

Trade Policy Strategic Game Considering Political Propensity

Case of Trump's Tariff Policy

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- ◆ Introduction
- ◆ Basic model
- ◆ Variation of Model
- ◆ Analysis & Implication
- ◆ Case Study

Motivation and Background



US tariffs on China could cost American households \$1,000 per year, JPMorgan says



By [Matt Egan, CNN Business](#)

Updated 1852 GMT (0252 HKT) August 20, 2019

The US-China trade war hurts American families

By [Mary E. Lovely for CNN Business Perspectives](#)

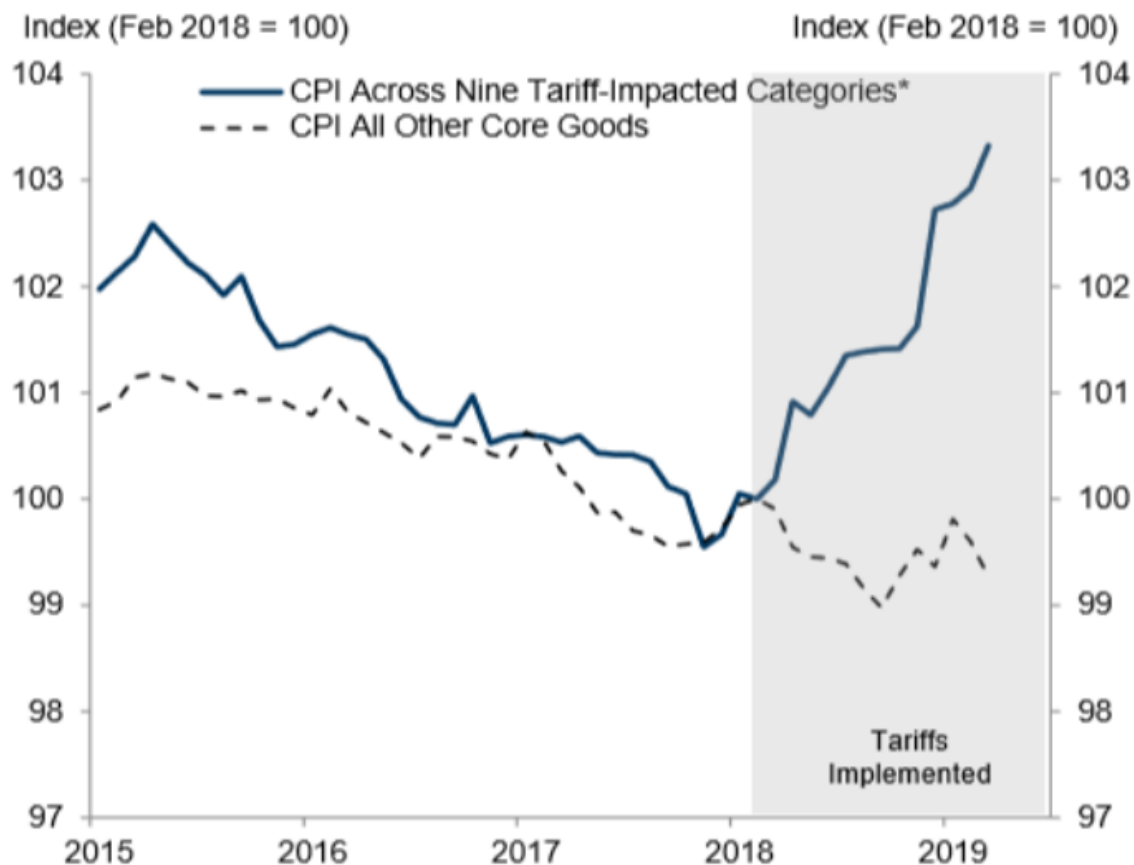
Updated 1944 GMT (0344 HKT) May 20, 2019

TRADE WAR

US-China trade war intensifies as Trump pushes 25% tariffs

Motivation and Background

Exhibit 5: The Impact of the Tariffs on Consumer Prices Is Clearly Visible



*Includes laundry equipment and other appliances, furniture, bedding, and floor coverings, auto parts, materials. Weighted by relative importance to headline index.

Source: Department of Labor, Department of Commerce, Goldman Sachs Global Investment Research

Trump's pro-business policy

- Reduction in corporate tax
 - : reduced from 35% -> 21% in 2017 (21% -> 20% in 2018)
- Easing environmental regulation
 - : abolition of Obama government environmental regulation
 - : easing methane gas emission regulation
- Weakening Labor union
 - : reducing labor union project
 - : cut the time off granted for paid union activities

Motivation and Background

[Objective]

- To figure out whether Trump administration's political propensity affects tariffs

[Expected Result]

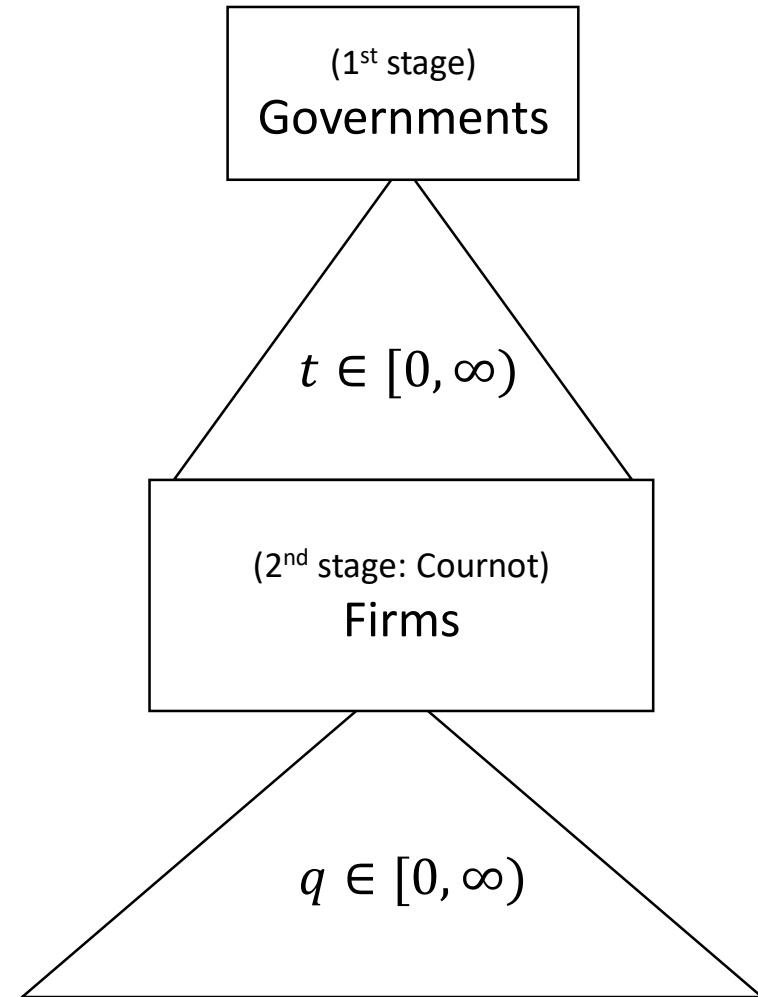
- Trump's pro-business propensity is related to high tariffs

- **Political propensity:** government`s tendency to behave according to which economic agent they are focusing on
 - **Pro-business government:** it implies the government placing **greater weight on firm`s profit** when determining domestic tariff
 - **Pro-consumer government:** it implies the government placing **greater weight on consumer surplus** when determining domestic tariff

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Structure of the Model

- Two Stage Sequential Game
- Players: Two governments (Home / Foreign)
Two firms (Home / Foreign)
- Strategy: $\{t, q\}$
 t is tariff rate and q is production
($q_i = h_i + e_i$)
- Preference
 - 1) Government
→ Social Welfare
 - 2) Firm
→ Profit



Notation of Variables

- $P_i(Q_i) = a - Q_i$

where P_i = market – clearing price in country i

Q_i = trade volume in country i's market

- $Q_i = h_i + e_j$

where h_i = firm i's production for home consumption

e_j = export by firm j

- Tariff costs for firm i : $t_j e_i$

where t_j = tariff by government j

e_i = export by firm i

Government's Objective Function : Social Welfare

$$\max [Consumer\ Surplus_i + Profit_i + Tariff\ Revenue_i]$$

$$CS_i = \frac{1}{2} Q_i^2 = \frac{1}{2} (h_i + e_j)$$

$$\pi_i = (P_i - c)h_i + (P_j - c)e_i - t_j e_i$$

$$TR_i = t_i e_j$$

Firm's Objective Function : Profit

- $$\begin{aligned}\pi_i &= (\text{domestic profit})_i + (\text{export profit})_i - (\text{tariff cost})_i \\ &= (P_i - c)h_i + (P_j - c)e_i - t_j e_i\end{aligned}$$
 where $i = H, F$

P_i : market – clearing price in country i

P_j : market – clearing price in country j

h_i : firm i 's production for home consumption

e_i : export by firm i

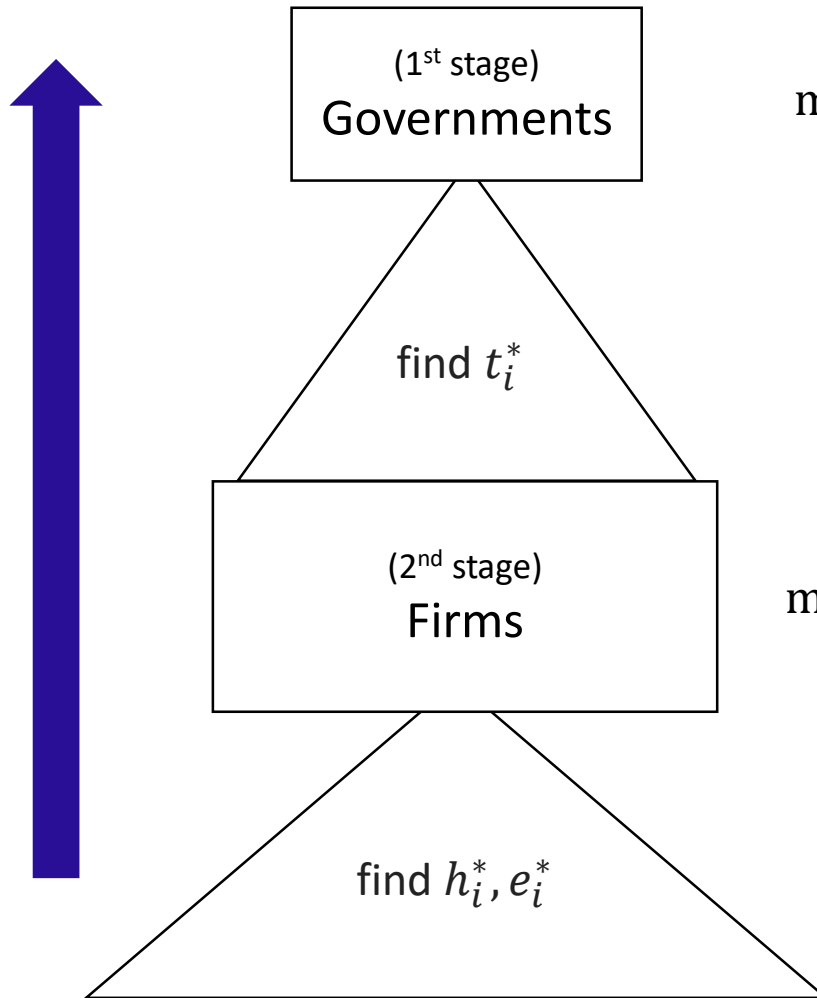
t_j : tariff by government j

c : constant and equal production cost of firm $i \& j$

- **Backward induction**

- the process of reasoning backwards in time, from the end of a problem or situation, to determine a sequence of optimal actions.
- It proceeds by first considering the last time a decision might be made and choosing what to do in any situation at that time.

Backward Induction



$$\max W_i = \left[\frac{1}{2} Q_i^2 + \pi_i + t_i e_j \right]$$

$$\max \pi_i = [(p_i - c_i)h_i + (p_j - c_i)e_i - t_j e_i]$$

$$\triangleright h_i^* = \frac{1}{3}(a - c + t_i)$$

$$\triangleright e_i^* = \frac{1}{3}(a - c + 2t_i)$$

- Find Subgame Perfect Nash Equilibrium

$$\blacktriangleright h_i^* = \frac{1}{3}(a - c + t_i) = \frac{4}{9}(a - c)$$

$$\blacktriangleright e_i^* = \frac{1}{3}(a - c + 2t_i) = \frac{5}{9}(a - c)$$

$$\blacktriangleright t_i^* = \frac{a-c}{3} = t_j^*$$

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Variation of Basic Model

$$G_i = (1 - \rho)CS_i + \rho\pi_i + TR_i$$

where CS_i = consumer surplus

π_i = firm's profit

TR_i = tariff revenue

ρ : relative weight on firm's profit in social welfare

: $0 < \rho < 1$

Variation of Basic Model : Meaning of ρ

- $\rho > \frac{1}{2}$: pro-business government
- $\rho < \frac{1}{2}$: pro-consumer government

$$\max G_i = (1 - \rho)CS_i + \rho\pi_i + TR_i$$

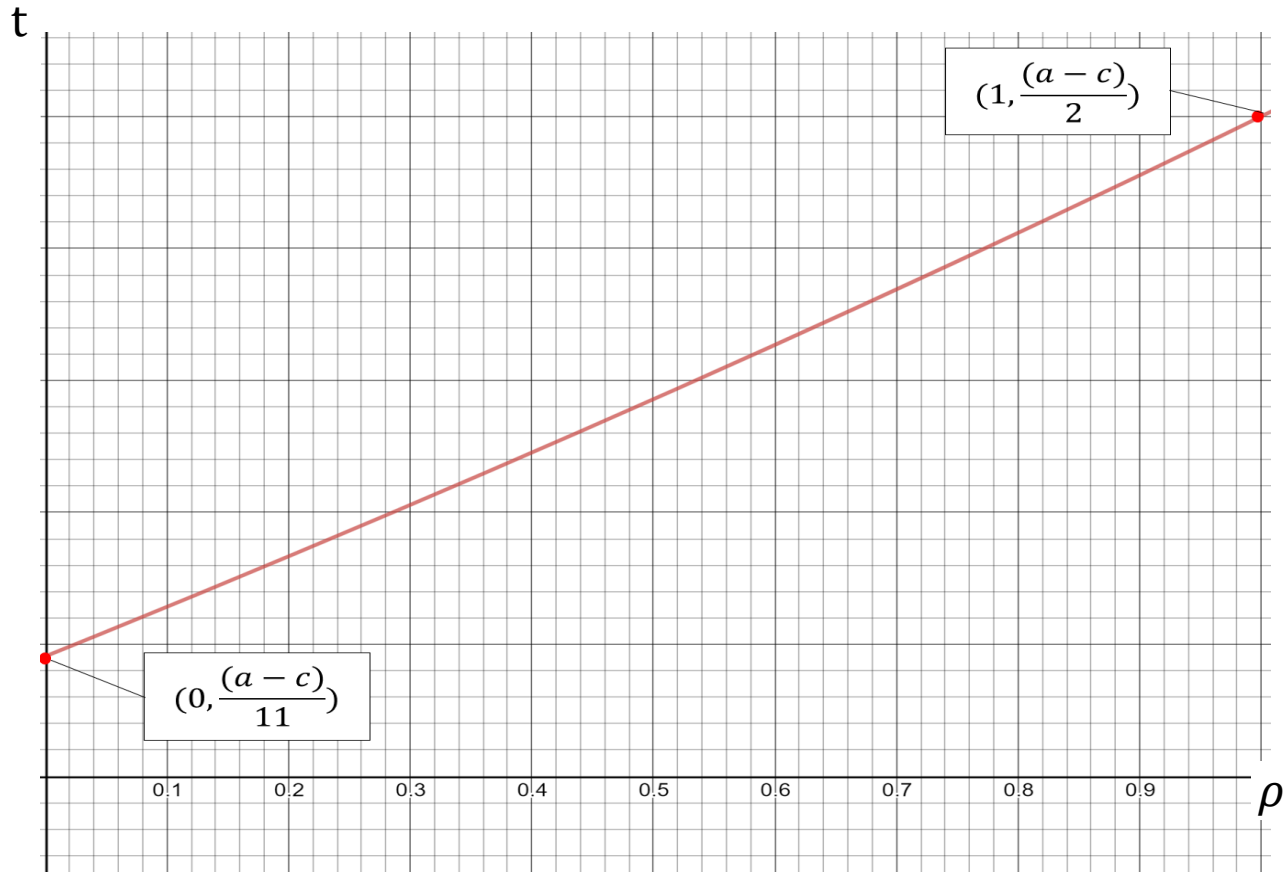
- Find t_i by solving $\frac{\partial G_i}{\partial t_i} = 0$

$$\begin{aligned}\triangleright \frac{\partial G_i}{\partial t_i} &= (1 - \rho) \left(-\frac{1}{9}\right) (2a - 2c - t_i) + \rho \left(\frac{2}{9}\right) (a - c + t_i) + \frac{1}{3} (a - c - 4t_i) \\ &= \frac{1}{9} (1 + 4\rho) (a - c) + \left(\frac{1}{9}\rho - \frac{11}{9}\right) t_i = 0\end{aligned}$$

$$\triangleright t_i^* = \frac{1+4\rho}{11-\rho} (a - c) = t_j^*$$

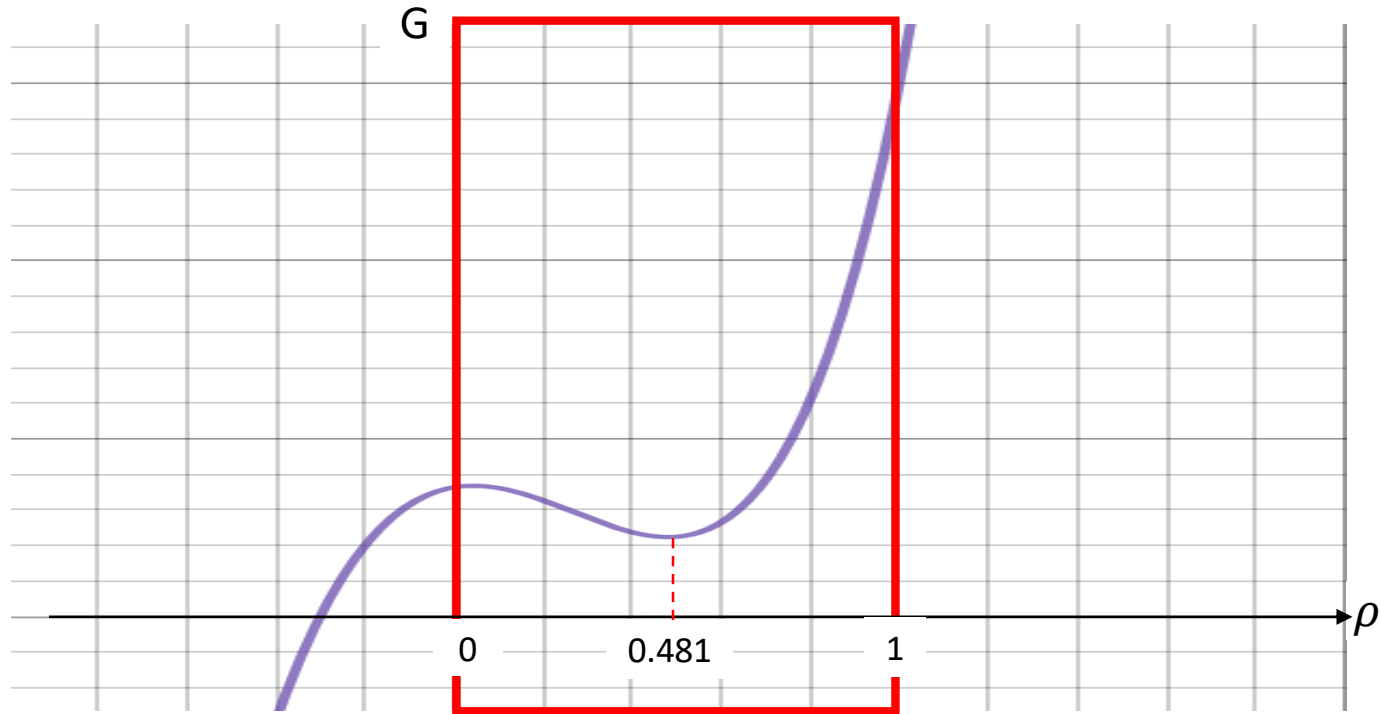
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Graphical Analysis : Increase in tariff



- positive relationship between ρ and t
- Implication
 - : Trump's **pro-business** government ($\rho > \frac{1}{2}$)
 - chooses **high tariffs** to maximize government's utility

Graphical Analysis : Government's Utility Graph



- Government's utility graph slopes upward when $\rho > 0.481$
→ Government's utility increases when ρ is close to 1
- Implication
: Trump's **pro-business** government ($\rho > \frac{1}{2}$) increases government's utility
: it is better to choose specific stance rather than middle stance

Comparative Statics: Social Welfare Graph

W, CS, π , TR

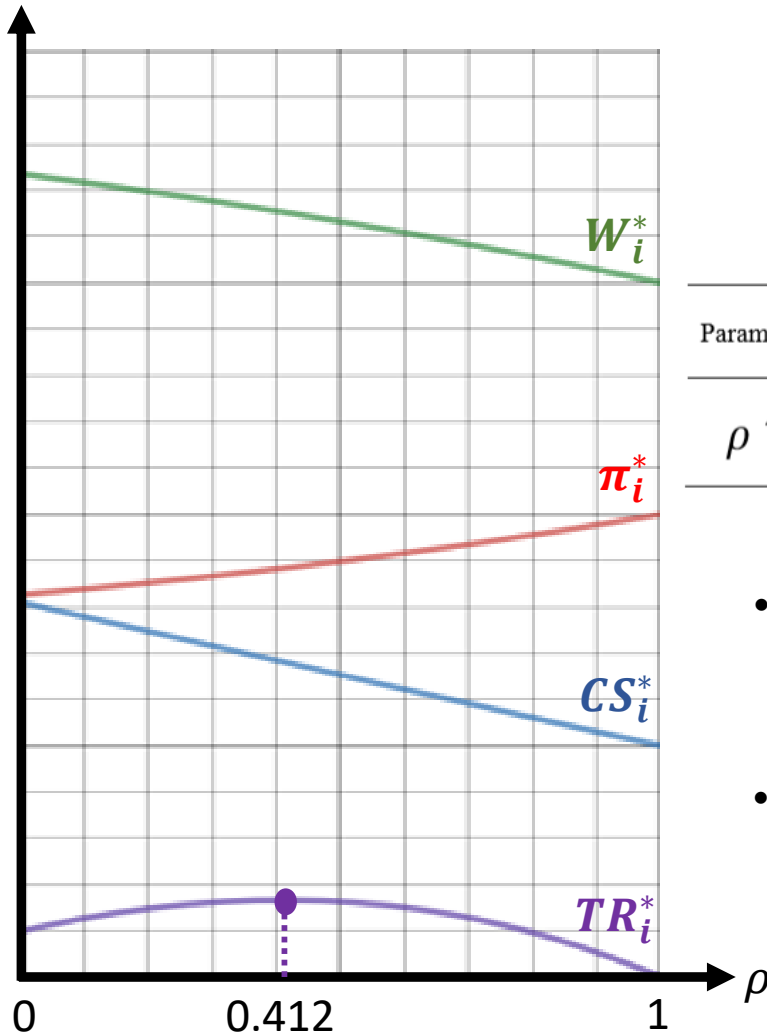


TABLE 1

Comparative Statics Results of the Outcomes of the Main Model

	$\rho < 0.412$				$\rho \geq 0.412$			
Parameter	CS_i^*	π_i^*	TR_i^*	W_i^*	CS_i^*	π_i^*	TR_i^*	W_i^*
$\rho \uparrow$	↓	↑	↑	↓	↓	↑	↓	↓
	-	+			-	+	-	

- If $\rho < 0.412$, **Negative effect of CS** is bigger than **positive effect of π and TR**.
-> Social Welfare decreases
- If $\rho \geq 0.412$, **Negative effect of CS and TR** is bigger than **positive effect of π** .
-> Social Welfare decreases

Quantity-traded Comparison

$$Q = h_i + e_j = \left(\frac{7 - 2\rho}{11 - \rho} \right) (a - c) \quad : \text{Quantity in our Model} \\ t > 0$$

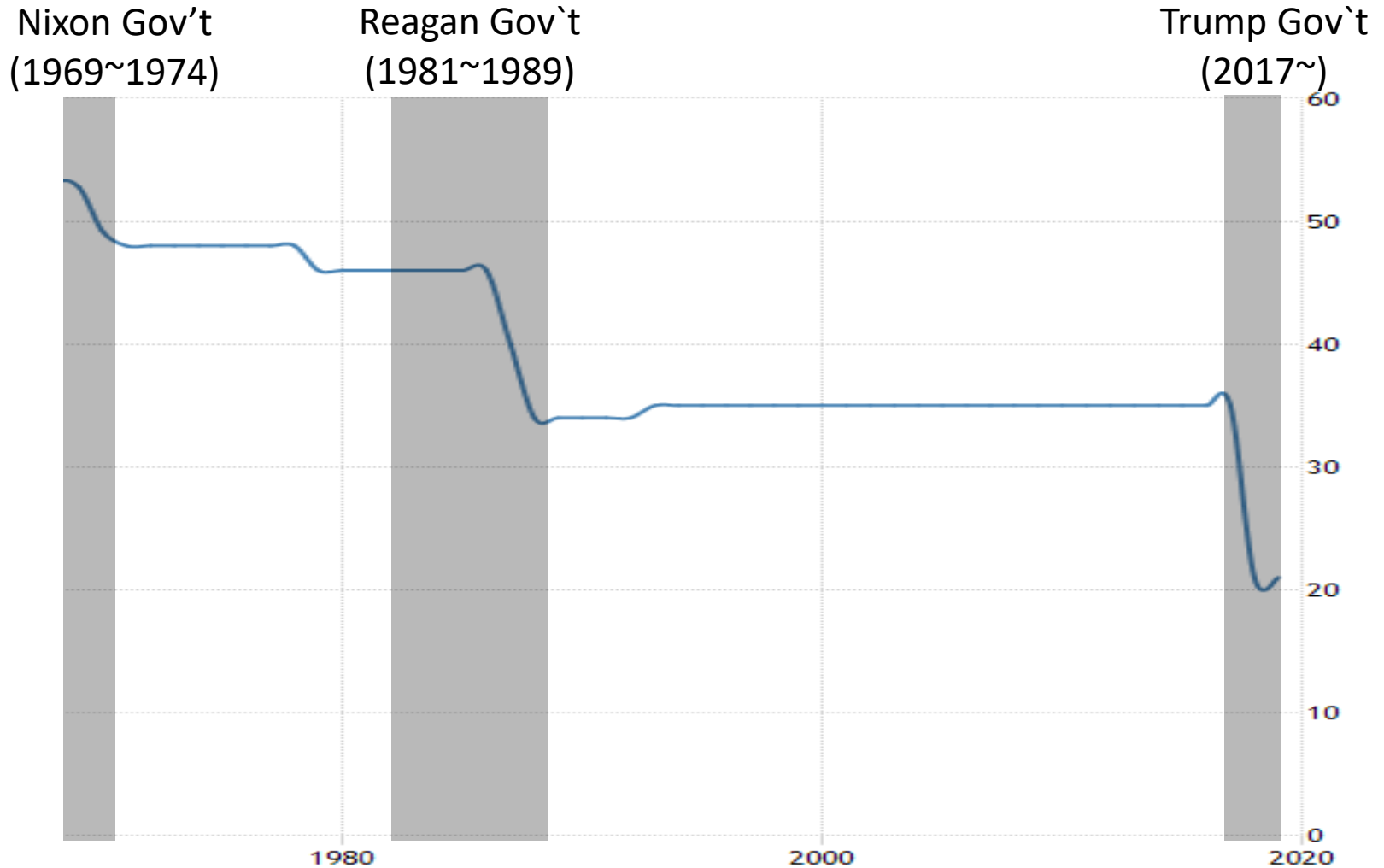
$$Q = \frac{2}{3} (a - c) \quad : \text{Quantity when } t = 0$$

$$\left(\frac{7 - 2\rho}{11 - \rho} \right) (a - c) < \frac{2}{3} (a - c) \quad (\because 0 < \rho < 1)$$

→ Quantity-traded when the tariff exists is smaller than the quantity-traded when the tariff doesn't exist

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Case Study - Corporate Tax Graph



SOURCE: TRADINGECONOMICS.COM | INTERNAL REVENUE SERVICE

Case Study - Nixon Government

- Nixon government's pro-business policy, 1969 ~ 1974
[New Economic Policy]
 1. Quitting the Bretton Woods agreement to make price competitiveness high in exporting manufacturing industry
 2. Providing a taxation privilege to industries to promote investments

Case Study - Reagan Government

- Reagan Government's pro-business policy, 1981~1989
[Reaganomics]
 1. Reduction in corporate tax rate: reduced from 46% -> 34%
 2. Easing transportation, energy, telecommunication regulation
 3. Regulating illegal labor strike by strict law enforcement

Case Study - Tariff Policy

Nixon(69-74)	Reagan(81-89)	Trump(17-)
<p>- 10% additional tariff on all imported goods</p> <p>-> political intention for the "1972 election"</p>	<p>- 25% on Japanese Cars</p> <p>- 45% on Japanese Motorcycle</p> <p>- 100% on Japanese electronic device</p>	<p>- 15%~45% tariff on Chinese goods (telephone, clothes, electronic device, shoes)</p> <p>- 20% on all European Cars</p> <p>- 25% on Steel and Aluminum of EU, Canada, Mexico</p>

Conclusion

- Trump's strong pro-business propensity leads to higher tariffs
- Trump's tariff policy due to pro-business propensity,
 - : increases government's utility
 - : decreases social welfare, quantity traded
- Governments tend to focus on government's utility rather than considering all parts of social welfare equally

[Contribution]

- Political propensity affects international trade policy as in Nixon, Reagan, Trump administration's case.

Literature Reference

- Nash and Social Welfare impact in an international trade model (Martins, Pinto, Zubelli)
- Political economy of trade policy (Dani Rodrik)
- Trade War and Trade Talk (Grossman, Helpman)
- Tariff games: Cooperation with random variation in political regimes (Dale O.Stahl, Arja H)