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Trade War and the Dollar Anchor

ABSTRACT We develop a general equilibrium model in which the safety of a country's currency and the choice of its exchange rate regime arise endogenously. Calibrated to pre-2025 data, the model replicates the US dollar's safety premium, low Treasury yields, and its status as the world's anchor currency. Introducing a trade war that isolates US goods markets from the world erodes the US dollar's safety premium, raises US interest rates, and lowers the world market value of US firms. For sufficiently high tariffs, small economies optimally repeg to the euro, precipitating a phase shift to a euro-centric international monetary system and a global welfare loss. The analysis implies that persistent trade wars may threaten the financial privileges that the United States derives from the dollar's international role.

Recent global market turmoil surrounding fears of an impending trade war has raised questions about the potentially changing role of the US dollar in the international monetary system. The tariff announcement by the United States on April 2, 2025—met by threats of retaliation abroad—has coincided with an unusual response in financial markets: The US dollar depreciated markedly even as indicators of global stress spiked. In the United States, interest rates increased and stock prices fell sharply. The fact that US equities, Treasury bonds, and the dollar lost value at a time

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of disruption for international markets represents a stark departure from the usual pattern in which the dollar appreciates in times of global stress. Scholars openly questioned the safe-haven status of the US dollar (Jiang and others 2025).

These developments suggest that the dollar's traditional role as the world's safe-haven and anchor currency may be sensitive to US trade policy, and they have sparked demand for a framework to understand the link between trade wars and the dollar's evolving role in the global monetary system.

The dollar has long been the linchpin of global finance: It emerged as the primary anchor and reserve currency. Prominent observers warn that a deterioration in the appeal of US currency could threaten its status at the center of the world's monetary system and with it the US government's ability to run large budget deficits, a privilege enabled in part by the dollar's safe-haven status (Rogoff 2025). Understanding the forces behind the dollar's changing role is therefore critical for anticipating the constraints and choices facing US macroeconomic policy should an era of economic nationalism emerge.

In this paper, we develop a risk-based framework to understand the dollar's role as a global safe-haven and anchor currency and analyze how that role might change under a nationalist trade policy. We build on recent advances in the theoretical literature, which emphasize risk and safety as key determinants of currency returns, interest rates, and capital flows (see, e.g., Lustig, Roussanov, and Verdelhan 2011; Colacito, Croce, Gavazzoni, and Ready 2018; Colacito, Croce, Ho, and Howard 2018; Miranda-Agrippino and Rey 2020; Maggiori 2017; Richmond 2019; di Giovanni and others 2022; Akinci, Kalemli-Özcan, and Queralto 2022; Bai and others 2025).

Our analysis yields two key insights. First, the dollar's position as the world monetary system's anchor currency, the relatively low yields on US government debt, US firms' ability to borrow cheaply in world financial markets, and the ability of the United States to attract a disproportionate share of international investments all hinge on the dollar's safe-haven property—its tendency to appreciate in times of global stress. If the US dollar loses its safe-haven status, our model predicts it will also lose these key macroeconomic privileges, including its position at the center of the world monetary system.

Second, the dollar's status as a safe-haven currency relies critically on relatively free trade: Isolating the US economy from world trade flows mitigates the forces that make the US dollar the safest currency in the world and may thus also remove the underpinning force that makes it the world monetary system's anchor.

Our analysis, therefore, suggests that a prolonged trade war may reduce or eliminate the dollar's safety premium, drive up US interest rates, and prompt foreign governments to loosen or drop their stabilization policies toward the US dollar. While a trade war with average tariffs below 26 percent may only loosen the dollar's anchor function, our model predicts that severe trade wars with average tariffs exceeding 26 percent prompt a phase shift in the world monetary system, where the euro emerges as an alternative anchor currency. This shift yields some benefits to the euro area. Globally, however, and in the United States in particular, welfare strictly falls.

Our work builds on a growing literature that links persistent differences in interest rates, currency returns, and capital intensity across countries to differences in the stochastic properties of their currencies (Lustig and Verdelhan 2007; Hassan and Mano 2019). This literature has identified differences in countries' economic size, trade centrality, and financial development as key drivers of these differences. The common theme in this literature is that whatever force makes economies different from each other results in differential sensitivities of their countries' exchange rates to various shocks so that some currencies (typically the US dollar) tend to appreciate systematically in times of global stress.[1]

Our model has the structure of a standard international business cycle model with fluctuating exchange rates: Households consume a freely traded good and a country-specific nontraded good (Stockman and Tesar 1995). The nontraded good is produced by domestic firms, the shares of which are traded in an international stock market. In addition, each country issues a bond denominated in its currency.

As a stand-in for the various potential sources of heterogeneity in the stochastic properties of countries' exchange rates mentioned above, we choose differences in country size as a source of heterogeneity (Martin 2013; Hassan 2013). That is, we assume that all shocks are common within a given country, and that some large countries (like the United States) account for a larger share of world GDP than others.

1. This literature has explored various potential drivers of heterogeneity in the safety features of countries' currencies, ranging from differences in country size (Martin 2013; Hassan 2013) and financial development (Maggiori 2017) to trade centrality (Richmond 2019), liquidity (Arvai and Coimbra 2025), and differential resilience to disaster risk (Farhi and Gabaix 2016; Colacito, Croce, Gavazzoni, and Ready 2018). Other papers in this literature have studied heterogeneity in the volatility of shocks affecting the nontraded sector (Tran 2013), factor endowments (Ready, Roussanov, and Ward 2017; Powers 2015), and risk aversion in combination with country size (Govillot, Rey, and Gourinchas 2010). Hassan and Zhang (2021) survey this literature.

As is standard in this class of models, a country's exchange rate appreciates whenever local demand outstrips local supply (local demand is high or local supply is low). Whenever a country's exchange rate appreciates, it thus tends to import more traded goods.

As the currency of the largest economy in the world, the US dollar emerges endogenously as the safest currency, because shocks that buffet the dollar's value tend to affect global investors by more than those of small countries. Whenever a country's currency appreciates, that country demands more imports of traded goods. In this respect, all countries behave similarly: Appreciation signals a demand for imports. However, shocks that lead to an appreciation of the US dollar affect a large share of world GDP, so that a large share of world traded goods is needed to satisfy Americans' demand for imports, making traded goods scarce worldwide.

The same shocks that appreciate the US dollar thus also drive up the price of traded goods in world markets. Consequently, the US dollar appreciates in high marginal utility states, when resources are scarce in the world economy, whereas the currencies of small economies do not.

This straightforward relationship between US shocks and the world market price of traded goods makes the dollar a safer store of value than other countries' currencies: It gains value in times of global stress. For this reason, international investors prefer holding US dollar–denominated bonds, giving rise to an "exorbitant privilege": The US dollar has a lower interest rate, so that Americans can borrow relatively cheaply in world markets.[2] The same mechanism makes investing in US firms more attractive, raises their value in international markets, and steers disproportionate capital flows to the United States.

It is this safety premium that gives small economies an incentive to stabilize their exchange rate. With stabilization to the US dollar, countries experience an increased comovement of their currency with the safest currency in the world and thus also become safer in the eyes of global investors. This safety premium raises the world market value of their domestic firms and thereby shifts wealth toward the stabilizing country while increasing domestic investment and wages.

The model thus suggests it is not an accident that the vast majority of countries in the world stabilize their exchange rates to the US dollar rather than to their largest trading partner, their neighbors, or some other currency. The US dollar emerges as the world's sole anchor currency due to its safety.

2. See the seminal work by Gourinchas and Rey (2007) for a discussion. Bertaut and others (2024) update their calculations.

Each country's optimal choice of exchange rate regime thus endogenously gives rise to the "dollar anchor," where small countries optimally choose to maintain a hard peg to the US dollar, larger countries maintain looser stabilizations to the US dollar, and only the largest economies float their exchange rates (Hassan, Mertens, and Zhang 2023).

Notably, this structure of the international monetary system emerges endogenously and as long as countries can trade freely. The key assumption is simply that countries are monopoly suppliers of their own firms (e.g., Mexican firms are originally owned by Mexicans), and that investors can trade stocks and bonds in international markets but not a complete set of state-contingent assets that would undo the wealth effects of stabilization policies. Under these conditions, countries below a given size increase the welfare of their populations by maintaining an exchange rate stabilization toward the currency of the largest economy in the world, putting the US dollar at the center of the world monetary system.

Next, we examine how this equilibrium, where the United States enjoys an exorbitant privilege and endogenously becomes the world's anchor currency, changes in response to a trade war.

The key insight from this analysis is that inhibiting trade flows to and from the United States, through tariffs or other means, weakens the force underpinning the dollar's special role: The dollar is the world's safest currency because US shocks spill over disproportionately into the world market price of traded goods. A trade war that isolates the United States from the world market erodes or removes these spillovers and thus dilutes the US dollar's tendency to appreciate in times of global stress. This loss of its safe-haven status leads to a rise in US interest rates and a drop in the world market value of US firms, capital outflows, and US wages. At the same time, a less safe dollar attracts fewer stabilizations, leading to a weakening of its anchor status. In this sense, the structure of the world monetary system depends on free trade between the United States and the rest of the world. Without free trade, the US dollar–centric system may collapse entirely or shift to another target currency.

To assess this possibility, we calibrate our simple (two-period) model to the data and show it can closely match the structure of the world monetary system prior to the tariff announcements in 2025: The US dollar, the euro, and a handful of currencies of other large economies float their exchange rates, while countries accounting for less than 4 percent of world GDP maintain some form of stabilization to the US dollar. Small countries that contribute less than 0.8 percent to world GDP maintain a hard peg to the US dollar. Moreover, US interest rates are 2.5 percentage points lower than those in small developed economies, leading to disproportionate investment in US firms.

Upon the announcements of large tariffs and retaliations of the size announced in April 2025, the model predicts movements in asset prices that mirror those observed in the data: US interest rates rise, US equities depreciate relative to those in the rest of the world, and the volatility of the US dollar spikes, while its correlation with the economy's stochastic discount factor drops to levels closer to that of the euro. Furthermore, the model predicts that these tariffs (12 to 17 percent on average for US imports and exports), if they prove to be permanent, should result in a significant weakening of the dollar anchor, where hard pegs are loosened and some soft stabilizers drop the US anchor altogether.

We then use our model to analyze several scenarios. One of the key takeaways from this analysis is that, at tariffs and retaliations exceeding 26 percent, the model predicts a fundamental shift in the architecture of the world monetary system, with the euro supplanting the US dollar as the primary anchor currency.

We make three main caveats to our interpretation. First, although we offer a calibration of our model to the data, we note that it has, in general, proven difficult to construct dynamic stochastic general equilibrium models that match both quantities and asset prices in international macroeconomics. This literature has a number of open conceptual questions, including the "currency premium puzzle," which we discuss in Hassan, Mertens, and Wang (2024). We do not resolve these issues here and instead sidestep them by focusing on a two-period model. Our quantitative results should thus be interpreted with some caution. Second, in constructing our model, we deliberately abstract from the well-studied channels through which tariffs affect the terms of trade and business cycle dynamics. Instead, our analysis focuses solely on the effect of a trade war on risk and safety properties of currencies. Third, we focus on differences in country size. Variations of the model in which safety premia also arise from differences in financial development, trade centrality, or other sources may yield similar interpretations.

Our paper contributes to the literature studying the US dollar's role in the world economy. Our focus is on the dollar's role as a safe-haven and anchor currency. Other authors have focused instead on the size of the American sovereign debt market (Farhi and Maggiori 2018; He, Krishnamurthy, and Milbradt 2019), its emergence as the dominant currency to finance international trade (Chahrour and Valchev 2022), its level of financial development (Maggiori 2017), and its use as invoicing currency (Gopinath and Stein 2021). Although the literature to date lacks a unifying framework connecting these different features of dollar dominance, we might view its status as a safe-haven currency as somewhat foundational to each of these types of dominance, suggesting that a loss of safe-haven status, and an associated rise in US interest rates, may also damage these other pillars of the dollar's dominance.[3]

We also relate to a rapidly growing literature on the economic effects of US tariffs and economic nationalism. One branch of this literature studies the business cycle implications of a tariff shock and optimal monetary policy responses (Bianchi and Coulibaly 2025; Werning, Lorenzoni, and Guerrieri 2025; Bergin and Corsetti 2025; Auray, Devereux, and Eyquem 2025). Another branch revisits classical results on optimal tariffs under a range of policy objectives (Itskhoki and Mukhin 2025; Dávila and others 2025; Caliendo, Kortum, and Parro 2025; Aguiar, Amador, and Fitzgerald 2025; Kocherlakota 2025; Rodríguez-Clare, Ulate, and Vasquez 2025; Ignatenko and others 2025; Auclert, Rognlie, and Straub 2025; Baqaee and Malmberg 2025; Costinot and Werning 2025; Kalemli-Özcan, Soylu, and Yildirim 2025) and the capacity of tariffs to substitute for taxes (Alessandria and others 2025). A third branch studies how tariffs may be used to achieve political and diplomatic goals (Clayton, Maggiori, and Schreger 2023; Clayton and others 2025; Liu and Yang 2025). Closely related to our own work, Chahrour and Valchev (2024) study the effects of economic nationalism on the dollar's status as the dominant currency in trade finance. We contribute to this literature by studying the effects of a trade war on the dollar-based international financial system and the dollar's status as a safe-haven currency.

Finally, we add to the aforementioned literature on currency risk and safety by developing a quantitatively viable model of the world's exchange rate arrangements, taking it to the data, and studying the interaction between the choice of anchor currency and economic nationalism.[4]

3. In this sense, we echo the results in Obstfeld and Rogoff (2001) that point to an interdependence between free trade and the dollar's exorbitant privilege.

4. In this sense, we also relate to a large literature that studies the effects of exchange rate stabilizations in two-country business cycle models (e.g., Kollmann 2002; Devereux and Engel 2003; Fornaro 2015; Bacchetta and van Wincoop 2000; Corsetti, Dedola, and Leduc 2010). One branch of this literature argues that stabilizations may promote bilateral trade or serve to import monetary policy credibility (Hooper and Kohlhagen 1978; Kenen and Rodrik 1986; Frankel and Rose 2002). More closely related, Fanelli and Straub (2021) and Gabaix and Maggiori (2015) argue that real exchange rate interventions can alter the distribution of wealth across agents under segmented markets. Mertens and Shultz (2017) and Fukui, Nakamura, and Steinsson (2025) analyze the effects of stabilizations empirically. Our work complements these other approaches in that the effect of currency stabilization on risk premia may operate in parallel to all of these other mechanisms.

The remainder of this paper is structured as follows. Section I outlines the key properties of the US dollar that are the object of our analysis. Section II sets up our basic model, studies the emergence of the dollar as the world's preeminent safe-haven currency, and examines the consequences of a trade war for dollar safety, US interest rates, and capital accumulation. Section III adds the optimal choice of exchange rate regimes, the emergence of the dollar as the world's anchor currency, and the consequences of a trade war for the world financial system. Section IV concludes.

I. Facts About the Dollar as a Safe-Haven and Anchor Currency

We begin by outlining key empirical facts regarding the US dollar's role as a safe-haven and anchor currency, which will be the focus of our analysis below.

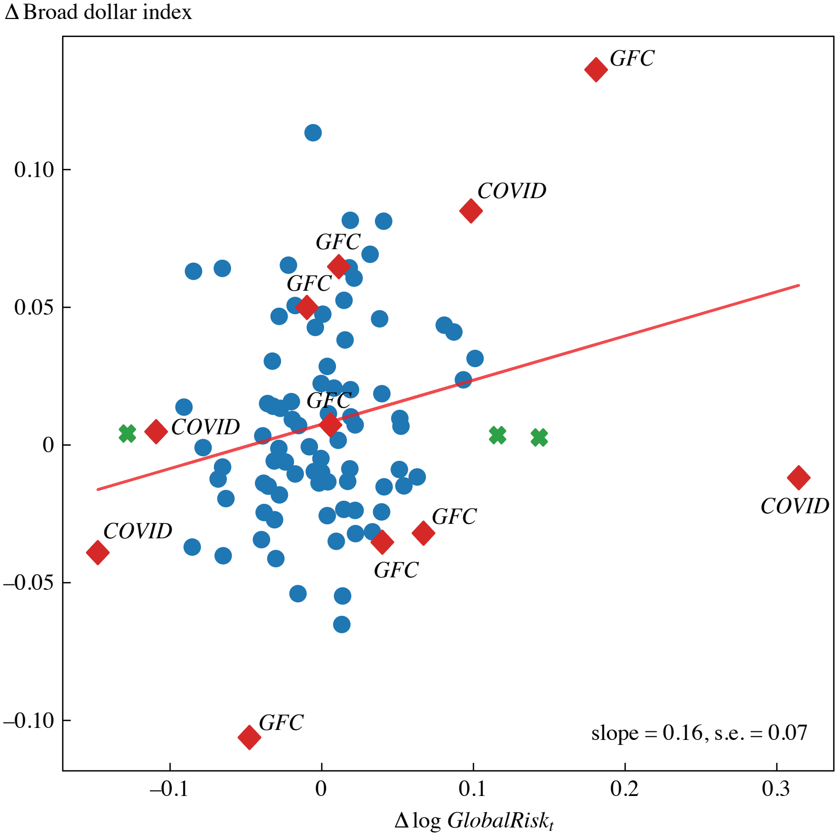
I.A. Dollar Safety

The US dollar's status as the quintessential safe-haven currency is well established in both theory and data. Safe-haven currencies tend to appreciate in global "bad times"—periods of heightened risk or low global growth—providing investors a form of insurance.

To show one piece of evidence that the US dollar is such a safe-haven currency, consider figure 1. This figure shows the relationship between the (arithmetic) average of the change in the price of the dollar against twenty-six foreign currencies over the quarterly change in global risk, as measured by the extent of discussion of risks associated with foreign countries in earnings calls of thousands of global listed firms (Hassan and others 2024). The plot shows a clear positive association between the two variables (coef. = 0.16, s.e. = 0.07) from 2002:Q2 to 2024:Q4, indicating that the dollar tends to appreciate significantly during periods of global stress, such as the global financial crisis of 2008 or the coronavirus pandemic (both episodes are marked in the plot). As already noted above, this pattern broke down in 2025, when the dollar failed to appreciate amid a spike in global risk following the announcement of large tariffs by the United States (marked with crosses).

Repeating this exercise for other countries shows that the US dollar shares this safe-haven property with a few other currencies like the euro and the Japanese yen. By contrast, most currencies tend to depreciate during times of global stress.

Figure 1. Global Risk and the US Dollar



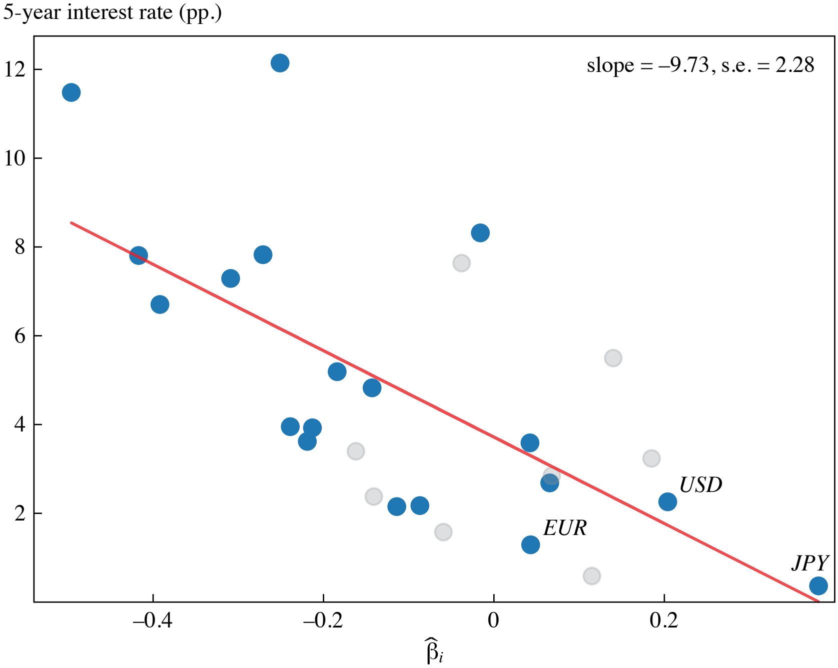
Source: Hassan and others (2024) and authors' calculations.

Note: The figure plots the (arithmetic) average of the quarterly change in the price of the US dollar against twenty-six foreign currencies over the change in global risk, as measured by the extent of discussion of risks associated with foreign countries in earnings calls of thousands of global listed firms (Hassan and others 2024). The sample period is 2002:Q2 to 2025:Q3. The regression line is fitted to observations up to and including 2024:Q4. The crosses represent observations occurring in 2025.

I.B. Low Interest Rates

Figure 2 shows that this heterogeneity in currencies' loadings on changes in global risk can explain cross-country heterogeneity in nominal interest rates and currency excess returns. In particular, we see that the US dollar, the Japanese yen, and the euro—currencies that also systematically appreciate in times of heightened global risk—have lower nominal interest rates.

Figure 2. Safe Currencies and Sovereign Bond Yields



Source: This figure was first circulated in the unpublished working paper version of Hassan and Zhang (2021).

Note: This figure plots the estimated coefficient $\widehat{\beta}_i$ from regressions of the form $\Delta \bar{s}_{i,t} = \alpha_i + \beta_i \Delta \log GlobalRisk_t + \epsilon_{i,t}$, against the average five-year government nominal interest rates from Du, Im, and Schreger (2018). $\Delta \bar{s}_{i,t}$ is the quarterly change in the arithmetic average change in the nominal exchange rate of country i against the twenty-six other currencies in the sample. $\Delta \log GlobalRisk_t$ is the quarterly change in the log of the measure of global risk provided by Hassan and others (2024). If a marker is lighter, it indicates that on average over the sample period, the exchange rate was less flexible than a "managed float" in the Ilzetzki, Reinhart, and Rogoff (2019) classification.

That is, countries with safe currencies, including the US dollar, systematically borrow more cheaply in international markets.[5]

Because exchange rates are largely unpredictable in the data (Meese and Rogoff 1983), these differences in interest rates translate into systematic differences in currency returns (violations of uncovered interest parity),

5. The safety properties affect both nominal and real interest rates that tend to comove strongly, particularly at longer horizons (Mertens and Zhang 2025). In our model, the relevant object disciplining the interest differential is the excess return an international investor obtains from borrowing in one currency and lending in another, net of any predictable change in the exchange rate. In this sense, differences in the two countries' inflation rates are relevant only if they engender predictable changes in nominal exchange rates.

where currencies with high interest rates also pay higher returns to international investors.

A voluminous literature in international asset pricing shows that these differences in currency returns should be interpreted as compensation for risk. For example, Lustig and Verdelhan (2007) show that currencies offering low interest rates systematically appreciate when US consumption growth is low, whereas high-yield currencies depreciate in those "bad" times. In other words, currencies with low interest rates provide a hedge by retaining value during downturns, justifying their lower interest rates. Subsequent work confirms this risk insurance pattern using a variety of methods (Lustig, Roussanov, and Verdelhan 2011; Menkhoff and others 2012; Lettau, Maggiori, and Weber 2014; Kalemli-Özcan and Varela 2025) and shows evidence of a common risk factor in currency returns: Investors demand higher compensation (risk premia) for currencies that depreciate in global stress events and accept lower returns on currencies that serve as a safe haven.

Several papers link a currency's safe-haven status to the economic characteristics of its issuing country, such as size, global integration, and financial depth. For instance, Hassan (2013), Ready, Roussanov, and Ward (2017), and Richmond (2019) document that currencies of countries with larger GDP, manufacturing capacity, and extensive trade links exhibit lower risk premia and "safe asset" characteristics. In contrast, currencies of smaller, highly specialized, or geographically remote economies are often procyclical with the global economy and carry higher risk premia (Lustig and Richmond 2020).

Against this backdrop, it is not surprising that the US dollar stands out as the world's quintessential safe-haven currency. The United States scores high on all the aforementioned dimensions of systemic importance.

I.C. Lower Cost of Capital and More Valuable Firms

Basic economics suggests that lower (risk-free) interest rates from a dollar safety premium pass through into lower borrowing rates for US firms, and more generally, a lower cost of capital and higher stock market valuations. Indeed, Richers (2023) shows an almost one-for-one pass-through from differences in risk-free interest rates at the country level into corporate borrowing rates, suggesting that a currency's safety premium translates directly into cheaper corporate borrowing and thus higher capital accumulation at local firms.

This result from a panel data set of firms based in different countries is bolstered by a large set of similar results, where increases in a country's interest rate or risk lead to reduced investment and capital growth at the firm level (Rajan and Zingales 1998; Kroszner, Laeven, and Klingebiel 2007; Hassan, Mertens, and Zhang 2016; Wang 2021; di Giovanni and others 2022; Kalemli-Özcan, Laeven, and Moreno 2022, among others).

I.D. Anchor Currency

Since the demise of the Bretton Woods system of fixed exchange rates in the early 1970s, individual countries have been largely free to choose their own exchange rate regime. Despite this lack of centralized coordination, Ilzetzki, Reinhart, and Rogoff (2019) show surprising regularity in the choices made by individual countries.

We highlight four stylized facts from their data, characterizing the US dollar's role as an anchor currency.

a. As of December 2019, more than half of all countries in the world stabilize their currency relative to the US dollar. This broad agreement in the choice of anchor currency arises despite the absence of a formal coordinating framework. That is, countries tend to choose to stabilize to the US dollar, the currency of the largest economy in the world, rather than the currencies of their largest trading partner or geographically proximate economies. Such stabilizations take on many different forms, including exchange rate pegs, moving bands, stabilized arrangements, and managed floats. Their common feature is that they lower the volatility of the real or nominal exchange rate, without necessarily manipulating its mean.
b. Second, small economies almost universally choose to stabilize, whereas only the largest economies in the world (the euro area, Japan, and a few others) float their exchange rates.
c. Third, the smaller the economy, the stricter the stabilizations tend to be—small economies, such as Hong Kong and Iceland, tend to maintain hard pegs, while intermediate-sized economies, such as Mexico or Thailand, allow more flexibility in their stabilizations.
d. Fourth, these stabilizing countries have lower interest rates, their currencies pay lower returns to international investors, and their firms produce with relatively more capital than those that do not. Holding constant the size of a country's economy, Hassan, Mertens, and Zhang (2023) show that a 1 percentage point decrease in the allowed annual standard deviation of its nominal exchange rate relative to the US dollar is statistically significantly associated with

a 0.4 percentage point decrease in its risk-free interest rate, 0.4 percentage point lower average returns that the currency pays to international investors, and a 1.6 percent increase in the capital intensity of production in the country. These estimates imply that moving from a soft stabilization that allows a 5 percent annual standard deviation to the US dollar (such as Mexico's) to a tighter stabilization allowing only variations of 2 percent (such as Thailand's) is associated with about a 4.8 percent increase in the domestic capital-to-output ratio.

II. A Model of Trade War and Dollar Risk

We next establish a formal framework. Our model extends Hassan, Mertens, and Zhang (2023) in two respects. First, we generalize and improve the model's quantitative fit by incorporating multiple countries, simultaneous supply and demand shocks, and financial market segmentation. Second, we allow the United States to impose tariffs against the rest of the world, which are met with partial or full retaliation (a "trade war").

We construct this model extension in a deliberately parsimonious way that allows us to focus exclusively on the effects of tariffs on risk premia, dollar safety, and the dollar's role as the world's anchor currency. To the extent possible, we therefore make modeling choices that abstract from the well-studied effects of tariffs on the terms of trade, the price of investment goods, and the business cycle. Unless otherwise noted, all effects of the trade war we discuss below transmit themselves through their effect on the risk and safety of different currencies.

To streamline the discussion, we begin by showing the effects of this trade war on facts I.A–C above. That is, we first examine the effects of the trade war on the US dollar's status as a safe-haven currency, on US interest rates, and on the incentives to invest in the United States. We discuss the trade war's consequences for the world's monetary system and the dollar's role as an anchor (facts I.D.a–d) in the following section.

The model economy exists in two discrete time periods: $t = 1, 2$. A unit measure of households $i \in [0, 1]$ is partitioned into N countries of measure θ^n, where each partition represents the constituent households of a country. These include the United States (*US*), the eurozone (*Euro*), China, Japan, and a continuum of small economies that aggregate to the remaining mass. Although we vary the economic sizes of these different countries in our calibration exercises, we always assume that the United States is the largest economy with $\theta^{US} > \theta^{n} \forall n \neq US$. Households make investment decisions in the first period, and all consumption occurs in the second period.

Households derive utility from consuming an index composed of a country-specific nontraded good, $C_{N,2}$, and a freely traded good, $C_{T,2}$, in each state ω, where

$$C_2(i,\omega) = C_{T,2}(i,\omega)^{\alpha} C_{N,2}(i,\omega)^{1-\alpha} \tag{1}$$

and $\alpha \in (0, 1)$. Each household exhibits constant relative risk aversion according to

$$U(i) = \frac{1}{1-\gamma}\mathbb{E}\left[\left(\exp(-\chi^{n}) C_2(i,\omega)\right)^{1-\gamma}\right], \tag{2}$$

where $\gamma > 1$ is the coefficient of relative risk aversion and χ^n is a common shock to households' demand for consumption goods in country n as in Pavlova and Rigobon (2007) with

$$\chi^{n} \sim N\left(-\frac{1}{2}\sigma_{\chi}^{2}, \sigma_{\chi}^{2}\right).$$

A positive demand shock χ^n raises the marginal utility of consumption (and thus demand for traded goods) in country n.

At the start of the first period, each household owns a firm that produces the local, country-specific, nontraded good using a Cobb-Douglas production technology that employs capital and labor. Each household supplies one unit of labor inelastically to its own firm and owns one unit of capital, which it can sell to its own firm or to any other firm in the world. Each firm's output of nontraded goods is

$$Y_{N,2}(i,\omega) = \exp(\eta^{n}) K(i)^{\nu}, \tag{3}$$

where $0 < \nu < 1$ is the capital share in production, $K(i)$ is the (per capita) stock of capital, and η^n is a country-specific productivity shock realized at the start of the second period,

$$\eta^{n} \sim N\left(-\frac{1}{2}\sigma_{N}^{2}, \sigma_{N}^{2}\right). \tag{4}$$

Exchange rates, and all other endogenous variables, may thus respond to the state ω, characterized by country-specific shocks to supply, η^n, and demand, χ^n.

Capital can be freely shipped in the first period, at the end of which it is invested for use in the production of nontraded goods in the second period. At the end of the first period, firms trade units of capital and households trade claims to the output of their firms (stocks).

In the second period, each household is also endowed with one unit of a traded consumption good. In the middle of the first period, the United States announces whether or not it chooses to charge a tariff rate, τ, on the importation of this traded good. If it does so, the remaining countries retaliate by imposing an equal tariff rate on US exports.

To lay bare the key mechanism in our model, we assume this traded good is homogeneous so that any tariffs levied have no effect on the terms of trade and risk sharing is the only motive for trade between countries.[6] Moreover, note that units of capital are still shipped freely so that any trade war has no direct effect on the price of investment goods, though it will affect risk premia and therefore how much capital firms optimally want to invest in different countries.

Once a traded good enters a country, it becomes indistinguishable from the domestically endowed traded goods, so that all (price-taking) households within the country pay the same price for the traded goods they purchase (as they would if traded goods were assembled from differentiated intermediates). Moreover, because we are not concerned with identifying an optimal tariff, we assume the tariff revenue is rebated lump-sum (details below).

To improve the quantitative fit of the model, we also assume a degree of market segmentation along the lines of Alvarez, Atkeson, and Kehoe (2002), Gabaix and Maggiori (2015), and Fanelli and Straub (2021): Within each country, a fraction $1 - \psi$ of households lack access to financial markets except for a local savings bond. These households are labeled "consumers" and own only a risk-free bond issued by a domestic financial intermediary.

6. More generally, there are two standard motives for trade in this class of model. With a homogeneous traded good, international trade primarily provides risk sharing to absorb country-specific supply and demand shocks (Cole and Obstfeld 1991; Backus, Kehoe, and Kydland 1992). By contrast, when traded goods are differentiated, a love-of-variety motive arises and, for large countries, a terms-of-trade externality can rationalize imposing (optimal) tariffs (Dixit and Stiglitz 1977; Krugman 1980; Bagwell and Staiger 1999). By assuming traded goods are homogeneous, we deliberately shut down this latter channel.

This bond is indexed to the country's consumer price index and pays off exactly the $P^n(\omega)$ traded goods needed to purchase one unit of utility for households in country n in state ω at world market prices.[7] The remainder of the country's assets (all shares in domestic and international firms) are held by a domestic financial intermediary, which is owned and managed by the remaining mass ψ of households ("financiers"). In the second period, the intermediary receives its portfolio payoff, pays off the domestic savings bond held by domestic consumers, and returns all remaining assets and intermediation profits to the financier household. Both consumer and financier households use their second-period wealth to purchase consumption goods to maximize utility in equation (2).

Throughout, we use the traded consumption good in the world market (outside the United States) as the numéraire such that all prices and returns are accounted for in the same units. To simplify the derivation, we also assume financiers receive a country-specific transfer in the first period, κ^n, that equalizes the marginal utility of wealth across countries after the imposition of any tariffs.[8]

Finally, because all households and firms within a given country are identical and consumption only occurs in the second period, we henceforth drop the household index i, the state of the economy ω, and the time subscript t whenever appropriate and write the per capita capital stock, output, and financier households' consumption of traded and nontraded goods in country n as K^n, Y^n_N, C^n_T, and C^n_N, respectively. The corresponding variables pertaining to consumer households are $\hat{C}^n_T$ and $\hat{C}^n_N$.

In sum, the economic environment of our baseline model is identical to that of a standard international business cycle model that allows for market segmentation. Our only, somewhat subtle, departure from this canonical benchmark is that we confine intermediaries to trading stocks and bonds in international markets but do not allow them to trade a full set of state-contingent claims. We prefer adding this modest restriction on the asset space both for realism and because it gives rise to a model-consistent rationale for exchange rate stabilization, discussed in section III.

7. The consumer households are therefore not insured against the price change induced by the unexpected tariff announcement.

8. Note that, even under freely floating exchange rates, differences in country size generate cross-country differences in firm values and thus in household wealth (Hassan 2013). The transfer κ^n compensates for these preexisting differences under the freely floating regime, so that any remaining endogenous differences in wealth across households are exclusively attributable to policy intervention.

In the meantime, however, note that because intermediaries can trade a stock and a bond for each country, financial markets for financier households are complete within the second period.[9] As a result, the allocation of goods across households (given a distribution of wealth) is efficient in the absence of government interventions.

To study the model analytically, we log-linearize around the deterministic solution—the point at which the variances of shocks are zero ($\sigma_{N,n} = \sigma_{\chi,n} = 0$)—and all firms have a capital stock fixed at the deterministic steady-state level. To simplify the exposition, we thus ignore the feedback effect of differential capital accumulation on the size of risk premia, studying the *incentives* to accumulate different levels of capital across countries while holding the capital stock fixed. Throughout, lowercase variables continue to refer to natural logs.

II.A. Dollar Safety and Interest Rates Under Free Trade

We begin by showing that, in the absence of tariffs, the model predicts the United States has the safest currency in the world and pays lower interest rates than other countries. Its firms trade at a premium in world markets and consequently accumulate more capital per capita than those in other countries.

For parsimony, we show analytical results for the special case where markets are not segmented ($\psi = 1$). The interpretation and qualitative results are identical in the general case. The equivalent expressions are shown in online appendix A.

Equilibrium consumption of traded goods is given by

$$c_T^{n*} = \frac{(1-\alpha)(\gamma-1)}{(1-\alpha)+\gamma\alpha}\left(\overline{y}_N - y_N^n\right) - \frac{\gamma-1}{(1-\alpha)+\gamma\alpha}\left(\overline{\chi} - \chi^n\right), \tag{5}$$

where $\overline{y}_N = \sum_n \theta^n y_N^n$ and $\overline{\chi}_N = \sum_n \theta^n \chi^n$ are the average log per capita output of nontraded goods across countries and the average per capita realization of the country-specific demand shock, respectively. We use asterisks to denote the solution in the freely floating exchange rate regime without tariffs.

9. In the terminology of Coeurdacier and Rey (2013), financial markets are "first-order complete" in the sense that the payoffs of the available assets span all states of the world in the log-linear solution to the competitive equilibrium.

The expression shows that households use shipments of traded goods to insure themselves against the supply and demand shocks affecting their country. Households have high marginal utility and thus receive additional traded goods whenever they have a higher-than-average demand shock (they "want" more consumption) or a lower-than-average output of nontraded goods (they produce fewer nontraded goods).

The real exchange rate between countries *f* and *h* mirrors this pattern in the flow of goods:

$$s^{f,h*} = p^{f*} - p^{h*} = \frac{\gamma(1-\alpha)}{(1-\alpha)+\gamma\alpha}\left(y_N^h - y_N^f\right) - \frac{(\gamma-1)(1-\alpha)}{(1-\alpha)+\gamma\alpha}\left(\chi^h - \chi^f\right). \tag{6}$$

We find it convenient to define the broad exchange rate index of country *f* as the arithmetic average of its bilateral exchange rates with all other currencies. Since there is a continuum of countries, the law of large numbers applies such that

$$\overline{s}^{f*} = -\frac{\gamma(1-\alpha)}{(1-\alpha)+\gamma\alpha} y_N^f + \frac{(\gamma-1)(1-\alpha)}{(1-\alpha)+\gamma\alpha}\chi^f, \tag{7}$$

where a higher $\overline{s}^{f*}$ implies an appreciation of country *f*'s currency.

The same shock (be it to supply or demand) that prompts a country to import more traded goods also leads to an appreciation of the country's currency: A country's consumption basket becomes more expensive whenever it has a relatively high demand shock or a relatively low output of nontraded goods.

As a result, a country imports relatively more traded goods, and its real exchange rate appreciates whenever domestic demand outstrips domestic supply—a common feature of a wide range of models of exchange rate determination, where appreciation signals relatively high marginal utility, either as a result of a positive demand shock or a lack of supply.

Note, however, that this pattern of appreciation and demanding more imports as a means of insuring against domestic shocks does not depend on the size of the country, as indicated by the absence of θ's in equation (7). That is, American, European, and households of other countries do not differ in their desire to use imports to soften the impact of domestic shocks on their consumption or in the reaction of their exchange rates to this desire.

Contrasting with this symmetric reaction of exchange rates and the demand for imports, countries' shocks differ in the extent to which they spill over to the world economy: Shocks that cause Americans to demand more imports (and the US dollar to appreciate) require a large share of the world's traded goods to be shipped to the United States, whereas shocks that cause the residents of a small country to demand more imports (and their currency to appreciate) do not. In other words, fluctuations in US demand for imports have a larger effect on the world market price of traded goods compared with the impact of fluctuations in a small country's demand for imports. It follows immediately that the US dollar appreciates in states of the world in which traded goods are scarce, whereas the currencies of smaller countries do not.

To show this effect formally, equation (8) displays the equilibrium marginal utility of traded good consumption. This marginal utility is equalized across households as long as there is free trade. It serves as a key indicator of stress in our model's world economy—one can show it is the economy's unique stochastic discount factor and thus the quintessential indicator of households' economic stress:

$$\lambda_T^* = -\left(\gamma - 1\right)\left(1 - \alpha\right)\sum\nolimits_n \theta^n y_N^n + \left(\gamma - 1\right)\sum\nolimits_n \theta^n \chi^n. \tag{8}$$

Note that λ_T is low in "good" states of the world when countries, on average, have high output of nontraded goods and demand is relatively low. In those "good" states of the world, traded goods are cheap in the world market, and households can buy and use them to smooth out any country-specific shocks. Conversely, λ_T is high in times of stress, when the supply of nontraded goods is low and demand is high on average.

The key insight is that, in this expression, each country's weight is proportional to the size of its economy: Shocks to the United States affect a larger measure of households and thus tend to spill over more to the rest of the world in the form of higher shadow prices of traded goods. In this sense, higher stress among US households translates into disproportionate stress in the world economy. This asymmetry in the spillovers of country-specific shocks to world prices gives rise to differences in the stochastic properties of countries' currencies. Inspecting λ_T^* and $s^{f,h*}$ shows that currencies of larger countries are "safer" in the sense that they have a positive covariance with λ_T^*: Whenever demand outstrips supply in a given country, its real exchange rate appreciates. For a given percentage decline in output or increase in demand, this appreciation occurs independently of how large the country is. However, a shock to a larger country has a larger impact on the shadow price of traded goods (λ_T^*), resulting in a higher covariance.

We can write the covariance as

$$\text{cov}\left[\lambda_T^*, p^{h*} - p^{f*}\right] = \frac{(\gamma - 1)\gamma(1-\alpha)^2}{(1-\alpha) + \gamma\alpha}\left(\theta^h - \theta^f\right)\sigma_N^2 + \frac{(\gamma-1)^2(1-\alpha)}{1-\alpha+\gamma\alpha}\left(\theta^h - \theta^f\right)\sigma_\chi^2. \quad (9)$$

This covariance is increasing in the size of the country. Consequently, we obtain a safety ranking of currencies that aligns with the issuing country's size. Because the United States is the world's largest economy, it follows that, under free trade, the US dollar is the world's safest currency (fact I.A).

The Euler equation of an international investor implies that the log expected return to borrowing in country h and lending in country f is linked to the covariance of exchange rates with λ_T^*:

$$r^{f*} + \Delta\mathbb{E}s^{f,h*} - r^{h*} = \text{cov}\left[\lambda_T^*, p^{h*} - p^{f*}\right], \quad (10)$$

where r^{n*} is the risk-free interest rate in country n and the log stochastic discount factor is λ_T^*.[10] Because $\Delta\mathbb{E}s^{f,h*} = 0$ in this model, it follows directly that the United States has a lower interest rate, $r^{US*} < r^{n*}\,\forall n \neq US$, than other countries (fact I.B above). That is, a currency that appreciates in times of global stress (when consumption goods are expensive everywhere) provides a hedge against worldwide consumption risk and pays a lower interest rate in equilibrium.

Finally, since domestic firms produce (nontraded) goods that are consumed domestically, the value of their output comoves with the real exchange rate. One can write the dividend payments made by each country's firms under free trade as

$$p_N^{n*} + y_N^{n*} = \frac{(1-\alpha)(\gamma-1)}{(1-\alpha)+\gamma\alpha}\left(\overline{y}_N - y_N^n\right) - \frac{(\gamma-1)}{(1-\alpha)+\gamma\alpha}\left(\overline{\chi} - \chi^n\right).$$

10. $\Delta\mathbb{E}s^{f,h*}$ is defined as the logarithm of the ratio of the countries' expected real price changes (see Hassan, Mertens, and Zhang 2023 for a formal derivation).

Thus, the same forces that make the US dollar a safer currency from the perspective of international investors also make the firms based in the United States safer investments, because their payouts (dividends) covary more positively with λ_T. The value of dividends paid by US firms tends to be high when traded goods are scarce in world markets.

It follows that US firms have a lower cost of capital, increasing their value in world markets and prompting them to invest relatively more capital: Because US firms operate in a country that is large and has low interest rates, they are more attractive to foreign investors, command a premium in world markets, and invest more capital per worker than their peers in foreign (smaller) countries (fact I.C).

Our model economy thus qualitatively reproduces the first three stylized facts from section I: It shows the US dollar as the safest currency in the world (fact I.A); US risk-free interest rates are low compared to those in foreign countries (fact I.B); and US firms have a relatively low cost of capital (fact I.C). All three facts result directly from one key mechanism: Shocks that lead the US dollar to appreciate also lead to a scarcity of traded goods in world markets.[11]

II.B. Dollar Safety and Interest Rates in a Trade War

Before generalizing our model to accommodate facts I.D.a–d (the dollar's role as the world's anchor currency), we first explore the effects of a trade war on the dollar's safety, US interest rates, and the cost of capital in the United States.[12] To simplify the exposition, we focus the discussion in this section on the case where foreign countries retaliate against any US export tariffs in equal measure so that the same tariff is levied on US imports and exports. We show in section II.E that allowing for partial retaliations does

11. Although political leaders often refer to the phenomenon of low US interest rates and low cost of capital for US firms as an "exorbitant privilege," note that this "privilege" (facts I.B and I.C) arises in equilibrium as an efficient, first-best response to the high risk emanating from the United States: Higher capital accumulation in the United States represents an effective hedge against global consumption risk. This precautionary behavior raises expected US output in times of stress and thus dampens the global effect of US shocks at the margin. In other words, the American "exorbitant privilege" is an efficient response to the fact that shocks affecting large countries are hard to insure against.

12. Recall that, in the baseline version of our model, we abstract from differentiated traded goods and instead make the simplifying assumption that, when a traded good enters a country, it becomes indistinguishable from domestically endowed traded goods, so that all traded goods within the country have the same price.

not materially change our results—in the general case, the key quantity is the average tariff levied on US imports and exports.

When the United States levies a tariff and trading partners retaliate in equal measure, the wedge between the price of traded goods in the United States and the world market takes the form

$$\lambda_T^{US} = \lambda_T + \tau c_T^{US}, \tag{11}$$

where τ is the tariff rate and λ_T^{US} is the logarithm of the marginal utility of traded consumption in the United States, which now deviates from its counterpart in the rest of the world (λ_T). In particular, the marginal utility of traded consumption in the United States exceeds that in other countries whenever the United States imports traded goods ($c_T^{US} > 0$).[13]

In a trade war, policymakers are thus placing a wedge between the marginal utility of traded consumption in the United States relative to the rest of the world, which is increasing the share of consumption that is imported or exported, and thus also increasing the size of the shock prompting the trade flow. The trade war therefore partially isolates the United States from the world economy, inhibiting risk sharing and the ability of domestic households to respond to shocks by importing or exporting traded goods.

Doing so has two effects on the safety of the US dollar. First, with a wedge on the price of the traded goods entering the country, the US domestic price level becomes more volatile, increasing the volatility of the average exchange rate between the US dollar and foreign currencies. Second, US households' reduced capacity to access the world market for traded goods reduces the spillover of US shocks into the world market price of traded goods. That is, the trade war insulates the world market from shocks that buffet the US economy.

The price of traded goods outside the United States becomes

$$\lambda_T = -(\gamma - 1)(1 - \alpha)\sum_n \bar{\theta}^n y_N^n + (\gamma - 1)\sum_n \bar{\theta}^n \chi^n, \tag{12}$$

where

$$\bar{\theta}^{US} = \frac{(1-\alpha) + \gamma\alpha}{(1-\alpha) + \gamma\alpha + (1 - \theta^{US})\tau}\theta^{US} \tag{13}$$

13. Recall that the endowment of traded goods is one. Also see online appendix A.2 for details.

and

$$\bar{\theta}^n = \frac{(1-\alpha)+\gamma\alpha+\tau}{(1-\alpha)+\gamma\alpha+(1-\theta^{US})\tau}\theta^n \quad n \neq US \tag{14}$$

are pseudo country sizes, adjusted for the effect of the trade war, with $\sum_n \bar{\theta}^n = 1$.

Examining these two expressions shows that the "effective country size" for the United States is strictly decreasing in the size of the tariff, whereas the other countries' effective sizes are increasing. In the extreme, if the United States goes all the way to autarky with $\tau \to \infty$, its effective country size goes to zero, $\bar{\theta}^{US} \to 0$, with other countries making up for the difference.

In this extreme case, the complete removal of spillovers of US shocks into world markets eliminates the force that induced a positive covariance between the US dollar and λ_T: A US dollar issued in autarky garners no safety premium, because shocks originating in the United States no longer spill over to the world economy and therefore have no effect on the world's stochastic discount factor. Instead, in this hypothetical scenario, the dollar would resemble a currency issued by a small (measure zero) country, with a higher interest rate, less valuable firms, and a lower capital-to-output ratio. By contrast, the countries that remain engaged in the world market now earn larger safety premia, commensurate with their larger effective sizes.

It is worth noting that one can construct examples where the increased volatility of the dollar can locally act as an opposing force to its loss of safe-haven status: For relatively small levels of τ, where US shocks still maintain a large effect on λ_T, there exist parameters where the increased volatility of the US dollar locally increases its covariance with λ_T despite the US economy's smaller effective size. However, it is clear that for large tariffs, the latter effect must dominate, which also applies to the quantitatively relevant range in our calibration below.

We conclude that, in our model, a trade war jeopardizes the US dollar's status as a safe-haven currency. Loss of this safe-haven status tends to raise interest rates, increase the cost of capital for US firms, lower their world market value, and therefore rotate capital flows away from the United States.

II.C. Calibration and Model Fit

We next calibrate our model to the data to assess the trade war's impact quantitatively. To this end, we calculate the average share each country contributes to world GDP in our pre-sample period of 1984–2019. This yields $\theta^{US} = 0.27$ for the United States, $\theta^{Euro} = 0.15$ for the eurozone, $\theta^{JPN} = 0.12$ for Japan, and $\theta^{CN} = 0.07$ for China.[14] We use this pre-sample to test and validate the model's fit to the historical data. For 2023, we calculate $\theta^{US} = 0.26$, $\theta^{Euro} = 0.15$, $\theta^{JPN} = 0.04$, and $\theta^{CN} = 0.17$.[15] We use these updated parameters when assessing the model's predictions for the trade war's impact on exchange rate arrangements going forward. In each case, we assign the remainder of world GDP to a continuum of small countries whose shocks integrate to zero by the law of large numbers.

In addition to the distribution of country sizes, the model features seven parameters. Of these, we set two to equal standard values in the literature, with a capital share in output of $\nu = 1/3$ and a relative risk aversion of $\gamma = 5$.

In our benchmark calibration, we set the tariff rate τ to 17 percent to match expectations of the long-term average tariff rate between the United States and the rest of the world, as reported by Cuevas (2025) and Goldman Sachs (2025).[16]

We calibrate the remaining parameters (the expenditure share of traded goods in overall consumption, α, the degree of market segmentation, ψ, and the volatility of supply, σ_N, and demand shocks, σ_χ) to match four key empirical moments of the 1984–2019 data.

The first two are the risk-free interest rate differential between the US dollar and the two small developed economies with floating exchange rates (Australia and New Zealand) and the excess return on the US dollar relative to these two countries' currencies. As will become apparent in section III, the model predicts that the stabilization policies followed by other small economies distort their interest rates and currency returns, and that absent these stabilization policies, other small economies would have interest rates and currency returns more similar to those of Australia and New Zealand. Table 1 shows that, on average, these two currencies have interest rates 2.84 percentage points higher than the interest rate on the US dollar. The mean excess return to borrowing in US dollars and lending in the Australian and New Zealand dollars of 3.18 percent shows that these currencies do not depreciate on average, so the interest differential passes

14. We use Germany and France, the issuers of two major currencies in the euro area, to represent the eurozone before 1999.

15. We use 2023 data to maximize coverage. Using data for 2024 yields virtually the same share for major economies.

16. Note that these studies do not reflect expectations as of April 2025 but rather June 2025. Both numbers are somewhat lower than the 22.5 percent projected by the Budget Lab at Yale (2025a) around the same time.

Table 1. Model Calibration and Target Moments

Panel A: Calibration		
Parameters	*Value*	*Source*
Size of tariff (τ)	0.17	Goldman Sachs (2025)
Capital share (ν)	0.33	Standard
Risk aversion (γ)	5.00	Standard
GDP share US (1984–2019)	0.27	Penn World Table
GDP share eurozone (1984–2019)	0.15	Penn World Table
GDP share US (2023)	0.26	World Bank
GDP share eurozone (2023)	0.15	World Bank
Calibrated parameters		
Share of active households (Ψ)	0.03	
Share of traded consumption (α)	0.45	
Supply shock volatility (σ_N)	0.03	
Demand shock volatility (σ_χ)	0.07	
Panel B: Targeted moments		
Interest rate difference (USA−ANZ) (pp.)	−2.84 [−3.35, −2.33]	−2.70
Currency excess return (USA−ANZ) (pp.)	−3.18 [−4.47, −1.89]	−2.70
Correlation of exchange rate with consumption growth	−0.12 [−0.31, 0.08]	−0.07
Standard deviation of consumption growth (%)	1.95 [1.55, 2.35]	0.65

Source: Penn World Table 10.01 (Feenstra, Inklaar, and Timmer 2015), World Bank, Goldman Sachs (2025), Hassan and Mano (2019), and authors' calculations.

Note: The table shows the parameters used in the model's calibration in table 2 and in the following exhibits, as well as the data moments we used for calibration. Panel A lists the parameter values. The parameters in the first block are taken from the literature. The GDP shares shown in the second block are averages calculated from the Penn World Table 10.01 for 1984–2019, with the shares in 2023 calculated from World Bank data. The GDP share of Japan is 0.12 for 1984–2019 and 0.04 for 2023; the GDP share of China is 0.07 for 1984–2019 and 0.17 for 2023. The parameters in the third block are calibrated to maximize the model's fit to the unconditional data moments shown in panel B. The interest rate differential is the twelve-month forward premium between the US dollar and the Australian and New Zealand dollars. The currency excess return subtracts changes in the exchange rate. These moments are computed using monthly data. The correlation between exchange rates and consumption growth and the standard deviation of consumption growth are computed using annual data for G10 economies from the Penn World Table 10.01. Bootstrapped 95 percent confidence intervals are shown in brackets. The sample period for panel B is 1984–2019.

through into currency returns almost one for one. The remaining moments are the average correlation between each of the G10 countries' exchange rates to the US dollar and their consumption growth, and the average standard deviation of consumption growth in these countries.

The second column of table 1, panel B lists these moments and their standard errors. We find that our model matches these moments well when we choose a relatively high market segmentation with $\psi = 0.03$ and supply

Table 2. Effects of the Trade War

	Data	*Model*			
	4/2/2025–4/14/2025 (1)	*Baseline (2)*	*Full retaliation (3)*	*40% retaliation (4)*	*No retaliation (5)*
Changes in . . .					
Interest rate differential (USA−G10) (pp.)	0.34 [−0.13, 0.80]	0.56	0.56	0.40	0.28
Stock price differential (USA−G10) (pp.)	−4.66 [−7.32, −2.00]	−2.23	−2.17	−1.55	−1.08
US exchange rate volatility (%)	8.20	3.05	3.08	2.20	1.55
Relative capital accumulation (%)		−0.64	−0.62	−0.44	−0.31
Relative expected wage (%)		−0.21	−0.21	−0.15	−0.10
Correlation of broad dollar with λ_T		−0.12	−0.15	−0.11	−0.08
Country sizes		1984–2019	2023	2023	2023

Source: Hassan, Mertens, and Wang (2024), Federal Reserve Bank of Minneapolis, Penn World Table 10.01 (Feenstra, Inklaar, and Timmer 2015), World Bank, and authors' calculations.

Note: This table presents the change in model moments along with their empirical counterparts before and after the tariff announcement. Column 1 captures changes in the variables of interest from April 2 to April 14, 2025. The change in the interest rate differential and the stock price differential is measured relative to G10 currencies. Bootstrapped 95 percent confidence intervals are shown in brackets. The change in the US exchange rate volatility captures the change in the US dollar's implied volatility computed using the change in the price of three-month dollar-euro futures during this period. Columns 2–5 show the model's predictions under the calibration in table 1. Column 2 uses the average country sizes (GDP shares) calculated from Penn World Table 10.01 (1984–2019), while columns 3–5 use country sizes in 2023 from World Bank data. Column 3 assumes all other countries impose full retaliation in response to the US tariff; column 4 assumes all other countries impose a tariff of 40 percent of that of the United States on US goods; and column 5 assumes no retaliation.

and demand shocks with standard deviations $\sigma_N = 0.03$ and $\sigma_\chi = 0.07$, respectively. Panel A of table 1 lists the complete set of calibration choices.

For these parameters, the model generates a US interest rate 2.70 percentage points below that of the two small developed economies. Because the exchange rate is moved in almost equal measure by supply and demand shocks, we obtain a correlation between exchange rates and consumption growth close to zero, –0.07 compared to –0.12 in the data, well within the confidence interval [–0.31, 0.08]. Finally, the standard deviation of consumption growth across countries comes in at 0.65 percent below the confidence interval.

We evaluate the fit of our model relative to two sets of untargeted moments. The first is the market reaction that unfolded during the period of frequent tariff announcements between April 2 and April 14, 2025. In particular, US interest rates rose relative to foreign countries: The twelve-month risk-free rate increased by 34 basis points relative to the G10 currencies; US stock prices, denominated in the average of G10 currencies, decreased in value by 4.66 percent; and the US dollar's implied volatility increased by 8.20 percent, though we should note that these market reactions are measured with a great deal of imprecision, as shown by the wide (bootstrapped) standard errors. We do not calculate a standard error for the change in exchange rate volatility because it is calculated based on a single data series (euro-to-dollar foreign exchange futures).

The second set of untargeted moments arises from data on the structure of international exchange rate arrangements as provided by Ilzetzki, Reinhart, and Rogoff (2019). That is, we evaluate the extent to which our model can fit the exchange rate regimes chosen by countries of different sizes before the imposition of US tariffs. We describe this procedure in detail in section III.

Following the tariff announcement, the model generates a rise in the US interest rate differential of 56 basis points, higher than the point estimate from the data but well within the confidence interval. The model further replicates the drop in US stock prices (2.23 percent)[17] and the rise in the US dollar's implied volatility (3.05 percent). Both of these predicted reactions are smaller than the ones observed in the data but match the sign. Overall, we conclude that our simple model manages to rationalize a significant part of the otherwise puzzling market reaction to President Trump's tariff policies.

In line with our analytical results above, the model also predicts a 0.12 percentage point drop in the correlation of the US dollar with the stochastic discount factor λ_T (from 0.79 to 0.67), a 0.64 percent drop in US capital accumulation, and a 0.21 percent drop in the average wage paid in the United States. In other words, the model predicts that the trade war increases borrowing costs in the United States relative to the rest of the

17. We follow Bansal and Yaron (2004) and assume that stock returns are leveraged claims on real economic activity. We set the leverage ratio to 3.5.

world, reduces the value of US firms, prompts capital outflows, and results in a commensurate drop in US wages. In short, the trade war chips away at the US exorbitant privilege, as reflected in facts I.A–C above.

Column 3 of table 2 repeats this calculation while updating the parameters governing country size (θ^n) to their values in 2023. As anticipated, the model's predictions remain largely unchanged. The reason is, of course, that the configuration of GDP shares has been very stable over the past decades—the United States accounts for 26 percent of world GDP in 2023, compared to 27 percent in the pre-sample. Similarly, the European Union accounts for 15 percent in both samples. The only material change is that Japan and China effectively traded places, with the former going from 12 to 4 percent of world GDP and the latter from 7 to 17 percent. However, this change has little effect on our calculations.

II.D. Quantitative Effects of a Trade War on Dollar Safety and Interest Rates

We next perform a counterfactual analysis to investigate how a trade war of varying intensity might affect these outcomes. Figure 3 shows the correlation between each country's broad log real exchange rate ($\overline{s}^n$) and λ_T, the stochastic discount factor, for a range of different possible tariff rates.

Recall from our discussion above that the imposition of a tariff affects both terms in this correlation: Isolating America from world trade increases the volatility of $\overline{s}^{US}$ while also decreasing the effect of US shocks on the world economy (λ_T).

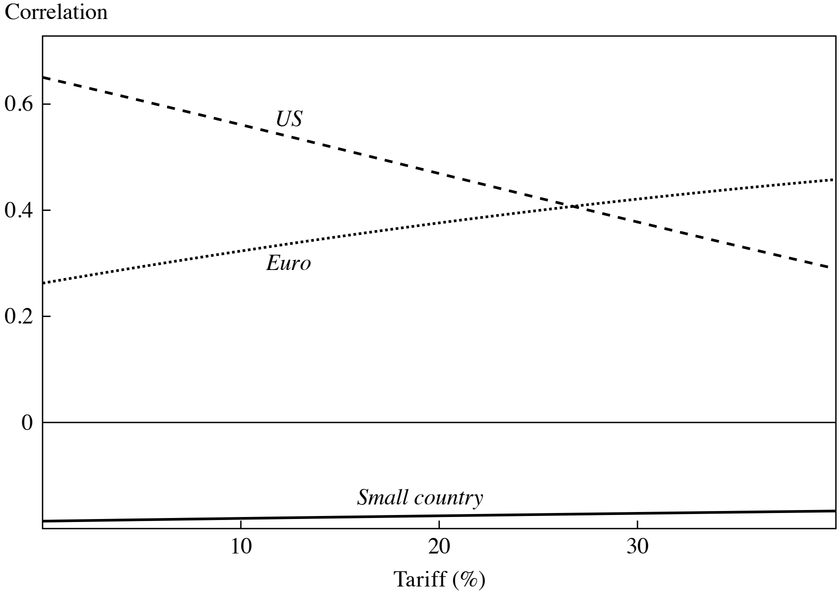
The figure shows that, over the entire range of tariffs depicted (from zero—free trade—to 40 percent), the latter effect dominates. Trade wars of increasing severity monotonically lower the dollar's correlation with λ_T and thus make it less safe from the perspective of global investors.

In this calibration, a trade war with tariffs (and retaliation) of about 26 percent makes the euro a safer store of value than the US dollar. Consistent with the intuition in section II.B, this is the critical level of tariffs above which the effective country size of the eurozone exceeds that of the United States, so that $\overline{\theta}^{Euro} \geq \overline{\theta}^{US}$.[18] This result will be key to our findings in section III that the dollar-centric world financial system may be subject to a sudden phase shift in favor of another anchor currency.

Consistent with these results, aggregate US consumption risk increases as the United States isolates itself from the larger world economy. Incidentally,

18. See online appendix A.8 for the expression of pseudo country sizes under incomplete markets.

Figure 3. Correlation of Each Country's (Broad) Real Exchange Rate with λ_T



Source: Authors' calculations.
Note: This figure plots the correlation between each country's broad log real exchange rate ($\bar{s}^n$) and λ_T, the stochastic discount factor, for trade wars of varying intensity between the United States and the rest of the world.

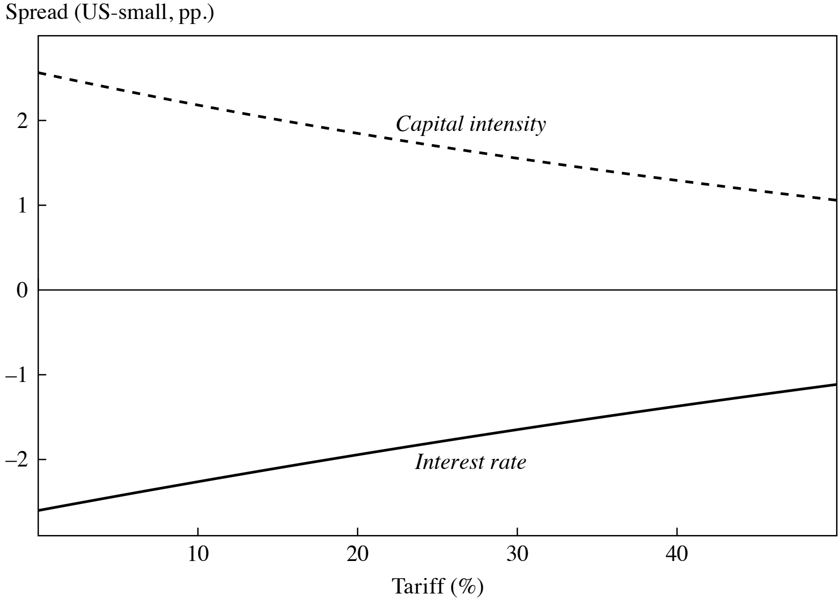
consumption risk in other countries drops because in this calibration, the United States, due to its size, influences a large share of world trade and is thus also a major exporter of consumption risk.

Figure 4 shows the consequences of the increasing riskiness of the dollar for US interest rates and capital accumulation. Whereas the dollar interest rate is 2.70 percentage points lower than that of a small (measure zero) country under free trade, this "exorbitant privilege" shrinks with increasing disruptions to America's trade with the rest of the world. At extreme levels of tariffs of 104 percent or more, the privilege disappears and even inverts as the broad dollar exchange rate becomes more and more volatile and less related to λ_T.

With rising interest rates, US firms become less valuable in world markets than their counterparts, eventually leading to capital outflows (in $t = 1$) in favor of other countries.

Although our model features only two periods, it is straightforward to see that, in a fully dynamic model with capital adjustment costs, a trade

Figure 4. US Interest Rates and Capital Accumulation



Source: Authors' calculations.
Note: This figure plots the interest rate differential and capital intensity of the United States relative to a small (size 0) country over the level of tariffs and retaliations prevailing in a trade war between the United States and the rest of the world.

war might lead to sustained capital outflows. It is thus not unreasonable to expect a link between a sustained trade war, steady capital outflows, and eventual pressure to impose capital controls. In this sense, our model backs up fears by some commentators that isolating the United States from world trade might create political pressure to also close its capital account (Klement 2025).

II.E. Partial Retaliation

We next generalize our results to allow for an asymmetric trade war where foreign countries may retaliate against US import tariffs to varying degrees, with different tariff rates applied to US imports versus foreign imports of US goods.

Although several institutions track the average tariff on US imports, the change in the average tariff on US exports is less well documented. Based on the available evidence, we may estimate that, as of the writing of this paper, the average tariff on US exports stands at about 6 percent, whereas

US imports are taxed at about 17 percent (see, e.g., the Budget Lab at Yale 2025b and Bown 2025).

To solve the model, we continue to rely on perturbation solutions that are now conditional on whether the United States is an importer or exporter. The solution is thus a piecewise linear function of the state space where there is a single cutoff for each shock at which net imports are zero and the tariff rate switches. We adapt the solution method in Mertens and Williams (2021) and Bok, Mertens, and Williams (2025), which demonstrate how to compute expectations of piecewise linear functions explicitly.[19]

Figure 5 summarizes the results. Panel A plots the change in the US interest rate in response to different tariffs imposed by the United States for varying levels of retaliation. The dotted line shows the effect on US interest rates under no retaliation, where foreign countries refrain from imposing taxes on US exports. The dashed line shows the case of 40 percent retaliation, which appears to be the status quo as of the writing of this paper.

The key insight from this graph is that the dotted line (the effect under no retaliation) has almost exactly half the slope of the solid line (the effect under full retaliation). That is, if a US export tariff of 17 percent raises the US interest rate by 0.56 percentage points under full retaliation, the effect is cut in half under no retaliation (a rise of 0.28 percentage points). With a 40 percent retaliation, closer to the empirically relevant case, we obtain an increase of 0.40 percentage points.

The same is true for the dollar's safety, shown in panel B. The correlation between the broad dollar and λ_T drops by 0.15 percentage points with a 17 percent tariff on US imports under full retaliation and by 0.11 percentage points under a 40 percent retaliation.

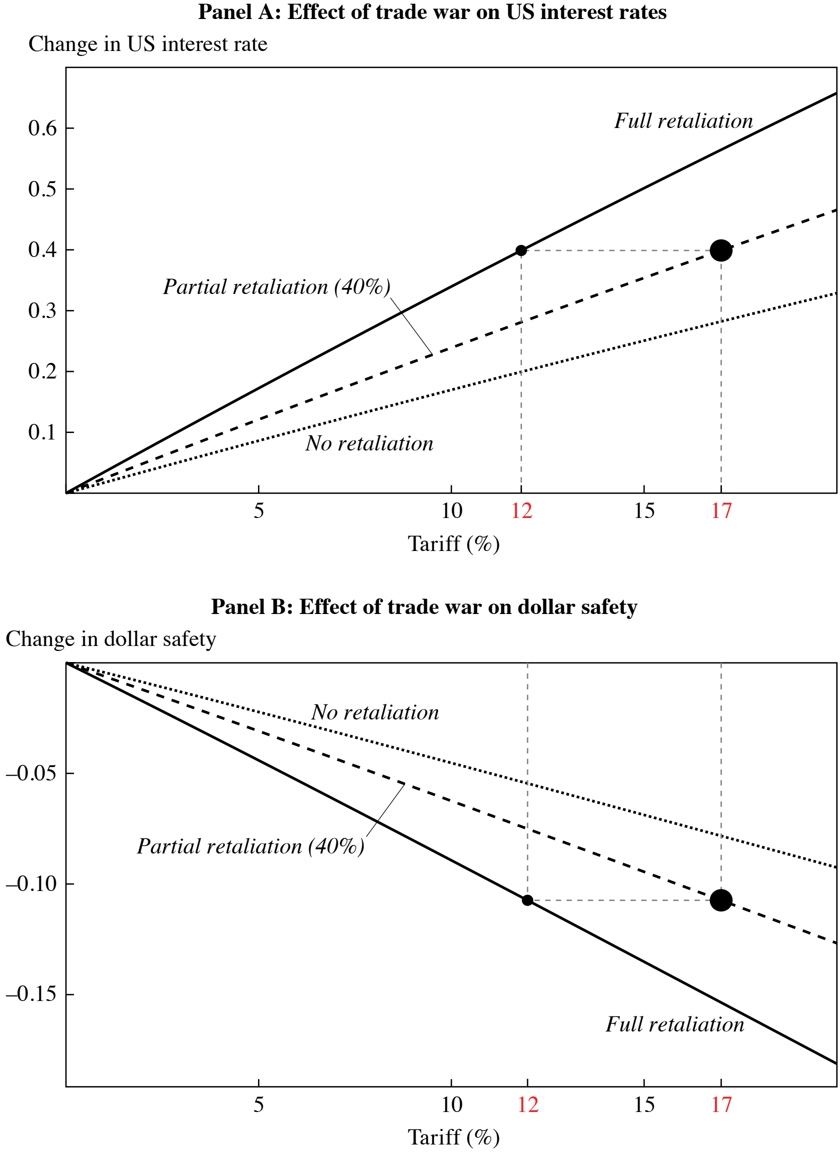
In other words, when thinking through the effects of an asymmetric trade war, it suffices to calculate the average tariff on US trade (the average between the US export and import tariff). A trade war with a 17 percent tariff on US imports and 6.8 percent on US exports has effects similar to a trade war with a tax of 12 percent on US imports and exports.

III. Trade Wars and the Dollar's Anchor Status

We next extend our model to allow countries to stabilize their real exchange rate relative to a target currency. Hassan, Mertens, and Zhang (2023) show that doing so qualitatively replicates facts I.D.a–d: The optimal

19. The computational problem is similar to solving a New Keynesian model with a zero lower bound on interest rates.

Figure 5. Partial Versus Full Retaliation



Source: Authors' calculations.

Note: This figure plots the effect of a trade war on interest rate differential between the United States and a small country and on the correlation of the US broad exchange rate ($\bar{s}^{US}$) with λ_T, which measures dollar safety, under different retaliation scenarios. The large black dots in each panel represent the effects of a US tariff of 17 percent on imports and a retaliation of 6.8 percent on US exports (a retaliation strength of 40 percent on the US interest rate and dollar safety). These effects are roughly the same as a US tariff of 12 percent met with full retaliation, as shown by the small black dots.

noncooperative policy in this model is for a small country to stabilize its real exchange rate relative to the currency of the largest economy in the world—the US dollar. Building on this work, we take the steps outlined above to make the model quantitatively viable and expand the number of countries to allow for the euro's endogenous emergence as an alternative anchor currency.[20]

We first summarize the economic rationale for optimal exchange rate stabilization and then show that the model's predictions are borne out quantitatively: The model closely replicates the structure of the world's exchange rate arrangements under free trade. In a third step, we examine how a trade war interferes with this structure and show that a severe trade war could quickly erode the dollar's anchor status.

III.A. Optimal Stabilizations and the World's Anchor Currency

Intuitively, when the US dollar appreciates in a global crisis, a government that keeps its own currency from falling inherits some or all of the dollar's insurance properties, making the country's currency a safer store of value. That is, a small country can inherit part or even all of the US dollar's safety characteristics and macroeconomic privileges by implementing a stabilization of its real exchange rate relative to the US dollar.

We formalize this idea by extending our model to allow each country's central bank to intervene in currency markets to stabilize its exchange rate relative to its chosen target currency. Hassan, Mertens, and Zhang (2023) do so by assuming sticky prices of traded goods and giving each country's central bank control of the domestic money supply.[21]

To avoid introducing significant additional notation relating to money and nominal prices, we skip these formal details of how stabilization is implemented and instead assume that each country's central bank can directly manipulate its country's real exchange rate. Doing so replicates the same outcome as in the full-fledged model. Formally, the central bank controls the real exchange rate by placing a state-contingent wedge $1 + z(\omega)$

20. Although China's economy has a GDP share similar to that of the euro area, we focus on the euro as an alternative anchor because the renminbi itself does not float and is subject to capital controls. However, our model does not distinguish between the two.

21. In this generalized model, the central bank can then stabilize the real exchange rate by intervening in currency markets to adjust the number of traded goods that the country imports. That is, if the price of traded goods is sticky and the central bank controls the domestic money supply, it also effectively controls the real exchange rate. A stabilization of the nominal exchange rate then also implements a real stabilization so that the two are equivalent.

between the domestic and the world market price of traded goods so that it can adjust the number of traded goods imported. The central bank uses this wedge to implement a stabilization of the real exchange rate $s^{\mathcal{T},m}$ relative to a target country $\mathcal{T}$.

A stabilization of the real exchange rate is then a schedule of contingent wedges $z(\omega)$ such that

$$\text{var}\left[s^{\mathcal{T},m}\right] = \left(1 - \Omega^{m}\right)^{2} \text{var}\left[s^{\mathcal{T},m*}\right], \tag{15}$$

where again s^* denotes the real exchange rate absent policy intervention. The central bank of a stabilizing country m therefore chooses (i) the target country of the stabilization ($\mathcal{T}$) and (ii) the degree of the stabilization, where $\Omega^m = 1$ represents a hard peg and $\Omega^m = 0$ means the currency floats freely. Any revenues (positive or negative) from this stabilization policy are rebated lump-sum to the country's financier households. We relegate details on the extension of the model to online appendix A.

One can then show that a stabilizing central bank sets the wedge (or, in the nominal variant, adjusts the monetary base) such that it raises the domestic price of traded goods whenever the target currency appreciates. Doing so raises the price of the stabilizing country's consumption in lockstep with that of the target, maintaining the stabilization of the real exchange rate. In other words, the stabilizing country reduces its absorption (imports) of traded goods whenever the target appreciates.[22]

By aligning the stochastic properties of its exchange rate with those of a large, safe currency, the stabilizing country inherits its risk properties. The stabilized real exchange rate now covaries more positively with λ_T, making the stabilizing country's currency safer, lowering domestic interest rates, and raising the present value of domestic firms and the domestic capital stock. Thus, by picking the largest economy in the world as the target for its stabilization, a stabilizing country can inherit part of the gains from "dollar privilege": safer currency, cheaper capital, and a valuation windfall for domestic equity.

Interestingly, Hassan, Mertens, and Zhang (2023) show that for a small stabilizer ($\theta^m \rightarrow 0$), the policy of stabilizing to a large country is not only self-funding but also revenue positive, because the government sells traded goods when they are expensive (when Americans demand more imports)

22. Equivalently, a nominal peg that commits the central bank to sell foreign reserves when the target country appreciates implements the same real wedge, so nominal and real stabilizations are isomorphic in this class of models.

and buys them when they are cheap (when Americans demand few imports). In this sense, stabilizing countries are getting paid for providing consumption insurance to the target country. However, for a larger stabilizer, its price impact in the world market for traded goods turns the terms of trade against itself, making the cost of stabilization rise monotonically with θ^m and eventually rendering the policy welfare-reducing for large economies.

The flip side of providing insurance to the target country is that domestic consumption becomes more volatile: The variance of consumption in the stabilizing country rises as the country absorbs some of the target's risk, making imports cheaper when the target demands more of them. While the attendant utility loss would, in isolation, make stabilization undesirable, for $\theta^m \to 0$, it is more than offset by the wealth transfer resulting from lower interest rates and the increase in the world market value of domestic firms.[23] Consequently, small economies optimally accept higher consumption risk to secure a larger share of world wealth, whereas large countries prefer to float.

III.B. A Quantitative Model of the International Monetary System

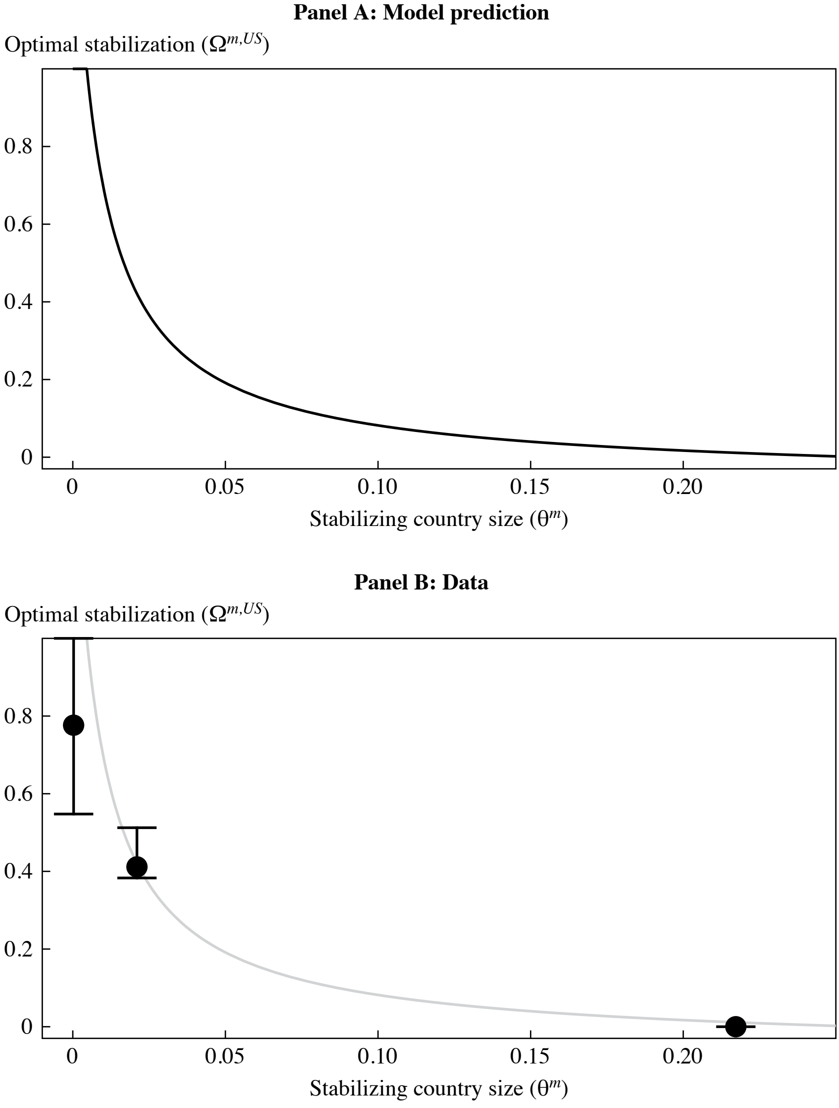
Using the calibration from table 1 and the configuration of country sizes from our pre-sample (1984–2019), we compute optimal stabilization policies for countries of varying sizes. We find that the model predicts the following: (i) All countries that choose to stabilize their exchange rates target the US dollar, the currency of the largest economy, which endogenously emerges as the world's anchor currency; (ii) countries that contribute less than 0.8 percent of world GDP optimally choose a hard peg against the dollar; and (iii) countries whose size exceeds this threshold choose looser stabilizations, while Japan and the euro area optimally choose to float. Panel A of figure 6 displays these optimal stabilizations to the US dollar graphically.

To compare these predictions to the data, we use detailed data on each currency's exchange rate regime from Ilzetzki, Reinhart, and Rogoff (2019). We first calculate for each country and year the allowed deviation in the country's nominal exchange rate against the identified target currency, and then normalize with the average standard deviation of exchange rates identified in the data set as "freely floating." We then average over the same time horizon as used to calibrate the model (1984–2019).

At the extensive margin, the model fits remarkably well. Given the distribution of GDP shares (country sizes) in the data, the model predicts

23. In this sense, the key assumption is that financial intermediaries trade international stocks but not a full set of state-contingent claims. This assumption makes each country the monopoly supplier of its own firms so that an increase in their value shifts wealth in favor of the stabilizing country.

Figure 6. Optimal Stabilization by Size of Stabilizing Country



Source: Ilzetzki, Reinhart, and Rogoff (2019) and authors' calculations.

Note: Panel A plots the model-predicted optimal stabilization policy (Ω^m) for countries of different sizes in the calibration shown in table 1. All optimal stabilizations are against the US dollar. Countries smaller than 0.8 percent of world GDP optimally choose a hard peg ($\Omega^m > 0.75$); countries larger than 3.6 percent of world GDP optimally choose to float their currencies ($\Omega^m < 0.25$); and countries in between optimally choose a looser stabilization shown in the graph. Panel B plots the median stabilization strength in the data for three groups of countries (smaller than 1 percent, between 1 percent and 10 percent, and larger than 10 percent of world GDP), as well as their interquartile range, using data from Ilzetzki, Reinhart, and Rogoff (2019), 1984–2019.

that all but the four largest economies (the euro area, Japan, China, and the United Kingdom) should reduce the standard deviation of their real exchange rates by at least 30 percent. Of the 141 countries in our data, all but five (96.5 percent) conduct such a stabilization. Of the 136 stabilizers, 108 (79.4 percent) on average stabilize to the US dollar over the sample period, as predicted by our model. Among stabilizers that target a different currency, the vast majority pick the euro, including European Union and European Free Trade Association members that are not in the monetary union. In this sense, our model correctly predicts the structure of the world's exchange rate arrangements, with the US dollar at its center, that emerged after the collapse of the Bretton Woods system.

To test the model's fit at the intensive margin, we divide countries in our sample into three groups: small economies (each contributing less than 1 percent of world GDP), intermediate-sized economies (each contributing between 1 percent and 10 percent), and large economies (those contributing more than 10 percent). For each of these groups, we estimate the average stabilization and compare it with our model's predictions. Panel B of figure 6 shows the results.

For the sample of small countries, the model predicts hard pegs—stabilizations of 100 percent. The median country in this group on average reduces the standard deviation of its exchange rate by 78 percent (with an interquartile range of 54 percent to 100 percent), with half of the countries in this group maintaining a more stringent stabilization—a remarkable fit, particularly given our stabilization data are measured with error and truncated at 100 percent.[24]

All of the thirty-six countries that sustained a hard peg throughout the entire sample period have a GDP share less than 1 percent, consistent with our model's predictions. These include Samoa, the Maldives, and Lesotho. Other small countries that predominantly maintain a hard peg include Saudi Arabia (with a world GDP share of 0.7 percent), Lebanon (share of 0.05 percent), and Jamaica (share of 0.02 percent).

For the group of intermediate-sized economies, the model on average predicts stabilizations of 42 percent. In the data, the median country maintains a stabilization of 41 percent (with an interquartile range between 38 percent and 51 percent). Examples include Brazil, Mexico, India, and Canada. Finally, the model fits the data for large economies *exactly*, where both Japan and the euro area float their exchange rates.

24. This truncation induces a natural downward bias in our measure of stabilization.

The model's main quantitative shortcomings are that China, on average, stabilizes significantly more than predicted by the model—with an average stabilization of 79 percent over the sample period versus 13 percent predicted by the model—and a number of European countries that stabilize to the euro rather than the US dollar. Both of these sets of policies may be affected by political considerations outside of our model. The other exceptions are a handful of smaller economies that float their exchange rates, notably Australia and New Zealand.

These shortcomings notwithstanding, the model accurately mirrors the structure of the world's exchange rate arrangements, with the dollar functioning as the anchor for the vast majority of stabilizations.

III.C. Quantitative Effects of a Trade War on the Dollar Anchor

A trade war can fundamentally affect the forces that make the US dollar the world's anchor currency. As we have already seen in figure 3, a trade war undermines the US dollar's safe-haven property and thus makes it a less attractive target for exchange rate stabilizations.

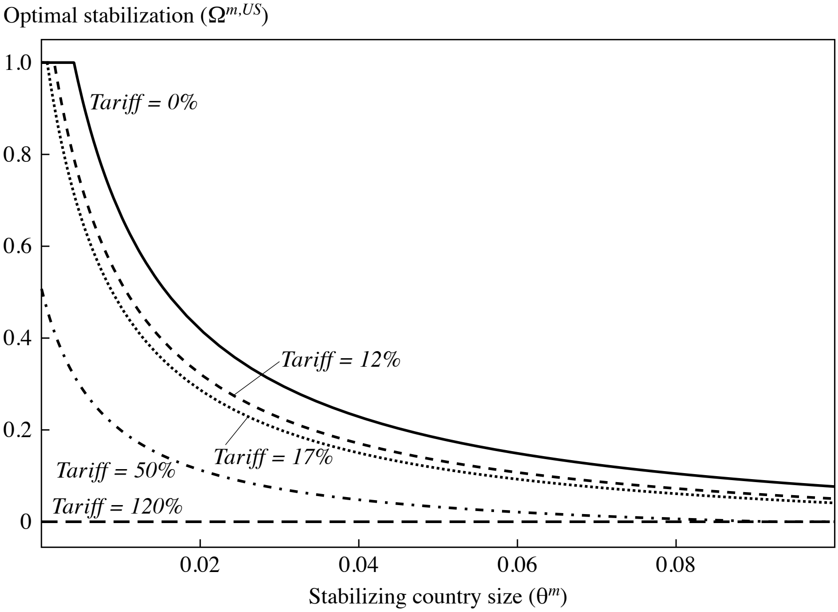
Figure 7 plots the optimal stabilization against the US dollar at different levels of tariffs. In a world in which the US dollar is the only possible anchor currency, the model predicts fewer and looser stabilizations as the trade war escalates, resulting in an eventual collapse of all stabilizations in favor of free floats.[25]

However, in our model, countries also have a choice regarding the target country of their stabilizations. As such, the euro represents an alternative anchor that becomes relatively more attractive as the United States isolates itself from world trade. Figure 8 shows a small stabilizing country's overall welfare when stabilizing to the US dollar versus the euro and abandoning stabilizations altogether. It shows that in a trade war with tariffs exceeding 26 percent, a small country would switch its target currency from the dollar to the euro.

Figure 9 shows the consequences of this optimal switching behavior for the world's monetary order. In our model, the dollar anchor holds at a trade war involving tariffs of 12 percent or 17 percent, albeit in a diminished form, with countries like Indonesia switching from a hard peg to looser forms of stabilization and India moving to a managed float (with a stabilization of 9 percent).

25. The figure shows looser stabilizations at tariffs and retaliations of 12 percent and 17 percent. At 50 percent, only the smallest countries still stabilize to the US dollar.

Figure 7. Optimal Stabilization Against the US Dollar at Different Levels of Trade War



Source: Authors' calculations.

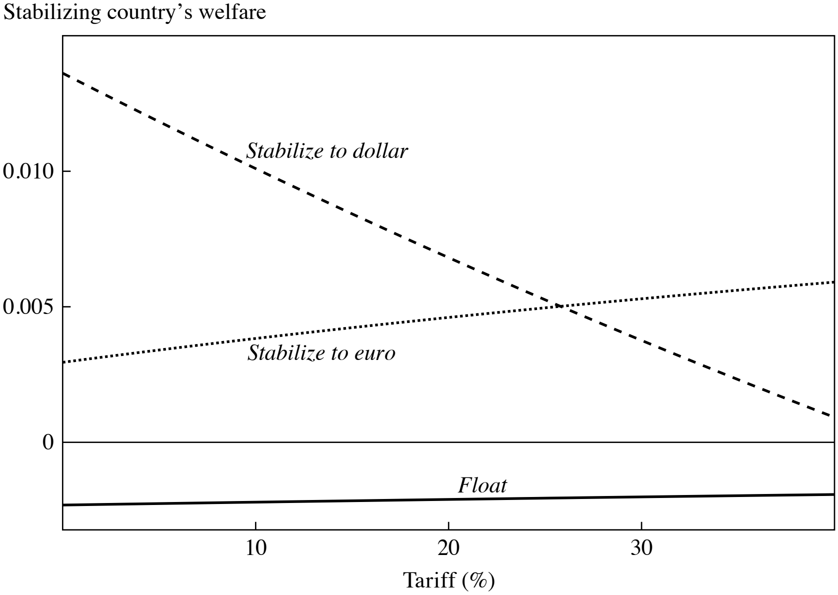
Note: This figure plots the optimal stabilization policy against the US dollar as a function of the size of the stabilizing country, assuming the US dollar is the only possible anchor currency. Lines show how this optimal policy changes at trade wars of varying intensity.

However, in the fourth column, when shifting to tariffs and retaliations of 30 percent, the dollar anchor gives way in favor of the euro as the world's new anchor currency. Overall, the euro-based system is looser than the dollar-based system, with, on the margin, countries like Saudi Arabia transitioning from a hard dollar peg to a soft stabilization toward the euro.[26]

This shift in the world monetary system unambiguously raises welfare in the euro area and lowers it in the United States. To understand this result, recall that stabilizing countries effectively provide consumption insurance to the target economy. As these countries shift away from the US dollar and

26. Because stabilizers provide tailor-made consumption insurance for the United States, they also lessen the extent to which US shocks move the world market price of traded goods. That is, a large country that stabilizes against the dollar erodes some of the exorbitant privilege that makes the dollar an attractive target for stabilization. In this sense, the stabilization decision is a strategic substitute, not a strategic complement: Whenever a country leaves the dollar bloc, it becomes marginally more attractive for others to maintain their stabilization. We discuss this result in more detail in Hassan, Mertens, and Zhang (2023).

Figure 8. Trade War and the Euro Anchor



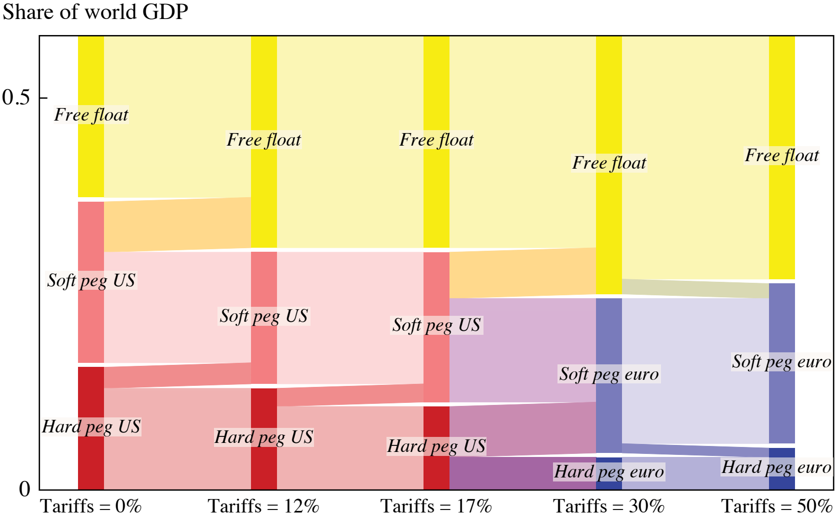
Source: Authors' calculations.
Note: This figure plots a small (size 0) stabilizing country's welfare when its currency is pegged to the US dollar, the euro, and free float. If the tariff exceeds 26 percent, it is optimal for the small country to stabilize against the euro instead of the US dollar.

toward the euro, this insurance benefit gets transferred from Americans to the residents of the euro area.

More generally, because the allocation under freely floating exchange rates is Pareto efficient, the model predicts winners and losers from the prevailing system of exchange rate arrangements. Naturally, the stabilizing countries benefit from the stabilization they themselves initiate (otherwise they would choose to float). Moreover, the target country benefits from the provision of insurance, which in our calibration is large enough to generate a welfare gain for the target country relative to the freely floating regime. The losers are therefore the remaining countries that are too large to maintain a stabilization themselves but not large enough to become the world's anchor currency (e.g., Japan and China).

Beyond these factors reflected in the model, a switch to a different world anchor currency would likely entail broader implications for the US dollar. First, many central banks currently maintain significant US dollar reserves, presumably in part to implement possible stabilizations to the US dollar (see, e.g., Chinn, Frankel, and Ito 2025 on dollar holdings). One might

Figure 9. Model-Predicted Exchange Rate Arrangements at Different Levels of Trade War



Source: World Bank and authors' calculations.

Note: This figure plots the model-predicted optimal stabilization decision at different tariff rates using the size distribution of 181 countries/regions in 2023 (World Bank data). The United States and the eurozone are excluded from the graph. Each block consists of countries scaled by their GDP share. Countries are sorted by their sizes with the largest at the top. Optimal strength of stabilization (Ω^m) above 75 percent is classified as hard peg; between 25 percent and 75 percent is classified as soft peg; and under 25 percent is classified as free floating. Ribbons between bars indicate countries maintaining or switching stabilization policies as a result of the change in the trade war's intensity.

expect them to shift some of these holdings in favor of euros, should the euro emerge as the new anchor currency. Second, the US dollar is widely used as invoicing currency for cross-border transactions and in trade finance. These functions, again, presumably also depend, at least in part, on the dollar's safety and low US interest rates. It is thus conceivable that these other forces underpinning demand for US dollars would not be sustained after a change to a different anchor in the international monetary system.

IV. Conclusion

In this paper, we provide a rationale for how the dollar's safe-haven status and its role as the anchor of the international monetary system arise endogenously from the interaction between the United States and the rest of the world in international markets. The dollar emerges as the safest currency in the world because shocks that affect the United States move a large share of global demand. Since US shocks spill over into world markets, the dollar endogenously appreciates in times of global distress. This safe-haven feature of the US dollar is the key force that lowers US interest rates and makes it both a destination for global investment and the target of exchange rate stabilizations. The result is a dollar-centric world monetary system.

We find that a sustained trade war would threaten this equilibrium. In the model, a trade war that isolates US goods markets from the world inhibits the channel through which US shocks propagate to world prices, eroding the dollar's safe-haven status. As the dollar's safety premium vanishes, US interest rates converge upward toward those of smaller economies, the world market value of US firms declines, and the incentive for other countries to stabilize their currencies to the US dollar weakens. Beyond a critical tariff rate—roughly 26 percent in our calibration—the euro inherits the anchor status along with its benefits.

These quantitative insights rest on the calibration of our intentionally spare two-period model, which already reproduces quantitatively the structure of the world monetary system as well as salient patterns in interest rates and currency returns. This success shows how combining insights from asset pricing with international macroeconomics yields valuable insights into the forces underpinning the global monetary system, the allocation of capital across countries, and the limits of dollar privilege.

The obvious next step—developing a fully dynamic, multilateral counterpart that matches both quantities and asset prices—therefore represents an important goal for future research. Such a model would allow us to investigate the duration until a possible shift in the anchor currency occurs, assess how interest rate differentials and risk premia interact with the US trade deficit, and more broadly shed light on the effects of risk premia in international markets. Future research on such a framework will thus be of the highest importance.

The broader implication of our analysis is that dollar supremacy is not immutable. Policies that curtail US integration in international trade may jeopardize the very attributes that make Treasury bills safe and sustain the United States' macroeconomic privileges. Open trade is not merely a matter of allocative efficiency; it is a precondition for the continued centrality of the dollar in global finance.

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Comments and Discussion

COMMENT BY

JESSE SCHREGER The international economic order is undergoing a period of remarkable stress over the first year of the second Trump administration. On April 2, 2025, the Trump administration issued a series of "reciprocal" tariffs against countries around the world. Stock markets around the world plunged and, most notably for this paper, so did the US dollar. With textbook theory predicting that a country imposing tariffs should experience an offsetting exchange rate appreciation, the behavior of the dollar on "Liberation Day" puzzled many. The dollar's plunge during the tariff announcement put the episode in stark contrast to the flight-to-safety appreciations of other spikes in global risk such as the collapse of Lehman Brothers or the peak of COVID-19 market stress. This ambitious paper by Tarek Hassan, Thomas Mertens, Jingye Wang, and Tony Zhang not only rationalizes these patterns but also makes a more general contribution in providing a framework that helps us understand the effect that tariffs can have on the dollar's central role in the international financial system. The authors clearly show how tariffs weaken the incentive to anchor to the dollar by reducing the degree of American integration in the international economic system.

Beyond the specific insights on tariffs and the dollar, an important contribution of this paper is to present a model for macroeconomic policy analysis in which exchange rate determination is driven by the risk properties of currencies. Lustig and Verdelhan (2007) and Lustig, Roussanov, and Verdelhan (2011) sparked a large literature by showing that currency excess returns stem from heterogeneous loading on global risk. Hassan and Mano (2019) demonstrate that this heterogeneous loading on global risk generally drives persistent differences in interest rates rather than predictable currency movements. This naturally leads to the question of what drives these heterogeneous exposures in the first place. Hassan (2013) shows this can stem from differences in country size, Richmond (2019) emphasizes trade network centrality, Maggiori (2017) highlights differences in financial market development, and Farhi and Gabaix (2016) point to exposures to rare disasters. While much of this literature focuses on explaining the cross-sectional behavior of currencies using asset pricing frameworks, the authors' previous work in Hassan, Mertens, and Zhang (2023) took an important step forward by integrating these insights into policy analysis to reconsider the decision of whether to peg one's currency. Instead of the classic trade-offs like commitment versus flexibility, the authors examine whether a country wants to change the stochastic properties of its own currency by pegging, thereby changing its interest rate and capital accumulation dynamics. The present paper builds on this earlier work by exploring how tariffs change the risk properties of currencies and thereby change the incentives of other countries to anchor to the country imposing tariffs.

THE MECHANISM The key idea of the paper is as follows: Countries want to stabilize their exchange rate against the currency that plays the largest role in the integrated world economy. The authors follow the country size structure of Hassan (2013), where the largest country in the world endogenously has the safest currency with the lowest interest rate. Rather than having a common aggregate shock, the world economy is composed of countries that each receive an idiosyncratic shock to their nontradable good endowment (supply) and their marginal utility of tradables (demand). With integrated world capital markets, the world nontradable good shock is the weighted average of the country-level shocks, with the weights given by the country sizes (equivalently for the tradable good demand shocks). Bad times for the world as a whole are most likely to coincide with bad times in the country whose shocks make up the largest component of the global economy. This means that if a country manages to have its own currency adopt the stochastic properties of the world's largest country, it can lower its own interest rate. This is precisely what pegging achieves in the model.

How does the introduction of tariffs change this decision? In a world economy with free trade, the price of traded goods is given by the marginal utility of traded good consumption, which is equalized around the world. American tariffs change this by driving a wedge between the price of traded goods in the United States and the rest of world. The authors show this is equivalent to shrinking the effective country size of the United States by reducing the relative importance of US shocks to the rest of the world. Reproducing the paper's equations (12)–(14) here, one can write the price of traded goods outside the United States, λ_T, as

$$\lambda_T = -(\gamma - 1)(1 - \alpha)\sum_n \overline{\theta}^n y_N^n + (\gamma - 1)\sum_n \overline{\theta}^n \chi^n, \text{ where}$$

$$\overline{\theta}^{US} = \frac{(1-\alpha) + \gamma\alpha}{(1-\alpha) + \gamma\alpha + (1-\theta^{US})\tau}\theta^{US}$$

$$\overline{\theta}^{n} = \frac{(1-\alpha) + \gamma\alpha + \tau}{(1-\alpha) + \gamma\alpha + (1-\theta^{US})\tau}\theta^{n},$$

with $\overline{\theta}^{US}$ and $\overline{\theta}^n$ denoting "effective" country sizes, n denoting any country other than the United States, α the traded goods share of consumption, γ the coefficient of relative risk aversion, and τ the tariff rate. In the case considered in Hassan, Mertens, and Zhang (2023), there is free trade ($\tau = 0$), so effective and actual country sizes coincide ($\overline{\theta}^{US} = \theta^{US}$ and $\overline{\theta}^n = \theta^n$). When $\tau > 0$, the two measures of country size diverge. Consider the case where $\tau \to \infty$ and the United States moves to trade autarky. As shown above, $\overline{\theta}^{US} \to 0$ and $\overline{\theta}^n \to \frac{\theta^n}{1-\theta^{US}}$, meaning that country n's effective size becomes its actual share of the non-US world economy. With intermediate tariffs, the question of whether to continue pegging to the dollar or to switch away from it to a different anchor is equivalent to calculating when an alternative country's effective size exceeds that of the United States. In this paper, the authors ask what tariff level leads countries to instead anchor to the euro. To do so, one simply needs to solve for the tariff rate τ where $\overline{\theta}^{Euro} \geq \overline{\theta}^{US}$ (with $n = Euro$ in the equations above). This implies the following threshold:

$$\tau^{crit} = \left((1-\alpha) + \gamma\alpha\right)\left(\frac{\theta^{US}}{\theta^{Euro}} - 1\right).$$

In this baseline calibration, $\alpha = 0.45$, $\gamma = 5$, $\theta^{US} = 0.27$, and $\theta^{Euro} = 0.15$. Plugging in the calibrated parameters to this expression, we see that the critical tariff rate would be 224 percent, meaning that the United States would need to impose a tariff above 224 percent before the countries would prefer to peg to the euro rather than the dollar. In the paper, however, the critical tariff rate for switching is estimated to be only 26 percent. What accounts for the difference relative to the baseline case? Here, I have assumed that all households are active in financial markets. Instead, the quantitative version of the model assumes that only 3 percent of households can access asset markets. The gap between the two results highlights the crucial role that financial market structure plays in determining how tariffs affect the dollar's anchor role. Better understanding how segmentation in financial markets shapes the international use of currencies is an important area for further research.

CAN THE INTERNATIONAL ROLE OF THE DOLLAR COEXIST WITH AMERICAN TARIFFS? In this paper, the United States imposes tariffs and the rest of the world retaliates tit for tat without strategic interaction between countries. While the paper makes clear the forces that lead tariffs to weaken the dollar's central role in the world economy, given the increasing use of tariffs as a threat, it raises the question of whether tariffs necessarily have to have this effect. What would a tariff policy designed to support the role of the dollar look like? One can imagine tariffs being used as a tool of geoeconomic pressure, where a great power like the United States uses its preeminent position in the international economy to achieve geopolitical and economic aims, one of which can be the preservation of the dollar's role (Clayton, Maggiori, and Schreger 2023, 2024).

Although the authors intentionally abstract from geopolitical or strategic motives for tariff policy, it is useful to consider how such motives might interact with the purely economic mechanisms emphasized in their model. This clarifies how real-world tariff threats could influence currency arrangements, even though these channels lie outside the authors' analysis. One way in which the United States has threatened to use its tariff policy to bolster the international role of the dollar was exemplified by then-President-Elect Donald Trump's post on Truth Social on November 30, 2024: "The idea that the BRICS Countries are trying to move away from the Dollar while we stand by and watch is OVER. We require a commitment from these Countries that they will neither create a new BRICS Currency, nor back any other Currency to replace the mighty U.S. Dollar or, they will face 100% Tariffs, and should expect to say goodbye to selling into the wonderful U.S. Economy. They can go find another 'sucker!' There is no chance that the BRICS will replace the U.S. Dollar in International Trade, and any Country that tries should wave goodbye to America."[1] In this statement, tariffs are used as a threat to push more international activity onto the US dollar. As the world moves toward an environment in which countries

1. Donald J. Trump (@realDonaldTrump), https://truthsocial.com/@realDonaldTrump/posts/113573130299319701.

jointly choose trade relationships, currency arrangements, and defense partnerships for geopolitical reasons, the use of trade policy to influence financial outcomes—or vice versa—may become more common. In particular, given the increasing evidence that the world may be fragmenting into American- and Chinese-led blocs (Gopinath and others 2025), one can imagine trade pressure being used to generate trade fragmentation between blocs or integration within them. At least in the short term, one can imagine that countries prefer to remain connected to the US dollar rather than facing the type of tariff retaliation threatened by the Trump administration, even if in the longer term this kind of blunt pressure may lead countries to insulate themselves from the United States by reducing their reliance on the dollar.

Such threats may be less powerful in the present model than in other frameworks because of the lack of any sense of strategic complementarity in the choice of anchor currency. Indeed, international currency usage is a place where network effects may be very important (e.g., Rey 2001; Coppola, Krishnamurthy, and Xu 2023). In the current framework, by contrast, countries anchoring to the US dollar are substitutes rather than complements: The more other countries sell insurance against US risk, the less systemically important US shocks become, and so the smaller the interest rate reduction a country gets for pegging to the dollar. This is very different from a world where more countries pegging to the dollar is equivalent to increasing the size of the US dollar market. For this force to occur in the current framework, one would need a pegging country to take on (some of) the underlying shocks of the target country, akin to the argument made in the literature on the endogeneity of optimal currency area criteria (Frankel and Rose 1998).

Beyond the possibility of directly using tariffs to sustain the role of the dollar, one possibility looking ahead is that the United States and its allies will move to coordinate tariffs against China. While the initial Liberation Day tariffs that motivated the analysis in this paper put high tariffs on a range of countries based on bilateral imbalances in goods trade, the United States may converge to higher tariffs on China relative to other countries. With the large inflow of Chinese goods into Europe, one can imagine protectionist pressure rising there as well. While the authors assume that the most viable alternative to the US dollar is the euro, with China roughly the same economic size as the euro area (though much smaller financially), it is not guaranteed that the euro would be the natural successor to the dollar if American tariffs trigger broader upheaval in the international monetary system. If, instead, the Chinese renminbi were the potential alternative to the US dollar, then through the lens of the current model, coordinated

American and European tariffs against China might serve to reduce China's effective size in the global economy, potentially prolonging the era of dollar dominance.

This discussion naturally leads to the question of whether the United States wants the dollar to remain the world's international currency. Indeed, some members of the current administration have cast doubt on whether the United States benefits from its position of providing the global currency (Miran 2024). In the paper, it is also not clear what the United States would prefer. While countries pegging to the dollar may benefit the United States by essentially offering it free insurance against its own shocks, this reduction in consumption volatility comes at the cost of higher interest rates and slower capital accumulation in the United States. As shown in Hassan, Mertens, and Zhang (2023), it is not clear whether the country issuing the anchor currency wins or loses as more countries peg to it.[2]

THE FISCAL SIDE OF BEING THE INTERNATIONAL CURRENCY The final point I want to highlight is an assumption made in this paper (and much of the literature) that tariff revenue is remitted lump sum. With all debt in this framework (nominally) risk free, there is no sense of fiscal capacity in the authors' model. However, looking ahead, the use of the tariff revenue could play a large role in American fiscal sustainability. Indeed, many theories of the global safe asset put the fiscal sustainability of the issuing country front and center (Farhi and Maggiori 2018; Chen and others 2025). With the Supreme Court currently considering the constitutionality of the tariffs at the time of writing, forecasting the long-term revenue impact of these tariffs is impossible. However, given the explosion of the US debt and the political challenges of raising tax revenue via other sources, the revenues raised by the tariffs are playing a large role in narrowing the US fiscal deficit. In practice, the extent to which a fiscal windfall from tariffs can partially offset some of the forces leading countries to turn away from the dollar is an open question. Understanding this will be increasingly important moving forward because we are beginning to see signs that the special role of US Treasuries is being eroded, even as the dollar maintains its dominant role (Du, Keerati, and Schreger 2025).

CONCLUSION This paper is an important contribution that does a superb job of providing a framework to explore how US tariffs have the potential to erode the central role of the dollar in the international monetary system.

2. In Hassan, Mertens, and Zhang (2023), the United States would always prefer the dollar to be the anchor currency relative to another currency being the anchor currency. It is unclear whether the United States would prefer that all countries float their currencies or stabilize against the United States.

It does so by building on the authors' previous work in which they consider how a decision to peg one's currency can be understood as the choice of altering the stochastic properties of one's currency. Tariffs affect this decision by altering the risk properties of the US dollar and thereby reduce countries' incentives to peg to it. The examination of international macroeconomic policy in a framework using the asset pricing view of exchange rate determination is an important step forward.

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COMMENT BY

LINDA TESAR The key question posed in this paper is whether the dollar's status as the world's global anchor is in jeopardy. On April 2, 2025, so-called Liberation Day, the Trump administration announced a sweeping set of increases in US tariffs.[1] While markets anticipated a shift in US trade policy, the magnitude of the tariff increases, coupled with the lack of a coherent economic rationale for increases in country-specific tariff rates, took markets by surprise. The response of markets to the Liberation Day announcement differed from past responses to tariffs. Tariffs typically generate an appreciation of the exchange rate as demand for foreign goods declines relative to demand for home goods. Further, disruptions to the global economy can trigger a run for safety, putting additional pressure on dollar appreciation. In contrast to past behavior, the Liberation Day tariff increases were followed by a *depreciation* of the dollar and a sell-off of US assets. Does this suggest a beginning of the end of the dollar's status as a safe asset? Will the US dollar maintain its position as an anchor for the global economy?

THE MODEL AND ITS ASSUMPTIONS The authors develop an elegant and remarkably simple framework to study the link between tariffs and the safety status of the dollar. In this simple world, households consume traded and nontraded goods. Productivity shocks affect the national supply of the nontraded goods, and preference shocks affect national demand for a

1. See Exec. Order No. 14257, published in 90 Fed. Reg. 15041 (April 7, 2025) at https://www.govinfo.gov/app/details/FR-2025-04-07/2025-06063.

composite good, composed of both traded and nontraded goods. I should note that the authors have explored extensions to the model where they generalize both its demand and supply features; for the purposes of this discussion, I will focus on this highly simplified case.

Countries trade assets and a homogeneous traded good. In this environment, trade in goods is the means of insuring households against local shocks. Households need currency to buy goods from other countries, and it is this need for insurance that determines the valuation of different currencies.

The key mechanism of the model can be understood from two equations. The first is the equilibrium condition for the real exchange rate of the country f relative to the rest of the world:

$$\overline{\overline{s}}^{f*} = -\left[\frac{\gamma(1-\alpha)}{(1-\alpha)+\gamma\alpha}\right] y_N^f + \left[\frac{(\gamma-1)(1-\alpha)}{(1-\alpha)+\gamma\alpha}\right]\chi^f.$$

The terms in brackets reflect preference parameters. The coefficient of relative risk aversion, γ, is greater than one, and α is the share of traded goods in the composite bundle, which is between zero and one. Under those reasonable restrictions, the bracketed terms are both positive. The output of the nontraded good in country f is denoted by y_N^f, and χ^f is the net demand for traded goods in country f. This equilibrium condition then implies that the real exchange rate appreciates ($\overline{\overline{s}}^{f*}$ increases) when y_N^f is low. That is, a decrease in the supply of nontraded goods increases demand for traded goods as households are compensated by consuming more traded goods, putting upward pressure on the real exchange rate. An increase in the demand for traded goods, χ^f, increases the cost of the consumption basket and results in an appreciation of the real exchange rate.

The second key equation is the global marginal utility of the traded good, λ_T^*:

$$\lambda_T^* = -(\gamma-1)(1-\alpha)\sum_n \theta^n y_N^n + (\gamma-1)\sum_n \theta^n \chi^n,$$

where θ^n represents the share of each country n in the global economy and λ_T^* is the stochastic discount factor that prices tradable assets and reflects the extent of "stress" in the global economy (i.e., whether times are "good" or "bad," depending on global supply and demand conditions). The marginal value of traded goods is high when the world supply of nontraded goods is low or when global demand for traded goods is high.

The key insight of this paper is that the "safety" of a country's currency depends on its relative importance in the global economy. To see this, consider a negative shock to the US supply of nontraded goods. From the first equation, a decline in nontraded goods will result in an appreciation of the US real exchange rate and, in this simple model, an appreciation of the dollar. In the second equation, we see that a fall in global nontraded goods increases the world valuation of the traded goods. Thus, there is a correlation between λ_T^* and $\overline{\overline{s}}^{f*}$ that is increasing in country size. Large countries are safer in the sense that they have a larger impact on the shadow value of the traded good; their currency will tend to appreciate when times are bad.

This brings us to tariffs. A tariff places a wedge between the true size of the US economy and its effective impact on the rest of the world. US tariffs reduce the effect of the US economy's weight in the second equation and weaken the covariance between the global stress factor and the dollar.

COMMENTS The model is strikingly simple yet delivers a number of implications that align well with empirical data. Safe-haven currencies appreciate during periods of heightened risk—a characteristic that nearly defines a safe-haven currency—and smaller countries are more likely to peg their currencies, while larger countries generally float. I do not have major disagreements with the empirical analysis or the model. Rather, my comments are meant to highlight some of the strong assumptions made in the paper and to point out where the connections between the theoretical model and reality may be tenuous. I view these as friendly amendments rather than critiques.

The US dollar and US bonds. The model is static and does not meaningfully distinguish between a country's currency and investment in sovereign or corporate bonds. While currency risk accounts for much of the risk in sovereign bonds, it is not the only factor. In other words, are holdings of US dollars equivalent to holdings of US Treasuries? In the months following Liberation Day, US companies have continued to attract foreign investment and the stock market has boomed, but investors are increasingly hedging their positions against dollar risk, suggesting that there is a meaningful difference between dollar risk and the risk embedded in other financial assets (Smith and Herbert 2025).

Country size. A key mechanism in the model is that larger countries are perceived to be safer because they have greater influence on the shadow value of the traded goods; in part, their currencies tend to appreciate in adverse times, when demand exceeds supply. But is it just about size? China is on track to become the world's largest economy and certainly leads in trade volume across a number of industries. Is the Chinese renminbi destined to become the world's safe asset? Even the authors admit that this is an unlikely scenario. China implements heavy capital controls and manages its currency. Clearly, there is more to being a global anchor than country size. From a risk perspective, even if we accept trade as a prominent driver, it is not just about trade volume. There are choke points and supply chain vulnerabilities in the global economy that can influence the risk associated with a currency. Trade is more complex than the model suggests.

It is also a bit unclear whether the relevant "size" measure is aggregate GDP or the production of traded goods. The relevancy of either depends on the elasticity between traded and nontraded goods. If utility is separable between traded and nontraded goods, then the size measure pertains to the size of the economy in terms of traded goods and international trade provides limited risk sharing against fluctuations in nontraded goods. If the elasticity of substitution is high, then it is the combined size of traded and nontraded goods that matters, though the need for insurance through trade will be minimized. The relationship between the coefficient of relative risk aversion and the elasticity of substitution between traded and nontraded goods is well-known in the international macro literature. It would be helpful for the authors to provide more discussion on the sensitivity of their model to alternative parameter choices.

Flights to safety and safe assets. The model assumes a strong overlap between flights to safety and events in the United States. While it is often the case that "when America sneezes, the world catches a cold," global volatility can result from shocks originating outside the United States. Swiss assets exhibit the characteristics of a safe-haven asset, yet the Swiss economy has a relatively small global footprint. Even the euro, the likeliest challenger to the dollar's anchor status, is still several steps away from becoming a true global safe-haven currency. Despite its potential, as European Central Bank President Christine Lagarde has noted, the size and liquidity of the Eurobond market remains a barrier.[2] Eurobonds are issued by different countries, with varying risk and liquidity profiles, and therefore are an inadequate substitute for US Treasuries.

Response to US policy: Is trade the key issue? The paper is motivated by the reaction of markets to the Liberation Day tariff announcements. However, was the news on that day about trade, or was it a larger signal about the capriciousness of US policy and its potential for disrupting the

2. See, for example, Lagarde's speech on October 7, 2025, "Turning Openness into Strength: The Moment of the Euro," at the Business France event "Business en Européens," in Paris, France.

global order? Headlines in the financial press in April 2025 reveal deeper anxieties about US economic policy: confidence in the dollar, threats to globalization, and the weaponization of US policy to achieve political and financial objectives. Tariffs may have been the catalyst, but broader issues such as commitment to new accords, attacks on Federal Reserve independence, hostility to foreign investors, rising public debt, persistent policy uncertainty, and shifting geopolitical alliances all pose threats to the dollar's status. These considerations, though outside the model, may affect the dollar far more than tariffs alone.

CONCLUSION In summary, the paper offers a brilliant and remarkably simple model that draws clear connections between trade and risk sharing, generating sharp predictions for exchange rates, interest rates, and demand for US assets. It serves as an effective benchmark, distilling complex global questions to their essence—a challenging feat in the context of anchor currencies and financial markets. Is this the best framework for understanding the safe-haven status of the dollar? I am not sure—that may be an unfair standard. That said, the paper provides a very useful starting point to clarify our thinking about the connections between risk, trade, tariffs, and exchange rates.

REFERENCE FOR THE TESAR COMMENT

Smith, Ian, and Emily Herbert. 2025. "Foreign Investors in US Assets Rush for Protection Against Swings in Dollar." *Financial Times*, September 17. https://www.ft.com/content/2a5ddef1-3392-4bd4-8449-d1dd51cc37ec.

GENERAL DISCUSSION Referring to discussant Linda Tesar's presentation, Şebnem Kalemli-Özcan stressed that several shocks took place in April 2025 when the US dollar depreciated, which created significant uncertainty in trade and general economic policy as reflected by the economic policy uncertainty index.[1] Yet, when the United States bombed the Iranian nuclear sites in June, the dollar appreciated. She asked whether it was possible to separate the effects of policy uncertainty and tariff announcement in the authors' model.

Regarding policy uncertainty, Frederic Mishkin highlighted that the tariffs imposed by the Trump administration are not always about trade but

1. Scott R. Baker, Nick Bloom, and Steven J. Davis, "Economic Policy Uncertainty Index," https://www.policyuncertainty.com/index.html.

exercise in power: Big tariffs are applied on certain countries as political punishment, taking Brazil as an example.[2] Mishkin noted that this creates a tremendous amount of uncertainty, which could prompt the switch to other currencies as safe haven and anchor without high levels of tariffs; however, the authors' model does not take this into account as it picks a particular level of tariffs.

Donald Kohn commented that an unusual aspect of the recent tariff negotiations is that they involved forced investments in the United States. Moreover, the administration has been actively promoting the dollar-denominated stablecoins, which many think would increase demand for US Treasuries and other dollar assets. These measures seem to counter the disruptions caused by tariffs by increasing capital investment in the United States and demand for US assets.

Gabriel Chodorow-Reich regretted that the administration's macroeconomic policy often does many things at once, making it difficult for researchers to disentangle different effects. While the data on asset market returns in April are very useful, he suggested that the authors run a second test with asset market data after the Supreme Court rules on the constitutionality of the tariffs.

Although Pinelopi Goldberg largely agreed with the aforementioned comments on the role of policy uncertainty, she argued in favor of the mechanism in the authors' model that when tariffs were initially announced on April 2, uncertainty seemed to be resolved—temporarily—because consumers knew what tariffs would be in the near future, with no prospect of negotiations. US dollar depreciated as the tariffs signaled that the United States wanted to decouple from the global economy—as predicted by the paper. Yet, what followed differed greatly from the initial announcement and uncertainty became relevant subsequently. Pushing back on Goldberg's point, Christina Romer pointed out that while some uncertainty around tariffs was resolved at the time of the initial announcement, the announcement raised uncertainty about almost every other policy that might come from the administration. She echoed Tesar's discussant remarks that there were multiple factors at play.

Yuanchen Yang suggested that the authors look at the differences in the effects of announced versus actual tariffs, given that the tariffs were announced at high levels with many exceptions; perhaps the dollar's

2. Danielle Kurtzleben, "Trump Sets 50% Tariff Rate for Brazil, Blasting Treatment of Former Far-Right President," NPR, July 9, 2025, https://www.npr.org/2025/07/09/nx-s1-5462903/trump-brazil-tariff-bolsonaro.

behavior in April was a result of the uncertainty or anticipation rather than actual implementation of the tariffs.

Jay Shambaugh agreed that chaotic trade policy would undermine the dollar's safe-haven status. However, he is skeptical that being a safe haven means appreciating when the prices of traded goods go up; it is more about a country's asset market properties such as the liquidity and depth of the market, than the size of trade in the global economy. Thus, he argued, countries like Switzerland and Japan could be considered a safe haven like the United States in terms of how their currencies appreciate relative to global risk. Drawing from his experience at the US Treasury, Shambaugh pointed out that countries like Vietnam actually dislike pegging their currencies to the dollar when it appreciates in bad times, as they want their currencies to depreciate in bad times in order to sell more goods unless they are short on foreign currency. He again emphasized that being tied to a deep, liquid financial market with many savers who prefer saving in dollars is an important reason for pegging.

Joseph Stiglitz extended Shambaugh's argument, noting that exchange rates should be viewed through the lens of a more dynamic capital market rather than a static model. Being an anchor and reserve currency drives capital flows, which are part of the general equilibrium and have first-order effects on exchange rates and the US macroeconomic policy. Stiglitz remarked that the United States has to run trade deficit when other countries want to hold dollars, which could affect the US economic stability. Furthermore, for smaller countries, anchoring to the dollar could be problematic, taking Argentina and Ecuador as examples.[3]

Neil Mehrotra encouraged the authors to consider dynamic effects in a world with capital markets and investment goods, where tariffs act as negative productivity shocks that depress global investment demand and significantly affect interest rates.

Ben Bernanke wondered if the authors' model could reach the same results if there is an endogenous asset decision, pointing to the view that, due to its liability and asset structure, the United States provides insurance to foreign investors by issuing bonds while holding equities abroad and taking equity losses in bad times.

3. Ramon Moreno, "Learning from Argentina's Crisis," Economic Letter 2002-31 (San Francisco: Federal Reserve Bank of San Francisco, 2002); Robin Brooks, "Fear of Floating Exchange Rates in Emerging Markets," October 24, 2024, The Brookings Institution, https://www.brookings.edu/articles/fear-of-floating-exchange-rates-in-emerging-markets/.

Jón Steinsson commented that, over the past few decades, the United States has supported free trade as the world's largest economy, yet a basic argument by trade economists is that the largest economy has the strongest incentives to impose tariffs due to the terms-of-trade effect. He applauded the authors for providing a great counterargument to this theory.

Free trade improves allocative efficiency worldwide, John Haltiwanger added. The United States attracts businesses partly because it has been the beacon for keeping its economy dynamic and flexible without much misallocation. Tariffs and the policy uncertainty resulted from them would increase misallocation in the United States on many dimensions, Haltiwanger concluded.

Ben Harris suggested that tariffs could be a new tool for macroeconomic stabilization if used right, considering the administration's tariff regime has been quite flexible and driven by a motivation for greater macroeconomic stability. He noted that there are two vehicles in the United States to manage macro stability risk: a Federal Open Market Committee bounded by the zero lower bound, which often takes no action, and fiscal policy that comes with mixed motivations and at best leads to one reconciliation package a year. By contrast, tariffs may function as a sales tax on certain goods, which can be changed quickly.

In terms of policy uncertainty, Tarek Hassan proposed that in their model, when the tariff rate is uncertain, it is just as bad as a specific tariff rate multiplied by the relative risk aversion and the modular risk premium—policy uncertainty becomes as damaging as the policy itself, at least directionally. Regarding Kohn's observation of the forced investment, Hassan argued that although the administration's stated goal is to reduce trade imbalances through tariffs, when it simultaneously demands more foreign investment in the United States, it attracts capital inflows that are likely to increase the trade deficit in the future. In response to calls for a more dynamic model, Hassan explained that he and his coauthors set out to build a simple static model as a first step toward synthesizing perspectives from international macroeconomics and asset pricing. He agreed that developing dynamic models of this type is an important area for future research.

Thomas Mertens agreed that a mixture of various uncertainties appeared on Liberation Day, which resulted in a depreciation of the US dollar. He acknowledged that the simplicity of their model is a double-edged sword, but emphasized that the model's advantage is to clearly show what is really driving the effects of tariffs.

Responding to the question from discussant Jesse Schreger's presentation on market segmentation, Hassan pointed to a fundamental issue that, with the type of preferences used in traditional macro models, risk premia generally have quantitatively small effects, putting them at odds with the data. Hassan and his coauthors resolved this tension by assuming extreme market segmentation, where only 3 percent of the world GDP is engaged in arbitraging prices across countries. This shortcut enables the model to generate large enough risk premia to fit the data. Hassan further noted that the general message from their model is that tariffs undermine the anchor status; this is also applicable to China that implements its own tariffs.

In regard to the dollar's importance as the world's principal reserve currency, Hassan suggested that a potential way to extend their model is to incorporate the assumption that countries wishing to stabilize relative to a given anchor currency need to hold reserves denominated in that anchor currency. Such an extension of the model would naturally predict that the anchor currency is also the currency that dominates international reserve holdings; in that case, the anticipation that the dollar anchor may weaken or disappear would trigger a depreciation of the dollar as countries expect to exchange their dollar reserves.

Hassan emphasized that in their model, small countries prefer stabilizing their currencies to the largest economy in the world, because doing so minimizes the costs and maximizes the benefits of stabilization. Larger countries prefer looser stabilization or floating their currencies, because for them, stabilization policies are costlier due to the price impact of their actions in the world markets. Currency stabilization also benefits the target currency at the expense of other large countries that are not the target. To comments by Shambaugh and Stiglitz, Hassan thought the credibility of currency stabilization does not materially alter the analysis, at least directionally: Even if countries like Argentina fail to be fully credible in their stabilization, as long as they implement some level of stabilization, the effects would go in the same direction.

Addressing Haltiwanger's comment on disruptions caused by tariffs to allocative efficiency, Hassan highlighted that while all disadvantages of tariffs still apply, their model primarily focuses on the risk premium effects of the tariffs. Mertens added that in their baseline model, optimal global welfare would be achieved without tariffs and without currency stabilization. However, small countries nevertheless find it optimal to stabilize their currencies to a large country. In equilibrium, other large countries that are not the target of the stabilization tend to bear the welfare loss.

In response to Bernanke's question, Mertens noted that they had looked at asset allocations in their model in a version with decentralization. There, it is indeed the case that countries hold home-biased portfolios in equilibrium.

They overweight their own equities and might even short bonds of other countries.

In terms of what a “bad” time means in their model, Jingye Wang commented that it could refer to a variety of scenarios in which the world market price of traded goods rises, including when large economies like the United States experience a high demand shock or low supply shock or there is increasing global risk. What affects the dollar’s safe-haven status is the US connection to the rest of the world—a large tariff that effectively cuts the United States off from the global economy would damage such connection and weaken the dollar’s safe-haven status.

A Details on Model Setup and Results

In this appendix, we provide additional details about the setup of our model, formally derive its equilibrium conditions, and present analytical results in the case when $\psi < 1$. For clarity, some portions of the model setup are reiterated from section 3.

A.1 Economic Environment

There are two discrete time periods, $t = 1, 2$. A unit measure of households $i \in [0, 1]$ is partitioned into N subsets of measure θ^n, where each partition represents the constituent households of a country. These include the United States (u), the EU (e), China, Japan, and a continuum of smaller countries. We use m to denote the country conducting an exchange rate stabilization. Households make investment decisions in the first period. All consumption occurs in the second period. We let ω denote the state of the world in the second period.

Households derive utility from consuming an index composed of a country-specific nontraded good, $C_{N,2}$, and a freely traded good, $C_{T,2}$, in each state ω, where:

$$C_2(i, \omega) = C_{T,2}(i, \omega)^{\alpha} C_{N,2}(i, \omega)^{1-\alpha} \tag{16}$$

and $\alpha \in (0, 1)$. Each household exhibits constant relative risk aversion according to:

$$U(i) = \frac{1}{1-\gamma} \mathbb{E}\left[\left(\exp(-\chi^n) C_2(i, \omega)\right)^{1-\gamma}\right] \tag{17}$$

where $\gamma > 1$ is the coefficient of relative risk aversion and χ^n is a common country-specific shock to households' preferences for consumption goods in country n with

$$\chi^n \sim N\left(-\frac{1}{2}\sigma_\chi^2, \sigma_\chi^2\right).$$

At the start of the first period, each household owns a firm that produces the local, country-specific nontraded good using a Cobb-Douglas production technology that employs capital and labor. Each household supplies one unit of labor inelastically to its own firm, and owns one unit of capital, which it can sell to its own firm or any other firm in the world. Each firm's output of nontraded goods is

$$Y_{N,2}(i, \omega) = \exp(\eta^n) K(i)^{\nu}. \tag{18}$$

where $0 < \nu < 1$ is the capital share in production, $K(i)$ is the per capita stock of capital, and η^n is a country-specific productivity shock realized at the start of the second period,

$$\eta^n \sim N\left(-\frac{1}{2}\sigma_N^2, \sigma_N^2\right),$$

The state ω is thus characterized by country-specific shocks to supply η^n, and demand, χ^n.

Capital can be freely shipped in the first period, at the end of which it is invested for use in the production of nontraded goods. At the end of the first period, firms trade units of capital and households trade claims to the output of their firms (stocks) in an international financial market.

Within each country, a fraction $1-\psi$ of households lack access to financial markets. These households are labeled "consumers" and hold only a risk-free bond issued by the domestic financial intermediary. This risk-free bond is indexed to the country's consumer price index and pays off $P^{n*}(\omega)$ traded goods needed to purchase one unit of utility for households in country n in each state ω under the freely-floating exchange rate regime without tariffs. The consumer's problem thus involves maximizing their expected utility subject to their budget constraint:

$$P_2^n(\omega)\hat{C}_2(i,\omega) \leq P_2^{n,*}(\omega),$$

where we use a hat-symbol to denote the consumption of the consumers.[27] They simply allocate their payoff across the two goods, taking domestic prices as given. Since the consumption bundle is a Cobb-Douglas aggregate of traded and nontraded goods, they spend a fraction α of their income on the traded good and a fraction $1-\alpha$ on the nontraded good.

The remainder of the country's assets (all shares in domestic firms, the first-period endowments of traded goods, and the first-period country-specific transfer) are held by a domestic financial intermediary, which is owned and managed by the remaining mass ψ households ("financiers"). The financiers' problem in the second period is thus to maximize their expected utility (17) subject to the budget constraint

$$\begin{aligned} &Z_P^n(\omega)Z_T^n(\omega)C_{2,T}^n(\omega) + P_{2,N}^n(\omega)C_{2,N}^n(\omega) \\ &\leq \frac{1}{\psi}\left(\sum_{l\in\{1,\ldots,N\}} A_l^n P_{2,N}^l(\omega)Y_{2,N}^l(\omega) + Y_{2,T}^n\right) - \frac{1-\psi}{\psi}P_2^{n,*}(\omega), \end{aligned} \tag{19}$$

where we let $Z_P^n(\omega)$ be the state contingent tax in country n that the central bank imposes to implement a stabilization, and $Z_T^n(\omega)$ is the state contingent tariff imposed by the government in country n. We specify these functions below. A_l^n denotes the holdings of stocks in the nontraded sector that pays one unit of the non-traded goods.

The market-clearing conditions for the traded and non-traded goods in the second period are

[27] As in the main text, we continue to use $*$ to denote equilibrium quantities in the free-trade free-floating regime.

given by

$$\sum_n \theta^n(\psi C^n_{2,T}(\omega) + (1-\psi)\hat{C}^n_{2,T}(\omega)) = 1 \tag{20}$$

$$\psi C^n_{2,N}(\omega) + (1-\psi)\hat{C}^n_{2,N}(\omega) = Y^n_{2,N}(\omega) \tag{21}$$

In the first period, financiers choose their portfolio of stocks and bonds to maximize expected utility in the second period. Their first-period budget constraint is

$$\sum_l A^n_l Q^l_N + Q_K K^n_N \leq W^n_0. \tag{22}$$

Note that financiers get all of the resources in a given country (measure 1). Q^l_N denotes the first-period price of stocks in country l. W^n_0 represents initial household wealth in terms of the traded goods in the first period:

$$W^n_0 = Q^n_N + Q_K + \kappa^n + \bar{Z}^n,$$

where κ_n is a transfer that equalizes the marginal utility of wealth across households under a no-tariff and no-stabilization regime, $\bar{Z}$ ensures the same is true when tariff or stabilization policies are conducted (details below). Let $\Lambda^n_{T,1}$ denote the Lagrangian multiplier associated with (22).

Since stocks and capital are freely traded among financiers in international markets, all households must be marginal to investing in all stocks and bonds, and all firms must be marginal to purchasing an additional unit of capital. As a result, the stochastic discount factors are equalized in equilibrium across countries:

$$\frac{\Lambda^n_T(\omega)}{\Lambda^n_{T,1}} = \frac{\Lambda^l_T(\omega)}{\Lambda^l_{T,1}} \qquad \forall\, n, l. \tag{23}$$

We denote the stochastic discount factor by $Q(\omega)$.

A.2 Tariff

We assume that the government of the U.S. imposes a tariff on the traded good in the form of:

$$Z^{US}_T(\omega) = 1 + \tau\left(1 - \frac{1}{C^{US}_{T,\text{agg}}(\omega)}\right) \tag{24}$$

$$Z^n_T(\omega) = 0 \quad \forall\, n \neq US \tag{25}$$

where $C^{US}_{T,\text{agg}}(\omega) = \psi C^{US}_T(\omega) + (1-\psi)\hat{C}^{US}_T(\omega)$ is the aggregate consumption of the traded goods in the United States. When imposing a tariff of τ on the imported goods (met with retaliation), the total expenditure on the trade good in the U.S. is given by

$$1 + (1+\tau)(C^{US}_{T,agg}(\omega) - 1) = C^{US}_{T,agg} + \tau(C^{US}_{T,agg} - 1)$$

Dividing the above equation by $C^{US}_{T,agg}$ yields the average price of the traded goods $Z^{US}_T(\omega)$. Log-linearizing (24) yields (11).

A.3 Stabilization

We assume that the government of a manipulating country (m) imposes a state-contingent tax on the traded good, $Z^m_P(\omega)$, to obtain a stabilization of strength Ω^m. In particular, it chooses a state-contingent tax so that

$$\text{var}\left[s^{m,\mathcal{T}}\right] = (1-\Omega^m)^2 \,\text{var}\left[s^{m,\mathcal{T}*}\right] \tag{26}$$

where t denotes the target country.

A.4 Solving the Model

In the second period, optimal consumption of the traded goods and non-traded goods by the consumers in country n is:

$$\hat{C}^n_T(\omega) = \frac{\alpha P^{n*}(\omega)}{Z^n_P(\omega) Z^n_T(\omega)} \tag{27}$$

$$\hat{C}^n_N(\omega) = \frac{(1-\alpha)P^{n*}(\omega)}{P^n_N(\omega)} \tag{28}$$

Optimal consumption of the traded goods and non-traded goods by the active households in country n is given by

$$\frac{\alpha\Big(\exp(-\chi^n)(C^n_T(\omega))^{\alpha}(C^n_N(\omega))^{1-\alpha}\Big)^{1-\gamma}(C^n_T(\omega))^{-1}}{Z^n_P(\omega)Z^n_T(\omega)} = \Lambda_T(\omega) \tag{29}$$

$$\frac{(1-\alpha)\Big(\exp(-\chi^n)(C^n_T(\omega))^{\alpha}(C^n_N(\omega))^{1-\alpha}\Big)^{1-\gamma}(C^n_N(\omega))^{-1}}{P^n_N(\omega)} = \Lambda_T(\omega) \tag{30}$$

where $\Lambda_T(\omega)$ is the Lagrangian multiplier associated with the budget constraint (19).

The first-order condition with respect to the aggregate consumption bundle $C^n(\omega)$ pins down the real price level in each country:

$$\exp(-\chi^n)^{1-\gamma}\left((C_T^n(\omega))^{\alpha}(C_N^n(\omega))^{1-\alpha}\right)^{-\gamma} = \Lambda_T(\omega)P^n(\omega). \tag{31}$$

We solve for allocations in the second period by log-linearizing the first-order conditions around the deterministic steady state — the point at which the variances of all shocks are zero and all firms have a capital stock fixed at the deterministic steady-state level. Lowercase variables denote logs.

To conduct our numerical analysis, we solve for the equilibrium in which the United States imposes a tariff of τ, and an arbitrary manipulating country m can implement a stabilization of strength Ω^m. In order to derive the taxes z_P^n that implement the exchange rate stabilization in the tariff regime, we proceed in two steps.

1. We solve for allocations under the freely floating exchange rate regime with no tariffs by setting $Z_P^n(\omega) = Z_T^n(\omega) = 1$. We have a system of $6N + 1$ equations: resource constraints (20) and (21); FOCs (27), (28), (29), (30), and (31). We use the log-linearized system of equations to solve for $6N + 1$ unknowns: c_T^n, c_N^n, $\hat{c}_T^n$, $\hat{c}_N^n$, p_N^n, p^n, and λ_T. We denote the solution of this system with freely floating exchange rates and no tariffs with asterisks. Importantly, we solve for the price of the consumption bundle under the freely floating exchange rate regime with no tariffs, $p^{n,*}$, which determines the consumption of the consumers within each country who do not have access to financial markets.

2. We solve for the state contingent tax z_P^m that implements the stabilization in the manipulation country m by plugging the expressions for $p^{n,*}\forall n$ and z_T^u into our first order conditions. We assume the state contingent tax takes the form:

$$z_P^m = \sum_n X_N^n y_N^n + X_\chi^n \chi^n, \tag{32}$$

   and we can solve for the equilibrium allocation as a function of the shocks in our model and the parameters of the state contingent tax, $\{X_N^n, X_\chi^n\}$. We then solve for the parameters X_N^n and X_χ^n such that:

$$\text{var}\left[s^{m,\mathcal{T}}\right] = (1-\Omega^m)^2\,\text{var}\left[s^{m,\mathcal{T}*}\right].$$

   We then plug the expression for the tax z_P^m into our solution, which allows us to write consumption and prices in terms of the primitives of the model.

A.5 Log-linear System of Equations

In this appendix, we present the log-linear system of equations that we use to solve for consumption and prices. We let $\lambda^n_{T,1}$ denote the log Lagrange multiplier on the first-period budget constraint for a household in country n. The natural log of the stochastic discount factor is given by

$$q = \lambda^n_T - \lambda^n_{T,1}. \tag{33}$$

We write the log-linear first-order conditions for the active households in the second period as

$$\begin{aligned} z^n_T + z^n_p + q + \lambda^n_{T,1} &= (1-\gamma)(\alpha c^n_T(\omega) + (1-\alpha)c^n_N(\omega)) - c^n_T(\omega) - (1-\gamma)\chi^n + \log(\alpha) \\ p^n + q + \lambda^n_{T,1} &= (1-\gamma)(\alpha c^n_T(\omega) + (1-\alpha)c^n_N(\omega)) - c^n_N(\omega) - (1-\gamma)\chi^n + \log(1-\alpha), \end{aligned}$$

where z^m_P is given by (32), $z^u_T = \lambda_T + \tau c^u_T$, and $z^n_P = 0, \forall n \neq m$, $z^n_T = 0, \forall n \neq u$. The log-linear resource constraints are:

$$\begin{aligned} \psi c^n_N + (1-\psi)\hat{c}^n_N &= y^n_N \\ \sum_n \theta^n \left(\psi c^n_T + (1-\psi)\hat{c}^n_T\right) &= 0. \end{aligned}$$

The log-linear first-order condition with respect to consumption yields the price level of the final consumption bundle:

$$p^n + q + \lambda^n_{T,1} = -\gamma(\alpha c^n_T + (1-\alpha)c^n_N) - (1-\gamma)\chi^n.$$

Finally, the log-linear optimal consumption choices of the inactive households are given by:

$$\begin{aligned} \hat{c}^n_T &= p^{n*} - z^n_P - z^n_T + \log(\alpha) \\ \hat{c}^n_N &= p^{n*} - p^n_N + \log(1-\alpha), \end{aligned}$$

where $z^m_P = \log(Z_P(\omega))$, $z^u_T = \lambda_T + \tau c^m_T$, and $z^n_P = 0, \forall n \neq m$, $z^n_T = 0, \forall n \neq u$.

As we discuss in Appendix A.4, this log-linear system of equations allows us to solve for the consumption of consumers and financiers, the prices of the nontraded good, the price levels in all countries, and the shadow cost of traded goods in the second period. However, to solve for the Lagrange multipliers, we need one more set of equations to pin down the relative wealth of the various countries in the model.

In the freely floating exchange rate regime with no tariffs (the regime noted by asterisks), we assume that the transfers κ^n equalize the marginal utility of wealth across countries. Thus, we solve for $\lambda^n_{T,1}$ using the condition:

$$\lambda^n_{T,1} = \lambda_{T,1} \quad \forall n, \tag{34}$$

and we normalize $\lambda_{T,1} = \mathbb{E}[\lambda_T] + \frac{1}{2}\operatorname{var}[\lambda_T]$.

In order to solve for $\lambda^n_{T,1}$ when the U.S. implements a tariff and the manipulating country is stabilizing its exchange rate, we compute the portfolio that financiers hold and determine $\lambda^n_{T,1}$ based on a second-order approximation of the financiers' first-period budget constraint. This process is described in the following appendices.

A.6 Equilibrium Asset Portfolio

In the log-linear solution, all prices and quantities are linear combinations of the supply and demand shocks in the economy. All asset payoffs are also linear combinations of the supply and demand shocks. Any set of assets with the same rank as the set of household expenditures will thus be able to span the space of household expenditures. Therefore, given the appropriate set of assets, we can write household expenditure in each state of the world as a linear combination of these asset payoffs.

It is straightforward to verify that the set of log-linear stock payoffs spans the space of the financiers' consumption. We obtain the following lemma.

Lemma 1. *Households in the freely floating exchange rate equilibrium with no tariffs hold levered positions in their own country's stocks and hold short positions in other countries' stocks,*

$$A^n_n = \frac{1-\theta^n\alpha}{(1-\alpha)\psi} \; and \; A^n_j = -\frac{\theta^j}{(1-\alpha)\psi} \forall j \neq n.$$

A.7 $\lambda^n_{T,1}$, Welfare, and Optimal Stabilizations

In this appendix, we describe how we compute $\lambda^n_{T,1}$ when countries impose tariffs and implement stabilizations. Afterwards, we discuss how we compute welfare and how we determine optimal stabilizations.

Financiers maximize utility subject to their budget constraints (19) and (22). When financiers hold the portfolio of assets derived in Appendix A.6, their initial wealth is

$$W^n_0 = \sum_{l=1,2,\ldots,N} A^{n*}_l Q^l_N + Q_K K^{n*}_N + \bar{Z},$$

where $\bar{Z}$ is the present value of tax revenues, be it tariff or the state-contingent tax central banks use to conduct exchange rate stabilization:

$$\bar{Z} = \mathbb{E}\left[\frac{\Lambda_T^n(\omega)}{\Lambda_{T,1}^n}(Z^n(\omega)-1)\Big(\psi C_T^n(\omega) + (1-\psi)\hat{C}_T^n(\omega)\Big)\right].$$

Here, $Z^u(\omega) = Z_T^u(\omega)$, $Z^m(\omega) = Z_P^m(\omega)$, and $Z^n(\omega) = 1$ for all $n \neq u, m$.

Appendix D of Hassan, Mertens, and Zhang (2023) shows that, naturally, the consumption of value of consumption of traded goods in each country needs to equal the value of the assets held by the financiers:

$$\mathbb{E}\left[\frac{\Lambda_T^n(\omega)}{\Lambda_{T,1}^n}\left(C_T^n(\omega) + \frac{1-\psi}{\psi}\hat{C}_T^n(\omega)\right)\right] = \left(A_n^{n*} - \frac{1}{\psi}\right)Q_N^n + \sum_{l\neq n} A_l^{n*}Q_N^l + \frac{1}{\psi}. \tag{35}$$

Because the measure of ψ financiers hold all financial assets, they each need to reserve $\frac{1}{\psi}$ shares of the nontraded good dividend for consuming nontraded goods.

We derive a second-order approximation for equation (22), which provides a system of N equations that are linear in $\lambda_{T,1}^n$. We solve for the $\lambda_{T,1}^n$ that satisfies this system of equations, and plug these values into our solution to the log-linear system of equations derived above. These new solutions for traded consumption and prices reflect level shifts arising from changes in the value of financiers' portfolios resulting from tariff and stabilization measures.

We calculate changes in welfare using a second-order approximation of household utility and aggregate over financiers and consumers:

$$Welfare^n = \psi\left(\mathbb{E}[c^n] - \frac{\gamma-1}{2}\,\text{var}[c^n]\right) + (1-\psi)\left(\mathbb{E}[\hat{c}^n] - \frac{\gamma-1}{2}\,\text{var}[c^n]\right),$$

where $c^n = \alpha c_T^n + (1-\alpha)c_N^n$. By plugging in our solutions for consumption into the welfare function, we determine welfare as a function of tariffs and stabilizations.

A.8 Expressions in Sections 3.1 and 3.2

This appendix presents the expressions for the freely floating exchange rate regime without tariffs when $0 < \psi < 1$ that are analogous to the expressions shown in Sections 3.1 and 3.2.

The consumption of the traded good by financiers in country n is:

$$c_T^{n*} = \frac{(\gamma-1)(1-\alpha)}{\psi(1-\alpha)+\gamma\alpha}\left(\frac{\gamma-\psi}{\psi(\gamma-1)}(\alpha+\psi(1-\alpha))\bar{y}_N - y_N^n\right) - \frac{(\alpha+\psi(1-\alpha))(\gamma-1)}{\psi(1-\alpha)+\gamma\alpha}(\bar{\chi}-\chi^n).$$

The exchange rate between f and h is:

$$s^{f,h*} = p^{f*} - p^{h*} = -\frac{\gamma(1-\alpha)}{\psi(1-\alpha)+\gamma\alpha}(y_N^f - y_N^h) + \frac{\psi(\gamma-1)(1-\alpha)}{\psi(1-\alpha)+\gamma\alpha}(\chi_N^f - \chi_N^h).$$

The marginal utility of traded consumption in the second period is:

$$\lambda_T^* = -\frac{1}{\psi}(\gamma-\psi)(1-\alpha)\bar{y}_N + (\gamma-1)\bar{\chi} + \text{constant}.$$

The difference in returns from investing in the risk-free bond in countries h and f is:

$$\text{cov}\left[\lambda_T^*, p^{h*} - p^{f*}\right] = \frac{\gamma-\psi}{\psi}\frac{\gamma(1-\alpha)^2}{\psi(1-\alpha)+\gamma\alpha}(\theta^h - \theta^f)\sigma_N^2 + \frac{\psi(\gamma-1)^2(1-\alpha)}{\psi(1-\alpha)+\gamma\alpha}(\theta^h - \theta^f)\sigma_\chi^2.$$

The payoff of one share of the nontraded firm's stock is:

$$p_N^{n*} + y_N^{n*} = \frac{(\gamma-\psi)(1-\alpha)}{\psi(1-\alpha)+\gamma\alpha}(\bar{y}_N - y_N^n) - \frac{(\gamma-1)\psi}{\psi(1-\alpha)+\gamma\alpha}(\bar{\chi}_N - \chi_N^n) + \log[\frac{1-\alpha}{\alpha}].$$

The pseudo country sizes in the U.S. and other countries are given by:

$$\bar{\theta}^{US} = \frac{A - \gamma(1-\alpha)(1-\psi)(\gamma-\psi(\gamma-1))(1-\theta^{US})\tau}{A + (\gamma\alpha+\psi(1-\alpha))(\gamma-\psi(\gamma-1))(1-\theta^{US})\tau}\theta^{US} \quad (36)$$

$$\bar{\theta}^{n} = \frac{A + (\gamma-\psi(\gamma-1))(\gamma-\psi(\gamma-1)(1-\alpha)-\gamma(1-\alpha)(1-\psi)(1-\theta^{US}))\tau}{A + (\gamma\alpha+\psi(1-\alpha))(\gamma-\psi(\gamma-1))(1-\theta^{US})\tau}\theta^{n} \quad \forall n \neq US \quad (37)$$

where

$$A = (\gamma\alpha + \psi(1-\alpha))(\gamma - \psi(\gamma-1)(1-\alpha)).$$