AEA Papers and Proceedings 2026, 116: 47–52
https://doi.org/10.1257/pandp.20261039

Global Trade, Tariff Uncertainty, and the US Dollar[†]

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

Standard models predict appreciation of the currency of the tariff-imposing country in the case of unilateral tariffs; in reality, the US dollar has depreciated substantially since the first quarter of 2025, when unilateral tariffs were imposed.[1] Figure 1, panel A depicts changes in the Nominal Broad US Dollar Index since January 2024, with dashed vertical lines marking the US election, the inauguration, and Liberation Day, respectively. As the figure shows, the US dollar began to depreciate following the inauguration (January 20, 2025), losing 1.52 percent of its value until April 1, 2025 (immediately prior to Liberation Day) with an additional 1.04 percent between April 1 and April 10, 2025.[2] In this paper, we extend Kalemli-Özcan, Soylu, and Yildirim (2025)—henceforth, KSY—to explain this unexpected depreciation. We find that while changes in tariff levels are appreciationary, increases in the volatility of tariffs can be depreciationary when households and financial intermediaries are sensitive to risk.

Such sensitivity to risk can be picked up by the uncovered interest parity (UIP) premium. Figure 1, panel B shows that the UIP premium indeed widened in 2025:I, relative to 2024:IV, as the US dollar depreciated. A standard second-order log approximation to the UIP condition in the finance literature is $\log(1+i_{H,t}) - \log(1+i_{F,t}) = \mathbb{E}_t\big[\log(\mathcal{E}_{t+1}) - \log(\mathcal{E}_t)\big] + \frac{1}{2}\mathrm{Var}_t\big(\log(\mathcal{E}_{t+1}) - \log(\mathcal{E}_t)\big)$, where $\mathcal{E}_t$ denotes the nominal exchange rate, defined as the price of foreign currency in units of home currency, and $i_{H,t}$ $(i_{F,t})$ is the nominal interest rate in the home (foreign) country. The added volatility term in general is regarded as small noise.

We write, based on our model, the linearized UIP condition: $\hat{i}_{H,t} - \hat{i}_{F,t} = \mathbb{E}_t\big[\hat{\mathcal{E}}_{t+1} - \hat{\mathcal{E}}_t\big] + \rho_t$, where ρ_t is the time-varying currency risk or the UIP premium and hat variables denote deviation from the steady state. When the home country imposes import tariffs with uncertainty—that is, when announced tariff rates may deviate from ultimately implemented rates—this time-varying currency risk can become quite large.[3] Interpreting this as perceptions of risk widening around tariff announcements, we extend KSY to explain the dollar depreciation. KSY analyze the macroeconomic effects of trade distortions within a global dynamic general equilibrium framework featuring multisector, multicountry production networks with full input-output linkages and nominal rigidities under incomplete markets. KSY show that increases in tariff rates can generate global inflation and lower output, accompanied by an appreciation of the home currency. In contrast, tariff threats—announcements that never get implemented—generate deflationary pressures combined with a modest depreciation of the dollar after tariff announcements are reversed.

In this paper, we simplify features of KSY and introduce two additional elements: risk-sensitive financial intermediaries and CARA utility. We assume that financial intermediaries solve a mean-variance

---

* Kalemli-Özcan: Brown University, CEPR, and NBER (email: sebnem_kalemli-ozcan@brown.edu); Soylu: Brown University (email: can_soylu@brown.edu); Yıldırım: Harvard University, Brown University, and Koç University (email: muhammed_yildirim@hks.harvard.edu). We would like to thank Jacob Adamcik for all the help and Julia Chahine, Adrien Foutelet, and Chidubem Okechi for excellent research assistance.

[†] Go to https://doi.org/10.1257/pandp.20261039 to visit the article page for additional materials and author disclosure statement(s).

[1] While we focus on the nominal exchange rate in this paper, the dollar depreciated both in real and nominal terms. The mechanism proposed in this paper explains both real and nominal depreciation.

[2] We use this period to cover Liberation Day (April 2, 2025), subsequent escalation, and the pause on April 9.

[3] This is because, in our setup, ρ_t is not a small Jensen's inequality correction originating from a second-order approximation (e.g., $\rho_t = \frac{1}{2}\mathrm{Var}\big(\log(\mathcal{E}_{t+1}) - \log(\mathcal{E}_t)\big)$); instead, it is microfounded through the intermediaries' mean-variance optimization problem and is nonzero even prior to approximation.

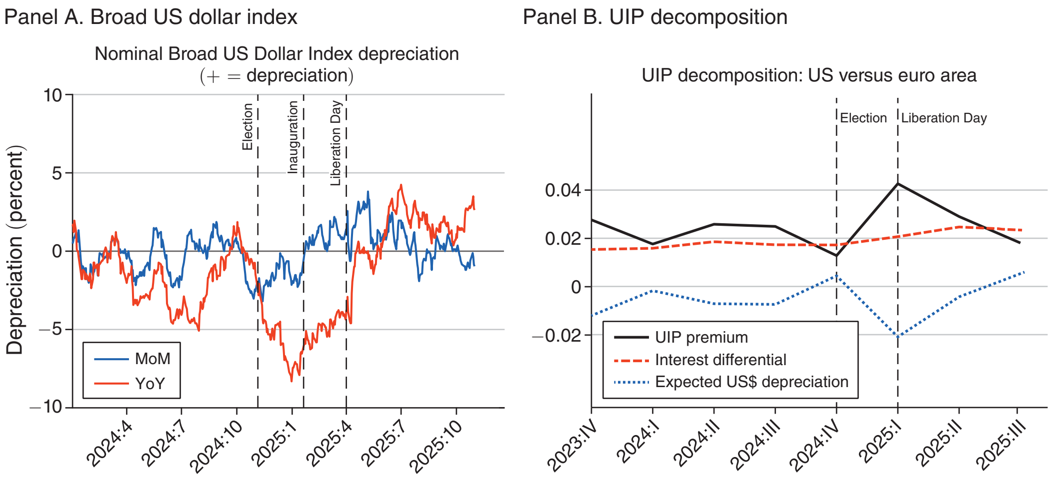

Figure 1. US Dollar Depreciation Measures

Notes: Panel A 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. Panel B 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 US dollar 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 that the first quarter of 2025 starts on January 20, 2025, with the inauguration of the president 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.

portfolio problem over home and foreign bonds in segmented financial markets.[4] This extension allows us to analytically characterize the conditions under which home currency depreciation can arise following announcements of home tariffs that are uncertain in nature—that is, when agents do not know the future level of tariffs and the range of possible future tariff outcomes widens today. Solving the intermediaries' problem shows that ρ_t depends positively on the conditional variance of exchange rate movements, scaled by a parameter χ (i.e., $\rho_t = \chi \mathrm{Var}_t\left(\hat{\mathcal{E}}_{t+1}\right)$), where χ need not be small.[5] In our framework, this conditional variance is directly linked to tariff uncertainty, so increases in tariff volatility widen the UIP wedge. At the same time, greater volatility in expected tariffs acts as an Euler equation shock for risk-sensitive households (via $\mathrm{Var}\left(\hat{C}_{t+1}\right)$), inducing precautionary savings. As a result, heightened uncertainty about future tariff policy can generate contemporaneous currency depreciation via these two channels even as tariff levels rise. This modeling approach aligns well with reality, as the Liberation Day announcements generated shocks not only to tariff levels but also to tariff volatility, with both trade policy uncertainty and broader economic policy uncertainty indices peaking around the announcement, as shown in the Supplemental Appendix.

I. Model

We develop a simplified two-country, one-good version of KSY to illustrate the mechanism through which tariff uncertainty can generate a depreciation of the dollar. Relative to KSY, we feature an

---

[4] CARA utility and segmented financial markets are absent in KSY, which features incomplete financial markets.

[5] In our stylized setup, we assume that investors are sensitive to the price of risk given by the variance term, but not to the quantity of risk. In the Supplemental Appendix, we present the more general case in which the level of outstanding debt enters into ρ_t.

endowment economy and monetary policy is simplified by fixing the aggregate price level (CPI). In addition, we assume symmetry and set both the intra- and intertemporal elasticities of substitution to one. We further assume that only home households exhibit CARA utility. Finally, we introduce financial intermediaries that solve a mean-variance portfolio optimization problem. Under these assumptions, the five-equation system in KSY collapses to a tractable set of equilibrium conditions that capture the key mechanisms of interest. Full derivations are provided in the Supplemental Appendix.

When a shock occurs, we track changes in variables as percent deviations from their steady-state values, denoted by a caret (^). 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—that is, under nonzero 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 net debt position of the home country, inclusive of interest payments. $\hat{C}_{H,t}$ and $\hat{C}_{F,t}$ denote consumption by home and foreign households. $(1-\gamma)$ captures home bias in consumption.

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

Euler equations with home country exhibiting CARA utility:

$$\left(\mathbb{E}_t\hat{C}_{H,t+1} - \hat{C}_{H,t}\right) = \hat{i}_{H,t} + \underbrace{\frac{1}{2}\mathrm{Var}_t\left(\hat{C}_{H,t+1}\right),}_{\eta\sigma_t^2} \quad \left(\mathbb{E}_t\hat{C}_{F,t+1} - \hat{C}_{F,t}\right) = \hat{i}_{F,t}. \tag{1–2}$$

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

$$0 = (1-\gamma)\hat{p}_{H,t} + \gamma\left(\hat{\mathcal{E}}_t + \hat{p}_{F,t} + \hat{\tau}_t\right), \quad 0 = (1-\gamma)\hat{p}_{F,t} + \gamma\left(\hat{p}_{H,t} - \hat{\mathcal{E}}_t\right). \tag{3–4}$$

UIP condition holds with a wedge that depends on the variance of the exchange rate:

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

Goods market clears for each country in both periods:

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

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

Balance of payments equation is given by

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

The model features two shock variables: $\hat{\tau}_t$ and σ_t^2. The first is a onetime shock to the level of tariffs, expressed as a deviation from the steady state, with $\hat{\tau}_t \sim \mathcal{N}\left(0, \sigma_{t-1}^2\right)$. We allow the variance of $\hat{\tau}_t$ to vary exogenously over time, which constitutes the second shock. Importantly, our timing convention assumes that the variance of shocks 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 onetime shocks to both the level and the variance of tariffs.

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 the Supplemental Appendix, 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 can be approximated as $\mathrm{Var}_t\big(\hat{C}_{H,t+1}\big) \approx \eta\sigma_t^2$ and $\mathrm{Var}_t\big(\hat{\mathcal{E}}_{t+1}\big) \approx \kappa\sigma_t^2$, where η and κ are given by the squares of the coefficients on $\hat{\tau}_{t+1}$ in the respective policy functions. This yields a system that is linear in the shock variables. We solve the model using the method of undetermined coefficients. We find that tariff-level shocks are appreciationary (captured by the first term below), whereas shocks to tariff volatility are depreciationary (the second term below):

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

Higher tariff uncertainty induces precautionary saving behavior, as it effectively serves as an Euler equation shock (e.g., similar to a patience 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 induces financial intermediaries to demand a higher risk premium (e.g., similar to a country risk shock or financial intermediation shock that widens the UIP premium). All else equal, this additionally generates depreciation pressure while reducing aggregate consumption in the home country relative to the foreign country.

When both shocks (tariff levels and tariff volatility) are present, the overall effect on the exchange rate is ambiguous. When the sensitivity to tariff volatility in the Euler equation, captured by η, the sensitivity of investors to tariff-related volatility κ, and the underlying volatility of tariffs captured by σ_t are sufficiently large, it is possible for tariff volatility shocks to yield depreciation even at the same time as a tariff hike. Thus, whether appreciationary forces from tariff levels or depreciationary forces from tariff volatility dominate is a quantitative question, which we turn to next.

II. Data and Construction of Shocks

We obtain all tariff data from WTO-IMF Tariff Tracker.[6] The final implemented tariffs are obtained as of October 17, 2025, and differ substantially from those announced on Liberation Day. Subsequent changes in implemented tariffs after this date are negligible.

To compute the standard deviation of tariffs, we compile all tariff-related events, including announced and threatened tariffs, from the Trade Compliance Resource Hub.[7] We then compute the standard deviation across all distinct tariff rates reported in this dataset, which yields a value of 43.9 percent.[8] This measure captures the extent of policy uncertainty, including erratic announcements, such as the proposed 125 percent tariffs on China, which we believe played an important role in amplifying tariff uncertainty. We additionally construct a time series of tariff volatility from these data. For each date, we compute the standard deviation of all tariffs that have been announced or threatened up to that point in time. Tariff volatility is 72 percent during the first quarter of 2025, declines to 60 percent by the end of the second quarter, and falls further to 49 percent by the end of the third quarter.[9]

---

[6] https://ttd.wto.org/en/analysis/tariff-actions, last accessed on October 17, 2025.

[7] https://www.tradecomplianceresourcehub.com/2025/12/11/trump-2-0-tariff-tracker/, last accessed on December 27, 2025.

[8] We also calculate the standard deviation of all implemented tariff rates (as reported in Table A.1 of the Supplemental Appendix), which yields a value of 5.4 percent. In another approach, for each country–HS6 product pair with nonzero import values in 2024, we compute the standard deviation of implemented tariffs over time, which yields the standard deviation of 8 percent at the beginning of the year and 34.9 percent around Liberation Day. We used these measures for robustness purposes.

[9] Our tariff volatility measure follows a similar path to the Trade Policy Uncertainty indices shown in the Supplemental Appendix.

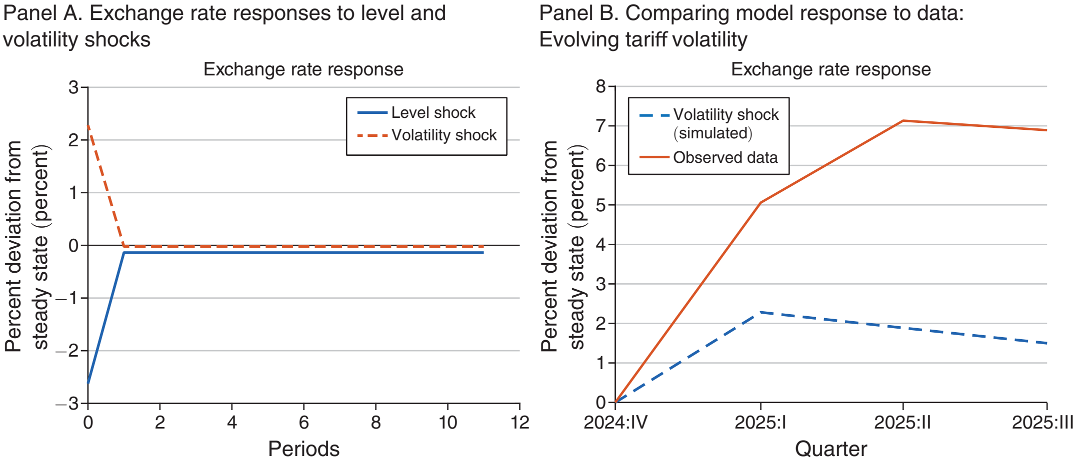

Figure 2. Exchange Rate Responses to Tariff-Level and Volatility Shocks

Notes: Figure 2 shows the model-implied responses to shocks in $\hat{\tau}_t$ and σ_τ^2. Panel B additionally compares the model-implied dynamics with the observed exchange rate response under evolving tariff volatility.

III. Quantitative Exercise

We feed two shocks into the model: a level shock to tariffs and a volatility shock. Specifically, the level of tariffs increases by 18.9 percentage points, while the variance of tariffs rises by 72.1 percentage points relative to their steady-state values.[10] Both shocks are introduced as onetime innovations. As noted above, the analytical solution yields exact coefficients for κ and η dependent on model primitives like γ. Based on KSY, we calibrate the home-bias parameter to $\gamma = 0.0708$, equal to the foreign expenditure share in US final consumption. As detailed in the Supplemental Appendix, the UIP wedge contains a risk sensitivity parameter, χ; we calibrate this to match the deviation of the UIP wedge from the last quarter of 2024, which we treat as the steady state, as shown in Figure 1, panel B.[11]

Consistent with the model's predictions, Figure 2, panel A shows that tariff-level shocks are appreciationary, whereas increases in tariff volatility are depreciationary. In particular, the level shock generates a 2.6 percent appreciation of the exchange rate, while the volatility shock leads to a 2.3 percent depreciation. These numbers are highly sensitive to parametrization and assumptions; the model here is a parsimonious one.[12] With that caveat, this exercise shows that there are two competing pressures from the introduction of tariffs in the first quarter of 2025: one that raised the level of tariffs and thereby created appreciationary pressure, and another that widened the range of possible future tariffs, leading to depreciationary pressure. These pressures are large enough that under different parametrizations and with a more detailed model, one can match more closely the path of the observed exchange rate. With differing elasticities of substitution and parameter asymmetry across countries, as in KSY, the appreciationary impact of tariffs can be muted to the point that the volatility shock's depreciationary impact sufficiently exceeds the appreciationary impact of tariffs.

---

[10] The 18.9 percentage point tariff-level shock is calculated as the difference between April 9 and January 1 effective tariff rates.

[11] Notably, exchange rate volatility varies considerably across time horizons and currency measures. The volatility of the dollar-euro exchange rate (broad dollar index) between April 1 and (i) June 30 is 36 percent (16 percent); (ii) October 1 is 27 percent (11 percent); (iii) December 1 is 23 percent (10 percent).

[12] For example, persistence (and perceived persistence) of the shocks matter significantly, as explored in KSY. If agents expect tariffs not to persist, the appreciationary effect of tariff levels can be dampened. Conversely, if tariff volatility is persistent rather than transitory, its depreciationary effect can be amplified.

Our baseline model features onetime volatility shocks with constant loadings. We next consider the impulse responses resulting from a series of volatility shocks that reveal themselves in successive periods. We use a time-varying tariff volatility series and feed this series into the model as a sequence of onetime volatility shock, in the spirit of the tariff-threat shocks studied by KSY. We construct a cumulative impulse response function from these successive shocks and compare the model-implied dynamics to the percent deviation of the quarterly Nominal Broad US Dollar Index from its 2024:IV level. Figure 2, panel B depicts the path of the exchange rate following these successive volatility shocks. Nearly half of the exchange rate response on impact in the first quarter of 2025 can be explained with the volatility shock.[13]

IV. Conclusion

We study how tariff uncertainty affects the exchange rate. While standard models predict that tariffs lead to currency appreciation, we show that this result can be overturned when tariff policy uncertainty increases. Uncertainty reduces demand for goods and dollars and generates a risk-premium wedge that weakens the currency of the tariff-imposing country. Our quantitative results can account for a sizable share of the observed dollar depreciation.

What do these results imply for "exorbitant privilege"? US dollar dominance rests on its functional advantages, network effects, and perceived safety as a store of value. These can come into question due to major policy errors, including uncertain trade policies, that may accelerate an erosion of confidence already under way (Rogoff 2025).

Trade policy uncertainty is not merely a second-order feature. Incorporating uncertainty (Akıncı, Kalemli-Özcan, and Queralto 2022) into macro models is essential for understanding exchange rate movements during periods of geopolitical instability.

REFERENCES

Akinci, Ozge, Şebnem Kalemli-Özcan, and Albert Queralto. 2022. "Uncertainty Shocks, Capital Flows, and International Risk Spillovers." NBER Working Paper 30026.

Kalemli-Özcan, Şebnem. 2019. "US Monetary Policy and International Risk Spillovers." NBER Working Paper 26297.

Kalemli-Özcan, Şebnem, Can Soylu, and Muhammed A. Yildirim. 2025. "Global Networks, Monetary Policy and Trade." NBER Working Paper 33686.

Rogoff, Kenneth. 2025. *Our Dollar, Your Problem: An Insider's View of Seven Turbulent Decades of Global Finance, and the Road Ahead*. Yale University Press.

---

[13] The broad dollar index (and against euro) depreciated between April 1 and (i) April 10 around 1–2 percent; (ii) June 30 by 5 percent (9 percent); (iii) October 1 by 4.8 percent (8.5 percent); (iv) December 1 by 4 percent (7.5 percent).