THE US LAMB MEAT INDUSTRY:

A Partial Equilibrium Analysis of Trade

Policy Impacts

ASI Convention – Lamb Council Meeting

January 17, 2025
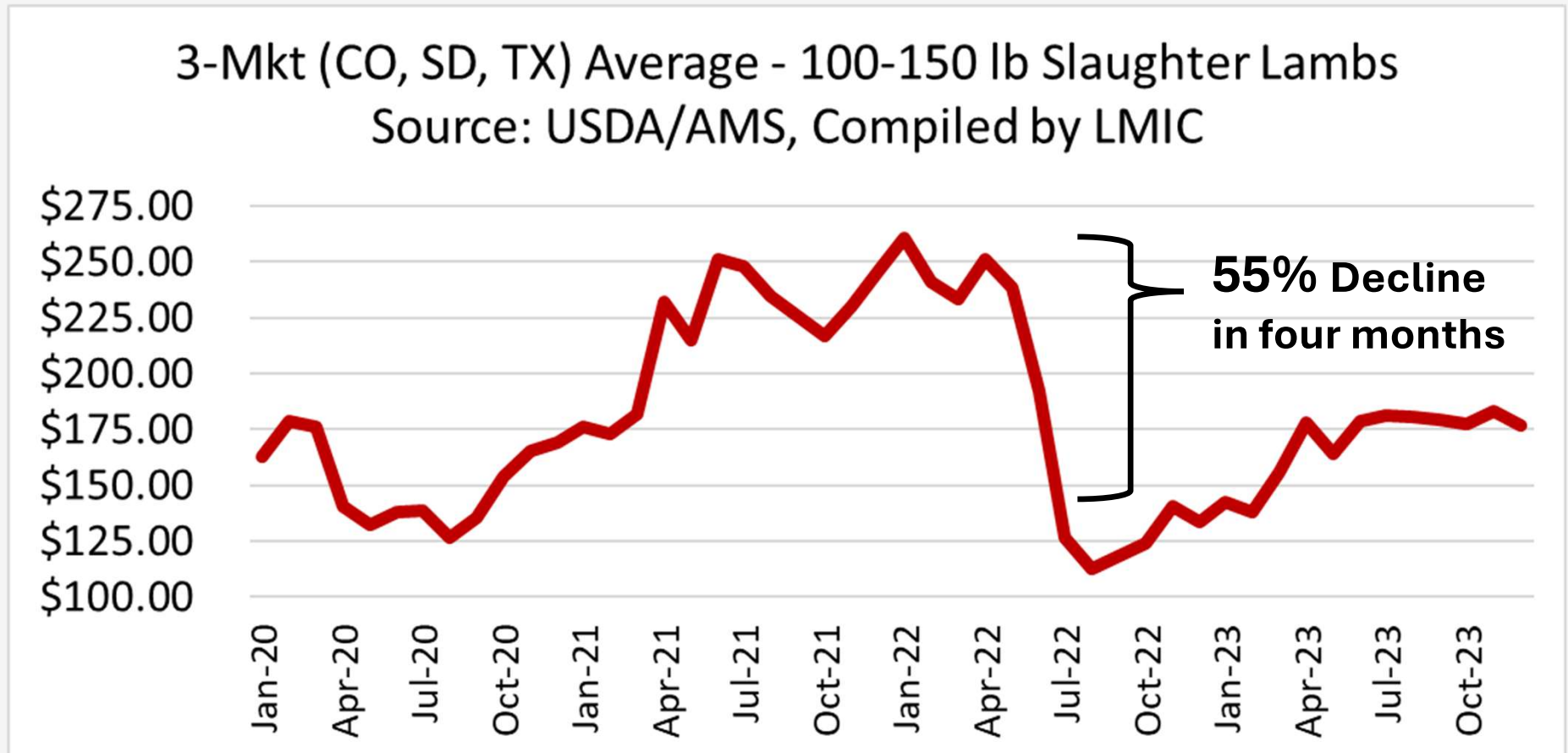
Authors: Habiba Shetawy, Dr. Xiaoxue Du,

Dr. Patrick Hatzenbuehler, & Brett Wilder

University of Idaho
Extension

Research Problem / Background

3-Mkt (CO, SD, TX) Average - 100-150 lb Slaughter Lambs
Source: USDA/AMS, Compiled by LMIC

55% Decline in four months

Research Problem / Background

Research Problem / Background

U.S. Lamb & Mutton Production & Disappearance (1970-2023)

Research Problem / Background

U.S. Lamb & Mutton Production vs. Imports (1970-2023)
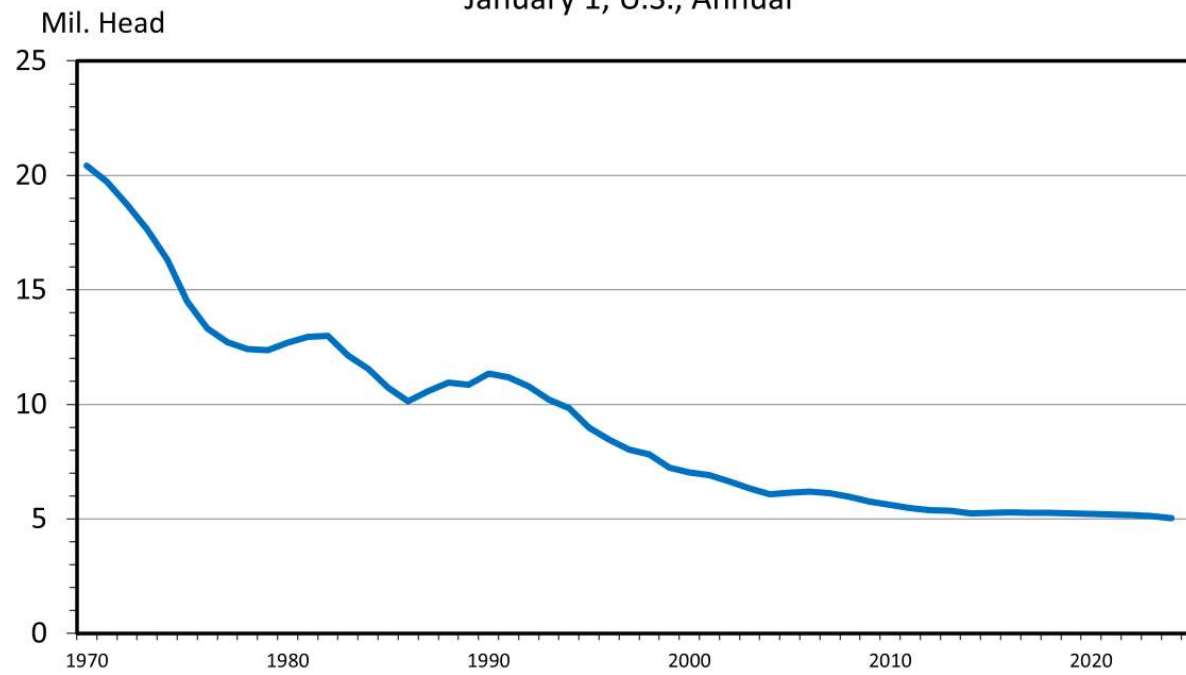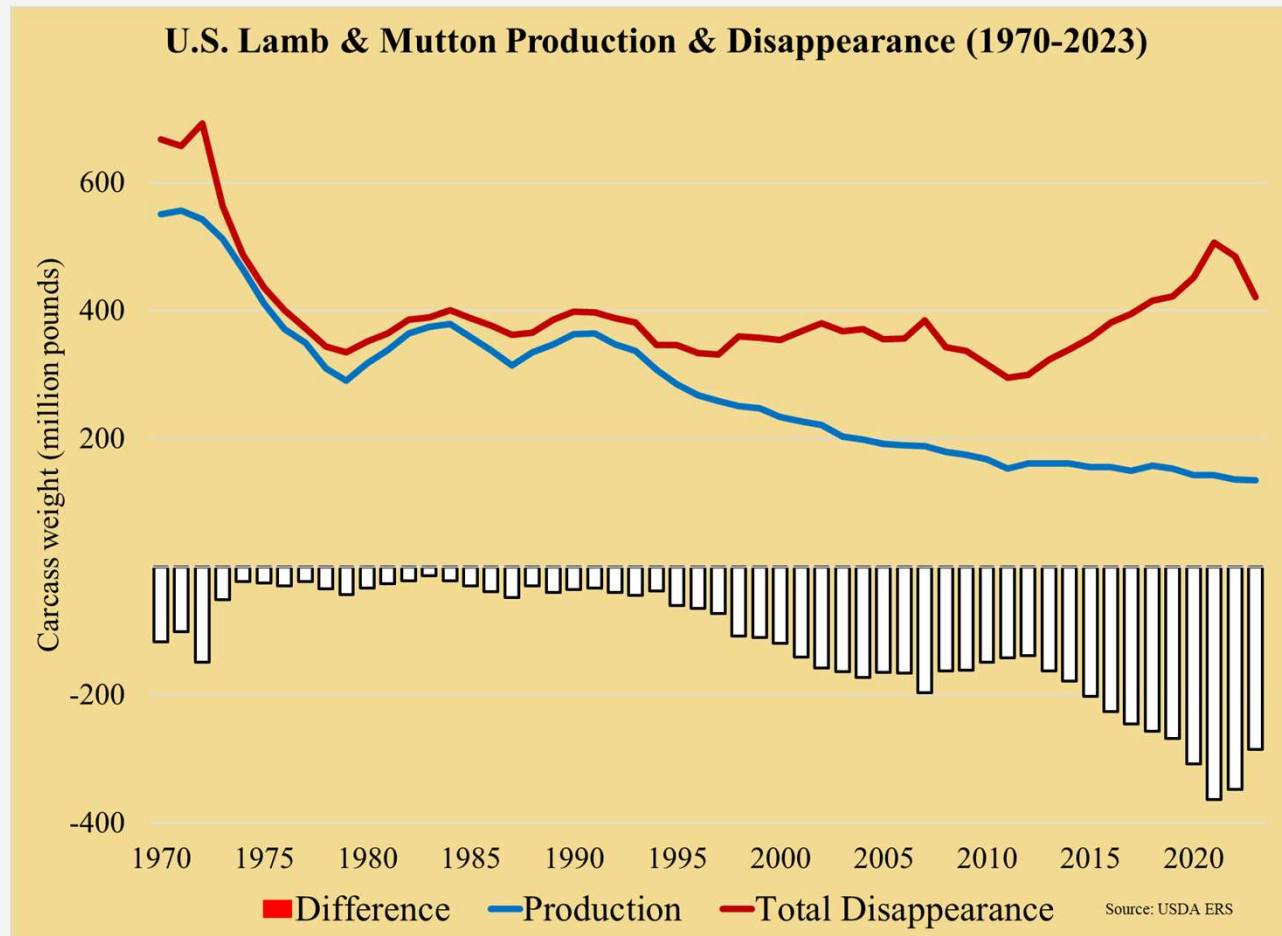
Current Trade Status...
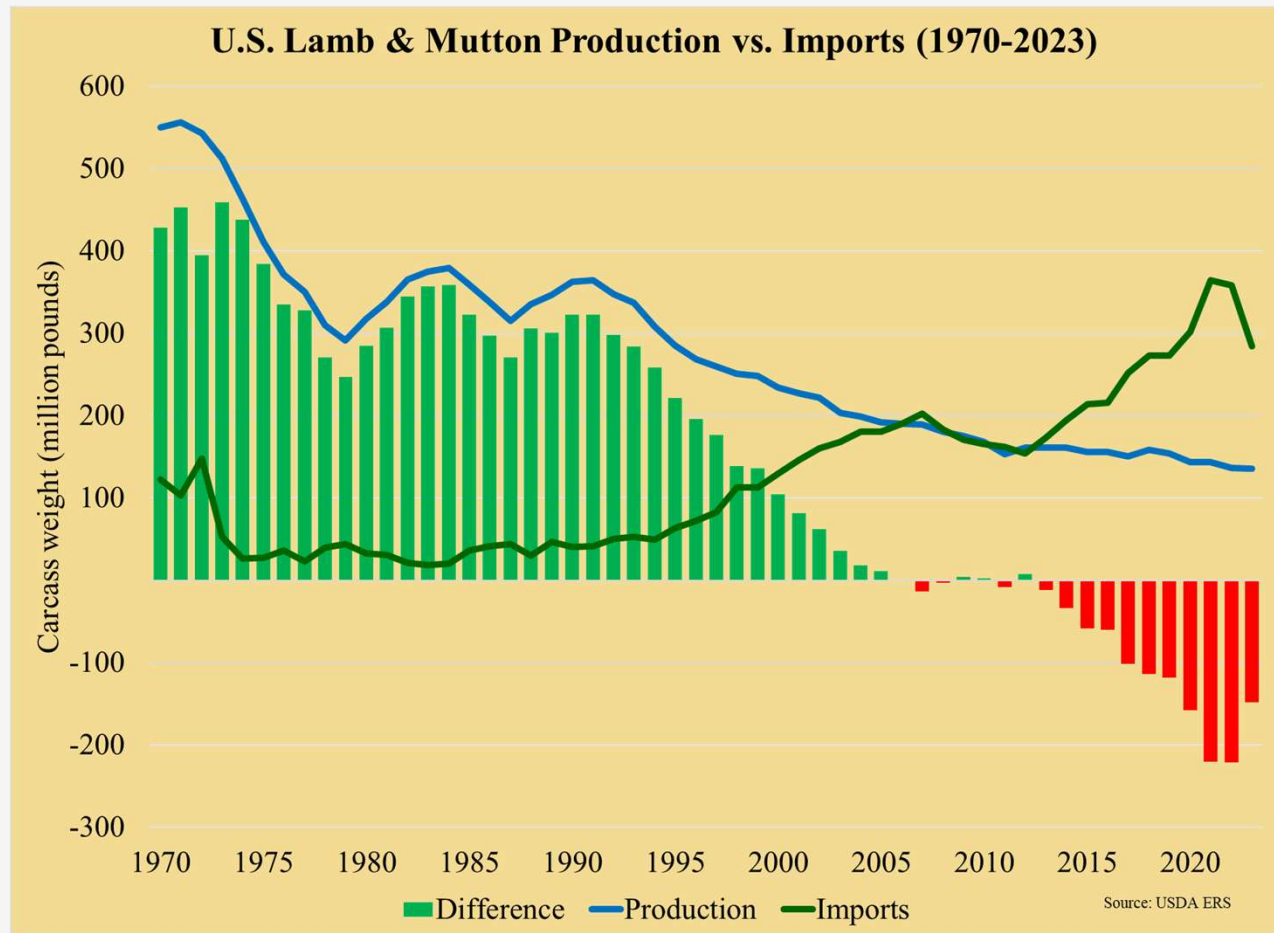
Current Trade Policy Situation

Current Trade Status...

- Australia

  - Imports are Duty free;

  - Under Free trade agreement with the US since 2005. (US Customs & Border Protection, 2023).

- New Zealand

  - "Most-Favored-Nation" (MFN) tariff

  - 0.7 cents/kg for lamb meat imports (USITC Tariff Database, 2024).

History of Lamb Trade Policy:

- 1930: Tariff Act of 1930 established the initial tariff on NZ lamb imports

- 1960: Subsidized lamb meat imports from NZ (USITC, 1990 & 1995)

  - 2 failed attempts, then countervailing duty was imposed between 1985-1995.

- 1998: Surge in lamb imports from NZ & AUS (USITC, 1999; Paarlberg & Lee, 2001).

  - A TRQ was imposed in 1999, then terminated in 2001 (WTO, 2001).

  - In 2004, the Tri-Lamb Group was established as an alternative to punitive tariffs

Industry Action

- 2023 (May): Dumping preliminary investigation by American Sheep Industry.

- 2023 (August): R-CALF USA filed a petition letter to the US Trade Representative.

  - Suggested a Tariff or TRQ that would result in a 50% domestic market share

Industry Action

- Results of ASI Investigation:

    - Showed injury to the industry, but no dumping violations.

    - Any trade policy will have minimal protection.

    - ASI decided not to pursue a trade case.

- Results of R-CALF Movement

    - There was initial support from members of Congress & re-stating of the request.

    - Was successful in opening the dialogue about global lamb markets.

- No *explicit* trade policy set-up was requested at the conclusion of either investigation

OUR RESEARCH

HABIBA'S THESIS

Research Objectives

1.

Determine the pure tariff rate or its equivalent pure quota that increase domestic

productions market share to 50% & its welfare impacts.

Research Objectives

2.

Determine the impacts of two hypothetical tariffs; inflation adjusted tariff

($1.25/lb) & Trump's 10% ad valorem proposition.

Steps needed to study these questions

1. Review available data

2. Look at similar research; evaluate models we can use to study potential tariffs
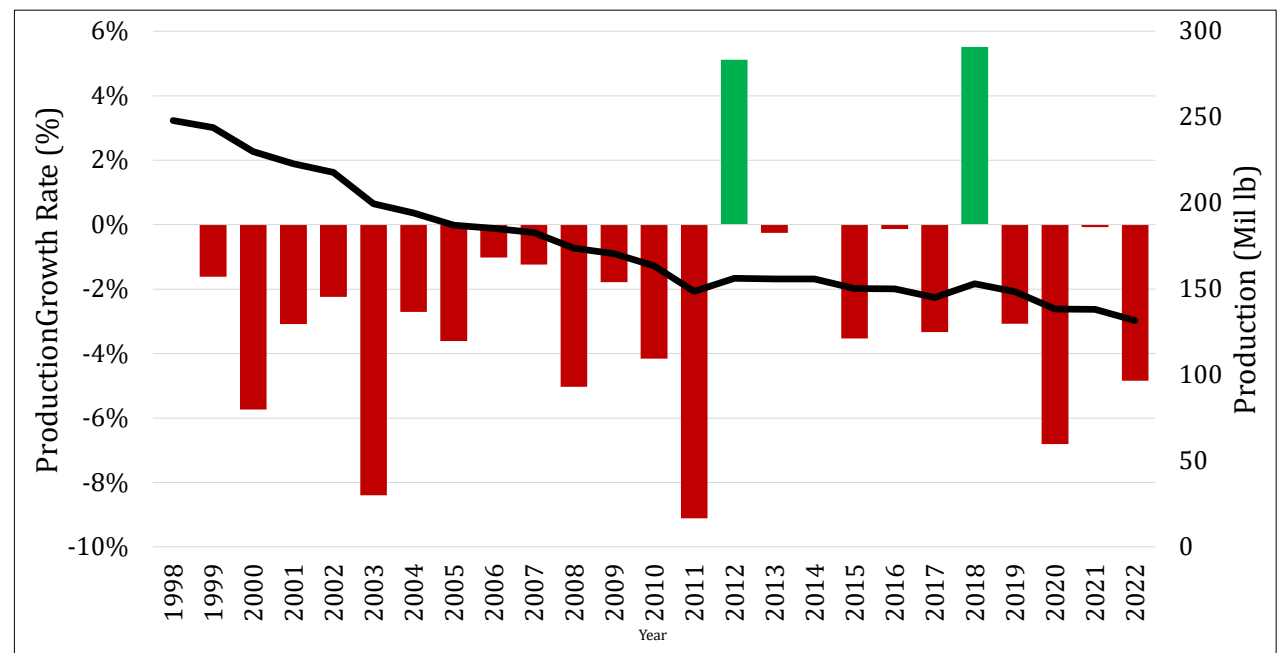
3. Choose a model; set assumptions

4. Evaluate results

DATA

Lamb Meat Production

- Mostly in decline

- 2012 – ASI Let's Grow

- 2018 – Holiday timing

Summary Statistics		
	(1998-2011)	**(2012-2022)**
Mean	197.8	147.6
Std Dev.	30.5	8.3
Min	148.7	131.6
Max	248	156.3

Source: USDA; Compiled by LMIC

Lamb Meat Consumption

- For this research:

$$Consumption = Production + Imports - Exports$$

Summary Statistics		
	(1998-2011)	**(2012-2022)**
Mean	321.4	346.2
Std Dev.	17.9	38.1
Min	277.3	284.6
Max	341.10	409.1
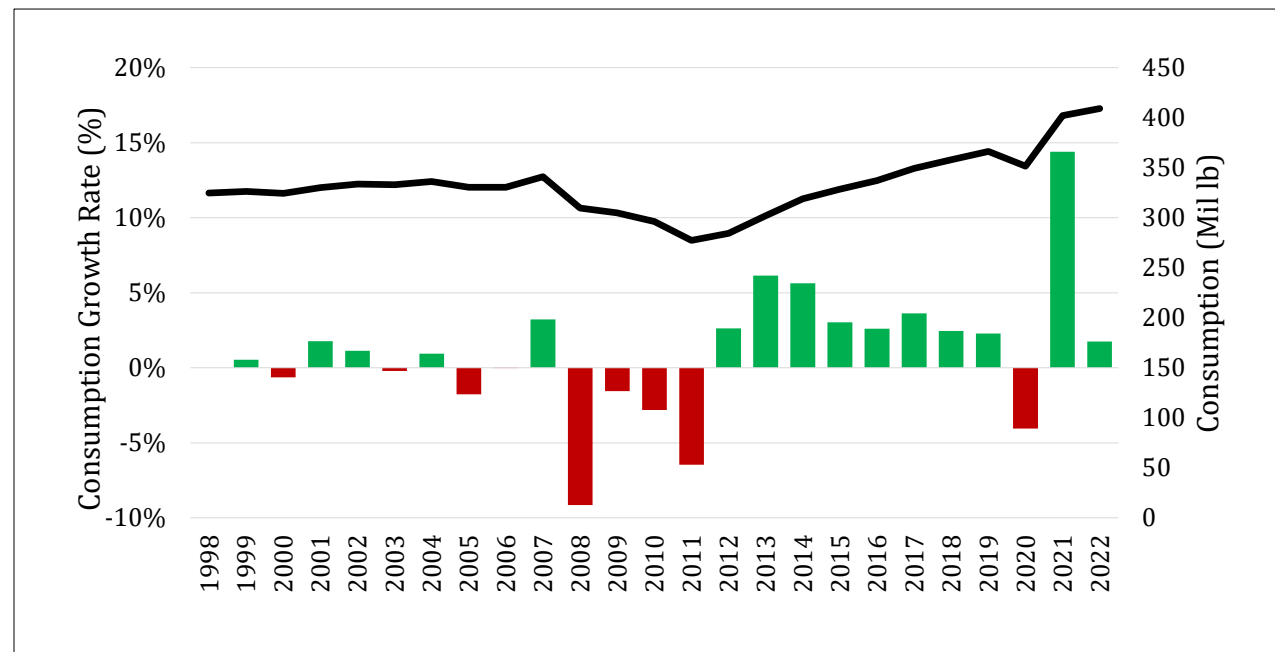
Source: USDA; Compiled by LMIC

Lamb Meat Imports

- Trending higher

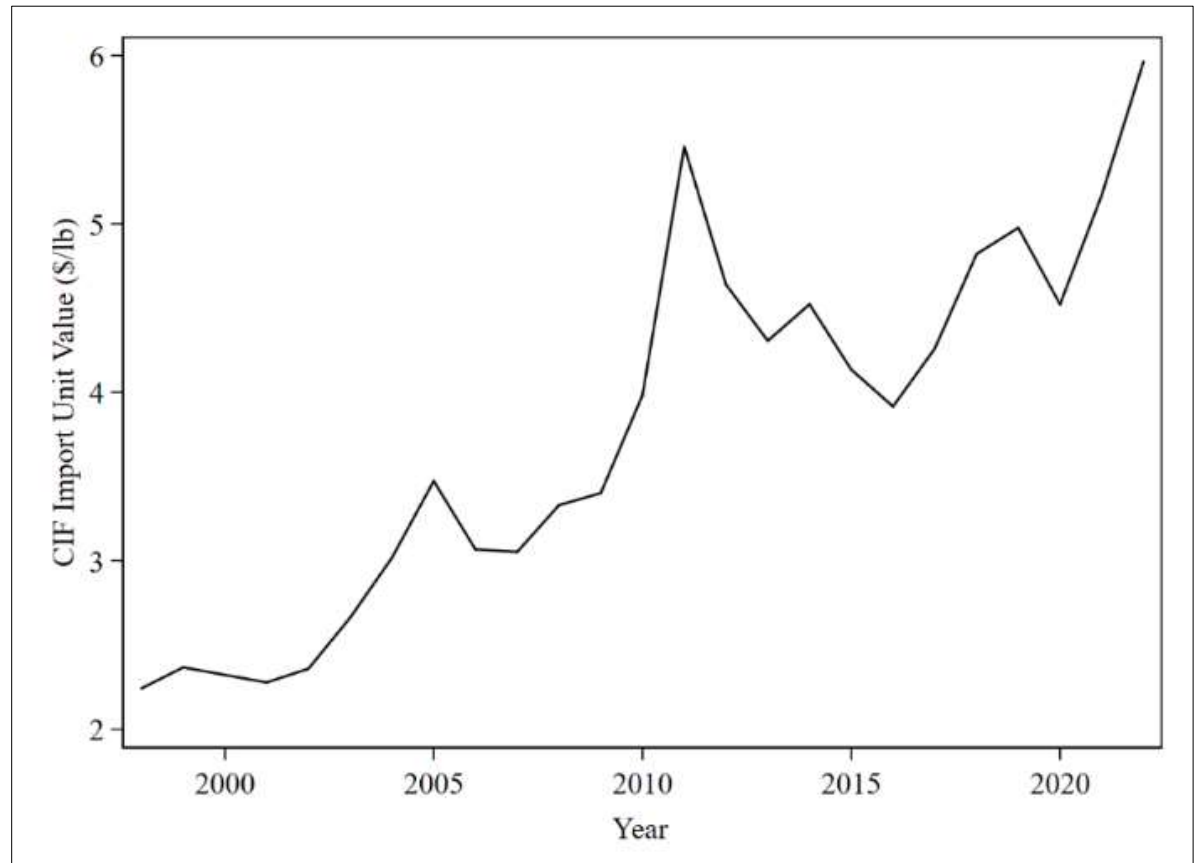| Summary Statistics		
	(1998-2011)	**(2012-2022)**
Mean	125	199.3
Std Dev.	25	45.3
Min	77.8	128.6
Max	159.3	278
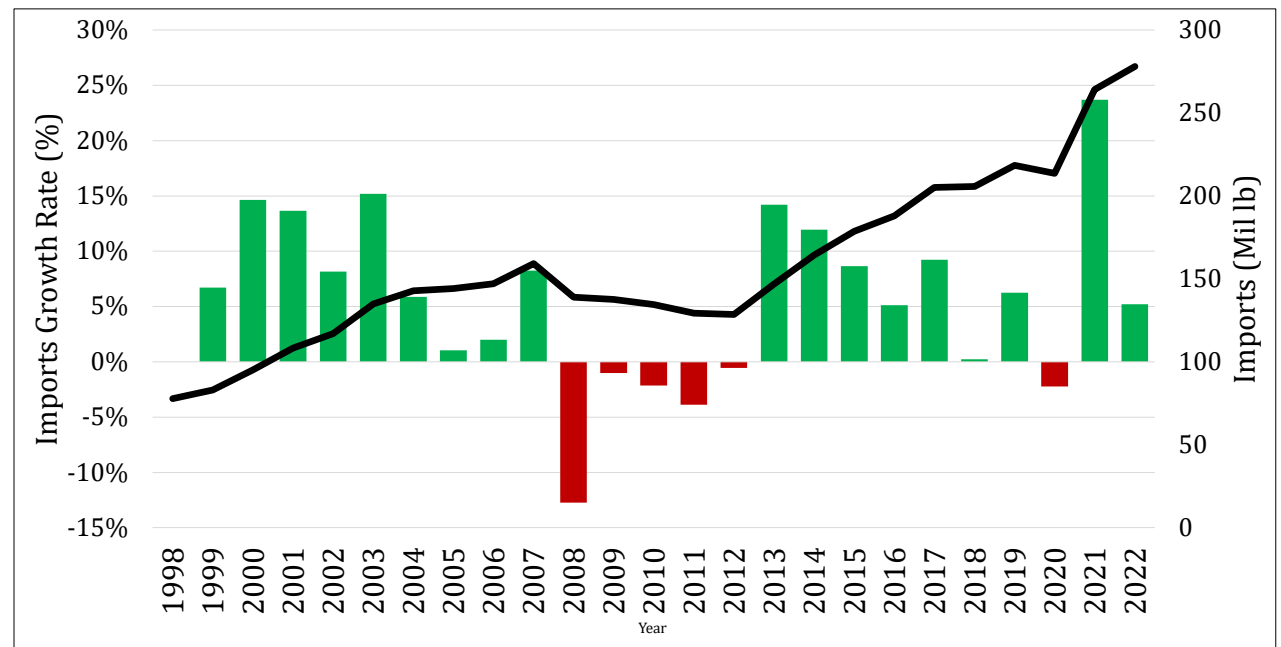
Source: USDA; Compiled by LMIC

World Price

- Cost, Insurance, Freight (CIF) import unit value.

- Value represents the landed value at the first port of arrival excluding U.S. import duties

Summary Statistics		
	(1998-2011)	**(2012-2022)**
Mean	3.1	4.7
Std Dev.	0.9	0.6
Min	2.2	3.9
Max	5.5	6.0

Source: United States International Trade Commission

RESEARCH REVIEW

Overview

- A thorough literature review was completed covering:

  - Lamb Meat Demand

  - Lamb Meat Supply

  - Lamb Meat Trade

  - Agricultural Tariffs and Tariff Rate Quotas

Highlights

- Most papers agree that there is a data availability issue with lamb

- Supply and Demand

  - Studies about consumer preferences and substitutability have inconsistent results

    - Different time periods, data, and methods

- Trade Studies

  - Paarlberg, Lee & Eales, 2001

    - Suggest the implemented (1999) TRQ benefited packers & harmed producers.

  - Literature suggested a Partial Equilibrium Analysis as the best way to proceed

MODEL

Partial Equilibrium- Main Assumptions

- Industry can be analyzed through partial equilibrium.

- Distinction between lamb meat & mutton.

- Homogeneous domestic & imported good (USITC, 1990, 1995, 1999 & 2002).

- Small importing nation (MLA, 2021; Tridge, 2023).

Baseline Scenario Analysis (USDA, 2007)

- Demand: $Y_d = a - b.P_d$

  - $b = -\frac{\partial Y_d}{\partial P_d} = |\varepsilon_{dp}| \cdot \frac{Y_{d0}}{P_{d0}}$

  - $a = Y_{d0} + b. P_{d0}$

- Supply: $Y_s = c + d.P_d$

  - $d = \frac{\partial Y_s}{\partial P_d} = \varepsilon_{sp} \cdot \frac{Y_{s0}}{P_{d0}}$

  - $c = Y_{s0} - d. P_{d0}$

Y_d : Quantity demanded of lamb meat.

Y_s: Quantity supplied of lamb meat.
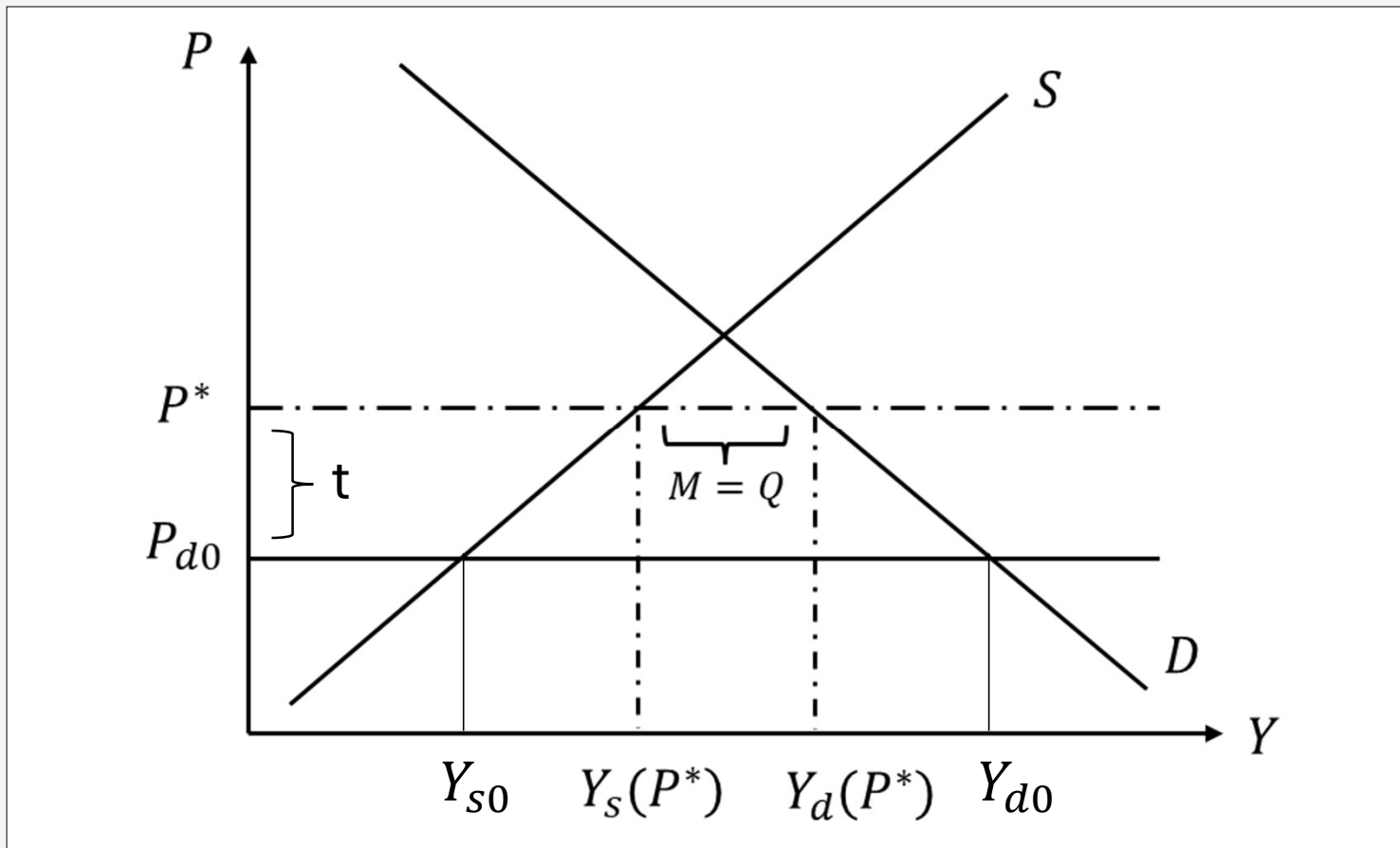
P_d : Domestic price of lamb meat.

ε_{dp}: Price elasticity of demand.

ε_{sp}: Price elasticity of supply.

Y_{d0}, Y_{s0}, P_{d0}: Base values.

Baseline Scenario Analysis

Simulation Model (Abbott & Paarlberg, 1998)

- Demand: $Y_d = Y_{d0}(1 + G_d)^T \left[1 - \left(\frac{|\varepsilon_{dp}|}{P_{d0}}\right)(P_d - P_{d0})\right]$

- Supply: $Y_s = Y_{s0} + \varepsilon_{sp}\left(\frac{Y_{s0}}{P_{d0}}\right)(P_d - P_{d0}) + G_s Y_{s0} T$

Y_d : Quantity demanded of lamb meat.

Y_s: Quantity supplied of lamb meat.

P_d : Domestic price of lamb meat.

ε_{dp}: Price elasticity of demand.

ε_{sp}: Price elasticity of supply.

G_d: Demand Growth Rates

G_s: Supply Growth Rate

T: Time Index

Y_{d0}, Y_{s0}, P_{d0}: Base values.

Model Data Requirements

- Base Year Values; 2022

- Elasticity

  - Supply: 0.15 (RTI International, 2007)

  - Demand: -0.62 (Ghosh & Williams, 2016)

- Growth Rates (Data)

  - Demand: 3.7%,

  - Supply: Scenario (A); -1 %; Scenario(B);-3%, & Scenario (C);2%.

Variables	Base:2022
Price ($/lb)	5.963
Production (mill lb)	131.60
Consumption (mill lb)	409.07
Imports (mill lb)	278

RESULTS

Target Pure Tariff/ Quota

- The target pure tariff is **_$2.968._**

- This is an ad valorem equivalent of approximately **_50%_** !

Scenario	Price ($/lb)	Production (mill lb)	Consumption (mill lb)	Imports (mill lb)	Market Share (%)
Baseline Scenario	5.963	131.60	409.07	278	32%
50% Share Objective	8.931	141.42	282.85	141.42	**50%**

Changes in Welfare (mill $)	Pure Tariff/Quota
Consumer Surplus	-1,026.68
Producer Surplus	405.12
Tariff Revenue/Quota Rent	419.69

Hypothetical Tariffs

- For lawmakers, this raises the moral question of whose welfare is a priority in the industry.

Scenario	Price ($/lb)		Production (mill lb)	Consumption (mill lb)	Imports (mill lb)	Market Share (%)
Baseline Scenario	5.963		131.60	409.07	278	32.2%
Inflation Adjusted Tariff	7.213	**21%**	135.74	355.90	220.17	38.1%
Trump's 10% Tariff	6.5593	**10%**	133.57	383.71	250.13	34.8%

Changes in Welfare (mill $)	Inflation Adjusted Tariff	Trump's 10% Tariff
Consumer Surplus	-478.11	-236.37
Producer Surplus	167.09	79.06
Tariff Revenue	275.21	149.15

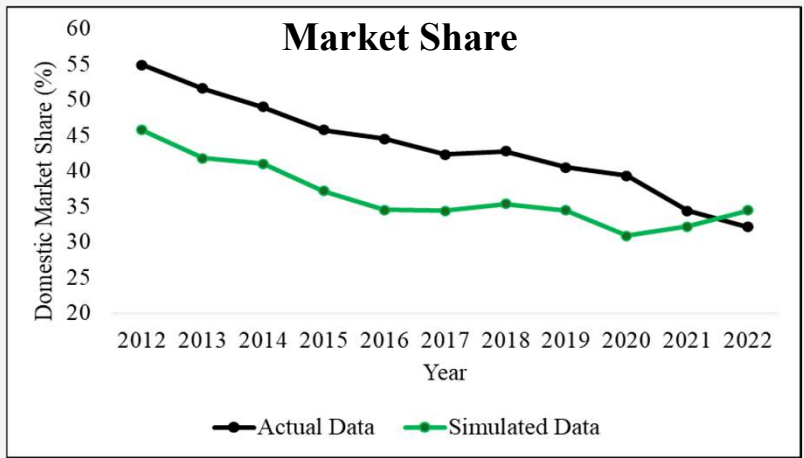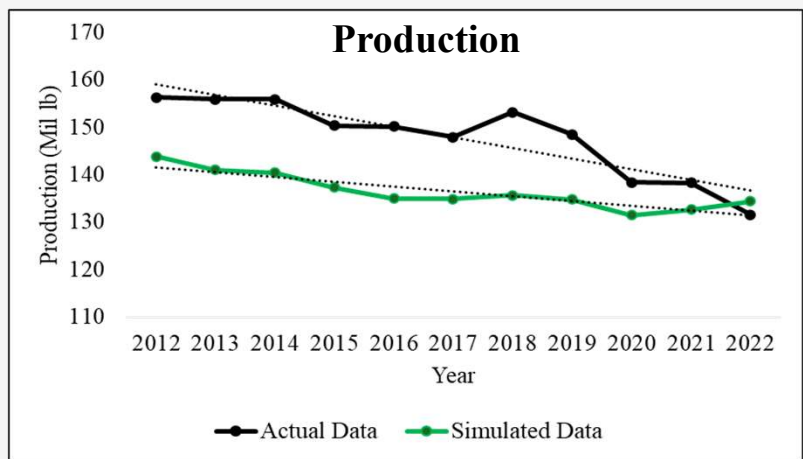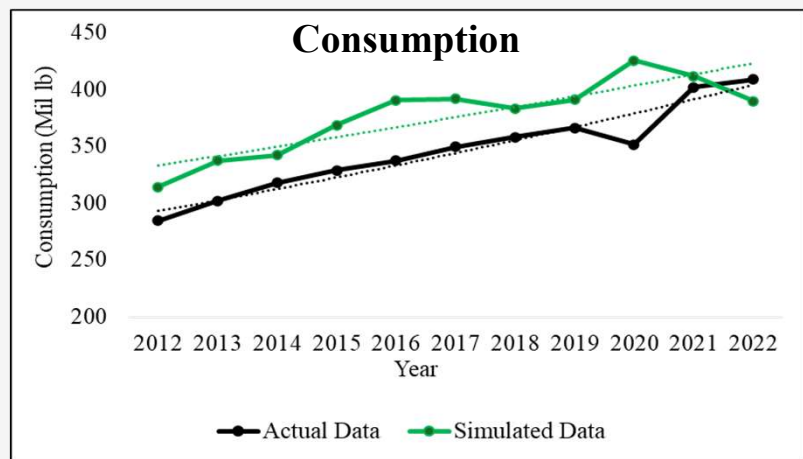## Trade Policy Considerations

- High level of uncertainty.

  - Trump's 10% ad valorem ;

    - Timing, Rate, Mechanism, & Trade diversion effect.

  - Inflation Adjusted Tariff ($1.25/lb)

    - Trade diversion effect.

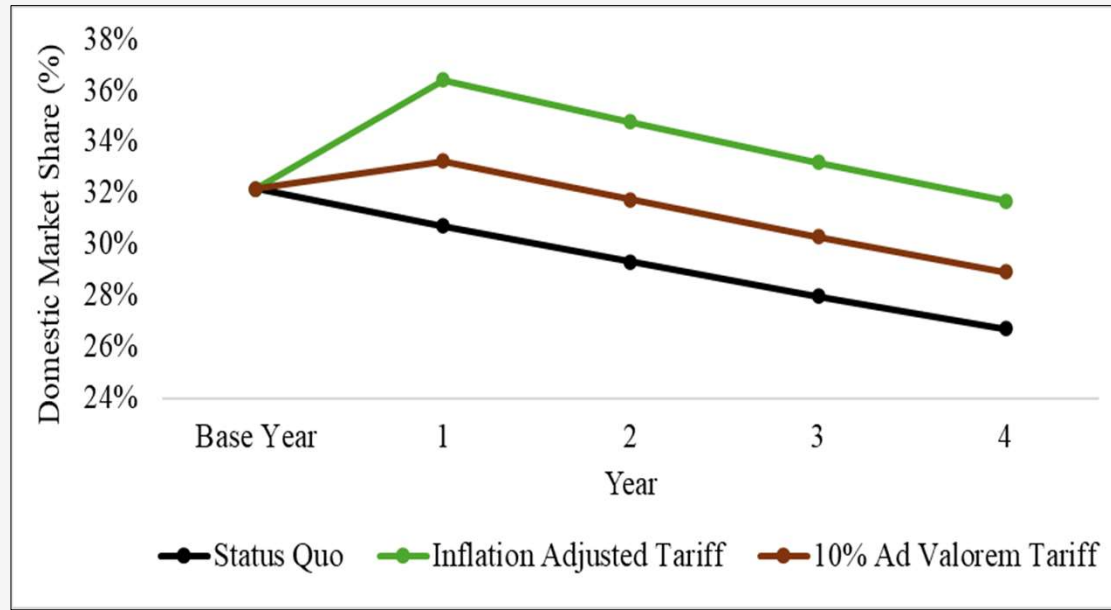 - The TRQ allowed under FTA with AUS.

    - Not a guarantee.

Numerical Simulation Validation
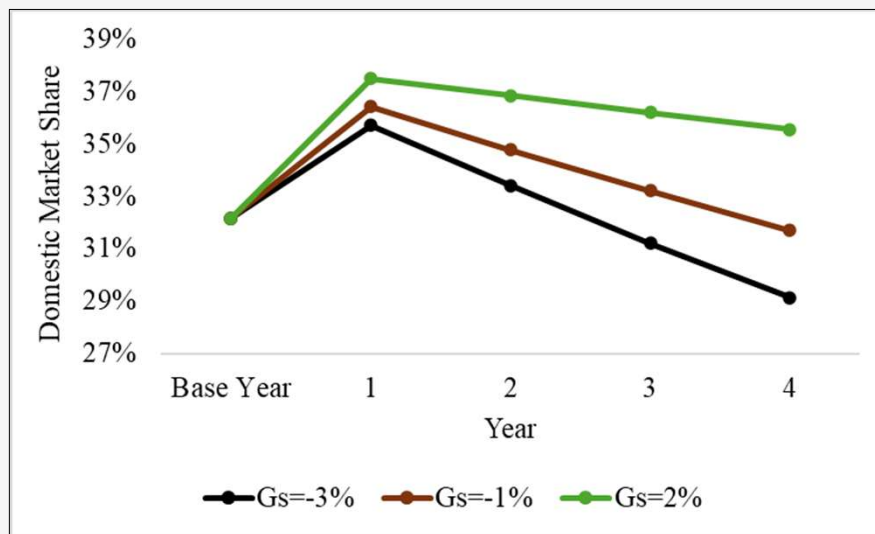
Model Simulation Results – Scenario (A)

Year	Status Quo	Inflation Adjusted Tariff	10% Ad valorem Tariff
Base	32%	32%	32%
1	**30.7%**	**36.4%**	**33.2%**
2	29.3%	34.8%	31.7%
3	28%	33.2%	30.3%
4	26.7%	31.7%	29%

Model Simulation Results – Scenario (B) & (C)

Inflation Adjusted Tariff

Year	G_s=-3%	G_s=2%
Base	32%	32%
1	**35.7%**	**37.5%**
2	33.4%	36.8%
3	31.2%	36.3%
4	29.1%	35.5%

10% Ad Valorem Tariff
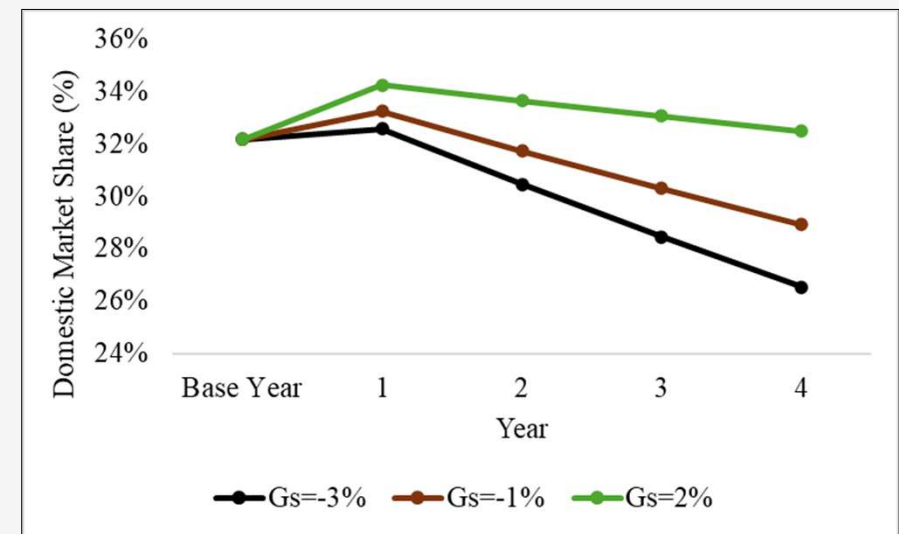
Year	G_s=-3%	G_s=2%
Base	32%	32%
1	**32.6%**	**34.23%**
2	30.5%	33.7%
3	28.5%	33.1%
4	26.5%	32.5%

CONCLUSIONS

Conclusion

Main Findings

- Achieving a 50% market share requires an extremely restrictive trade policy, causing significant welfare loss in the economy.

- With declining supply & expanding demand, tariffs have limited & minimal effectiveness in protecting the industry.

- A growing supply coupled with a tariff provides room for breath for the industry.

  - Industry initiatives (ASI, 2024).

Limitations

- Target tariff/quota results.

- Numerical simulation model results aren't applicable to a TRQ.

- High uncertainty regarding suggested trade policy & investigation.

- Lack of trade model in the literature to analyse trade policy impacts.

Conclusion

Future Trade Research

- A theoretical model to analyse trade policy impacts.

    - Relaxing the assumptions.

        - Market Power

        - Perfect substitutability.

        - Small importing nation.

    - Estimating the possible trade diversion in case of one-sided trade policy.

Top Research Priorities

1. Updated Supply and Demand Elasticity Studies

2. An Updated Consumer Preferences Study

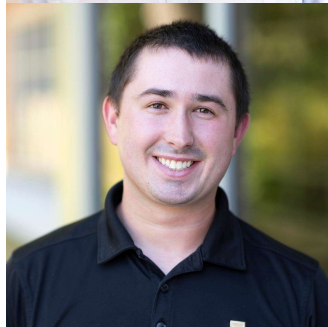   - _Can_ we relax the Perfect Substitutability claim?

Dr. Xiaoxue "Rita" Du

xiaoxuedu@uidaho.edu

Dr. Patrick Hatzenbuehler

phatzenbuehler@uidaho.edu

Brett Wilder

bwilder@uidaho.edu

QUESTIONS?

University of Idaho