Sugar Highs and Sugar Lows: U.S. Interwar Tariff Policy and Cuba's Great Depression

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Road Map

Renaissance of Research on Interwar Trade

1. Pre-2007
   - Tariff history – Crucini (1994), Irwin (1998)
   - US-ROW, 3 sector, DSGE – Crucini and Kahn (1996)
   - US reduced form model – Irwin (1998)
   - Global VAR – Madsen (2001)
   - Political economy - Irwin and Krozner (1996)
2. 2007 - Great Depressions of the 20th Century (DSPE/DSGE models)
   - Amaral and MacGee (Canada), Perri and Quadrini (Italy), Crucini and Kahn (US, ROW)
3. Post-2007
   - Competitive devaluations – Bouscasse (2022), Candia and Pedemonte (2022)
   - Tariffs – Bond, Crucini, Potter and Rodrigue (2013), Greenland and Lopresti (2022), Harrison (2018)
   - Political economy – Irwin and Soderbery (2021)

Macroeconomics of Interwar Tariff Policies

- The literature has focused on the US (which had a trade share of 4-6%) or large industrialized nations.
- The impact of US tariffs on Small Open Commodity Dependent Economies (SOCDE) has been largely ignored in the interwar macroeconomic narrative
- And yet, we know from the trade and development literature that movements in the commodity terms of trade plays a key role in growth and business cycles of SOCDE's.

The Cuban Economy

- Cuba was a small open commodity-dependent economy (SOCDE)
- Cuban seems an ideal case study:
  1. Small: US had about 30 times the population and 3 times the per capita income of Cuba
  2. Open: Cuba was the 7th largest trading partner of the US by import or export volume (1928)
  3. Commodity Dependent: 36-48% of GDP from sugar (accounting for 25% of world sugar exports)
  4. Tied to the US: 76% of Cuban sugar exported to USA (also fixed exchange rate)
  5. Sugar tariff revisions 1909, 1913, 1921, 1922, 1930 and 1934
  6. Nominally sticky specific duties

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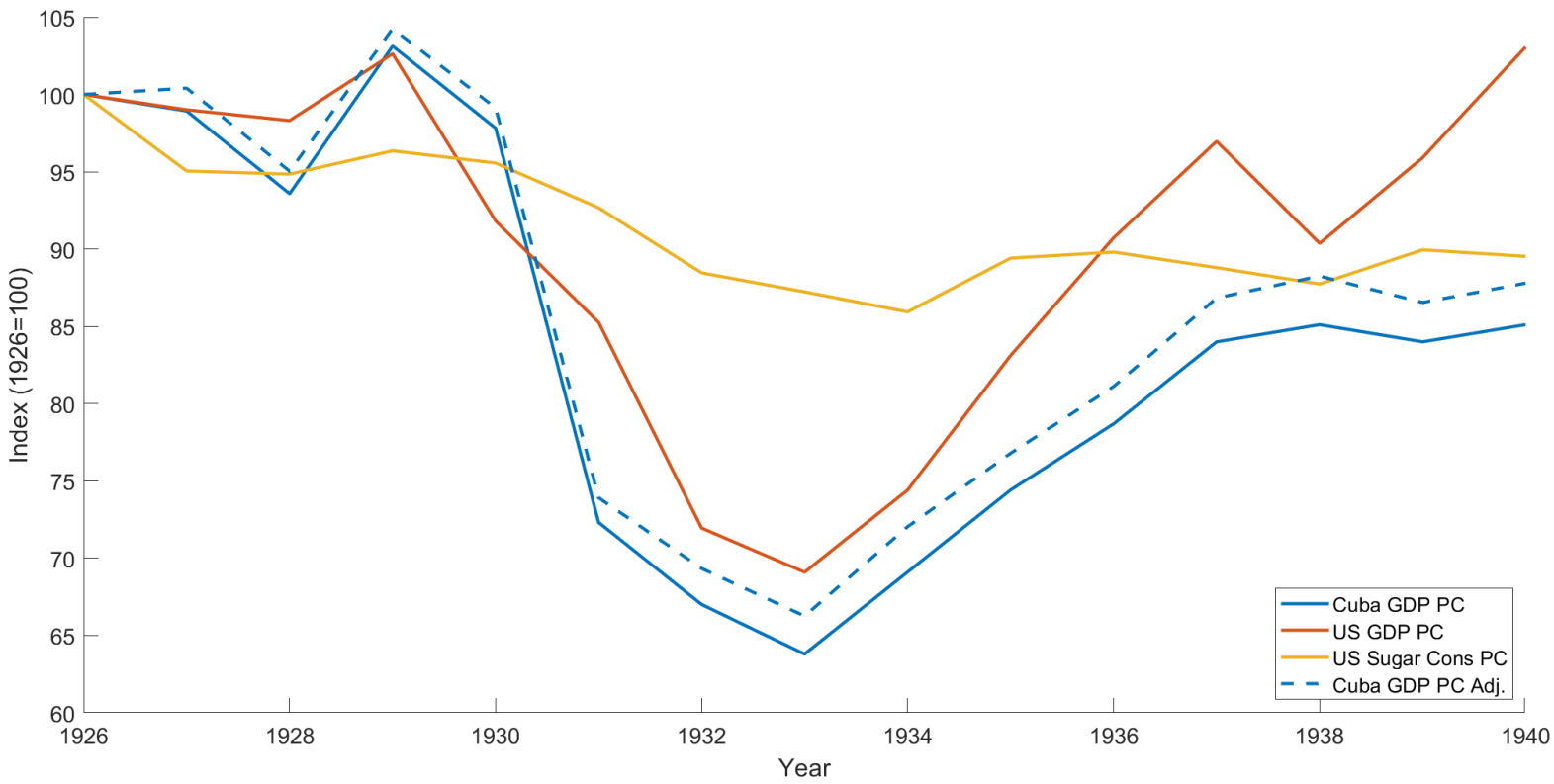
US-Cuban Business Cycle Relationship

Figure: **Per Capita GDP and Sugar Consumption**



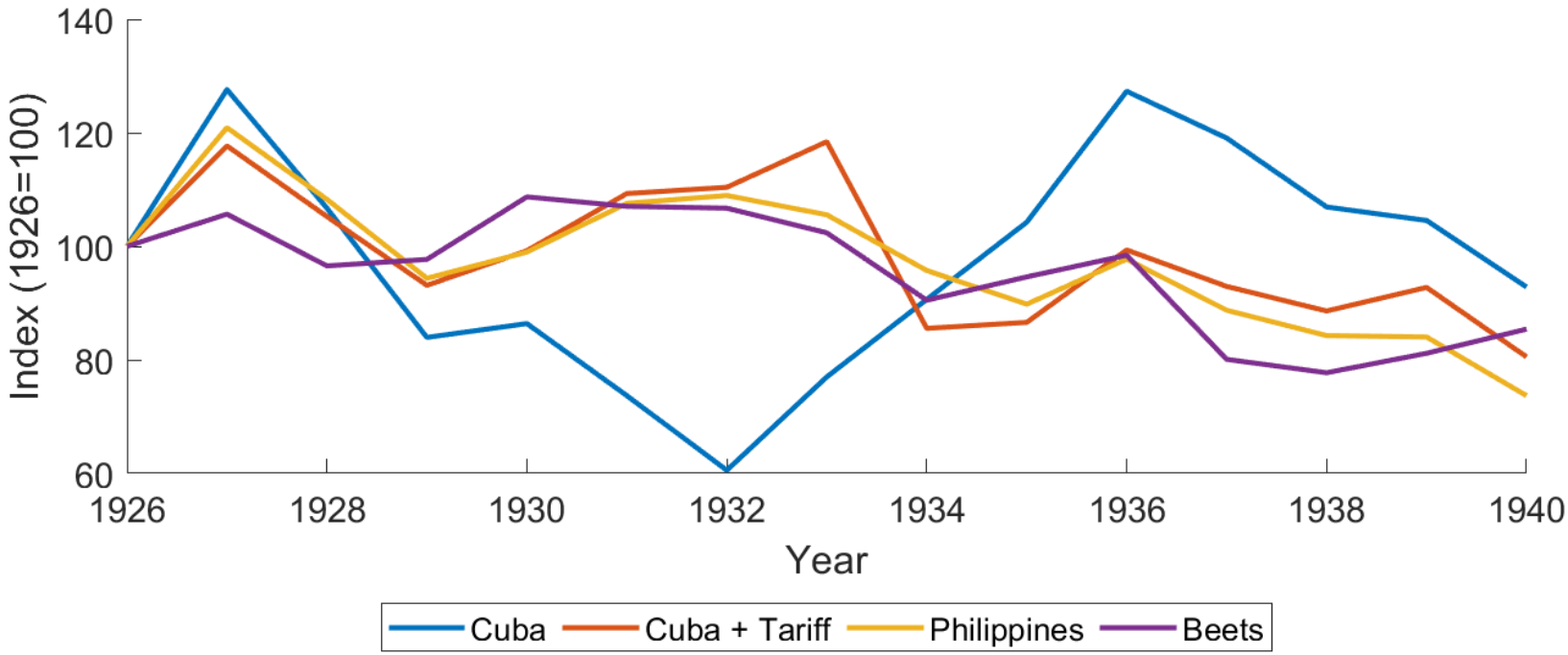
Note: Data come from Maddison Project and Sugar Statistics and Related Data (USDA) 1961 v.1.

Cuba in Depression

- A common narrative about the Great Depression is that most of the decline in foreign income resulted from a US demand spillover
- US economy crashes, import demand is highly procyclical so trading partners suffer the consequences
- Given the relatively smooth path of US aggregate sugar consumption, this narrative does not work for Cuba
- Our hypothesis: Cuban terms of trade deterioration driven mostly by US commercial policies

Terms of Trade Channel

Figure: **Sugar Prices Relative to US WPI**



Note: Data are unit values from the Foreign Commerce and Navigation of the United States except for beets which are prices received by farmers sourced from the USDA NASS. Prices are deflated by a wholesale price index.

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Sugar Tariffs (Later Quotas)

Why did Cuba enter a Great Depression if US sugar consumption was relatively stable?

- US government asked beet producers to ramp up production during WWI and promised protective tariffs in return.
- Tariffs on Cuban sugar rose to 1.7648 cents/lb (68.8%) in 1922 and then to about 2 cents/lb (103.6%) in 1930
- Nominally sticky tariffs rose to 224% AVE by 1932.

Was there a terms of trade response?

- Cuba drastically lowered prices to remain competitive (recall the pre-tariff import unit value figure)
- Irwin (2019) finds tariff hikes reduced Cuba's export price by about 1/3-1/2 of the duty from 1890-1914

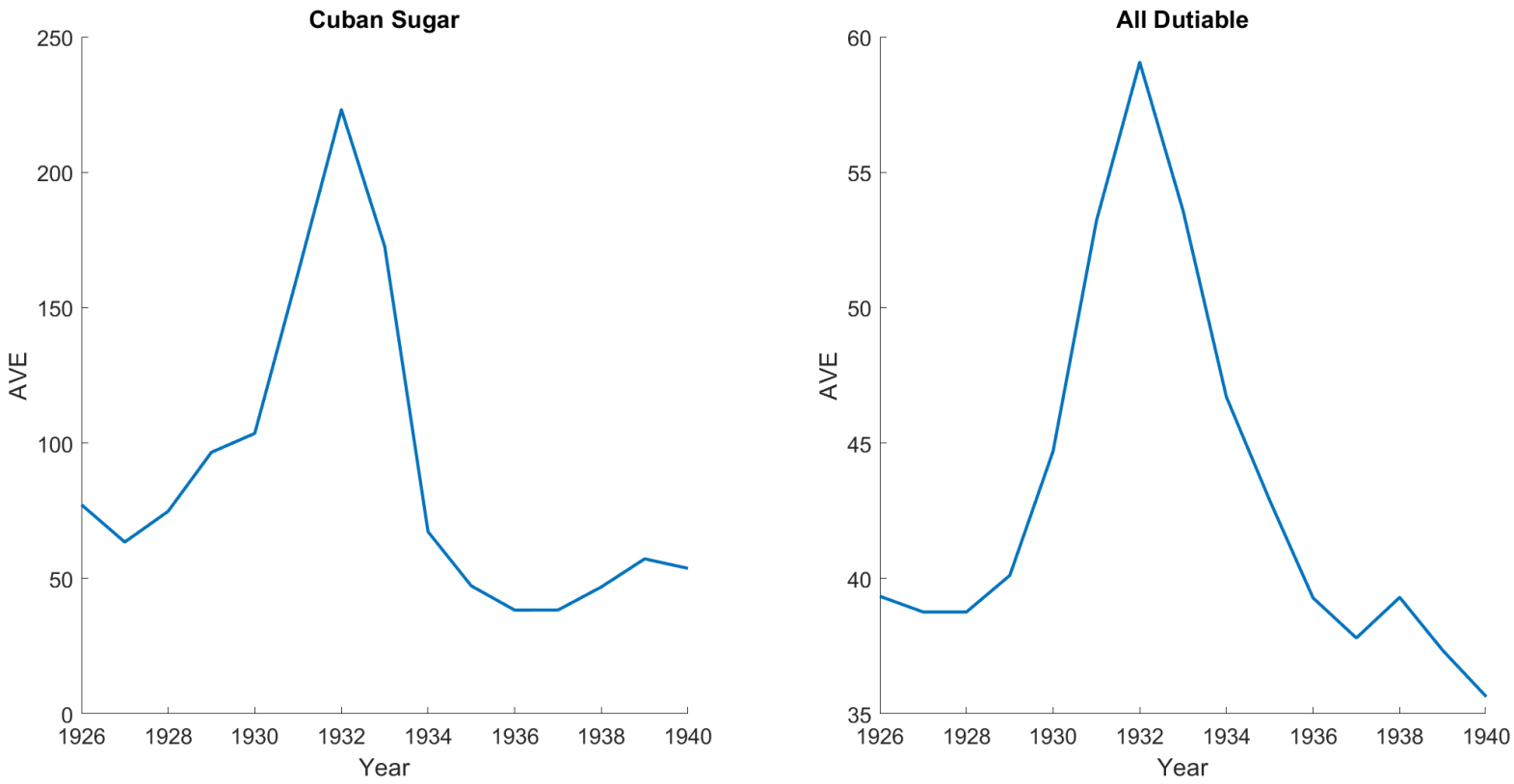
US Imports and Tariffs on Sugar

Table 1. Imports of sugar in 1929

Description	Quantity mill's lbs	Duties $/lb	AVE percent	Price $/lb	Tariff Inclusive Price
Sugar cane	511	0.05	29	0.17	0.22
Cane Sugar:					
Philippine Is.	1,421	0	0	3.50	3.50
Cuba	7,333	1.76	94	1.89	3.65
Beet sugar	0.0004	2.39	60	4.0	6.39

Sugar Tariffs Were Exceptional

Figure: **Ad-Valorem Equivalent Tariffs**



Note: Data come from the FCNUS.

Complexities of Interwar Duties

Three types of import duties:

1. Standard ad-valorem rate, τ_{iL}, which is a percent of the value imported
2. Specific rate, ω_{iL}, which is a fixed nominal value per unit imported (e.g., 10 cents per bushel)
3. A combination of these two

Algebraically,

$$\tau_{it} = \tau_{iL} + \frac{\omega_{iL}}{P_{it}}$$

Key idea: the ad-valorem-equivalent of the specific duty moves inversely with the nominal import unit value, P_{it}, introduction a monetary non-neutrality into the tariff system.

The Crucini (1994) decomposition

The ad-valorem-equivalent duty may be parsed into three components:

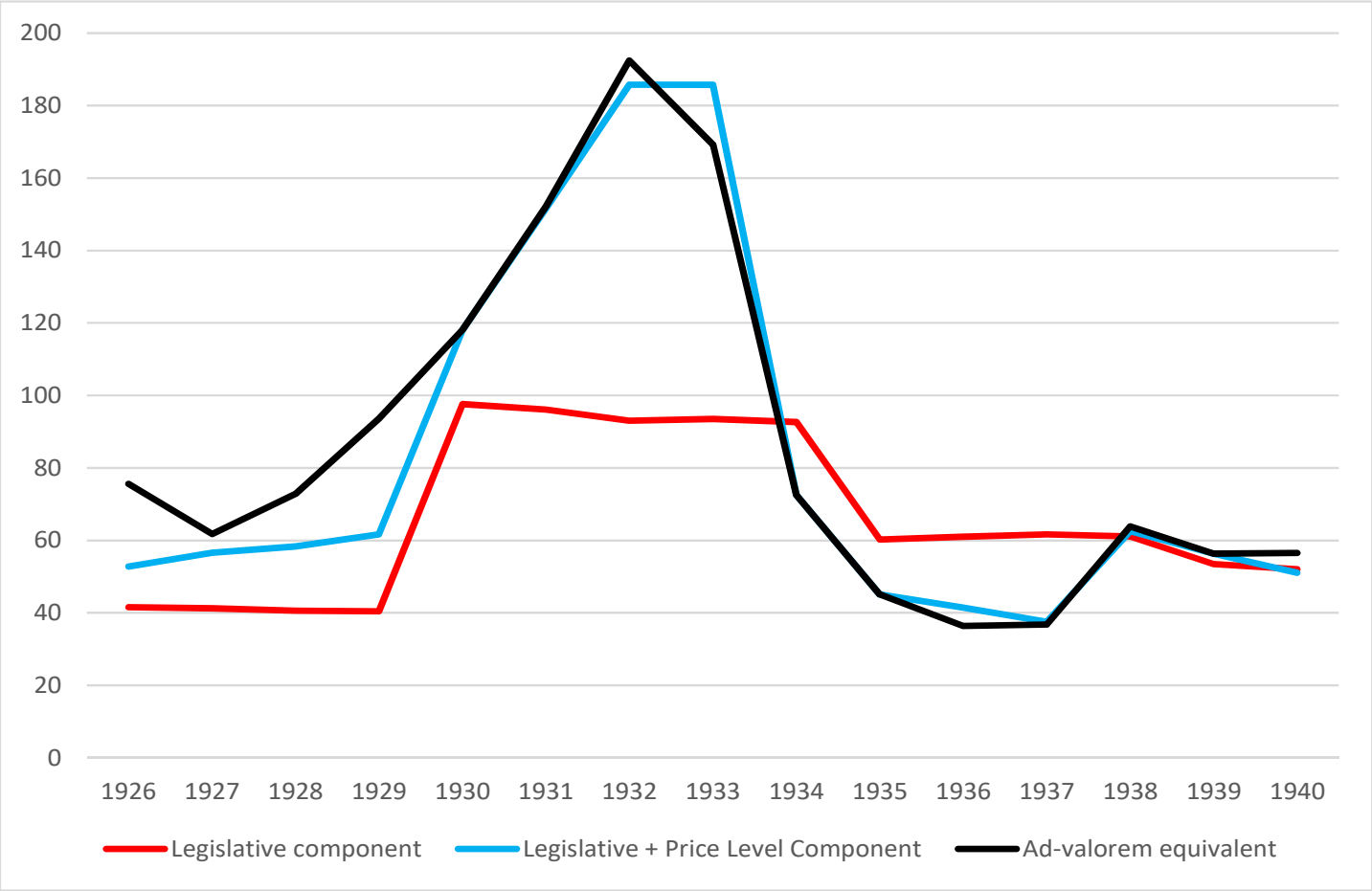
$$\tau_{it} = \underbrace{\left[\tau_{jL} + \frac{\omega_{iL}}{P_{iL}}\right]}_{T_{iL}^{L}} + \underbrace{\left[\frac{\omega_{iL}}{P_{iL}}\left(\frac{P_L}{P_t} - 1\right)\right]}_{T_{it}^{P}} + \underbrace{\left[\frac{\omega_{iL}}{P_{iL}}\left(\frac{P_{iL}}{P_{it}} - \frac{P_L}{P_t}\right)\right]}_{T_{it}^{RP}}$$

The three components of the decomposition, from left to right, are:

1. The legislative component T_{iL}^{L},
2. The price level component T_{it}^{P}, and
3. The relative price component T_{it}^{RP}.

Sugar Tariff Decomposition

Figure: **Components of Ad-Valorem Equivalent Sugar Tariff**



Note: Data come from the FCNUS.

Beneficiaries of Protectionism

Two major groups stood to benefit from this protectionism

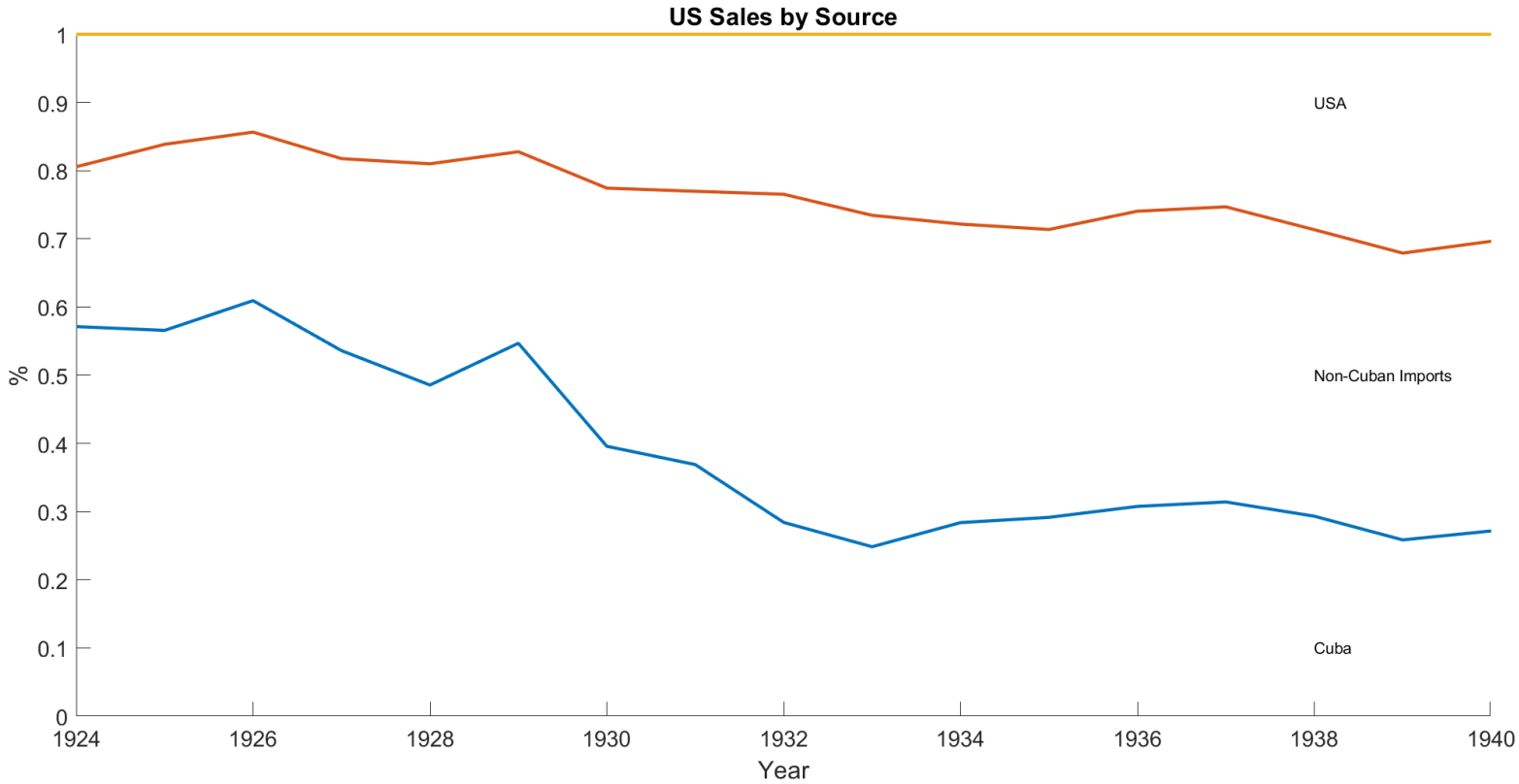
1. US domestic producers
   - Mostly sugar beet producers/refiners in upper-midwest and northwest
2. Insular US possessions that were not subjected to sugar tariff
   - Philippines main beneficiary as Hawaii had insufficient land to expand production
   - Both gained from higher relative prices sustained by the nominally rigid tariff

Did beneficiaries expand production or merely realize excess profits?

- Consumption shifted from Cuba toward protected groups
- These altered consumption shares were solidified by a (domestic and import) quota in 1934

Sugar Consumption Shares

Figure: **US sugar consumption by source**



Note: Data come from Sugar Statistics and Related Data (USDA) 1961 v.1.

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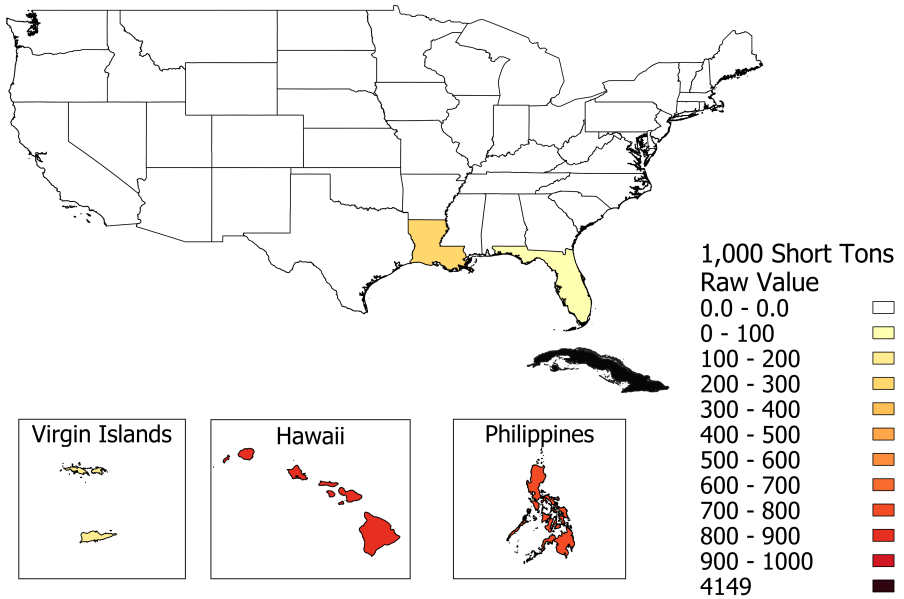
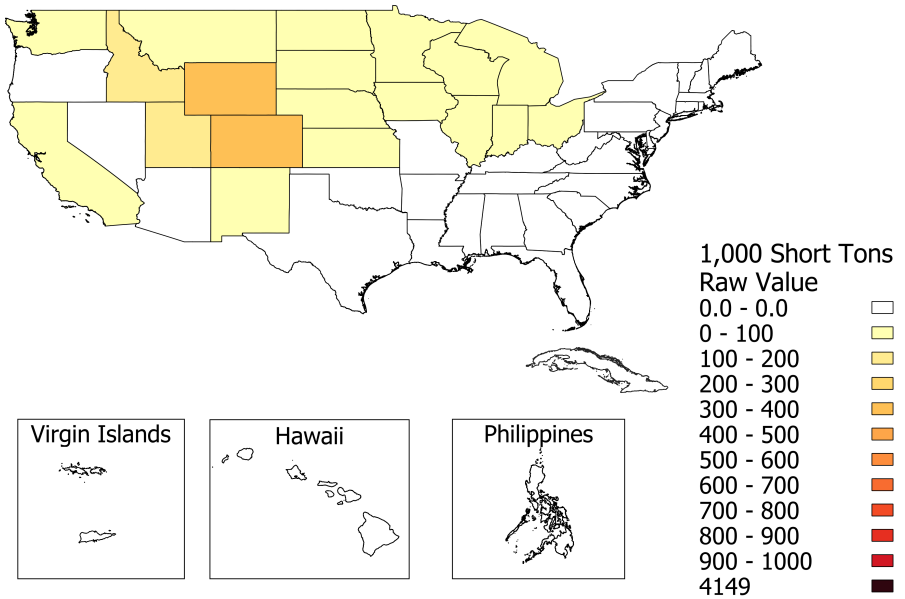
Figure: Geography of Cane and Beet Sugar Production



(a) Cane Production



(b) Beet Production

Note: The data source is Sugar Statistics and Related Data (USDA) 1961 v.1. The values are for the year 1929.

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SOCDE Business Cycle Model

Overview

- Current model considers two SOCDEs: Cuba and Other
- Cuba receives the pre-tariff price of sugar
- Others – by virtue of the protective tariff – receive the tariff-inclusive price of sugar
- Each SOCDE specializes in production of sugar, a perishable good
- Each SOCDE imports a durable manufactured good that serves as physical investment and durable consumption
- Two shocks in each location, productivity in sugar production and the terms of trade (we will focus on the second one)
- Impose period-by-period trade balance (financial autarky)

SOCDE Business Cycle Model

Key Equations

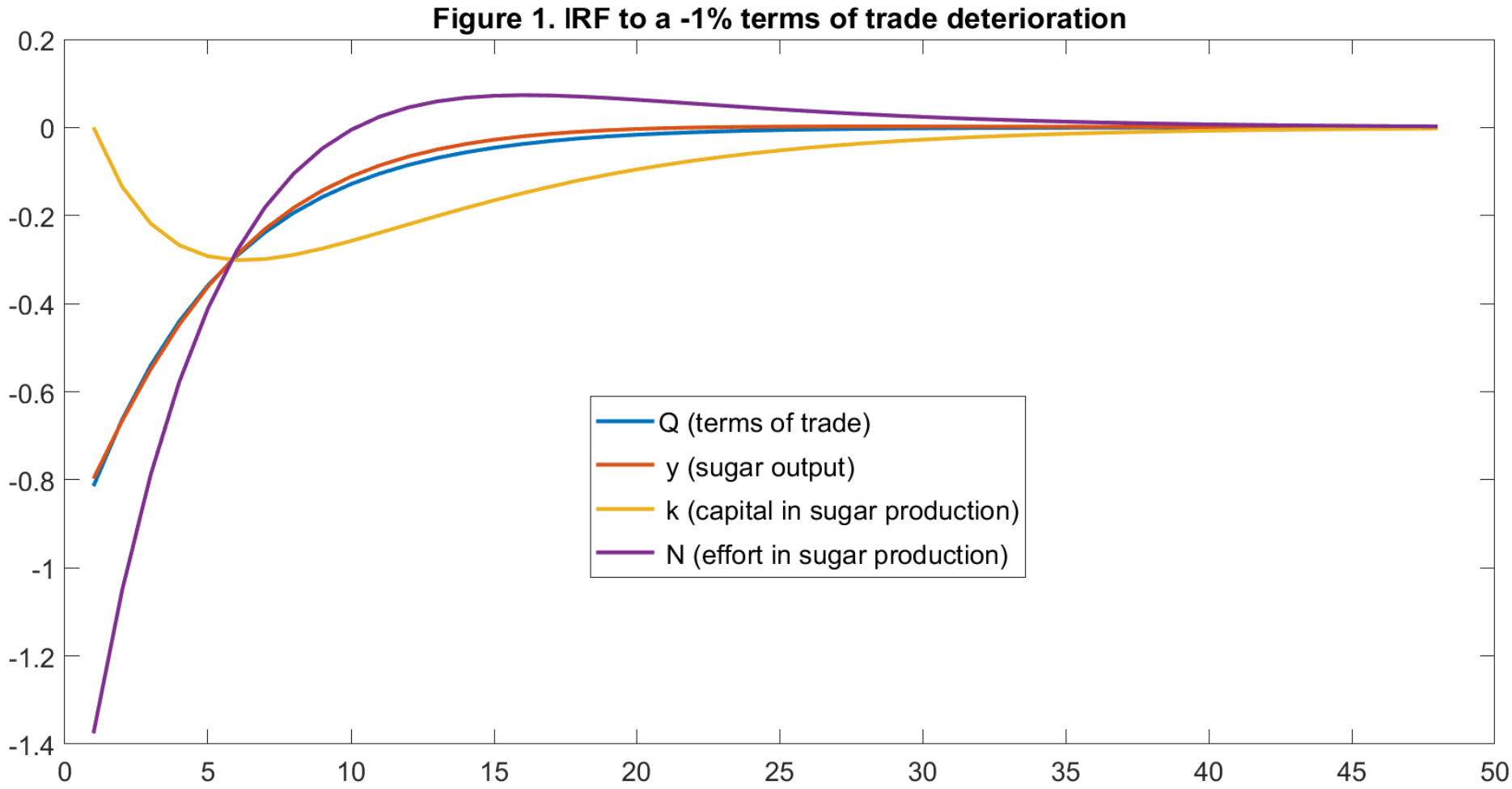
$$
\begin{aligned}
U &= \sum_{t=0}^{\infty} \beta^t U(x_t, 1 - N_t) \\
x_t &= H(d_t, s_t) \\
y_t &= A_t F(k_t, N_t) \\
k_{t+1} &= (1-\delta)k_t + \phi(\frac{i_t^k}{k_t})k_t \\
d_{t+1} &= (1-\delta)d_t + \phi(\frac{i_t^d}{d_t})d_t \\
Q_t(y_t - s_t) &= i_t^k + i_t^d \\
\begin{bmatrix} Q_t \\ A_t \end{bmatrix} &= \begin{bmatrix} \rho_q & 0 \\ 0 & \rho_a \end{bmatrix} \begin{bmatrix} Q_{t-1} \\ A_{t-1} \end{bmatrix} + \begin{bmatrix} \epsilon_{q,t} \\ \epsilon_{a,t} \end{bmatrix}
\end{aligned}
$$

Calibration

Table 1. Parametric Calibration (Annual model)

Description	Symbol	Value
Intertemporal substitution	σ	1.0
Substitution (sugar, manu)	η	0.5
Sugar consumption share	b_1	0.1
Fraction of work time	N_{ss}	0.2
Elasticity Tobin's Q wrt i^z/Z	ξ	-0.075
Depreciation rate	δ	0.10
Growth	$\gamma_x - 1$	1.6%
Labor's share	α	0.58

Impulse Response to Negative Terms of Trade Shock



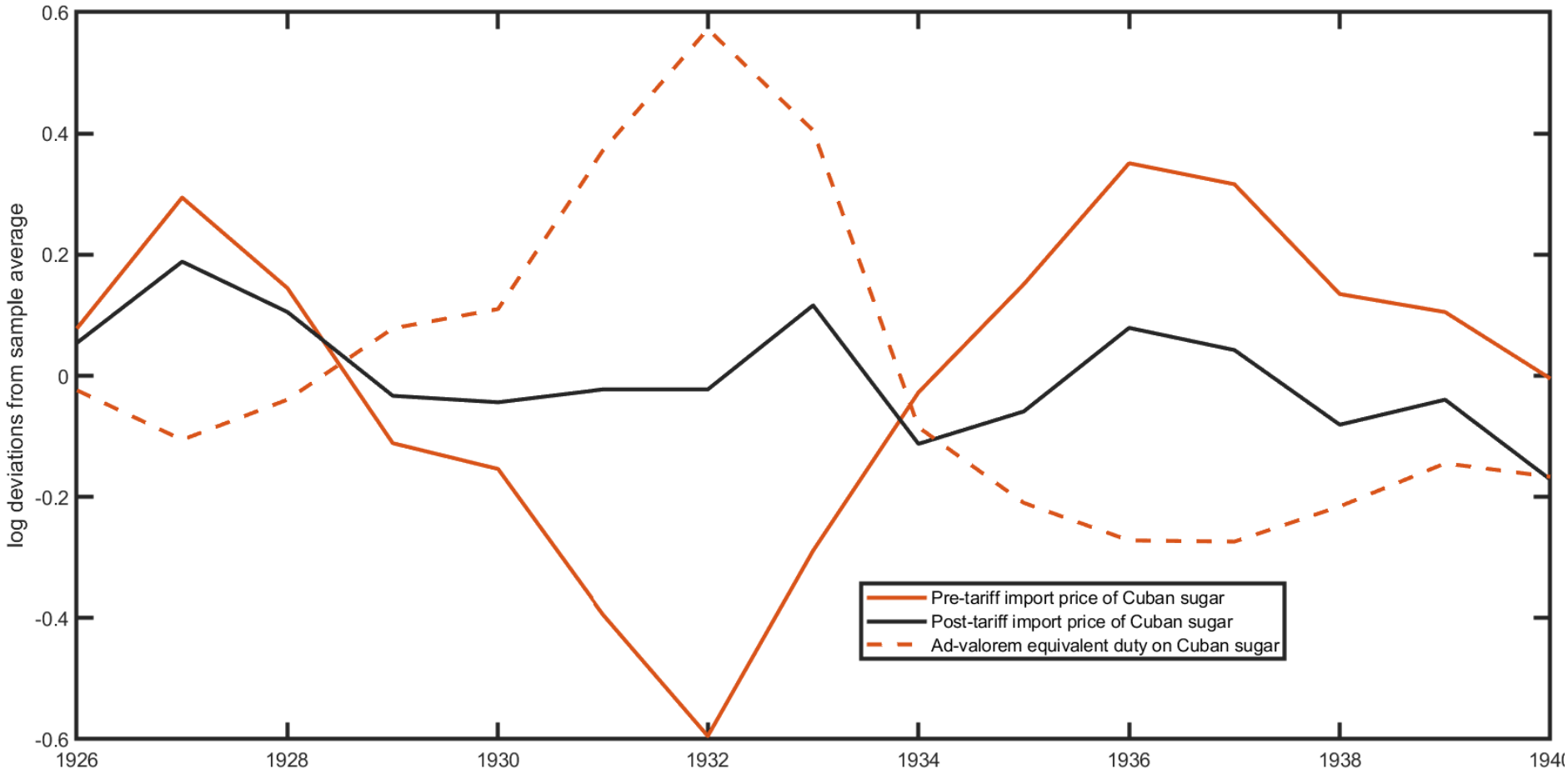
Properties of the Shocks

- P_t^s - FOB unit value of Cuban sugar in USD
- P_t^m - US CPI
- τ_t - Ad-valorem-equivalent tariff on Cuban sugar imports to the US
- $Q_t^h = P_t^s / P_t^m$ - Terms of trade for Cuba
- $Q_t^o = (1 + \tau_t) P_t^s / P_t^m$ - Terms of trade for Other

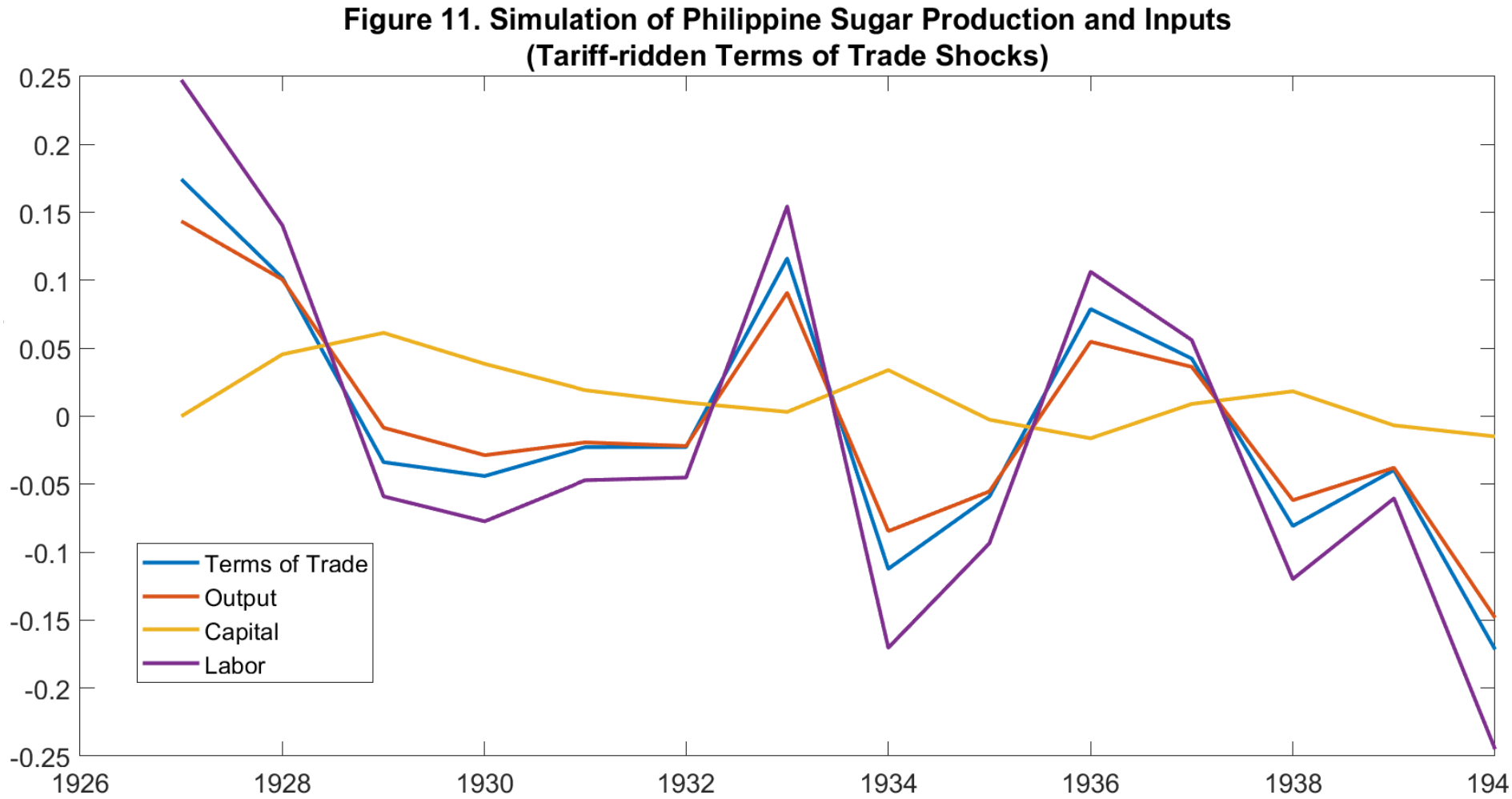
Table 2. Stochastic Properties of Terms of Trade

Country	Variable	Persistence	Std. dev.
Cuba	$ln(Q_t^h)$	0.74	0.28
Other	$ln(Q_t^o)$	0.26	0.09

Simulation: The Shocks



Simulation: Tariff-exempt Sugar Producers



Simulation: Cuban Business Cycle

Figure 10. Simulation of Cuban Sugar Production and Inputs
Pre-tariff Terms of Trade Shocks

THANK YOU!