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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 U.S. dollar's safety premium, low Treasury yields, and its status as the world's anchor currency. Introducing a trade war that isolates U.S. goods markets from the world erodes the U.S. dollar's safety premium, raises U.S. interest rates, and lowers the world market value of U.S. firms. For sufficiently high tariffs, small economies optimally re-peg 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 the United States derives from the dollar's international role.

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1 Introduction

Recent global market turmoil surrounding fears of an impending trade war has raised questions about the potentially changing role of the U.S. dollar in the international monetary system. The tariff announcement by the United States on April 2nd, 2025 —– met by threats of retaliation abroad —– has coincided with an unusual response in financial markets: the U.S. 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 U.S. equities, Treasury bonds, and the dollar lost value at a time 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 U.S. dollar (Jiang et al., 2025).

These developments suggest that the dollar's traditional role as the world's safe haven and anchor currency may be sensitive to U.S. 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 U.S. currency could threaten its status at the center of the world's monetary system, and with it the U.S. 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 U.S. macroeconomic policy should an era of economic nationalism emerge.

This paper develops a risk-based framework to understand the dollar's role as a global safe-haven and anchor currency and analyzes how that role might change under a nationalist trade policy. We build on recent advances in the theoretical literature that emphasize risk and safety as key determinants of currency returns, interest rates, and capital flows (see, e.g., Lustig et al., 2011; Colacito et al., 2012; Miranda-Agrippino and Rey, 2020; Maggiori, 2017; Richmond, 2019; Colacito et al., 2018; di Giovanni et al., 2022; Akinci et al., 2022; Bai et al., 2024).

Our analysis yields two key insights. First, the dollar's position as the world monetary system's anchor currency, the relatively low yields on U.S. government debt, U.S. 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 U.S. dollar loses its safe-haven status, our model predicts it also loses 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 U.S. economy from world trade flows mitigates the forces that make the U.S. dollar the safest currency in the world, and may thus also remove the underpinning force making 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 U.S. interest rates, and also prompt foreign governments to loosen or drop their stabilization policies towards the U.S. dollar. While a trade war with average tariffs below 26% may only loosen the dollar's anchor function, our model predicts that severe trade wars with average tariffs exceeding 26% 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 U.S. 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 all shocks are common within countries, and some large countries (like the United States) account for a larger share of world GDP than others.

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 appreciates, it thus tends to import more traded goods.

As the currency of the largest economy in the world, the U.S. dollar emerges endogenously as the safest currency, because shocks that buffet the dollar's value tend to affect global investors by more

[1]This literature has explored various potential drivers of heterogeneity in the safety features of countries' currencies, ranging from differences in country size (Martin, 2012; Hassan, 2013) and financial development (Maggiori, 2017) to trade centrality (Richmond, 2019), liquidity (Arvai and Coimbra, 2024), and differential resilience to disaster risk (Farhi and Gabaix, 2015; Colacito et al., 2018). Other papers in this literature have studied heterogeneity in the volatility of shocks affecting the nontraded sector (Tran, 2013), factor endowments (Ready et al., 2017; Powers, 2015), and risk aversion in combination with country size (Govillot et al., 2010). Hassan and Zhang (2021) survey this literature.

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 U.S. 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 world-wide.

The same shocks that appreciate the U.S. dollar thus also drive up the price of traded goods in world markets. Consequently, the U.S. 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 U.S. shocks and the world-market price of traded goods makes the dollar a safer store of value than the currencies of other countries: the dollar gains value in times of global stress. For this reason, international investors prefer holding U.S. dollar denominated bonds, giving rise to an "exorbitant privilege:"[2] the U.S. dollar has a lower interest rate, so that Americans can borrow relatively cheaply in world markets. The same mechanism makes investing in U.S. 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 U.S. dollar, countries experience an increased co-movement 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 towards the stabilizing country, while simultaneously 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 rate to the U.S. dollar, rather than to their largest trading partner, the euro, or some other currency. The U.S. dollar emerges as the world's sole anchor currency due to its safety. 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 U.S. dollar, larger countries maintain looser stabilizations to the U.S. dollar, and only the largest economies float their exchange rates (Hassan et al., 2022).

Notably, this structure of the international monetary system emerges endogenously, and as long as countries are able to 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 towards the currency of the largest economy in the world, putting the U.S. dollar at the center of the world monetary system.

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

Next, we ask 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 U.S. 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 U.S. dollar's tendency to appreciate in times of global stress. This loss of its safe-haven status leads to a rise in U.S. interest rates, a drop in the world-market value of U.S. firms, capital outflows, and lower U.S. 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 U.S. 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 is able to closely match the structure of the world monetary system prior to the tariff announcements in 2025: the U.S. dollar, the euro, and a handful of currencies of other large economies float their exchange rates, while countries accounting for less than 4% of world GDP maintain some form of stabilization to the U.S. dollar. Small countries who contribute less than 0.8% to world GDP maintain a hard peg to the U.S. dollar. Moreover, U.S. interest rates are 2.5 percentage points lower than those in small developed economies, leading to disproportionate investment in U.S. 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: U.S. interest rates rise, U.S. equities depreciate relative to those in the rest of the world, and the volatility of the U.S. 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 (12-17% on average for U.S. 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 U.S. 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%, the model predicts a fundamental shift in the architecture of the world monetary system with the euro supplanting the U.S. dollar as the primary anchor currency.

We make two 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 et al. (2024). We do not resolve these issues here, and instead side-step them by focusing on a two-period model. Our quantitative results should thus be interpreted with some caution. Second, we focus on differences in country size. Variations of the model where safety premia also arise from differences in financial development, trade centrality, or other sources may have similar interpretations.

Our paper contributes to the literature studying the U.S. 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, 2017; He et al., 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, 2019). 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 U.S. 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 U.S. 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 et al., 2025; Bergin and Corsetti, 2025; Auray et al., 2025). Another branch revisits classical results on optimal tariffs under a range of policy objectives (Itskhoki and Mukhin, 2025; Dávila et al., 2025; Caliendo et al., 2025; Aguiar et al., 2025; Kocherlakota, 2025; Rodríguez-Clare et al., 2025; Ignatenko et al., 2025; Auclert et al., 2025; Baqaee and Malmberg, 2025; Costinot and Werning, 2025; Kalemli-Özcan et al., 2025), and the capacity of tariffs to substitute for taxes (Alessandria et al., 2025). A third branch studies how tariffs may be used to achieve political and diplomatic goals (Clayton et al., 2023, 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 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]

The remainder of this paper is structured as follows. Section 2 outlines the key properties of

[3]In this sense, we echo results in Obstfeld and Rogoff (2000) that already 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 et al., 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 (2019) 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 et al. (2023) 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 U.S. dollar that are the object of our analysis. Section 3 sets up our basic model, studies the emergence of the dollar as the world's preeminent safe-haven currency, and the consequences of a trade war for dollar safety, U.S. interest rates, and capital accumulation. Section 4 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 5 concludes.

2 Facts About the Dollar as a Safe Haven and Anchor Currency

We begin by outlining the key empirical facts relating to the U.S. dollar's role as safe-haven and anchor currency, which will be the object of our analysis below.

1. Dollar safety. The U.S. 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.

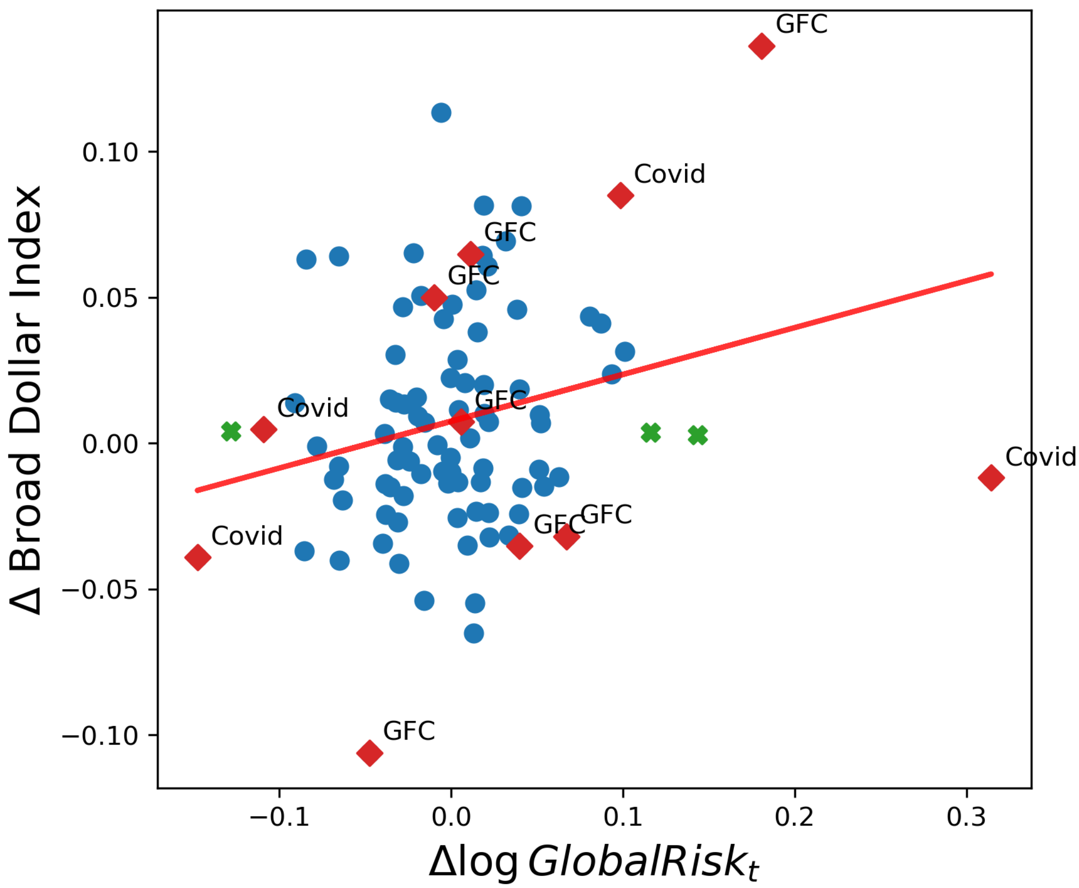
To show one piece of evidence that the U.S. dollar is such a safe-haven currency, consider Figure 1. This figure shows the relationship between the (arithmetic) average of the change in the price of the dollar against 26 foreign currencies over the quarterly change in Global Risk, as measured by the extent of discussion of risks associated with foreign countries in earnings calls of thousands of global listed firms (Hassan et al., 2023). The plot shows a clear positive association between the two variables (coef.=0.16, s.e.=0.07) from 2002Q2 to 2024Q4, meaning that the dollar tends to significantly appreciate in times of global stress, such as during 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 during a spike in Global Risk following the announcement of large tariffs by the United States (marked with green crosses).

Repeating this exercise for other countries shows the U.S. 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.

2. Low interest rates. Figure 2 shows that this heterogeneity in currencies' loading on changes in Global Risk can explain cross-country heterogeneity in nominal interest rates and currency excess returns. In particular, we see that the U.S. dollar, the Japanese yen, and the euro — currencies that also systematically appreciate in times of heightened Global Risk — have lower nominal interest rates. That is, countries with safe currencies, including the U.S. dollar, systematically borrow more cheaply in international markets.[5]

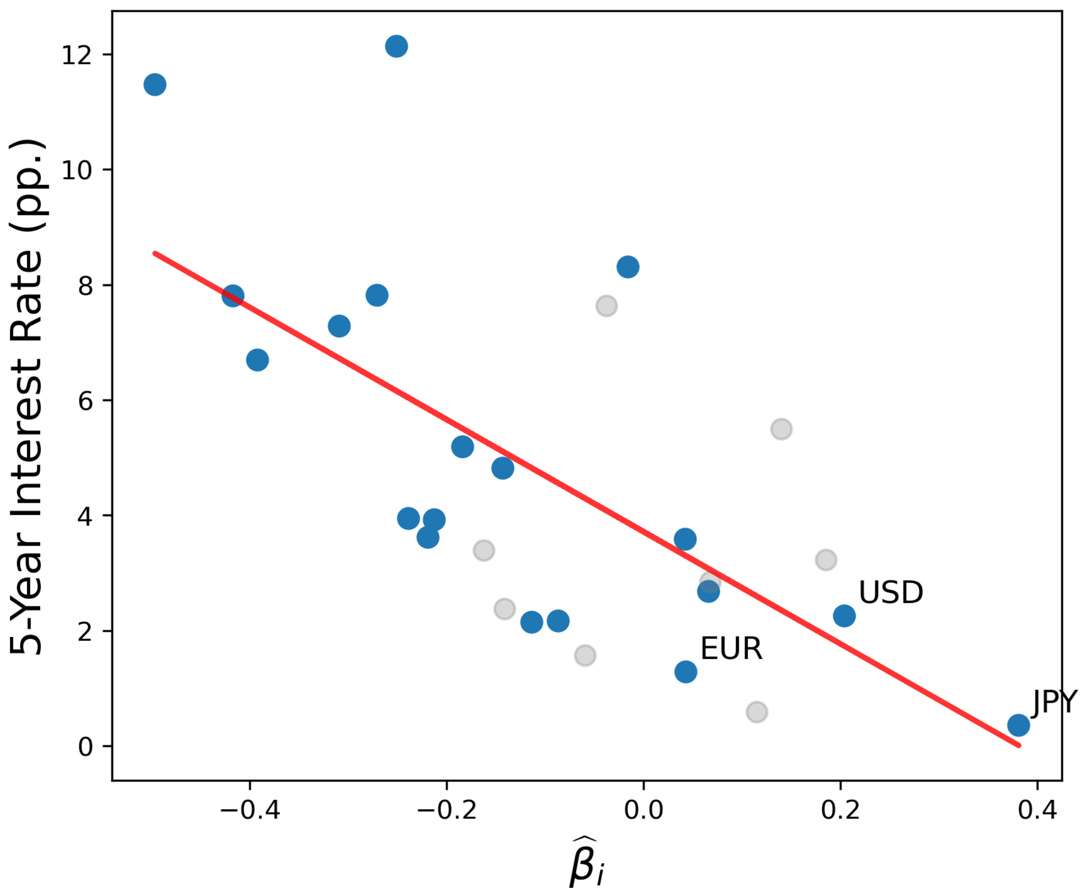
[5] The safety properties affect both nominal and real interest rates that tend to co-move strongly, particularly at longer horizons (Mertens and Zhang, 2025). In our model below, the relevant object disciplining the interest differential is the excess return an international investor obtains from borrowing in one currency and lending in another, net of any

Figure 1: Global Risk and the U.S. Dollar.



Notes: The figure plots the (arithmetic) average of the quarterly change in the price of the U.S. dollar against 26 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 et al., 2023). The sample period is 2002Q2 to 2025Q3. The regression line is fitted to observations up to and including 2024Q4. The slope of the regression line is 0.16 (s.e.=0.07). The green crosses represent observations occurring in 2025.

Figure 2: Safe Currencies and Sovereign Bond Yields



Notes: This figure plots the estimated coefficient $\hat{\beta}_i$ from regressions of the form

$$\Delta e^B_{i,t} = \alpha_i + \beta_i \Delta \log GlobalRisk_t + \epsilon_{i,t},$$

against the average 5-year government nominal interest rates from Du et al. (2018). $\Delta e^B_{i,t}$ is the quarterly change in the arithmetic average change in the nominal exchange rate of country i against the 26 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 et al. (2023). If a marker is in gray, it indicates that on average over the sample period, the exchange rate was less flexible than a "managed float" in the Ilzetzki et al. (2019) classification. This figure was first circulated in the unpublished working paper version of Hassan et al. (2021). The slope of the regression line is -9.73 (s.e.=2.28).

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), 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 U.S. 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 rate. Subsequent work confirms this risk-insurance pattern using a variety of methods (Lustig et al., 2011; Menkhoff et al., 2012; Lettau et al., 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 et al. (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 pro-cyclical with the global economy and carry higher risk premia (Lustig and Richmond, 2020).

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

3. 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 U.S. 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 dataset 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 et al. (2007); Hassan et al. (2016); Wang (2021); di Giovanni et al. (2022); Kalemli-Özcan et al. (2022), among others).

predictable change in the exchange rate. In this sense, differences in the two countries' inflation rates are only relevant if they engender predictable changes in nominal exchange rates.

4. Anchor currency. Since the demise of the Bretton-Woods system of fixed exchange rates in 1975, individual countries have been largely free to choose their own exchange rate regime. Despite this lack of centralized coordination, Ilzetzki et al. (2019) show surprising regularity in the choices made by individual countries.

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

4a. As of December 2019, 60% of all countries in the world stabilize their currency relative to the U.S. 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 U.S. 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.

4b. 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 rate.

4c. 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.

4d. 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 et al. (2022) show a one percentage point decrease in the allowed annual standard deviation of its nominal exchange rate relative to the U.S. dollar is statistically significantly associated with a 0.4 percentage point decrease in its risk-free interest rate, 0.4 p.p. lower average returns the currency pays to international investors, and a 1.6% increase in the capital intensity of production in the country. These estimates imply that moving from a soft stabilization that allows a five percent annual standard deviation to the U.S. dollar (such as Mexico's), to a tighter stabilization allowing only variations of two percent (such as Thailand's) is associated with about a 4.8% increase in the domestic capital-to-output ratio.

3 A Model of Trade War and Dollar Risk

We next establish a formal framework. Our model extends Hassan et al. (2022) 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 tariffs have on risk premia, dollar safety, and the dollar's function 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 1-3 above. That is, we first study the effects of the trade war on the U.S. dollar's status as a safe-haven currency, its effect on U.S. interest rates, and 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 anchor function (facts 4a-4d) 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 (u), the EU (e), China, 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 the United States to be the largest economy with $\theta^u > \theta^n \ \forall n \neq u$. Households make investment decisions in the first period. 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

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

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 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, in addition, 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 U.S. 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 — although 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 en-

[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 et al., 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.

dowed 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 et al. (2002), Gabaix and Maggiori (2015), and Fanelli and Straub (2019): 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 that is issued by a domestic financial intermediary. This risk-free 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 (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 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, as well as 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 for 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

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

[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 pre-existing differences under the freely floating regime, so that any remaining endogenous differences in wealth across households are exclusively attributable to policy intervention.

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 4.

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 $\left(\sigma_{N,n} = \sigma_{\chi,n} = 0\right)$ 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, lower-case variables continue to refer to natural logs.

3.1 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 Appendix A.

Equilibrium consumption of traded goods is given by

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

where $\bar{y}_N = \sum_n \theta^n y_N^n$ and $\bar{\chi}_N = \sum_n \theta^n \chi^n$ 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.

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).

[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 real exchange rate between two 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 number applies such that

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

where a higher $\bar{s}^{f*}$ 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 the 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 U.S. dollar to appreciate) require a large share of the world's traded of 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 U.S. demand for imports have a large effect on the world-market price of traded goods in comparison with the impact of fluctuations in a small country's demand for imports.

It follows immediately that the U.S. 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:

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

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 are able to 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 U.S. households translates to disproportionate stress in the world economy.

This asymmetry in the spillovers of country-specific shocks on 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

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

This covariance is increasing in the size of the country. Consequently we get 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 U.S. dollar is the world's safest currency (Fact 1).

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

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

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,

[10] $\Delta\mathbb{E}s^{f,h*}$ is defined as the logarithm of the ratio of the countries' expected real price changes (see Hassan et al. (2022) for a formal derivation).

$r^{u*} < r^{n*}\ \forall n \neq u$ than other countries (Fact 2 above). That is, a currency that appreciates at 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 co-moves with the real exchange rate. One can write the dividend payments made by each country's firms under free trade as

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

Thus, the same forces that make the U.S. 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) co-vary more positively with λ_T. The value of dividends paid by U.S. firms tends to be high when traded goods are scarce in world markets.

It follows that U.S. firms have a lower cost of capital, increasing their value in world markets and prompting them to invest relatively more capital: Because U.S. 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 3).

Our model economy thus qualitatively reproduces the first three stylized facts from Section 2: It shows the U.S. dollar as the safest currency in the world (Fact 1); U.S. risk-free interest rates are low compared to those in foreign countries (Fact 2); and U.S. firms have a relatively low cost of capital (Fact 3). All three facts result directly from one key mechanism: shocks that lead the U.S. dollar to appreciate also lead to a scarcity of traded goods in world markets.[11]

3.2 Dollar Safety and Interest Rates in a Trade War

Before generalizing our model to accommodate Facts 4a-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, U.S. 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 to any U.S. export tariffs in equal measure so

[11] Although political leaders often refer to the phenomenon of low U.S. interest rates and low cost of capital for U.S. firms as an "exorbitant privilege," note that this "privilege" (facts 2 and 3) arise 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 U.S. output in times of stress and thus dampens the global effect of U.S. 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 that instead, we make the simplifying assumption that when a traded good enters a country it becomes indistinguishable from the domestically endowed traded goods, so that all traded goods within the country have the same price.

that the same tariff is levied on U.S. imports and exports. We show in Section 3.5 that allowing for partial retaliations does not materially change our results — in the general case, the key quantity is the average tariff levied on U.S. 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

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

where τ is the tariff rate and λ_T^u is the logarithm of 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, U.S. marginal utility of traded consumption exceeds marginal utility in other countries whenever the United States imports traded goods ($c_T^u > 0$).[13]

In a trade war, policymakers are thus placing a wedge between the marginal utility of traded consumption in the U.S. relative to the rest of the world, which is increasing in the share of consumption that is imported or exported, and thus also increasing in 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 U.S. dollar. First, with a wedge on the price of the traded goods entering the country, the U.S. domestic price level becomes more volatile, increasing the volatility of the average exchange rate between the U.S. dollar and foreign currencies. Second, U.S. households' reduced capacity to access the world market for traded goods reduces the spillover of U.S. shocks into the world-market price of traded goods. That is, the trade war insulates the world market from shocks that buffet the U.S. 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

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

and

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

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

[13] Recall that the endowment of traded goods is 1. Also see Appendix A.2 for details.

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, $\bar{\theta}^u \to 0$, with other countries making up for the difference.

In this extreme case, the complete removal of spillovers of U.S. shocks into world markets eliminates the force that induced a positive covariance between the U.S. dollar and λ_T: A U.S. 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 U.S. shocks still maintain a large effect on λ_T, there exist parameters where the increased volatility of the U.S. dollar locally increases its covariance with λ_T, despite the U.S. 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 U.S. 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 U.S. firms, lower their world-market value, and therefore rotate capital flows away from the United States.

3.3 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 1984-2019. This yields $\theta^u = 0.27$ for the United States, $\theta^e = 0.15$ for the euro zone, $\theta^j = 0.12$ for Japan, and $\theta^{ch} = 0.07$ for China.[14] We use this pre-sample to test and validate the model's fit to the historical data. For 2023, we calculate $\theta^u = 0.26$, $\theta^e = 0.15$, $\theta^j = 0.04$, and $\theta^{ch} = 0.17$.[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 the two to equal standard values in the literature, with a capital share in output of $\nu = 1/3$, and relative risk aversion of $\gamma = 5$.

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

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

In our benchmark calibration, we set the tariff rate τ to 17%, to match expectations of the long-term average tariff rate between the United States and the rest of the world as reported by J.P. Morgan (2025); 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 U.S. dollar and the two small developed economies with floating exchange rates (Australia and New Zealand) and the excess return on the U.S. dollar relative to these two countries' currencies. As will become apparent in Section 4 below, 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. The table shows that, on average, these two currencies have interest rates 2.48 percentage points higher than the interest rate on the US dollar. The mean excess return to borrowing in U.S dollars and lending in Australia and New Zealand of 2.40% shows that these currencies do not depreciate on average, so that the interest differential passes 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 U.S. dollar and their consumption growth, and the average standard deviation of consumption growth in these countries.

Column 1 of Table 2 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 and demand shocks with standard deviations $\sigma_N = 0.03$ and $\sigma_\chi = 0.07$, respectively. Table 1 lists the complete set of calibration choices.

For these parameters, the model generates a U.S. 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 get a correlation between exchange rates and consumption growth close to zero, -0.07 — compared to -0.10 in the data, well within the confidence interval [-0.35,0.16]. Finally, the standard deviation of consumption growth across countries comes in at 0.65%, 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$^{\text{nd}}$ and April 15$^{\text{th}}$ of 2025. In particular, U.S. interest rates rose relative to foreign countries — the 12-month risk-free rate increased by 34 basis points relative to the G10 currencies; U.S. stock prices, denominated in the average of G-10 currencies, decreased in value by 4.66%; and the U.S. dollar's implied volatility increased by 8.20%, though we should note these market reactions are measured

[16] Note that these studies do not reflect expectations as of April, but rather June 2025. Both numbers are somewhat lower than the 22.5% projected by The Budget Lab at Yale (2025) 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 WT
GDP Share Euro Zone (1984-2019)	0.15	Penn WT
GDP Share US (2023)	0.26	World Bank
GDP Share Euro Zone (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.)	-2.48 [-2.73,-2.24]	-2.70
Currency Excess Return (USA - ANZ)(pp.)	-2.40 [-3.53,-1.28]	-2.70
Correlation of Exchange Rate with Consumption Growth	-0.10 [-0.35,0.16]	-0.07
Standard Deviation of Consumption Growth (%)	1.95 [1.62,2.29]	0.65

Notes: The table shows the parameters used in the model's calibration in Table 2 and in the following exhibits, as well as 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 Tables 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 12-month forward premium between the U.S. dollar and the Australian dollar and the New Zealand dollar. The currency excess return subtracts off 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 Tables. Bootstrapped 95% confidence intervals are shown in parentheses. The sample period for panel (b) is 1984 to 2019.

with a great deal of error, 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 FX futures).

The second set of untargeted moments arises from data on the structure of international exchange rate arrangements as provided by Ilzetzki et al. (2019). That is, we evaluate the extent to which our model can fit the exchange rate regimes chosen by countries of different sizes prior to the imposition of U.S. tariffs. We describe this procedure in detail in Section 4.

Following the announcement of tariffs, the model generates a rise in the U.S. 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 U.S. stock prices (-2.23%)[17] and the rise in the U.S. dollar's implied volatility (3.05%). 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 U.S. dollar with the stochastic discount factor λ_T (from 0.79 to 0.67), a drop in U.S. capital accumulation, and a drop in the average wage paid in the United States of -0.64% and -0.21%, respectively. In other words, the model predicts that the trade war increased borrowing costs in the United States relative to the rest of the world, reduced the value of U.S. firms, prompted capital outflows, and resulted in a commensurate drop in U.S. wages. In short, the trade war eroded the U.S. exorbitant privilege as reflected in facts 1-3 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% of world GDP in 2023, compared to 27% in the pre-sample. Similarly, the European Union accounts for 15% in both samples. The only material change is that Japan and China effectively traded places, with the former going from 12% to 4% of world GDP and the latter from 7% to 17%. This change, however, has little effect on our calculations.

3.4 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 ($\bar{s}^n$) with 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 corre-

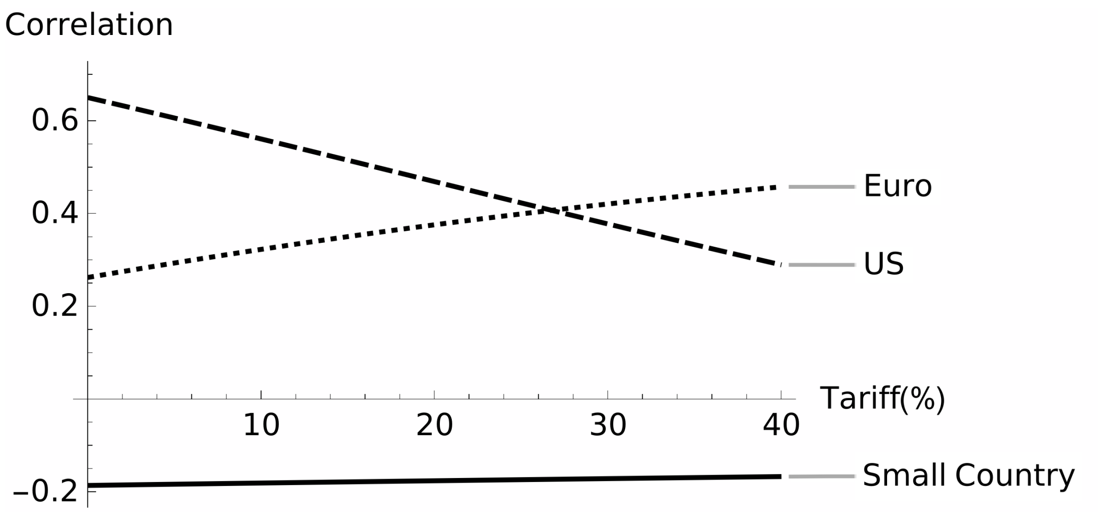
[17] We follow Bansal and Yaron (2004) and assume that stock returns are leveraged claims on real economic activity. We set the leverage ratio to 3.5.

Table 2: Effects of the Trade War

	Data	Model			
	2/4/2025-15/4/2025	Full Retaliation	Full Retaliation	40% Retaliation	No Retaliation
	(1)	(2)	(3)	(4)	(5)
Changes in...					
U.S. Interest Rate (USA-G10) (pp.)	0.34	0.56	0.56	0.40	0.28
	[-0.13,0.80]				
U.S. Stock Prices (USA-G10) (pp.)	-4.66	-2.23	-2.17	-1.55	-1.08
	[-7.32,-2.00]				
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

Notes: This table presents the change in model moments along with their empirical counterparts before and after the announcement of the tariffs. Column (1) captures changes in the variables of interest from April 2, 2025, to April 15, 2025. The change in the interest rate differential and the stock price differential is measured relative to G10 currencies. Bootstrapped 95% confidence intervals are shown in parentheses. The change in the U.S. exchange rate volatility captures the change in the U.S. dollar's implied volatility computed using the change in the price of 3-month dollar-euro futures during this period. Column (2) - (5) shows the model's predictions under the calibration in Table 1. Column (2) uses the average country sizes (GDP shares) calculated from PWT 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 U.S. tariff, column (4) assumes all other countries impose a tariff of 40% of that of the U.S. on U.S. goods, and column (5) assumes no retaliation.

Figure 3: Correlation of each country's (broad) real exchange rate with λ_T



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

lation: isolating America from world trade increases the volatility of $\bar{s}^u$, while also decreasing the effect of U.S. shocks on the world economy (λ_T).

The figure shows that, over the entire range of tariffs depicted (from 0 — free trade — to 40%), 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% makes the euro a safer store of value than the U.S. dollar. This result will be key to our finding in Section 4 that the dollar-centric world financial system may be subject to a sudden phase-shift in favor of another anchor currency.

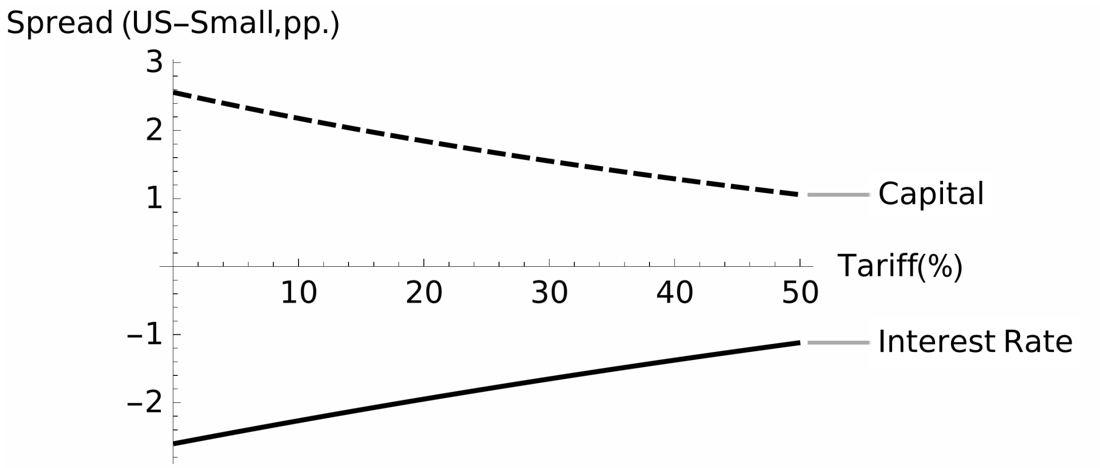
Consistent with these results, aggregate U.S. consumption risk increases as the United States isolates itself from the larger world economy. Incidentally, consumption risk in other countries drops because, in this calibration, the United States, due to its size, influences a large share of world trade and is thus also a major exporter of consumption risk.

Figure 4 shows the consequences of the increasing riskiness of the dollar for U.S. 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% 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, U.S. firms become less valuable in world markets than their counterparts, eventually leading to capital outflows (in $t = 0$) in favor of other countries.

Although our model features only two periods, it is straightforward to see that, in a fully

Figure 4: U.S. Interest Rates and Capital Accumulation



Notes: 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.

dynamic model with capital adjustment costs, a trade 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).

3.5 Partial Retaliation

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

Although several institutions track the average tariff on U.S. imports, the change in the average tariff on U.S. exports is less well documented. Based on the available evidence, we may estimate that, as of the writing of this article, the average tariff on U.S. exports stands at about 6%, whereas U.S. imports are taxed at about 17%.

To solve the model, we continue to rely on perturbation solutions that are now conditional on whether the U.S. 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 et al. (2025) that demonstrate how to compute expectations of piecewise linear functions explicitly.[18]

Figure 5 summarizes the results. Panel (a) plots the change in the U.S. interest rate in response

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

to different tariffs imposed by the United States for different levels of retaliation. The dashed line shows the effect on U.S. interest rates under no retaliation, where foreign countries refrain from imposing taxes on U.S. exports. The dotted line shows the case of a 40% retaliation, which appears to be the status quo as of the writing of this article.

The key insight from this graph is that the dashed 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 U.S. export tariff of 17% causes a rise in the U.S. interest rate of 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% 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 0.12 percentage points with a 17% tariff on U.S. imports and exports, by 0.11 percentage points under a 40% retaliation.

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

4 Trade Wars and the Dollar's Anchor Status

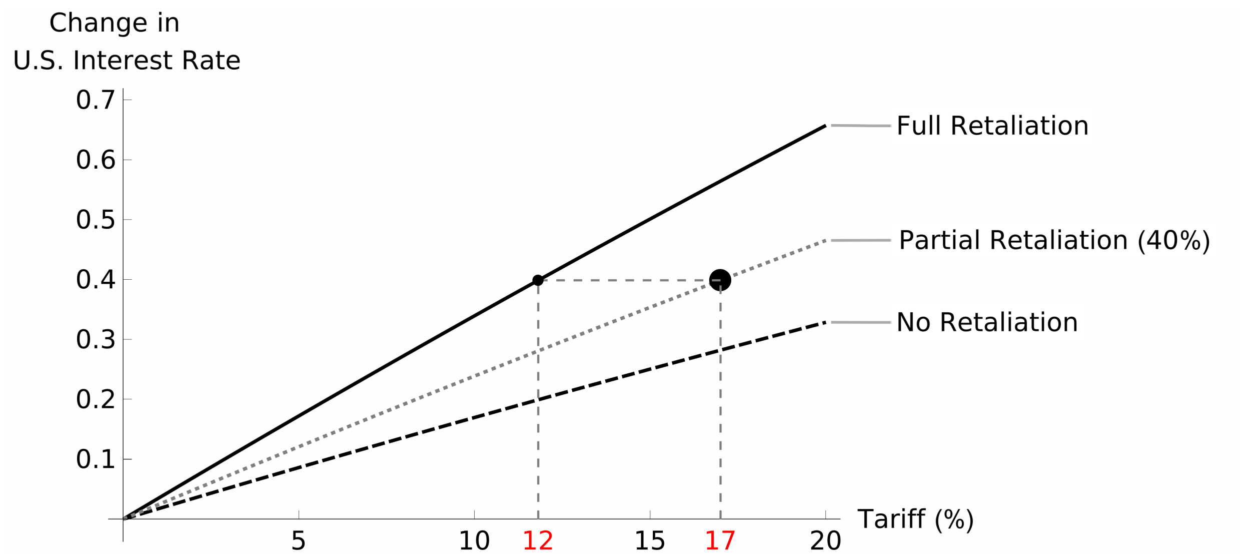
We next extend our model to allow countries to stabilize their real exchange rate relative to a target currency. Hassan et al. (2022) show that doing so qualitatively replicates facts 4a-4d: The optimal non-cooperative policy in this model is for a small country to stabilize its real exchange rate relative to the currency of the largest economy in the world — the U.S. dollar. Relative to Hassan et al. (2022), we take the steps outlined above to make the model quantitatively viable and extend the number of countries to allow for the endogenous emergence of the euro as an alternative anchor currency.[19]

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 then ask how a trade war interferes with this structure, and show that a severe trade war could quickly erode the dollar's anchor status.

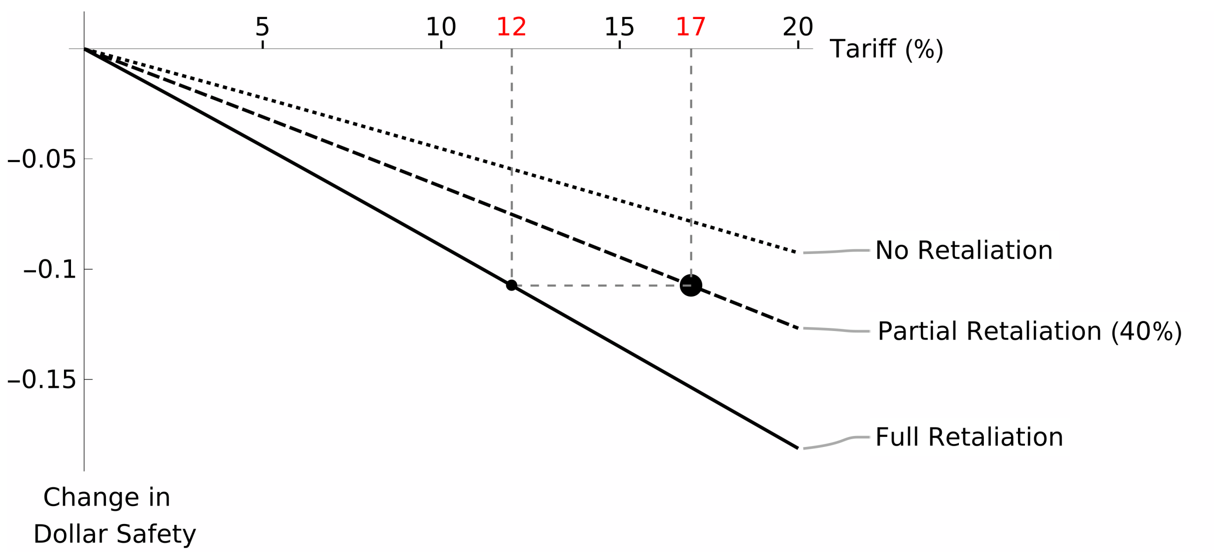
[19] Although China's economy has a GDP share similar to that of the euro area, we focus on the euro as an alternative anchor, because the renminbi itself does not float and is subject to capital controls. However, our model itself does not distinguish between the two.

Figure 5: Partial vs Full Retaliation

(a) **Effect of Trade War on U.S. Interest Rates**



(b) **Effect of Trade War on Dollar Safety**



Notes: This figure plots the effect of a trade war on interest rate differential between the U.S. and a small country and on the correlation of the U.S. broad exchange rate ($\bar{s}^{US}$) with λ_T, which measures dollar safety, under different retaliation scenarios. The black dot represents a U.S. tariff of 17% and a retaliation of 7% (a retaliation strength of 40%), which is roughly the same as a U.S. tariff of 12% met with full retaliation.

4.1 Optimal Stabilizations and the World's Anchor Currency

Intuitively, when the U.S. 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 U.S. dollar's safety characteristics and macroeconomic privileges by implementing a stabilization of its real exchange rate relative to the U.S. 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 et al. (2022) do so by assuming sticky prices of traded goods and giving each country's central bank control of the domestic money supply.[20]

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 $1 + z(\omega)$ 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 $s^{t,m}$ relative to a target country t.

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

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

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 (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 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 lock-step 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.[21]

[20] 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 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.

[21] Equivalently, a nominal peg that commits the central bank to sell foreign reserves when the target country appre-

By aligning the stochastic properties of its exchange rate with that of a large, safe currency, the stabilizing country inherits its risk properties. The stabilized real exchange rate now co-varies more positively with λ_T, making the stabilizing country's currency safer, lowering domestic interest rates, 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 share part of the gains from "dollar privilege": safer currency, cheaper capital, and a valuation windfall for domestic equity.

Interestingly, Hassan et al. (2022) show that for a small stabilizer ($\theta^m \rightarrow 0$) the policy of stabilizing to a large country is not only self-funding but revenue-positive, because the government sells traded goods when they are expensive (when Americans demand more imports) 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 $\theta^m \rightarrow 0$ it is more than offset by the wealth-transfer resulting from lower interest rates and the increase in world-market value of domestic firms.[22] Consequently, small economies optimally accept higher consumption risk to secure a larger share of world wealth, whereas large countries prefer to float.

4.2 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: (i) All countries that choose to stabilize their exchange rates target the U.S. dollar, the currency of the largest economy, which endogenously emerges as the world's anchor currency; (ii) countries that contribute less than 0.8% 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 U.S. dollar graphically.

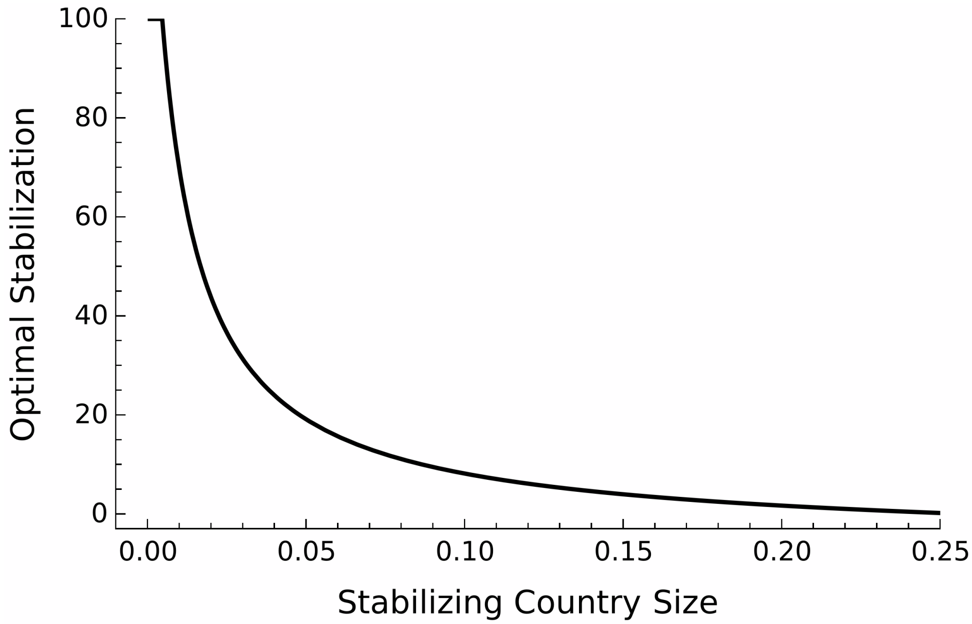
To compare these predictions to the data, we make use of the detailed data on each currency's

ciates implements the same real wedge, so nominal and real stabilizations are isomorphic in this class of models.

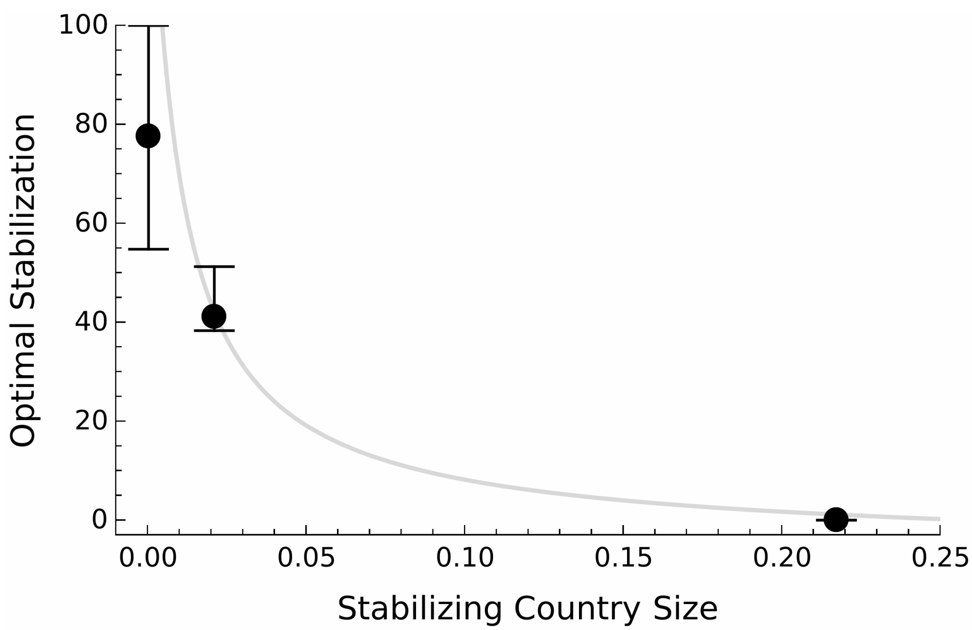
[22] In this sense, the key assumption is that financial intermediaries trade international stocks but not a full set of state contingent claims. This assumption makes each country the monopoly supplier of its own firms, so that an increase in their value shifts wealth in favor of the stabilizing country.

Figure 6: Optimal Stabilization by Size of Stabilizing Country

(a) **Model Prediction**



(b) **Data**



Notes: Panel (a) of this figure plots the model-predicted optimal stabilization policy ($100 \times \Omega^m$) for countries of different sizes in the calibration shown in Table 1. All optimal stabilizations are against the U.S. dollar. Countries smaller than 0.8% of world GDP optimally choose a hard peg ($100\Omega^m > 75$); countries larger than 3.6% of the world GDP optimally choose to float their currencies ($100\Omega^m < 25$), 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% of world GDP, between 1% and 10%, and larger than 10% of world GDP), as well as their inter-quartile range, using data from Ilzetzki et al. (2019), 1984-2019.

exchange rate regime from Ilzetzki et al. (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 dataset 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 that all but the four largest economies (the euro area, Japan, China, and the UK) should reduce the standard deviation of their real exchange rates by at least 30%. Of the 141 countries in our data, all but five (96.5%) conduct such a stabilization. Of the 136 stabilizers, 108 (79.4%) on average stabilize to the U.S. dollar over the sample period, as predicted by our model. Of the stabilizers that pick a different target, the vast majority pick the euro, including EU and EFTA members who are not in the monetary union. In this sense, our model correctly predicts the structure of the world's exchange rate arrangements, with the U.S. 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% of world GDP), intermediate-sized economies (each contributing between 1% and 10%), and large economies (those contributing more than 10%). 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%. The median country in this group on average reduces the standard deviation of its exchange rate by 78% (with an inter-quartile range of 54% to 100%), 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 are truncated at 100%.[23]

All of the 36 countries that sustained a hard peg throughout the entire sample period have a GDP share is less than 1%, consistent with our model's predictions. These include Samoa, the Maldives, and Lesotho.

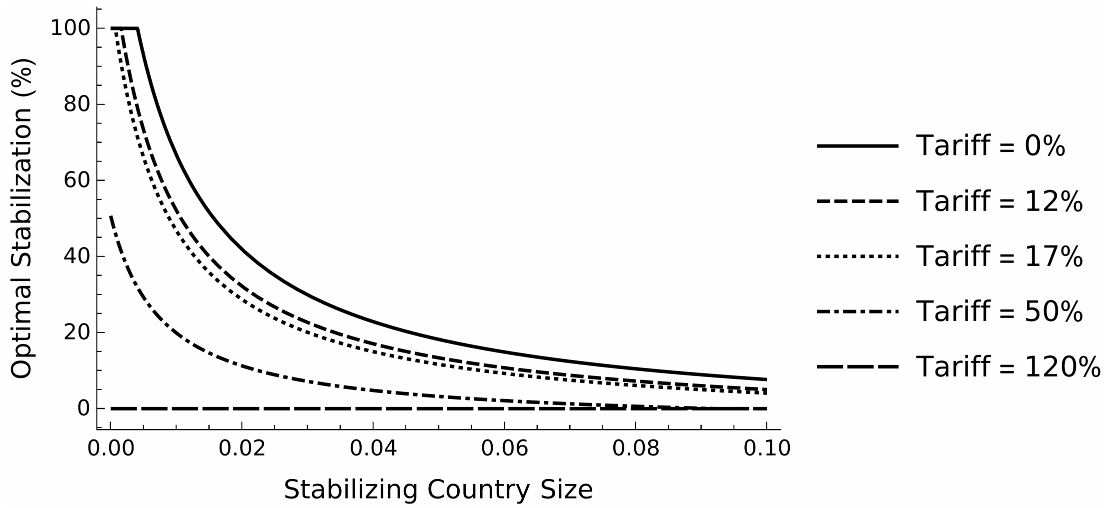
Other small countries that predominantly maintain a hard peg include Saudi Arabia (with a world GDP share of 0.7%), Lebanon (world GDP share of 0.05%), and Jamaica (world GDP share of 0.02%).

For the group of intermediate-sized economies, the model on average predicts stabilizations of 42%. In the data, the median country maintains a stabilization of 41% (with an inter-quartile range between 38% and 51%). 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, as predicted by the model.

The model's main quantitative shortcomings are that China, on average, stabilizes significantly

[23]This truncation induces a natural downward bias in our measure of stabilization.

Figure 7: Optimal Stabilization against the U.S. Dollar at Different Levels of Trade War



Notes: This figure plots the optimal stabilization policy against the U.S. dollar as a function of the size of the stabilizing country, and assuming the U.S. dollar is the only possible anchor currency. Solid, dotted, and dashed lines show how this optimal policy changes at trade wars of varying intensity.

more than predicted by the model, with an average stabilization of 79% over the sample period vs 13% predicted by the model; and a number of European countries that stabilize to the euro rather than the U.S. 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 aside, 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.

4.3 Quantitative Effect of a Trade War on the Dollar Anchor

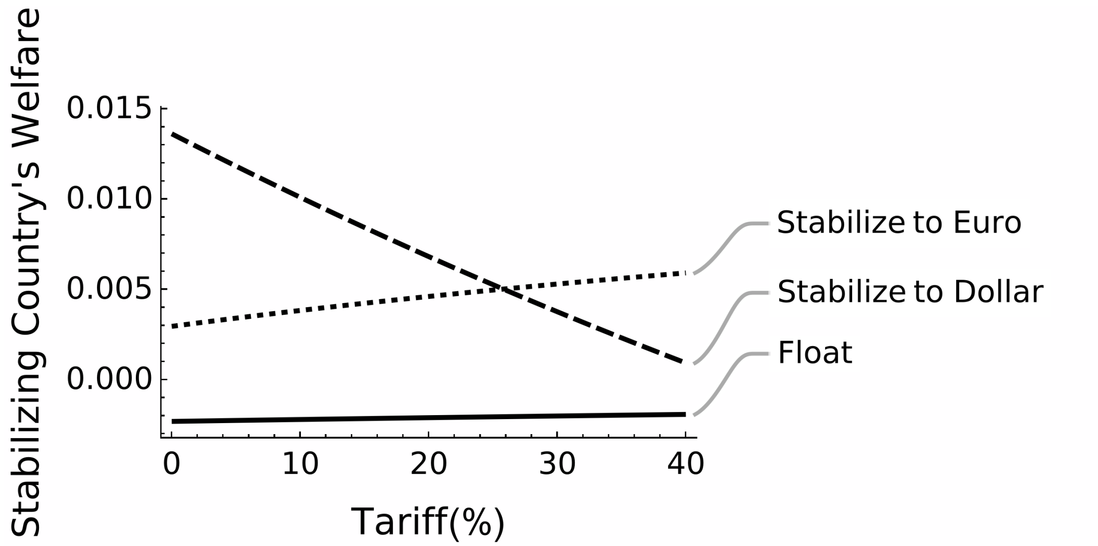
A trade war can fundamentally affect the forces that make the U.S. dollar the world's anchor currency. As we have already seen in Figure 3, a trade war undermines the U.S. dollar's safe haven property. It thus makes the U.S. dollar a less attractive target for exchange rate stabilizations.

Figure 7 plots the optimal stabilization against the U.S. dollar at different levels of tariffs. In a world in which the U.S. 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.[24]

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, as the United States isolates

[24] The figure shows looser stabilizations at tariffs and retaliations of 12% and 17%. At 50%, only the smallest countries still stabilize to the U.S. dollar.

Figure 8: Trade War and the Euro Anchor



Notes: This figure plots a small (size 0) stabilizing country's welfare when it's currency is pegged to the U.S. dollar, the euro, and free float. If the tariff exceeds 26%, it is optimal for the small country to stabilize against the euro instead of the U.S. dollar.

itself from world trade, becomes relatively more attractive. Figure 8 shows a small stabilizing country's overall welfare when stabilizing to the U.S. dollar versus the euro, and abandoning stabilizations altogether. It shows that in a trade war with tariffs exceeding 26%, a small country would switch its target currency from the dollar to the euro.

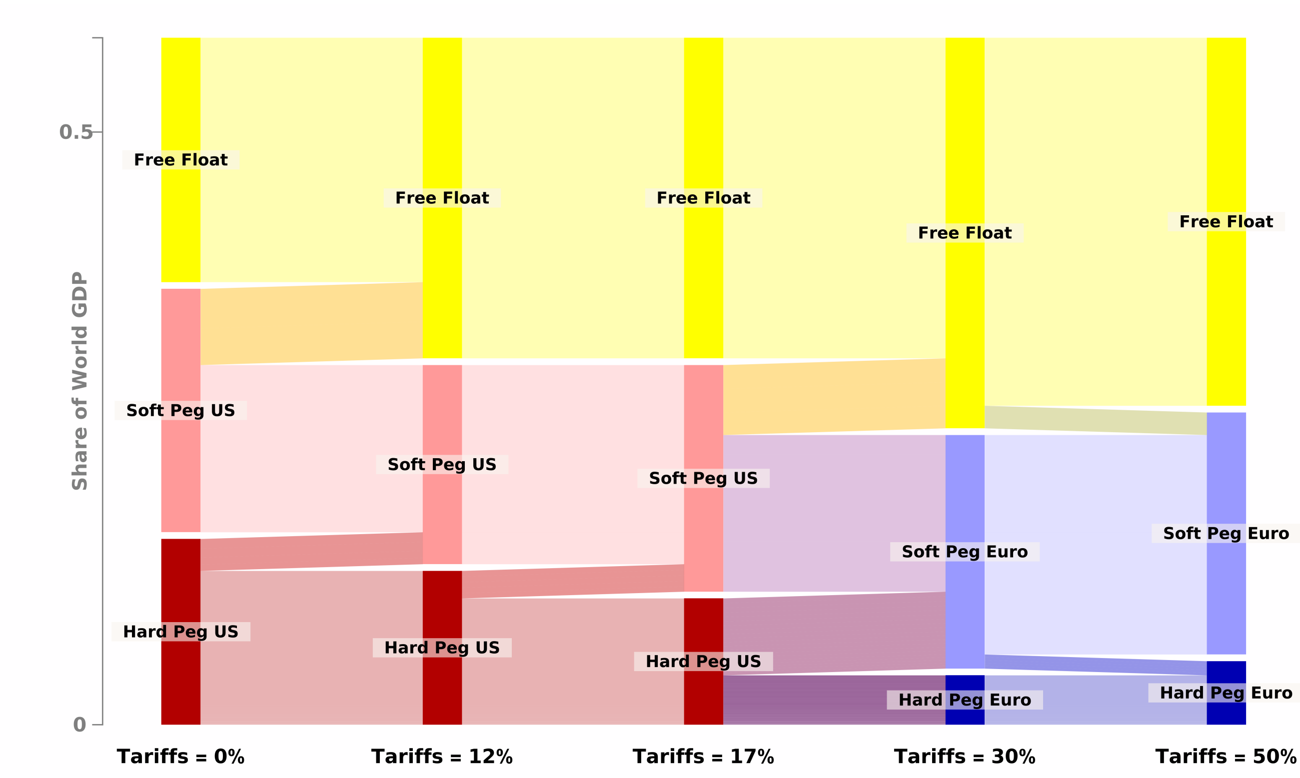
Figure 9 shows the consequences of this optimal switching behavior for the world's monetary order. In our model, the dollar anchor holds at a trade war involving tariffs of 12% or 17%, albeit in a diminished form, with countries like Indonesia switching from a hard peg to looser forms of stabilization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

However, in the fourth column, when shifting to tariffs and retaliations of 30%, 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 towards the euro.[25]

This shift in the world monetary system unambiguously raises welfare in the euro area and lowers welfare in the United States. To understand this result, recall that stabilizing countries effectively provide consumption insurance to the target economy. As stabilizing countries shift away from the U.S. dollar and towards the euro, this insurance benefit gets transferred from Americans to the residents of the euro area.

[25] Because stabilizers provide tailor-made consumption insurance for the United States, they also lessen the extent to which U.S. 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 makes it marginally more attractive for others to maintain their stabilization. We discuss this result in more detail in Hassan et al. (2022).

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



Notes: This figure plots the model-predicted optimal stabilization decision at different tariff rates using the size distribution of 181 countries/regions (World Bank data) in 2023. The U.S. and the Euro Zone are excluded from the graph. Each block consists of countries scaled by their GDP share. Countries are sorted by their sizes with the smallest at the top. Optimal strength of stabilization (Ω^m) above 75% is classified as hard peg (dark red if relative to the U.S. dollar and dark blue if relative to euro); between 25% and 75% is classified as soft peg (light red if relative to the U.S. dollar and light blue if euro); and under 25% is classified as free floating (yellow). Ribbons between bars indicate countries maintaining or switching stabilization policies as a result of the change in the trade war's intensity.

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 stabilizations 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, therefore, are the remaining countries that are too large to maintain a stabilization themselves, but are 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 U.S. dollar. First, many central banks currently maintain significant U.S. dollar reserves, presumably in part to implement possible stabilizations to the U.S. dollar (see, e.g., Chinn et al. (2025) on dollar holdings). One might expect them to shift some of these holdings in favor of euros, should the euro emerge as the new anchor currency. Second, the U.S. 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 U.S. interest rates. It is thus conceivable that these other forces underpinning demand for U.S. dollars may not be sustained after a change to a different anchor in the international monetary system.

5 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 U.S. shocks spill over into world markets, the dollar endogenously appreciates in times of global distress. This safe-haven feature of the U.S. dollar is the key force that lowers U.S. interest rates, makes it 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 U.S. goods markets from the world inhibits the channel through which U.S. shocks propagate to world prices, eroding the dollar's safe-haven status. As the dollar's safety premium vanishes, U.S. interest rates converge upward toward those of smaller economies, the world-market value of U.S. firms declines, and the incentive for other countries to stabilize their currencies to the U.S. dollar weakens. Beyond a critical tariff rate —– roughly 26% 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 challenge for future research. Such a model would enable us to investigate the duration until a possible shift in the anchor currency occurs, to assess how interest rate differentials and risk premia interact with the U.S. 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 U.S. 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.

References

Aguiar, M. A., Amador, M., and Fitzgerald, D. (2025). Tariff wars and net foreign assets. Working Paper 33743, National Bureau of Economic Research.

Akinci, O., Kalemli-Özcan, Ş., and Queralto, A. (2022). Uncertainty shocks, capital flows, and international risk spillovers. Staff Report 1016, Federal Reserve Bank of New York.

Alessandria, G. A., Ding, J., Khan, S. Y., and Mix, C. B. (2025). The tariff tax cut: Tariffs as revenue. Working Paper 33784, National Bureau of Economic Research.

Alvarez, F., Atkeson, A., and Kehoe, P. J. (2002). Money, interest rates, and exchange rates with endogenously segmented markets. Journal of Political Economy, 110(1):73–112.

Arvai, K. and Coimbra, N. (2024). Privilege Lost? The Rise and Fall of a Dominant Global Currency.

Auclert, A., Rognlie, M., and Straub, L. (2025). The macroeconomics of tariff shocks. Working Paper 33726, National Bureau of Economic Research.

Auray, S., Devereux, M. B., and Eyquem, A. (2025). Tariffs and retaliation: A brief macroeconomic analysis. Working Paper 33739, National Bureau of Economic Research.

Bacchetta, P. and van Wincoop, E. (2000). Does exchange-rate stability increase trade and welfare. American Economic Review, 90(5):1093–1109.

Backus, D. K., Kehoe, P. J., and Kydland, F. E. (1992). International real business cycles. Journal of Political Economy, 100(4):745–775.

Bagwell, K. and Staiger, R. W. (1999). An economic theory of GATT. American Economic Review, 89(1):215–248.

Bai, Y., Kehoe, P. J., and Perri, F. (2024). The world financial cycle. Technical report, mimeo Stanford University.

Bansal, R. and Yaron, A. (2004). Risks for the long run: A potential resolution of asset pricing puzzles. The Journal of Finance, 59(4):1481–1509.

Baqaee, D. and Malmberg, H. (2025). Long-run effects of trade wars. Working Paper 33702, National Bureau of Economic Research.

Bergin, P. and Corsetti, G. (2025). Monetary stabilization of sectoral tariffs. Working Paper 33845, National Bureau of Economic Research.

Bertaut, C. C., Curcuru, S. E., Faia, E., and Gourinchas, P.-O. (2024). New evidence on the us excess return on foreign portfolios. International Monetary Fund.

Bianchi, J. and Coulibaly, L. (2025). The optimal monetary policy response to tariffs. Working Paper 33560, National Bureau of Economic Research.

Bok, B., Mertens, T. M., and Williams, J. C. (2025). Macroeconomic drivers and the pricing of uncertainty, inflation, and bonds. Journal of Financial Economics, 172:104130.

Caliendo, L., Kortum, S. S., and Parro, F. (2025). Tariffs and trade deficits. Working Paper 34003, National Bureau of Economic Research.

Chahrour, R. and Valchev, R. (2022). Trade finance and the durability of the dollar. The Review of Economic Studies, 89(4):1873–1910.

Chahrour, R. and Valchev, R. (2024). The dollar in an era of international retrenchment. IMF Economic Review, 72(3):1042–1080.

Chinn, M. D., Frankel, J. A., and Ito, H. (2025). Reserves, sanctions and tariffs in a time of uncertainty. NBER Working Paper Series 34177, National Bureau of Economic Research.

Clayton, C., Coppola, A., Maggiori, M., and Schreger, J. (2025). Geoeconomic pressure. Working Paper 34020, National Bureau of Economic Research.

Clayton, C., Maggiori, M., and Schreger, J. (2023). A framework for geoeconomics. NBER Working Paper No. w31852.

Coeurdacier, N. and Rey, H. (2013). Home bias in open economy financial macroeconomics. Journal of Economic Literature, 51(1):63–115.

Colacito, R., Croce, M., Gavazzoni, F., and Ready, R. (2018). Currency risk factors in a recursive multi-country economy. The Journal of Finance, 73(6):2719–2756.

Colacito, R., Croce, M., Ho, S., and Howard, P. (2012). Bkk the ez way. mimeo University of North Carolina.

Cole, H. L. and Obstfeld, M. (1991). Commodity trade and international risk sharing: How much do financial markets matter? Journal of Monetary Economics, 28(1):3–24.

Corsetti, G., Dedola, L., and Leduc, S. (2010). Optimal monetary policy in open economies. In Friedman, B. M. and Woodford, M., editors, Handbook of Monetary Economics, volume 3, chapter 16, pages 861–933. Elsevier, 1 edition.

Costinot, A. and Werning, I. (2025). How tariffs affect trade deficits. Working Paper 33709, National Bureau of Economic Research.

Devereux, M. B. and Engel, C. (2003). Monetary policy in the open economy revisited: Price setting and exchange-rate flexibility. Review of Economic Studies.

di Giovanni, J., Kalemli-Özcan, Ş., Ulu, M. F., and Baskaya, Y. S. (2022). Foreign shocks as granular fluctuations. Review of Economic Studies, 89(2):733–773.

Dixit, A. K. and Stiglitz, J. E. (1977). Monopolistic competition and optimum product diversity. American Economic Review, 67(3):297–308.

Du, W., Im, J., and Schreger, J. (2018). The us treasury premium. Journal of International Economics, 112:167–181.

Dávila, E., Rodríguez-Clare, A., Schaab, A., and Tan, S. (2025). A dynamic theory of optimal tariffs. Working Paper 33898, National Bureau of Economic Research.

Fanelli, S. and Straub, L. (2019). A theory of foreign exchange interventions.

Farhi, E. and Gabaix, X. (2015). Rare disasters and exchange rates. Quarterly Journal of Economics, forthcoming.

Farhi, E. and Maggiori, M. (2017). A model of the international monetary system. Quarterly Journal of Economics, 133(1):295–355.

Fornaro, L. (2015). Financial crises and exchange rate policy. Journal of International Economics, 95(2):202–215.

Frankel, J. A. and Rose, A. (2002). An estimare of the effect of common currencies on trade and income. The Quarterly Journal of Economics, 117(2):437–466.

Fukui, M., Nakamura, E., and Steinsson, J. (2023). The macroeconomic consequences of exchange rate depreciations. Working Paper 31279, National Bureau of Economic Research.

Gabaix, X. and Maggiori, M. (2015). International liquidity and exchange rate dynamics. Quarterly Journal of Economics, 130(3):1369–1420.

Goldman Sachs (2025). Us earnings will start to show the impact of trump's tariffs. Markets Insight (3 July 2025).

Gopinath, G. and Stein, J. (2019). Banking, trade and the making of a dominant currency. NBER Working Paper Series No. 24485.

Gourinchas, P.-O. and Rey, H. (2007). From world banker to world venture capitalist: U.s. external adjustment and the exorbitant privilege. In G7 Current Account Imbalances: Sustainability and Adjustment, NBER Chapters, pages 11–66. National Bureau of Economic Research, Inc.

Govillot, N., Rey, H., and Gourinchas, P. (2010). Us external returns and the exorbitant duty. 2010 Meeting Papers 371, Society for Economic Dynamics.

Hassan, T. A. (2013). Country size, currency unions, and international asset returns. Journal of Finance, 68(6):2269–2308.

Hassan, T. A. and Mano, R. (2019). Forward and spot exchange rates in a multi-currency world. The Quarterly Journal of Economics, 134(1):397–450.

Hassan, T. A., Mertens, T. M., and Wang, J. (2024). A currency premium puzzle. Federal Reserve Bank of San Francisco Working Paper 2024-32.

Hassan, T. A., Mertens, T. M., and Zhang, T. (2016). Not so disconnected: Exchange rates and the capital stock. Journal of International Economics, 99:S27–S45.

Hassan, T. A., Mertens, T. M., and Zhang, T. (2022). A risk-based theory of exchange rate stabilization. The Review of Economic Studies, 90(2):879–911.

Hassan, T. A., Schreger, J., Schwedeler, M., and Tahoun, A. (2021). Sources and transmission of country risk. NBER Working Paper, (w29526).

Hassan, T. A., Schreger, J., Schwedeler, M., and Tahoun, A. (2023). Sources and transmission of country risk. The Review of Economic Studies, 91(4):2307–2346.

Hassan, T. A. and Zhang, T. (2021). The economics of currency risk. Annual Review of Economics, 13:281–307.

He, Z., Krishnamurthy, A., and Milbradt, K. (2019). A model of safe asset determination. American Economic Review, 109(4):1230–1262.

Hooper, P. and Kohlhagen, S. W. (1978). The effect of exchange rate uncertainty on the prices and volume of international trade. Journal of International Economics, 8(4):483–511.

Ignatenko, A., Lashkaripour, A., Macedoni, L., and Simonovska, I. (2025). Making america great again? the economic impacts of liberation day tariffs. Working Paper 33771, National Bureau of Economic Research.

Ilzetzki, E., Reinhart, C. M., and Rogoff, K. S. (2019). Exchange arrangements entering the twenty-first century: Which anchor will hold? Quarterly Journal of Economics, 134(2):599–646.

Itskhoki, O. and Mukhin, D. (2025). The optimal macro tariff. Working Paper 33839, National Bureau of Economic Research.

Jiang, Z., Krishnamurthy, A., Lustig, H. N., Richmond, R., and Xu, C. (2025). Dollar upheaval: This time is different. SSRN Working Paper.

J.P. Morgan (2025). Defying the tariff drag: 3 reasons markets are moving forward. Investment-Strategy brief.

Kalemli-Özcan, Ş., Laeven, L., and Moreno, D. (2022). Debt overhang, rollover risk, and corporate investment: Evidence from the european crisis. Journal of the European Economic Association, 20(6):2353–2395.

Kalemli-Özcan, Ş., Soylu, C., and Yildirim, M. A. (2025). Global networks, monetary policy and trade. Working Paper 33686, National Bureau of Economic Research.

Kalemli-Özcan, Ş. and Varela, L. (2025). Five facts about the uip premium. Working Paper 28923, National Bureau of Economic Research. Revised January 2025.

Kenen, P. B. and Rodrik, D. (1986). Measuring and analyzing the efects of short-term volatility in real exchange rates. The Review of Economics and Statistics, 68(2):311–315.

Klement, J. (2025). Investors could exit tariff purgatory only to enter a capital controls inferno. Reuters Breakingviews. Commentary column.

Kocherlakota, N. R. (2025). Optimal tariffs when labor income taxes are distortionary. Working Paper 33759, National Bureau of Economic Research.

Kollmann, R. (2002). Monetary policy rules in the open economy: effects on welfare and business cycles. Journal of Monetary Economics.

Kroszner, R. S., Laeven, L., and Klingebiel, D. (2007). Banking crises, financial dependence, and growth. Journal of financial Economics, 84(1):187–228.

Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. American Economic Review, 70(5):950–959.

Lettau, M., Maggiori, M., and Weber, M. (2014). Conditional risk premia in currency markets and other asset classes. Journal of Financial Economics, 114(2):197–225.

Liu, E. and Yang, D. Y. (2025). International power. Working Paper 34006, National Bureau of Economic Research.

Lustig, H. and Richmond, R. J. (2020). Gravity in the exchange rate factor structure. The Review of Financial Studies, 33(8):3492–3540.

Lustig, H., Roussanov, N., and Verdelhan, A. (2011). Common risk factors in currency markets. Review of Financial Studies, 24(11):3731–3777.

Lustig, H. and Verdelhan, A. (2007). The cross-section of foreign currency risk premia and consumption-growth risk. American Economic Review, 97(1):89–117.

Maggiori, M. (2017). Financial intermediation, international risk sharing, and reserve currencies. American Economic Review, 107(10):3038–71.

Martin, I. (2012). The forward premium puzzle in a two-country world. mimeo.

Martin, I. (2013). The forward premium puzzle in a two-country world. Mimeo, London School of Economics.

Meese, R. and Rogoff, K. (1983). The out-of-sample failure of empirical exchange rate models: Sampling error or misspecification? In Exchange Rates and International Macroeconomics, NBER Chapters, pages 67–112. National Bureau of Economic Research, Inc.

Menkhoff, L., Sarno, L., Schmeling, M., and Schrimpf, A. (2012). Carry trades and global foreign exchange volatility. Journal of Finance, 67(2):681–718.

Mertens, T. M. and Shultz, P. (2017). China's exchange rate policies and us financial markets. FRBSF Economic Letter, 2017:28.

Mertens, T. M. and Williams, J. C. (2021). What to expect from the lower bound on interest rates: Evidence from derivatives prices. American Economic Review, 111(8):2473–2505.

Mertens, T. M. and Zhang, T. (2025). A financial new keynesian model. Federal Reserve Bank of San Francisco Working Paper 2023-35.

Miranda-Agrippino, S. and Rey, H. (2020). U.s. monetary policy and the global financial cycle. The Review of Economic Studies, 87(6):2754–2776.

Obstfeld, M. and Rogoff, K. (2000). The six major puzzles in international macroeconomics: Is there a common cause? NBER Macroeconomics Annual, 15:339–390.

Pavlova, A. and Rigobon, R. (2007). Asset prices and exchange rates. The Review of Financial Studies, 20(4):1139–1180.

Powers, T. Y. (2015). The commodity currency puzzle. mimeo Harvard University.

Rajan, R. and Zingales, L. (1998). Financial development and growth. American economic review, 88(3):559–586.

Ready, R., Roussanov, N., and Ward, C. (2017). Commodity trade and the carry trade: A tale of two countries. Journal of Finance, 72(6):2629–2684.

Richers, J. (2023). Uip violations and the cost of capital: Firm-level evidence. Mimeo, Boston University.

Richmond, R. (2019). Trade network centrality and the currency carry trade. The Journal of Finance, 74(3):1315–1361.

Rodríguez-Clare, A., Ulate, M., and Vasquez, J. P. (2025). The 2025 trade war: Dynamic impacts across u.s. states and the global economy. Working Paper 33792, National Bureau of Economic Research.

Rogoff, K. S. (2025). Our Dollar, Your Problem: The Battle for the Twenty-First Century's Turbulent World Economy. Yale University Press, New Haven, CT.

Stockman, A. C. and Tesar, L. L. (1995). Tastes and technology in a two-country model of the business cycle: Explaining international comovements. American Economic Review, 85:168–185.

The Budget Lab at Yale (2025). Where we stand: The fiscal, economic, and distributional effects of all u.s. tariffs enacted in 2025 through april 2. Policy simulation estimating the long-run trade-weighted U.S. tariff at 22.5 % if all announced 2025 measures take full effect. Accessed 1 Aug 2025.

Tran, N.-K. (2013). Growth risk of nontraded industries and asset pricing. mimeo Olin Business School.

Wang, J. (2021). Currency risk and capital accumulation.

Werning, I., Lorenzoni, G., and Guerrieri, V. (2025). Tariffs as cost-push shocks: Implications for optimal monetary policy. Working Paper 33772, National Bureau of Economic Research.

A Details on Model Setup and Results

In this appendix, we provide additional details on 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 only own a risk-free bond that is 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 hat to denote the consumption of the consumers.[26] 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

[26] 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 reads:

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

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. (country u) imposes a tariff on the traded good in the form of:

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

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

where $C^u_{T,\text{agg}}(\omega) = \psi C^u_T(\omega) + (1-\psi)\hat{C}^u_T(\omega)$ 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

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

Dividing the above equation by $C^u_{T,agg}$ yields the average price of the traded goods $Z^u_T(\omega)$. Loglinearizing (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

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

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 of 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 actually 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:

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

   We can 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 $\lambda^n_{T,1}$ denotes 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 can then 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 discussed 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, in order to solve for the Lagrange multipliers, we need to use one more set of equations that pin down the relative wealth of 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 $\lambda_{T,1} = \mathbb{E}[\lambda_T] + \frac{1}{2}\,\text{var}[\lambda_T]$.

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 can prove 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 et al. (2022) 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 that occur due to changes in the value of the financiers' portfolios that result from the implementation of tariffs and stabilizations.

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 to determine welfare as a function of tariffs and stabilizations.

A.8 Expressions in Section 3.1

The following appendix presents the expressions for the freely floating exchange rate regime with no tariffs when $0 < \psi < 1$ that are analogous to the expressions shown in Section 3.1.

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

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

The exchange rate between two arbitrary countries 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:

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