Tariff Uncertainty and the U.S. Dollar*

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Abstract

Standard models predict that a unilateral tariff appreciates the implementing country's currency; in 2025, U.S. tariffs rose and the dollar fell. We show that tariff uncertainty can reverse the textbook prediction. In a two-country general equilibrium model with risk-averse agents and segmented financial markets, tariff volatility enters the UIP condition as a risk-premium wedge and the Euler equation as a precautionary-savings wedge, so that uncertainty depreciates the currency even as the tariff level pushes toward appreciation. The model delivers an identifying sign pattern: among the model's sign-normalized shocks, only an uncertainty shock pairs currency depreciation and falling equity prices with an unchanged interest-rate differential—a pattern that neither tariff-level nor convenience-yield shocks reproduce. To measure the policy signal agents actually faced, we build TiRADE, a timestamped database of every U.S. tariff rate communicated between January 2025 and May 2026 — speeches, social media posts, and executive actions — of which 71 percent never appear in the statutory record. In high-frequency windows around these announcements, a one-standard-deviation rise in tariff uncertainty depreciates the dollar by 0.24 percent, lowers equities by 0.67 percent, and moves the interest differential by a precisely estimated zero; the covered (CIP) component of the dollar's convenience yield does not reprice in these windows, and generic risk-off episodes outside them move the dollar the opposite way, the safe-haven direction. Estimating the model on the event-study responses, with the steady state disciplined by U.S. external-balance-sheet and trade data, we find markets priced the announced tariffs as largely transitory, so the uncertainty channel — not the tariff level, valuation effects, or covered convenience-yield erosion — accounts for the dollar's depreciation at announcement frequencies.

JEL Codes: E2, E3, E6, F1, F4
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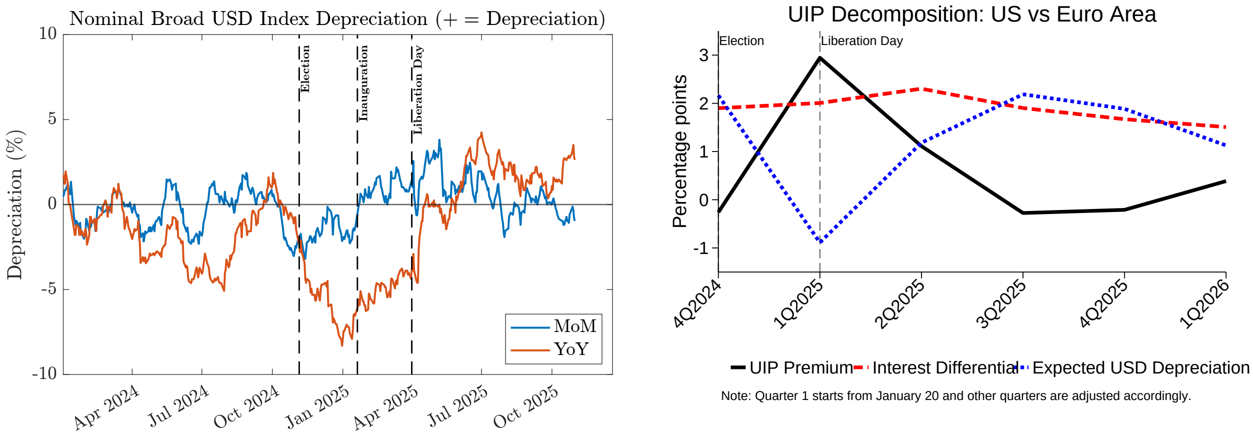
1 Introduction

A unilateral import tariff appreciates the imposing country's currency in the standard benchmark (Mundell, 1961). The tariff raises the relative price of imports, shifts demand toward home goods, and requires a real appreciation to clear goods and asset markets. Complete offset of tariff with home currency appreciation obtains under the complete-markets conditions behind Lerner symmetry; under incomplete markets, the temporariness of tariffs and valuation effects break that symmetry of import tariff and export tax and invalidate the offset. Dynamic trade and New Keynesian mechanisms typically reinforce, rather than overturn, the appreciation force by front-loading expenditure-switching or raising real interest rates under nominal rigidities (Kalemli-Özcan, Soylu and Yildirim, 2025; Werning, Lorenzoni and Guerrieri, 2025; Monacelli, 2025).

The empirical case of the 2025 U.S. tariffs tells a different story, where the dollar depreciated. Figure 1 left panel shows that the broad dollar index lost 1.52% between the inauguration (January 20, 2025) and April 1, 2025, immediately before "Liberation Day," and a further 1.04% between April 1 and April 10, through various announcements, escalations, and walk-backs of that week. The dollar's depreciation was both nominal and real, and it occurred while short-term interest differentials were essentially stable; as the right panel shows, the counterpart of the depreciation was a widening UIP premium on the dollar. Dominant-currency pricing can mute the expenditure-switching offset by limiting pass-through into dollar import prices, and the 2018–19 tariff episode is consistent with partial adjustment through dollar appreciation and renminbi depreciation. But this mechanism does not explain the 2025 sign reversal: the broad dollar depreciated as shown in Figure 1.

We offer an incomplete-financial-markets based explanation, where uncertainty of trade policy takes center stage. Why are incomplete markets important? Under Arrow–Debreu, the Backus–Smith condition ties relative consumption to the real exchange rate, and the wealth effects of the tariff are effectively shared internationally through state-contingent

Figure 1. The U.S. Dollar Depreciation in 2025



(a) Broad US Dollar Index **(b)** UIP Decomposition

Note: The left panel shows month-on-month and year-on-year changes in the broad US dollar index, whereby positive values indicate depreciation of the US dollar and negative values indicate appreciation. The figure highlights the partial reversal of the strong 2024 appreciation in 2025. The right panel presents a decomposition of the UIP condition into three components: the interest rate differential, $\hat{i}_{H,t} - \hat{i}_{F,t}$; expected exchange rate depreciation, $\mathbb{E}_t\left[\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t\right]$; and the UIP premium, ρ_t. As the UIP premium rose, the USD depreciated. Because the depreciation occurred contemporaneously, agents expected an appreciation of the dollar, while the interest rate differential has been relatively stable. To align the data with the timing of tariff policy changes, we assume the first quarter of 2025 starts on January 20, 2025, to capture both announcements around Liberation Day and earlier tariff rate increases in the same quarter; all other quarters are adjusted accordingly. We follow the methodology of Kalemli-Özcan (2019) to construct the UIP premium. The nominal broad US dollar index is sourced from FRED, and exchange rate expectations are taken from Consensus surveys.

transfers. The exchange rate is then purely a relative price clearing the goods market, and whether the tariff is transitory or permanent does not matter for the response of the exchange rate on impact.[1] Under incomplete markets, with a single non-contingent bond, on the other hand, persistence of the shock matters as a temporary tariff induces intertemporal substitution, moves the current account, and generates an exchange-rate path.[2]

<u>*Model.*</u>

Our incomplete markets setup involves non-contingent bonds together with a segmented market. We make the intermediaries risk-averse, hence they solve a mean-variance optimization problem, conditional on a convenience yield they receive from the dollar. We add another

[1] Note that complete markets also make Lerner symmetry time-invariant: the equivalence holds whether the import tariff or export tax is temporary or permanent, because households can insure against the entire path of relative price changes.

[2] As shown by Barbiero et al. (2019), Lerner symmetry breaks under incomplete markets once tariffs are temporary and NFA positions change.

wedge through similarly risk-sensitive households, where both these wedges—UIP and Euler equation—are endogenous to tariff uncertainty: higher uncertainty about the trade policy leads to a rise in the dollar risk premium (less demand for the U.S. currency), and higher precautionary savings against tariff risk (less demand for U.S. goods).[3]

The financial channel that we offer to explain the dollar's depreciation, together with the appreciation-predicting trade channel we keep, are only half of the story without the valuation effects. The U.S. is long foreign-currency assets and short dollar liabilities, so a dollar appreciation (depreciation) is a wealth transfer abroad (toward the U.S.), as it deteriorates (improves) the U.S. NFA position. Under incomplete markets, appreciation (depreciation) is a negative (positive) wealth effect that dampens (boosts) home demand and partially undercuts the appreciation (depreciation) itself (Gourinchas and Rey, 2007*b*). The U.S. is also a large net debtor: as of end-2025, the net international investment position was −71.1% of GDP and gross dollar liabilities 200.1% of GDP. When the dollar depreciates, the U.S. foreign-currency assets rise in dollar value while dollar liabilities are unchanged, so the NIIP improves. Symmetrically, a dollar appreciation shrinks the dollar value of the asset side against fixed dollar liabilities, worsening the NIIP. Hence, the wealth transfer abroad operates entirely through the asset side and dollar depreciation works as a valuation gain even with the net position (as opposed to a balance-sheet stress event for other countries) since the U.S. net debtor position is in its own currency.

Aguiar, Amador and Fitzgerald (2025) argue that, in the case of no re-balancing of net and/or gross positions, under a severe retaliatory trade war with restricted imports and exports, the entire adjustment works via prices, implying huge valuation effects. This is why improving the net position (closing the trade deficit) after a tariff shock may itself require

[3] A closely related and complementary mechanism appears in Monacelli and Merendino (2026), who study how structural uncertainty about the persistence of the tariff regime can overturn the textbook appreciation. Agents Bayesian-update a transitory tariff as partly permanent and borrow against expected future trade surpluses, deteriorating the current account and depreciating the currency. Their channel thus operates through the perceived persistence of the tariff stance, whereas ours operates through the conditional variance of the exchange rate priced into the UIP premium.

a depreciation. If trade shuts down, then the exchange rate must jump to the unique level at which gross positions revalue so that net debt is settled without default. In our model, debt is a state variable with its own equation of motion and hence adjustment can occur both through prices and flows—portfolio and trade. We argue that our model is empirically the more relevant case as the applied tariff rates rose by roughly 19 percentage points while trade volumes fell but did not collapse, and announced rates were revised repeatedly.

Similar to our paper, Itskhoki and Mukhin (2025) and Jiang et al. (2025) also explain the dollar's depreciation with the financial channel, though under a different interpretation: a loss of the dollar's convenience yield. In Itskhoki and Mukhin (2025)'s dynamic model, an exogenous convenience yield on dollar assets enters the country's budget constraint as exorbitant privilege: a tariff on its own still appreciates the dollar, so the exchange-rate response turns on what the trade war does to the convenience yield and the external balance sheet, not to trade flows alone. If the trade war erodes that convenience yield, the currency can depreciate despite the expenditure-switching logic pushing the other way. Our evidence and theirs are best read as a frequency decomposition of the same premium rather than as competing accounts. The convenience-yield decline that Jiang et al. (2025) document is a cumulative, lower-frequency drift in the one-year Treasury basis—roughly 20 basis points from mid-January to late April 2025—and we recover the same movement in the same series. Our novel high-frequency evidence adds over these papers that essentially another shock is priced in tight windows around the tariff announcements: whatever erodes slowly did not reprice at the announcements. What is repriced at the announcements is the uncovered component of the UIP premium, and if one interprets the convenience yield broadly as that uncovered premium on dollar assets, our uncertainty mechanism—which endogenously widens the premium at the announcements—supplies the tariff-triggered movement whose source Itskhoki and Mukhin (2025) pose as an open question.

Interestingly, in the long-run, our model and both Itskhoki and Mukhin (2025) and

Aguiar, Amador and Fitzgerald (2025) reach similar conclusions.[4] The contribution of our paper is short-run transitory dynamics and how to get the short-run depreciation of the dollar through the novel uncertainty channel that we introduce.[5]

Our model is deliberately parsimonious: a two-country, two-good, no I-O linkages version of Kalemli-Özcan, Soylu and Yildirim (2025) without nominal rigidities. Home households have CARA utility, so tariff volatility σ_t^2 enters the Euler equation as a precautionary-saving term $\eta\sigma_t^2$; financial intermediaries solve a mean–variance portfolio problem in segmented markets, so the same volatility widens the UIP premium by $\kappa\sigma_t^2$ with κ disciplined by the intermediaries' risk sensitivity rather than by a second-order Jensen term; a convenience-service flow ψ_t on Home-currency bonds shifts the same UIP condition; and asymmetric home bias (A) generates a steady-state trade imbalance while a gross position ($\tilde{V}$, the ratio of foreign-currency assets to home-currency liabilities) exposes the balance of payments to valuation effects. The model admits a closed-form solution in which a single object—the endogenous risk-sharing wedge between the exchange rate and relative consumption—organizes all three mechanisms.

The theory delivers three results. First, a pure tariff-level shock appreciates the home currency, while a tariff-volatility shock depreciates it through two reinforcing channels: precautionary saving depresses home demand, and the widening UIP premium raises the required return on home-currency assets. A decline in the convenience yield is observationally equivalent to a widening of the UIP premium in the exchange rate alone and is likewise depreciationary in the model. The covered (CIP-basis) component of the convenience yield—the component we measure directly—is quantitatively negligible in the relevant windows: in

[4] Appendix B.8 makes this explicit: we solve the model's nonlinear steady states under a permanent tariff and show that the tariff that closes the trade balance appreciates the dollar, in line with their permanent-tariff experiments.

[5] There are also other channels that are shown to deliver depreciation of the dollar. Kalemli-Özcan, Soylu and Yildirim (2025) show that expected retaliation under tariff threats can weaken the currency especially with tariffs on upstream inputs that reverse the terms-of-trade gains. Expected monetary-policy easing, such as in Bianchi and Coulibaly (2025), can give depreciation. Auclert, Rognlie and Straub (2025) argue that exchange rate response depends on whether high-MPC or low-MPC households get the tariff rebate.

2025Q1 the aggregate UIP premium reaches 2.95 percentage points while its covered CIP component is only 0.015 percentage points, and across announcement windows the wedge moves by 0.00 percentage points on average (standard deviation 0.03). Any convenience-yield contribution to the depreciation must therefore operate through unhedged positions, where the exchange rate by itself cannot separate it from priced tariff uncertainty; the model's cross-equation restrictions can, and the over-identification exercise of Section 5 performs exactly that separation using the joint response of equities and the interest rate differential.

Second, the balance-sheet and valuation channels cannot deliver depreciation. The intuition is as follows. In the U.S.-relevant case, home is a net borrower, a net importer, and long in foreign-currency assets and short in home-currency liabilities. With our analytical solution, we prove that for a net importer the total exchange-rate response remains an appreciation for every admissible gross position, as long as the steady-state foreign interest rate is at least as high as the home steady-state interest rate. This is sensible in our context: with the home country being a net importer at the steady state, financing a permanent trade deficit requires the net factor income that defines the "exorbitant privilege." Generating depreciation on impact through valuation effects alone would require both an inverted carry ($i_H > i_F$) and gross foreign-currency assets exceeding home-currency liabilities.

Third, we use the model to generate testable predictions in the form of predicted signs for asset prices ($\hat{\mathcal{E}}_t$, $\hat{S}_t$, $i_{H,t} - i_{F,t}$): a tariff-level shock pairs dollar appreciation with a higher interest rate differential; a convenience-yield decline pairs depreciation with a higher interest rate differential. The uncertainty shock is the only disturbance that depreciates the currency and lowers equity prices while leaving the interest differential approximately unchanged, as observed in the data, because the impacts of uncertainty via precautionary saving and via the UIP premium reinforce each other in the exchange rate but offset in the differential. The joint response of the three asset prices therefore identifies the shock.

Evidence.

To identify the mechanism, we build a novel database, TiRADE (Tariff Rates in Announcements, Declarations, and Events), and conduct high frequency empirical analyses. TiRADE measures the policy signal that forward-looking agents actually faced: not the statutory tariffs only, but also what was communicated—including threats that were reversed or never implemented, with rates in this rhetorical layer reaching 350 percent, roughly twice the statutory maximum. It is from this communicated record, rather than from enacted rates, that households and investors formed beliefs about the distribution of future tariffs—the object our model identifies as σ_t^2. TiRADE records 434 rate statements across 389 sources from January 21, 2025 to May 27, 2026, of which 420 contain a numeric rate, covering speeches, interviews, press events, Truth Social posts, White House statements, executive orders, Section 232 proclamations, and Federal Register notices. A related database is USTAD (Manova et al., 2026); however, 309 statements, or 71 percent of our dataset, come from outside their dataset given our broader news and social media coverage.[6] We timestamp records in U.S. Eastern time and classify events as increases, decreases, mixed changes, or potential changes.

We then estimate event-window responses to tariff news and tariff uncertainty. The daily analysis uses a set of 114 major episodes from January 21, 2025 to May 14, 2026, falling on 108 trading days; regression samples below are smaller only through data availability (94 days with end-of-day FX quotes, 88 with both implied-volatility inputs for the uncertainty measure, 49 with the CIP wedge). The intraday robustness starts from 319 time-stamped rate events, merges communications within twenty minutes into 177 announcement clusters. The outcomes are EURUSD, the broad dollar index with and without euro, the S&P 500, and the one-year U.S.–Germany yield differential; tariff uncertainty is measured by a composite of the VIX and EURUSD one-month implied volatility, and a CIP wedge proxies the covered

[6] The two databases answer different questions by design. USTAD measures what the tariff was and how hard it was to calculate the rate firms would actually pay; it is restricted to legally operative instruments. TiRADE measures what was said and, through it, what forward-looking agents could expect and hence how households and investors formed beliefs about future tariffs rather than about the statutory rate. See the Data Section for similarities and differences of the datasets.

convenience-yield component.

A one-standard-deviation announcement-window jump in uncertainty depreciates the dollar against the euro by 0.236%, lowers equity prices by 0.673%, and leaves the interest differential unchanged—a precise zero whose standard error of 0.009 rules out moves larger than about two basis points per standard deviation, consistent with the currency moving through the risk premium rather than expected policy rates. A Shapley decomposition attributes 83.8% of the explained announcement-window variation in the euro–dollar rate to uncertainty. The pattern is specific to tariff news: on non-announcement days with large volatility moves, the dollar *appreciates*—the familiar safe-haven response—so the announcement-window depreciation is not a generic risk-off repricing of the dollar, but indicative of tariff-regime risk. The estimate survives instrumenting the financial uncertainty measure with trade policy uncertainty measures, where instruments has no explanatory power on non-announcement days. The CIP wedge explains the interest differential and comoves with equities but does not significantly explain EURUSD.

Our model-based quantitative exercise calibrates the model using U.S. external-balance-sheet and trade data together with standard parameter values from the literature. Conditional on this calibration, we ask which parameter values are most consistent with the regression coefficients estimated in the data. To this end, we conduct a limited-information Bayesian estimation of the persistence that markets assign to announced tariff changes, ρ_τ, intermediaries' sensitivity to risk, χ, and the persistence of the convenience-yield wedge, ρ_ψ. The posterior implies that markets priced tariff announcements as transitory: the posterior median of ρ_τ is 0.20, with high persistence essentially excluded. Equivalently, at announcement frequencies, markets assigned a low probability to full implementation. Under either interpretation, the estimates imply a largely dormant tariff-level channel and an operative tariff-uncertainty channel. The uncertainty channel is economically meaningful, with a posterior median of $\chi = 6.0$. Convenience-yield persistence is weakly identified from the exchange rate alone: the posterior median of ρ_ψ is 0.44, with a 90 percent credible interval of $[0.04, 0.88]$, consistent with the small covered component in the data. The convenience-yield shock required to rationalize the exchange-rate response misses the equity response by approximately six standard errors and overpredicts the level response of the interest differential by an order of magnitude, contributing to the evidence that it was not a major force in this episode. In contrast, the uncertainty shock can account for the responses of the three asset prices.

Section 2 presents the model and sign restrictions. Section 3 describes TiRADE. Section 4 presents the UIP-premium decomposition and event-study evidence. Section 5 quantifies the tariff-level and tariff-volatility shocks. Section 6 concludes.

2 Model

We develop a simplified two-country, one-sector version of Kalemli-Özcan, Soylu and Yildirim (2025) (henceforth KSY) to illustrate the mechanism through which tariff uncertainty can generate a depreciation of the dollar. Relative to KSY, we feature an endowment economy and monetary policy is simplified by fixing the aggregate price level (CPI).

Rather than imposing symmetry, we allow asymmetric home bias: $\gamma_H = \gamma$ and $\gamma_F = A\gamma$, where A indexes the asymmetry and pins down the steady-state trade imbalance $\overline{NX} = \gamma(A-1)$. For the analytical results we adopt the Cole and Obstfeld (1991) parametrization, setting the trade elasticity to one and approximating the Euler blocks at $\alpha = 1$; the quantitative exercise solves the same linear system numerically for general (α, θ) (Appendix E). We further assume that only home households exhibit CARA utility, while foreign households have CRRA utility.

Finally, we introduce financial intermediaries that solve a mean–variance portfolio optimization problem over a Home-currency leg $V_{H,t}$ and a signed Foreign-currency position $D_{F,t}$, augmented by a Home-currency liquidity/convenience service flow ψ_t. We also separate $D_{F,t}$ from the exogenous Foreign-currency gross asset V_F, whose net carry enters Home resources through a lump-sum transfer. Full derivations are provided in the Supplementary Appendix (SA).

2.1 Households

Home and Foreign consume CES bundles $C_{H,t}$ and $C_{F,t}$ of Home and Foreign goods $c_{j,k,t}$, $j,k \in \{H,F\}$ with home bias parameters $(1-\gamma_H)$ and $(1-\gamma_F)$. Let $\mathcal{E}_t$ denote Home currency per unit of Foreign currency. Law of one price with Home tariff τ_t implies

$$p_{F,H,t} = \frac{p_{H,t}}{\mathcal{E}_t}, \qquad p_{H,F,t} = \mathcal{E}_t p_{F,t}\tau_t, \qquad \tau_t = e^{\hat{\tau}_t}, \qquad \mathrm{Var}_t(\hat{\tau}_{t+1}) = \sigma_t^2.$$

Monetary policy fixes the price of the aggregate consumption basket such that $P_{H,t} = P_{F,t} = 1\ \forall t$.[7] The Home and Foreign households solve

$$\max_{\{C_{H,t},V_{H,t}\}_{t=0}^{\infty}} \quad \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_H^t u_H(C_{H,t})$$
$$\text{s.t.} \quad P_{H,t}C_{H,t} + V_{H,t-1} = p_{H,t}y_{H,t} + \frac{V_{H,t}}{R_{H,t}} + T_{H,t},$$

and

$$\max_{\{C_{F,t},D_{F,t}\}_{t=0}^{\infty}} \quad \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_F^t u_F(C_{F,t})$$
$$\text{s.t.} \quad P_{F,t}C_{F,t} + D_{F,t-1} = p_{F,t}y_{F,t} + \frac{D_{F,t}}{R_{F,t}} + T_{F,t}.$$

where $V_{H,t}$ is the Home-currency liability position, $R_{H,t}$ is the gross Home nominal return, and $V_{F,t}$ is Home's Foreign-currency gross asset. The Home transfer is $T_{H,t} = (\tau_t - 1)\mathcal{E}_t p_{F,t} c_{H,F,t} +$

[7] Since the model is a flexible-price model, monetary neutrality holds and the fact that policy sets the nominal price level does not affect real variables.

$\mathcal{E}_t\left(V_{F,t-1} - \frac{V_{F,t}}{R_{F,t}}\right)$, where the first term is rebated tariff revenue and the second term is the net payoff on Home's Foreign-currency gross asset. The corresponding Foreign transfer is $T_{F,t} = \frac{V_{F,t}}{R_{F,t}} - V_{F,t-1} + \frac{\pi_{H,t}}{\mathcal{E}_t}$, because $V_{F,t}$ is a Foreign-currency liability for the Foreign country; the last term is the rebated intermediary profit, with $\pi_{H,t}$ defined in the next subsection. Both transfers are lump-sum, so neither enters the Foreign Euler equation.

To capture the role that volatility has on households we will assume that Home households have CARA utility. As a simplifying assumption we assume that Foreign households have CRRA utility.[8] With CARA utility in the Home country, $u_H'(C) = e^{-\alpha C}$, and CRRA utility in the Foreign country, $u_F'(C) = C^{-\alpha}$, the Euler equations are

$$\alpha\big(\mathbb{E}_t C_{H,t+1} - C_{H,t}\big) = \ln(\beta_H R_{H,t}) + \frac{1}{2}\alpha^2 \mathrm{Var}_t(C_{H,t+1}),$$
$$1 = \beta_F R_{F,t} \mathbb{E}_t\left[\left(\frac{C_{F,t+1}}{C_{F,t}}\right)^{-\alpha}\right].$$

2.2 Intermediaries

Let $D_{F,t}$ denote the signed Foreign-currency position intermediated in international markets: $D_{F,t} > 0$ is long Foreign-currency bonds and $D_{F,t} < 0$ is short Foreign-currency bonds. Intermediaries solve a mean-variance optimization problem augmented by an exogenous liquidity/convenience service flow associated with the Home-currency leg $V_{H,t}$, given by ψ_t:

$$\max_{V_{H,t}, D_{F,t}} \quad \mathbb{E}_t \pi_{H,t+1} - \frac{\chi_t}{2}\mathrm{Var}_t(\pi_{H,t+1}) + V_{H,t}\psi_t$$
$$\text{s.t.} \quad 0 = \mathcal{E}_t \frac{D_{F,t}}{R_{F,t}} + \frac{V_{H,t}}{R_{H,t}},$$
$$\pi_{H,t+1} = V_{H,t} + \mathcal{E}_{t+1} D_{F,t}.$$

[8]The CRRA specification for Foreign is a normalization that sets the Foreign Euler-equation loading on tariff volatility to zero. More generally, if Foreign preferences generated an analogous precautionary term, the Home and Foreign Euler equations would load on volatility through $\eta_H \sigma_t^2$ and $\eta_F \sigma_t^2$, respectively, in the approximated equilibrium. The relevant object would then be the relative precautionary wedge $(\eta_H - \eta_F)\sigma_t^2$, as it loads onto the risk sharing wedge, $\hat{w}_t$. The baseline therefore corresponds to $\eta_F = 0$ for simplicity.

With the risk-aversion scaling used in SA, $\chi_t = \chi \frac{R_{H,t}}{R_{F,t}} \frac{1}{V_{H,t}}$, this problem yields the UIP condition

$$\frac{R_{H,t}}{R_{F,t}} = \frac{1}{1+\psi_t} \left[\frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} + \chi \mathrm{Var}_t \left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \right) \right].$$

2.3 Balance of Payments and Valuation Effects

Rearranging the household's budget constraint yields the following balance of payments equation for the home country:

$$\frac{V_{H,t}}{R_{H,t}} - \mathcal{E}_t \frac{V_{F,t}}{R_{F,t}} = V_{H,t-1} - \mathcal{E}_t V_{F,t-1} - \mathrm{NX}_t$$

Let us note that in the model $V_{H,t}$ and $V_{F,t}$ are debt inclusive of interest payments (i.e. we can write domestic and foreign debt as $B_{H,t} = \frac{V_{H,t}}{R_{H,t}}$ and $B_{F,t} = \frac{V_{F,t}}{R_{F,t}}$) and the gross interest rate variables can be written in terms of the nominal interest rate (e.g. $R_H = 1 + i_{H,t}$). Using these definitions to map to accounting, the balance of payments identity in the context of our model is $B_{H,t} - \mathcal{E}_t B_{F,t} = (1 + i_{H,t-1}) B_{H,t-1} - \mathcal{E}_t (1 + i_{F,t-1}) B_{F,t-1} - \mathrm{NX}_t$; rearranging it, we can decompose the US balance of payments (BoP) and relate it to the change in the net international investment position (NIIP) as follows:

$$\underbrace{-\Big(\mathrm{NX}_t + \mathcal{E}_t i_{F,t-1} B_{F,t-1} - i_{H,t-1} B_{H,t-1}\Big)}_{\text{Current Account Deficit to be Funded}} = \underbrace{(\mathcal{E}_t - \mathcal{E}_{t-1}) B_{F,t-1}}_{\text{Valuation}}$$
$$+ \underbrace{- (\mathcal{E}_t B_{F,t} - \mathcal{E}_{t-1} B_{F,t-1}) + (B_{H,t} - B_{H,t-1})}_{-\Delta NIIP}.$$

This decomposition aims to capture the following: the US runs a current account deficit and this deficit is either financed explicitly by increasing the amount borrowed (-$\Delta NIIP$) or with gains from valuation effects. In practice, because the US dollar-denominated liability position (roughly 170% of GDP) far exceeds its foreign-currency asset position (roughly 100%

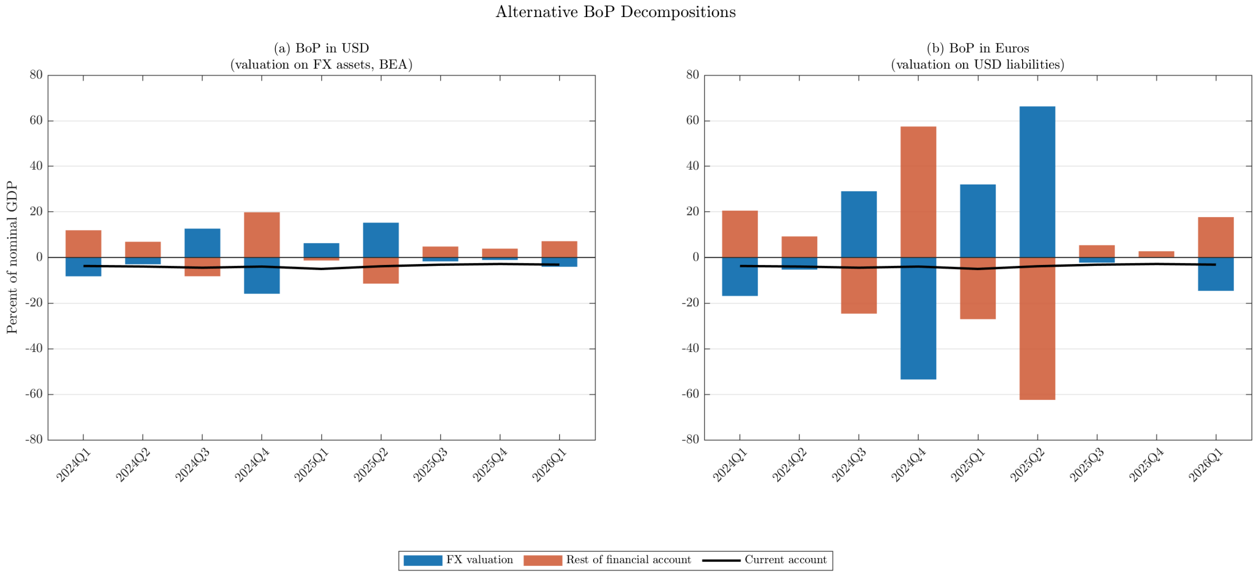
of GDP), it matters quantitatively whether we write the BoP in dollars—so the valuation term falls on the smaller foreign-currency asset leg B_F—or in the foreign currency—so it falls on the much larger dollar liability leg B_H.[9]

Figure 2 implements this decomposition over 2024–2026. Panel (a), *BoP in dollars*, is based on BEA data: its "exchange-rate changes" on the net international investment position, which—because U.S. liabilities are dollar-denominated—revalue the foreign-currency asset leg B_F and thus realize the dollar-accounting valuation $(\mathcal{E}_t - \mathcal{E}_{t-1})B_{F,t-1}$. Its magnitude is simply the size of that asset position (about four times quarterly GDP) times the quarterly exchange-rate move (a few percent)—roughly ten percent of GDP per quarter—and reconstructing it from BEA position stocks split by currency reproduces the published series at correlation 0.99. Panel (b), *BoP in euros*, is the alternative denomination we construct: writing the balance of payments in euros puts the valuation on the dollar *liability* leg, $(1/\mathcal{E}_{t-1} - 1/\mathcal{E}_t)B_{H,t-1}$, which is roughly twice as large because dollar liabilities exceed foreign-currency assets. The measured size of valuation effects thus depends on the currency of denomination, and BEA's published effects are the dollar-accounting object—the valuation on foreign-currency assets—not the valuation on the dollar position. This is why the gross position $\widetilde{V}$ and the currency composition of the balance sheet, rather than the net position alone, are the relevant primitives, a point Proposition 2 makes exact.

[9] For example, if we write the balance of payments of the US in Euros

$$\underbrace{-\left(\frac{\mathrm{NX}_t}{\mathcal{E}_t} + i_{F,t-1}B_{F,t-1} - \frac{i_{H,t-1}B_{H,t-1}}{\mathcal{E}_t}\right)}_{\Delta NIIP \text{ in Euros}} = \underbrace{\left(\frac{1}{\mathcal{E}_{t-1}} - \frac{1}{\mathcal{E}_t}\right)B_{H,t-1}}_{\text{Valuation on USD Position}} + \underbrace{\left(\frac{B_{H,t}}{\mathcal{E}_t} - \frac{B_{H,t-1}}{\mathcal{E}_{t-1}}\right) - (B_{F,t} - B_{F,t-1})}_{-\Delta NIIP \text{ in Euros}}.$$

Figure 2. Alternative BoP Decompositions



Note: Both panels split the current-account-deficit funding need ($-$CA*, black line) into an FX-valuation component (blue) and the residual financial-account flow (orange); percent of quarterly nominal GDP, 2024Q1–2026Q1. Panel (a),* BoP in dollars*, is BEA's published "exchange-rate changes" on the net international investment position, which revalue the foreign-currency asset leg. Panel (b),* BoP in euros*, is our construction of the valuation on the dollar liability leg,* $(1/\mathcal{E}_{t-1} - 1/\mathcal{E}_t)B_{H,t-1}$*, roughly twice as large because dollar liabilities exceed foreign-currency assets; our from-scratch reconstruction of panel (a) matches the BEA series at correlation* 0.99*. Positions are BEA IIP stocks split by currency (debt from the IMF IIPCC dataset, equity/FDI by the Lane–Shambaugh convention); FX and GDP from FRED. Source: BEA, IMF, FRED.*

What is the right primitive here to consider when trying to understand the impact of the gross position? In our model there are two such primitives. The first is the asymmetry of home bias, A, which pins down the steady-state trade imbalance. The second is

$$\widetilde{V} \equiv \frac{R_H V_F}{V_H R_F} = \frac{B_F}{B_H},$$

the ratio of Foreign-currency assets to Home-currency liabilities. In our context, this ratio captures how large the gross position is relative to the net position (i.e. when $\widetilde{V} = 0$, the model only tracks a net position). In the U.S.-relevant configuration, Home owes dollars and owns Foreign-currency assets. Therefore a Home appreciation, $\hat{\mathcal{E}}_t < 0$, lowers the Home-currency value of the asset leg and shifts wealth toward the rest of the world; a Home depreciation, $\hat{\mathcal{E}}_t > 0$, does the opposite. This sign reversal is why $\widetilde{V}$ can make a tariff raise the risk-sharing wedge without making the valuation channel equivalent to an exogenous UIP or convenience-yield shock.

2.4 Approximated Equilibrium

When a shock occurs, we track changes in variables as percent deviations from their steady-state values, denoted by a caret (ˆ). Lack of time notation for a variable denotes steady-state level (e.g., R_H (R_F) is the steady-state level of the gross nominal interest rate for the Home (Foreign) country). Steady-state unconditional moments (e.g., variances) are evaluated at the ergodic distribution, i.e., under non-zero volatility. $\hat{p}_{H,t}$ ($\hat{p}_{F,t}$) denotes the price of Home (Foreign) goods produced and consumed domestically (abroad). $\hat{\mathcal{E}}_t$ is the nominal exchange rate and real exchange rate (since aggregate price levels are fixed) where an increase corresponds to a depreciation of the home currency. $\hat{V}_{H,t}$ is the Home-currency liability position of the Home country, inclusive of interest payments (the exogenous Foreign-currency gross asset enters separately as V_F). $\hat{C}_{H,t}$ and $\hat{C}_{F,t}$ denote consumption by Home and Foreign households. $(1-\gamma)$ captures home bias in consumption.

The model features three shock variables: $\hat{\tau}_t$, σ_t^2 and ψ_t. The first is the tariff level, expressed as a deviation from the steady state, which follows an AR(1) process $\hat{\tau}_t = \rho\,\hat{\tau}_{t-1} + \varepsilon_t, \qquad \varepsilon_t\,|\,t{-}1 \sim \mathcal{N}\big(0, \sigma_{t-1}^2\big), \qquad \rho \in [0,1)$, so that $\hat{\tau}_t\,|\,t{-}1 \sim \mathcal{N}(\rho\hat{\tau}_{t-1}, \sigma_{t-1}^2)$; the case of purely transitory tariff shocks corresponds to $\rho = 0$. We allow the variance of the innovation ε_t to vary exogenously over time, which constitutes the second shock. Importantly, our timing convention assumes that the variance of innovations at time $t+1$ is known and determined at time t. This structure captures tariff uncertainty: the range of possible future tariff realizations widens today. We consider transitory innovations to the level of tariffs and one-time shocks to their variance. Finally, ψ_t is a shock to the convenience yield with persistence $\rho_\psi \in [0, 1)$; the analytical solution below is stated for the one-time case $\rho_\psi = 0$, and Section 5 estimates ρ_ψ, with the wedge loading scaling by the present-value multiplier $1/(1 - \rho_\psi)$.

Our model is largely linear, with the exception of terms involving variances. We therefore perform a second-order approximation and simplify cross terms that are quantitatively negligible. As shown in SA, our setup and timing convention allow us to approximate the variance of the response of endogenous variables. We solve the model to obtain the policy functions for $\hat{C}_{H,t}$ and $\hat{\mathcal{E}}_t$ as a function of $\hat{\tau}_t$. Since $\hat{\tau}_t$ is the only source of uncertainty, the conditional variances enter as $\frac{1}{2}\text{Var}_t(\hat{C}_{H,t+1}) \approx \eta\, \sigma_t^2$ and $\chi\, \text{Var}_t(\hat{\mathcal{E}}_{t+1}) \approx \kappa\, \sigma_t^2$, so that $\eta = \frac{\alpha}{2}\lambda_C^2$ and $\kappa = \chi\lambda_E^2$, where λ_C and λ_E are the coefficients on $\hat{\tau}_{t+1}$ in the respective policy functions; at the analytic benchmark $\alpha = 1$, η is one-half the squared consumption loading. This yields the following system that is linear in the shock variables.

Definition 1. An approximated equilibrium comprises 8 sequences $\{\hat{p}_{H,t}, \hat{p}_{F,t}, \hat{\mathcal{E}}_t, \hat{i}_{H,t}, \hat{i}_{F,t}, \hat{V}_{H,t}, \hat{C}_{H,t}, \hat{C}_{F,t}\}_{t=0}^{\infty}$ such that, given exogenous variables $\{\hat{\tau}_t, \sigma_t^2, \psi_t\}_{t=0}^{\infty}$, the equations (1)–(8) hold:

- Euler equations with Home country exhibiting CARA utility:

$$\mathbb{E}_t\hat{C}_{H,t+1} - \hat{C}_{H,t} = \hat{i}_{H,t} + \underbrace{\frac{1}{2}\text{Var}_t(\hat{C}_{H,t+1})}_{\eta\sigma_t^2}, \tag{1}$$

$$\mathbb{E}_t\hat{C}_{F,t+1} - \hat{C}_{F,t} = \hat{i}_{F,t}. \tag{2}$$

- Aggregate price level with policy stabilizing aggregate price levels in both countries:

$$0 = (1-\gamma)\,\hat{p}_{H,t} + \gamma\,(\hat{\mathcal{E}}_t + \hat{p}_{F,t} + \hat{\tau}_t), \tag{3}$$

$$0 = (1-\gamma A)\,\hat{p}_{F,t} + \gamma A(\hat{p}_{H,t} - \hat{\mathcal{E}}_t). \tag{4}$$

- UIP condition with a premium that widens as volatility increases ($\sigma_t^2 \uparrow$) and as the convenience yield declines ($\psi_t \downarrow$):

$$\hat{i}_{H,t} - \hat{i}_{F,t} = \mathbb{E}_t \hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t + \underbrace{\underbrace{\chi \mathrm{Var}_t(\hat{\mathcal{E}}_{t+1})}_{\kappa\sigma_t^2} - \psi_t}_{\text{UIP Premium}} . \tag{5}$$

- Goods market clears for each country in both periods:

$$0 = (1-\gamma)\left(\hat{C}_{H,t} - \hat{p}_{H,t}\right) + \gamma A \left(\hat{C}_{F,t} + \hat{\mathcal{E}}_t - \hat{p}_{H,t}\right), \tag{6}$$

$$0 = \gamma \left(\hat{C}_{H,t} - \hat{\mathcal{E}}_t - \hat{p}_{F,t} - \hat{\tau}_t\right) + (1-\gamma A)\left(\hat{C}_{F,t} - \hat{p}_{F,t}\right). \tag{7}$$

- Balance of payments equation with $\hat{V}_{H,t}$ as the Home-currency liability position and V_F as the exogenous Foreign-currency gross asset:

$$\hat{V}_{H,t} = R_H \hat{V}_{H,t-1} - \Xi \left[A\left(\hat{C}_{F,t} + \hat{\mathcal{E}}_t\right) - \left(\hat{C}_{H,t} - \hat{\tau}_t\right)\right] + \hat{i}_{H,t} - \widetilde{V}\left[(R_F - 1)\hat{\mathcal{E}}_t + \hat{i}_{F,t}\right]. \tag{8}$$

where $\Xi \equiv \frac{R_H \gamma}{V_H} = \frac{(R_H-1)\gamma}{\gamma(A-1)+\frac{R_F-1}{R_F}V_F}$ and $\widetilde{V} \equiv \frac{R_H V_F}{V_H R_F} = \frac{B_F}{B_H}$.

2.5 Symmetry

To establish intuition we first start with the case in which the two countries are symmetric in home bias; that is $A = 1$ and $\widetilde{V} = 0$. We solve the model using the method of undetermined coefficients. We find that tariff-level shocks are appreciationary, whereas shocks to tariff volatility and declines in the convenience yield are depreciationary.

$$\begin{aligned}\hat{\mathcal{E}}_t = &\underbrace{\left(\left(\tfrac{1}{2} - \tfrac{R_H-1}{R_H-\rho}\right)(1-2\gamma)^2 - \tfrac{1}{2}\right)}_{<0} \hat{\tau}_t + \underbrace{R_H^{-1}(1-2\gamma)^2 \eta}_{>0} \sigma_t^2 + \underbrace{R_H^{-1}(1-2\gamma)^2}_{>0}\left(\kappa\sigma_t^2 - \psi_t\right) \\ &+ \underbrace{\frac{(1-R_H^{-1})(1-2\gamma)^2}{\gamma}}_{>0} \hat{V}_{H,t-1}.\end{aligned}$$

Higher tariff uncertainty induces precautionary saving behavior, as it effectively serves as an Euler equation shock. This increase in precautionary savings reduces current demand and leads to a depreciation of the home currency, because under home bias, each country consumes a larger share of its own goods and a decline in domestic demand reduces relative demand for the Home country's goods. Simultaneously, higher policy volatility raises the UIP premium through $\kappa\sigma_t^2$. A decline in the convenience yield works through the same UIP-premium margin with the opposite sign, $-\psi_t$. All else equal, both forces generate depreciation pressure while reducing aggregate consumption in the Home country relative to the Foreign country.

The key object for interpreting the solution above is the endogenous risk-sharing wedge, following KSY. This wedge also provides a useful organizing device for a broader class of mechanisms capable of generating the real exchange rate depreciation observed after Liberation Day. Combining the two Euler equations with UIP yields the Backus–Smith condition *in expectation*:

$$\mathbb{E}_t \Delta \hat{C}_{H,t+1} - \mathbb{E}_t \Delta \hat{C}_{F,t+1} = \mathbb{E}_t \Delta \hat{\mathcal{E}}_{t+1} + \eta\sigma_t^2 + \kappa\sigma_t^2 - \psi_t. \tag{9}$$

Define endogenous deviations from perfect risk sharing by $\hat{\mathcal{E}}_t - (\hat{C}_{H,t} - \hat{C}_{F,t}) = \hat{w}_t$. Then (9) can be rewritten as

$$\hat{w}_t = \mathbb{E}_t \hat{w}_{t+1} + \eta\sigma_t^2 + \kappa\sigma_t^2 - \psi_t.$$

The risk-sharing wedge has a natural wealth-transfer interpretation: when it is negative (positive), wealth is transferred toward (away from) the tariff-imposing country.

Absent volatility and convenience-yield shocks, $\hat{w}_t$ is a martingale in this environment. Accordingly, once a shock is realized, the wedge jumps immediately to its permanent level and captures the cross-country wealth transfer generated by terms-of-trade gains and balance-sheet effects. Because we restrict these shocks to be one-off innovations, we have $\hat{w}_t =$

$\bar{w} + \eta\sigma_t^2 + \kappa\sigma_t^2 - \psi_t$, where $\bar{w}$ denotes the permanent component of the shock.[10] Thus, for reasonable parametrizations, tariff-level shocks push the wedge into negative territory, as shown in KSY, whereas uncertainty shocks and convenience-yield declines push it into positive territory.

The method-of-undetermined-coefficients solution makes this decomposition transparent:[11]

$$\hat{w}_t = \underbrace{\left(-\frac{R_H - 1}{R_H - \rho}\right)}_{<0} \hat{\tau}_t + \underbrace{R_H^{-1}(\eta + \kappa)}_{>0} \sigma_t^2 \underbrace{-R_H^{-1}}_{<0} \psi_t + \underbrace{\frac{1 - R_H^{-1}}{\gamma}}_{>0} \hat{V}_{H,t-1} \tag{10}$$

With $\beta_H = R_H^{-1}$ the tariff coefficient reads $-(1 - \beta_H)/(1 - \beta_H \rho)$: the wedge capitalizes the *expected reversal* of the tariff, so persistence—which slows the reversal—scales the wealth-transfer response down toward –1 as $\rho \to 1$, while a purely transitory tariff ($\rho = 0$) recovers $R_H^{-1} - 1$. The σ_t^2 and $\hat{V}_{H,t-1}$ coefficients do not depend on ρ, when $\rho = 0$.[12]

Tariff-level shocks reduce $\hat{w}_t$, which lowers $\hat{\mathcal{E}}_t$ (an appreciation); relative Home consumption $(\hat{C}_{H,t} - \hat{C}_{F,t})$ rises only if the tariff is sufficiently persistent ($\rho > 2 - R_H$), and falls in the empirically relevant transitory case. By contrast, shocks to tariff volatility and declines in the convenience yield increase the wedge between the exchange rate and relative consumption: they raise $\hat{\mathcal{E}}_t$ (a depreciation) while reducing $(\hat{C}_{H,t} - \hat{C}_{F,t})$.

For tariffs to generate real exchange rate depreciation, $\hat{w}_t$ must be pushed into positive territory. This follows directly from $\hat{\mathcal{E}}_t - (\hat{C}_{H,t} - \hat{C}_{F,t}) = \hat{w}_t$: a positive wedge is precisely what allows the Home currency to depreciate while relative Home consumption declines. In the absence of a positive wedge that reflects the asset market equilibrium and the associated wealth transfer, a unilateral tariff pushes the terms of trade in the home country's favor and

[10] This follows from $\hat{w}_t = \bar{w} + \sum_{j=0}^{\infty} \mathbb{E}_t \left[\eta\sigma_{t+j}^2 + \kappa\sigma_{t+j}^2 - \psi_{t+j}\right], \qquad \bar{w} \equiv \lim_{J\to\infty} \mathbb{E}_t \hat{w}_{t+J}$.

[11] The exact symmetric benchmark involves a separate linearization of the balance of payments around zero gross positions rather than the $A \to 1$, $\widetilde{V} \to 0$ limit of Proposition 1. See the Supplemental Appendix.

[12] The volatility coefficients η and κ are themselves equilibrium objects—squares of the policy-function loadings on the tariff innovation—and therefore vary with ρ, when $\rho \neq 0$. We take this into account in our calibration (Appendix E).

would normally favor an increase in the home country's consumption while the exchange rate appreciates.

2.6 Asymmetry, Unbalanced Trade and Gross Positions

We now relax the symmetry assumption ($A \neq 1$) and allow for a gross position ($\widetilde{V} > 0$). Recalling the steady-state objects $\overline{NX} = \gamma(A-1)$, $y_H = 1 + \overline{NX}$, and $y_F = 1 - \overline{NX}$, the model admits the following solution.

Proposition 1. *Solving the model yields*

$$\hat{\mathcal{E}}_t = \underbrace{\frac{\left(1-2\gamma-\overline{NX}\right)^2}{y_H y_F}}_{>0}\hat{w}_t - \underbrace{\frac{2\gamma(1-\gamma-\overline{NX})}{y_F}}_{>0}\hat{\tau}_t,$$

$$\hat{w}_t = \Gamma_\tau\,\hat{\tau}_t + \Gamma_\sigma\,\sigma_t^2 - \underbrace{\Gamma_\psi}_{>0}\,\psi_t + \underbrace{\Gamma_V}_{>0}\,\hat{V}_{H,t-1},$$

where $\Gamma_\psi \equiv \frac{\mathcal{D}+(1+\widetilde{V})\gamma[A(1-A\gamma)+(1-\gamma)](R_H-1)}{R_H\mathcal{D}}$, $\Gamma_\tau \equiv -\frac{(R_H-1)y_H}{(R_H-\rho)\mathcal{D}}\mathcal{N}_\tau$, $\Gamma_\sigma \equiv (\eta+\kappa)\Gamma_\psi - \frac{\eta(R_H-1)y_H y_F}{R_H\mathcal{D}}$, *and* $\Gamma_V \equiv \frac{(R_H-1)y_H y_F}{\mathcal{D}}$, *with* $\mathcal{D} \equiv \Xi\Big\{A\left[1-A\gamma(1-\gamma)\right]+\gamma(1-\gamma)\Big\}+\widetilde{V}(R_F-1)\left(1-2\gamma-\overline{NX}\right)^2$ *and* $\mathcal{N}_\tau \equiv \Xi\left[(1-\overline{NX})^2+\gamma\overline{NX}\right]-\gamma(1-\gamma-\overline{NX})\Big[(1-\rho)\big(1+\widetilde{V}\big)+2(R_F-1)\widetilde{V}\Big]$.

Only the tariff loading Γ_τ depends on the persistence ρ: the coefficient equations that determine the σ_t^2, ψ_t, and $\hat{V}_{H,t-1}$ loadings of every endogenous variable do not involve ρ, so Γ_σ, Γ_ψ, Γ_V, and $\mathcal{D}$ are the same objects for all $\rho \in [0,1)$. This invariance is conditional on the reduced-form composites (η,κ): in the structural exercise of Section 5, $\eta = (\alpha/2)\lambda_C(\rho)^2$ and $\kappa = \chi\lambda_E(\rho)^2$ inherit ρ-dependence through the impact loadings. At $\rho = 0$, $\mathcal{N}_\tau = \Xi[(1-\overline{NX})^2+\gamma\overline{NX}]-\gamma(1-\gamma-\overline{NX})[1+\widetilde{V}(2R_F-1)]$ and Γ_τ reduces to the transitory-tariff solution.

Two features of Proposition 1 organize the analysis. First, the coefficient on the wedge in the exchange-rate equation is strictly positive under home bias ($0 < \gamma < 1/2$ and $0 <$

$A\gamma < 1/2$), while the tariff enters the goods-market component with a negative sign: fixing $\hat{w}_t = 0$, a tariff increase appreciates the Home currency. Any depreciation must therefore operate through the risk-sharing wedge.

Second, the gross-position channel operates through Γ_τ. Since $\frac{(R_H-1)y_H}{(R_H-\rho)\mathcal{D}} > 0$ for all $\rho \in [0, 1)$, we have $\Gamma_\tau > 0 \iff \mathcal{N}_\tau < 0$, or equivalently

$$\widetilde{V} > \widetilde{V}^* = \frac{1}{2R_F - 1 - \rho}\left[\frac{(1-\overline{NX})^2 + \gamma\overline{NX}}{B_H(1-\gamma-\overline{NX})} - (1-\rho)\right].$$

A sufficiently large gross position—$\widetilde{V}$ above the threshold $\widetilde{V}^*$—makes the tariff shock raise the risk-sharing wedge: the tariff-induced valuation loss on Home's foreign-currency assets more than offsets the direct terms-of-trade transfer to Home in the wedge equation. In wealth-transfer language, in general equilibrium the tariff then shifts wealth to the rest of the world relative to the perfect risk sharing benchmark.

This first threshold is not the depreciation threshold. A convenience-yield or UIP-premium shock is an *additive* asset-market disturbance: it raises $\hat{w}_t$ directly, so the currency can depreciate without undoing the source of the shock. The valuation transfer, on the other hand, is endogenous to the exchange-rate movement that generates it. It supplies depreciation pressure by dampening the direct appreciation, not by adding a free positive-wedge shock. Because $\partial\hat{\mathcal{E}}_t/\partial\hat{w}_t > 0$, a tariff increase depreciates on impact only if the endogenous wedge response dominates the direct goods-market term—writing $\Gamma \equiv 1 - 2\gamma - \overline{NX}$, only if $\left(\Gamma^2/(y_H y_F)\right)\Gamma_\tau > 2\gamma(1-\gamma-\overline{NX})/y_F$.

Whether this inequality can hold is not merely a calibration issue, because Ξ, $\widetilde{V}$, and the two steady-state interest rates are jointly restricted by the external account. Imposing that discipline settles the question for a net importer. Substituting Γ_τ from Proposition 1, the condition collects into a single inequality in $(\widetilde{V}, \Xi)$:

Lemma 1. *The impact response of the exchange rate to a tariff-level shock is*

$$\frac{\partial \hat{\mathcal{E}}_t}{\partial \hat{\tau}_t} = \frac{(1-\rho)\,\gamma(1-\gamma-\overline{NX})\,\Gamma^2\, f(\widetilde{V}) \;-\; \Xi\,\mathcal{K}_\rho}{(R_H-\rho)\, y_F\, \mathcal{D}}, \qquad f(\widetilde{V}) \equiv (R_H-1) - \big(2R_F - R_H - 1\big)\widetilde{V}, \tag{11}$$

where $\mathcal{K}_\rho > 0$ for every $\rho \in [0,1)$ is a constant independent of Ξ, $\widetilde{V}$, and R_F. A tariff increase therefore depreciates the Home currency if and only if $(1-\rho)\gamma(1-\gamma-\overline{NX})\Gamma^2 f(\widetilde{V}) > \Xi\mathcal{K}_\rho$, and since $\Xi\mathcal{K}_\rho > 0$, the condition $f(\widetilde{V}) > 0$ is necessary—for every ρ*. The function f itself does not depend on ρ: persistence rescales the wedge channel by $(1-\rho)$ but leaves the relative strength of the two channels qualitatively intact.*

The derivation, together with the explicit expression for $\mathcal{K}_\rho$, is in Appendix B.7.5.

In net-interest-rate terms, $2R_F - R_H - 1 = 2i_F - i_H$, so for a large gross position the necessary condition $f(\widetilde{V}) > 0$ approaches $i_H > 2i_F$: the Home rate would have to exceed *twice* the Foreign rate at the steady state. At finite $\widetilde{V}$, the exact restriction follows from the fact that Ξ is not free. From the steady-state balance of payments derived in SA, $V_H\Big(1 - \frac{1}{R_H}\Big) = \overline{NX} + V_F\Big(1 - \frac{1}{R_F}\Big)$, which in the $(\Xi, \widetilde{V})$ parametrization (recall $B_H = \gamma/\Xi$ and $\widetilde{V} = B_F/B_H$) reads

$$\gamma\,(R_H-1) \;=\; \overline{NX}\,\Xi \;+\; \gamma\,(R_F-1)\,\widetilde{V} \;\iff\; \Xi = \frac{\gamma\,\Big[(R_H-1)-(R_F-1)\widetilde{V}\Big]}{\overline{NX}}. \tag{12}$$

Admissibility ($\Xi > 0$) ties the sign of the trade balance to the carry configuration. A net importer ($\overline{NX} < 0$) must satisfy

$$(R_F-1)\,\widetilde{V} \;>\; (R_H-1), \tag{13}$$

so net factor income on the foreign-currency asset finances the steady-state trade deficit. Condition (13) places a floor on the gross position, $\widetilde{V} > (R_H-1)/(R_F-1)$, and—whenever

$\widetilde{V} \leq 1$, as in the data—forces $R_F > R_H$. This is exactly the exorbitant-privilege configuration the convenience yield is meant to capture: the Home country pays less on its home-currency liabilities than it earns on its foreign-currency assets. Within the model it is the *steady-state* convenience flow that delivers this carry: with a stationary exchange rate, the steady-state UIP condition reads $R_H/R_F = (1 + \chi\sigma_{\mathcal{E}}^2)/(1 + \bar{\psi})$, so $R_F > R_H$ holds if and only if the steady-state convenience yield exceeds the steady-state risk premium, $\bar{\psi} > \chi\sigma_{\mathcal{E}}^2$ (see the SA steady state). The shock ψ_t perturbs this flow around $\bar{\psi}$. The next result shows that this same configuration prevents a tariff-level increase from resulting in depreciation in this context.

Proposition 2 (No tariff depreciation through the gross position for a net importer, any persistence)**.** *Let* $\overline{NX} < 0$ *(i.e.,* $A < 1$*) and impose steady-state admissibility* (12)–(13)*. Then, for every persistence* $\rho \in [0, 1)$*:*

(i) If $R_F \geq R_H$*, then* $\partial\hat{\mathcal{E}}_t/\partial\hat{\tau}_t < 0$ *for* every *admissible gross position* $\widetilde{V} > 0$*: a tariff increase strictly appreciates the Home currency, no matter how large the balance sheet and no matter how persistent the tariff.*

(ii) If $\widetilde{V} \leq 1$ *(foreign-currency assets no larger than home-currency liabilities), then* (13) *implies* $R_F > R_H$*, so case (i) applies: under the maintained assumptions of Table 1 a tariff-level depreciation is impossible.*

(iii) A tariff-level depreciation therefore requires both $R_H > R_F$ and $\widetilde{V} > (R_H - 1)/(R_F - 1) > 1$*. In that region it does occur for any* $\rho \in [0, 1)$*: as* $\widetilde{V}$ *approaches the admissibility floor from above,* $\Xi \to 0^+$ *while* $(1 - \rho)f(\widetilde{V})$ *remains strictly positive, so the depreciation condition of Lemma 1 holds on a nonempty interval.*

The proof is in Appendix B.7.6.

Proposition 2 is not a quantitative statement: parts (i)–(ii) hold analytically, for every admissible parameterization, no matter how large the balance sheet. The economics is the self-limiting valuation force combined with steady-state solvency. The tariff's goods-market effect appreciates the Home currency; the induced revaluation can transfer wealth abroad and raise the risk-sharing wedge, thereby dampening the appreciation. But that transfer exists only because of the appreciation it dampens: a wedge response large enough to generate depreciation would reverse the valuation flow and pull wealth back toward Home. Steady-state solvency turns this logic into a strict bound. A net importer must finance its trade deficit out of net factor income, so the foreign-currency asset must out-yield the home-currency liability (13); in exactly that carry configuration, $f(\widetilde{V}) < 0$ in Lemma 1, and the wedge term is capped below the goods-market term.[13] For the United States—a net importer and a net borrower, with dollar liabilities exceeding foreign-currency assets so that $\widetilde{V} < 1$—part (ii) applies, and a tariff-level depreciation is impossible, not merely unlikely. More generally, within this configuration the gross position dampens every disturbance that transmits through valuation: a shock that appreciates in the zero-gross-position benchmark appreciates by less once valuation effects operate, and one that depreciates depreciates by less.

In the empirically relevant configuration, the model's prediction for a pure tariff-level shock is therefore unambiguous—appreciation, for any admissible gross position and any persistence—and it carries a sharp corollary: if valuation effects were the operative depreciation channel, tariff de-escalations would have to appreciate the currency by the mirror-image amount. We exploit both implications below, through the sign restrictions of Table 1 and the symmetry test in the high-frequency evidence of Section 4, which together point away from the valuation channel and toward the uncertainty and convenience-yield channels as the source of the observed depreciation.

[13] Part (iii) leaves open a net-importer region with $R_H > R_F$ and $\widetilde{V} > 1$ where this bound does not apply.

2.7 Testable Predictions

The analytical solution delivers a set of testable predictions, which we derive here and collect in Table 1; Appendix B.7 contains the proofs. To speak to equity data we first add a stock market to the model in a way that leaves the equilibrium conditions above unchanged.[14]

Equity prices. Home households trade among themselves shares of a Lucas tree in unit net supply whose dividend is the Home endowment, $D_t \equiv p_{H,t} y_H$. Because the tree is held only by Home households, equity trades net out in the aggregate and aggregate dividends equal $p_{H,t} y_H$, so the aggregate Home budget constraint—and every equilibrium condition above—is unchanged; since y_H is constant, $\hat{D}_t = \hat{p}_{H,t}$. Appendix B.7.7 spells out the household-level construction. With S_t the ex-dividend nominal stock price and $M^H_{t,t+1} \equiv \beta_H \, u'(C_{H,t+1})/u'(C_{H,t})$ the Home nominal stochastic discount factor, no arbitrage for an interior Home holding implies

$$S_t = \mathbb{E}_t\left[M^H_{t,t+1}\,(S_{t+1} + D_{t+1})\right]. \tag{14}$$

Linearizing (14) around the steady state $S = y_H/(R_H - 1)$ and solving for one-time shocks ($\rho = 0$) yields (Appendix B.7.7; Lemma 8)

$$\hat{S}_t \;=\; \underbrace{\frac{(R_H-1)\gamma A\, y_F}{\mathcal{D}}\,\hat{V}_{H,t}}_{\text{valuation}} - \underbrace{\frac{\varphi}{y_H y_F}\,\hat{w}_t}_{\text{wealth transfer}} - \underbrace{\frac{\gamma(1-A\gamma)}{y_F}\,\hat{\tau}_t}_{\text{dividend}} + \underbrace{\eta\,\sigma_t^2}_{\text{discount rate}}\;, \tag{15}$$

where $\varphi \equiv \gamma[(1+A)-(1+A^2)\gamma] > 0$. Equity is a levered claim on the same objects that price the currency. It falls with the risk-sharing wedge: a wealth transfer away from Home lowers the path of Home consumption and, with it, the discounted value of the Home dividend stream. It falls with the tariff directly: with the aggregate price level fixed, a tariff raises the consumer price of imports, so the producer price of the Home good—the dividend—

[14] In this section, we do not allow foreigners to buy or sell US equities. The share of foreign holdings in US corporate equities has remained relatively stable over the sample period, so this abstraction does not drive the equity predictions.

must fall. It rises with the inherited debt state through the valuation term, although net of the wedge's own dependence on $\hat{V}_{H,t}$ the total state loading is $-(R_H - 1)\gamma\Gamma/\mathcal{D} < 0$: a more indebted Home ultimately supports a lower dividend path. And it rises mechanically with $\eta\sigma_t^2$, because precautionary saving lowers the equilibrium discount rate $\hat{i}_{H,t}$—a force we return to below, since it is exactly what an equity risk premium works against.

The interest-rate differential. Substituting the exchange-rate solution of Proposition 1 and the martingale property of the wedge into the UIP condition yields the differential in closed form (Proposition 3): the loadings of $\hat{i}_{H,t} - \hat{i}_{F,t}$ on $(\hat{\tau}_t, \sigma_t^2, \psi_t)$ are

$$\frac{2(1-\rho)\,\gamma(1-A\gamma)}{y_F} \;>\; 0, \qquad \frac{2\kappa\varphi - \eta\,\Gamma^2}{y_H y_F} \;\gtrless\; 0, \qquad -\frac{2\varphi}{y_H y_F} \;<\; 0, \tag{16}$$

with $\Gamma = 1-2\gamma-\overline{NX}$ as before. Two properties of (16) matter for the empirical design. First, the loadings are independent of Ξ, $\widetilde{V}$, and R_F, and the differential does not load on the debt state at all: by UIP the differential equals expected depreciation plus the premium, and along the unit-root state expected and current exchange rates move one for one. The financial block therefore shifts the *levels* of the exchange rate and equity prices but leaves the differential's comparative statics untouched—there is no small- versus large-$\widetilde{V}$ case to distinguish. Second, each shock has a distinct signature. A transitory tariff makes consumption temporarily expensive relative to the future; this intertemporal distortion raises the Home real rate—equivalently, the impact appreciation must be undone in expectation, and UIP prices that expected depreciation into a higher Home yield. A convenience-yield decline strips a service flow from Home bonds, and investors demand the missing return in cash yield, raising the differential by $2\varphi/(y_H y_F)$ per unit of ψ_t. An uncertainty shock, by contrast, activates two channels that pull the differential in *opposite* directions: the premium channel κ raises $\hat{i}_{H,t} - \hat{i}_{F,t}$ as compensation for currency risk, while the precautionary channel η is a savings glut that lowers Home yields. Their net, $(2\kappa\varphi - \eta\Gamma^2)/(y_H y_F)$, is theoretically ambiguous and plausibly close to zero—even though the same two channels *reinforce* in the exchange rate, where both depreciate (Proposition 4). This asymmetry—a shock that moves the currency while leaving the differential nearly flat—is the model's fingerprint for uncertainty.

Signing the table. The exchange-rate column follows from Proposition 1 together with Proposition 2: a tariff-level increase appreciates for *every* admissible gross position, while uncertainty shocks and convenience-yield declines depreciate (Proposition 4). The equity column combines (15) with the law of motion of debt: for the tariff and convenience shocks the wedge, dividend, and valuation forces line up, and the "−" entries are proved for any $\widetilde{V} > 0$ (Proposition 5). For an uncertainty shock the two interest-rate channels compete inside $\hat{i}_{H,t}$, exactly as in the differential: the premium channel depresses equities one-for-one with the convenience loading ($\partial s_\sigma / \partial \kappa = -s_\psi < 0$, an implication of the observational equivalence of $\kappa\sigma_t^2$ and $-\psi_t$ in Lemma 7), while the precautionary channel supports them through a lower discount rate. The "−" entry is therefore conditional: it requires the premium channel to dominate (Proposition 6)—the κ/η dominance recorded in the table's Notes—and it is reinforced once the equity risk premium is treated symmetrically with the other variance terms: restoring the omitted $\text{Cov}_t(\hat{M}_{t+1}, \hat{S}_{t+1} + \hat{p}_{H,t+1})$, which is negative under CARA preferences and of the same order σ_t^2 as η and κ, adds a term $-\varsigma\sigma_t^2$ that unambiguously pushes equities down after uncertainty shocks (Remark 2). Table 1 collects the resulting predictions.

Table 1. Testable Predictions

Shock	$\hat{\mathcal{E}}_t$	$\hat{S}_t$	$i_{H,t} - i_{F,t}$
Tariff Increase $\tau_t \uparrow$	$-$	$-$	$+$
Uncertainty $\sigma_t^2 \uparrow$	$+$	$-$	≈ 0
Convenience Yield Decline $\psi_t \downarrow$	$+$	$-$	$+$

Notes. The Home country is assumed to be a net importer: $\overline{NX} = \gamma(A-1) < 0$, so $A < 1$, with $0 < \gamma < 1/2$, $0 < A\gamma < 1/2$, and $0 < \widetilde{V} < 1$. An increase in $\hat{\mathcal{E}}_t$ is a Home-currency depreciation. The differential response to an uncertainty shock is the net of two offsetting channels, $(2\kappa\varphi - \eta\Gamma^2)/(y_H y_F)$: the UIP-premium channel raises the differential while the precautionary channel lowers it, so the entry is approximately zero (Proposition 3). The equity "$-$" for the uncertainty row requires the premium channel to dominate (Proposition 6) and is reinforced by the equity risk premium (Remark 2).

Table 1 summarizes the model's testable predictions, which double as a set of identifying sign restrictions. A tariff-level shock *appreciates* the currency, and it does so while raising the differential. A convenience-yield decline pairs depreciation with a *higher* differential—and, since ψ_t is priced in covered positions, with a movement in the CIP wedge, its direct empirical counterpart. An uncertainty shock pairs depreciation and falling equity prices with an *approximately unchanged* differential, the near-offset in (16). The joint behavior of $(\hat{\mathcal{E}}_t, \hat{S}_t, i_{H,t} - i_{F,t})$ around tariff announcements therefore reveals which disturbance the announcements actually delivered—the question we take to the data in Section 4.

The level row carries one further testable implication regarding the gross position. If valuation effects on a large balance sheet were the operative depreciation channel—the hypothesis ruled out theoretically in Proposition 2 and, quantitatively, in the counterfactuals of Section 5.3—announcements would need to follow symmetry, with de-escalations appreciating the dollar in proportion to the tariff relief. Any systematic departure from this symmetry in signed tariff news can be interpreted as evidence that announcements transmit through the other rows of the table: they move the perceived volatility of the tariff regime, σ_t^2, or the convenience yield, ψ_t, rather than the deterministic level alone. The event-study evidence in Section 4 shows that the departures line up with the uncertainty row.

3 Data

3.1 TiRADE: Tariff Rates in Announcements, Declarations, and Events

We assemble TiRADE, a database of every tariff action from January 2025 through May 2026 that specifies a numeric rate, meaning each distinct threat, announcement, or implementation of a US import tariff at a stated percentage. Each observation records the country/countries-product sector(s) to which the rate applies, the type of action (threatened, announced, or implemented), the channel through which it was communicated, its date and time, a verbatim supporting excerpt, and a reference to the underlying source document, transcript, or post. Multi-country measures, such as the April 2025 reciprocal ("Liberation Day") tariffs, are disaggregated to one observation per affected country-sector using the official schedule.

The database draws on three kinds of primary source. First, the President's public speeches, remarks, interviews, and press conferences, obtained from Factbase.[15] Second, his social media posts, likewise obtained from Factbase and verified against the complete public archive of his Truth Social posts, from which we also recover engagement counts and deletion flags for posts later removed. Third, the formal legal instruments: presidential executive orders, Section 232 proclamations, and Federal Register implementation notices, obtained from the US Federal Register and reconciled announcement by announcement against the US Tariff Announcement Database (USTAD) of Manova et al. (2026). A further set of measures

[15] We are grateful to Bill Frischling for generously sharing tariff- and trade-related presidential speeches and social media posts from Factbase.

announced through official White House channels that are neither legal instruments nor speeches or posts (framework-agreement joint statements, fact sheets, and presidential-action clarifications) is included under a fourth source type, “White House statement”.

Our database is complementary to USTAD of Manova et al. (2026). USTAD hand-collects the 53 formal trade-policy announcements made in presidential executive orders and proclamations and converts them into monthly statutory US import tariffs at the origin-country by HTS 10-digit product level, to establish novel indicators of *tariff confusion*—the difficulty of computing the statutory tariff as announcements accumulate. Thus, USTAD measures what the tariff *was* and how hard it was to calculate, capturing the difficulty firms faced in working out which rate they would actually pay. This is why, it is restricted to legally operative instruments, and its sample ends before the Supreme Court’s 2026 IEEPA ruling. TiRADE, on the other hand, measures what was *said* and, through it, what forward-looking agents could expect and hence how households and investors formed beliefs about future tariffs rather than about the statutory rate in force. Concretely, 309 of our 434 rate statements (71 percent) come from channels outside USTAD’s scope (speeches, interviews, social media posts, and White House statements), including threats that never became law (rates in this rhetorical layer reach 350 percent, roughly twice the statutory maximum), and our coverage extends through the post-ruling Section 122 regime of 2026. Where the two databases overlap we reconcile them: all 53 USTAD entries are represented in our executive-order layer, and our per-source linkage makes it possible to observe, for any formal instrument, the trail of speeches and posts that preceded and followed it.

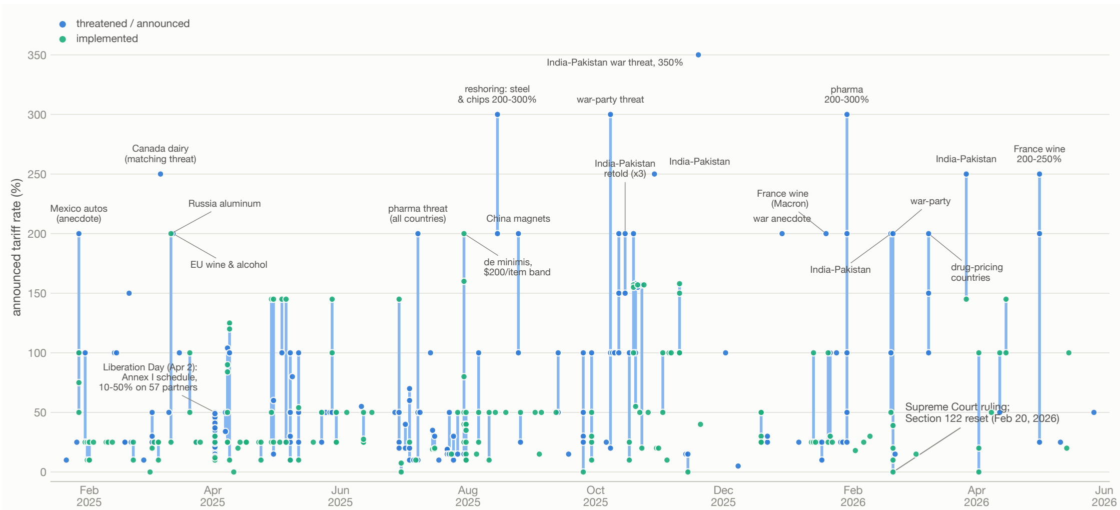
Used together, the two databases separate the ex post from the ex ante: USTAD provides the statutory tariff surface and the computational complexity of complying with it, while TiRADE provides the communication record laid over that surface, at the timing precision required to separate announcement effects from implementation effects and to measure the dispersion of possible future rates that our model interprets as tariff uncertainty, σ_t^2.

We clean this data through a rigorous process. First, we remove four classes of false positives: tariffs that foreign governments charge the US (unless US threatens a matching US rate); value-added and other non-tariff taxes; statistics that happen to be percentages of trade-deficit, and counterfactuals ("if president had said 100%..."). Restatements of the same rate within a single transcript are consolidated, while restatements across separate appearances are retained as separate observations, since each is a distinct communication event. If the same underlying action surfaces in more than one channel (for example, an executive order accompanied by a Rose Garden speech and a Truth Social post), the records are linked by a common event identifier that matches records within a one-day window. This allows the data to be used either at the level of individual communications or at the level of distinct policy actions.

The 389 source records give 434 rate statements (235 from speeches, 61 from social media posts, 125 from executive orders, proclamations, and Federal Register notices, and 13 from White House statements). Of the 434, fourteen are *tbd* rows in which a tariff is authorized without a stated percentage (the Cuba and Iran secondary-tariff orders, framework deals announced without a rate, and the de minimis suspension), leaving 420 statements with a numeric rate. Of these 420, 340 can easily match to OECD-ICIO country-by-sector cells and therefore can carry import weights. We hand-audited crosswalks using a chronological running-rate engine that tracks the additional rate applying to each of the 4,050 ICIO country-sector cells as events accumulate. The engine identifies rollbacks that textual annotation misses and yields an event-level direction classification: 58 implemented increases, 28 implemented decreases, 25 mixed changes, and 119 potential (threatened or announced but not implemented) changes. The full construction procedure was validated by an independent end-to-end rebuild from the raw sources, executed without reference to the existing database. Appendix C documents the construction rules, and Appendix D the ICIO augmentation.

Figure 3 provides a visualization at the daily level: one dot per distinct announced rate, colored by implementation status. Implemented rates converge toward the 10 to 25 percent band while the rhetorical layer escalates; of the 25 labeled rates at or above 200 percent, all but two never became law.[16] The communicated tariff surface is far wider, and moves on different dates, than the statutory one, the idea at the heart of our paper.

Figure 3. Tariff Announcements



Note: Figure 3 shows every distinct announced tariff rate between January 2025 and May 2026: of the 420 statements with a numeric rate, a rate might be repeated across communication channels within one linked event, leaving 381 dots on 156 days. Vertical bars span each day's range. Green dots mark implemented measures (173); blue dots mark threatened and announced rates (208). All rates at or above 200 percent are labeled; except for the Russia aluminum tariff and the de-minimis $200-per-item duty, none became law.

3.2 Implemented Tariffs from WTO-IMF Tracker

To cross-check implemented/applied tariffs, we obtain all implemented tariff data from WTO-IMF Tariff Tracker (WTO and IMF, 2025).[17] Table 2 reports the evolution of the implemented weighted-average tariff through February 24, 2026. Implemented rates differ substantially from those announced on Liberation Day, and also from those communicated rates TiRADE captures. Columns (2) and (3) report cross-product dispersion in implemented statutory rates that are similar in size to confusion metrics of USTAD data, which

[16] The de-minimis action is a specific duty ($200 per item), not an ad valorem rate; it is plotted for completeness at the top band and excluded from all rate-level statistics.

[17] https://ttd.wto.org/en/analysis/tariff-actions, last accessed on March 18, 2026.

is also at product level.

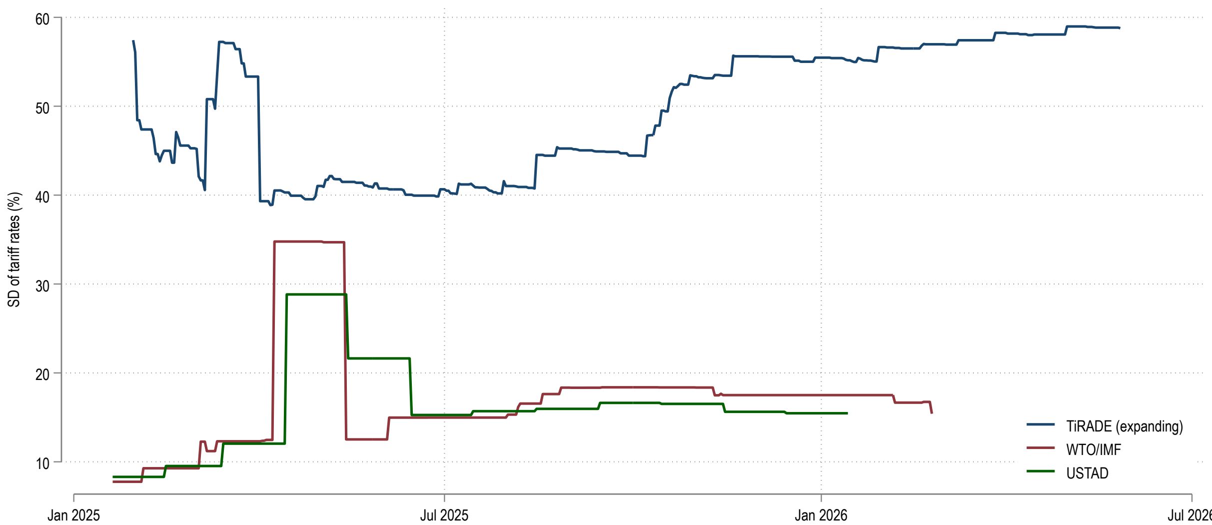
Table 2. Implemented Product-Level Tariff Rates

Date	Tariff(%)	Standard Deviation	Weighted Std. Dev.	Date	Tariff(%)	Standard Deviation	Weighted Std. Dev.
1/1/25	2.4	7.8	6.0	8/7/25	17.1	16.6	18.2
2/4/25	3.8	9.3	8.5	8/18/25	20.2	17.6	19.7
3/4/25	11.6	12.3	13.4	8/27/25	20.6	18.3	20.1
3/7/25	6.2	11.2	11.5	9/1/25	20.0	18.3	20.2
3/12/25	7.4	12.3	12.6	9/8/25	19.9	18.3	20.2
4/3/25	8.5	12.4	13.2	9/16/25	19.7	18.4	20.2
4/4/25	8.5	12.4	13.2	10/1/25	19.7	18.4	20.2
4/5/25	12.2	12.5	14.3	10/14/25	19.7	18.4	20.2
4/9/25	21.2	34.8	41.4	11/1/25	19.3	18.4	20.2
5/3/25	22.7	34.7	41.5	11/10/25	18.0	17.5	18.4
5/14/25	13.7	12.5	15.3	11/13/25	17.8	17.7	18.5
6/4/25	15.5	15.0	17.5	11/14/25	17.4	17.5	18.4
6/23/25	15.6	15.0	17.6	2/6/26	16.9	16.7	17.8
6/30/25	15.6	15.0	17.6	2/20/26	10.8	16.7	16.7
8/1/25	15.6	15.3	17.7	2/24/26	13.5	15.4	16.5
8/6/25	15.8	16.2	17.9				

Note: Table 2 reports the average U.S. tariff rates between January 1, 2025 and February 24, 2026, together with the unweighted and import-weighted standard deviations of implemented statutory rates across products. We downloaded the tariff data from WTO and IMF (2025) as of March 18, 2026, at the HS-6 level of classification. To compute the average U.S. tariff rate, we use 2024 import weights to aggregate tariff rates across products.

Figure 4 contrasts the dispersion of the tariff rates the President communicated, as captured by TiRADE, with the dispersion of the statutory rates actually in force, as measured by the WTO–IMF Tariff Tracker and by USTAD. Three patterns stand out. First, dispersion in what was said always exceeds dispersion in what was implemented: the TiRADE series never falls below 39 percentage points and reaches 59 by the end of the sample, whereas the statutory series start near 8 and never exceed 35. The gap opens in the very first weeks of the administration, when threatened rates already spanned the range up to 350 percent while statutory schedules had barely moved, and it is at its narrowest only briefly in April 2025. Second, the two statutory measures track each other closely, both climbing from roughly 8 percentage points in January 2025 to a plateau of 15–17 by late 2025; the modest remain-

Figure 4. Dispersion of communicated versus statutory tariff rates



Note: The figure plots three measures of US tariff-rate dispersion, in percentage points, from January 1, 2025 onward. The TiRADE series is the standard deviation of all tariff rates communicated by President Trump across speeches, interviews, social media posts, executive orders, and White House statements, computed over an expanding window of rate statements and updated daily. The WTO–IMF series is the standard deviation of implemented statutory tariff rates from the WTO–IMF Tariff Tracker (WTO and IMF, 2025), observed at tariff-action dates and held constant between actions; it ends with the last recorded action on February 24, 2026. The USTAD series is the standard deviation of the statutory tariff at the origin-country by HTS 10-digit product level from Manova et al. (2026), a monthly measure plotted at mid-month and held constant until the following mid-month; it ends in December 2025, before the Supreme Court's IEEPA ruling. The statutory series (WTO–IMF, USTAD) move closely together and, outside the April–May 2025 US–China escalation, remain below 20 percentage points, whereas dispersion in communicated rates is several times larger, reflecting threatened rates of up to 350 percent that never entered force. We would like to thank Kalina Manova and her coauthors for graciously sharing the data.

ing differences reflect aggregation, since the WTO–IMF tracker is built from HS 6-digit tariff lines while USTAD works at the HTS 10-digit level, as well as timing, daily action dates versus monthly statutory schedules. Third, the US–China escalation of April 2025 is the one episode in which statutory dispersion surges toward rhetorical levels: as duties on Chinese imports rose above 100 percent, the WTO–IMF series jumped from 12 to 35 percentage points and USTAD to 29, before the mid-May Geneva de-escalation returned the tracker to 13 within a month. Thereafter the two layers decouple: statutory dispersion settles as rates converge to the 10–25 percent range, while TiRADE ratchets upward through May 2026 as ever more extreme threatened rates accumulate in the communication record.

3.3 Sub-Sample for High-Frequency Analysis

We create a high-frequency event-study sample out of TiRADE's 434 rate statements. This is a smaller sample as intra-day high frequency analysis requires both a wall-clock timestamp and a numeric rate: 319 statements satisfy both (316 in the raw workbook, plus three April 2025 announcements restored in the build). Because a single action typically surfaces as a burst of communications, these 319 timestamped rate events are merged into 177 announcement clusters whenever they fall within twenty minutes of one another, ensuring no market movement is counted twice.

We collect both minute-by-minute and daily Bloomberg data on exchange rates, interest-rate differentials, equity prices, and volatility. These are used for our intra-day analysis with time-stamped announcements. In addition, we match chronological tariff-event dataset to end-of-day observations on EURUSD spot, the DXY dollar index, S&P 500 futures (ES1), the one-year U.S.–Germany government-bond yield differential, the one-year forward/spot spread, a CIP wedge (equivalently, the one-year Treasury basis; see Section 4.2), the VIX, EURUSD one-month implied volatility, and the daily trade-policy-uncertainty (TPU) index. Each end-of-day market outcome (spot rates, the dollar index, equity futures, yields, the forward/spot spread, the CIP wedge, and the implied volatilities) is constructed by collapsing the underlying intraday Bloomberg quotes to a daily frequency, with each daily observation measured over a fixed 11am ET to 11am ET window. For the daily series, the interest-rate leg is pulled at this same fixed timestamp rather than Bloomberg's native end-of-day convention, which can differ across bonds.

Event changes are computed over a tight end-of-day window around each episode: the pre-event value is the last available trading-day observation and the post-event value is the first available trading-day observation. Exchange rates and equity prices enter as percent changes; yields, the forward/spot spread, the UIP and CIP wedge, volatility, and policy-uncertainty measures enter as percentage point differences. Episodes are classified as tariff increases or decreases by the sign of $\Delta\tau_t$, and as uncertainty increases or decreases by the sign of the event-window change in composite EURUSD/VIX one-month implied volatility. These signs condition on, but do not select, the sample: every episode enters the estimation regardless of sign, so the classification is a mechanical labeling of moves already inside the window, not a selection rule. The unit of observation throughout the daily analysis is the event day: when several rate statements fall on the same day, they enter as a single episode whose net tariff change $\Delta\tau_t$ is the day's change in the aggregate import-weighted rate, so no daily market movement enters the sample more than once.

4 Empirical Analysis

Through the first half of 2025 the United States raised tariffs and the dollar fell. The model admits three disturbances that could connect those facts, and Table 1, above, shows that they leave different fingerprints across markets. A tariff-*level* shock appreciates the dollar, raises the U.S.–Germany interest differential, and—because the mechanism is a deterministic terms-of-trade force—must act symmetrically: so lowering the tariff-level should reverse what increasing tariff-level does. A *convenience-yield* decline depreciates the dollar but is priced in covered positions, so it must move the CIP wedge and the differential. A tariff-*uncertainty* shock depreciates the dollar and lowers equity prices while leaving the interest rate differential approximately unchanged, the near-offset of Proposition 3.

In this section, we first document the empirical responses to tariff announcements. We then assess the empirical relevance of each transmission channel implied by the model, exploiting high-frequency identification in both exercises.

4.1 Descriptive Patterns around Events

We start by presenting descriptive patterns for the estimation sample, that is the set of announcement days on which the aggregate import-weighted tariff rate changed by at least one percentage point, or an official act was signed or implemented. Table 3 reports the average announcement-day move in each market, first pooled and then split along the two dimensions the model says should matter: whether the announcement raised or lowered the tariff, and whether it raised or lowered the uncertainty, σ_t^2 of Section 4.3.

The pooled column's puzzle is solved in split columns. Averaged over all announcement days, the dollar barely moves against the euro (+0.04 percent, standard error 0.06), the broad dollar excluding the euro moves +0.01 percent, and equities move +0.09 percent: on the surface, tariff news is a non-event. The splits show that this near-zero is two large responses of opposite signs canceling each other. On escalation days that *raised* the uncertainty score (48 days), the dollar depreciates 0.18 percent and equities fall 0.56 percent. On escalation days that *lowered* the score (41 days), every one of these signs flips: the dollar is flat to slightly stronger (−0.06), and equities *rise* 0.78 percent—even though the average tariff increase on these days is *larger* (+13.11 versus +9.62 percentage points). These are the days on which a widely feared action arrived smaller, later, or better-defined than markets had priced-in ex-ante. De-escalations that lowered uncertainty (10 days) complete the pattern: the dollar appreciates (−0.17) and equities rally (+0.83 percent). The response of the dollar against non-euro currencies tracks the euro response (+0.12 percent on escalation days with rising uncertainty), so this is a dollar phenomenon, not a euro one. Meanwhile the covered-interest-parity wedge does not move across the board (0.00, standard deviation 0.03).

Thus, the sign of the tariff change and its magnitude do not matter: whatever moves the dollar on these days is linked to the second moment of the announcement, not its first.

A natural suspect is the tariff action itself. The model predicts that the dollar must *appreciate* when tariffs rise: the tariff improves the U.S. terms of trade and the currency

Table 3. Descriptive Event-Window Averages

Variable	Raw avg.	$\tau\uparrow$ $\sigma^2\uparrow$	$\tau\uparrow$ $\sigma^2\downarrow$	$\tau\downarrow$ $\sigma^2\uparrow$	$\tau\downarrow$ $\sigma^2\downarrow$
Net $\Delta\tau$ (pp)	+8.56***	+9.56***	+13.27***	-4.49*	-7.48**
	(1.49)	(1.67)	(2.65)	(1.76)	(2.49)
σ^2 (PCA uncertainty, std)	-0.03	+0.87***	-0.69***	+0.38**	-1.28**
	(0.14)	(0.20)	(0.15)	(0.11)	(0.54)
$\Delta\psi$: CIP wedge (1Y, pp)	0.00	0.00	0.00	0.00	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
EURUSD, USD dep. (%)	+0.06	+0.23*	-0.05	-0.01	-0.20
	(0.06)	(0.12)	(0.07)	(0.16)	(0.17)
DXY ex-EUR, re-signed (%)	+0.04	+0.19*	-0.08	+0.05	-0.11
	(0.05)	(0.09)	(0.07)	(0.17)	(0.18)
Stock index, SPX/ES1 (%)	+0.13	-0.58***	+0.74***	-0.13	+0.86**
	(0.15)	(0.20)	(0.22)	(0.31)	(0.38)
TPU daily change	+30.69	+52.34*	+11.68	+36.54	+14.06
	(20.18)	(29.47)	(31.94)	(82.46)	(75.00)
N obs.	102	44	42	5	11
% of obs.	100.0	43.1	41.2	4.9	10.8

Note: The first numeric column is the raw event-window average; the remaining four split episodes by the sign of the net tariff change $\Delta\tau_t$ and the sign of the event-window uncertainty change σ_t^2 (the four $\Delta\tau\times\sigma^2$ cells). Rows report, in order, the net tariff change (pp), the composite tariff-uncertainty score σ_t^2 (standardized), the one-year CIP wedge $\Delta\psi_t$ (pp), EUR/USD, the broad dollar index excluding the euro (DXY ex-EUR, re-signed), the equity index (S&P 500 cash, E-mini (ES1) futures fallback), and the daily TPU change; EUR/USD and DXY ex-EUR are signed so that a positive value is a U.S. dollar depreciation. The two bottom rows give the per-column number of episodes N and their share of all episodes. Each cell reports the mean with its standard error (sd/$\sqrt{N}$) in parentheses; stars are from a one-sample t-test of a zero mean. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

strengthens on impact. In addition, this channel is symmetric: Proposition 2 shows that de-escalations must mirror escalations, and that valuation effects on the gross external position—the popular "the dollar fell because foreign balance sheets were marked down" variant—can only dampen the appreciation, never reverse its sign.

Thus, we separate the net change in $\Delta\tau$ into tariff increases and decreases. Results are reported in Table 4. A kinked regression allowing for separate slopes for tariff increases and decreases yields no statistically significant difference, and a formal Wald test fails to reject symmetry. Because valuation effects attenuate only the level channel (Proposition 2), this symmetry provides additional evidence against valuation effects as the primary driver of depreciation. However, with only 16 de-escalation days, the test has limited power.

Table 4. Asymmetric Pass-Through: Separate Slopes for Increases and Decreases of Tariffs

Outcome	Increase $\hat{\beta}_+$	Decrease $\hat{\beta}_-$	$p(\beta_+ = \beta_-)$	Pooled $\hat{\beta}$	N
EURUSD, USD dep. (%)	0.003	0.026	0.217	0.006	94
	(0.006)	(0.016)			
DXY ex-EUR, re-signed (%)	0.003	0.021	0.252	0.005	94
	(0.005)	(0.015)			

Note: Kinked pass-through $100\,\Delta y = a + \beta_+ \max(\Delta\tau_t, 0) + \beta_- \min(\Delta\tau_t, 0) + u$, *estimated separately for the euro (EUR/USD) and the broad dollar index excluding the euro (DXY ex-EUR, re-signed so a positive value is a dollar depreciation), on event days. Columns report the increase slope* $\hat{\beta}_+$, *the decrease slope* $\hat{\beta}_-$, *the p-value of the Wald symmetry test* $p(\beta_+ = \beta_-)$, *the pooled single-slope estimate* $\hat{\beta}$, *and the number of episodes* N. *Heteroskedasticity-robust standard errors in parentheses.*

4.2 Decomposing the UIP Premium

Another suspect for the depreciating dollar is the dollar's safe-asset convenience yield. If what tariff policy damaged was the willingness of foreigners to pay a premium for dollar safety, the deterioration would appear in covered positions, since foreign holders of dollar assets hedge their currency exposure (Shin, Wooldridge and Xia, 2025). This subsection shows that the covered (CIP-basis) component moved negligibly at the quarterly frequency where the UIP premium widened.

To make this case we start by a decomposition of the UIP premium and calculating the empirical counterpart of the model's UIP condition. The standard accounting decomposition separates this premium into the covered component observed in forward markets and the residual premium on unhedged dollar exposure. Let $\hat{f}_{t,t+1}$ denote the twelve-month forward exchange rate, in the same log-linear units as $\hat{\mathcal{E}}_t$. Since the Consensus data are monthly and report twelve-month-ahead forecasts, $t+1$ is the empirical one-year counterpart of the model's one-period-ahead object.

$$\underbrace{\left[(\hat{i}_{H,t}-\hat{i}_{F,t})-\left(\mathbb{E}_t\hat{\mathcal{E}}_{t+1}-\hat{\mathcal{E}}_t\right)\right]}_{\text{UIP premium}}=\underbrace{\left[(\hat{i}_{H,t}-\hat{i}_{F,t})-\left(\hat{f}_{t,t+1}-\hat{\mathcal{E}}_t\right)\right]}_{\text{CIP wedge }=-\psi_t}+\underbrace{\left[\hat{f}_{t,t+1}-\mathbb{E}_t\hat{\mathcal{E}}_{t+1}\right]}_{\text{Forward Risk Premium }=\kappa\sigma_t^2}.$$

The first term is the CIP wedge: the part of the UIP premium already priced in covered positions. Both rate legs are one-year government-bond yields—the U.S. Treasury and the German sovereign—so this wedge is the one-year Treasury basis: the U.S. Treasury yield minus the dollar yield synthesized by holding the German bond and hedging it back through the forward market. It is exactly the Treasury basis of Jiang, Krishnamurthy and Lustig (2021), equivalently minus the U.S. Treasury premium of Du, Im and Schreger (2018), and it prices the dollar's safe-asset convenience yield.[18] In the model, this corresponds to the liquidity-service-flow channel, $-\psi_t$. A decline in the dollar convenience yield raises required cash returns on dollar assets and therefore widens this covered wedge. Empirically, we interpret this term conservatively because measured CIP deviations can also reflect intermediary balance-sheet costs, and other financial frictions (Du, Tepper and Verdelhan, 2018). The second term is the Forward Premium: the gap between the forward rate and the Consensus expected future spot rate. In the model, after removing the covered liquidity-service-flow component, this residual is the premium generated by tariff-related currency risk, $\kappa\sigma_t^2$.[19] What we identify is the *covered* convenience component, and any service flow on unhedged dollar positions is observationally folded into $\kappa\sigma_t^2$. Magnitudes nonetheless discipline the interpretation: over January–April 2025 the one-year Treasury basis moved on the order of 0.2–0.3 percentage points peak-to-trough, while the aggregate UIP premium reached 2.95

[18] Note that this is *not* the money-market cross-currency basis of Du, Tepper and Verdelhan (2018), which is built from interbank rather than government bond rates.

[19] Our model does not explicitly contain forward contracts. However, $-\psi_t$ can be mapped to real-life CIP wedge data as a covered position bears no exchange-rate risk. It is true that the convenience yield need not be priced exclusively in covered positions: a service flow accruing on *unhedged* dollar bonds appears in the uncovered Forward Premium residual rather than in the basis (Valchev, 2020; Engel and Wu, 2023). However, if this service flow is captured by the forward premium term and moves with exchange rate volatility then we categorize it also as a risk premium instead of a service flow on an unhedged dollar position.

percentage points in 2025Q1 with a covered component of only 0.015 percentage points—so even a generous uncovered convenience wedge most likely leaves the bulk of the premium as priced currency risk.

Figure 5 implements this decomposition using the same Consensus survey forecasts used to construct expected depreciation in Figure 1b. Daily financial-market variables are matched to the monthly Consensus survey date, using the most recent prior trading day when necessary, and the quarterly series averages the monthly observations inside the same rolled-quarter bins used above. In the rolled 2025Q1 bin, which contains the major early-2025 tariff announcements, the aggregate UIP premium is 2.95 percentage points, while the average CIP component is only 0.015 percentage points. The signed CIP contribution is therefore 0.51% of the aggregate UIP premium; even averaging the absolute monthly CIP wedges gives less than 0.9% of the absolute UIP premium. The widening UIP premium in this period is therefore almost entirely the Forward Premium rather than the covered CIP wedge. Appendix Figure A.3 corroborates this decomposition using the ECB Survey of Professional Forecasters in place of Consensus to measure expected depreciation: the SPF-based decomposition delivers the same pattern—an aggregate UIP premium dominated by the Forward Premium and a negligible covered CIP component—so the result does not hinge on the particular survey of forecasters. An across-maturity check points the same way: in the announcement-day differential regressions of Appendix Table A.3, the CIP wedge loads on the one-year differential at 1.532*** (U.S.–Germany) and 1.743*** (U.S.–euro-area AAA), with R^2 of 0.521 and 0.394, but at thirty years (FRED DGS30 against the ECB euro-area AAA curve) the coefficient collapses to 0.618* and the R^2 to 0.079. A repricing of the dollar's safe-asset convenience should raise the differential across the entire curve; instead the covered wedge is a short-end phenomenon.

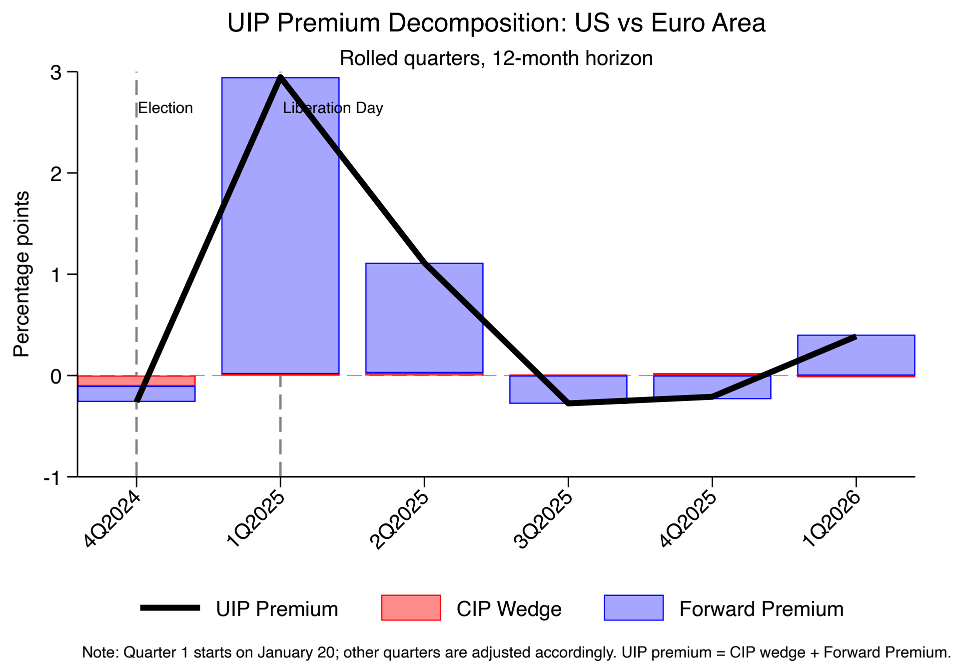


Figure 5. UIP Premium Decomposition

Note: The figure decomposes the aggregate dollar–euro UIP premium into its covered component—the one-year Treasury basis (the CIP wedge $-\psi_t$)—and the residual Forward Premium, the gap between the forward rate and the Consensus expected future spot rate. Both interest legs are one-year government-bond yields (the U.S. Treasury and the German sovereign). Daily financial-market variables are matched to the monthly Consensus survey date, using the most recent prior trading day when necessary, and the quarterly series averages the monthly observations within the same rolled-quarter bins used elsewhere (2025Q1 begins January 20, 2025). In the rolled 2025Q1 bin the aggregate UIP premium is 2.95 *percentage points while the average CIP component is* 0.015*; the widening premium is almost entirely the Forward Premium rather than the covered CIP wedge. Interest legs sourced from FRED; exchange-rate expectations from Consensus surveys.*

This decomposition is consistent with the prior event windows patterns. If announcements had transmitted through the convenience yield, the wedge would move when the news arrives; it barely does. Across announcement windows the average change in the CIP wedge is 0.00 percentage points with a standard deviation of 0.03 (Table 3)—movements an order of magnitude too small to account for exchange-rate responses measured in tenths of a percent, even taking the CIP wedge's estimated currency coefficient at face value.

The CIP wedge is not our uncertainty measure in disguise: on announcement days the relationship between wedge changes and σ_t^2 is statistically indistinguishable from its non-event counterpart and close to zero (slope-equality $p \approx 0.60$), so the convenience and uncertainty channels are measured off essentially orthogonal variation rather than one shock split in two. In the next section, we will also show this point with high frequency regressions, where the CIP wedge's coefficient on the currency is statistically indistinguishable from zero in every specification.

None of this says the dollar's convenience yield is unimportant, or invalidates that this episode might be the start of a secular erosion of the dollar's safe-asset status (Jiang, Krishnamurthy and Lustig, 2021; Du, Im and Schreger, 2018; Jiang et al., 2025). Our claim is narrower but sharper: whatever is eroding slowly was not what repriced in the minutes and days around tariff announcements. Section 5 returns to the distinction, separating transitory movements in the wedge from persistent erosion and quantifying how little of the observed depreciation can be linked to a secular long-run decline in dollar's status.

Figure 6 investigates the cross-sectional relationship between the exchange rate and these two components of the UIP premium. On tariff-announcement days (red-filled markers) both the EURUSD and the broad dollar depreciate substantially more when tariff uncertainty rises: the event-day slope of the dollar on $\Delta\sigma_t^2$ is positive and steep, whereas on all other trading days (hollow markers) it is flat. Interacting the uncertainty change with an announcement-day indicator, the slope difference is statistically significant for both EURUSD ($p = 0.003$) and the broad dollar index ($p = 0.023$). No comparable differential appears against the convenience-yield (CIP) wedge $-\psi_t$ ($p = 0.80$ and $p = 0.41$) shown as flat-lined figures: the announcement-day depreciation loads on uncertainty specifically, not on contemporaneous convenience-yield movements. The patterns are the sign the model predicts, in which tariff volatility σ_t^2 raises precautionary saving (via $\eta\sigma_t^2$) and widens the

UIP premium (via $\kappa\sigma_t^2$). Additionally, this plot is in line with the observation that the CIP wedge contributed only a small portion of the widening of the UIP premium.

4.3 Event Study

We map the linear solution of the model into an event-study design. For any outcome x_t,

$$x_t = a_{x,\tau}\tau_t + a_{x,\sigma}\sigma_t^2 + a_{x,\psi}\psi_t + a_{x,V}\hat{V}_{H,t-1} + \varepsilon_{x,t}, \tag{17}$$

where $x_t = \hat{\mathcal{E}}_t$ corresponds to EURUSD, $x_t = \hat{S}_t$ to equity prices, and $x_t = i_t - i_t^*$ to the U.S.–Germany bond interest-rate differential.[20] First-differencing (17) over the event window gives the estimating equation:[21]

$$\Delta x_t = \alpha_x + \beta_{x,\tau}\Delta\tau_t + \beta_{x,\sigma}\Delta\sigma_t^2 + \beta_{x,\psi}\Delta\psi_t + u_{x,t}. \tag{18}$$

With linearization, the predetermined debt state drops out: there is no new issuance inside the window, so its first difference is approximately zero—and for the differential the state loading is exactly zero to begin with (Proposition 3). The coefficients $\beta_{x,\cdot}$ then inherit the sign restrictions of Table 1, with one caveat of interpretation: a major announcement jointly revises current tariff rates, expected future rates, and the perceived volatility of the tariff regime, so the signed tariff variable $\Delta\tau_t$ is a reduced-form policy-news measure rather than a clean level comparative static. $\Delta\tau_t$ is the net tariff-rate change of the announcement, and with slight abuse of notation, $\Delta\psi_t$ is the change in the measured CIP wedge, the price

[20] These safe sovereign yields are the event study's *change* observables. Notably, they are different from the steady state's *level* objects referenced elsewhere: the calibrated returns of Section 5.1 are average balance-of-payments portfolio returns on the external position, which safe benchmark yields need not match in levels. Our relevant identifying assumption is that announcement-window *innovations* in the one-year U.S.–Germany spread pass through to the rates paid on external assets and liabilities.

[21] Because the outcomes are forward-looking asset prices, the announcement-window change identifies the jump response to the revision of $(\tau_t, \sigma_t^2, \psi_t)$ with no time aggregation; the coefficients and regressor units remain those of the annual-frequency model ($\Delta\tau_t$ and $\Delta\psi_t$ in annualized percentage points, $\Delta\sigma_t^2$ converted to a one-year-ahead variance in Section 5).

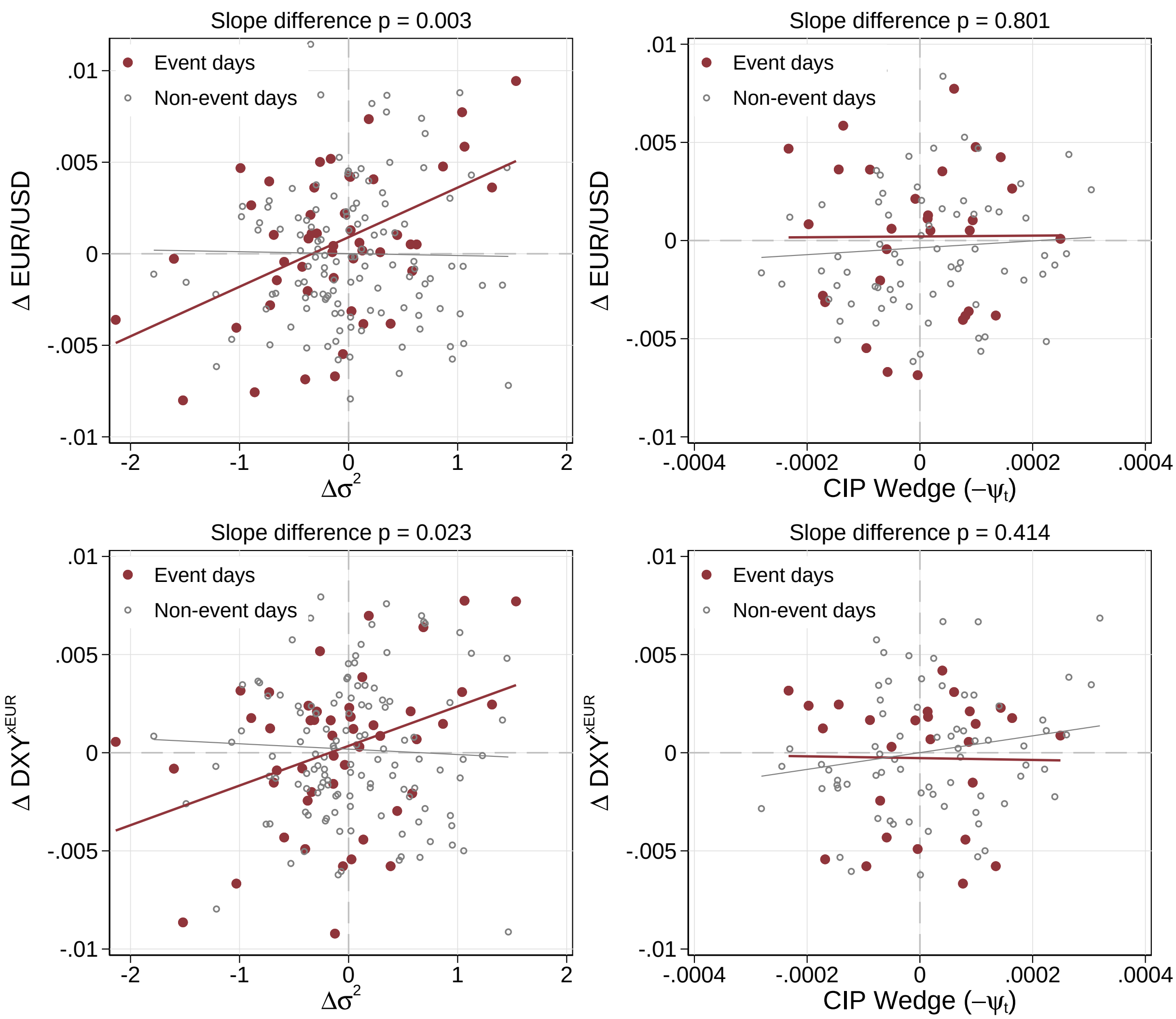


Figure 6. Dollar depreciation loads on tariff uncertainty on announcement days

Notes. Daily end-of-day changes. Rows are outcomes—the euro (Δ EUR/USD, top) and the broad dollar index excluding the euro (Δ DXY^{xEUR}, bottom); for both, a positive value is a U.S. dollar depreciation. Columns are regressors: the tariff-uncertainty measure $\Delta\sigma_t^2$ (left) and the covered-interest-parity wedge $-\psi_t$ (right). Filled markers are tariff-announcement days; hollow markers are all other trading days; each carries its own OLS fit line. The reported p-value is for the interaction coefficient d in $\Delta y_t = a + b\,x_t + c\,\mathbb{1}\{\text{event}\}_t + d\left(x_t \cdot \mathbb{1}\{\text{event}\}_t\right) + \varepsilon_t$, with heteroskedasticity-robust (HC1) standard errors, i.e. a test that the announcement-day slope differs from the non-announcement-day slope. To limit the influence of outliers, the top and bottom 2.5% of each plotted variable are trimmed.

of the convenience flow in covered positions (Section 4.2). Since the measured wedge corresponds to $-\psi_t$ in the model's notation, a positive $\Delta\psi_t$ is a *widening* of the wedge—the empirical counterpart of a convenience-yield decline—so the $\psi_t \downarrow$ row of Table 1 gives the predicted signs of the $\Delta\psi_t$ coefficients directly.

For $\Delta\sigma_t^2$ we need the announcement-window change in the market's assessment of tariff-regime risk, and no single traded price isolates it: tariff news in this period moved both aggregate risk (the VIX) and currency risk (EURUSD one-month implied volatility). We therefore measure σ_t^2 with a composite of the two: the changes in the two implied volatilities, each standardized over the full sample of windows, averaged with equal weights—equivalently, their first principal component, whose loadings on two standardized inputs are equal by construction. Coefficients on σ_t^2 are per standard deviation. Implied volatility also embeds a price of variance risk, so one might object that the measure bundles the quantity of uncertainty with its price. Either way the announcement-window jump is a *repricing* of tariff-regime uncertainty, and in the model that repricing enters the forward risk premium $\kappa\sigma_t^2$ all the same—the very term the exchange rate loads on. The quantity-versus-price distinction therefore leaves the event-study coefficients untouched; it bears only on converting those slopes into structural units, which we take up in Section 5 using our model. A distinct objection is that a composite built partly from the VIX could proxy global risk appetite rather than tariff-regime risk. Our identification rests on *timing*: the relationship lives inside tight windows around time-stamped tariff announcements, and the placebo version of the instrumented design below—the identical instrument built from non-announcement days—has no first stage ($F \approx 0$ versus 13.4 on announcement days; Table 7). Consistent with this, a Shapley decomposition attributes 83.8% of the explained announcement-window variation in the euro–dollar rate to the uncertainty score (Appendix Table A.2). A sign check runs the comparison in reverse: on non-tariff days in the top decile of absolute VIX moves ($N = 12$ with EURUSD available), the dollar *appreciates*—an EURUSD coefficient of -0.0779 per VIX point (robust s.e. 0.0177), the opposite sign of the tariff-window fingerprint of $+0.236$.

Table 5. Sequential Event-Window Regressions: EUR/USD and DXY ex-EUR

	$\Delta\hat{\mathcal{E}}_t$ (EURUSD, %)			$\Delta \mathrm{DXY}_t^{\mathrm{xEUR}}$ (re-signed, %)		
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta\tau_t$: Net Tariff Change (pp)	0.006	0.006	0.002	0.005	0.005	0.003
	(0.005)	(0.005)	(0.002)	(0.005)	(0.005)	(0.003)
σ_t^2: PCA Uncertainty (std)		0.133*	0.236***		0.081	0.233**
		(0.069)	(0.078)		(0.061)	(0.101)
$\Delta\psi_t$: CIP Wedge (1Y, pp)			-1.410			-2.736
			(5.266)			(4.545)
Constant	0.021	0.017	-0.019	0.005	0.004	-0.030
	(0.066)	(0.063)	(0.064)	(0.053)	(0.053)	(0.060)
N	94	88	49	94	88	49
SD outcome	0.588	0.597	0.427	0.501	0.505	0.417
R^2	0.022	0.138	0.189	0.021	0.081	0.200

Note: Daily end-of-day panel of announcement (event) days. All columns are OLS. The dependent variable is 100× *the daily log change in the exchange rate (percent; positive = U.S. dollar depreciation): EUR/USD in the left panel of columns and the euro-excluded dollar index (DXY ex-EUR) in the right. Within each outcome the columns add regressors sequentially: the standardized uncertainty score* σ_t^2 *alone, then the net tariff change* $\Delta\tau_t$ *(pp), then the one-year CIP wedge* $\Delta\psi_t$*; the specification including the CIP wedge is estimated on the subsample of event days with the one-year wedge available. Robust standard errors in parentheses.* $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Generic risk-off moves the dollar the safe-haven way; tariff-announcement uncertainty moves it the other way.

We begin with the estimating equation (18), regressing the announcement-window change in the exchange rate on the signed tariff change $\Delta\tau_t$, the announcement-window jump in the uncertainty score σ_t^2, and the change in the covered-interest-parity wedge $\Delta\psi_t$. Table 5 builds this specification up one regressor at a time so the reader can see what each addition does. The headline estimate is that a one-standard-deviation announcement-window jump in σ_t^2 depreciates the dollar against the euro by 0.236 percent—more than half a standard deviation of the announcement-day outcome—while the tariff change (0.002, standard error 0.002) is small and the CIP wedge coefficient is indistinguishable from zero. Similar results for the broad dollar index excluding the euro suggest that the story is not about the euro.

Table 6 is the OLS specification that maps to the model solution. It runs the outcome regression (18) for the exchange rate, the equity index, and the U.S.–Germany interest differential on the same three regressors, so the σ_t^2 row reads as one shock's fingerprint across markets: ($+0.236^{***}$, -0.673^{***}, -0.006). A one-standard-deviation jump in σ_t^2 depreciates the dollar, takes two-thirds of a percent off equities, and leaves the differential dead. That last entry is the sharpest of the three and is a *precise* zero, not a failure to find an effect: its standard error of 0.009 rules out moves larger than about two basis points per standard deviation, in line with the near-offset that the Proposition 3 predicts when the currency response runs through the risk premium rather than expected policy rates. The level shock requires appreciation and a rising differential; the data deliver depreciation and a flat differential, with $\Delta\tau_t$ itself nil at 0.002. The convenience shock requires the wedge to load on the currency; its coefficient is -1.410 with a standard error of 5.266, indistinguishable from zero. No combination of the other two rows produces $(+, -, 0)$—the uncertainty row does. A Shapley decomposition of the announcement-window R^2 (Appendix Table A.2) attributes 83.8% of the explained variation in the euro–dollar rate to the uncertainty score, with the tariff level and CIP wedge together about 16%.

Table 6. Three-Outcome Event-Window System

Outcome	$\Delta\hat{\mathcal{E}}_t$ (EURUSD, %)	$\Delta\hat{S}_t$ (SPX/ES1, %)	$\Delta(i_t - i_t^*)$ (1Y, pp)
$\Delta\tau_t$: Net Tariff Change (pp)	0.002	0.005	0.000
	(0.002)	(0.006)	(0.000)
σ_t^2: PCA Uncertainty (std)	0.236***	-0.673***	-0.006
	(0.078)	(0.242)	(0.009)
$\Delta\psi_t$: CIP Wedge (1Y, pp)	-1.410	-1.990	1.192
	(5.266)	(10.666)	(0.815)
Constant	-0.019	0.030	0.000
	(0.064)	(0.140)	(0.006)
N	49	47	49
SD outcome	0.427	0.945	0.038
R^2	0.189	0.348	0.151

Note: Each column regresses one outcome—the euro ($\Delta\hat{\mathcal{E}}_t$, EUR/USD, %), the equity index ($\Delta\hat{S}_t$; S&P 500 cash, E-mini (ES1) futures fallback, %), and the U.S.–Germany one-year interest differential ($\Delta(i_t - i_t^*)$, pp)—on the same three regressors: the net tariff change $\Delta\tau_t$ (pp), the composite tariff-uncertainty score σ_t^2 (standardized), and the one-year CIP wedge $\Delta\psi_t$ (pp), following (18); a constant is included. EUR/USD is signed so that a positive value is a U.S. dollar depreciation. The sample is the $N = 49$ episodes for which the one-year yield differential is available, without which the CIP wedge cannot be computed (see the note to Table 5); the equity column has $N = 47$ because both the S&P 500 cash index and the E-mini fallback are missing on two of those days. Heteroskedasticity-robust standard errors in parentheses; the bottom rows report N, the outcome standard deviation, and R^2. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Since the uncertainty score σ_t^2 is a composite index composed of variables that can move contemporaneously with asset prices, its OLS coefficient can suffer from simultaneity bias and in principle the measure can contain information beyond tariff volatility. Table 7 therefore instruments σ_t^2 with the same-day change in the daily trade-policy-uncertainty index, ΔTPU_t, estimating the design within the sample of announcement days. The logic is identification through heteroskedasticity (Rigobon and Sack, 2004): the variance of tariff news jumps discretely on announcement days, so restricting the experiment to those days isolates movements in σ_t^2 driven by tariff news rather than by whatever else moves implied volatilities day to day; and because the TPU index is constructed from newspaper text rather than asset prices, its innovations are plausibly orthogonal to the measurement error in a score built from option-implied volatilities. The instrument is strong (robust first-stage $F = 13.4$, partial $R^2 = 0.12$), and the 2SLS estimate—controlling for the signed tariff change and the one-year CIP wedge—is a 0.222 percent dollar depreciation per standard deviation of σ_t^2 (significant at the 10% level), nearly the same as the OLS estimate of 0.236. Two features sharpen the reading. First, the tariff-level channel remains negligible in the instrumented regression, so the instrumented experiment moves the second moment of tariff policy while holding the first moment fixed—the depreciation is priced uncertainty, not the tariff level. Second, the design carries its own falsification: the identical 2SLS estimated on non-event days ($N = 215$; column (2) of Table 7) has no first stage ($F \approx 0$, partial $R^2 \approx 0$) and no identified second-stage effect, confirming that the identifying variation is the announcement-day uncertainty jump rather than a generic TPU–dollar comovement. Overall, the 2SLS estimates are in line with the relevant coefficients in Table 6.

A prior question is whether the announcement timestamps carry information at all. Table 8 answers it without imposing a sign: for each window length it reports the *absolute* value of the change around tariff announcements over non-event windows matched exactly on year-month and hour of day. The announcements move markets, and they do so fast: at fifteen minutes EUR/USD moves an excess 0.021 percent and the uncertainty score an excess 1.51 (both significant at 5 percent); equities show positive but insignificant excesses throughout, and the interest differential and CIP basis are flat intraday. The data indicates rapid price discovery at the announcement timestamps. Because the outcome is unsigned, this is a validation that the event times are informative–and it complements the regressions above.

Table 7. Tariff Uncertainty and the Dollar: OLS and Instrumental Variables

	(1) 2SLS	(2) Placebo IV
Panel A: Second stage. Dep. var. $\Delta EURUSD$ (%)		
$\Delta\tau_t$: Net Tariff Change (pp)	0.005	0.000
	(0.005)	(0.000)
σ_t^2: PCA Uncertainty (std)	0.222*	17.960
	(0.135)	(324.820)
$\Delta\psi_t$: CIP Wedge (1Y, pp)	-3.245	99.695
	(4.641)	(1781.155)
Panel B: First stage. Dep. var. σ_t^2		
ΔTPU_t	0.002***	-0.000
	(0.001)	(0.000)
Robust first-stage F	13.4	0.0
First-stage partial R^2	0.116	0.000

Note: Daily end-of-day panel. Column (1) is the 2SLS estimated on announcement (event) days: 100× the daily log change in EUR/USD (percent; positive = U.S. dollar depreciation) is regressed on the net tariff change $\Delta\tau_t$ (pp), the standardized uncertainty score σ_t^2, and the one-year CIP wedge $\Delta\psi_t$, with σ_t^2 instrumented by the daily trade-policy-uncertainty change ΔTPU_t; identification exploits the jump in tariff-news variance on announcement days (Rigobon and Sack, 2004). Column (2) re-estimates the identical 2SLS on non-event days as a placebo. Panel B reports the first stage, with the heteroskedasticity-robust first-stage F and partial R^2; the instrument is dead off announcement days (column 2). Robust standard errors in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

5 Quantitative Exercise

In this section, we ask the following two related questions. Could the moments we identify in the data in Section 4 have been generated by the model? Naturally, this is a parameter-dependent question and that brings up a second and related question: what can the range of parameters that produce on-impact responses that match the moments in the data tell us about the economics at play?

To answer these questions we proceed in three steps. First we detail the calibration. Next we estimate the perceived tariff persistence ρ_τ, the intermediary risk sensitivity χ, and the persistence of the convenience wedge ρ_ψ by matching the event-study exchange-rate responses. Finally, in the counterfactuals we ask how sensitive the on-impact responses are to the calibrated primitives, and how the estimated responses change as we vary $\widetilde{V}$—the size of the gross foreign-currency position—which governs the valuation channel.

Table 8. Do tariff announcements move markets? Absolute-move excess over matched non-event windows

	EUR/USD	Stocks	Int. diff.	σ_t^2	CIP basis
15 min	0.021**	0.110	-0.0002	1.514**	-0.0002
	(0.010)	(0.070)	(0.0013)	(0.704)	(0.0008)
N	10,930	7,931	1,430	9,903	1,427
30 min	0.016**	0.091	-0.0005	0.976**	-0.0003
	(0.008)	(0.074)	(0.0011)	(0.468)	(0.0008)
N	10,930	8,021	1,442	9,903	1,436
60 min	0.017	0.103	-0.0004	0.994**	-0.0006
	(0.011)	(0.077)	(0.0014)	(0.503)	(0.0009)
N	10,930	8,237	1,464	9,903	1,452
120 min	0.022*	0.090	-0.0007	0.705*	-0.0002
	(0.011)	(0.082)	(0.0020)	(0.426)	(0.0008)
N	10,930	8,244	1,464	9,903	1,452
240 min	0.020	0.079	0.0006	0.548	0.0002
	(0.016)	(0.097)	(0.0030)	(0.363)	(0.0008)
N	10,930	8,249	1,464	9,903	1,452
Daily (11am EoD)	0.190*	0.396	0.0085	0.661**	-0.0050**
	(0.107)	(0.296)	(0.0060)	(0.287)	(0.0021)
N	161	167	81	223	81

Note: Each cell is the coefficient on a tariff-announcement dummy from a WLS regression of $100\,|\Delta_h X|$ *on the dummy, estimated separately by outcome and window length h (15–240 minutes, plus a daily 11am-to-11am end-of-day row). The comparison pool is the full grid of non-event windows anchored at the same clock times on non-announcement days; placebo observations are reweighted so their year-month×hour-of-day composition matches the event windows exactly (weight* $n^{event}/n^{placebo}$ *within each cell; the daily row matches on year-month only). Outcomes: EUR/USD, the equity index (S&P 500 cash, E-mini futures fallback), the U.S.–Germany one-year interest differential, the composite tariff-uncertainty score* σ_t^2 *(native variance units), and the one-year CIP basis. Log-change outcomes are* $\times 100$ *(units: percent); the interest differential and CIP basis are changes in percentage points (×100 of decimals). Standard errors in parentheses: for the intraday rows, cluster-robust (CR1) standard errors clustered by calendar day, since multiple overlapping intraday windows share a day; for the daily row, heteroskedasticity-robust (HC1, White) standard errors, as each day contributes a single observation. Intraday coverage for the interest differential and CIP basis is thin (roughly 23 event windows per row). The absolute tariff change* $|\Delta\tau_t|$ *is omitted: it is significant by construction, since the placebo tariff change is identically zero and the cell merely recovers the mean announcement size.* $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

5.1 Calibration

We calibrate the model at an annual frequency, matching the twelve-month horizon of the interest rates and exchange-rate expectations used in the empirical analysis. The numeraire is Home consumption, $C_H = 1$, so every data ratio below is expressed per unit of U.S. personal consumption expenditures rather than GDP (average PCE/GDP = 0.67; steady-state output is then $y_H = 1 + \overline{NX} = 0.95$). All moments come from a single 1999–2024 window—the longest over which every series is available—of BEA data.

The trade block is fixed from data. The foreign expenditure share is $\gamma = 0.0708$, the U.S. import content of final consumption in the ICIO tables of Section 3, and the steady-state trade balance is $\overline{NX} = -5.0\%$ of consumption (-3.4% of GDP), the 1999–2024 average U.S. goods-and-services balance (BEA International Transactions Accounts). Since $\overline{NX} = \gamma(A-1)$, the home-bias asymmetry is implied: $A = 1 + \overline{NX}/\gamma = 0.29$.

The financial block is disciplined by the steady-state external account of Lemma 4, which in terms of positions net of interest, $B_H = V_H/R_H$ and $B_F = V_F/R_F$, reads

$$(R_F - 1)\,B_F - (R_H - 1)\,B_H = -\overline{NX}\,: \tag{19}$$

a country that is both a net importer and a net debtor can be in steady state only if its foreign-currency assets return more than its home-currency liabilities cost—the exorbitant-privilege configuration of the U.S. external balance sheet (Gourinchas and Rey, 2007*a*). Because the model's two instruments are a dollar bond and a foreign-currency asset, the empirical counterparts of B_H and B_F are *net positions by currency of denomination*: following the convention of Lane and Shambaugh (2010) and Bénétrix, Lane and Shambaugh (2015), U.S. portfolio-equity and direct-investment liabilities are dollar claims of foreigners, U.S. equity-type claims abroad are foreign-currency, and with a 0.95 dollar share of gross liabilities and a 0.65 foreign-currency share of gross assets (updated in Allen, Gautam and Juvenal, 2023), the

1999–2024 BEA positions give $B_H = 1.53$ (net dollar liabilities) and $B_F = 1.03$ (net foreign-currency assets), hence $\widetilde{V} = B_F/B_H = 0.67$ and $\Xi = \gamma/B_H = 0.046$; $B_F - B_H = -0.50$ reproduces the average net international investment position by construction.[22] The dollar rate is $i_H = 2.64\%$, the average balance-of-payments income yield on U.S. external liabilities (investment-income payments over the position), so $\beta_H = e^{-\alpha^2\sigma_C^2/2}/R_H = 0.974$ with $\alpha = 2$, $\sigma_C = 0.01$. Identity (19) then implies $i_F = (i_H B_H - \overline{NX})/B_F = 8.8\%$ ($\beta_F = 0.92$), a return differential of 6.1pp. The implied i_F is a *total* return: it exceeds the measured cash income yield on U.S. external assets (3.9%) by construction, because in a stationary equilibrium the entire average trade deficit must be financed by net factor income.

Two clarifications discipline how to read this number. First, the relevant steady-state facts are three decades of averages, not recent yield spreads: the United States has combined a persistent trade deficit with a persistently negative net foreign asset position, a configuration that has *sustained itself* in the descriptive sense, and stationarity leaves only one margin to finance it—net factor income on the external position. The sign is directly visible in the data: the U.S. earns *positive* net investment income (+0.9% of GDP on average) on a net position of roughly −50% of annual consumption expenditure ($B_F - B_H = -0.50$ in consumption units, about −34% of GDP), which is possible only if external assets out-return external liabilities. Every accounting of this configuration imputes the same residual—excess total returns inclusive of valuation gains (Gourinchas and Rey, 2007*a*), or income from assets that escape measurement, Hausmann–Sturzenegger's "dark matter" (Hausmann and Sturzenegger, 2007; Atkeson, Heathcote and Perri, 2025). Our calibration is agnostic between these interpretations: identity (19) simply prices the full financing requirement into a total return on the recorded position, which is a benchmark for measuring deviations, not a stand on the source of the excess return. Second, the implied carry disciplines *levels*, not the observables of the event study: i_H is the balance-of-payments income yield on the whole external

[22] In GDP units, with PCE/GDP = 0.67: $B_H \approx 103\%$, $B_F \approx 70\%$, and NIIP $\approx -34\%$ of GDP—1999–2024 averages, smaller in magnitude than the end-of-sample levels quoted in the Introduction.

liability position, not a Treasury yield, so the steady-state differential $i_H - i_F = -6.1$pp is not comparable to a contemporaneous one-year U.S.–Germany sovereign spread. The event study identifies *changes*—announcement-window movements in safe benchmark yields that pass through to the rates paid on the external position—so the steady state and the event study deliberately use different observables for different objects. Appendix E develops the imputation and reports the identity's sensitivity to the currency-share assumptions: the implied return stays between 8.1% and 11.2%.

Finally, the volatility loadings are equilibrium objects, not parameters: $\eta = \frac{\alpha}{2}\lambda_C^2$ and $\kappa = \chi\lambda_E^2$, where λ_C and λ_E are the coefficients on a tariff innovation in the policy functions for $\hat{C}_{H,t}$ and $\hat{\mathcal{E}}_t$ (closed forms in Appendix E). At the baseline with $\theta = 1$ and $\rho = 0$, $\lambda_E = -0.175$ and $\lambda_C = -0.062$, so $\eta = 0.0038$ and $\kappa = 0.031\,\chi$. The remaining degrees of freedom—the intermediary risk sensitivity χ, the trade elasticity θ, the perceived tariff persistence ρ_τ, and the persistence of the convenience wedge ρ_ψ—are simulated over $\chi \sim U[0, 8]$, $\theta \sim U[1, 4]$, $\rho_\tau \sim U[0, 0.99)$, and $\rho_\psi \sim U[0, 0.99)$. Table 9 summarizes.

5.2 Estimating ρ_τ, χ, and ρ_ψ

The event-study coefficients are informative about three objects the data do not reveal directly: the persistence ρ_τ that markets attached to announced tariffs, the intermediary risk-bearing parameter χ that converts tariff uncertainty into currency risk premia, and the persistence ρ_ψ that markets attached to movements in the convenience wedge. We estimate all three by limited-information Bayesian estimation, holding every calibrated primitive of the baseline calibration fixed. We draw 30,000 parameter vectors $\vartheta = (\chi, \theta, \rho_\tau, \rho_\psi)$ from the uniform ranges of the Monte Carlo cloud ($\chi \sim U[0, 8]$, $\theta \sim U[1, 4]$, $\rho_\tau \sim U[0, 0.99]$, $\rho_\psi \sim U[0, 0.99]$, annual), solve the model at each draw, convert impact responses into event-

Table 9. Baseline calibration (annual; consumption numeraire, $C_H = 1$)

Parameter	Value		Source / target
Panel A: fixed from data (1999–2024 averages, per unit of PCE)			
γ	0.0708	foreign expenditure share	ICIO
$\overline{NX}$	-0.050	trade balance	BEA ITA
α	2	CARA curvature	standard
i_H	2.64%	\$ funding rate ($\beta_H = 0.974$)	BoP income yield, liab.
B_H	1.53	net \$ liability position	BEA IIP + currency shares
B_F	1.03	net FX asset position	BEA IIP + currency shares
Panel B: implied by the steady state, eq. (19)			
A	0.294	home-bias asymmetry	$1 + \overline{NX}/\gamma$
Ξ	0.046	BOP slope	γ/B_H
i_F	8.8%	FX total return ($\beta_F = 0.919$)	$(i_H B_H - \overline{NX})/B_F$
$\widetilde{V}$	0.67	net-position ratio	B_F/B_H
Panel C: degrees of freedom (baseline; simulated range)			
χ	—	risk sensitivity; $U[0, 8]$	simulated
θ	1	trade elasticity; $U[1, 4]$	Cobb–Douglas benchmark
ρ_τ	0	tariff persistence; $U[0, 0.99)$	simulated
ρ_ψ	—	convenience-wedge persistence; $U[0, 0.99)$	simulated

Notes: Implied loadings at the baseline ($\theta = 1$, $\rho = 0$, $\alpha = 2$): $\lambda_E = -0.175$, $\lambda_C = -0.062$, so $\eta = (\alpha/2)\lambda_C^2 = 0.0038$ and $\kappa = \chi\lambda_E^2 = 0.031\,\chi$. Positions are per unit of Home consumption; i_F is the total return on the net foreign-currency position implied by external solvency (Appendix E). No calibrated parameter is chosen to match the event-study estimates (ρ_τ and χ are estimated from them separately).

study units,[23] and reweight draws by a Gaussian likelihood of the empirical estimates,

$$w_i \;\propto\; \exp\Big\{-\tfrac{1}{2}\sum_{j\in\mathcal{M}}\big(\hat\beta_j-\beta_j(\vartheta_i)\big)^2/s_j^2\Big\}, \qquad s_j^2=\mathrm{SE}_j^2+\mathrm{tol}_j^2, \tag{20}$$

a quasi-posterior in the sense of Chernozhukov and Hong (2003). The weighted draws are the posterior; the prior ranges play the role of (deliberately flat) priors, so wherever a parameter is not identified the posterior simply returns the prior. [24]

In this section, to model the nature of real-life announcements we adjust the timing convention of the shock: The tariff shock follows the process, $\tau_t = \rho_\tau\tau_{t-1} + e_{\tau,t-1}$ — the innovation is announced one period before it moves the tariff level — so $\beta_j(\vartheta)$ is the response of asset prices *at the announcement date*, when the current tariff is still unchanged and only the anticipated future path has moved.[25]

Moments and identification. The baseline moment set $\mathcal{M}$ consists of the three exchange-rate cells of Table 6: the tariff-level coefficient $(\tau\to\hat{\mathcal{E}})$, the uncertainty coefficient $(\sigma^2\to\hat{\mathcal{E}})$, and the convenience-yield coefficient $(\psi\to\hat{\mathcal{E}})$, each mapping to the impact response of the exchange rate to the model's shocks. Figure 7 captures the intuition behind identification: the tariff-level coefficient is numerically invariant to χ and ρ_ψ and moves with (ρ_τ,θ), so it delivers an *upper bound* on perceived persistence; the uncertainty coefficient is linear in χ and nearly flat in ρ_τ and ρ_ψ, so it pins χ; and the convenience-yield coefficient is invariant to χ and ρ_τ and monotone increasing in ρ_ψ — the exchange rate is a present value, so it loads on the wedge through the multiplier $1/(1-\rho_\psi)$ — so it pins ρ_ψ. That is, the third coefficient

[23] The empirical uncertainty regressor is the standardized composite tariff-uncertainty score σ_t^2 of Section 4, so the target coefficient is percent per one standard deviation of that score; the model's variance response is mapped into these units through the linearized volatility-to-variance conversion of Appendix E, scaled by the bridge factor $f = 0.373$ vol points of EURUSD one-month implied volatility per one standard deviation of the score (the product of the EURUSD-leg and composite standard deviations over two, exported by the empirical pipeline). Under that linearization the estimate of χ is a lower bound.

[24] The tol_j^2 term is a model-error allowance; for the tariff moment it is what permits a nondegenerate posterior, since the smallest model-implied gap anywhere in the prior is 0.0095 against an empirical standard error of 0.0023.

[25] In KSY, a similar approach is utilized to capture reversed tariff threats. In that experiment, after the tariff for the next period is announced it is subsequently reversed in the ensuing period.

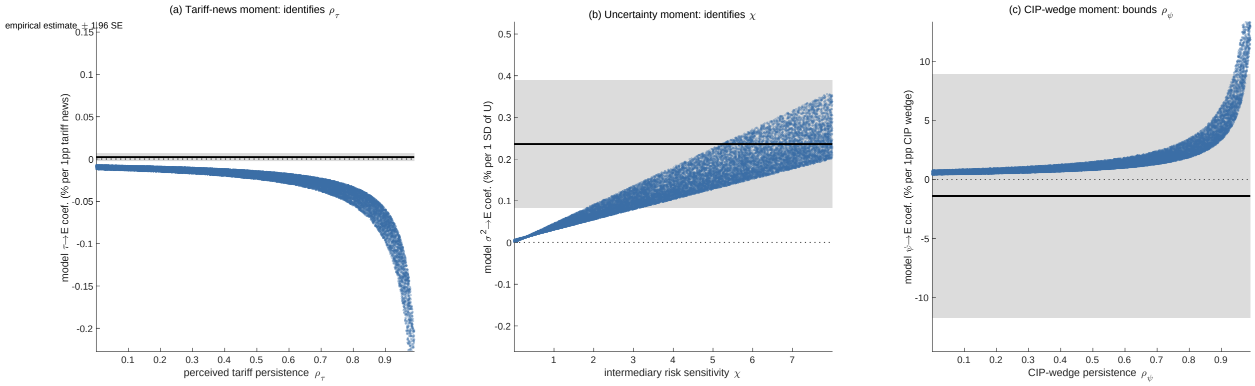


Figure 7. Identification. Each panel plots one estimation moment against its identifying parameter; each point is one solved model draw; black line and band: empirical estimate ± 1.96 s.e. (a) Under news timing the model's announcement response to a tariff is smallest at low ρ_τ — where it comes closest to the empirical band — and falls steeply as $\rho_\tau \to 1$, so the data are consistent with low persistence and reject high persistence. (b) The uncertainty coefficient is linear in χ and crosses the empirical estimate in the interior, pinning χ. (c) The convenience-yield coefficient rises monotonically in ρ_ψ through the present-value multiplier $1/(1-\rho_\psi)$; the wide empirical band accommodates most of the prior but disfavors $\rho_\psi \to 1$.

helps identify the persistence of the wedge. Because at the announcement the current tariff has not yet moved, the model's tariff-level response is an order of magnitude smaller than under contemporaneous timing ($\lambda_{\mathcal{E}} \approx -0.01$ at $\rho_\tau = 0$, versus -0.17 contemporaneously) and grows in magnitude as $\rho_\tau \to 1$, when the announced path becomes more permanent.

Fit. Under news timing the model comes close to the near-zero empirical tariff-level coefficient of 0.0022 (s.e. 0.0023): the smallest gap attainable anywhere in the prior is 0.0095 — the announcement-day point estimate sits just above the model's news-timing floor, the least-negative response the model can generate. The muted announcement response is exactly what a forward-looking asset price does when a small, mostly transitory future tariff is pre-announced.[26]

[26] In the baseline, each moment's variance is inflated by tol_j^2, the smallest $|\hat{\beta}_j - \beta_j(\vartheta)|$ the model can achieve anywhere in the prior (zero for the uncertainty cell, and negligible relative to the standard error for the convenience cell); as a robustness check, we re-estimate without this inflation. For the tariff cell this term is load-bearing: without it the likelihood concentrates on the draws at the model's floor and the posterior piles onto $\rho_\tau \approx 0$. The substantive conclusion is unaffected — both variants exclude high persistence, and the no-tolerance posterior reads the announcements as even more transitory.

Results. Figure 8 and Table 10 report the posteriors. Perceived tariff persistence is low and sharply bounded: the posterior median is 0.20 with a 90 percent credible interval of $[0.02, 0.52]$, and high persistence is essentially excluded, $P(\rho_\tau > 0.9) \approx 0$ against a prior of 9 percent. The posterior median implies a half-life of about five months, and the 95th percentile a half-life of about one year. Markets priced tariff announcements as transitory policy. The risk-bearing parameter is positive: χ has posterior median 6.0 with 90 percent interval $[2.7, 7.8]$, excluding zero — the data require an operative uncertainty channel, and at the posterior median the model reproduces the estimated exchange-rate response to tariff volatility. The wedge persistence ρ_ψ has posterior median 0.44 with 90 percent interval $[0.04, 0.88]$. The $\psi \to \hat{\mathcal{E}}$ cell is weakly informative — its standard error (5.27) is large relative to its point estimate (-1.41) — so it does not pin a point; what it does is exclude a near-permanent decline in the convenience yield, cutting $P(\rho_\psi > 0.9)$ from 9 percent in the prior to 3.4 percent, because as $\rho_\psi \to 1$ the present-value multiplier $1/(1-\rho_\psi)$ pushes the model's exchange-rate response outside even this wide empirical band.

Reading the low estimate of ρ_τ. These estimates rationalize the paper's reduced-form pattern within the model. The exchange-rate response to a tariff announcement is small in the data for two mutually reinforcing reasons the model now captures jointly: tariffs were priced as transitory (ρ_τ low), and the announcement concerns *future* tariffs, so the contemporaneous jump is muted even before persistence is taken into account. What remains observable in exchange rates is therefore the uncertainty channel ($\chi > 0$) — precisely the cell in which the event study finds a significant response. The same logic implies a counterfactual discipline: had markets priced the announcements as permanent ($\rho_\tau \to 1$), the model's implied level response would have been an order of magnitude larger, and announcement days could see appreciation.

The exchange rate alone cannot adjudicate the convenience-yield hypothesis: the identifying cell ($\psi \to \hat{\mathcal{E}}$, -1.41, s.e. 5.27) is too imprecise to pin ρ_ψ, leaving a posterior band

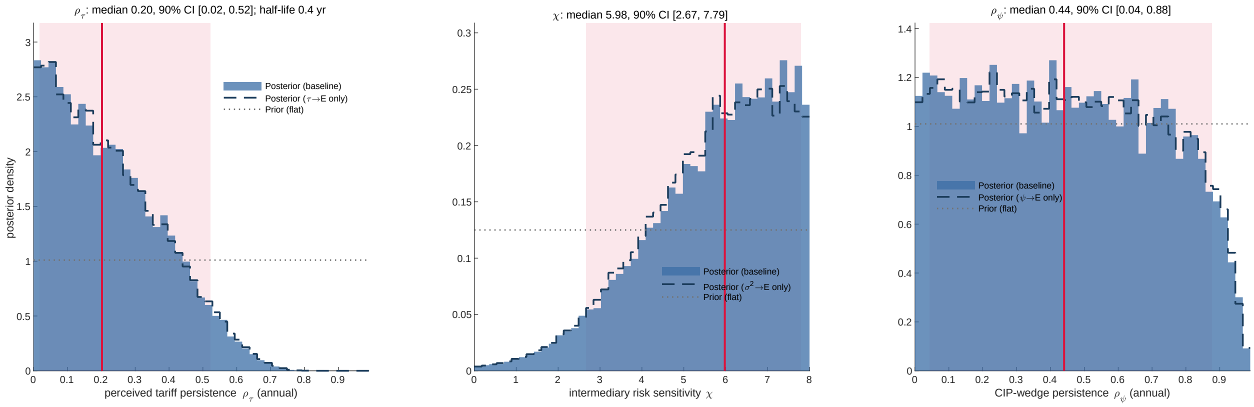


Figure 8. Posterior distributions of perceived tariff persistence ρ_τ (left), intermediary risk sensitivity χ (center), and convenience-wedge persistence ρ_ψ (right), baseline moment set $\{\tau\to\hat{\mathcal{E}},\ \sigma^2\to\hat{\mathcal{E}},\ \psi\to\hat{\mathcal{E}}\}$; 30,000 prior draws reweighted by eq. (20), news-timing tariff shock. Dashed lines: single-moment posteriors, showing that ρ_τ is identified by the tariff-level cell alone, χ by the uncertainty cell alone, and ρ_ψ by the convenience-yield cell alone. Dotted lines: uniform priors. Vertical line and shading: posterior median and 90 percent credible interval.

of $[0.04, 0.88]$. The model closes this gap by over-identification — the same ρ_ψ must also move equities and the interest differential (Table 1) — and no single value fits all three: the wedge that rationalizes the exchange rate misses the convenience-yield–equity cell by about six standard errors and over-predicts the level differential by hundreds. The arithmetic agrees with the estimation. The wedge barely moved — averaging 0.015 percentage points of a 2.95-point premium in 2025Q1, with a mean announcement-window change of 0.00 (s.d. 0.03) — an order of magnitude too small to price exchange-rate moves measured in tenths of a percent. The wide ρ_ψ band is thus not evidence for a convenience-yield channel but the signature of its near-absence.

5.3 Model Counterfactuals and Role of The Gross Position

Our goal in this section is two-fold. First, we show how sensitive the on-impact exchange-rate responses are to the calibrated primitives, relaxing the parameters we fixed above. Second, fixing those primitives and the parameters disciplined by the estimation, we vary $\widetilde{V}$ to answer the following question: how sensitive are the results to the presence and size

Table 10. Posterior summaries: perceived tariff persistence, risk sensitivity, and wedge persistence

	ρ_τ (annual)			χ		ρ_ψ (annual)		
Specification	Median	90% CI	$P(\rho_\tau > 0.9)$	Median	90% CI	Median	90% CI	ESS
Baseline (3 FX moments)	0.20	[0.02, 0.52]	0.00	5.98	[2.67, 7.79]	0.44	[0.04, 0.88]	8,718
$\tau \rightarrow \mathcal{E}$ only	0.20	[0.02, 0.53]	0.00	3.98	[0.39, 7.59]	0.49	[0.05, 0.94]	14,435
$\sigma^2 \rightarrow \mathcal{E}$ only	0.49	[0.05, 0.94]	0.09	5.89	[2.65, 7.78]	0.49	[0.05, 0.94]	18,629
$\psi \rightarrow \mathcal{E}$ only	0.49	[0.05, 0.94]	0.09	4.00	[0.40, 7.59]	0.44	[0.04, 0.88]	28,529
No model-error tolerance	0.04	[0.00, 0.15]	0.00	6.21	[2.67, 7.86]	0.43	[0.04, 0.88]	518

Notes: Weighted quantiles of 30,000 prior draws, weights from eq. (20), news-timing tariff shock. ESS $= (\sum_i w_i)^2 / \sum_i w_i^2$ is the effective number of draws. Baseline: the three exchange-rate moments of Table 6. The single-moment rows exhibit the block-diagonal identification — each of ρ_τ, χ, and ρ_ψ is pinned by one cell, with the unidentified parameters returning the prior. "No model-error tolerance" drops the tol_j term: because the tariff-level point estimate sits just above the model's news-timing floor—the least-negative response the model can generate, attained at low ρ_τ—the posterior then concentrates on $\rho_\tau \approx 0$ — an even more transitory reading, with the same exclusion of high persistence. Empirical targets and standard errors from the event-study estimates.

of the gross foreign-currency position — the balance-sheet leg through which the valuation channel operates?

Figure 9 maps the model's impact exchange-rate responses over its primitives. Each panel plots the response of the exchange rate to one of the three shocks against one drawn primitive, with $\gamma \sim U[0.01, 0.49]$, $A \sim U[0.01, 0.99]$, $\chi \sim U[0, 8]$, $\theta \sim U[1, 4]$, $\rho_\tau \sim U[0, 0.99)$ and $\rho_\psi \sim U[0, 0.99)$. The net currency positions, the dollar funding rate, and risk aversion are held at their calibrated values ($B_H = 1.53$, $B_F = 1.03$, $i_H = 2.64\%$, $\alpha = 2$), and every draw satisfies (19). Responses are in percent per one-standard-deviation (0.01) shock. Three regularities organize the figure. The expenditure share γ governs the tariff-level and convenience rows; holding all else constant, when the home country is a larger buyer of the rest of the world's goods, that makes the exchange rate response lower (more appreciationary than otherwise). The asymmetry primitive, A, governing the steady-state trade balance, tilts the tariff-level response. When A approaches 1, $\gamma_H = \gamma_F$; so a larger A, as it makes the foreign country a larger buyer of Home's goods, makes the exchange rate response higher (Home's currency is less valuable than otherwise). The dispersion in the volatility row is generated almost entirely by the intermediary sensitivity χ, with θ and ρ_τ second order throughout.

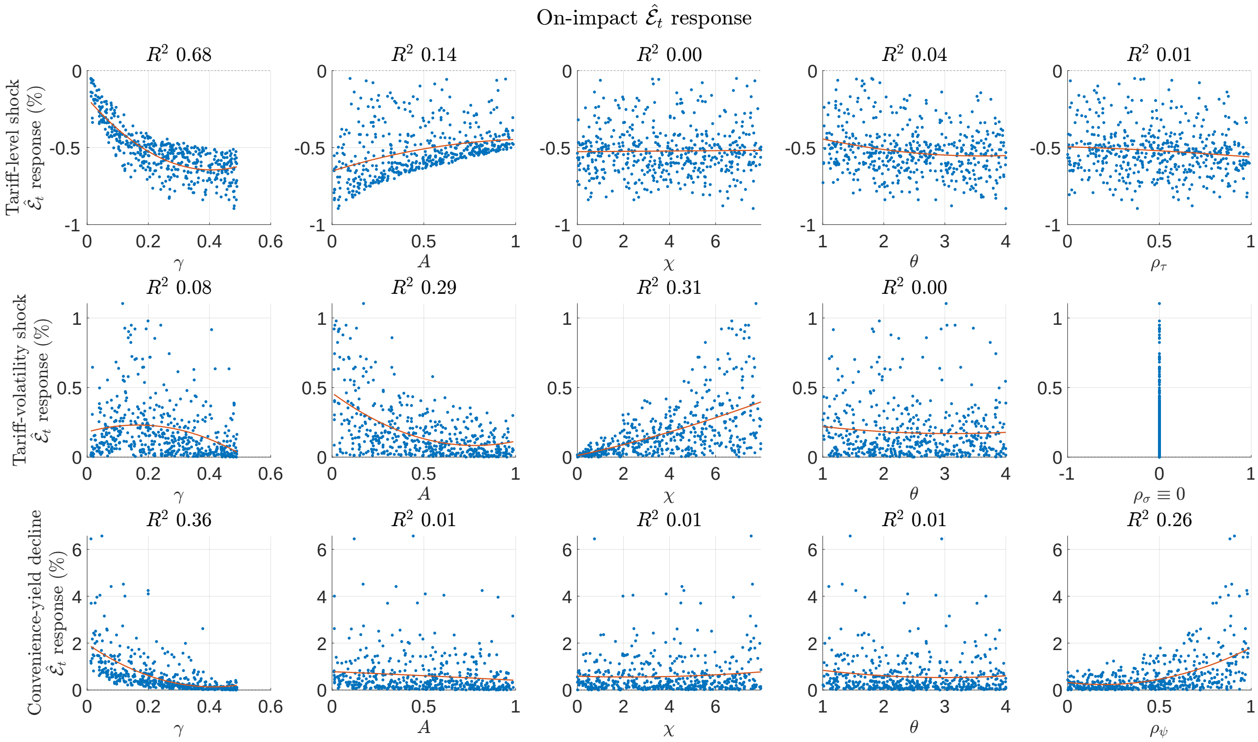


Figure 9. Sensitivity to the calibrated primitives: exchange-rate impact responses. Rows: tariff-level, tariff-volatility, and convenience-yield shocks (0.01 each); columns: draws of γ, A, χ, θ, ρ_τ. Net currency positions, the dollar rate, and risk aversion are fixed ($B_H = 1.53$, $B_F = 1.03$, $i_H = 2.64\%$, $\alpha = 2$); i_F adjusts to satisfy (19). Curves are quadratic fits.

Figure 10 isolates the gross position's role, the only channel through which $\widetilde{V} = B_F/B_H$ operates. Each panel plots the on-impact response of one shock against $\widetilde{V}$, scaling the foreign-currency leg B_F while holding $B_H = 1.53$ fixed and drawing the other primitives from their priors as in Figure 9, with i_F adjusting draw by draw through (19).

Two facts stand out. First, over the entire range of gross positions the tariff-level response never flips sign—the quantitative counterpart of Proposition 2. Second, conditional on the other primitives, $\widetilde{V}$ itself accounts for a negligible share of the dispersion in the three responses.

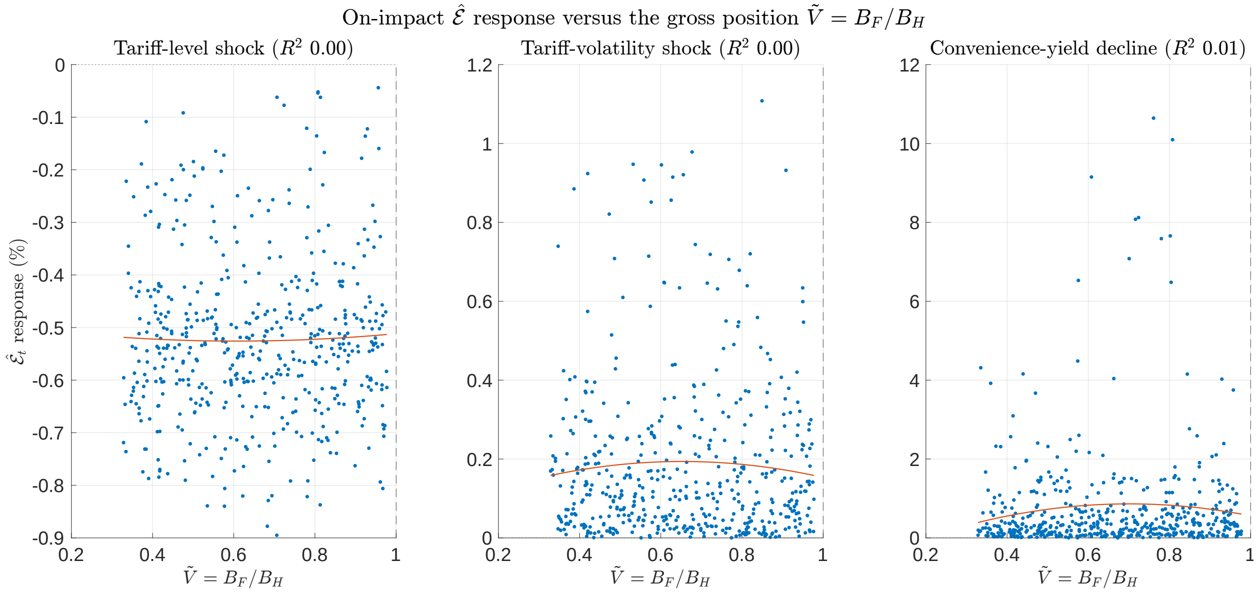


Figure 10. Counterfactual: the gross position and the on-impact exchange-rate responses. Each panel plots the on-impact $\hat{\mathcal{E}}$ responses to one shock (0.01 each: tariff level, tariff volatility, convenience yield) against $\widetilde{V} = B_F/B_H$ over $[0.33, 0.98]$, with the foreign-currency leg B_F and the other primitives (γ, A, χ, θ, ρ_τ) drawn from their priors as in Figure 9, holding $B_H = 1.53$ and $\overline{NX} = -0.05$ fixed and i_F adjusting through eq. (19); curves are quadratic fits.

6 Conclusion

This paper studies why the dollar depreciated during the 2025–2026 U.S. tariff episode despite the standard prediction that unilateral import tariffs should appreciate the tariff-imposing country's currency. The central result is that the textbook prediction is a statement about tariff levels, not about tariff uncertainty. Once announcements move both the expected tariff rate and the perceived dispersion of future tariff outcomes, the exchange-rate response can reverse.

We develop a tractable two-country model that nests three proposed explanations for the depreciation: tariff uncertainty, a decline in the dollar convenience yield, and valuation effects from the U.S. external balance sheet. The closed-form solution shows that a tariff-level shock appreciates the Home currency. A gross foreign-currency asset position can dampen this appreciation by generating valuation losses when the currency appreciates, but under the empirically relevant net-importer configuration with the usual exorbitant-privilege carry, this force cannot overturn the appreciation for any admissible gross position. Depreciation instead requires an additive asset-market wedge: either a decline in the convenience yield or an increase in tariff-related currency risk. Tariff uncertainty is distinctive because its two channels reinforce in the exchange rate but offset in the interest-rate differential: precautionary saving lowers Home demand and yields, while the UIP premium raises the return required to hold Home-currency assets. This results in dollar depreciation, lower equity prices, and an approximately unchanged interest differential.

The quantitative exercise shows that these forces are economically large. In the model, implemented tariffs generate dollar appreciation while the contemporaneous rise in tariff volatility generates an offsetting depreciation. In the TiRADE data the estimated tariff-level effect on the dollar is economically negligible and statistically indistinguishable from zero, so the appreciation force is a model implication rather than a direct empirical estimate; through the lens of the model, this reads as markets pricing the announcements as largely transitory—or, equivalently at announcement frequencies, as attaching low probability to their full implementation.

The event-study evidence supports the uncertainty channel. Across the daily sample of 108 event days from January 21, 2025 to May 14, 2026 (49 with all three regressors available), exchange-rate movements load strongly on the composite tariff-uncertainty measure: a one-standard-deviation announcement-window jump depreciates the dollar against the euro by 0.236%, lowers equity prices by 0.673%, and leaves the interest differential unchanged. By contrast, the CIP wedge—our proxy for the covered convenience-yield component—comoves with the interest differential and equities, but its impact on the spot dollar cannot be distinguished from zero; and the model's cross-equation restrictions rule out a persistent uncovered decline as well, since the convenience shock that would rationalize the exchange-rate response cannot simultaneously fit the equity and interest-differential responses. Tariff-rate news also does not behave like a pure level shock: the estimated coefficient on the signed tariff change is statistically indistinguishable from zero at every horizon, while de-escalations that reduce volatility appreciate the dollar. The pattern is specific to tariff news: outside announcement windows, volatility spikes appreciate the dollar in the familiar safe-haven direction, so the depreciation we identify is about tariff-regime risk rather than generic risk-off.

The broader implication is that trade policy uncertainty can temporarily undo the canonical exchange-rate effect of trade policy itself. At announcement frequencies, the 2025–2026 episode does not require a valuation-driven depreciation or a collapse in the covered component of the dollar's convenience yield. It is instead consistent with a regime in which tariff announcements widened the distribution of future policy, raised the compensation required for dollar exposure, and induced precautionary saving. Our evidence does not speak against a slower, secular erosion of the dollar's safe-asset status; it shows that whatever erodes slowly did not reprice in the minutes and days around tariff announcements, and that the fast-moving component of the dollar's premium is priced tariff-regime risk. For macroeconomic models of trade wars, the relevant state variable is therefore not only the tariff rate but also the perceived volatility of the tariff regime. For the dollar system, the lesson is similar: exorbitant privilege rests not only on liquidity and network effects, but also on the credibility and predictability of U.S. policy.

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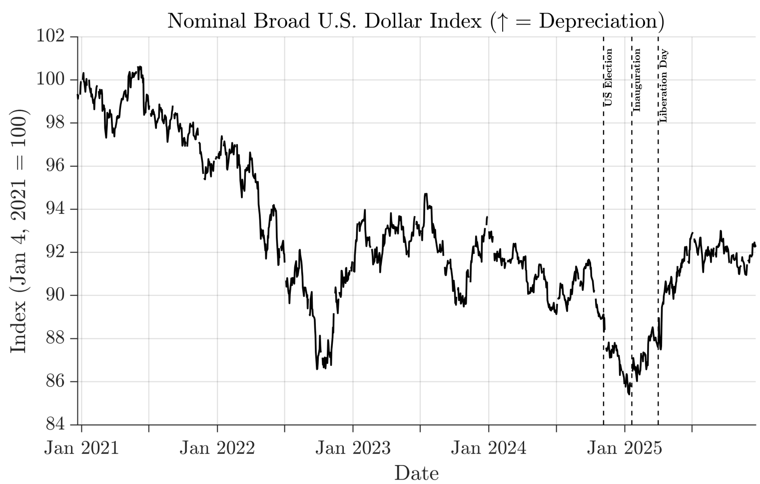
Supplemental Appendix

Tariff Uncertainty and the U.S. Dollar

Şebnem Kalemli-Özcan, Can Soylu and Muhammed A. Yıldırım

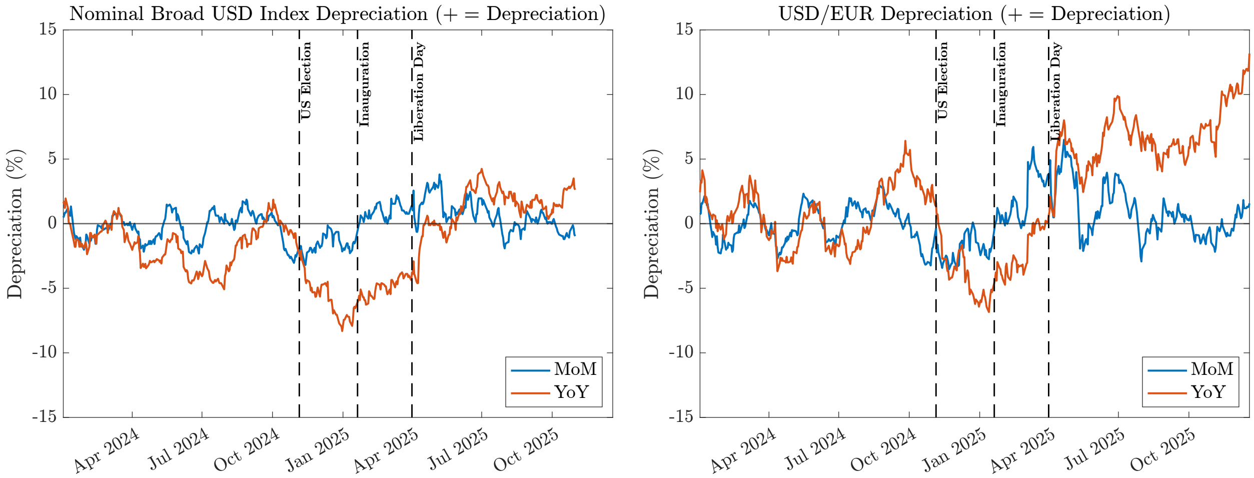
A Additional Figures and Tables

Figure A.1. Nominal Broad US Dollar Index



Note: The broad U.S. Dollar index since January 1, 2021. Source: FRED.

Figure A.2. US Dollar Depreciation Measures



(a) Broad US Dollar Index **(b)** USD–EUR Exchange Rate

NOTE: Positive values indicate depreciation of the US dollar and negative values indicate appreciation. The left panel shows month-on-month and year-on-year changes in the broad US dollar index, highlighting the partial reversal of the strong 2024 appreciation in 2025. The right panel shows USD–EUR depreciation, where the depreciation pattern is more pronounced. SOURCE: FRED.

Table A.1. U.S. Dollar Depreciation/Appreciation

	Broad US Dollar Index		**USD–EUR**	
Date	MoM (30d, %)	YoY (365d, %)	MoM (30d, %)	YoY (365d, %)
2025-04-01	1.4	-3.8	3.8	0.6
2025-04-02	1.0	-3.9	3.5	0.9
2025-04-03	2.6	-2.9	4.9	2.1
2025-04-04	0.5	-3.9	2.3	1.4
2025-04-07	-0.6	-4.5	0.5	0.7
2025-04-08	-0.6	-4.6	0.5	0.5
2025-04-09	-0.3	-4.6	1.9	1.7
2025-04-10	0.8	-2.7	2.4	4.2

Note: Positive values indicate depreciation of the US dollar; negative values indicate appreciation. Source: FRED.

Table A.2. Shapley decomposition of the daily EURUSD announcement-window R^2.

Regressor	Shapley R^2	% of full R^2	Coefficient
Panel A. $\{\Delta\tau,\ \sigma^2,\ \Delta\psi\}$, full R^2 =0.109			
$\Delta\tau_t$: Net Tariff Change (pp)	0.011	10.5%	0.004
σ_t^2: PCA Uncertainty (std)	0.091	83.8%	0.125
$\Delta\psi_t$: CIP Wedge (1Y, pp)	0.006	5.7%	-0.840
Panel B. $\{\Delta\tau,\ \sigma^2\}$ (no CIP requirement), full R^2 =0.105			
$\Delta\tau_t$: Net Tariff Change (pp)	0.013	12.8%	0.005
σ_t^2: PCA Uncertainty (std)	0.092	87.2%	0.117

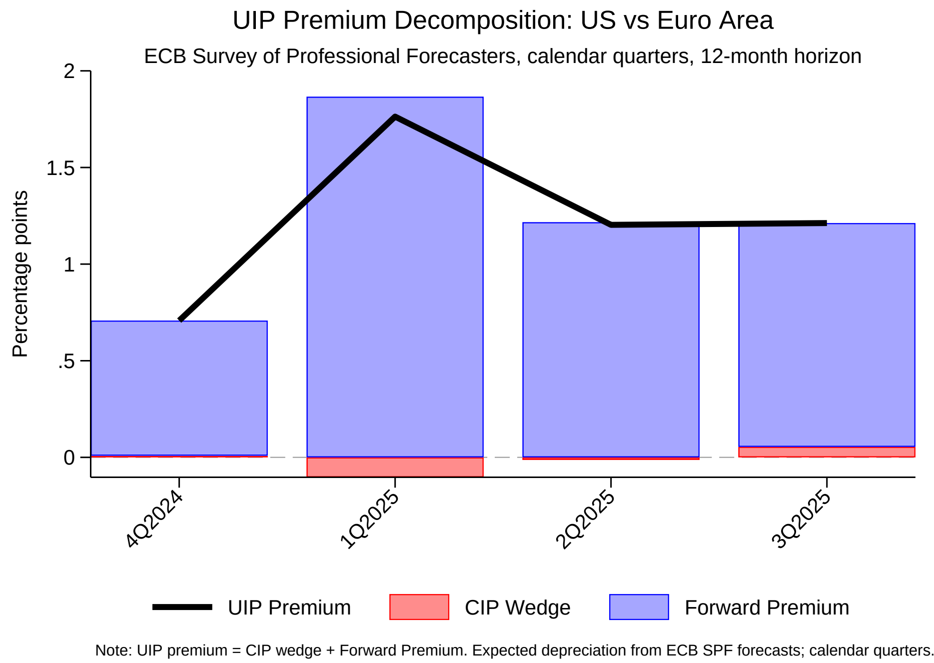
Note: Each regressor's Shapley value is its contribution to the regression R^2 averaged over all orderings of $\{\Delta\tau_t, \sigma_t^2, \Delta\psi_t\}$; the "% of full R^2" column expresses that value as a share of the full-model R^2. The dependent variable is 100× the EUR/USD announcement-window return (signed so a positive value is a U.S. dollar depreciation). The uncertainty score σ_t^2 accounts for 83.8% of the explained variation (87.2% without the CIP restriction); the tariff level $\Delta\tau_t$ and the CIP wedge $\Delta\psi_t$ together account for about 16%.

Table A.3. Across-Maturity Decomposition of Announcement-Day Interest Differentials: Convenience Is a Short-End Phenomenon

Outcome	$\Delta(i_t - i_t^*)$ 1Y DE (pp)	$\Delta(i_t - i_t^*)$ 1Y EA-AAA (pp)	$\Delta(i_t - i_t^*)$ 30Y EA-AAA (pp)
$\Delta\tau_t$: Net Tariff Change (pp)	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)
$\Delta\sigma_t^2$: Uncertainty Score (std)	-0.002	-0.001	0.005
	(0.007)	(0.010)	(0.009)
$\Delta\psi_t$: CIP Wedge (pp)	1.532***	1.743***	0.618*
	(0.269)	(0.390)	(0.351)
Constant	0.002	0.003	-0.006
	(0.007)	(0.011)	(0.010)
N	41	41	41
SD outcome	0.057	0.073	0.054
R^2	0.521	0.394	0.079

Notes: OLS coefficients (constant included) from the full event-window specification $\Delta(i_t - i_t^*) = a + b\,\Delta\tau_t + c\,\Delta\sigma_t^2 + d\,\Delta\psi_t + \varepsilon_t$, estimated for three legs of the U.S.–foreign differential (percentage points): the baseline one-year U.S.–Germany leg, the one-year U.S. minus ECB euro-area AAA leg, and the thirty-year U.S. (FRED DGS30) minus ECB euro-area AAA leg. Standard errors in parentheses; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$. By the logic of Du, Im, and Schreger (2018), a decline in the *convenience* value of Treasuries can be interpreted as a discount-factor wedge that would be expected to raise the U.S. differential across the entire curve, whereas short-maturity money-market plumbing concentrates at the front end. The data show the latter: the CIP-wedge coefficient is 1.532*** (1Y DE) and 1.743*** (1Y EA-AAA) but collapses to 0.618* at thirty years, with R^2 falling from 0.521 and 0.394 to 0.079. The uncertainty term $\Delta\sigma_t^2$ (the composite tariff-uncertainty score of Section 4, standardized) is economically negligible at every maturity—the signature of a priced uncertainty shock, not an across-the-curve erosion of the Treasury premium.

Figure A.3. UIP Premium Decomposition: ECB Survey of Professional Forecasters



Note: This figure repeats the UIP-premium decomposition of Figure 5—aggregate dollar–euro UIP premium = covered CIP wedge (the one-year Treasury basis, $-\psi_t$) + residual Forward Premium—but measures expected depreciation with the ECB Survey of Professional Forecasters (SPF) instead of Consensus, over calendar quarters (2024Q4 and 2025Q1–Q3) at the 12-month horizon. Each SPF round's own nowcast is used as the spot base, and the interest and CIP legs are our synchronized one-year U.S.–German government-bond series (2024Q4, which precedes the synchronized sample, uses the ECB SPF 2024Q4 round with a Bloomberg-default CIP wedge validated to within ≈ 3bp of the synchronized series). The SPF-based decomposition reaches the same conclusion as the main text: the widening UIP premium is almost entirely the Forward Premium, with a negligible covered CIP component. Sources: interest legs and CIP wedge from FRED/Bloomberg; expected depreciation from the ECB Survey of Professional Forecasters.

B Model Appendix

Our model is a stylized two-country version of KSY, whereby the supply side of the economy is simplified to an endowment economy under flexible prices. It corresponds to the version of the model in Section 4. To that baseline, we add risk-sensitive households (via CARA utility) and risk-sensitive financial intermediaries (via a mean-variance optimization problem). The intermediary problem is further augmented with a liquidity/convenience service flow associated with the Home-currency leg of the intermediary balance sheet. This document is intended to serve as a standalone derivation of the stylized model.

B.1 Set-up

Timing and countries. Home (subscript H) and Foreign (subscript F) have representative households. Each country is endowed with its own tradable good, $y_{H,t}$ and $y_{F,t}$. One-period nominal discount bonds in each currency are traded internationally.

Preferences and intratemporal aggregator. Each household consumes a CES bundle of Home and Foreign Goods:

$$\max_{\{C_{H,t},c_{H,H,t},c_{H,F,t}\}} \mathbb{E}\left[\sum_{t=0}^{\infty}\beta^t\, u(C_{H,t})\right], \qquad C_{H,t}=\left[(1-\gamma_H)\, c_{H,H,t}^{\frac{\theta-1}{\theta}}+\gamma_H\, c_{H,F,t}^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}},\ \ \theta>0,\ \theta\neq 1.$$

(Home bias parameter $1-\gamma_H\in(0,1)$; Foreign reliance on Home is γ_F.) In the A-asymmetry specialization below, $\gamma_H=\gamma$, $\gamma_F=A\gamma$, $0<\gamma<1/2$, and $0<A\gamma<1/2$, so both countries retain home bias with and without asymmetry.

Given home-currency good prices $p_{H,H,t}=p_{H,t}, p_{H,F,t}$, the unit-expenditure (CPI) index and Hicksian demands are

$$P_{H,t}=\left[(1-\gamma_H)\, p_{H,t}^{1-\theta}+\gamma_H\, p_{H,F,t}^{1-\theta}\right]^{\frac{1}{1-\theta}}, \quad c_{H,H,t}=(1-\gamma_H)\left(\tfrac{p_{H,t}}{P_{H,t}}\right)^{-\theta}C_{H,t}, \quad c_{H,F,t}=\gamma_H\left(\tfrac{p_{H,F,t}}{P_{H,t}}\right)^{-\theta}C_{H,t}.$$

Foreign utility maximization, CPI $P_{F,t}$ and demands $c_{F,H,t}, c_{F,F,t}$ are defined analogously with prices in Foreign currency $p_{F,H,t}, p_{F,t}$.

Law of One Price, tariffs and exchange rates. Let $\mathcal{E}_t$ be the nominal exchange rate (Home currency per unit of Foreign currency). For each good,

$$p_{F,H,t} = \frac{p_{H,t}}{\mathcal{E}_t} \qquad p_{H,F,t} = \mathcal{E}_t \, p_{F,t} \tau_t$$

where τ_t is a gross import tariff rate imposed by the home country on the foreign country.

The gross tariff rate is a random variable, whereby $\tau_t = e^{\hat{\tau}_t}$ and $\hat{\tau}_t$ follows the AR(1) process of the main text, $\hat{\tau}_{t+1} = \rho\hat{\tau}_t + \varepsilon_{t+1}$, with normally distributed innovations: $\varepsilon_{t+1} \,|\, t \sim \mathcal{N}(0, \sigma_t^2)$; the i.i.d. case corresponds to $\rho = 0$. We allow for the variance of $\hat{\tau}_t$ to exogenously vary across time. Notably, we choose the following timing convention. The next period's tariff shock depends on a variance term that is known today: $\mathrm{Var}_t(\hat{\tau}_{t+1}) = \sigma_t^2$. We do this for notational ease in capturing uncertainty. In our stylized model, to capture uncertainty, we will consider one-time changes in σ_t^2, which will impact next period's state variable, $\hat{\tau}_t$. That is, today uncertainty increases about tomorrow's tariffs.

Home and foreign budget constraints with nominal bonds.

$$P_{H,t}C_{H,t} + V_{H,t-1} = p_{H,t}y_{H,t} + \frac{V_{H,t}}{R_{H,t}} + T_{H,t}$$
$$P_{F,t}C_{F,t} + D_{F,t-1} = p_{F,t}y_{F,t} + \frac{D_{F,t}}{R_{F,t}} + T_{F,t}$$

where $V_{H,t}$ is the Home-currency liability position and $D_{F,t}$ denotes the signed Foreign-currency position intermediated in international markets. The notation V_F is reserved for the exogenous Foreign-currency gross asset of the Home country. This asset has constant face value V_F in Foreign currency, is not optimized over by households or intermediaries, and enters Home resources only through the lump-sum transfer $T_{H,t}$, which collects tariff revenue

$(\tau_t - 1)\mathcal{E}_t p_{F,t} c_{H,F,t}$, any other lump-sum fiscal rebates, and the net carry on the exogenous gross asset, $\mathcal{E}_t V_F(1 - 1/R_{F,t})$. The Foreign lump-sum transfer is $T_{F,t} = \frac{V_F}{R_{F,t}} - V_F + \frac{\pi_{H,t}}{\mathcal{E}_t}$: the first two terms are the counterpart of the V_F-carry in $T_{H,t}$ (since V_F is its Foreign-currency liability), and the last is the rebated intermediary profit $\pi_{H,t}$, defined below.

Policy. Let us assume monetary policy in the two countries, perfectly stabilizes the aggregate price level such that $P_{H,t} = P_{F,t} = 1 \; \forall t$.

B.2 Households' Problem

The Home household maximizes expected discounted utility over an infinite horizon subject to a sequence of nominal budget constraints:

$$\max_{\{C_{H,t}, V_{H,t}\}_{t=0}^{\infty}} \quad \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_H^t u(C_{H,t})$$

$$\text{s.t.} \quad P_{H,t} C_{H,t} + V_{H,t-1} = p_{H,t} y_{H,t} + \frac{V_{H,t}}{R_{H,t}} + T_{H,t}$$

for all $t \geq 0$, given initial debt $V_{H,-1}$. The exogenous gross asset V_F affects this constraint only through the lump-sum transfer $T_{H,t}$; it is not a household choice variable.

The Lagrangian is

$$\mathcal{L} = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_H^t \Big[u(C_{H,t}) + \lambda_{H,t} \Big(p_{H,t} y_{H,t} - P_{H,t} C_{H,t} - V_{H,t-1} + \tfrac{V_{H,t}}{R_{H,t}} + T_{H,t} \Big) \Big].$$

Since $T_{H,t}$ is lump-sum and V_F is not chosen by the household, the transfer introduces no additional FOC. FOCs with respect to $C_{H,t}$ and $V_{H,t}$:

$$\frac{\partial \mathcal{L}}{\partial C_{H,t}} : \quad u'(C_{H,t}) - \lambda_{H,t} P_{H,t} = 0,$$

$$\frac{\partial \mathcal{L}}{\partial V_{H,t}} : \quad \frac{\lambda_{H,t}}{R_{H,t}} - \beta_H \mathbb{E}_t[\lambda_{H,t+1}] = 0.$$

Since policy perfectly stabilizes the aggregate price level we obtain the following Euler equation:

$$u'(C_{H,t}) = \beta_H R_{H,t}\,\mathbb{E}_t[u'(C_{H,t+1})]\,.$$

Using the CARA form, $u'(c) = e^{-\alpha c}$,

$$e^{-\alpha C_{H,t}} = \beta_H R_{H,t}\,\mathbb{E}_t\big[e^{-\alpha C_{H,t+1}}\big]\,.$$

Since uncertainty is driven by tariff shocks, in line with our second-order approximation detailed below, $C_{H,t+1}$ is approximately conditionally normal,

$$C_{H,t+1} \mid \mathcal{F}_t \approx \mathcal{N}(\mathbb{E}_t C_{H,t+1},\ \mathrm{Var}_t(C_{H,t+1}))\,.$$

Then

$$\mathbb{E}_t\big[e^{-\alpha C_{H,t+1}}\big] = \exp\!\big(-\alpha\,\mathbb{E}_t C_{H,t+1} + \tfrac{1}{2}\alpha^2 \mathrm{Var}_t(C_{H,t+1})\big)\,.$$

So the Euler equation is:

$$\begin{aligned} e^{-\alpha C_{H,t}} &= \beta_H R_{H,t} e^{\left(-\alpha\,\mathbb{E}_t C_{H,t+1} + \frac{1}{2}\alpha^2 \mathrm{Var}_t(C_{H,t+1})\right)} \\ e^{\left(\alpha(\mathbb{E}_t C_{H,t+1} - C_{H,t}) - \frac{1}{2}\alpha^2 \mathrm{Var}_t(C_{H,t+1})\right)} &= \beta_H R_{H,t}. \end{aligned}$$

Taking logs:

$$\alpha(\mathbb{E}_t C_{H,t+1} - C_{H,t}) = \ln(\beta_H R_{H,t}) + \tfrac{1}{2}\alpha^2 \mathrm{Var}_t(C_{H,t+1}).$$

We shall assume that the foreign household, has CRRA utility instead of CARA utility.

The foreign household's problem then yields:

$$1 = \beta_F R_{F,t}\, \mathbb{E}_t \left[\left(\frac{C_{F,t+1}}{C_{F,t}} \right)^{-\alpha} \right]$$

B.3 Relative Demand Conditions

Standard CES structure yields the following expressions:

$$\frac{c_{H,H,t}}{c_{H,F,t}} = \frac{1-\gamma_H}{\gamma_H} \left(\frac{p_{H,t}}{p_{H,F,t}} \right)^{-\theta}$$
$$\frac{c_{F,H,t}}{c_{F,F,t}} = \frac{\gamma_F}{1-\gamma_F} \left(\frac{p_{F,H,t}}{p_{F,t}} \right)^{-\theta}$$

B.4 Intermediaries' Problem

Redefine bond variable inclusive of interest payments. To keep the exogenous gross asset V_F distinct from the Foreign-currency position intermediated in international markets, denote the latter signed position by $D_{F,t}$: $D_{F,t} > 0$ is long Foreign-currency bonds and $D_{F,t} < 0$ is short Foreign-currency bonds. Intermediaries solve a mean-variance optimization problem augmented by an exogenous liquidity/convenience service flow associated with the Home-currency leg $V_{H,t}$, given by ψ_t:

$$\max_{V_{H,t}, D_{F,t}} \quad \mathbb{E}_t \pi_{H,t+1} - \frac{\chi_t}{2} \operatorname{Var}_t(\pi_{H,t+1}) + V_{H,t}\psi_t$$

subject to the resource constraint at t,

$$0 = \mathcal{E}_t \frac{D_{F,t}}{R_{F,t}} + \frac{V_{H,t}}{R_{H,t}},$$

and with profits (in Home currency) realized at $t+1$,

$$\pi_{H,t+1} = V_{H,t} + \mathcal{E}_{t+1} D_{F,t}.$$

Using the constraint to substitute out $V_{H,t} = -R_{H,t}\mathcal{E}_t \frac{D_{F,t}}{R_{F,t}}$, we obtain

$$\pi_{H,t+1} = D_{F,t}\Big(\mathcal{E}_{t+1} - \mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}\Big) \tag{B.1}$$

Therefore, the Lagrangian can be written as

$$\mathcal{L}_t = \mathbb{E}_t\Big[D_{F,t}\Big(\mathcal{E}_{t+1} - \mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}\Big)\Big] - \frac{\chi_t}{2}(D_{F,t})^2 \operatorname{Var}_t\Big(\mathcal{E}_{t+1}\Big) - D_{F,t}\mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}\psi_t,$$

where $\chi_t > 0$ is an aversion to risk. First order condition (interior) yields:

$$0 = \mathbb{E}_t\Big[\Big(\mathcal{E}_{t+1} - \mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}\Big)\Big] - \chi_t(D_{F,t}) \operatorname{Var}_t(\mathcal{E}_{t+1}) - \mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}\psi_t, \tag{B.2}$$

$$\iff \quad \mathcal{E}_t \frac{R_{H,t}}{R_{F,t}}(1+\psi_t) = \mathbb{E}_t[\mathcal{E}_{t+1}] - \chi_t(D_{F,t}) \operatorname{Var}_t(\mathcal{E}_{t+1}) \tag{B.3}$$

Dividing both sides by $\mathcal{E}_t$:

$$\frac{R_{H,t}}{R_{F,t}}(1+\psi_t) = \frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} - \chi_t \frac{D_{F,t}}{\mathcal{E}_t} \operatorname{Var}_t(\mathcal{E}_{t+1})$$

Rearranging:

$$\frac{R_{H,t}}{R_{F,t}}(1+\psi_t) = \frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} - \chi_t \underbrace{D_{F,t}\mathcal{E}_t}_{Quantity\ of\ Risk} \underbrace{\operatorname{Var}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right)}_{Price\ of\ Risk}$$

$$\frac{R_{H,t}}{R_{F,t}}(1+\psi_t) = \frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} + \chi_t V_{H,t}\frac{R_{F,t}}{R_{H,t}} \operatorname{Var}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right)$$

This yields a UIP condition with a deviation based on the quantity of risk (based on the open position of intermediaries) multiplied by the price of risk (variance of depreciation). The liquidity/convenience service flow adds a multiplicative wedge on the Home-currency return leg. Let us suppose risk aversion is such that $\chi_t = \chi \frac{R_{H,t}}{R_{F,t}} \frac{1}{V_{H,t}}$. For the stylized model, this allows us to simplify the last equation above into an expression with a convenient risk premium expression, ρ_t, which is not sensitive to the quantity of risk and instead is only sensitive to the price of risk:

$$\frac{R_{H,t}}{R_{F,t}} = \frac{1}{1+\psi_t} \left[\frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} + \underbrace{\chi \text{Var}_t \left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \right)}_{\rho_t} \right]$$

For analytical simplicity, the realized intermediation profits $\pi_{H,t}$ are rebated lump-sum to the Foreign household via the $\pi_{H,t}/\mathcal{E}_t$ term in the transfer $T_{F,t}$.

B.5 Equilibrium Definition

An equilibrium comprises 8 sequences $\{p_{H,t}, p_{F,t}, \mathcal{E}_t, R_{H,t}, R_{F,t}, V_{H,t}, C_{H,t}, C_{F,t}\}_{t=0}^{\infty}$ such that for a given sequence of exogenous variables $\{\tau_t, y_{H,t}, y_{F,t}, \psi_t\}_{t=0}^{\infty}$, where the tariff follows the AR(1) process $\ln \tau_t = \rho \ln \tau_{t-1} + \varepsilon_t,\ \varepsilon_t \,|\, t{-}1 \sim \mathcal{N}\big(0, \sigma_{t-1}^2\big),\ \rho \in [0,1)$, with $\{\sigma_t^2\}$ an exogenous volatility sequence known one period in advance, equations (B.4)–(B.11) hold:

- Euler equations:

$$\alpha(\mathbb{E}_t C_{H,t+1} - C_{H,t}) = \ln(\beta_H R_{H,t}) + \frac{1}{2}\alpha^2 \text{Var}_t(C_{H,t+1}) \tag{B.4}$$

$$1 = \beta_F R_{F,t}\, \mathbb{E}_t \left[\left(\frac{C_{F,t+1}}{C_{F,t}} \right)^{-\alpha} \right] \tag{B.5}$$

- CPI equations with price level substituted out:

$$1 = \Big[(1-\gamma_H)\, p_{H,t}^{1-\theta} + \gamma_H \left(\mathcal{E}_t\, p_{F,t} \tau_t \right)^{1-\theta} \Big]^{\frac{1}{1-\theta}} \tag{B.6}$$

$$1 = \left[(1-\gamma_F)\, {p_{F,t}}^{1-\theta} + \gamma_F \, \left(\frac{p_{H,t}}{\mathcal{E}_t} \right)^{1-\theta} \right]^{\frac{1}{1-\theta}} \tag{B.7}$$

- UIP condition:

$$\frac{R_{H,t}}{R_{F,t}} = \frac{1}{1+\psi_t} \left[\frac{\mathbb{E}_t[\mathcal{E}_{t+1}]}{\mathcal{E}_t} + \chi \mathrm{Var}_t \left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \right) \right] \tag{B.8}$$

- Goods market clears for each country in both periods

$$y_{H,t} = (1-\gamma_H) \left(\frac{p_{H,t}}{1} \right)^{-\theta} C_{H,t} + \gamma_F \left(\frac{p_{H,t}}{\mathcal{E}_t} \right)^{-\theta} C_{F,t} \tag{B.9}$$

$$y_{F,t} = \gamma_H \left(\frac{\mathcal{E}_t \, p_{F,t} \tau_t}{1} \right)^{-\theta} C_{H,t} + (1-\gamma_F) \left(\frac{p_{F,t}}{1} \right)^{-\theta} C_{F,t} \tag{B.10}$$

- Balance of payments equation

$$\begin{aligned}
\frac{V_{H,t}}{R_{H,t}} &= V_{H,t-1} - \mathrm{NX}_t + \mathcal{E}_t V_F \left(\frac{1-R_{F,t}}{R_{F,t}} \right) \\
&= V_{H,t-1} - p_{H,t} c_{F,H,t} + p_{F,t} \mathcal{E}_t c_{H,F,t} + \mathcal{E}_t V_F \left(\frac{1-R_{F,t}}{R_{F,t}} \right) \\
&= V_{H,t-1} - p_{H,t} \gamma_F \left(\frac{p_{H,t}}{\mathcal{E}_t} \right)^{-\theta} C_{F,t} + p_{F,t} \mathcal{E}_t \gamma_H \left(\frac{\mathcal{E}_t \, p_{F,t} \tau_t}{1} \right)^{-\theta} C_{H,t} + \mathcal{E}_t V_F \left(\frac{1-R_{F,t}}{R_{F,t}} \right)
\end{aligned} \tag{B.11}$$

The added external-account term is the counterpart to the V_F-carry component embedded in $T_{H,t}$. Tariff rebates and other fiscal rebates contained in $T_{H,t}$ are internal lump-sum transfers and therefore do not generate an additional external financing term. Given the intermediary balance-sheet identity, the Foreign budget constraint (with $T_{F,t}$) then holds by Walras' law, so the listed system and the Home balance of payments are unchanged.

B.6 2nd Order Approximation

Let us assume that the endowment is fixed and let us use the Cole and Obstfeld (1991) parametrization $\alpha = \theta = 1$.[27] Below we set $C_H = C_F = 1$, $\gamma_H = \gamma$, and $\gamma_F = \gamma A$, with $0 < \gamma < 1/2$ and $0 < A\gamma < 1/2$, so the steady-state trade imbalance is generated by the home-bias asymmetry A.

We conduct a second-order approximation around a steady state with unconditional moments evaluated at the ergodic distribution. Hat variables denote deviation from this steady state:

B.6.1 Steady State

We evaluate the steady state at the ergodic distribution, with tariff level $\tau = 1$, constant tariff-innovation variance σ^2, and a constant convenience-service flow $\psi_t = \bar{\psi} \geq 0$. We do *not* normalize the convenience flow to zero at the steady state: as the balance-of-payments block below shows, $\bar{\psi} > 0$ is what reconciles a stationary nominal exchange rate with the debtor steady state. Throughout we focus on the U.S.-relevant net-importer configuration $0 < A < 1$, so $\bar{\mathrm{NX}} = \gamma(A-1) < 0$, Home owes its own currency ($V_H > 0$), and Home holds a Foreign-currency gross asset ($V_F \geq 0$). Because the convenience flow is a non-pecuniary service yield that enters only the intermediary objective, it appears in no budget constraint, and the balance-of-payments identity below is unaffected by $\bar{\psi} > 0$.

- Euler equations:

$$\ln(\beta_H R_H) = -\frac{1}{2}\sigma_c^2 \to R_H = \beta_H^{-1} e^{-\frac{1}{2}\sigma_c^2}$$

$$R_F = \beta_F^{-1}$$

We'll assume in our work that volatility is small enough that the steady-state gross

[27] When $\theta = 1$, the consumption price basket becomes a Cobb-Douglas function that is exactly log-linear.

interest rate is greater than 1: $R_H = \beta_H^{-1} e^{-\frac{1}{2}\sigma_c^2} > 1$; $R_F = \beta_F^{-1} > 1$ holds automatically.

- All prices and exchange rate will be 1 at the steady state:

$$P_H = P_F = \mathcal{E} = 1$$

- UIP condition with the steady-state convenience flow $\bar{\psi}$. At the approximation point the exchange rate is stationary ($\mathbb{E}_t \mathcal{E}_{t+1} = \mathcal{E}_t = 1$) with conditional variance $\sigma_{\mathcal{E}}^2$, so

$$\frac{R_H}{R_F} = \frac{1 + \chi \sigma_{\mathcal{E}}^2}{1 + \bar{\psi}}$$

  Plugging in what we know from the Euler equation we can show how the endogenous volatility of the exchange rate is related to the endogenous volatility of consumption:

$$\frac{R_H}{R_F} = \frac{1 + \chi \sigma_{\mathcal{E}}^2}{1 + \bar{\psi}} = \frac{\beta_H^{-1} e^{-\frac{1}{2}\sigma_c^2}}{\beta_F^{-1}}$$

  Importantly, σ_c^2 and $\sigma_{\mathcal{E}}^2$ are a function of the volatility of tariffs, σ^2, at the steady state. For the existence of a steady state, with a constant exchange rate, we assume that β_H and β_F are such that the equality above holds.

  We assume that the convenience flow is such that $R_F > R_H$ while the nominal exchange rate remains stationary. That is we have

$$\bar{\psi} \ > \ \chi \sigma_{\mathcal{E}}^2 \qquad \Longleftrightarrow \qquad R_F \ > \ R_H, \tag{B.12}$$

  i.e., the convenience yield on the Home-currency leg exceeds the steady-state tariff-risk premium. The debtor steady state below requires exactly this configuration.

- Goods market clearing under A-asymmetry. With $C_H = C_F = 1$, $\gamma_H = \gamma$, $\gamma_F = \gamma A$,

$0 < \gamma < 1/2$, and $0 < A\gamma < 1/2$,

$$y_H = (1-\gamma) + \gamma A = 1 + \underbrace{\gamma(A-1)}_{\bar{\text{NX}}}$$
$$y_F = \gamma + (1-\gamma A) = 1 - \underbrace{\gamma(A-1)}_{\bar{\text{NX}}}$$

Thus the steady-state trade balance $\bar{\text{NX}}$ is not an independent object, but rather a function of the asymmetry parameter A: $\bar{\text{NX}} = \gamma(A-1) < 0$ in the net-importer case $0 < A < 1$.

- Balance of payments equation with the exogenous Foreign-currency gross asset. In terms of the bond positions inclusive of interest, $B_H \equiv V_H/R_H$ and $B_F \equiv V_F/R_F$,

$$\frac{V_H}{R_H} = V_H - \bar{\text{NX}} + V_F\,\frac{1-R_F}{R_F}$$
$$\iff \qquad B_H\,(R_H - 1) = \bar{\text{NX}} + B_F\,(R_F - 1):$$

net interest paid on the Home-currency liability equals the trade balance plus net factor income on the Foreign-currency asset. To avoid treating V_F as an independent third steady-state target, introduce a single gross-balance-sheet primitive $\omega \geq 0$ that scales the gross asset against the steady-state trade deficit $\gamma(1-A) > 0$:

$$\frac{R_F - 1}{R_F} V_F \equiv \omega\,\gamma(1-A), \qquad V_F = \omega\,\frac{R_F}{R_F - 1}\,\gamma(1-A) \;\geq\; 0.$$

Substituting into the balance of payments, the steady-state Home-currency liability is

$$V_H = \frac{R_H}{R_H - 1}\,(\omega - 1)\,\gamma(1-A),$$

so the debtor configuration $V_H > 0$ requires $\omega > 1$: net factor income on the Foreign-currency asset must more than cover the trade deficit. This is the admissibility floor (13) of the main text in ω-form: the implied gross-position ratio is $\widetilde{V} \equiv \frac{B_F}{B_H} = \frac{\omega}{\omega-1}\frac{R_H-1}{R_F-1}$, and $(R_F-1)\widetilde{V} > (R_H-1)$ holds if and only if $\omega > 1$. Whenever $\widetilde{V} \leq 1$, as in the data, this forces $R_F > R_H$, i.e., $\bar{\psi} > \chi\sigma_{\mathcal{E}}^2$ by (B.12). Hence the steady state has two primitive balance-sheet objects—A, which pins down the steady-state trade balance $\bar{\text{NX}} = \gamma(A-1)$, and ω (equivalently $\widetilde{V} = \frac{\omega}{\omega-1}\frac{R_H-1}{R_F-1}$), which scales the gross Foreign-currency asset and the corresponding gross Home-currency liability through the balance-of-payments identity—plus one asset-market primitive, $\bar{\psi}$, which delivers the carry $R_F > R_H$ that external solvency requires.

B.6.2 Approximation

Given the parametrization, with $\alpha = \theta = 1$, the model is already highly linear except for the variance terms, so we shall focus on those. [28]

There are two key variances in the model $\text{Var}_t(C_{H,t+1})$ and $\text{Var}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right)$. Any variable can be expressed as the steady-state value multiplied by percent deviation: $X_t = X(1+\hat{X}_t)$. Then we can write:

$$\begin{aligned}
\text{Var}(C_{H,t+1}) &= \text{Var}(C_H(1+\hat{C}_{H,t+1})) \\
&= C_H^2\text{Var}(\hat{C}_{H,t+1}) \\
&= \text{Var}(\hat{C}_{H,t+1})
\end{aligned}$$

where the last line follows from $C_H = 1$.

Similarly, since $log\left(\frac{1+\hat{\mathcal{E}}_{t+1}}{1+\hat{\mathcal{E}}_t}\right) \approx \hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t$ and $e^x \approx 1+x$, so we have:

$$\text{Var}_t\left(\frac{\mathcal{E}_{t+1}}{\mathcal{E}_t}\right) = \text{Var}_t\left(\frac{1+\hat{\mathcal{E}}_{t+1}}{1+\hat{\mathcal{E}}_t}\right)$$

[28] We assume near equivalence of log deviation and percent deviation from the steady state. Additionally with consumption and prices normalized to 1, many terms can be converted into hat variables by taking logs.

$$
\begin{aligned}
&= \mathrm{Var}_t \left(e^{log\left(\frac{1+\hat{\mathcal{E}}_{t+1}}{1+\hat{\mathcal{E}}_t}\right)} \right) \\
&\approx \mathrm{Var}_t \left(1 + \hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t\right) \\
&= \mathrm{Var}_t \left(\hat{\mathcal{E}}_{t+1}\right)
\end{aligned}
$$

With these the Euler equation and the UIP condition read as follows. Since the convenience flow equals $\bar{\psi} > 0$ at the steady state, we log-linearize the wedge around $1 + \bar{\psi}$. With slight abuse of notation, from here on ψ_t denotes the log deviation of the gross convenience wedge from its steady-state value,

$$
\psi_t \;\equiv\; \ln\!\left(\frac{1 + \psi_t^{\mathrm{lev}}}{1 + \bar{\psi}}\right) \;\approx\; \frac{\psi_t^{\mathrm{lev}} - \bar{\psi}}{1 + \bar{\psi}},
$$

where ψ_t^{lev} denotes the flow itself. Taking logs of the UIP condition and subtracting its steady-state counterpart, the deviation enters the log-linear UIP condition additively—and, for the wedge term, exactly—under the sign convention implied by the objective above:

$$
\begin{aligned}
(\mathbb{E}_t \hat{C}_{H,t+1} - \hat{C}_{H,t}) &= \hat{i}_{H,t} + \frac{1}{2}\mathrm{Var}(\hat{C}_{H,t+1}) \\
\hat{i}_{H,t} - \hat{i}_{F,t} &= \mathbb{E}_t[\hat{\mathcal{E}}_{t+1}] - \hat{\mathcal{E}}_t + \chi \mathrm{Var}_t \left(\hat{\mathcal{E}}_{t+1}\right) - \psi_t
\end{aligned}
$$

We have a system with four state variables: $\hat{\tau}_t, \hat{V}_{t-1}, \sigma_t^2$, and ψ_t; the tariff carries its own law of motion, $\hat{\tau}_{t+1} = \rho\hat{\tau}_t + \varepsilon_{t+1}$ with $\varepsilon_{t+1} \,|\, t \sim \mathcal{N}(0, \sigma_t^2)$, so no additional state is needed to track the AR(1). The convenience-flow wedge ψ_t is exogenous and enters the equilibrium conditions only through the UIP condition and it is a state variable; agents know at t that $\psi_{t+j} = 0$ for all $j > 0$. With a second order approximation, every endogenous variable, $\hat{x}_t$ (e.g., including $\hat{\mathcal{E}}_{t+1}$ and $\hat{C}_{t+1}$) will be some linear and quadratic function of the state variables:

$$\hat{x}_t = a_1\hat{\tau}_t + a_2\hat{V}_{H,t-1} + a_3\sigma_t^2 + a_{10}\,\psi_t + a_4\hat{\tau}_t^2 + a_5\hat{V}_{H,t-1}^2 + a_6(\sigma_t^2)^2 + a_{11}\,\psi_t^2$$
$$+ a_7\hat{\tau}_t\hat{V}_{H,t-1} + a_8\hat{\tau}_t\sigma_t^2 + a_9\hat{V}_{H,t-1}\sigma_t^2 + a_{12}\,\hat{\tau}_t\,\psi_t \;+\; a_{13}\,\hat{V}_{H,t-1}\,\psi_t \;+\; a_{14}\,\sigma_t^2\,\psi_t\,,$$

Iterating one period forward:

$$\hat{x}_{t+1} = a_1\hat{\tau}_{t+1} + a_2\hat{V}_{H,t} + a_3\sigma_{t+1}^2 + a_{10}\,\psi_{t+1} + a_4\hat{\tau}_{t+1}^2 + a_5\hat{V}_{H,t}^2 + a_6(\sigma_{t+1}^2)^2 + a_{11}\,\psi_{t+1}^2$$
$$+ a_7\hat{\tau}_{t+1}\hat{V}_{H,t} + a_8\hat{\tau}_{t+1}\sigma_{t+1}^2 + a_9\hat{V}_{H,t}\sigma_{t+1}^2 + a_{12}\,\hat{\tau}_{t+1}\,\psi_{t+1} \;+\; a_{13}\,\hat{V}_{H,t}\,\psi_{t+1} \;+\; a_{14}\,\sigma_{t+1}^2\,\psi_{t+1}\,,$$

where now $\mathbb{E}_t\hat{\tau}_{t+1} = \rho\hat{\tau}_t$ and $\mathbb{E}_t\hat{\tau}_{t+1}^2 = \rho^2\hat{\tau}_t^2 + \sigma_t^2$, so conditional means acquire the terms $a_1\rho\hat{\tau}_t$ (first order; this is what the method of undetermined coefficients tracks below, together with the linear loadings a_2, a_3, and a_{10}) and $a_4(\rho^2\hat{\tau}_t^2 + \sigma_t^2)$ (second order).

Let us assume that we are interested in one-time increases in uncertainty and one-time convenience-flow shocks, so $\sigma_{t+j} = 0$ and $\psi_{t+j} = 0 \;\; \forall j > 0$, and this is known by agents. Every term of $\hat{x}_{t+1}$ that contains σ_{t+1}^2 or ψ_{t+1} then equals zero—the a_3, a_6, a_8, and a_9 terms as before, and now also the a_{10}–a_{14} terms—leaving

$$\hat{x}_{t+1} = a_1\hat{\tau}_{t+1} + a_2\hat{V}_{H,t} + a_4\hat{\tau}_{t+1}^2 + a_5\hat{V}_{H,t}^2 + a_7\hat{\tau}_{t+1}\hat{V}_{H,t}.$$

Conditional on time t, the only random variable in $\hat{x}_{t+1}$ is therefore $\hat{\tau}_{t+1} \sim \mathcal{N}(\rho\hat{\tau}_t, \sigma_t^2)$, exactly as in the specification without the convenience-flow state. Using $\mathrm{Var}_t(\hat{\tau}_{t+1}) = \sigma_t^2$, $\mathrm{Var}_t(\hat{\tau}_{t+1}^2) = 4\rho^2\hat{\tau}_t^2\sigma_t^2 + 2\sigma_t^4$, and $\mathrm{Cov}_t(\hat{\tau}_{t+1}, \hat{\tau}_{t+1}^2) = 2\rho\hat{\tau}_t\sigma_t^2$ (which vanishes only in the mean-zero case $\rho = 0$),

$$\mathrm{Var}_t(\hat{x}_{t+1}) = \mathrm{Var}_t\Big(\big(a_1 + a_7\hat{V}_{H,t}\big)\hat{\tau}_{t+1} + a_4\hat{\tau}_{t+1}^2\Big)$$
$$= \big(a_1 + a_7\hat{V}_{H,t}\big)^2\sigma_t^2 \;+\; a_4^2\big(4\rho^2\hat{\tau}_t^2\sigma_t^2 + 2\sigma_t^4\big) \;+\; 4\,a_4\big(a_1 + a_7\hat{V}_{H,t}\big)\rho\,\hat{\tau}_t\,\sigma_t^2.$$

We shall assume $\sigma_t < 1$. Given this, for small shocks, all terms beyond $a_1^2\sigma_t^2$ are near zero: the terms involving $a_7\hat{V}_{H,t}$ and a_4^2 are dropped exactly as in the $\rho = 0$ case, and the new covariance term $4a_1a_4\rho\hat{\tau}_t\sigma_t^2$ is of order $O(\hat{\tau}_t\sigma_t^2)$—a product of the small quadratic coefficient a_4 with the third-order object $\hat{\tau}_t\sigma_t^2$—and is simplified away on the same grounds.[29] That is we choose to focus on a variance that is only a function of the exogenous variance of the tariff innovation, and we have $\mathrm{Var}_t(\hat{x}_{t+1}) \approx a_1^2\sigma_t^2$ for any $\rho \in [0, 1)$: the coefficient a_1 multiplying $\hat{\tau}_{t+1}$ is the same object whether or not the tariff is persistent, since the known component $\rho\hat{\tau}_t$ contributes nothing to the conditional variance. In particular, the convenience-flow state contributes to conditional variances neither directly (its future values are zero) nor through cross terms, so η and κ retain their definition—η as one-half, and κ as χ times, the squared $\hat{\tau}_{t+1}$-coefficient in the respective policy function—while ψ_t enters the linearized system only through its linear loadings a_{10}. At the steady state, unconditional moments are evaluated at the ergodic distribution, where $\mathrm{Var}(\hat{\tau}) = \sigma^2/(1-\rho^2)$ and the convenience flow sits at $\bar{\psi}$ (zero deviation, $\psi = 0$); this rescales the steady-state constants but not the dynamic system.

B.6.3 Asymmetry via A

Throughout this subsection, $\gamma_H = \gamma$, $\gamma_F = \gamma A$, $C_H = C_F = 1$, $0 < \gamma < 1/2$, $0 < A\gamma < 1/2$, and the Foreign-currency gross asset V_F is constant.

An approximated equilibrium comprises 8 sequences $\{\hat{p}_{H,t}, \hat{p}_{F,t}, \hat{\mathcal{E}}_t, \hat{i}_{H,t}, \hat{i}_{F,t}, \hat{V}_{H,t}, \hat{C}_{H,t}, \hat{C}_{F,t}\}_{t=0}^{\infty}$ such that, given exogenous variables $\{\hat{\tau}_t, \sigma_t^2, \psi_t\}_{t=0}^{\infty}$ and the constant gross-position primitive V_F (or, in steady state, $\widetilde{V}$), the following equations hold:

[29] That is, via the $a_7\hat{V}_{H,t}$ and $a_4\rho\hat{\tau}_t$ terms there could otherwise be endogenous and, under persistence, level-dependent time variation in how the variances of $\hat{C}_{t+1}$ and $\hat{\mathcal{E}}_{t+1}$ depend on the underlying variance of tariffs. We assume that in our model and context of shocks, these are small enough to simplify away. (With an anticipated nonzero path for ψ_{t+1}, the cross term $a_{12}\hat{\tau}_{t+1}\psi_{t+1}$ would likewise add $a_{12}\psi_{t+1}$ to the coefficient on $\hat{\tau}_{t+1}$; under one-time convenience-flow shocks this term is identically absent.)

- Euler equations:

$$(\mathbb{E}_t\hat{C}_{H,t+1} - \hat{C}_{H,t}) = \hat{i}_{H,t} + \eta\sigma_t^2 \tag{B.13}$$

$$(\mathbb{E}_t\hat{C}_{F,t+1} - \hat{C}_{F,t}) = \hat{i}_{F,t} \tag{B.14}$$

- CPI equations with price level substituted out:

$$0 = (1-\gamma)\,\hat{p}_{H,t} + \gamma\,(\hat{\mathcal{E}}_t + \hat{p}_{F,t} + \hat{\tau}_t) \tag{B.15}$$

$$0 = (1-\gamma A)\,\hat{p}_{F,t} + \gamma A(\hat{p}_{H,t} - \hat{\mathcal{E}}_t) \tag{B.16}$$

- UIP condition with a wedge that widens as volatility increases ($\sigma_t^2 \uparrow$) and as the convenience yield declines ($\psi_t \downarrow$) :

$$\hat{i}_{H,t} - \hat{i}_{F,t} = \mathbb{E}_t\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t + \kappa\sigma_t^2 - \psi_t \tag{B.17}$$

- Goods market clears for each country in both periods

$$0 = (1-\gamma)\left(\hat{C}_{H,t} - \hat{p}_{H,t}\right) + \gamma A\left(\hat{C}_{F,t} + \hat{\mathcal{E}}_t - \hat{p}_{H,t}\right) \tag{B.18}$$

$$0 = \gamma\left(\hat{C}_{H,t} - \hat{\mathcal{E}}_t - \hat{p}_{F,t} - \hat{\tau}_t\right) + (1-\gamma A)\left(\hat{C}_{F,t} - \hat{p}_{F,t}\right) \tag{B.19}$$

- Balance of payments equation with $\hat{V}_{H,t}$ as the Home-currency liability position and V_F as the exogenous Foreign-currency gross asset:[30]

$$\hat{V}_{H,t} = R_H\hat{V}_{H,t-1} - \Xi\left[A(\hat{C}_{F,t} + \hat{\mathcal{E}}_t) - (\hat{C}_{H,t} - \hat{\tau}_t)\right] + \hat{i}_{H,t} - \widetilde{V}((R_F - 1)\hat{\mathcal{E}}_t + \hat{i}_{F,t}) \tag{B.23}$$

[30]The linearization is

$$\frac{V_{H,t}}{R_{H,t}} = V_{H,t-1} - p_{H,t}\gamma A\left(\frac{p_{H,t}}{\mathcal{E}_t}\right)^{-\theta} C_{F,t} + p_{F,t}\mathcal{E}_t\gamma\left(\frac{\mathcal{E}_t\, p_{F,t}\tau_t}{1}\right)^{-\theta} C_{H,t} + \mathcal{E}_t V_F\left(\frac{1-R_{F,t}}{R_{F,t}}\right) \tag{B.20}$$

$$\frac{V_H}{R_H}(\hat{V}_{H,t} - \hat{i}_{H,t}) = V_H\hat{V}_{H,t-1} - \gamma\left[A(\hat{C}_{F,t} + \hat{\mathcal{E}}_t) - (\hat{C}_{H,t} - \hat{\tau}_t)\right] + V_F\frac{1-R_F}{R_F}\hat{\mathcal{E}}_t - \frac{V_F}{R_F}\hat{i}_{F,t} \tag{B.21}$$

where $\Xi \equiv \frac{R_H\gamma}{V_H} = \frac{(R_H-1)\gamma}{\gamma(A-1)+\frac{R_F-1}{R_F}V_F} = \frac{\gamma}{B_H} = \frac{(R_F-1)\widetilde{V}-(R_H-1)}{1-A}$ and $\widetilde{V} \equiv \frac{R_H V_F}{V_H R_F} = \frac{B_F}{B_H}$, so that, under the maintained net-importer configuration $A < 1$ (so $1 - A > 0$), $\Xi > 0$ exactly under the admissibility floor (13), consistent with the steady-state discipline (12) and Lemma 4.

B.7 Proofs for the Testable Predictions

This appendix proves the signs reported in Table 1 of the main text, using the closed-form solution of the model. Throughout we maintain the assumptions in that table's Notes: the Home country is a net importer, $\overline{NX} = \gamma(A-1) < 0$ so $A < 1$, with $0 < \gamma < 1/2$, $0 < A\gamma < 1/2$, and $0 < \widetilde{V} < 1$, together with admissibility of the steady state ($\Xi > 0$).

B.7.1 Notation and results

Let $a \equiv R_H - 1 > 0$ and $b \equiv R_F - 1 > 0$ denote the steady-state net interest rates, and recall $y_H = 1 + \overline{NX}$, $y_F = 1 - \overline{NX}$. Define

$$\Gamma \equiv 1 - 2\gamma - \overline{NX} \;=\; 1 - \gamma - A\gamma, \quad \varphi \equiv \gamma\big[(1+A) - (1+A^2)\gamma\big], \quad \delta \equiv y_H y_F,$$

$$\Lambda \equiv A\big[1 - A\gamma(1-\gamma)\big] + \gamma(1-\gamma), \quad \mu \equiv (1-\overline{NX})^2 + \gamma\overline{NX}, \quad \mathcal{D} \equiv \Xi\Lambda + b\,\widetilde{V}\,\Gamma^2,$$

and $\mathcal{N}_\tau \equiv \Xi\mu - \gamma(1-A\gamma)\big[(1-\rho)(1+\widetilde{V}) + 2b\,\widetilde{V}\big]$, where $\rho \in [0,1)$ is the tariff persistence (at $\rho = 0$, $\mathcal{N}_\tau = \Xi\mu - \gamma(1-A\gamma)[1+\widetilde{V}(2R_F-1)]$), so that Proposition 1 reads $\hat{\mathcal{E}}_t = (\Gamma^2/\delta)\hat{w}_t - (2\gamma(1-A\gamma)/y_F)\hat{\tau}_t$ with wedge loadings $\Gamma_\tau = -\frac{a\,y_H}{(R_H-\rho)\mathcal{D}}\mathcal{N}_\tau$, $\Gamma_\psi = \frac{\mathcal{D}+a(1+\widetilde{V})\varphi}{R_H\mathcal{D}}$, $\Gamma_\sigma = (\eta+\kappa)\Gamma_\psi - \frac{\eta\,a\,\delta}{R_H\mathcal{D}}$, and $\Gamma_V = \frac{a\,\delta}{\mathcal{D}}$. (Here we used $\gamma(1-\gamma-\overline{NX}) = \gamma(1-A\gamma)$ and $A(1-A\gamma) + (1-\gamma) = \varphi/\gamma$.)

$$\hat{V}_{H,t} = R_H\hat{V}_{H,t-1} - \underbrace{\frac{R_H\gamma}{V_H}}_{\Xi}\Big[A(\hat{C}_{F,t}+\hat{\mathcal{E}}_t) - (\hat{C}_{H,t}-\hat{\tau}_t)\Big] + \hat{i}_{H,t} - \underbrace{\frac{R_H V_F}{V_H R_F}}_{\widetilde{V}}\Big[(R_F-1)\hat{\mathcal{E}}_t + \hat{i}_{F,t}\Big]. \tag{B.22}$$

Lemma 2 (Building blocks)**.** *Under* $0 < \gamma < 1/2$, $0 < A\gamma < 1/2$, $0 < A < 1$*:* $0 < y_H < 1 < y_F$, $\Gamma > 0$, $\varphi > 0$, $\Lambda > 0$, $\mu > 0$, $1 - A\gamma > 1/2$, *and, for* $\Xi > 0$, $\mathcal{D} > 0$. *Moreover*

$$\delta \ = \ \Gamma^2 + 2\varphi. \tag{B.24}$$

Proof. $\overline{NX} \in (-\gamma, 0)$ gives the y bounds. $\Gamma = 1 - \gamma - A\gamma > 1 - \frac{1}{2} - \frac{1}{2} = 0$. For φ: $(1 + A) - (1 + A^2)\gamma > (1 + A) - \frac{1+A^2}{2} = \frac{2-(1-A)^2}{2} > \frac{1}{2}$. Λ is a sum of positive terms since $A\gamma(1-\gamma) < \frac{1}{2}$. $\mu = y_F^2 + \gamma\overline{NX} > 1 - \gamma^2 > 0$. Identity (B.24): $\delta = 1 - \overline{NX}^2 = 1 - \gamma^2(A-1)^2$ and $\Gamma^2 + 2\varphi = \big(1 - (1+A)\gamma\big)^2 + 2\gamma(1+A) - 2\gamma^2(1+A^2) = 1 + \gamma^2\big[(1+A)^2 - 2(1+A^2)\big] = 1 - \gamma^2(A-1)^2$ by direct expansion. □

Lemma 3 (Block separation under persistence)**.** *Guess* $x_t = x_\tau\hat{\tau}_t + x_\sigma\sigma_t^2 + x_\psi\psi_t + x_V\hat{V}_{H,t-1}$ *for each endogenous variable* x*. Under* $\hat{\tau}_{t+1} = \rho\hat{\tau}_t + \varepsilon_{t+1}$ *with one-off* σ_t^2, ψ_t*,*

$$\mathbb{E}_t x_{t+1} = \rho\, x_\tau\, \hat{\tau}_t + x_V\, \hat{V}_{H,t},$$

so ρ *enters the coefficient-matching system only through the* $\hat{\tau}_t$*-block. Consequently the loadings* (x_σ, x_ψ, x_V) *of every endogenous variable—and hence* $\Gamma_\sigma, \Gamma_\psi, \Gamma_V, \mathcal{D}$*,* v_σ, v_ψ*, and the* σ^2*- and* ψ*-columns of all results below—are identical for all* $\rho \in [0, 1)$ *conditional on the reduced-form composites* (η, κ)*, and only the* $\hat{\tau}_t$*-loadings depend on* ρ*; in the structural exercise of Section 5, where* $\eta = (\alpha/2)\lambda_C(\rho)^2$ *and* $\kappa = \chi\lambda_E(\rho)^2$*, those composites inherit* ρ*-dependence through the impact loadings.*

Proof. Substituting the guess into $\mathbb{E}_t$, the σ_{t+1}^2 and ψ_{t+1} terms vanish (one-off shocks) and $\mathbb{E}_t\hat{\tau}_{t+1} = \rho\hat{\tau}_t$, giving the displayed expression with $\hat{V}_{H,t}$ itself replaced by its guess. Collecting coefficients on σ_t^2, ψ_t, $\hat{V}_{H,t-1}$ in each equilibrium condition then yields equations that contain no ρ and no $\hat{\tau}$-block unknowns, i.e., exactly the $\rho = 0$ system for those blocks; the $\hat{\tau}_t$-coefficients solve a separate linear system in which ρ appears. □

Lemma 4 (Steady-state discipline)**.** *The steady-state external account* $V_H(1 - \frac{1}{R_H}) = \overline{NX} +$

$V_F(1-\frac{1}{R_F})$ is, in the $(\Xi,\widetilde{V})$ parametrization,

$$\gamma\, a = \overline{NX}\,\Xi + \gamma\, b\,\widetilde{V} \qquad \Longleftrightarrow \qquad \Xi = \frac{b\,\widetilde{V}-a}{1-A}\,, \qquad \textit{i.e.} \qquad b\,\widetilde{V} = a + (1-A)\,\Xi. \quad \text{(B.25)}$$

Hence admissibility ($\Xi > 0$) with $\overline{NX} < 0$ requires $b\,\widetilde{V} > a$; and if in addition $\widetilde{V} \leq 1$, then $b > a$, i.e. $R_F > R_H$.

Proof. Divide the external account by $V_H/R_H = B_H = \gamma/\Xi$, use $\widetilde{V} = B_F/B_H$, and $\overline{NX} = -\gamma(1-A)$. The last claim: $b \geq b\widetilde{V} > a$. ☐

Lemma 5 (Static relations)**.** *The following identities hold: $\Gamma + Ay_F = \varphi/\gamma$ and $\varphi - \gamma A y_F = \gamma\Gamma$. Moreover, combining the CPI and goods-market conditions with Proposition 1,*

$$\hat{p}_{H,t} = -\frac{\gamma\Gamma}{\delta}\,\hat{w}_t - \frac{\gamma(1-A\gamma)}{y_F}\,\hat{\tau}_t, \tag{B.26}$$

$$\hat{C}_{H,t} = \hat{p}_{H,t} - \frac{A\gamma}{y_H}\,\hat{w}_t \;=\; -\frac{\varphi}{\delta}\,\hat{w}_t - \frac{\gamma(1-A\gamma)}{y_F}\,\hat{\tau}_t. \tag{B.27}$$

Proof. The identities are direct expansions. The CPI conditions give $\hat{p}_{F,t} = -\frac{A\gamma}{1-A\gamma}(\hat{p}_{H,t} - \hat{\mathcal{E}}_t)$ and then $\Gamma\,\hat{p}_{H,t} = -\gamma\hat{\mathcal{E}}_t - \gamma(1-A\gamma)\hat{\tau}_t$; substituting $\hat{\mathcal{E}}_t$ from Proposition 1 and using $(y_F - 2\gamma)/y_F = \Gamma/y_F$ yields (B.26). For (B.27), the Home goods-market condition is $(1-\gamma)\hat{C}_{H,t} + A\gamma\hat{C}_{F,t} = y_H\hat{p}_{H,t} - A\gamma\hat{\mathcal{E}}_t$; substituting $\hat{C}_{F,t} = \hat{C}_{H,t} - \hat{\mathcal{E}}_t + \hat{w}_t$ and $1-\gamma+A\gamma = y_H$ gives $\hat{C}_{H,t} = \hat{p}_{H,t} - (A\gamma/y_H)\hat{w}_t$; the second equality then uses $\gamma\Gamma/\delta + A\gamma/y_H = \gamma(\Gamma + Ay_F)/\delta = \varphi/\delta$. ☐

Lemma 6 (Law of motion of debt)**.** *By Lemma 3, $\mathbb{E}_t x_{t+1} = \rho\, x_\tau \hat{\tau}_t + x_V \hat{V}_{H,t}$ for every endogenous variable x; in particular $\mathbb{E}_t \hat{w}_{t+1} = \rho\,\Gamma_\tau \hat{\tau}_t + \Gamma_V \hat{V}_{H,t}$. Matching coefficients in the wedge recursion $\hat{w}_t = \mathbb{E}_t\hat{w}_{t+1} + (\eta+\kappa)\sigma_t^2 - \psi_t$ against Proposition 1 gives $\hat{V}_{H,t} = \hat{V}_{H,t-1} + v_\tau\hat{\tau}_t + v_\sigma\sigma_t^2 + v_\psi\psi_t$ (a unit root) with*

$$v_\tau = \frac{(1-\rho)\,\Gamma_\tau}{\Gamma_V} = -\frac{(1-\rho)\,\mathcal{N}_\tau}{(R_H-\rho)\,y_F}, \qquad v_\sigma = \frac{\Gamma_\sigma - (\eta+\kappa)}{\Gamma_V} = \frac{(\eta+\kappa)\big[(1+\widetilde{V})\varphi - \mathcal{D}\big] - \eta\,\delta}{R_H\,\delta}$$

$$v_\psi = \frac{1-\Gamma_\psi}{\Gamma_V} = \frac{\mathcal{D} - (1+\widetilde{V})\varphi}{R_H\,\delta}. \tag{B.28}$$

The $\hat\tau_t$-matching condition, $\Gamma_\tau = \rho\,\Gamma_\tau + \Gamma_V v_\tau$, is exactly the statement that the wedge remains a martingale absent volatility shocks for any ρ; and $v_\tau \to 0$ as $\rho \to 1$: a permanent tariff triggers no debt dynamics.

Proof. Substitute the guessed forms, match the coefficients on $\hat\tau_t$, σ_t^2, ψ_t, and use $\Gamma_\psi - 1 = \frac{a[(1+\widetilde{V})\varphi - \mathcal{D}]}{R_H \mathcal{D}}$ and $\Gamma_V = a\delta/\mathcal{D}$. For v_τ: $(1-\rho)\Gamma_\tau/\Gamma_V = -(1-\rho)\frac{a y_H \mathcal{N}_\tau}{(R_H-\rho)\mathcal{D}} \cdot \frac{\mathcal{D}}{a\delta} = -\frac{(1-\rho)\mathcal{N}_\tau}{(R_H-\rho)y_F}$. □

Lemma 7 (Observational equivalence of $\kappa\sigma^2$ and $-\psi$)**.** *The terms $\kappa\sigma_t^2$ and ψ_t enter the equilibrium system only through the UIP condition, as the combination $\kappa\sigma_t^2 - \psi_t$. Hence for every endogenous variable x_t, the κ-component of its σ^2-loading equals* minus *its ψ-loading:*

$$x_\sigma \;=\; \eta\, x^{(\eta)} \;-\; \kappa\, x_\psi,$$

where $x^{(\eta)} \equiv \partial x_\sigma/\partial\eta$ and x_ψ is the loading on ψ_t.

Proof. Immediate from inspection of equations (1)–(8): σ_t^2 appears only as $\eta\sigma_t^2$ in the Home Euler equation and as $\kappa\sigma_t^2$ in the UIP condition, where it is paired with $-\psi_t$. □

B.7.2 The interest-rate differential column

Proposition 3 (Interest differential)**.** *The impact responses of $\hat{i}_{H,t} - \hat{i}_{F,t}$ are, for any admissible $(\Xi, \widetilde{V}, R_H, R_F)$,*

$$\underbrace{\frac{2(1-\rho)\gamma(1-A\gamma)}{y_F}}_{\hat\tau_t\text{-loading}>0}, \qquad \underbrace{\frac{2\kappa\varphi - \eta\,\Gamma^2}{\delta}}_{\sigma_t^2\text{-loading}\gtrless 0}, \qquad \underbrace{-\frac{2\varphi}{\delta}}_{\psi_t\text{-loading}<0}, \qquad \underbrace{0}_{\hat V_{H,t-1}\text{-loading}}. \tag{B.29}$$

Hence: a tariff increase raises the differential (row 1: +, proved, independently of $\widetilde{V}$*); a convenience-yield decline ($\psi_t \downarrow$) raises the differential (row 3: +,* proved*); an uncertainty increase raises the differential* if and only if $2\kappa\varphi > \eta\,\Gamma^2$ *(row 2: ≈ 0, sign conditional); only d_τ depends on ρ, and $d_\tau \downarrow 0$ as $\rho \to 1$.*

Proof. From Proposition 1, $\mathbb{E}_t\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t = \frac{\Gamma^2}{\delta}\big(\mathbb{E}_t\hat{w}_{t+1} - \hat{w}_t\big) - \frac{2\gamma(1-A\gamma)}{y_F}\big(\mathbb{E}_t\hat{\tau}_{t+1} - \hat{\tau}_t\big)$, where $\mathbb{E}_t\hat{\tau}_{t+1} - \hat{\tau}_t = (\rho-1)\hat{\tau}_t$ and, by Lemma 6, the $\hat{\tau}_t$-component of $\mathbb{E}_t\hat{w}_{t+1} - \hat{w}_t$ is $\rho\Gamma_\tau + \Gamma_V v_\tau - \Gamma_\tau = 0$, so the wedge recursion gives $\mathbb{E}_t\hat{w}_{t+1} - \hat{w}_t = -(\eta+\kappa)\sigma_t^2 + \psi_t$ exactly as before. Substituting into the UIP condition $\hat{\imath}_{H,t} - \hat{\imath}_{F,t} = \mathbb{E}_t\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t + \kappa\sigma_t^2 - \psi_t$ yields the $\hat{\tau}_t$-loading, the σ_t^2-loading $\kappa - (\eta+\kappa)\Gamma^2/\delta = (2\kappa\varphi - \eta\Gamma^2)/\delta$ by (B.24), and the ψ_t-loading $\Gamma^2/\delta - 1 = -2\varphi/\delta$. The state drops out because the differential responds to $\mathbb{E}_t\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t$, and along the unit-root state both terms load identically. Signs follow from Lemma 2. □

The sign of the σ^2 cell flips at $\kappa/\eta = \Gamma^2/(2\varphi)$, which is why the table records the entry as approximately zero.

B.7.3 The exchange-rate column

Define $\Theta_U \equiv \frac{\Gamma^2}{R_H\delta}\Big[1 + \frac{a(1+\widetilde{V})\varphi}{\mathcal{D}}\Big]$ and $\Theta_E \equiv \Theta_U - \frac{a\Gamma^2}{R_H\mathcal{D}} = \frac{\Gamma^2}{R_H\,\delta\,\mathcal{D}}\Big[\mathcal{D} - a\big(\Gamma^2 + (1-\widetilde{V})\varphi\big)\Big]$, where the second equality uses $\delta - (1+\widetilde{V})\varphi = \Gamma^2 + (1-\widetilde{V})\varphi$ from (B.24). The exchange-rate loadings implied by Proposition 1 are

$$\hat{\mathcal{E}}_t : \qquad e_\tau = \frac{(1-\rho)\,\gamma(1-A\gamma)\,\Gamma^2 f(\widetilde{V}) - \Xi\,\mathcal{K}_\rho}{(R_H-\rho)\,y_F\,\mathcal{D}}, \qquad e_\sigma = \eta\,\Theta_E + \kappa\,\Theta_U, \qquad e_\psi = -\,\Theta_U, \tag{B.30}$$

with $f(\widetilde{V}) = a - (2b-a)\widetilde{V}$ and $\mathcal{K}_\rho = a\Gamma^2\mu + 2\gamma(1-A\gamma)(R_H-\rho)\Lambda > 0$ as in Lemma 1 of the main text.

Proposition 4 (Exchange rate)**.** *Under the maintained assumptions and Lemma 4:*

(i) Tariff. *$e_\tau < 0$ for every admissible $\widetilde{V} > 0$, every $R_F \geq R_H$, and every $\rho \in [0,1)$.*

(ii) Convenience. *$\Theta_U > 0$, so $e_\psi < 0$ and a decline in ψ_t depreciates: row 3's "+" is proved.*

(iii) Uncertainty. *$e_\sigma > 0$ whenever $\Theta_E \geq 0$, for which $\Xi\Lambda \geq a\varphi$ is sufficient (as is $\widetilde{V} \geq 1$); in general $e_\sigma > 0 \iff \kappa\,\Theta_U > -\eta\,\Theta_E$. Row 2's "+" therefore holds generically; it can fail only in the corner where gross positions are extreme ($\Xi \to 0$, i.e., $B_H = \gamma/\Xi \to \infty$)* and

η/κ is large.

Proof. (i) Under $\overline{NX} < 0$ with steady-state admissibility, $e_\tau < 0$ for every admissible $\widetilde{V} > 0$, every $R_F \geq R_H$, and every $\rho \in [0,1)$ (Lemma 1 and Proposition 2 in the main text; the factor $(1-\rho)$ multiplies only the wedge channel, so persistence weakly strengthens the appreciation). (ii) Immediate from Lemma 2. (iii) $\Theta_E \geq 0 \iff \mathcal{D} \geq a\big(\Gamma^2 + (1-\widetilde{V})\varphi\big)$. By (B.25), $\mathcal{D} = \Xi\Lambda + \big(a + (1-A)\Xi\big)\Gamma^2 \geq a\Gamma^2 + \Xi\Lambda$, so $\Xi\Lambda \geq a\varphi \geq a(1-\widetilde{V})\varphi$ suffices; if $\widetilde{V} \geq 1$ the right side is $\leq a\Gamma^2$ and the condition is automatic. $\square$

B.7.4 The stock-price column

Lemma 8 (Stock-price representation)**.** *For any tariff persistence $\rho \in [0,1)$, the recursion* (B.36) *solves to*

$$\hat{S}_t = \frac{\gamma A}{y_H}\,\mathbb{E}_t\hat{w}_{t+1} - \frac{\varphi}{\delta}\,\hat{w}_t - \frac{\gamma(1-A\gamma)}{y_F}\,\hat{\tau}_t + \eta\,\sigma_t^2. \tag{B.31}$$

At $\rho = 0$, $\mathbb{E}_t\hat{w}_{t+1} = \Gamma_V\hat{V}_{H,t}$ and (B.31) *reads $\hat{S}_t = \frac{a\gamma A y_F}{\mathcal{D}}\hat{V}_{H,t} - \frac{\varphi}{\delta}\hat{w}_t - \frac{\gamma(1-A\gamma)}{y_F}\hat{\tau}_t + \eta\sigma_t^2$.*

Proof. By Lemma 5, $\hat{C}_{H,t} = \hat{p}_{H,t} - (A\gamma/y_H)\hat{w}_t$. Substituting into the Home Euler equation $\hat{i}_{H,t} = \mathbb{E}_t\hat{C}_{H,t+1} - \hat{C}_{H,t} - \eta\sigma_t^2$ and using the wedge recursion $\mathbb{E}_t\hat{w}_{t+1} - \hat{w}_t = -(\eta+\kappa)\sigma_t^2 + \psi_t$ gives the exact identity

$$\hat{i}_{H,t} = \mathbb{E}_t\hat{p}_{H,t+1} - \hat{p}_{H,t} - z_t, \qquad z_t \equiv \eta\sigma_t^2 - \frac{A\gamma}{y_H}\big[(\eta+\kappa)\sigma_t^2 - \psi_t\big]. \tag{B.32}$$

Guess $\hat{S}_t = \hat{p}_{H,t} + z_t$. Since σ_t^2, ψ_t are one-off, $\mathbb{E}_t z_{t+1} = 0$, and the right side of (B.36) evaluates to $-\hat{i}_{H,t} + \mathbb{E}_t\hat{p}_{H,t+1} = \hat{p}_{H,t} + z_t$ by (B.32), confirming the guess for any ρ. Substituting $\hat{p}_{H,t}$ from Lemma 5 and z_t, and using $\gamma\Gamma/\delta = \varphi/\delta - A\gamma/y_H$ together with $\hat{w}_t - (\mathbb{E}_t\hat{w}_{t+1} - \hat{w}_t)$-bookkeeping via the wedge recursion, yields (B.31). $\square$

Remark 1 (Dividend representation). The proof establishes the sharper statement

$$\hat{S}_t = \hat{p}_{H,t} + \eta\sigma_t^2 - \frac{A\gamma}{y_H}\big[(\eta+\kappa)\sigma_t^2 - \psi_t\big],$$

exactly and for any ρ. In particular $s_\tau = p_\tau$ identically—tariff news moves equities only through the producer price—which is used in the proof of Proposition 5.

Combining (B.31) with Lemma 6 gives the loadings analyzed next.

Proposition 5 (Stock prices: tariff and convenience)**.** *For every admissible parameter vector (any $\widetilde{V} > 0$, $\Xi > 0$ satisfying* (B.25)*, $A < 1$):*

(i) $s_\psi = \dfrac{\mathcal{D}\,(a\gamma A y_F + \varphi) + a(1+\widetilde{V})\gamma\Gamma\varphi}{R_H\,\delta\,\mathcal{D}} > 0$, *so a convenience-yield* decline *lowers stock prices: row 3's "−" is proved.*

(ii)

$$s_\tau = \frac{\gamma\Big[a\,\Gamma\,\mathcal{N}_\tau - (R_H-\rho)(1-A\gamma)\,\mathcal{D}\Big]}{(R_H-\rho)\,y_F\,\mathcal{D}} < 0 \qquad \textit{for every } \widetilde{V} > 0,\ R_F \geq R_H,\ \rho \in [0,1).$$

So a tariff increase lowers stock prices: row 1's "−" is proved.

Proof. (i) $s_\psi = (p_V - c_V)v_\psi + \frac{\varphi}{\delta}\Gamma_\psi$; substituting (B.28) and Γ_ψ and collecting over $R_H\delta\mathcal{D}$ gives numerator $a\gamma A y_F\big[\mathcal{D}-(1+\widetilde{V})\varphi\big]+\varphi\big[\mathcal{D}+a(1+\widetilde{V})\varphi\big] = \mathcal{D}(a\gamma A y_F+\varphi)+a(1+\widetilde{V})\varphi(\varphi-\gamma A y_F)$, and $\varphi - \gamma A y_F = \gamma\Gamma > 0$.

(ii) By Remark 1, $s_\tau = p_\tau = -(\gamma\Gamma/\delta)\Gamma_\tau - \gamma(1-A\gamma)/y_F$; substituting Γ_τ and $y_H/\delta = 1/y_F$ gives the display. If $\mathcal{N}_\tau \leq 0$ both numerator terms are negative and we are done. If $\mathcal{N}_\tau > 0$, define $\mathcal{G}_\rho \equiv a\Gamma\mathcal{N}_\tau - (R_H-\rho)(1-A\gamma)\mathcal{D}$ and substitute the steady-state identity $b\widetilde{V} = a + (1-A)\Xi$ into $\mathcal{N}_\tau$ and $\mathcal{D}$. Then $\partial\mathcal{G}_\rho/\partial\widetilde{V} = -a\Gamma\gamma(1-A\gamma)(1-\rho) \leq 0$, so it suffices to sign $\mathcal{G}_\rho$ at $\widetilde{V} = 0$, holding Ξ fixed:

$$\mathcal{G}_\rho(0) = \Xi\Big\{a\Gamma\big[\mu - 2\gamma(1-A\gamma)(1-A)\big] - (R_H-\rho)\,Q\Big\} - a\Gamma\gamma(1-A\gamma)\big(1-\rho+2a\big) - (R_H-\rho)(1-A\gamma)\,a\,\Gamma^2,$$

with $Q \equiv (1 - A\gamma)\big[\Lambda + (1 - A)\Gamma^2\big]$. Since $R_H - \rho = 1 + a - \rho \geq a$ for $\rho \leq 1$, the brace is bounded above by $a\big\{\Gamma[\mu - 2\gamma(1 - A\gamma)(1 - A)] - Q\big\} = aP$, and $P < 0$ by exactly the computation in the transitory case ($P = -A\gamma y_F[A + \gamma(1 - A^2)]$). The remaining terms are strictly negative for $\rho \leq 1$. Hence $\mathcal{G}_\rho < 0$ for all $\widetilde{V} \geq 0$ and $s_\tau < 0$. □

Proposition 6 (Stock prices: uncertainty)**.** *By Lemma 7, the σ^2-loading of the stock price is*

$$s_\sigma \;=\; \eta\Big[1 + \frac{a\gamma\Gamma}{R_H\mathcal{D}}\Big] \;-\; (\eta + \kappa)\, s_\psi, \tag{B.33}$$

with $s_\psi > 0$ from Proposition 5. Hence row 2's "−" is ***conditional****: $s_\sigma < 0$ if and only if*

$$\frac{\kappa}{\eta} \;>\; \frac{1 + \frac{a\gamma\Gamma}{R_H\mathcal{D}}}{s_\psi} - 1.$$

The κ (UIP-premium) channel unambiguously depresses equities, $\partial s_\sigma/\partial\kappa = -s_\psi < 0$, while the η (precautionary) channel generically lifts them by lowering $\hat{i}_{H,t}$.

Proof. By Lemma 7, $\partial s_\sigma/\partial\kappa = -s_\psi$. For the η-part, differentiate the loadings entering (B.31): $\partial v_\sigma/\partial\eta = \big[(1+\widetilde{V})\varphi - \mathcal{D} - \delta\big]/(R_H\delta)$ and $\partial\Gamma_\sigma/\partial\eta = \Gamma_\psi - a\delta/(R_H\mathcal{D})$; collecting over $R_H\delta\mathcal{D}$ and using $\varphi - \gamma A y_F = \gamma\Gamma$ gives $s^{(\eta)} = 1 + \frac{a\gamma\Gamma}{R_H\mathcal{D}} - s_\psi$. Then $s_\sigma = \eta s^{(\eta)} - \kappa s_\psi$ rearranges to (B.33). □

Remark 2 (Restoring the equity risk premium). The stock-price recursion used above is exact to first order and drops $\mathrm{Cov}_t\big(\hat{M}_{t+1}, \hat{S}_{t+1} + \hat{p}_{H,t+1}\big)$, a term of order σ_t^2—the *same* order as the $\eta\sigma_t^2$ and $\kappa\sigma_t^2$ terms retained in the Euler and UIP conditions. For CARA Home households this covariance is negative (a tariff realization at $t+1$ lowers consumption and the dividend together), so treating it symmetrically adds $-\varsigma\,\sigma_t^2$, $\varsigma \geq 0$, to the right side of the recursion and shifts s_σ to $s_\sigma - \varsigma$. With the equity risk premium restored, the table's "−" for row 2 holds whenever ς exceeds the (small) net of the two interest-rate channels in (B.33).

B.7.5 Derivation of the Tariff Impact Response and Proof of Lemma 1

Because $\partial\hat{\mathcal{E}}_t/\partial\hat{w}_t > 0$, a tariff increase depreciates the Home currency on impact if and only if the endogenous wedge response dominates the direct goods-market term:

$$\frac{\partial\hat{\mathcal{E}}_t}{\partial\hat{w}_t}\,\Gamma_\tau \;>\; \frac{2\gamma(1-\gamma-\overline{NX})}{y_F}. \tag{B.34}$$

Writing $\Gamma \equiv 1-2\gamma-\overline{NX}$ and substituting $\partial\hat{\mathcal{E}}_t/\partial\hat{w}_t = \Gamma^2/(y_H y_F)$ and Γ_τ from Proposition 1, condition (B.34) collects into the single inequality in $(\widetilde{V},\Xi)$ recorded in Lemma 1. The constant multiplying Ξ in (11) is

$$\mathcal{K}_\rho \;\equiv\; (R_H-1)\,\Gamma^2\left[(1-\overline{NX})^2+\gamma\overline{NX}\right] \;+\; 2\gamma(1-\gamma-\overline{NX})(R_H-\rho)\Big\{A\,[1-A\gamma(1-\gamma)]+\gamma(1-\gamma)\Big\}, \tag{B.35}$$

which is independent of Ξ, $\widetilde{V}$, and R_F.

Proof of Lemma 1. Combine (B.34) with the goods-market term: the total effect is

$$\frac{\partial\hat{\mathcal{E}}_t}{\partial\hat{\tau}_t} \;=\; -\,\frac{(R_H-1)\,\Gamma^2\,\mathcal{N}_\tau \;+\; 2\gamma(1-\gamma-\overline{NX})(R_H-\rho)\,\mathcal{D}}{(R_H-\rho)\,y_F\,\mathcal{D}}.$$

Substituting the definitions of $\mathcal{N}_\tau$ and $\mathcal{D}$ and grouping the terms proportional to $\widetilde{V}$ and to Ξ yields (11) with $\mathcal{K}_\rho$ as in (B.35), using the identity

$$(R_H-1)\big[(1-\rho)+2(R_F-1)\big]-2(R_H-\rho)(R_F-1) \;=\; (1-\rho)\big(R_H+1-2R_F\big),$$

so that the $\widetilde{V}$-slope and the intercept of the first numerator term share the common factor $(1-\rho)$. Positivity of $\mathcal{K}_\rho$ follows from $0<\gamma<1/2$, $0<A\gamma<1/2$, and $R_H-\rho>R_H-1>0$: the first bracket equals $y_F^2+\gamma\overline{NX} > 1-2|\overline{NX}|+\overline{NX}^2 \geq 0$ and the second bracket is a sum of positive terms. $\square$

B.7.6 Proof of Proposition 2

Proof. (i) Since $R_F \geq R_H > 1$, we have $2R_F - R_H - 1 = (R_F - R_H) + (R_F - 1) \geq R_F - 1 > 0$, so f is strictly decreasing in $\widetilde{V}$. Evaluating f at the floor (13),

$$f(\widetilde{V}) \ < \ (R_H - 1) - \big(2R_F - R_H - 1\big)\frac{R_H - 1}{R_F - 1} \ = \ (R_H - 1)\,\frac{R_H - R_F}{R_F - 1} \ \leq \ 0,$$

and $1 - \rho > 0$, so the numerator of (11) is the sum of a nonpositive term and the strictly negative term $-\Xi\mathcal{K}_\rho$.

(ii) $\widetilde{V} \leq 1$ and (13) give $R_F - 1 \geq (R_F - 1)\widetilde{V} > R_H - 1$.

(iii) Necessity follows from (i) and (13). For existence, note from (12) that $\Xi \downarrow 0$ as $\widetilde{V} \downarrow (R_H - 1)/(R_F - 1)$, while

$$(1 - \rho)\, f(\widetilde{V}) \ \longrightarrow \ (1 - \rho)\,(R_H - 1)\,\frac{R_H - R_F}{R_F - 1} \ > \ 0 \qquad \text{when } R_H > R_F,$$

so $(1 - \rho)f$ remains bounded away from zero at the floor; continuity of (11) then delivers a nonempty open interval of admissible $\widetilde{V}$ with $\partial\hat{\mathcal{E}}_t/\partial\hat{\tau}_t > 0$. □

B.7.7 The Equity Block: Household-Level Setup and Linearization

Let a unit continuum of Home households, $h \in [0, 1]$, trade among themselves shares $\zeta_{h,t}$ of a Lucas tree. The tree is in unit net supply, is held only by Home households, and produces the Home endowment y_H each period, so its nominal dividend is $D_t \equiv p_{H,t}y_H$. Equity terms enter individual budgets as $S_t\zeta_{h,t}$ on the expenditure side and $(S_t + D_t)\zeta_{h,t-1}$ on the income side; aggregating over h, stock trades cancel and aggregate dividends equal $p_{H,t}y_H$, so the aggregate Home budget constraint and all equilibrium conditions of the main text are unchanged. Since y_H is constant, $\hat{D}_t = \hat{p}_{H,t}$.

Around the steady state $S = y_H/(R_H - 1)$, with $\hat{S}_t \equiv (S_t - S)/S$ and $\mathbb{E}_t M^H_{t,t+1} = R^{-1}_{H,t}$, the Euler equation (14) linearizes to

$$\hat{S}_t = -\hat{\imath}_{H,t} + R_H^{-1}\,\mathbb{E}_t\hat{S}_{t+1} + \left(1 - R_H^{-1}\right)\mathbb{E}_t\hat{p}_{H,t+1}. \tag{B.36}$$

For one-time shocks ($\rho = 0$), (B.36) delivers the closed form (15) reported in the main text; the solution is stated and proved as Lemma 8.

B.8 Long run: a permanent tariff that closes the trade balance

In this subsection, to map our model to models of permanent tariffs in the long run and other static tariff models—in particular the permanent-tariff benchmarks of Itskhoki and Mukhin (2025), who ask whether an import tariff can close a long-run trade deficit and show it appreciates the real exchange rate, and Aguiar, Amador and Fitzgerald (2025), who study how tariff wars revalue gross foreign asset positions—we consider the nonlinear steady states of the model under a permanent tariff. In particular, we focus on a tariff τ' that closes the trade balance.

Let us begin by removing all non-tariff shocks (e.g. we set $\sigma_t^2 = 0\ \forall t$) and fix endowments (y, y^*). With constant consumption the Euler equations pin gross rates at $R_H = 1 + i = \beta_H^{-1}$ and $R_F = 1 + i^* = \beta_F^{-1}$ (so $i < i^*$ requires $\beta_H > \beta_F$). We conjecture, and verify, that the exchange rate is constant within each steady state; UIP with a constant wedge, $(R_H/R_F)(1+\psi) = \mathbb{E}_t\mathcal{E}_{t+1}/\mathcal{E}_t$, then reduces to $1+\psi = R_F/R_H$, i.e. $\psi = (i^*-i)/(1+i) \approx i^*-i$: the wedge absorbs the steady-state differential exactly, while the *level* of $\mathcal{E}$ is left to the balance of payments. (The once-and-for-all jump in $\mathcal{E}$ at the shock date is an unanticipated revaluation, unrestricted by UIP. Under this convention $\psi > 0$ is a convenience premium on Home bonds, exactly the convenience-service flow ψ_t of the main text, whose steady-state UIP condition with $\sigma^2 = 0$ reads $R_H/R_F = 1/(1 + \bar{\psi})$.) Setting $\theta = 1$ (Cobb–Douglas), fixing both CPIs at 1 by policy, and holding Home's own-currency debt at B and its foreign-currency asset at B^* (both > 0), the steady state reduces to five equations in $(p_H, p_F, \mathcal{E}, C, C^*)$:

$$1 = p_H^{1-\gamma}(\mathcal{E} p_F \tau)^{\gamma}, \qquad 1 = p_F^{1-\gamma^*}(p_H/\mathcal{E})^{\gamma^*}, \qquad iB = \underbrace{\gamma^* \mathcal{E} C^* - \gamma C/\tau}_{NX(\tau)} + \mathcal{E} B^* i^*, \tag{B.37}$$

$$y = (1-\gamma)\tfrac{C}{p_H} + \gamma^* \tfrac{\mathcal{E} C^*}{p_H}, \quad y^* = \gamma \tfrac{C}{\mathcal{E} p_F \tau} + (1-\gamma^*)\tfrac{C^*}{p_F}. \tag{B.38}$$

Tariff-free benchmark. At $\tau_- = 1$, normalizing $p_{H,-} = p_{F,-} = \mathcal{E}_- = 1$ and writing $\Phi \equiv 1-\gamma-\gamma^* > 0$, market clearing gives $C_- = [(1-\gamma^*)y - \gamma^* y^*]/\Phi$, $C^*_- = [(1-\gamma)y^* - \gamma y]/\Phi$, hence $NX_- = (\gamma^* y^* - \gamma y)/\Phi$, and the bond equation imposes the consistency condition

$$iB - i^* B^* = NX_-. \tag{B.39}$$

The U.S.-relevant case is an initial deficit, $NX_- < 0$ (equivalently $\gamma^* y^* < \gamma y$), so $iB < i^* B^*$.

Zero-NX steady state. Guess and verify: if τ' satisfies $NX(\tau') = 0$, the bond equation forces $iB = \mathcal{E}' B^* i^*$, and with $Q' \equiv \mathcal{E}' p'_F / p'_H$ the system is solved in closed form by

$$\begin{gathered} Q' = \frac{\gamma y}{\gamma^* y^*} \frac{1}{\gamma + (1-\gamma)\tau'}, \qquad p'_F = (Q')^{\gamma^*}, \qquad p'_H = (Q')^{-\gamma}(\tau')^{-\gamma}, \\ C^{*\prime} = y^*(Q')^{\gamma^*}, \qquad C' = \frac{\gamma^* y^*}{\gamma}(Q'\tau')^{1-\gamma}, \end{gathered} \tag{B.40}$$

with $\mathcal{E}' = (Q')^{\Phi}(\tau')^{-\gamma} = iB/(i^* B^*)$; the last equality is the scalar equation pinning τ'.

Main result: appreciation. Using (B.39), $\mathcal{E}' = iB/(iB - NX_-)$, so

$$NX_- < 0 \implies \mathcal{E}' < 1 = \mathcal{E}_-, \qquad \text{with } \tau' > 1. \tag{B.41}$$

($\tau' > 1$ because $F(\tau) \equiv [\frac{\gamma y}{\gamma^* y^*} \frac{1}{\gamma + (1-\gamma)\tau}]^{\Phi} \tau^{-\gamma}$ is strictly decreasing with $F(1) = (\gamma y / \gamma^* y^*)^{\Phi} > 1 > \mathcal{E}'$.) Closing the trade balance with a permanent tariff therefore *appreciates* the dollar: it extinguishes exactly the net factor income that finances the deficit, which requires shrinking the Home-currency value of the out-yielding foreign-currency leg.

Remark 3 (The wedge is mandatory). $NX_- < 0$ gives $iB < i^* B^*$; if in addition $B \geq B^*$ (as in the data), then $i^* > (B/B^*)\, i \geq i$, so $\psi > 0$ strictly. A net-importer, constant-debt steady state with $B \geq B^*$ cannot satisfy UIP without the wedge: $\psi = 0$ would force $B < B^*$. This is the exorbitant-privilege configuration — the deficit is financed by carry on the out-yielding foreign asset — and it, not the face-value ordering of B and B^*, signs the exchange-rate movement.

Remark 4 (Flow vs. stock settlement). Zeroing the income *flow* requires $\mathcal{E}' = iB/(i^* B^*) < 1$; zeroing the net-asset *stock* requires $\mathcal{E}^{\text{nfa}} = B/B^* > 1$, a depreciation. The two coincide iff $\psi = 0$, which the previous remark rules out. At $\mathcal{E}^{\text{nfa}}$ trade never balances ($NX = -(i^* - i)B < 0$ forever); at $\mathcal{E}'$ the net position worsens ($\mathcal{E}' B^* - B = \frac{i - i^*}{i^*} B < B^* - B < 0$) but rolls over at zero net income cost. The stock margin is what a permanent *prohibitive bilateral* war activates in Aguiar, Amador and Fitzgerald (2025) — no flow margin survives, so the exchange rate must revalue gross positions to erase net debt. Here trade stays open (Cobb–Douglas admits no prohibitive tariff) and the tariff is unilateral, so the flow condition pins $\mathcal{E}$; the mandated $\psi > 0$ is precisely what separates the two targets and delivers an appreciation.

Calibration. With $y = y^* = 1$, $\gamma = 0.07$, $\gamma^* = 0.06$, $B = 1.70$, $B^* = 1.30$, $i = 0.01$: $NX_- = -0.0115$; (B.39) pins $i^* = 0.02192$, hence $\psi = +0.01180$ ($\approx$ 118bp convenience premium). Then $\mathcal{E}' = 0.5966$ (a 40% appreciation), $\tau' = 2.067$, $Q' = 0.5855$, $p'_F = C^{*\prime} = 0.9684$, $p'_H = 0.9867$, $C' = 1.0237$, and $NX' = 0$ (both terms 0.03467). For the stock comparison: $\mathcal{E}^{\text{nfa}} = B/B^* = 1.3077$ with perpetual $NX = -0.02026$, while at $\mathcal{E}'$ the net position falls from $B^* - B = -0.40$ to $\mathcal{E}' B^* - B = -0.9244$.

C Constructing TiRADE database

C.1 Inclusion and exclusion

Included: a numeric rate that the President threatens, announces, or implements as a US import tariff, whether prospective or a restatement of a measure in force, including first-term measures recounted as policy (e.g. the Whirlpool washing-machine safeguard). Excluded as false positives:

- foreign tariffs charged on the United States (e.g. Canada's dairy tariffs), unless the President explicitly threatens a matching US tariff with a number;
- value-added taxes and other non-tariff taxes;
- percentage statistics: trade-deficit, GDP, stock-market, market-share, industry-loss, drug-price, and similar figures;
- pure counterfactuals ("if a president had said 100%");
- within one transcript, verbatim restatements of a rate already captured from that transcript (the first or most explicit statement is kept); retweet echoes and near-duplicate reposts of the same post.

Descriptive percentages inside legal instruments that are not tariff rates (e.g. "50% of global smelting capacity") and scope, pause, or suspension amendments that restate prior rates without setting new ones are likewise excluded from the executive-order rows.

C.2 Rate parsing and the exploded master

Where a single source cell states several distinct rates, the exploded sheets split it into one row per rate: semicolon-separated discrete rates become one row each (*one_of_several*); ranges such as "15%–50%" become two rows (*range_low*, *range_high*); compound cells with context ("20% (10%+10%)", "10% (reduced from 25%)") are kept as a single operative rate, the parenthetical numbers being context rather than separate tariffs; future step-ups (e.g. furniture rising on 2027-01-01) are separate rows flagged *scheduled*; and orders that authorize tariffs without a set percentage (the Cuba and Iran secondary-tariff orders, framework deals announced without a rate, the de minimis suspension) carry *rate_role* = *tbd* with rate_value left blank.

C.3 Event identifiers

Records describing the same underlying action are linked by event_id. The match rule is: same normalized country or group, same normalized primary rate, and dates within ± 1 day. Country normalization collapses variants ("All countries", "All foreign", and Annex-I group labels to ALL; "European Union", "France & EU countries", and similar to EU; the BRICS variants to BRICS; "China & others" to CHINA). The ± 1-day window captures announce-then-implement and speech-triggers-post couplings; wider windows begin transitively merging distinct restatements (clusters spanning up to five days), so the window was frozen at ± 1. A strict same-day key is retained as event_id_strict. Event identifiers are re-generated at each build and are therefore stable within but not across builds; cross-build joins should use (date, source_type, countries, rate) or ref_id.

C.4 Time standardization

All times are US Eastern wall-clock, labeled ET. Social-post timestamps are converted from the archive's UTC with correct daylight-saving handling; speech times come from the official calendar (live event start, or taping time for interviews); executive-order times are signing-event start times, attached only where a genuine public signing event could be identified on the signing date (a proxy, flagged time_basis = signing_event). Because US equity markets run on Eastern wall-clock and shift with daylight saving in the same way, datetime_et is directly comparable to market hours; to obtain a precise UTC instant, localize it to the America/New_York zone.

D The ICIO-augmented workbook

The augmented workbook `trump_tariff_events_augmented_20260703.xlsx` is generated end to end from the master workbook and three OECD ICIO reference files by a single script (`Python/tariff_icio_mapping.py`). It adds, for every exploded row: the matched ICIO country ids and ISO codes, the matched ICIO sector ids and codes, a match-status flag, the value of US imports in the affected country×sector cells (USD millions), a text-heuristic action classification, and a running-rate-engine classification. Seven sheets: *README* (goal, judgment calls, verification checklist), *Master_exploded_augmented*, *Annex_I_decreases*, *country_crosswalk*, *sector_crosswalk*, *rate_change_log*, and *final_rate_state*.

D.1 Country crosswalk

Every one of the 123 distinct *countries* strings is hard-coded to a list of ISO codes, so the mapping is auditable line by line; nothing is inferred at runtime. Clean single names map to their ISO. Group tokens expand: the EU variants to the 27 member ISOs; "All countries"/"All foreign" to all 80 partners; the BRICS variants to the founding members present in ICIO (BRA, RUS, IND, CHN, ZAF). Countries not individually modelled in ICIO (Algeria, Lesotho, Venezuela, Ecuador, and similar) are left unmapped rather than folded into the rest-of-world aggregate, because charging ROW's value to one country would be wrong. Policy-defined groups with no fixed geography (Letter countries, Surplus countries, secondary-sanction buyers, drug-pricing countries, the IEEPA de-minimis rate bands) are left unmapped and flagged not codable.

The reciprocal-tariff sets are defined as: *Annex I* = the partners whose Liberation-Day rate exceeded the 10% floor, taken from the official Annex I schedule with the EU bloc line expanded to its 27 members (55 of the 57 Annex jurisdictions resolve to ICIO); *All other Annex I partners* = Annex I excluding China (the April 9 pause kept China elevated); *Non-Annex-I partners* = all partners minus Annex I minus the separate-regime carve-outs Canada, Mexico, Russia, and Belarus.

D.2 Sector crosswalk

Every one of the 68 distinct *sectors* strings is hard-coded to a list of ICIO sector codes. Core product mappings:

Product term	ICIO code(s)
Steel	C24A
Aluminum, copper (non-ferrous metals)	C24B
Automobiles, auto parts, trucks (all weights)	C29
Pharmaceuticals (all variants)	C21
Semiconductors, smartphones, electronics	C26
Washing machines / electrical equipment	C27
Lumber	C16
Furniture, cabinets/vanities, toys	C31T33
Wine/champagne/alcohol, dairy, food	C10T12
Cattle/beef	A01 + C10T12
Agricultural products	A01 + A02 + A03
Rare earths, metal ores	B07
Potash	B08
Oil/energy	B06 + C19
Aircraft, aerospace	C302T309
Port-handling machinery, cranes	C28
Movies	J58T60

Every "all goods" variant, the IEEPA "fentanyl-linked" scope (legally an all-imports tariff), and mixed "X; all goods" labels map to the 27 goods sectors (ICIO codes beginning A, B, or C); the all-goods scope dominates a combination. De minimis, "certain articles", and transshipment scopes are non-product legal categories and are left unmapped.

D.3 Affected import value and reconciliation

For each row, the affected value is the sum of US imports over the full country×sector grid implied by the resolved ISO and sector lists. It is blank when either list is empty, with the reason recorded in match_status; 347 of 434 rows are valued and 87 blank (policy groups and non-product scopes); among the 420 rows carrying a numeric rate, 340 are valued, the remaining seven valued rows being tbd rows whose country and sector scope resolves but whose rate is unset. The trade file is validated before use (81 countries × 50 sectors; US self-imports zero; grand total 3,611,167 USD millions, of which the 27 goods sectors account for 2,500,441). Three reconciliation totals are asserted programmatically on every run: China × all goods = 453,407.2; all countries × all goods = 2,500,441.3; Canada+Mexico × automobiles = 141,599.1.

D.4 Action classification

Two classifications are provided. The *text heuristic* defaults every first or standalone rate to an increase; a row is a decrease if the rate text contains reduce/pause/suspend/exempt language or an explicit "(from X%)" prior exceeding the new rate; an increase is "potential" unless the event is implemented. Counts: 183 increase, 230 potential increase, 21 decrease.

The *running-rate engine* is the recommended classification. Every ICIO (country, sector) cell starts at an additional rate of zero; events are walked in date order; each implemented action replaces the prevailing rate in its affected cells; a decrease is any cell whose new rate falls below the stored one. Threatened and announced actions are compared against the current state but do not move it; scheduled and tbd rows never update state; where one event cites several rates for a cell, the maximum applies. The engine emits *rate_change_log* (25,863 cell-level changes, of which 5,698 decreases, 5,200 of them implemented) and *final_rate_state* (2,160 cells with a nonzero end-of-sample rate), plus the event-level direction: 58 increase, 28 decrease, 25 mixed, 77 potential increase, 35 potential mixed, 7 potential decrease, 24 no change, 78 not codable (332 events). The February 2026 termination of the IEEPA duties and their replacement with a Section 122 global tariff is detected as a rollback automatically, with no manual override.

D.5 Judgment calls and limitations

Each of the following is a defensible choice, not a fact, and each is isolated to one place in the code: "all goods" means the 27 A/B/C goods sectors only, excluding services; "fentanyl-linked" is treated as all goods because it legally applied to all imports; non-ICIO countries are left unmapped, not folded into ROW; Annex I is defined as Liberation-Day rate above 10% with the EU bloc expanded; "Non-Annex-I" excludes Canada, Mexico, Russia, and Belarus; multi-rate citations for one cell collapse to the maximum; rates replace rather than stack. Known limitations: the running rate is only as granular as the rates present as events (the per-country April 2 Annex I schedule lives in its own sheet, *Annex_I_decreases*); a broad all-goods event overwrites sector cells, so Section 232 tariffs are not layered under broad tariffs and broad rollbacks look larger than the legal reality (the direction of each event is robust, exact intermediate magnitudes depend on the replacement assumption; a two-layer broad-versus-sectoral refinement is the natural extension); and ICIO sector granularity is coarser than some actions (patented and generic pharmaceuticals both land in C21).

D.6 Comparison with the US Tariff Announcement Database (USTAD)

Our database is built for a different object, the communication of tariff policy rather than its statutory computation, and the two are complements. Manova et al. (2026) construct the US Tariff Announcement Database (USTAD) to study *tariff confusion*: they hand-collect all 53 formal US trade-policy announcements made in presidential executive orders and proclamations during 2025 (pertaining to tariffs on 233 origin countries and 18,854 HTS 10-digit products), use them to compute the monthly statutory US import tariff for each origin-product pair, and derive four indicators of the difficulty of computing that tariff: the number of relevant announcements, the number of possible tariff calculations they generate, the highest tariff a firm could plausibly have computed, and the gap between that worst case and the actual statutory rate. Their design decisions follow from that objective: only legally operative instruments enter; the unit is the origin $\times$ HTS-10 product $\times$ month; and the sample ends in December 2025, before the Supreme Court's February 2026 IEEPA ruling, which the authors note generated further changes and confusion.

D.6.1 Reconciliation

USTAD is used in this project both as an input and as an audit benchmark. Each of its 53 announcements was matched against our executive-order layer; announcements already captured from the Federal Register pull were left unchanged, and those absent were added, with the USTAD row number recorded in the supporting excerpt. The integration proceeded in two passes: the initial merge (Step 6 of the replication log) added the Section 232 steel, automobile, and copper proclamations, the framework-implementation orders, and twelve White House statement rows; the rebuild reconciliation (Step 7) caught the remaining USTAD items the first pass had missed: the aluminum proclamation (Proc. 10895), the June 4 doubling of steel and aluminum duties (Proc. 10947), the auto-parts extension (Proc.

10908), and EO 14309 implementing the US–UK Economic Prosperity Deal. As of the 2026-07-03 build, all 53 USTAD announcements are represented, and our executive-order layer additionally covers the 2026 instruments outside USTAD's window (including EO 14389, the post-ruling termination of the IEEPA duties). Conversely, USTAD's HTS-10 statutory calculations have no counterpart here: users who need the tariff line actually applied to a product should use USTAD (or the two in combination, joined on the instrument).

E Calibration Details

Data and construction. All data moments are computed on a single 1999–2024 window—the longest over which every series exists—from one vintage of BEA data: positions from the International Investment Position accounts (Table 1.1), investment-income flows from the International Transactions Accounts (Table 1.2, available from 1999, the binding constraint), the goods-and-services balance from the ITA/FT-900, and GDP and personal consumption expenditures from NIPA Table 1.1.5. Because the model's numeraire is consumption, every ratio is formed per unit of PCE year by year and then averaged (mean PCE/GDP = 0.67); the steady-state identity is homogeneous of degree zero in $(B_H, B_F, \overline{NX})$, so this scaling moves the positions and the deficit but not the implied return. The income yield i_H divides year-t payments by the average of adjacent end-of-year liability positions. The net currency positions apply constant shares to the gross positions under the convention of Lane and Shambaugh (2010) and Bénétrix, Lane and Shambaugh (2015)—portfolio-equity and direct-investment liabilities of the U.S. are dollar-denominated, equity-type claims abroad are foreign-currency—with a dollar share of gross liabilities of 0.95 ("over 90 percent" in Lane and Shambaugh, 2010) and a foreign-currency share of gross assets of 0.65, consistent with the U.S. aggregate exposure in that literature and its updates (Allen, Gautam and Juvenal, 2023). For *any* such shares, $B_F - B_H$ equals the net international investment position identically, so the calibration reproduces the average NIIP (-0.50 in consumption units) by construction. We use long averages rather than end-of-sample levels throughout to construct steady-state values. Parameters over which the data leave a degree of freedom (χ, θ, ρ_τ, ρ_ψ) are not point-calibrated; they are simulated over the ranges in Table 9. No calibrated parameter is chosen to match the event-study estimates; ρ_τ, χ, and ρ_ψ are estimated from them separately (Section 5.2).

Steady state versus data: the implied return as a total return. Treating period averages as a steady state is a substantive abstraction. In the data, the change in the net foreign asset position decomposes into the current account plus valuation effects plus a statistical residual, and the U.S. position has moved with the valuation and residual terms as much as with cumulated current accounts—favorably before 2007, sharply against the U.S. thereafter as the boom in U.S. corporate valuations inflated equity liabilities (Atkeson, Heathcote and Perri, 2025). A stationary model shuts these terms down: in steady state the entire average trade deficit (3.4% of GDP) must be financed by net factor income, whereas measured net investment income averages only +0.9% of GDP over the window. Solving identity (19) for i_F at the measured positions therefore prices the full financing requirement into the return on the net foreign-currency asset: $i_F = 8.8\%$, against a measured cash income yield on assets of 3.9%. The 4.9pp gap is the return the data assign to revaluations and to income that escapes measurement (Hausmann and Sturzenegger, 2007); the resulting differential $i_F - i_H = 6.1$pp is the stationarity-required counterpart of the excess returns documented for the U.S. external balance sheet (Gourinchas and Rey, 2007*a*). Table E.4 varies the currency-share assumptions over the ranges in the literature; the implied return stays between 8.1% and 11.2%. The identity also rules out narrow, bond-only readings of the foreign asset: financing the same deficit with foreign-currency debt claims alone ($B_F \approx 0.1$) would require an implausibly high foreign return. This is the steady-state counterpart of the valuation-relevant, broad reading of $\widetilde{V}$ discussed alongside Proposition 1.

Table E.4. Currency-share assumptions and the implied foreign total return

	FX share of gross assets w_A			
\$ share of gross liabilities s_L	0.55	0.60	**0.65**	0.70
0.90	11.2%	10.3%	9.5%	8.9%
0.95	10.0%	9.4%	**8.8%**	8.3%
0.97	9.7%	9.0%	8.5%	8.1%

Notes: Each cell solves (19) for i_F at $\overline{NX} = -0.050$ and $i_H = 2.64\%$, with $B_H = s_L\, L - (1 - w_A)\, A$ and $B_F = w_A\, A - (1 - s_L)\, L$ built from the 1999–2024 average gross positions (A and L per unit of consumption); $B_F - B_H$ equals the average NIIP in every cell. Bold marks the baseline.

The variance loadings in primitives. In equations (1) and (5), $\eta\sigma_t^2 = \frac{1}{2}\mathrm{Var}_t(\hat{C}_{H,t+1})$ and $\kappa\sigma_t^2 = \chi\mathrm{Var}_t(\hat{\mathcal{E}}_{t+1})$. With the AR(1) tariff process the only date-t+1 innovation is $\varepsilon_{\tau,t+1}$, with variance σ_t^2, so

$$\eta = \frac{\alpha}{2}\,\lambda_C(\alpha,\theta,\rho)^2, \qquad \kappa = \chi\,\lambda_E(\alpha,\theta,\rho)^2,$$

where λ_C and λ_E are the coefficients on a unit tariff innovation in the policy functions for $\hat{C}_{H,t}$ and $\hat{\mathcal{E}}_t$ (for general α the Euler equations carry the semi-elasticity $1/\alpha$ and the precautionary term $\frac{\alpha}{2}\mathrm{Var}_t$; the analytical sections set $\alpha = 1$, while the quantitative calibration uses $\alpha = 2$). For the $\alpha = \theta = 1$ benchmark, Proposition 1 and the static relations of Appendix B.7.1 give the loadings in closed form: with $a = R_H - 1$, $b = R_F - 1$, $y_H = 1 + \overline{NX}$, $y_F = 1 - \overline{NX}$, $\Gamma = 1 - \gamma - A\gamma$, $\varphi = \gamma[(1 + A) - (1 + A^2)\gamma]$, $\delta = y_H y_F$, $\Lambda = A[1 - A\gamma(1-\gamma)] + \gamma(1-\gamma)$, $\mu = (1-\overline{NX})^2 + \gamma\overline{NX}$, $\mathcal{D} = \Xi\Lambda + b\,\widetilde{V}\,\Gamma^2$, and $\mathcal{N}_\tau(\rho) = \Xi\mu - \gamma(1-A\gamma)\big[(1-\rho)(1+\widetilde{V}) + 2b\widetilde{V}\big]$, the wedge loading is $\Gamma_\tau(\rho) = -a\,y_H\,\mathcal{N}_\tau(\rho)/\big[(R_H - \rho)\,\mathcal{D}\big]$ and

$$\lambda_E(\rho) = \frac{\Gamma^2}{\delta}\,\Gamma_\tau(\rho) - \frac{2\gamma(1-A\gamma)}{y_F}, \tag{E.42}$$

$$\lambda_C(\rho) = -\frac{\varphi}{\delta}\,\Gamma_\tau(\rho) - \frac{\gamma(1-A\gamma)}{y_F}, \tag{E.43}$$

so that κ and η are functions of the primitives $(\gamma, A, R_H, R_F, \Xi, \widetilde{V}, \rho; \chi, \alpha)$ alone, all of which except χ and ρ are pinned down above.[31] At the baseline ($\theta = 1$, $\rho = 0$): $\lambda_E = -0.109$,

[31]For $\alpha \neq 1$ or $\theta \neq 1$ the loadings solve the same linear system numerically; numerically, we verify that the solution reproduces (E.42)–(E.43) at $\alpha = \theta = 1$ to within 10^{-14} across the calibrated (B_F, ρ) grid. Because the symmetric benchmark earlier in the paper is normalized around zero gross positions, whereas here $\hat{V}_{H,t}$ is

$\lambda_C = -0.068$, $\eta = 0.0023$ at $\alpha = 1$; and $\lambda_E = -0.175$, $\lambda_C = -0.062$, $\eta = 0.0038$ at the quantitative setting $\alpha = 2$, where $\kappa = 0.031\,\chi$. Both loadings are negative—a tariff surprise appreciates the dollar and lowers Home consumption—and η is an order of magnitude below κ for all but the smallest simulated χ: the volatility-induced depreciation operates through the intermediary UIP premium rather than precautionary saving.

Impact responses over the primitives. Figures E.4–E.6 map the model's impact responses over its primitives. Each panel plots the response of the exchange rate, the equity price, or the interest differential to one of the three shocks against one drawn primitive, with $\gamma \sim U[0.01, 0.49]$, $A \sim U[0.01, 0.99]$, $\chi \sim U[0, 8]$, $\theta \sim U[1, 4]$, and $\rho_\tau \sim U[0, 0.99)$. The net currency positions, the dollar funding rate, and risk aversion are held at their calibrated values ($B_H = 1.53$, $B_F = 1.03$, $i_H = 2.64\%$, $\alpha = 2$), and every draw satisfies (19): i_F adjusts so that the drawn trade imbalance is financed at the fixed positions. Responses are in percent per one-standard-deviation (0.01) shock; no empirical quantities appear. Three regularities organize the figures. The expenditure share γ governs the tariff-level and convenience rows—pass-through of both the tariff and the priced wedge into the exchange rate falls sharply with openness—and the asymmetry A tilts the tariff-level response. The dispersion in the volatility row is generated almost entirely by the intermediary sensitivity χ, with θ and ρ_τ second order throughout. The calibrated (γ, A) therefore discipline the level and convenience channels, while the uncertainty channel turns on the parameter the quantitative exercise simulates over. To read the signs against Table 1, note the convention: each row plots the response to the shock in that table's orientation—the tariff-volatility row to a rise in σ_t^2, and the convenience-yield row to a convenience-yield *decline* ($-\psi_t$, equivalently a widening of the CIP wedge).

Units for the model–data comparison. To place model responses and the event-study estimates on a common axis, the figures report model-implied coefficients in the units of the

a percent deviation of a positive interest-bearing stock, these expressions do not literally nest the symmetric formulas as $A \to 1$, $\widetilde{V} \to 0$.

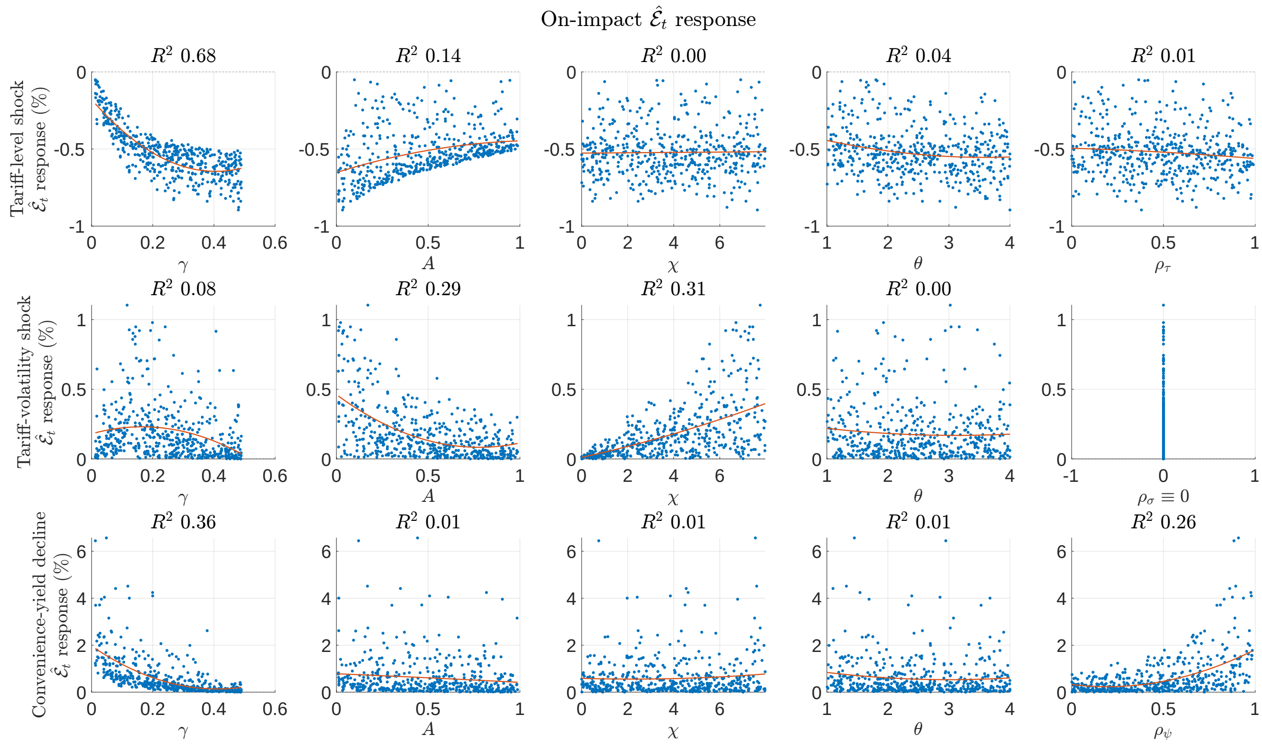


Figure E.4. Theoretical clouds: exchange-rate impact responses over the primitives. Rows: tariff-level, tariff-volatility, and convenience-yield shocks (0.01 each); columns: draws of γ, A, χ, θ, ρ_τ. Net currency positions, the dollar rate, and risk aversion are fixed ($B_H = 1.53$, $B_F = 1.03$, $i_H = 2.64\%$, $\alpha = 2$); i_F adjusts per draw to satisfy (19). Curves are quadratic fits.

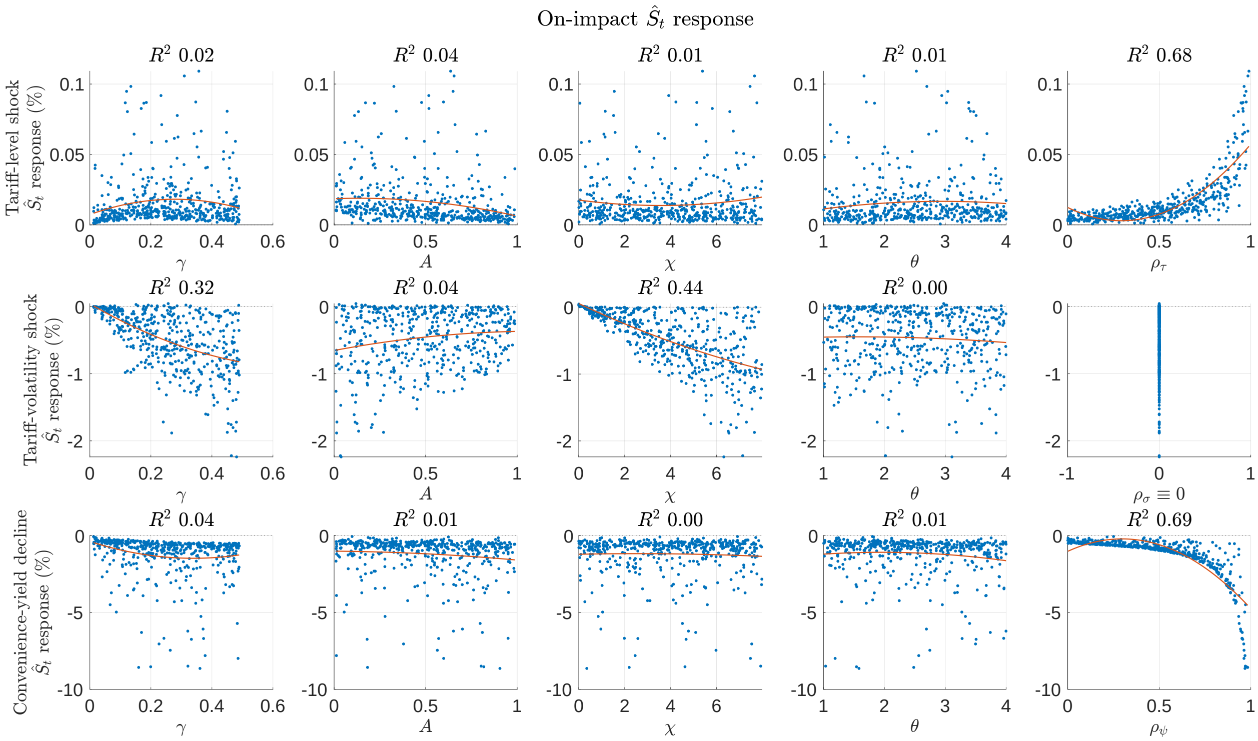


Figure E.5. Theoretical clouds: equity-price impact responses over the primitives. Layout and steady-state treatment as in Figure E.4.

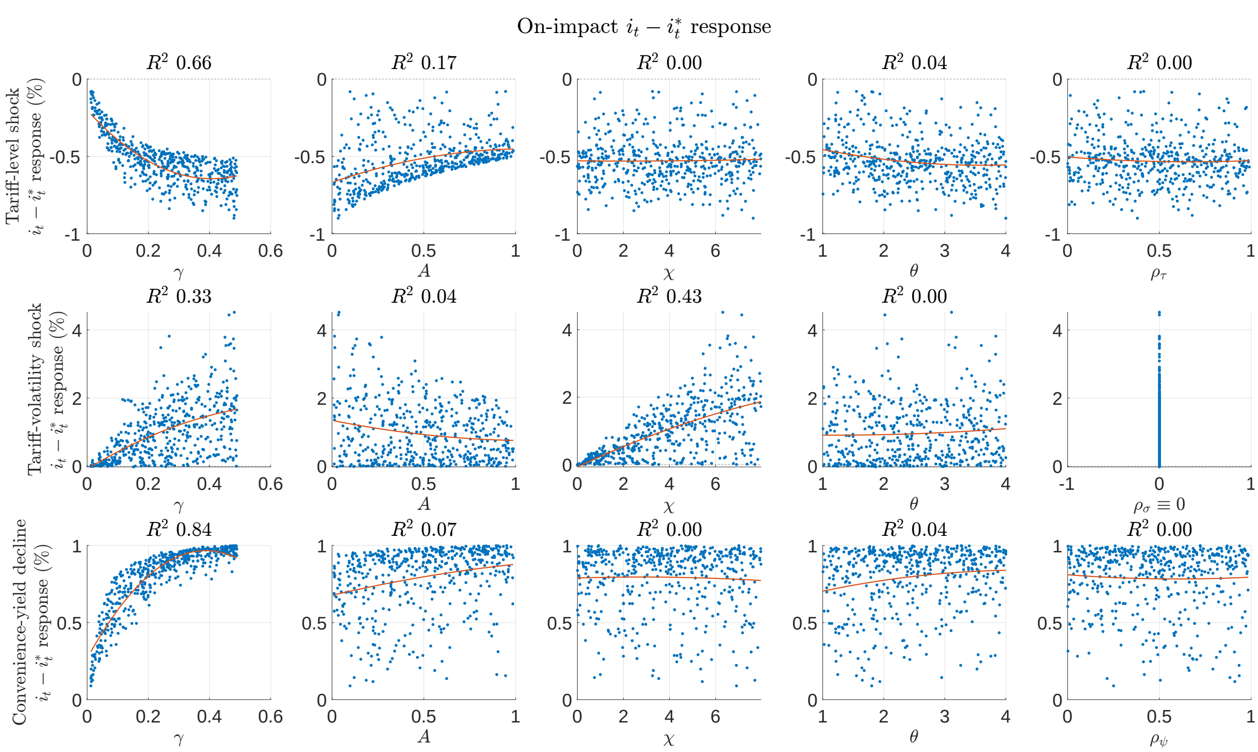


Figure E.6. Theoretical clouds: interest-differential impact responses over the primitives. Layout and steady-state treatment as in Figure E.4.

empirical specification. Tariff-level and convenience-yield responses convert directly (one shock unit of 0.01 equals one percentage point of tariff news or of the CIP wedge, recalling that the wedge prices $-\psi_t$). For the volatility row, since $\mathrm{Var}_t(\hat{\mathcal{E}}_{t+1}) = \lambda_E^2 \sigma_t^2$ and one point of annualized implied volatility at level $\overline{IV}$ moves the one-year-ahead variance by $2\overline{IV}/10^4$, a one-point volatility surprise corresponds to $\Delta\sigma_t^2 = (2\overline{IV}/10^4)/\lambda_E^2$ and

$$\beta_{x,\sigma}^{\text{model}} = 100 \times \frac{\partial \hat{x}_t}{\partial \sigma_t^2} \times \frac{2\,\overline{IV}/10^4}{\lambda_E^2}, \tag{E.44}$$

where $\overline{IV} = 7.90$ is the sample-average level of one-month EURUSD implied volatility over the original event sample, carried over as the linearization anchor (the rebuilt pipeline retains this anchor rather than recomputing it; the one-month horizon proxies the one-year-ahead conditional variance, i.e., an approximately flat volatility term structure is assumed). For the Bayesian estimation of Section 5.2, whose regressor is the standardized composite uncertainty score, (E.44) is further scaled by the bridge factor $f = 0.373$ vol points of one-month EURUSD implied volatility per one standard deviation of the score, exported by the empirical pipeline. This conversion uses only observed volatility moments; no estimated coefficient enters the model side.