Miyagiwa, 2005; Kao and Peng, 2016)

Observation

Country		Intermediate Goods	%	Final Goods	%
Developing countries	BRA	69	67%	34	33%
	CHN	143	93%	10	7%
	IND	311	71%	126	29%
	IDN	18	44%	23	56%
	TUR	12	50%	12	50%
	MYS	11	41%	16	59%
	THL	10	29%	25	71%
	MEX	18	32%	39	68%
	ARG	46	37%	80	63%
Sub-Total		**638**	**64%**	**365**	**36%**

Country		Intermediate Goods	%	Final Goods	%
Transition countries	TWN	9	41%	13	59%
	KOR	35	50%	35	50%
Sub-Total		**44**	**48%**	**48**	**52%**
Developed countries	USA	113	39%	180	61%
	AUS	34	39%	53	61%
	CAN	43	48%	47	52%
	EUN	90	45%	110	55%
	JPN	6	100%	0	0%
Sub-Total		**286**	**42%**	**390**	**58%**
Total		**968**	**55%**	**803**	**45%**

Data Source: Bown, Chad P. (2009). Data period is from 2000 to 2008, except: JPN (2000, Jan.~2007, Jul.), TWN (2000, Jan.~2006, Oct.), and THL (2001, Apr.~2007, Oct.).

Motivation

- Empirical observations have shown that antidumping protections are often targeted on intermediate goods such as primary metals, chemical, electronics, and mechanical engineering parts.
- However, the effects of AD policies on intermediate good market has attract few attention in the literature.
- Berhonfen (1995) is the only paper discusses this issue.

Research questions

- to explore the protection and welfare effects of AD policies in intermediate good markets.

- to examine the effects of AD policies on domestic industry

Main contributions

- Downstream firms can produce heterogeneous products
- AD duty vs. price undertaking policy
- Protection effects for the protected firm and for the domestic industry
- Domestic and World Welfare

Main findings

- Comparing to free trade, imposing AD duty in domestic intermediate good market:
  - increases the profit of the domestic upstream firm but decreases the profit of the domestic downstream firm;
  - enhances the domestic industry profit but deteriorates consumers surplus;
  - raises the domestic welfare at the expense of world welfare.

Main findings

- Comparing to free trade, a price undertaking policy
  - always hurts the domestic downstream firm;
  - increases the profits of the domestic upstream firm and domestic industry if the product differentiation between the final products is large;
  - is not only beneficial to the domestic consumers but also socially and globally more desirable if the product differentiation of the final products is large.

Main findings

- The domestic welfare is always higher under an AD duty policy than a price undertaking policy.

- An AD duty is superior (inferior) to a price undertaking policy in terms of world welfare and industrial profitability if the degree of product differentiation is small (large).

- If the foreign upstream firm can choose between the two policies, it always prefers price undertakings to AD duties.

Outlines

- Section 2 sets out our basic model.
- Section 3 examines the AD duty regime and then compares the results with those under free trade.
- Section 4 investigates the price undertaking regime.
- Section 5 compares the equilibrium outcomes under the two AD policies.
- Section 6 concludes the paper.

THE BASIC MODEL

Assumptions

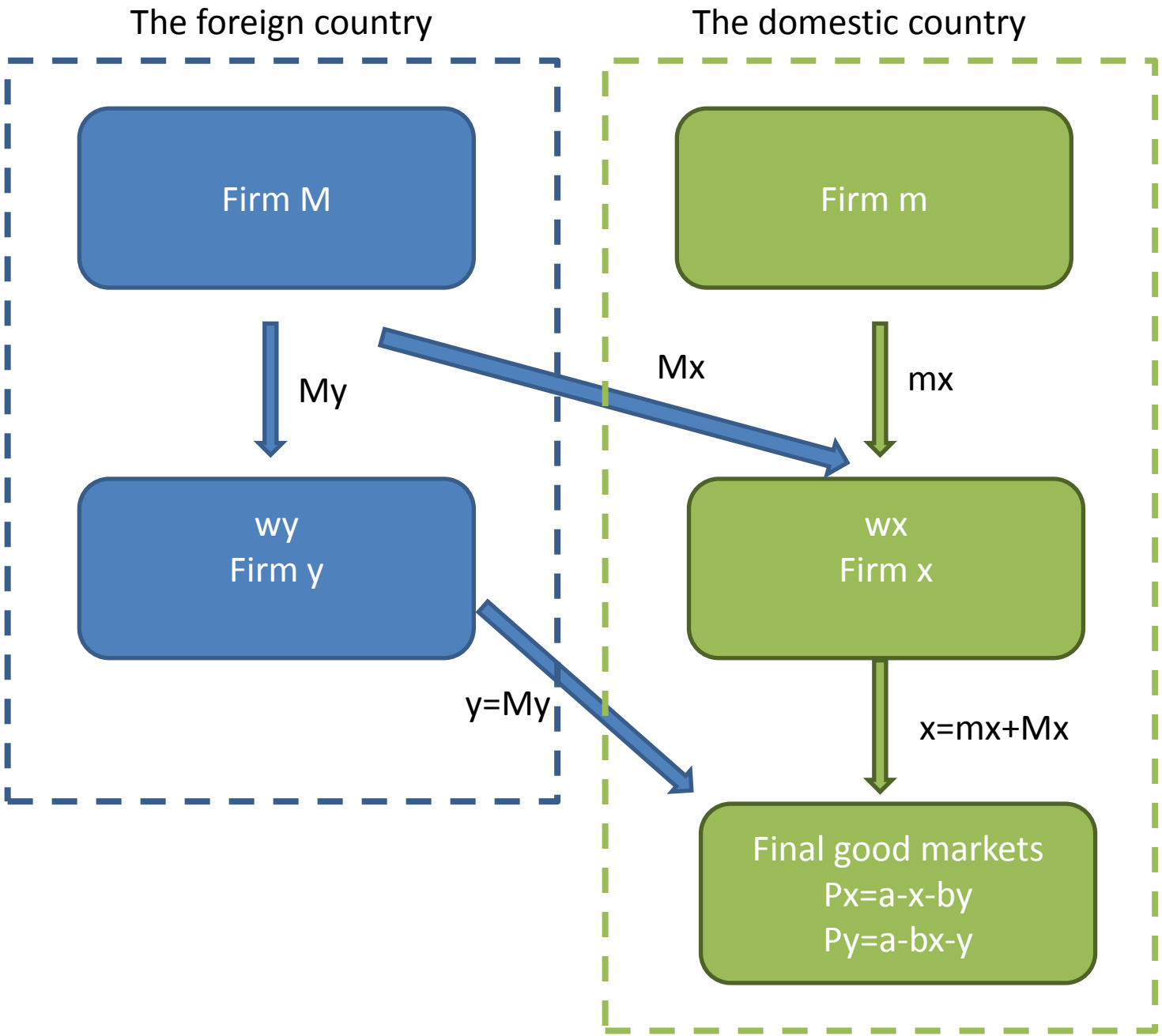
- Two countries: F and H
- Two upstream firms: m and M located in H and F.
- Two downstream firms: x and y located in H and F.
- m produces m_x and supplies its entire output to the domestic market; M produces and sales M_x and M_y to the domestic and the foreign intermediate good markets respectively.
- m and M compete in Cournot fashion in the domestic intermediate good market

Assumptions

- The domestic downstream firm, firm x, and the foreign downstream firm, firm y, produce differentiated products, *x* and *y,* and compete in Cournot fashion in the domestic final good market.
- Marginal cost for the intermediate product =c, transport cost = 0

- We assume that one unit final good is produced by one unit intermediate good,

  hence, x=mx+Mx and y=My.


The foreign country
The domestic country
Firm M
Firm m
My
Mx
mx
wy
Firm y
wx
Firm x
y=My
x=mx+Mx
Final good markets
Px=a-x-by
Py=a-bx-y

Demand and profits

- Inverse demand function

$$p_x = a - x - by,$$

$$p_y = a - y - bx.$$

- Upstream firms' profits

$$\pi_m = \left(w_x - c\right) m_x$$

$$\pi_M = \left(w_x - c\right) M_x + \left(w_y - c\right) M_y$$

where wx and wy are the prices of the intermediate good in the domestic and the foreign intermediate good markets respectively.

- Downstream firms' profits

$$\pi_x = (p_x - w_x)x = \left(a - w_x - x - by\right)x$$

$$\pi_y = (p_y - w_y)y = \left(a - w_y - y - bx\right)y$$

- The game in question consists of two stages.
  - First stage: Firm m and M determine their outputs
  - Second stage: Firm x and y determine their outputs
- The sub-game perfect Nash equilibrium is solved through backward induction.

The derived demands

- The equilibrium in the second stage:

$$x = \frac{a(2-\mathrm{b}) - 2w_x + bw_y}{4-b^2}, \text{ and } y = \frac{a(2-\mathrm{b}) + bw_x - 2w_y}{4-b^2}.$$

- The inverse derived demands

$$w_x = a - 2m_x - 2M_x - bM_y, and$$
$$w_y = a - bm_x - bM_x - 2M_y.$$

The first stage

- Equilibrium outputs of the intermediate products

$$m_x^f = \frac{1}{6}A,\ M_x^f = \frac{4-b}{12(2+b)}A,\ \text{and}\ M_y^f = \frac{1}{2(2+b)}A$$

- where A=(a-c) and “f” are associated with the free trade regime.

Equilibrium

$$x^f = \frac{(b+8)A}{12(b+2)} \qquad y^f = \frac{1}{2(b+2)}A \qquad p_x^f = \frac{(16+5b)}{12(2+b)}A + c \qquad p_y^f = \frac{(18+4b-b^2)}{12(2+b)}A + c$$

$$w_y^f = \frac{(6-b)}{12}A + c \qquad w_x^f = \frac{1}{3}A + c \qquad w_y^f - w_x^f = (2-b)A/12 > 0$$

$$\pi_y^f = \frac{1}{4(b+2)^2}A^2 \qquad \pi_x^f = \frac{(b+8)^2}{144(b+2)^2}A^2 \qquad \pi_M^f = \frac{(26-5b)}{72(b+2)}A^2 \qquad \pi_m^f = \frac{1}{18}A^2$$

$$CS^f = u(x,y) - p_x x - p_y y = \frac{100+112b+13b^2}{288(b+2)^2}A^2,$$

$$SW^f = CS + \pi_m + \pi_x + tM_x = \frac{146+31b}{288(b+2)}A^2 \qquad WW^f = SW + \pi_M + \pi_y = \frac{572+272b+11b^2}{288(b+2)^2}A^2$$

THE ANTIDUMPING DUTY REGIME

AD duty

- The second stage game is the same as that in the free trade model, we proceed to the first stage game.
- The profit functions of the upstream firms:

$$\pi_m = (w_x - c) m_x ,$$

$$\pi_M = (w_x - c - t) M_x + (w_y - c) M_y ,$$

$$w_x^D = \frac{A + t}{3}, \quad w_y^D = \frac{(6 - b)A + bt}{12} + c .$$

Both input prices are raised by the AD policy.

Equilibrium

$$x^D = \frac{88+12b-b^2}{144(2+b)}A,\quad y^D = \frac{b+12}{24(b+2)}A, p_x^D = \frac{5(40+12b-b^2)}{144(2+b)}A+c,\quad p_y^D = \frac{b^3-12b^2+50b+216}{144(b+2)}\text{A+c},$$

$$m_x^D = \frac{14-2b}{72}A,\quad M_x^D = \frac{(b-4)(b-8)}{144(b+2)}A,\quad M_y^D = \frac{b+12}{24(b+2)}A,$$

$$w_x^D = \frac{14-b}{36}A+c,\quad w_y^D = \frac{72-14b+b^2}{144}A+c,$$

$$\pi_x^D = \frac{(b^2-12b-88)^2}{20736(b+2)^2}A^2,\quad \pi_y^D = \frac{1}{576}\frac{(b+12)^2}{576(b+2)^2}A^2,\quad \pi_m^D = \frac{(14-b)^2}{2592}A^2,\quad \pi_M^D = \frac{7b^3-352b-38b^2+3104}{10368(b+2)}A^2$$

$$CS^D = \frac{12928+15648b+2788b^2-24b^3-11b^4}{41472(b+2)^2}A^2,$$

$$SW^D = \frac{22016+3728b-134b^2-17b^3}{41472(2+b)}A^2,$$

$$WW^D = \frac{79232+40800b+1820b^2-264b^3+11b^4}{41472(b+2)^2}A^2.$$

Comparing with free trade

$$\pi_m^D - \pi_m^f > 0 \quad , \quad \pi_x^D - \pi_x^f < 0$$

$$(\pi_m^D + \pi_x^D) - (\pi_m^f + \pi_x^f) > 0$$

$$CS^D - CS^f < 0$$

$$SW^D - SW^f > 0, \quad WW^D - WW^f < 0.$$

- Product differentiation is irreverent.

Proposition 1. An AD duty policy imposed in the domestic intermediate good market

(i) increases the profit of the domestic upstream firm but decreases the profit of the domestic downstream firm;

(ii) enhances the domestic industry profit but deteriorates consumers surplus;

(iii) raises the domestic welfare at the expense of world welfare.

THE PRICE UNDERTAKING REGIME

Price undertaking

- The first stage game:

$$\max_{m_x} \pi_m = \left(w_x - c\right) m_x$$

$$\max_{M_x, M_y} \pi_M = \left(w_x - c\right) M_x + \left(w_y - c\right) M_y$$

$$\text{s.t. } M_y - M_x = m_x$$

Equilibrium

$$M_x^U = \frac{1}{5(b+2)}A, M_y^U = \frac{3}{5(b+2)}A, \quad m_x^U = \frac{2}{5(b+2)}A.$$

$$w_x^U = w_Y^U = \frac{2}{5}A + c \equiv w^U$$

Note that w_x increases but w_y decreases. This is different from the AD duty regime

$$x^U = \frac{3}{5(b+2)}A, y^U = \frac{3}{5(b+2)}A, \quad p_x^U = \frac{(2b+7)}{5(b+2)}A + c, \quad p_y^U = \frac{(2b+7)}{5(b+2)}A + c,$$

$$\pi_x^U = \frac{9}{25(b+2)^2}A^2, \quad \pi_y^U = \frac{9}{25(b+2)^2}A^2, \quad \pi_m^U = \frac{4}{25(b+2)}A^2, \quad \pi_M^U = \frac{8}{25(b+2)}A^2,$$

$$CS^U = \frac{9(b+1)}{25(b+2)^2}A^2, \quad SW^U = \frac{13}{25(b+2)}A^2, \quad WW^U = \frac{3(7b+17)}{25(b+2)^2}A^2.$$

Comparing with free trade

- Protection effects

$$\pi_m^U - \pi_m^f \geq 0 \quad \text{if} \quad b \leq 0.88,$$

$$\pi_x^U - \pi_x^f < 0,$$

$$(\pi_m^U + \pi_x^U) - (\pi_m^f + \pi_x^f) \geq 0 \quad \text{if} \quad b \leq 0.075$$

Proposition 2. A price under policy imposed in the domestic intermediate good market always decreases the profitability of the domestic downstream firm. It decreases (increases) the profits of the domestic upstream firm and domestic industry if the product differentiation between the final products is small (large).

Comparing with free trade

- Consumer surplus

$$CS^U - CS^f \geq 0 \text{ if } b \leq 0.301$$

- Welfare effects

$$SW^U - SW^f \geq 0 \text{ if } b \leq 0.121,$$

$$WW^U - WW^f \geq 0 \text{ if } b \leq 0.444.$$

Proposition 3. A price undertaking policy imposed in the domestic intermediate good market is not only beneficial to the domestic consumers but also socially and globally more desirable if the product differentiation of the final products is large.

COMPARISONS BETWEEN THE TWO POLICIES

AD duty vs. price undertaking

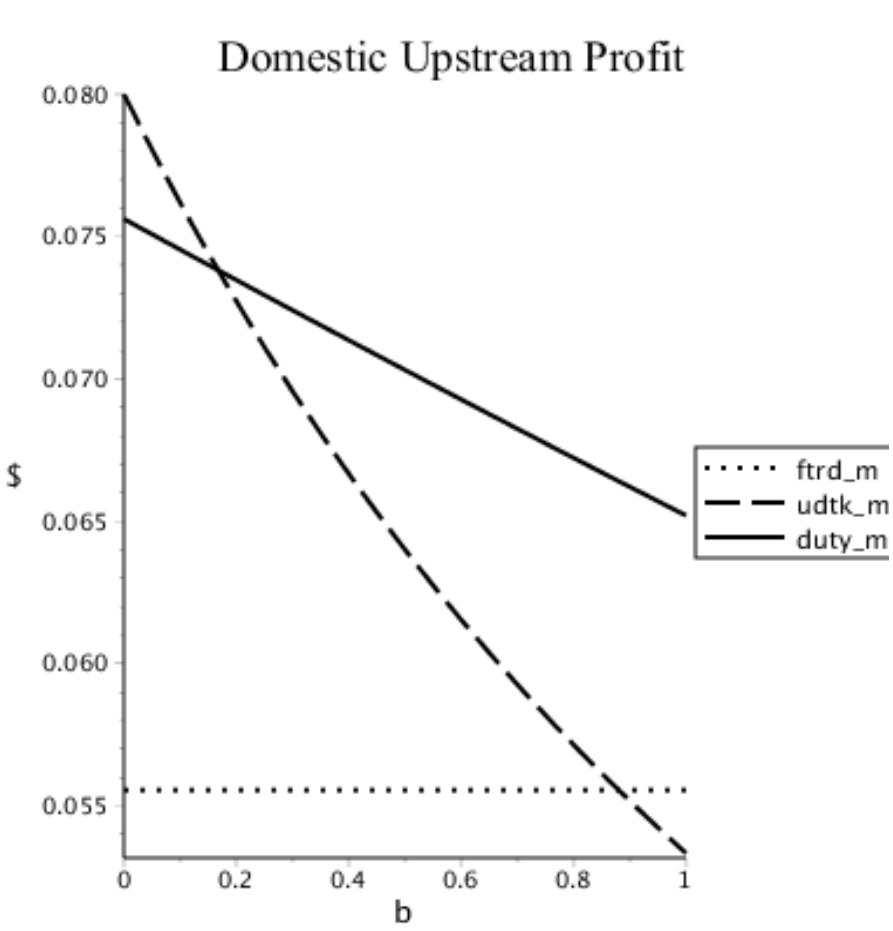
- Protection effects

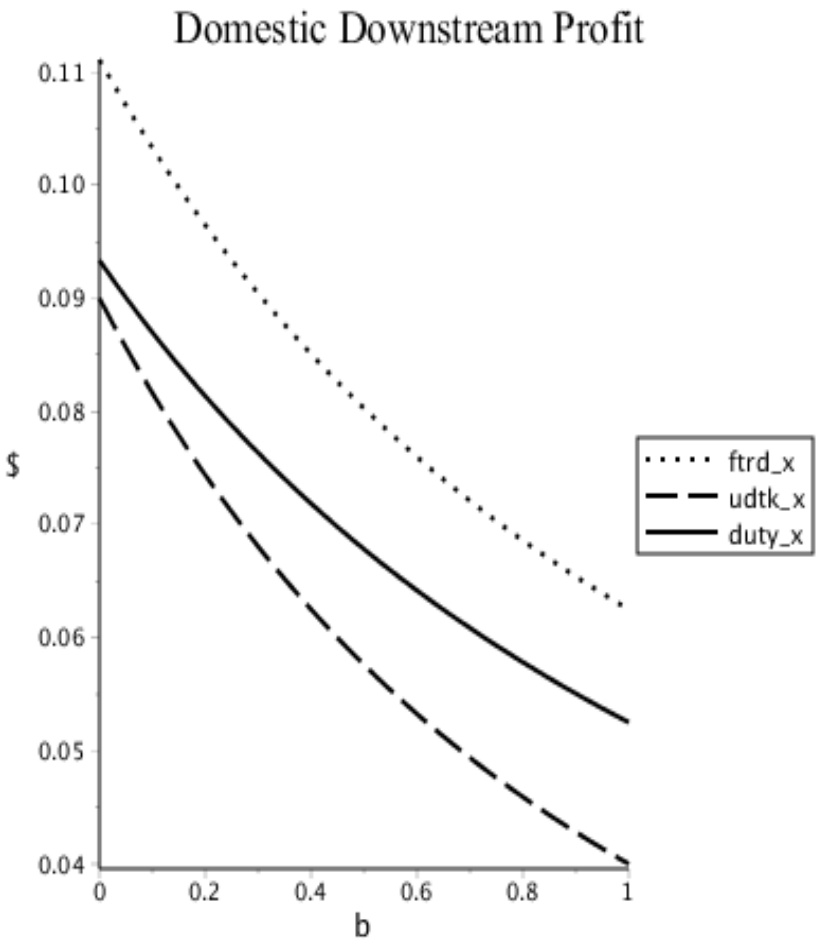
$$\pi_m^U - \pi_m^D \geq 0 \quad \text{if} \quad b \leq 0.167,$$

$$\pi_x^U - \pi_x^D < 0,$$

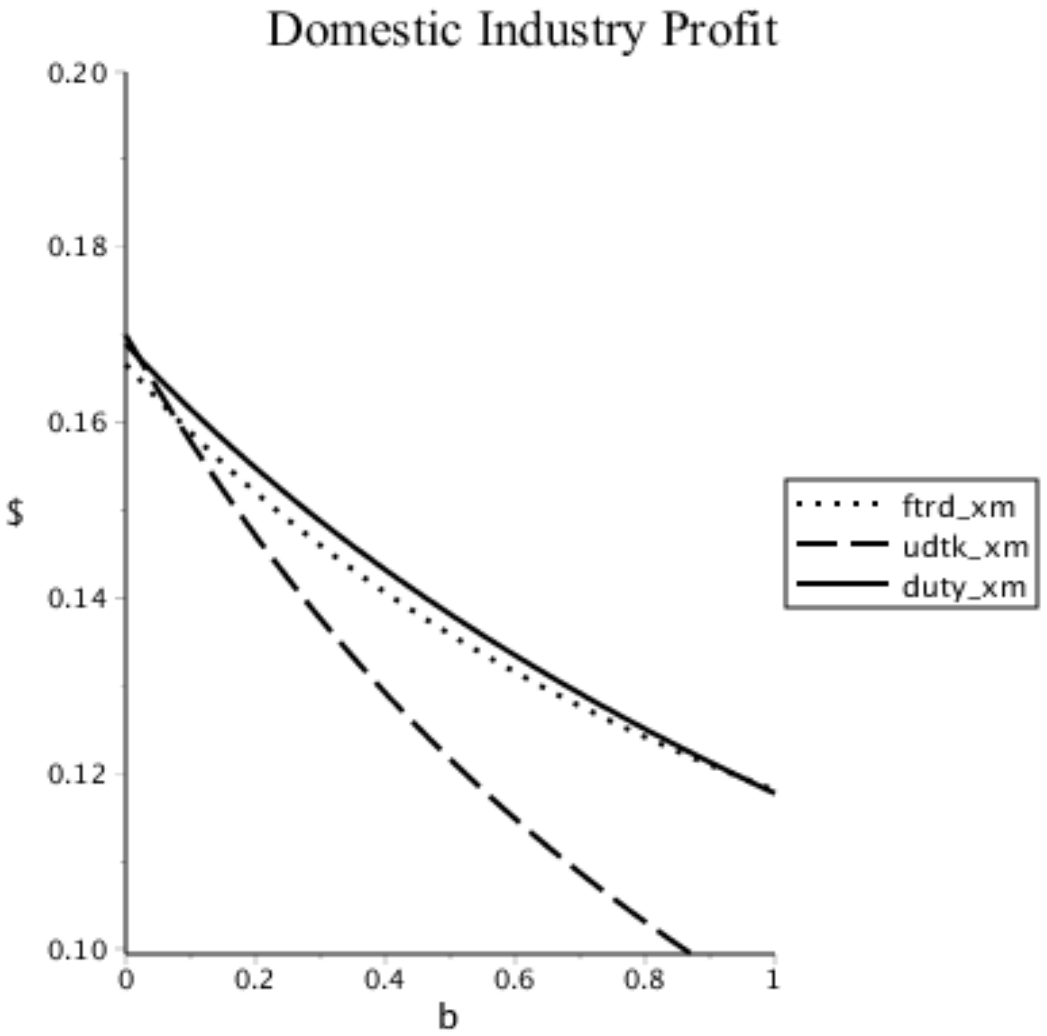
$$(\pi_m^U + \pi_x^U) - (\pi_m^D + \pi_x^D) \geq 0 \quad \text{if} \quad b \leq 0.02$$

Protection effects





Protection effects



AD duty vs. price undertaking

- Consumer surplus

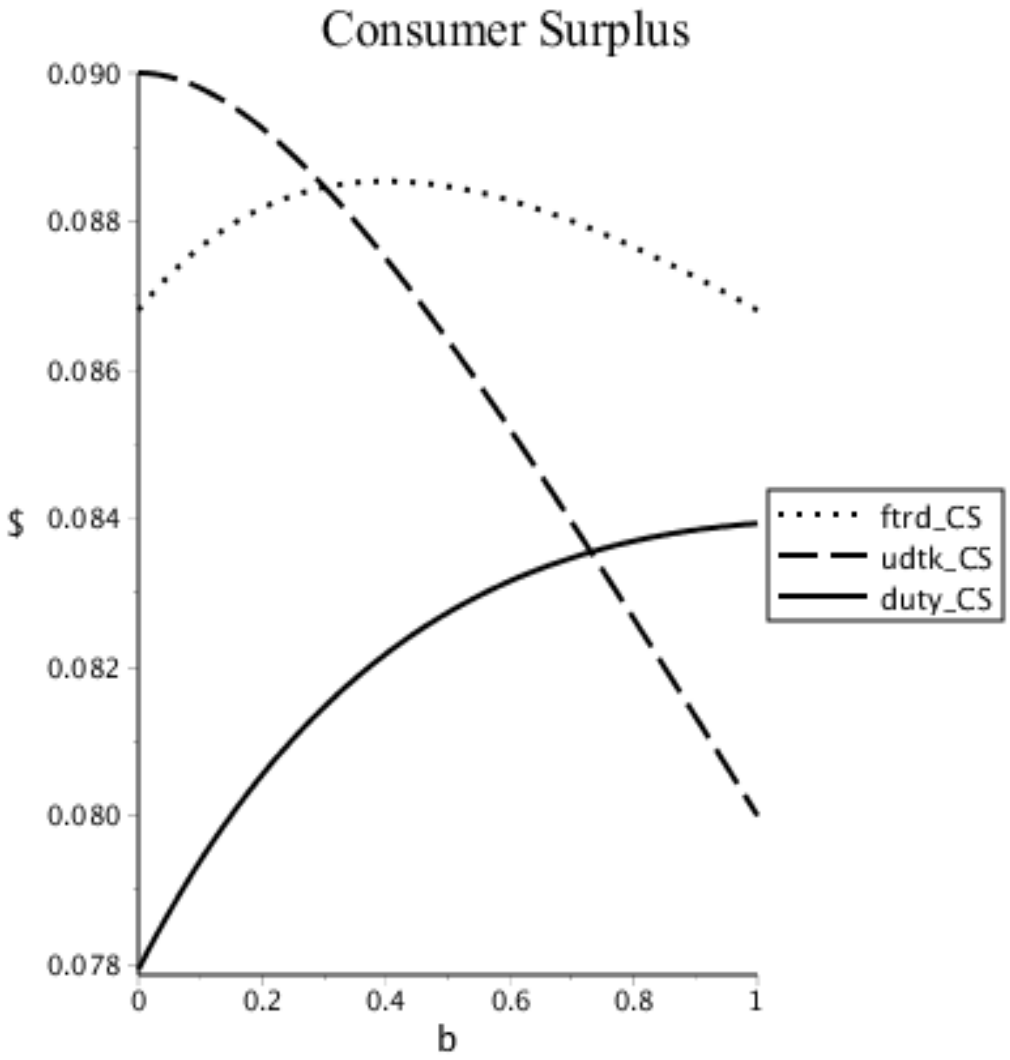
$$CS^U - CS^D \geq 0 \text{ if } b \leq 0.731$$

- Welfare effects

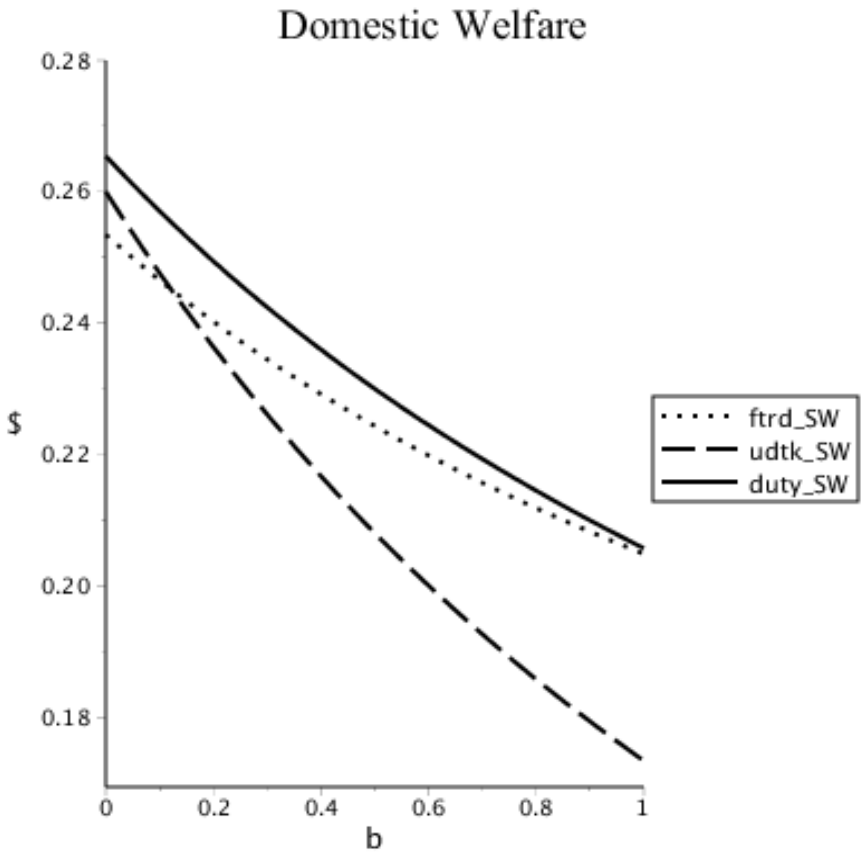
$$SW^U - SW^D < 0 \ ,$$

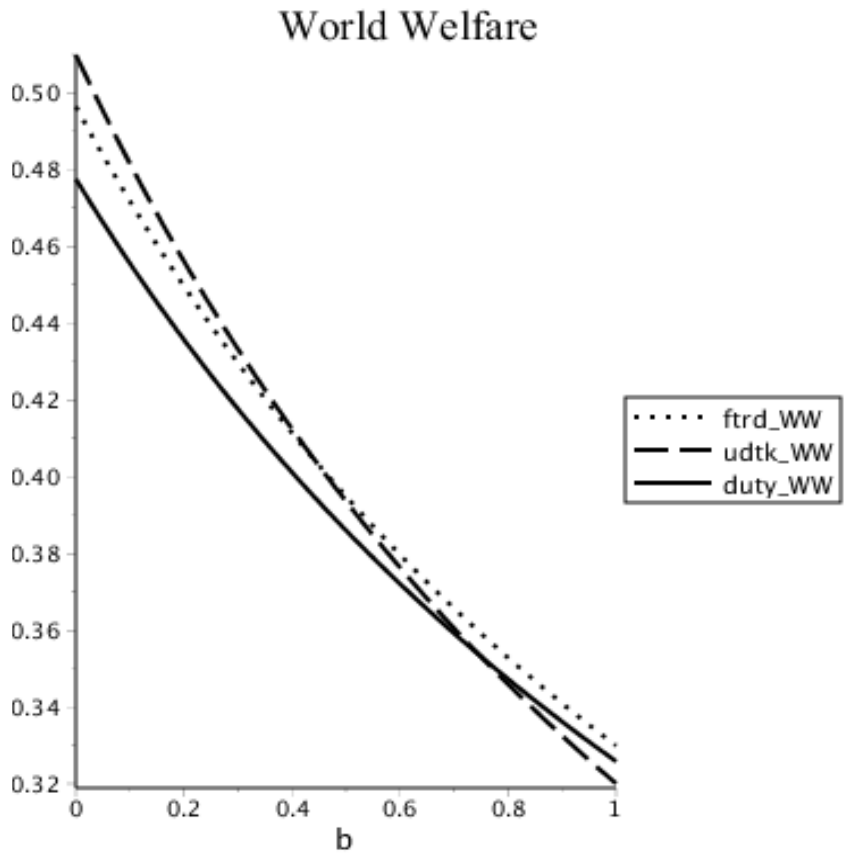
$$WW^U - WW^D \geq 0 \text{ if } b \leq 0.748$$

Consumer surplus



Welfare


Domestic Welfare
0.28
0.26
0.24
0.22
0.20
0.18
$
0
0.2
0.4
0.6
0.8
1
b
ftrd_SW
udtk_SW
duty_SW


World Welfare
0.50
0.48
0.46
0.44
0.42
0.40
0.38
0.36
0.34
0.32
0
0.2
0.4
0.6
0.8
1
b
ftrd_WW
udtk_WW
duty_WW

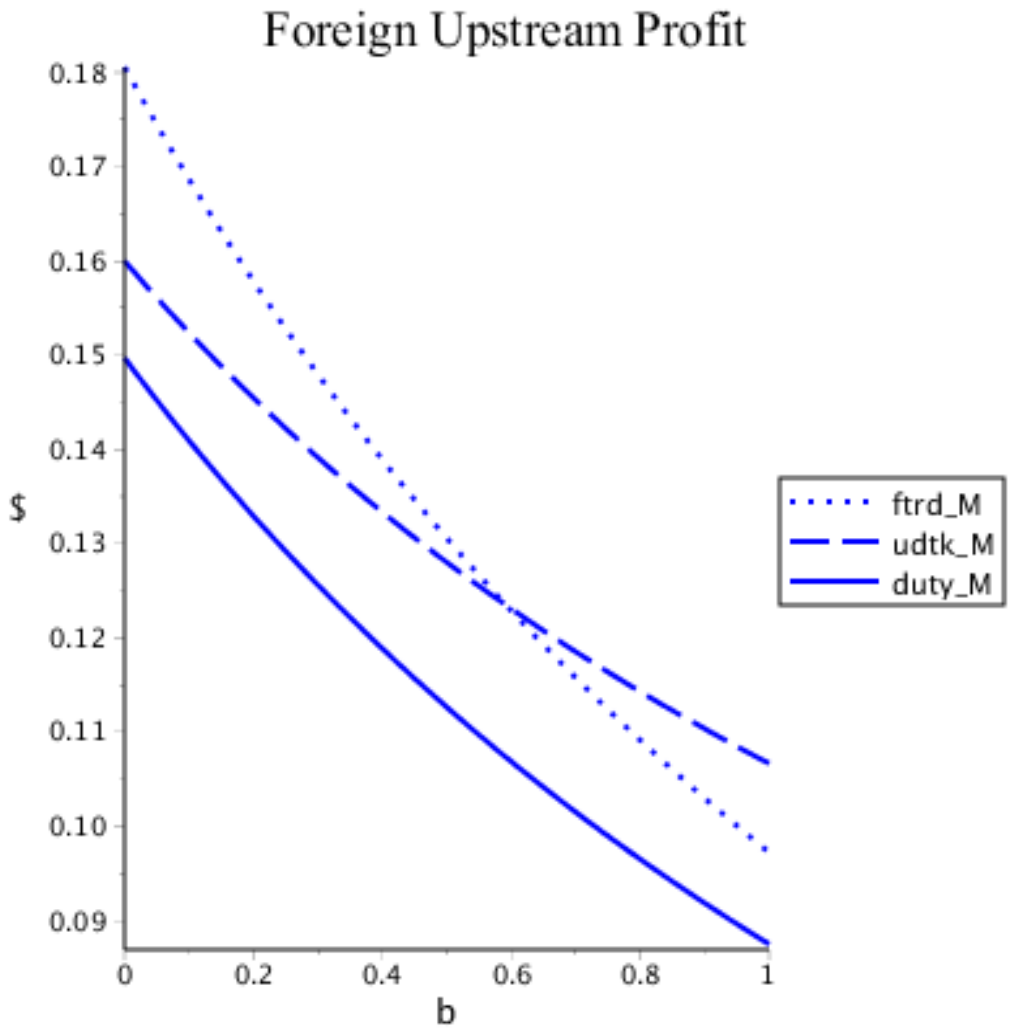
Proposition 4. An AD duty is superior (inferior) to a price undertaking policy in terms of world welfare and industrial profitability if the degree of product differentiation is small (large). That is to say, the protection effect of the two policies hinges on the product differentiation of the final goods. However, the domestic welfare under the AD duty regime is higher than the price undertaking regime.

AD duty vs. price undertaking

- If the foreign upstream firm can determine which policy to take, it always prefer a price undertaking policy to an AD duty.

$$\pi_M^U - \pi_M^D > 0$$

Foreign upstream firm's profit



Summary: Comparing with free trade

	AD duty	Price undertaking
Domestic		
downstream firm	decreases	decreases
upstream firm	increases	increases*
industrial profit	increases	increases*
consumer surplus	decreases	increases*
welfare	increases	increases*
World welfare	decreases	increases*

* The results hold if the product differentiation is large; otherwise the reverse is true

Summary: AD duty vs. Undertaking

Domestic	
downstream firm	AD duty
upstream firm	Undertaking*
industrial profit	Undertaking*
consumer surplus	Undertaking*
welfare	AD duty
World welfare	Undertaking*
Foreign upstream firm	Undertaking

* The results hold if the product differentiation is large; otherwise the reverse is true.

COMMENTS ARE WELCOME

THANK YOU