MIDWEST MACROECONOMIC MEETING

The Impact of Tariff and Trade Policy Uncertainty Shocks on Household Asset Portfolios

Siwon Lee

Washington University in St. Louis

Main Question

- **How does trade policy uncertainty affect household portfolios?**

Evidence

- Use monthly U.S. local projections to trace portfolio shares, equity prices, real activity, and wages after a trade policy uncertainty (TPU) innovation.
- The stock share and monthly-average NASDAQ fall on impact. Cash and bond shares rise. Output and employment responses are imprecise.

Model

- Tariff escalation changes when firms buy and draw down imported inputs, which affects equity payouts and government debt service.
- Households infer inventories from market signals and choose consumption and portfolios under ambiguity about inventory dynamics.

Monthly local projections

$$u_t^{\mathrm{TPU}} = \frac{T_t - \widehat{a} - \sum_{\ell=1}^{6} \widehat{\rho}_\ell T_{t-\ell} - \widehat{d}' D_t}{\widehat{\sigma}_\nu},$$

$$W_{t-1} = \left(100\Delta \log P_{t-1}^{\mathrm{PCE}},\ \log VIX_{t-1}^{\mathrm{EOM}},\ 100\Delta \log IP_{t-1}\right)',$$

$$y_{t+h} - y_{t-1} = \alpha_h + \beta_h u_t^{\mathrm{TPU}} + \Gamma_h' W_{t-1} + \varepsilon_{t,h}, \qquad h = 0, \ldots, 10.$$

- **Innovation.** T_t is the Caldara index in levels. D_t contains first-stage pandemic indicators. $\widehat{\sigma}_\nu$ is the standard deviation of the AR(6) residual.
- **Response.** β_h measures the cumulative change relative to $t-1$ per one-standard-deviation innovation, conditional on the lagged controls.
- **Sample.** Jan. 2007–Jan. 2026. Exclude outcome windows overlapping Mar.–Jun. 2020. Pointwise 95% HAC intervals.

TPU episodes Inference Data sources

Table 1. Portfolio shares

Cumulative responses to a one-standard-deviation TPU innovation

Share	Impact	Month 1	Month 2
Stock	-0.289	-0.415	-0.292
	$[-0.421, -0.158]$	$[-0.583, -0.246]$	$[-0.520, -0.064]$
Cash	0.194	0.272	0.208
	$[0.060, 0.329]$	$[0.109, 0.434]$	$[0.019, 0.398]$
Bond	0.097	0.146	0.087
	$[0.047, 0.148]$	$[0.067, 0.225]$	$[0.001, 0.173]$
Observations	224	222	220

- The estimated cash increase is larger than the bond increase at all three horizons. Survey weights reflect both trading and asset valuations.
- AAII Asset Allocation Survey. Percentage points. Brackets show pointwise 95% HAC intervals.

Response paths Robustness

Table 2. Market prices and real activity

Outcome	Impact	Month 2
NASDAQ, monthly average	$-\mathbf{0.846}\,[-1.361, -0.332]$	$-0.489\,[-1.232, 0.254]$
NASDAQ, month end	$-0.395\,[-0.829, 0.039]$	$0.105\,[-0.634, 0.843]$
Industrial output	$0.011\,[-0.033, 0.055]$	$0.015\,[-0.039, 0.068]$
Employment	$-0.002\,[-0.014, 0.009]$	$-0.004\,[-0.034, 0.026]$
Real income	$0.015\,[-0.010, 0.040]$	$-0.029\,[-0.093, 0.035]$
Real sales	$0.022\,[-0.039, 0.083]$	$0.002\,[-0.085, 0.089]$
Nominal PCE	$-0.002\,[-0.027, 0.023]$	$-0.030\,[-0.079, 0.018]$
Real PCE	$-0.001\,[-0.026, 0.023]$	$-0.029\,[-0.074, 0.016]$
Intermediate-demand PPI	$-0.012\,[-0.077, 0.052]$	$-0.044\,[-0.151, 0.062]$

- The monthly-average NASDAQ declines on impact. The month-end estimate and the real-activity intervals include zero.
- Cumulative 100 log changes. Pointwise 95% HAC intervals. Impact $N = 224$, except real PCE ($N = 223$).

NASDAQ paths | Activity paths | Aggregate spending

Table 4. Nominal hourly wage growth

Change in median year-over-year wage growth (pp)

Horizon	Estimate	Pointwise 95% HAC CI	p	N
0	-0.008	$[-0.069, 0.052]$	0.785	224
1	-0.005	$[-0.031, 0.022]$	0.740	222
2	$\mathbf{-0.056}$	$[-0.094, -0.018]$	0.004	220
3	0.000	$[-0.058, 0.059]$	0.993	218
4	-0.031	$[-0.064, 0.001]$	0.060	216

- Wage growth slows at month two. The first two estimates are imprecise. The model takes the posted nominal wage as sticky in the short run.
- Atlanta Fed Wage Growth Tracker. The outcome is $g^w_{t+h} - g^w_{t-1}$.

Table 3. Spending components

A two-country portfolio model

- **Two countries in continuous time.** Countries trade final goods and intermediate inputs. A public regime switch can raise country 1's tariff on new imports.
- **Merton portfolio choice.** Households allocate wealth across equity, government bonds, and cash. Inventory choices link tariff policy to risky payoffs, and households have incomplete information about inventories.
- **Partial equilibrium.** Intermediate inputs are supplied elastically at given world prices. Households take asset price processes as given in their portfolio problem. Final-goods and labor markets clear, and trade and fiscal accounts close. Holdings and valuations must agree.
- **Indices.** i denotes the home country, $j \neq i$ its trading partner, and k, l the policy regimes.

4.1 Trade policy uncertainty regimes

- Regime 1 has gradual tariff adjustment. Regime 2 features escalation and more frequent revisions. The current regime is public.

$$\mathbf{Q}(t) = \begin{pmatrix} -\lambda_{12}(t) & \lambda_{12}(t) \\ \lambda_{21}(t) & -\lambda_{21}(t) \end{pmatrix},$$

$$\tau_{i,k} = \text{import tariff in country } i \text{ and regime } k,$$

$$\tau_{1,2} > \tau_{1,1} = \tau_{2,1} = \tau_{2,2}.$$

- λ_{12} is the arrival rate of escalation and λ_{21} is the arrival rate of easing. Only country 1 raises its tariff in regime 2.
- In regime 1, escalation news raises λ_{12} and the expected tariff on future purchases while the current tariff stays in place.

Policy events and revaluation

4.2 Production and input sourcing

- Monopolistically competitive firms combine labor with a CES bundle of domestic and imported inputs. Firms set prices at a markup over marginal cost and choose employment at a sticky nominal wage.

$$Y_i = A_i L_i^{\alpha_i} X_i^{1-\alpha_i}, \qquad X_{F,i} = X_{F,i}^N + X_{F,i}^I,$$

$$P_{F,i}^{\text{use}} = \phi_i P_{M,i} + (1-\phi_i) P_{I,i}, \qquad \phi_i = X_{F,i}^N / X_{F,i}.$$

- $X_{F,i}^N$ is new imports used in production and $X_{F,i}^I$ is withdrawals from inventory. $P_{I,i}$ is the average acquisition cost of stored inputs.
- When the tariff raises the new import price $P_{M,i}$, inventories bought earlier can cushion current production costs.

4.2 Physical inventory and its book value

$$\dot{I}_i = Q_{X,i} - X^I_{F,i} - \delta_I I_i,$$

$$\frac{d(P_{I,i} I_i)}{dt} = P_{M,i} Q_{X,i} - P_{I,i} X^I_{F,i} - \delta_I P_{I,i} I_i.$$

- $Q_{X,i}$ is the rate of new import purchases for storage. δ_I is the depreciation rate of the physical stock.
- Additions enter at the current import price. Withdrawals and depreciation are recorded at the average acquisition cost.
- A tariff increase changes the cost of new purchases immediately. The inherited stock and its book value carry over at the switch.

Inventory policy

4.2 Inventory finance and dividends

- The firm maximizes discounted operating profit. Storage purchases must be funded from current cash resources $\mathscr{R}_i$.

$$\mathscr{R}_i = \Pi_i + P_{I,i} X^I_{F,i} + \delta_I P_{I,i} I_i,$$

$$0 \leq P_{M,i} Q_{X,i} \leq \mathscr{R}_i,$$

$$CF^S_i = \mathscr{R}_i - P_{M,i} Q_{X,i}.$$

- Π_i is accrued operating profit. Adding back withdrawals and depreciation gives cash available before storage purchases.
- The dividend CF^S_i is the cash left after buying inventory. It is zero when the funding bound binds.

Proposition 1

4.3 Tariff receipts and public debt

$$T_i = \tau_c P_{C,i} C_i + \tau_s P_{Y,i} Y_i + \underbrace{\tau_{i,k} \epsilon_{ij} p_{x,j} (X^N_{F,i} + Q_{X,i})}_{\text{duties on new imports}},$$

$$\dot{D}_i = r^D_{i,k} D_i - (T_i - \bar{G}_i).$$

- Duties apply when imports cross the border. ϵ_{ij} converts the partner's currency into country i's currency.
- Net issuance raises nominal debt D_i when debt service exceeds the primary balance $T_i - \bar{G}_i$. The market value of the bond responds to expected future payments.

Debt service and bond valuation

4.4 Stock, bond, and cash returns

Gains on inherited positions within regime k

$$\frac{dS_{i,t}}{S_{i,t}} = \mu^S_{i,k}\, dt + \sigma^S_{i,k}\, dZ^S_{i,t},$$

$$\frac{dB_{i,t}}{B_{i,t}} = \mu^B_{i,k}\, dt + \sigma^B_{i,k}\, dZ^B_{i,t},$$

$$\frac{dM_{i,t}}{M_{i,t}} = r^M_{i,k}\, dt.$$

- $\mu^S_{i,k}$ and $\mu^B_{i,k}$ are conditional expected total returns, including payouts. $dZ^S_{i,t}$ and $dZ^B_{i,t}$ are correlated return innovations.
- Equity pays cash profits and bonds pay debt service. Their prices can jump when the regime switches. The cash account accrues the safe rate and remains continuous.

Valuation and net issuance

4.4 Incomplete information about inventories

- Firms know their inventories. Households update a conditional distribution using observed prices, returns, wages, payouts, and the public policy regime.

$$dI_{i,t} = b_{i,k}(I_{i,t})\,dt + \bar{\nu}_{i,k}\,dW^I_{i,t}, \qquad \bar{\nu}_{i,2} > \bar{\nu}_{i,1}.$$

- In the household's reference forecast, $b_{i,k}$ is net accumulation implied by the sourcing rule and $\bar{\nu}_{i,k}$ is the dispersion of inventory innovations.

$$\Psi^a_{i,k} = \bar{\nu}_{i,k}\,\partial_{I_i} \log V^a_{i,k}(I_i), \qquad a \in \{S, B\},$$

$$\Sigma_{i,k} = R_i + \boldsymbol{\Psi}_{i,k}\boldsymbol{\Psi}^\top_{i,k}.$$

- $\Psi^a_{i,k}$ is the inventory loading of asset a, with $V^S_{i,k} = S_i$ and $V^B_{i,k} = B_i$. R_i captures return covariance orthogonal to the inventory shock.

4.4 Ambiguity about inventory dynamics

- Households consider alternative inventory drifts around the reference forecast.

$$dI_{i,t} = [b_{i,k}(I_{i,t}) + \bar{\nu}_{i,k} h_{i,t}]\, dt + \bar{\nu}_{i,k}\, dW_{i,t}^{I,\mathbb{Q}_i}, \qquad \tfrac{1}{2} h_{i,t}^2 \leq \kappa_k(t),$$

$$\kappa_k(t) = \bar{\kappa}\, \mathbf{1}_{\{k=2\}} + \varphi_\kappa \frac{\lambda_{12}(t)}{\lambda^{\max}}.$$

- The distortion $h_{i,t}$ changes the drift at a given diffusion. The entropy bound κ_k widens with escalation news and has a higher regime component in regime 2.
- With positive total inventory exposure, the worst case shifts the drift down. At fixed positive loadings, equity takes the larger return reduction under the model's loading assumption.
- Relative-entropy formulation following Drechsler (2013).

Worst-case distortion

4.5 Robust Merton portfolio choice

$$J_{i,k} = \max_{C_i, \boldsymbol{\theta}_i} \min_{\mathbb{Q}_i \in \mathscr{P}_{i,k}} \mathbb{E}_{i,0}^{\mathbb{Q}_i} \int_0^\infty e^{-\rho t} \left[U(C_{i,t}) - v(l_{i,t}) \right] dt,$$

$$dW_{i,t} = \left[W_{i,t}(r_{i,k}^M + \boldsymbol{\theta}_{i,t}^\top \boldsymbol{\pi}_{i,k}) - \widetilde{P}_{C,i,t} C_{i,t} + w_{i,t} l_{i,t} \right] dt + W_{i,t} \boldsymbol{\theta}_{i,t}^\top \boldsymbol{\sigma}_{i,k} \, d\boldsymbol{Z}_{i,t},$$

$$\theta_{i,t}^S, \theta_{i,t}^B \geq 0, \quad \theta_{i,t}^S + \theta_{i,t}^B \leq 1, \quad \theta_{i,t}^M = 1 - \theta_{i,t}^S - \theta_{i,t}^B.$$

- $\boldsymbol{\theta}_{i,t}$ contains the two risky financial shares. $\boldsymbol{\pi}_{i,k}$ is their conditional excess return under the candidate law. $\mathscr{P}_{i,k}$ is the set of laws within the entropy bound.
- The budget above applies within a regime. A switch marks inherited risky holdings to their new prices. Employment follows firms' labor demand. Wealth and consumption stay nonnegative.

4.6 Market clearing and external balance

$$L_i = l_i,$$
$$P_{Y,i} Y_i = P_{C,i} C_i + \bar{G}_i + NX_i,$$
$$NX_1^F + \mathscr{M}_2 - \mathscr{M}_1 = 0.$$

- Households supply the labor firms demand at the posted wage. Domestic and foreign private and public expenditure absorb final output.
- NX_1^F is country 1's final-goods balance. $\mathscr{M}_i$ is country i's pretariff spending on new intermediate imports in a common currency.
- With zero net foreign asset accumulation, the final- and intermediate-goods balances jointly determine the exchange rate with production and expenditure.

Proposition 3

Proposition 2. Optimal inventory policy

- **Positive stock target.** The threshold assumes fixed input use, regime prices, and transition intensities, with a zero inventory floor.

$$\lambda_{12}(P_{M,i,2} - P_{M,i,1}) > (\rho + \delta_I)P_{M,i,1}.$$

$$T_i^* = \frac{1}{\rho + \delta_I + \lambda_{21}} \log\left[\frac{P_{M,i,2} - \bar{q}_i}{\left(1 + \frac{\rho+\delta_I}{\lambda_{12}}\right) P_{M,i,1} - \bar{q}_i}\right], \qquad \bar{q}_i = \frac{\lambda_{21} P_{M,i,1}}{\rho + \delta_I + \lambda_{21}}.$$

- **Drawdown.** The target is zero in regime 2. Starting at the regime 1 target, T_i^* is the time to stockout after escalation.
- **Purchases over time.** The cash funding limit can spread stockbuilding across several periods. An early switch leaves the firm with the stock it has actually acquired.

Stock target $I_{i,1}^*$ Funding limit

Proposition 4. Household optimum

$$\boldsymbol{A}_{i,k}\boldsymbol{\theta}_i = \boldsymbol{m}_{i,k} - \sqrt{2\kappa_k}\, s_{i,k}\boldsymbol{\Psi}_{i,k} + \frac{\lambda_{kl}}{J_{i,k,W}}\mathbb{E}_{i,t}^{h^*_{i,k}}[J_{i,l,W}\boldsymbol{\Delta}_{i,kl} \mid k \to l] - \boldsymbol{n}_{i,k}.$$

$$\boldsymbol{A}_{i,k} = -\frac{W_i J_{i,k,WW}}{J_{i,k,W}}\Sigma_{i,k}, \qquad \boldsymbol{m}_{i,k} = \boldsymbol{\pi}^0_{i,k} + \Gamma_{i,k}\frac{J_{i,k,Wz}}{J_{i,k,W}}.$$

- $\boldsymbol{A}_{i,k}$ scales return covariance by wealth curvature. $\boldsymbol{m}_{i,k}$ adds an information hedge to reference excess returns. $\Gamma_{i,k}$ is the covariance of return and belief innovations.
- Ambiguity tilts expected returns according to the subgradient $s_{i,k}$ of absolute inventory exposure. The transition term values revaluation at post-switch marginal utility. $\boldsymbol{n}_{i,k}$ enforces portfolio constraints.

Bellman equation and distortion

Proposition 5. Partial equilibrium

$$\dot{M}_i = r^M_{i,k} M_i + w_i l_i - (1+\tau_c) P_{C,i} C_i + CF^S_i + T_i - \bar{G}_i.$$

- Cash accumulates with interest, labor income, dividends, and net bond receipts $T_i - \bar{G}_i$, less consumption spending.

Valuation along the clearing path (62)

$$(S_i(t), B_i(t), M_i(t)) = \lim_{T\to\infty} \mathbb{E}^{h^*_i}_{i,t} \int_t^T \frac{m_{i,s}}{m_{i,t}} \left(CF^S_i(s),\, T_i(s) - \bar{G}_i,\, K_i(s)\right) ds,$$

$$W_i(t) = \lim_{T\to\infty} \mathbb{E}^{h^*_i}_{i,t} \int_t^T \frac{m_{i,s}}{m_{i,t}} \left[(1+\tau_c) P_{C,i}(s) C_i(s) - w_i(s) L_i(s)\right] ds.$$

- The first line values dividends, net bond receipts, and the cash-account flow $K_i = r^M_{i,k} M_i - \dot{M}_i$.
- The second line values tax-inclusive consumption spending net of labor income. Both lines use the same household discount factor $m_{i,s}/m_{i,t}$.

Marginal utility and valuation

Proposition 7. The regime-transition hedge

$$\boldsymbol{x}^{*}_{i,k} - \boldsymbol{x}^{\mathrm{nh}}_{i,k} = \frac{\lambda_{kl}(A_{i,l}/A_{i,k})}{\gamma(1 + \boldsymbol{x}^{*\top}_{i,k}\boldsymbol{\Delta}_{i,kl})^{\gamma}}\Sigma^{-1}_{i,k}\boldsymbol{\Delta}_{i,kl},$$

$$\boldsymbol{x}^{\mathrm{nh}}_{i,k} = \gamma^{-1}\Sigma^{-1}_{i,k}(\boldsymbol{\pi}^{0}_{i,k} - \sqrt{2\kappa_k}\boldsymbol{\Psi}_{i,k}).$$

- **Transition hedge.** The difference compares interior risky shares in total-wealth units with and without the jump term, holding robust returns and covariance fixed. The covariance-adjusted price jump can shift demand from stocks toward bonds even when both prices fall.
- **Inventory exposure.** $\Psi^{a}_{i,k} = \bar{\nu}_{i,k}\partial_{l_i}\log V^{a}_{i,k}$ measures how asset a loads on inventory shocks. With positive total inventory exposure, the worst case lowers expected returns on assets with positive loadings.

Covariance conditions Full policy response

Conclusion

- **Evidence.** The impact stock share falls by 0.289 pp. Cash rises by 0.194 pp and bonds by 0.097 pp.
- **Inventories.** The auxiliary inventory target can be positive in regime 1 and is zero in regime 2. Buying early and drawing stocks down after escalation change equity payouts and the timing of tariff receipts.
- **Ambiguity.** Households face greater inventory dispersion in regime 2 and entertain a wider range of drift laws. Escalation news can widen that range before tariffs change.
- **Contribution.** The model links an imperfectly observed production state to equity and bond returns. Ambiguity changes expected returns, while regime revaluation creates a separate hedge. Cash absorbs the net change in risky shares.

Thank you Appendix

Appendix

Empirical evidence

TPU index | Portfolio paths | NASDAQ | Activity | Aggregate PCE

Table 3 | Spending components | Table 5 | Table 6 | Table 7

Inference | Table A.1. Data

Production and market clearing

Table 8 | Proposition 1 | Stock target | Funding time | Proposition 3

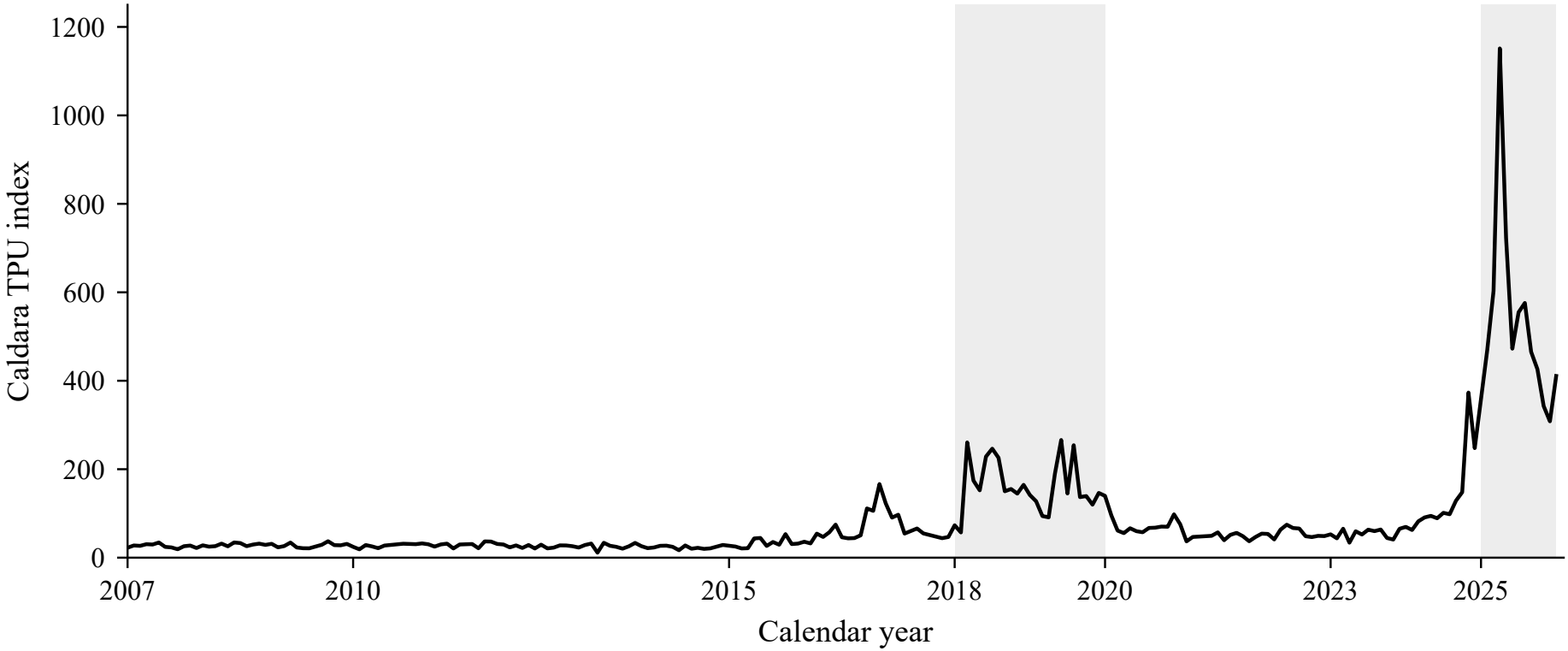
Households and asset prices

Bellman equation | Asset valuation | Equation (62)

Proposition 6 | Hedge conditions

Conclusion | Thank you

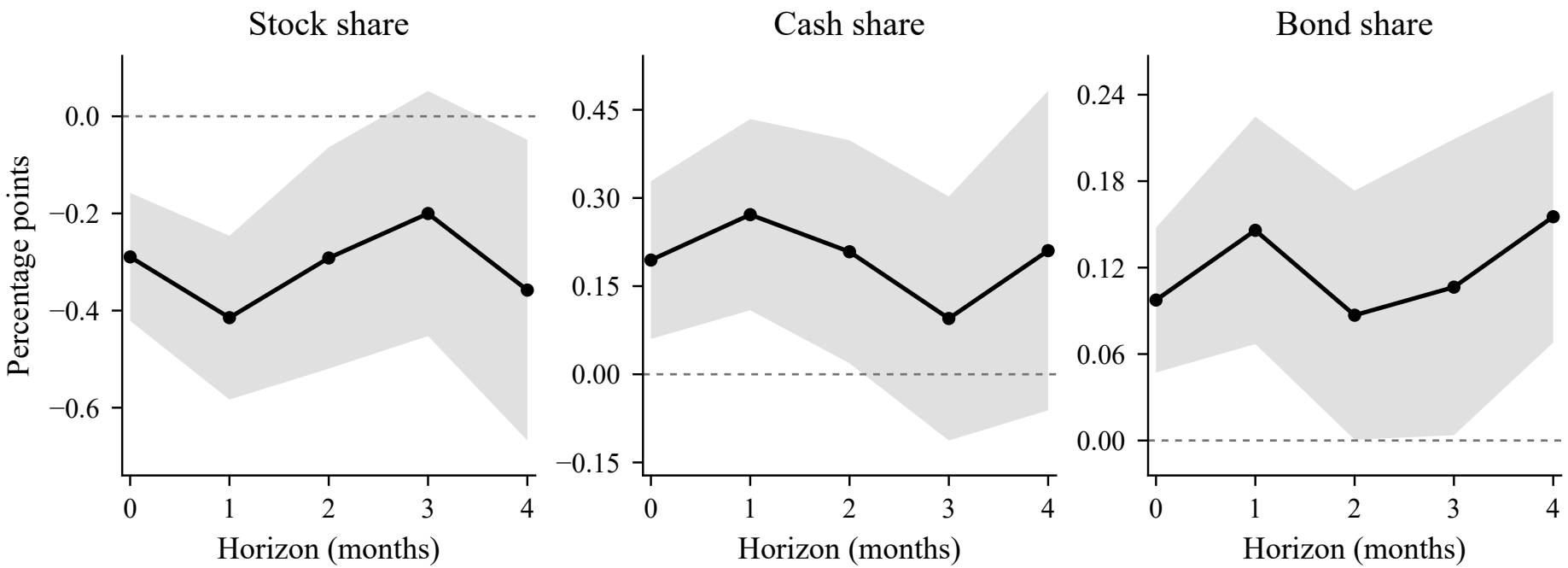
Caldara trade policy uncertainty index



- **Major episodes.** Shading marks the 2018–19 trade conflict and the 2025 escalation. The index peaks at 266 in June 2019 and 1,151 in April 2025. The first stage uses published index levels.

▸ Back to main slide Appendix menu

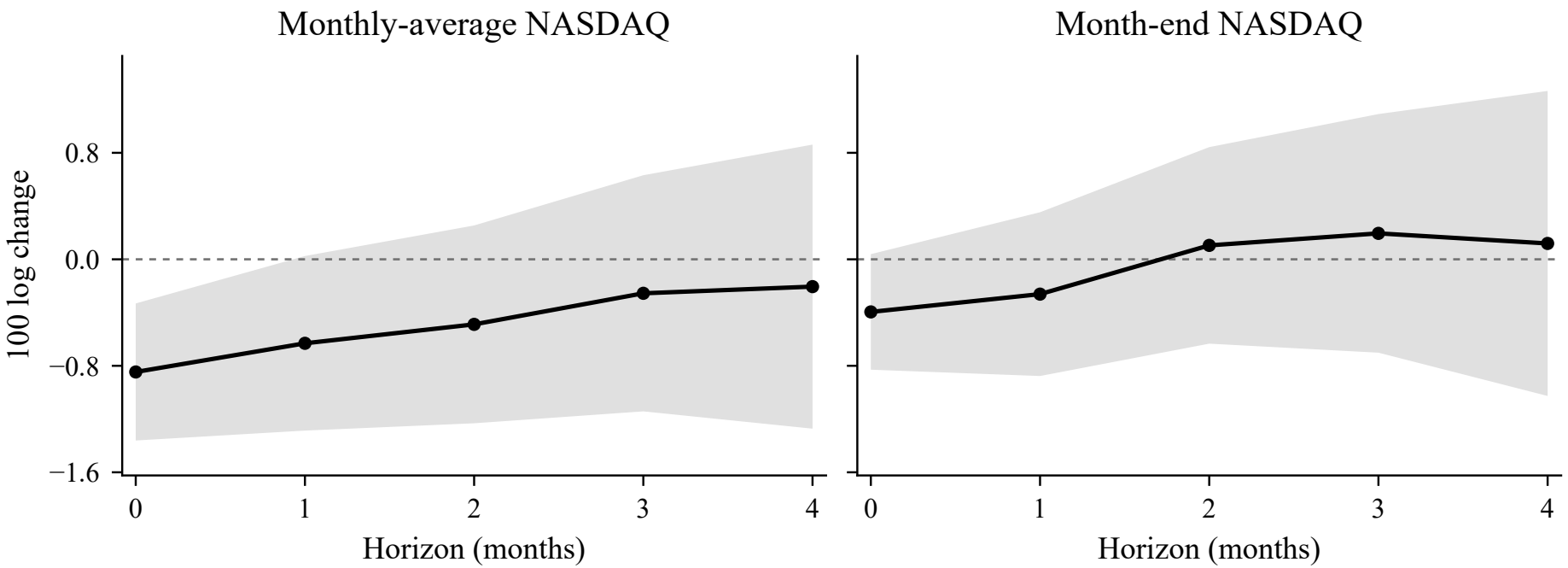
Portfolio share response paths



- **Portfolio weights.** The paths show cumulative changes in percentage points. Panels have separate vertical scales. Shading shows pointwise 95% HAC intervals.

▸ Back to main slide Appendix menu

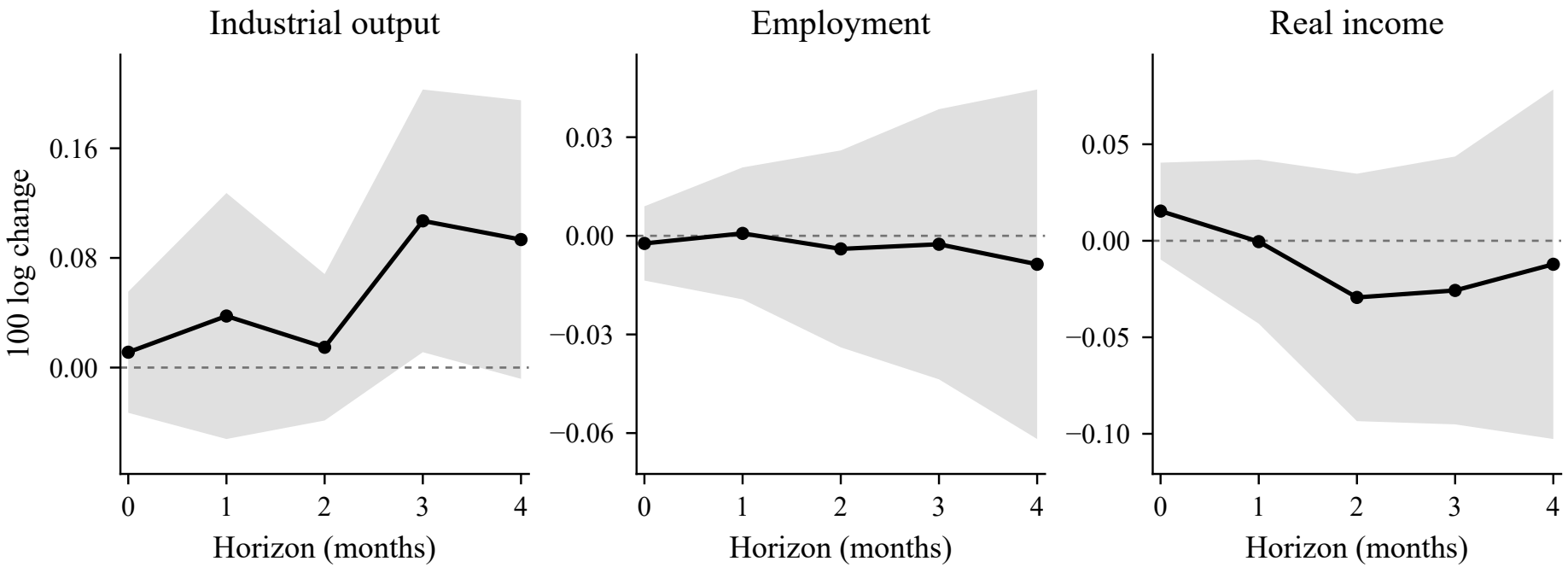
NASDAQ response by measurement timing



- **Price timing.** The paths show cumulative 100 log changes. The monthly average uses daily closing values. The month-end series uses the last available close.

▸ Back to main slide Appendix menu

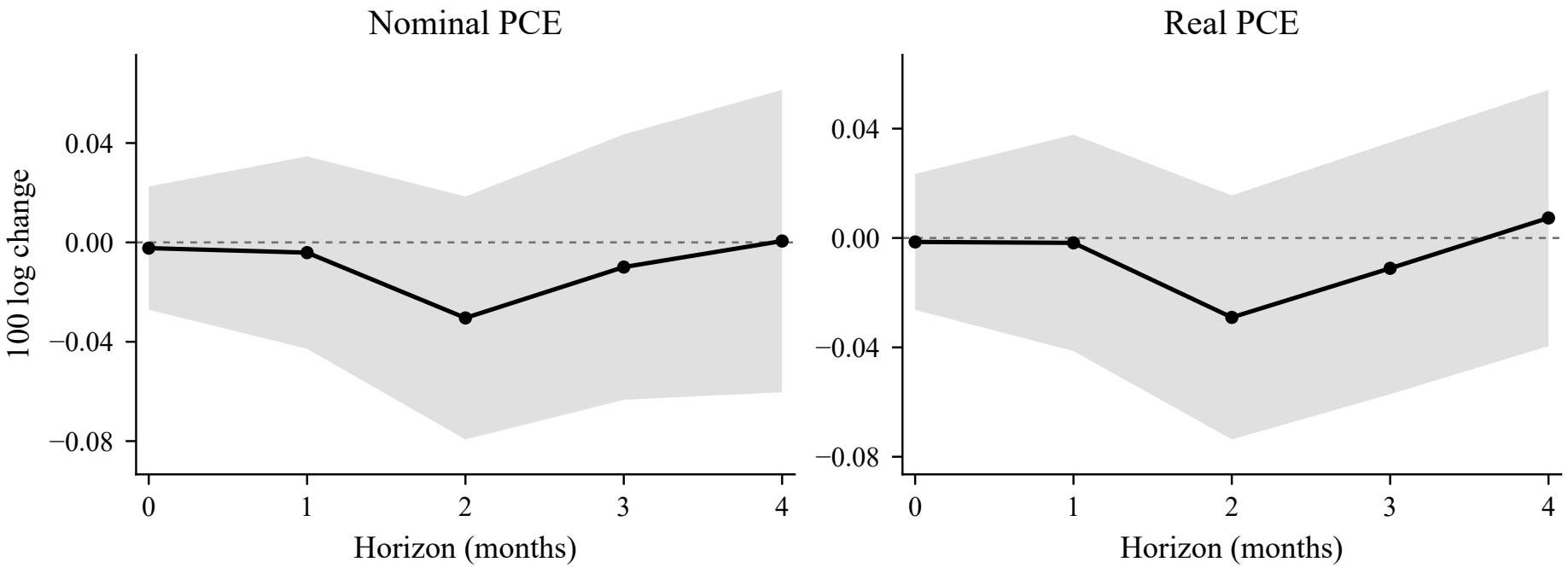
Output, employment, and real income



- **Real activity.** The paths show cumulative 100 log changes. Panels have separate vertical scales. Shading shows pointwise 95% HAC intervals.

▸ Back to main slide Appendix menu

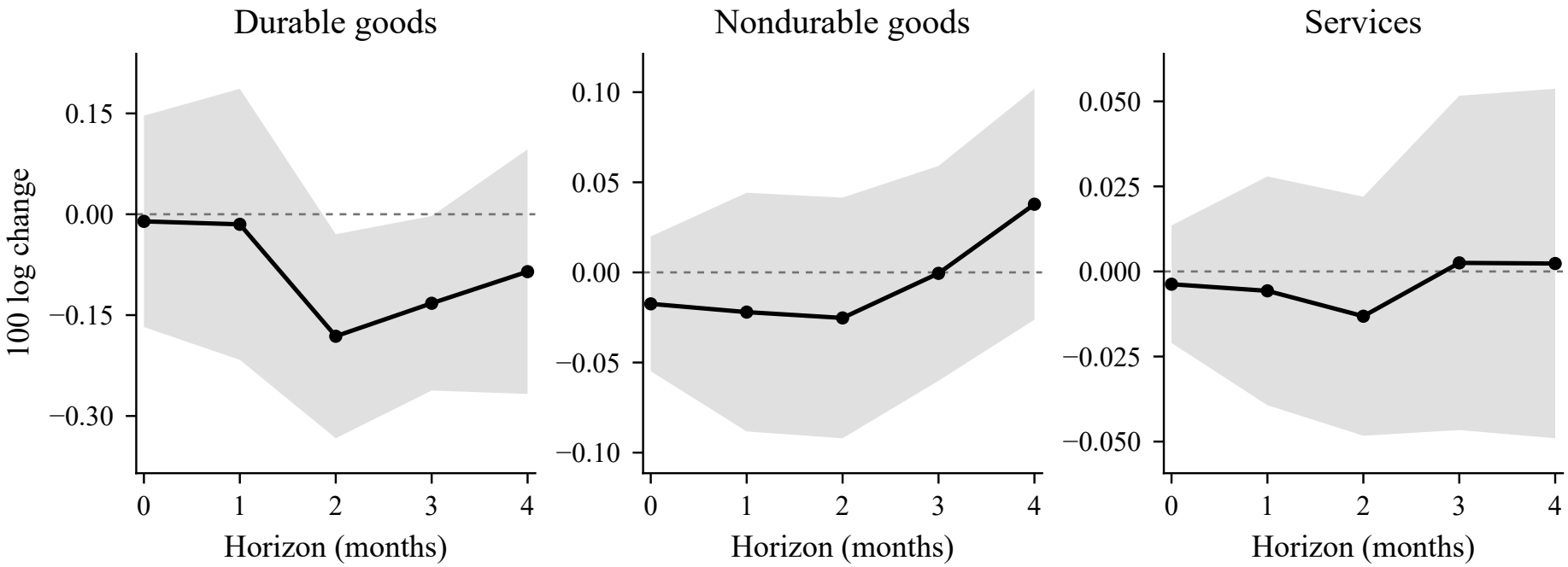
Nominal and real spending



- **Spending.** The paths show cumulative 100 log changes. Nominal PCE measures spending at current prices. Real PCE measures the volume of expenditure.

▸ Back to main slide Appendix menu

Real spending by category



- **Durable versus nondurable spending.** The comparison uses common regression dates. A direct contrast gives durable minus nondurable spending of -0.156 at month two, with interval $[-0.291, -0.022]$.

▸ Back to main slide Appendix menu

Inference and the April 2025 innovation

- **Concentration.** At impact, 2025 accounts for 70% of the squared residualized TPU innovation. April 2025 alone accounts for 44%.

Share (pp)	Baseline	Drop Apr. 2025	95% CI after drop
Stock	-0.289	-0.347	$[-0.581, -0.113]$
Cash	0.194	0.231	$[-0.009, 0.470]$
Bond	0.097	0.121	$[0.037, 0.204]$

- The first-stage fit and scale stay fixed. The impact signs survive the deletion and the cash interval includes zero.
- Across covariance estimators, the impact evidence is stronger than the evidence at month two. Intervals are pointwise and conditional on the fitted first stage.

▸ Back to main slide Appendix menu

Table A.1. Data sources and measurement

Series	Source and measurement
Portfolio shares	AAII monthly stock, bond, and cash weights.
Trade uncertainty	Caldara et al. TPU in published level units.
Consumer prices	BEA/FRED PCEPI. Monthly log inflation.
Market risk	Cboe/FRED VIXCLS. Log of the last daily reading.
Equity prices	Nasdaq/FRED NASDAQCOM. Monthly average and last daily close.
Industrial output	Federal Reserve/FRED INDPRO. Seasonally adjusted.
Real consumption	BEA/FRED PCEC96. Real expenditure in chained dollars.

More series Back to main slide Appendix menu

Table A.1. Data sources continued

Series	Source and measurement
Nominal spending	BEA/FRED PCE. Current-dollar expenditure.
Other uncertainty	Baker, Bloom, and Davis general and trade EPU.
Other outcomes	Employment, income, sales, and intermediate-demand PPI in cumulative log changes.
Spending components	BEA/FRED PCEDGC96, PCENDC96, and PCESC96.
Nominal wage growth	Atlanta Fed/FRED FRBATLWGTUMHWGO. Median year-over-year hourly wage growth.
Bond yield	FRED DGS10. Yield changes with an eight-year duration for risk moments.

▸ Back to main slide Appendix menu

Table 3. Total and durable spending

Real spending category	h	Estimate	95% HAC interval	p	N
Total real PCE	0	−0.007	[-0.028, 0.014]	0.515	223
	1	−0.010	[-0.056, 0.036]	0.664	221
	2	−0.034	[-0.080, 0.011]	0.139	219
	3	−0.012	[-0.059, 0.034]	0.599	217
	4	0.001	[-0.047, 0.048]	0.978	215
Durable goods	0	−0.011	[-0.168, 0.147]	0.895	223
	1	−0.015	[-0.217, 0.187]	0.884	221
	2	−0.181	[-0.333, -0.030]	0.019	219
	3	−0.132	[-0.262, -0.003]	0.046	217
	4	−0.085	[-0.267, 0.097]	0.356	215

- **Durable spending.** The pointwise intervals exclude zero for declines at months two and three. Estimates use common regression dates. Units are cumulative 100 log changes.

▸ Back to main slide Appendix menu

Table 3. Nondurable spending and services

Real spending category	h	Estimate	95% HAC interval	p	N
Nondurable goods	0	−0.017	[-0.055, 0.020]	0.359	223
	1	−0.022	[-0.088, 0.044]	0.513	221
	2	−0.025	[-0.092, 0.041]	0.456	219
	3	−0.001	[-0.060, 0.059]	0.986	217
	4	0.038	[-0.026, 0.102]	0.246	215
Services	0	−0.004	[-0.021, 0.014]	0.669	223
	1	−0.006	[-0.039, 0.028]	0.739	221
	2	−0.013	[-0.048, 0.022]	0.461	219
	3	0.003	[-0.047, 0.052]	0.920	217
	4	0.002	[-0.049, 0.054]	0.929	215

- **Nondurables and services.** Pointwise 95% HAC intervals include zero at the five reported horizons. The component series share the October 23, 2026 data vintage.

▸ Back to main slide Appendix menu

Table 5. Alternative sample starts

Sample start	Stock	Cash	Bond	N
January 2007	−0.289	0.194	0.097	224
January 2010	−0.274	0.178	0.099	188
January 2015	−0.285	0.184	0.102	128

- **Common scale.** Impact estimates are in percentage points. The first-stage coefficients and scaling are fixed. All samples end in January 2026 and retain the two major tariff episodes.

▸ Back to main slide Appendix menu

Table 6. Alternative uncertainty measures

Indicator	Stock	Cash	Bond
Baseline TPU	$-0.289\,[-0.421, -0.158]$	$0.194\,[0.060, 0.329]$	$0.097\,[0.047, 0.148]$
US EPU	$-0.578\,[-0.906, -0.249]$	$0.335\,[-0.039, 0.709]$	$0.245\,[-0.036, 0.526]$
Trade EPU	$-0.280\,[-0.636, 0.077]$	$0.204\,[-0.122, 0.530]$	$0.077\,[-0.197, 0.350]$

- **Alternative indices.** Estimates are in percentage points per one standard deviation of each innovation. General EPU reproduces the stock decline. The trade EPU intervals are wider. Both alternatives use AR(6) residuals from log indices.

▸ Back to main slide Appendix menu

Table 7. Additional lagged controls

Specification	Stock	Cash	Bond
Baseline	$-0.289\,[-0.421, -0.158]$	$0.194\,[0.060, 0.329]$	$0.097\,[0.047, 0.148]$
policy rate	$-0.283\,[-0.420, -0.146]$	$0.189\,[0.047, 0.330]$	$0.097\,[0.044, 0.150]$
market return	$-0.173\,[-0.316, -0.031]$	$0.074\,[-0.074, 0.223]$	$0.102\,[0.032, 0.172]$
past stock share	$-0.155\,[-0.338, 0.029]$	$0.085\,[-0.096, 0.266]$	$0.072\,[0.020, 0.123]$

- **Sensitivity to controls.** One additional lagged control per row. $N = 224$ throughout. The bond interval excludes zero in each specification. Stock and cash estimates are sensitive to conditioning on the past stock share.

▸ Back to main slide Appendix menu

Table 8. Preset structural parameters

Parameter	Meaning	Value	Reference
γ	Risk aversion	5	Campbell et al. (2002)
ρ	Discount rate	0.04/yr	
χ	Labor disutility curvature	1	Chetty et al. (2011)
α_i	Labor share	0.62	Gollin (2002)
η	Input substitution elasticity	2	Boehm et al. (2023)
ε_p	Variety elasticity	6	Christiano et al. (2005)
s, s_c	Domestic CES weights	0.85	Amiti et al. (2019)
δ_I	Inventory depreciation	0.25/yr	Alessandria et al. (2011)
τ_c	Consumption tax	0.065	
τ_s	Sales tax	0.05	
$\tau_{i,1}$	Common baseline tariff	0.03	Fajgelbaum et al. (2020)
$\tau_{1,2}$	Country 1 escalation tariff	0.12	Fajgelbaum et al. (2020)

- **Calibration inputs.** References motivate the parameter choices. Values are maintained model inputs.

▸ Back to main slide Appendix menu

Proposition 1. Production and inventory orders

$$P^*_{F,i} = \min\{P_{M,i}, U_i/\Lambda_i\}, \qquad Q_{X,i} \in \begin{cases} \{\mathscr{R}_i/P_{M,i}\}, & \chi_{Q,i} > 0, \\ [0, \mathscr{R}_i/P_{M,i}], & \chi_{Q,i} = 0, \\ \{0\}, & \chi_{Q,i} < 0. \end{cases}$$

- **Definitions.** $Z_i = P_{I,i} I_i$ is book stock. For firm value V_i, let $\chi_{Q,i} = V_{i,I} + P_{M,i} V_{i,Z}$, $\Lambda_i = 1 + (\chi_{Q,i})_+ / P_{M,i}$, and $U_i = V_{i,I} + P_{I,i}(1 + V_{i,Z})$.
- **Sourcing and funding.** Use the cheaper source, or import at stockout. Evaluate markup and factor demands at $P^*_{F,i}$. A positive marginal order value makes the cash cap bind.

$$CF^S_i = \Pi_i - \dot{Z}_i, \qquad \dot{I}_i = X^N_{F,i} + Q_{X,i} - X_{F,i} - \delta_I I_i.$$

- With stationary prescribed inputs and zero inherited stock, accumulation improves operating value exactly when $\lambda_{12}(P_{M,i,2} - P_{M,i,1}) > \delta_I P_{M,i,1}$.

Funding time | Back to main slide | Appendix menu

Auxiliary stock target and drawdown time

$$T_i^* = \frac{1}{\rho + \delta_I + \lambda_{21}} \log\left[\frac{P_{M,i,2} - \bar{q}_i}{\left(1 + \frac{\rho+\delta_I}{\lambda_{12}}\right) P_{M,i,1} - \bar{q}_i}\right], \qquad \bar{q}_i = \frac{\lambda_{21} P_{M,i,1}}{\rho + \delta_I + \lambda_{21}},$$

$$I_{i,1}^* = \frac{\bar{X}_{F,i}}{\delta_I}\left(e^{\delta_I T_i^*} - 1\right).$$

- **Drawdown.** At a positive auxiliary target, T_i^* is the time to exhaust the inherited stock in regime 2. The constant $\bar{X}_{F,i}$ is foreign input use during drawdown.
- **Stock target.** The low-regime target is $I_{i,1}^*$. With zero depreciation it equals $\bar{X}_{F,i} T_i^*$. The excess target over the benchmark stock is $I_{i,1}^* - K_{0,i}$.

Funding time | Back to main slide | Appendix menu

Time to build inventory under the funding cap

$$I_i(t) = \min\{I_i^{\mathrm{tar}},\, I_i^{\mathrm{cap}}(1 - e^{-\delta_I t})\}, \qquad I_i^{\mathrm{cap}} = \frac{\pi_{f,i,1}}{\delta_I P_{M,i,1}},$$

$$t_i^{\mathrm{hit}} = -\frac{1}{\delta_I} \log\left(1 - \frac{I_i^{\mathrm{tar}}}{I_i^{\mathrm{cap}}}\right) \qquad (0 < I_i^{\mathrm{tar}} < I_i^{\mathrm{cap}}).$$

- **Funding path.** Starting from zero inventory with $\delta_I > 0$, $\pi_{f,i,1}$ is the maximum pre-depreciation cash surplus at the fresh-input price. I_i^{tar} is the single target of the funded firm under the stationary benchmark.
- **Timing.** Purchases build the stock toward the target over time. If the tariff switches before t_i^{hit}, the firm carries only $I_i(t)$ into the new regime. Targets at or above I_i^{cap} have no finite hitting time.

Order rule | Auxiliary drawdown | Appendix menu

Proposition 3. Prices and quantities

$$R_{Y,a} = \omega_{a1} E_1 + \omega_{a2} E_2, \qquad Y_1 = \frac{R_{Y,1}}{P_{Y,1}}, \qquad Y_2 = \frac{R_{Y,2}}{eP_{Y,2}},$$

$$\frac{E_2}{E_1} = \frac{\nu_1 + (1 - \nu_1 - \nu_2)\omega_{21}}{\nu_2 + (1 - \nu_1 - \nu_2)\omega_{12}}.$$

- **Final demand.** At the trial exchange rate e, E_b is total final expenditure in destination b, in country 1's currency. ω_{ab} is the CES expenditure share on goods from origin a.
- **External balance.** ν_b is pretariff intermediate imports per unit of producer revenue. The second line chooses e so the final-goods balance offsets the intermediate-goods balance.
- **Conditional uniqueness.** Given positive $J_{b,k,W}$ and fixed firm continuations, the sufficient bounds are $s_c \geq 1/2$, $\alpha_1 + \alpha_2 > 1$, and $\nu_1^{\max} + \nu_2^{\max} < 1$. Here $\nu_b^{\max}$ bounds the import ratio.

▸ Back to main slide Appendix menu

Asset valuation and bond issuance

$$S_i(t) = \mathbb{E}^{\mathrm{pr}}_{i,t} \int_t^\infty A^S_i(t,s)\, CF^S_i(s)\, ds,$$

$$B_i(t) = \mathbb{E}^{\mathrm{pr}}_{i,t} \int_t^\infty A^B_i(t,s)\, r^D_i(s) D_i(s)\, ds.$$

- **Market values.** $A^a_i(t,s) = \exp(-\int_t^s d^a_i(u)\, du)$ discounts gross payouts at the pricing rate d^a_i. Equity pays cash dividends and bonds pay debt service.

$$r^D_{i,k} D_i - \dot{D}_i = T_i - \bar{G}_i,$$

$$\mu^B_{i,k,\mathrm{hold}} = \mu^B_{i,k,\mathrm{gross}} - \mathbb{E}_{i,t}[\dot{D}_i / B_i].$$

- **Household bond receipts.** The domestic household sector absorbs net issuance. Subtracting issuance from gross debt service gives the primary surplus $T_i - \bar{G}_i$ in equation (62).

Equation (62) Asset returns Appendix menu

Bellman equation and worst-case drift

$$\rho J_{i,k} = \max_{C_i, \boldsymbol{\theta}_i} \min_{|h_i| \le \sqrt{2\kappa_k}} \{ U(C_i) - v(l_i) + J_{i,k,t} + (\mathscr{L}^{C_i, \boldsymbol{\theta}_i, h_i} J_i)_k \}.$$

- **Continuation.** The generator includes the regime jump at marked wealth. $\upsilon_{i,k}$ measures how h_i changes the drift of beliefs z_i.

$$\mathscr{E}_{i,k} = W_i J_{i,k,W} \boldsymbol{\theta}_i^\top \boldsymbol{\Psi}_{i,k} + \upsilon_{i,k}^\top J_{i,k,z},$$

$$h_{i,k}^* = -\sqrt{2\kappa_k}\, s_{i,k}, \qquad s_{i,k} \in \partial |\mathscr{E}_{i,k}|,$$

$$C_i = [(1+\tau_c) P_{C,i} J_{i,k,W}]^{-1/\gamma}.$$

- **Worst case.** $\mathscr{E}_{i,k}$ combines exposure through financial wealth and through beliefs. Positive exposure selects a downward drift, with minimized term $-\sqrt{2\kappa_k}|\mathscr{E}_{i,k}|$. The consumption rule applies at an interior optimum.

▸ Back to main slide Appendix menu

Household valuation in partial equilibrium

$$m_{i,t} = \frac{e^{-\rho t} C_{i,t}^{-\gamma}}{(1+\tau_c) P_{C,i,t}}, \qquad K_i = r_{i,k}^{M} M_i - \dot{M}_i.$$

Valuation along the clearing path (62)

$$(S_i(t), B_i(t), M_i(t)) = \lim_{T\to\infty} \mathbb{E}_{i,t}^{h_i^*} \int_t^T \frac{m_{i,s}}{m_{i,t}} \left(CF_i^S(s), T_i(s) - \bar{G}_i, K_i(s)\right) ds,$$

$$W_i(t) = \lim_{T\to\infty} \mathbb{E}_{i,t}^{h_i^*} \int_t^T \frac{m_{i,s}}{m_{i,t}} \left[(1+\tau_c) P_{C,i}(s) C_i(s) - w_i(s) L_i(s)\right] ds.$$

- **Assets.** The first line prices dividends, the primary surplus, and the intermediate payment K_i. The bond value agrees with the market value from gross coupons.
- **Financial wealth.** The second line prices consumption net of labor income. Both use $m_{i,s}/m_{i,t}$ under the worst-case law at a regular interior optimum.

▸ Back to main slide Appendix menu

Proposition 6. Responses to policy events

$$W_i^+ = W_i^- \left(\theta_i^{S,-} \frac{S_i^+}{S_i^-} + \theta_i^{B,-} \frac{B_i^+}{B_i^-} + \theta_i^{M,-} \right).$$

- **Mark inherited holdings.** Physical and book inventory, nominal debt, and cash carry through the event. The superscripts $-$ and $+$ denote the baseline and updated states.

$$\boldsymbol{A}_i^+ \, \mathrm{d}\boldsymbol{\theta}_i = \boldsymbol{F}_i, \qquad \boldsymbol{F}_i = \mathrm{d}\boldsymbol{b}_i - (\boldsymbol{A}_i^+ - \boldsymbol{A}_i^-)\boldsymbol{\theta}_i^- .$$

- **Reoptimize.** $\boldsymbol{b}_i$ is the right-hand side of the Proposition 4 condition. d denotes the updated value less the baseline value.

$$\mathrm{d}\theta_i^B > 0 \iff (0,1)(\boldsymbol{A}_i^+)^{-1}\boldsymbol{F}_i > 0,$$
$$\mathrm{d}\theta_i^M > \mathrm{d}\theta_i^B \iff (1,2)(\boldsymbol{A}_i^+)^{-1}\boldsymbol{F}_i < 0.$$

▸ Back to main slide Appendix menu

Covariance conditions for the hedge

$$\Sigma_{i,k}^{-1}\boldsymbol{\Delta}_{i,kl} = \frac{1}{\det \Sigma_{i,k}} \begin{pmatrix} (\sigma_{i,k}^{B})^2 \Delta_{i,kl}^{S} - \sigma_{i,k}^{SB}\Delta_{i,kl}^{B} \\ (\sigma_{i,k}^{S})^2 \Delta_{i,kl}^{B} - \sigma_{i,k}^{SB}\Delta_{i,kl}^{S} \end{pmatrix}.$$

- **Hedge direction.** With two negative price jumps and a positive hedge multiplier, equity demand falls if $(\sigma_{i,k}^{B})^2|\Delta_{i,kl}^{S}| > \sigma_{i,k}^{SB}|\Delta_{i,kl}^{B}|$. Bond demand rises if $\sigma_{i,k}^{SB}|\Delta_{i,kl}^{S}| > (\sigma_{i,k}^{S})^2|\Delta_{i,kl}^{B}|$.
- **Inventory exposure.** $\boldsymbol{\Psi}_{i,k}$ affects worst-case expected returns and the covariance matrix. $\boldsymbol{\Delta}_{i,kl}$ records the price changes at the switch.
- **Cash.** Cash rises more than bonds when the decline in the stock share exceeds twice the increase in the bond share.

▸ Back to main slide Appendix menu

Thank you

Siwon Lee

Washington University in St. Louis

l.siwon@wustl.edu

Conclusion Appendix