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US Tariffs in a Model with Trade and FDI

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Abstract: The new US administration has a clear agenda of reducing imports to the US and attract FDI by reducing tariffs and using the proceeds for supporting investment in the US. This paper uses a dynamic two country US vs RoW model where monopolistically competitive firms make export and FDI decisions. We study how this additional FDI channel affects the impact of import tariffs on the US and RoW economy. We model both the international supply linkages of domestic producers and subsidiaries of foreign firms as well as EoS of FDI sales with domestic products and imports in order to capture cost and demand channels affecting FDI decisions. Concerning the respective elasticities we use both trade elasticities as well as estimates on the effect of tariffs on the import to inward FDI sales ratio. We are in particular interested how the use of tariff revenues affects the outcome of a tariff. We find that a unilateral US tariff with transfers to households has positive effects on US consumption and leads to rising inward FDI and reduces US imports. However, rising production and investment cost reduce total US investment. A real dollar appreciation cushions the effect of tariffs on RoW exporters but increase the cost for production and investment, generating a negative spillover to the RoW. If tariffs are accompanied by investment subsidies the expansionary effects for the US are significantly larger and total US investment becomes positive. This holds especially for FDI flows to the US. The investment boom generated in the US increases world interest rates. This contributes to larger negative spillovers to the RoW. The use of tariff revenues also affects how the US and RoW are affected in case of (full) retaliation. In case of transfers, the US is hit more since higher openness increases cost of production and investment more in the US. This ranking is reversed in case of subsidies. Higher US openness generates more tariff revenues as a share of GDP and therefore more investment subsidies.

Keywords: international trade, foreign direct investment, import tariffs, USA, two-country open economy model

JEL Classification: F13, F21, F23, F41, O24

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I. Introduction

With the first presidency of Donald Trump, US trade policy took a sharp protectionist turn. Addressing concerns about the US external imbalance and claiming that unfair trade practices were harming US industries, the Trump Administration imposed tariffs on a broad range of imports, particularly on Chinese goods, which marked the beginning of the trade war in 2018. Besides threatened but unimplemented tariffs, safeguard tariffs on solar panels and washing machines, as well as national security tariffs on steel (25% from most countries) and aluminum (10% from most countries), were the most notable measures. In 2018, 14.9% of total US imports were hit by Trump's special tariffs, with roughly 50% of these targeting Chinese imports (Bown and Zhang 2019). In response, most countries affected by these tariffs enacted retaliatory measures. Nevertheless, analysis from the Congressional Research Service reveals that the estimated annual trade affected by tariff actions on US imports in 2019 was four times larger than that of US exports affected by retaliatory actions (CRS 2020).

During the 2024 election campaign and after becoming the 47th president in January 2025, Donald Trump signaled an even more protectionist trade policy than in his first term. Right after his inauguration, he announced plans to impose a universal tariff on all imports and threatened to impose tariffs of up to 100% on Chinese goods, 25% on Canadian and Mexican imports, as well as additional tariffs on EU products. This represents a significant escalation in protectionism compared to his first term, with tariff coverage rising from 14.9% to 100% of imports. Besides that, Trump outlined a plan to use the revenue gained from these tariffs for benefiting US citizens: "*Instead of taxing our citizens to enrich other countries, we will tariff and tax foreign countries to enrich our citizens*" (Financial Times 2025). In earlier speeches and interviews he proposed redirecting these tariff revenues toward tax cuts and subsidies for American businesses, with the stated goal of stimulating investment and employment growth (CNBC, 2024). However, critics argue that this approach could significantly burden consumers through higher prices for imported goods, effectively acting as a regressive tax on households (Gleckman 2024).

Several recent studies discuss the economic costs of these protectionist measures. Bouët et al. (2024) use the MIRAGE model and show that a 10 percentage-point increase in US tariffs on all trading partners – plus an extra 60 percentage points on Chinese imports – would reduce global GDP by 0.5% and US GDP by 1.3% by 2030. McKibbin et al. (2024) estimate that a 10% universal tariff, together with retaliation, could lower US real GDP by about 0.25 percentage points. Their analysis also suggests that an appreciation of the US dollar would offset any price advantage from tariffs. Autor et al. (2024) find that Trump's tariffs in his first term did not create many jobs in the protected sectors, and that China's counter-tariffs significantly harmed US exporters. These findings match earlier work by Furceri et al. (2018), which shows that increasing tariffs weakens competitiveness over time.

While most studies focus on GDP, trade flows, and employment, there is less work on how tariffs affect foreign direct investment (FDI). Our approach builds on a broad strand of research emphasizing the so-called proximity-concentration trade-off, where firms decide whether to export or establish foreign subsidiaries depending on trade costs and scale economies (Brainard 1993, 1997; Markusen and Venables 2000). This idea holds that if trade frictions are sufficiently high, MNEs may opt for local production rather than serving foreign markets via exports. Our aim is to shed new light on the effects of various scenarios for Trump's second term of protectionist trade policies, particularly on the interplay of trade and FDI decisions of multinational enterprises (MNEs) as well as capital flows and supply chain dynamics. To the best of our knowledge, this is the first analysis applying such a framework to investigate the effects of tariffs.

The rest of the paper is organized as follows: Section II presents stylized facts on trade and FDI patterns during Trump's first presidency. Section III explains our trade and FDI model. Section IV describes the calibration strategy and historical simulations for Trump's first term. In Section V, we use the model to explore possible outcomes of "Trump 2.0" scenarios, including retaliation and subsidies. We then conclude by discussing the policy implications of our findings for the US and its trading partners.

II. Trade & FDI Model

In this section, we add an FDI decision to a two-region model of the world economy consisting of the US and the rest of the world ($c = (US, RoW)$[1]). The model distinguishes between (type 1) firms that conduct international sales via exports and (type 2) firms that sell internationally via foreign subsidiaries, i.e. type 2 firms conduct international transactions with the RoW via FDI.

[1] In our model discussion, superscript c generally refers to the RoW, while the superscript $c*$ refers to the US.

Instead of export revenues, the domestic type 2 firm receives rental income and profits/monopoly rents from its foreign operations. Thus, type 2 firms are dominated by multinational companies which produce internationally. The only trade of type 2 firms is intra-firm trade. The multinational company exports capital and intermediate goods produced in the headquarters to its foreign affiliates.

We assume that households use a final consumption good C_t and firms (type 1 and type 2 firms plus subsidiaries of type 2 firms abroad) use a final investment good $I_{k,t}^{c}, k = (1,2,f)$ and a final intermediate production input $Z_{k,t}^{c}, k = (1,2,f)$ which is produced from domestic type 1 and type 2 firms as well as from imports of foreign type 1 firms and goods produced from subsidiaries of foreign type 2 firms. Final consumption and investment goods producers are perfectly competitive. Let $X_t^c \epsilon \{C_t^c, I_{k,t}^c, Z_{k,t}^c\}, k = 1,2,f$ denote consumption in country c as well as investment and intermediate production inputs of the three types of firms from country c. Consumption as well as investment goods and intermediate production input producers use the following nested CES technology

(1) $$X_t^c = \left[s^{D\frac{1}{\sigma}} X_t^{c,D\frac{\sigma-1}{\sigma}} + s^{F\frac{1}{\sigma}} X_t^{c,F\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

(1a) $$X_t^{c,D} = \left[s^{1\frac{1}{\sigma^d}} X_t^{c,1\frac{\sigma^d-1}{\sigma^d}} + s^{2\frac{1}{\sigma^d}} X_t^{c,2\frac{\sigma^d-1}{\sigma^d}} \right]^{\frac{\sigma^d}{\sigma^d-1}}$$

(1b) $$X_t^{c,F} = \left[s^{M\frac{1}{\sigma^f}} X_t^{c,M\frac{\sigma^f-1}{\sigma^f}} + s^{FDI\frac{1}{f}} X_t^{c,FDI\frac{\sigma^f-1}{\sigma^f}} \right]^{\frac{\sigma^f}{\sigma^f-1}}$$

With $$X_t^c \epsilon \{C_t^c, I_{k,t}^c, Z_{k,t}^c\}, k = 1,2,f;$$

With $$X_t^{c,l} \epsilon \{C_t^{c,l}, I_{k,t}^{c,l}, Z_{k,t}^{c,l}\}, \quad k = 1,2,f; \quad l = D, F, 1,2, M, FDI$$

According to our nesting structure we first distinguish between domestic and foreign inputs with EoS σ and in a second stage we distinguish between inputs from domestic type 1 and type 2 firms with EoS σ^d and between imports from foreign type 1 firms and inputs from subsidiaries of foreign type 2 firms with EoS σ^f. In contrast to models without FDI we have to determine not only the EoS between domestically produced goods and imports (σ), but also the EoS between type 1 and type 2 goods (σ^d) and the EoS between imports of type 1 goods and goods produced by subsidiaries of sector 2 MNCs (σ^f). For σ^d and σ^f we set identical values since we assume symmetry across domestic and foreign type 1 and type 2 firms. The choice of the parameter values is discussed in Section III.

A. Households

We use a discrete-time version of Blanchard's (1985) model of perpetual youth as a tractable OLG model. The economy is populated by different age cohorts of unitary size (born in period *s*) which face a constant probability of death ($p = 1 - \gamma$). Given our interest in the effects of permanent shocks and longer-term trends of the current account, we abstract from aggregate uncertainty. Each household in country *c* maximizes an intertemporal utility function over a final consumption good $C_{s,t}^c$.

The household receives labor income from employment $L_{1,s,t}^c$ and $L_{2,s,t}^c$ in type 1 and 2 firms as well as from employment by the subsidiary of the foreign type 2 firm $L_{f,s,t}^c$ at a common wage rate W_t^c. Asset markets are incomplete[2] and financial transactions in each country are restricted to four assets, namely a domestically traded bond $B_{s,t}^c$ in zero net supply each period, which pays one period interest rate i_t^c and (end of period) a number of shares $S_{i,s,t}^c$ from domestic type *i* firms, valued at price $q_{i,t}^c$, respectively. Firms pay their net cash flow as dividends $div_{i,t}^c$ per share to the representative cohort member. International financial transactions are conducted via an internationally traded bond $B_{s,t}^{W,c}$, which is denominated in US dollars and which pays interest at rate i_t^{US} , and where E_t is the nominal exchange rate (expressed in units of RoW currency, per unit of Dollars ($\Delta E_t > 0$: depreciation of RoW currency).

(2) $$F_{s,t}^c = B_{s,t}^{W,c} E_t + B_{s,t}^c + q_{1,t}^c S_{s,t}^{c,1} \; + q_{2,t}^c S_{s,t}^{c,2}.$$

[2] It is difficult to conceptualize complete financial contracts with as yet unborn future cohorts.

In order to distinguish between safe and risky assets in household portfolios, we follow Krishnamurthy and Vissing-Jorgensen (2012) and introduce preferences for domestic bonds in both regions and the dollar denominated bond for RoW households. Similarly, for generating an equity premium we allow for a disutility of holding physical capital,

(3) $$U(.) = \frac{1}{1-\sigma^c} {C_{s,t}^c}^{\sigma^c} + \xi_t^{W,c} V^{B,W}\left(\frac{B_{s,t}^{W,c} E_t}{C_{s,t}^c}\right) + \xi_t^c V^B\left(\frac{B_{s,t}^c}{C_{s,t}^c}\right) - \zeta_t^c V^S\left(\frac{S_{s,t}^{c,1}+S_{s,t}^{c,2}}{C_{s,t}^c}\right)$$

where $V^{B,W}(\cdot)$, $V^B(\cdot)$ and $V^S(.)$ is increasing and concave and $\xi_t^{W,c} \geq 0,\ \xi_t^c \geq 0,\ \zeta_t^c \geq 0$, denote exogenous demand shifters, whereas σ^c denotes the inverse of the intertemporal elasticity of substitution of consumption. Importantly, we follow Fisher (2014) who provides conditions under which only $\xi_t^{W,c},\ \xi_t^c,\ \zeta_t^c$ appear in the first order condition for the respective assets. Because the international tradable bond is denominated in dollars, US households only have access to the US bond as a safe asset, while RoW households can diversify their portfolio over domestic and US bonds. Within our model a flight to safety shock is represented by $\xi_t^{W,RoW} \geq 0$, while a global risk premium shock is characterized by $\xi_t^c \geq 0, c = US, ROW$. An equity premium shock[3] is given by $\zeta_t^c \geq 0, c = US, RoW$.

Households write a contract with an insurance company which pays them a premium equal to $pF_{s,t}$ each period, with the proviso that the insurance company receives the total financial wealth of the household in the case of death. Due to the positive probability of death, the effective discount rate exceeds the rate of time preference

(4) $$U_{s,0}^c = \sum_{t=0}^{\infty} (\beta\gamma)^t\, U\left(C_{s,t}^c, \frac{B_{s,t}^{W,c} E_t}{C_{s,t}^c}, \frac{B_{s,t}^c}{C_{s,t}^c} \frac{S_{s,t}^{c,1}+S_{s,t}^{c,2}}{C_{s,t}^c}\right).$$

The cohort budget constraint is given by:

(5) $$B_{s,t}^{W,c} E_t + B_{s,t}^c + q_{1,t}^c S_{s,t}^{c,1} + q_{2,t}^c S_{s,t}^{c,2} = \left(1 + i_{t-1}^{c^*}\right) B_{s,t-1}^{W,c} E_t + (1 + i_{t-1}^c) B_{s,t-1}^c + S_{s,t}^{c,1} div_{1,s,t-1}^c + q_{1,t}^c S_{s,t-1}^{c,1} + S_{s,t}^{c,2} div_{2,s,t}^c + q_{2,t}^c S_{s,t-1}^{c,2} + pF_{s,t}^c - PI_t^c C_{s,t}^c + W_t^c (L_{1,s,t}^c + L_{2,s,t}^c + L_{f,s,t}^c)$$

[3] We use the equity premium shock only to generate a constant return differential between the return of stocks and bonds.

where PI_t^c is the ideal CES price deflator.

The first order conditions w. r. t. financial assets are given by:

(6a) $$\frac{\partial \mathcal{L}}{\partial C_{s,t}^c} = {C_{s,t}^c}^{-\sigma^c} - \lambda_{s,t}^c PI_t^c = 0$$

(6b) $$\frac{\partial \mathcal{L}}{\partial B_{s,t}^c} = -\lambda_{s,t}^c + \xi_t^c U_{B_{s,t}^c} = \beta \lambda_{s,t+1}^c (1 + i_t^c) = 0$$

(6c) $$\frac{\partial \mathcal{L}}{\partial S_{s,t}^{c,i}} = -\lambda_{s,t}^c q_{i,t}^c - \zeta_t^c V_{S_{i,t}}^S = \beta \lambda_{s,t+1}^c (div_{i,t}^{c,i} + q_{i,t+1}^c) = 0$$

(6d) $$\frac{\partial \mathcal{L}}{\partial B_{s,t}^{W,c}} = -\lambda_{s,t}^c E_t + \xi_t^{W,c} U_{B_{s,t}^{W,c}} E_t + \beta \lambda_{s,t+1}^c \left(1 + i_t^{c^*}\right) E_{t+1} = 0.$$

The first order conditions determine wedges in rates of return between different types of assets. For example, with $\xi_t^c = \xi_t^{W,c} = 0$, $\zeta_t^c > 0$ generates an equity premium. No-arbitrage between the internationally-tradable bond and the domestically-tradable bond determines the interest parity condition between the US and the RoW

(7) $$1 + i_t^{RoW} = \frac{1 + i_t^{US}}{1 - \xi_t^{W,RoW} U_{B_{s,t}^{W,RoW}}} \left(\frac{E_{t+1}}{E_t}\right).$$

Preference for the dollar-denominated financial asset of RoW households ($\xi_t^{W,RoW} > 0$) drives a wedge between the interest rate of the domestic tradable bond and the internationally traded bond in the RoW. Given the medium-term focus of our analysis and to simplify the discussion of transmission channels of the diverse shocks we assume inelastic labor supply.

B. Corporate Sector

There are two types of firms in each country, distinguished by the way firms conduct international operations. Type 1 firms sell internationally by exporting and type 2 firms supply the foreign market via foreign subsidiaries, i.e. type 2 firms conduct international transactions with the RoW via FDI.

Type 1 Firms

The representative type 1 firm produces output $Y_{1,t}^{c}$ which is a CES aggregate of value added $VA_{1,t}^{c}$ and an intermediate production input $Z_{1,t}^{c}$

(8a) $$Y_{1,t}^{c} = \left(VA_{1,t}^{c}{}^{\frac{\omega-1}{\omega}} + Z_{1,t}^{c}{}^{\frac{\omega-1}{\omega}}\right)^{\frac{\omega}{\omega-1}}$$

Value added is itself a Cobb Douglas function of capital $K_{1,t}^{c}$ and labor $L_{1,t}^{c}$ and a labor augmenting technology term A_{1}^{c}

(8b) $$VA_{1,t}^{c} = (A_{1}^{c}L_{1,t}^{c})^{\alpha}K_{1,t}^{c}{}^{1-\alpha}.$$

The representative type 1 firm is monopolistically competitive and faces price elasticity ε_{1}^{c} in the domestic market and $\varepsilon_{1}^{c^{*}}$ in the foreign market. In order to simplify, we assume that the firm faces the same price elasticity in domestic and foreign markets, i.e., the firm charges the same markup at home and abroad. Firms conduct domestic cost pricing in export markets. All type 1 firms pay the country-specific wage, i.e., we assume homogenous labor in each country and full mobility of labor across firm types.

The representative type 1 firm seeks to maximize the discounted value of dividends:

(9) $$Max\ V_{1,t}^{c} = \sum_{j=0}^{\infty}\prod_{k=0}^{j}\left(\frac{1}{1+i_{t+k}^{c}}\right)^{k} div_{1,t+j}^{c}$$

where

(10) $$div_{1,t}^{c} = P_{1,t}^{c}\left(Y_{1,t}^{D,c};\varepsilon_{1}^{c}\right)Y_{1,t}^{D,c} + P_{1,t}^{c}\left(X_{1,t}^{c};\varepsilon_{1}^{c}\right)EX_{1,t}^{c} - W_{t}^{c}L_{1,t}^{c} - P_{1,t}^{C^{c}}I_{1,t}^{c}. - P_{1,t}^{C^{c}}Z_{1,t}^{c}$$

Dividends are revenues from domestic sales $Y_{1,t}^{D,c}$ and exports $EX_{1,t}^{c}$ minus wage costs, expenditure for current investment $I_{1,t}^{c}$ and intermediate production inputs $Z_{1,t}^{c}$. This objective is consistent with the no-arbitrage conditions of households for type 1 stocks and implies maximizing the value of the households' type 1 equity. Dividends are distributed to individual cohorts in proportion to their stock holdings, and maximization is subject to the technology and capital accumulation constraint as well as the domestic and foreign demand function.

Type 2 Firms

The representative type 2 firm produces output in the domestic and foreign location $j = 2, f$ $Y^c_{\mathrm{j,t}}$ using an identical technology across locations. Output is a CES aggregate of value added $VA^c_{j,t}$ and an aggregate of intermediate inputs $Z^c_{j,t}$

(11a) $$Y^c_{\mathrm{j,t}} = \left(VA^c_{j,t}{}^{\frac{\omega-1}{\omega}} + Z^c_{j,t}{}^{\frac{\omega-1}{\omega}}\right)^{\frac{\omega}{\omega-1}}, j = 2, f$$

Value added is itself a Cobb Douglas function of capital $K^c_{\mathrm{j,t}}$ and labor $L^c_{\mathrm{j,t}}$ and a labor augmenting technology term A^c_{j}

(11b) $$VA^c_{\mathrm{j,t}} = (A^c_{\mathrm{j}} L^c_{\mathrm{2,t}})^{\alpha} K^c_{\mathrm{j,t}}{}^{1-\alpha}.$$

The MNCs are monopolistically competitive in home and foreign markets and face price elasticity ε^c_2 and ε^c_f respectively. Here, elasticities are also assumed to be identical. The MNC maximizes the present discounted value (PDV) of current and future expected cash flows using the discount factor of the domestic owner. In this case, the multinational corporation decides about domestic and foreign production, domestic and foreign investment, and domestic and foreign employment. The optimization is subject to a technological constraint and a capital accumulation constraint. As with type 1 firms, investment is financed from retained earnings.

The representative type 2 firm seeks to maximize the discounted value of dividends.

(12) $$Max\ PDV^c_{2,0} = \sum_{t=0}^{\infty} \prod_{k=0}^{t} \left(\frac{1}{1+i_{t+k}}\right)^k (div^{c,D}_{2,t} + div^{c,S}_{2,t} E_t)$$

where $div^{c,D}_{2,t}$ and $div^{c,S}_{2,t}$ denote dividends of the representative type 2 MNC in the home and foreign market respectively

(13a) $$div^{c,D}_{2,t} = P^c_{2,t}\left(Y^c_{2,t}; \varepsilon^c_2\right) Y^c_{2,t} - W^c_t L^c_{2,t} - P^{C^c}_{2,t} I^c_{2,t} - P^{C^c}_{2,t} Z^c_{2,t}$$

(13b) $$div^{c,S}_{2,t} = \left(P^{c^*}_{f,t}\left(Y^{c^*}_{f,t}; \varepsilon^c_f\right) Y^{c^*}_{f,t} - W^{c^*}_t L^{c^*}_{f,t} - P^{C,FDI^{c^*}}_{f,t} I^{c^*}_{f,t} - P^{C,FDI^{c^*}}_{f,t} Z^{c^*}_{f,t}\right) E_t.$$

Total dividends $div_{2,t}^{c} = div_{2,t}^{c,D} + div_{2,t}^{c,S} E_t$ are distributed to individual cohorts in proportion to their stock holdings.

C. Equilibrium

Equilibrium is characterized by a sequence of prices and quantities that satisfy the equilibrium conditions for goods traded by the three firm types and the labor market in each region and the optimality conditions of households and firms.

Goods market

Type 1 firms:

(14) $$Y_{1,t}^{c} = C_t^{c,1} + C_t^{c^*,M} + \sum_{j\epsilon(1,2,f)} I_{\mathrm{j},t}^{c,1} + \sum_{j\epsilon(1,2,f)} I_{\mathrm{j},t}^{c^*,M} + \sum_{j\epsilon(1,2,f)} Z_{1,\mathrm{j},t}^{c,1} + \sum_{j\epsilon(1,2,f)} Z_{\mathrm{j},t}^{c^*,M}$$

Type 2 firms:

(15) $$Y_{2,t}^{c} = C_t^{c,2} + \sum_{j\epsilon(1,2,f)} I_{\mathrm{j},t}^{c,2} + I_t^{c^*,FDI} + \sum_{j\epsilon(1,2,f)} Z_{2,,\mathrm{j}t}^{c,2} + Z_t^{c^*,FDI}$$

FDI firms:

(16) $$Y_{f,t}^{c^*} = C_{f,t}^{c^*,FDI} + \sum_{j\epsilon(1,2)} I_{\mathrm{j},t}^{c^*,FDI} + \sum_{j\epsilon(1,2)} Z_{\mathrm{j},t}^{c^*,FDI}$$

Labor market (domestic economy):

(17) $$L_t^c = L_{1,t}^c + L_{2,t}^c + L_{f,t}^c.$$

D. Current Account

The current account CA_t^c consists of the trade balance of goods and services TB_t^c, and the primary income balance

(18) $$CA_t^c = TB_t^c + PRB_t^c,$$

with the trade balance

(19) $$TB_t^c = (P_{1,t}^c M_{1,t}^{c^*} - P_{1,t}^{c^*} E_t M_{1,t}^c) + (P_{2,t}^c (I_{2,f,t}^{c^*} + Z_{2,f,t}^{c^*}) - P_{2,t}^{c^*} E_t (I_{2,f,t}^c + Z_{2,f,t}^c)),$$

and the primary income balance PRB_t^c consist of the interest income balance from the holding of internationally tradable bonds

(20) $$IntY_t^c = i_{t-1}^{c^*} B_{t-1}^{W,c} E_t,$$

and the FDI income balance

(21) $$FDIB_t^c = (div_{2,t}^{c,S} E_t + P_{f,t}^{C,FDI^{c^*}} I_{f,t}^{c^*} E_\mathrm{t} - div_{2,t}^{c^*,S} - P_{f,t}^{C,FDI^c} I_{f,t}^c).$$

Foreign assets evolve according to

(22) $$B_t^{W,c} E_t + V_{ft}^c - V_{ft}^{c^*} = \left(1 + i_{t-1}^{c^*}\right) B_{t-1}^{W,c} E_t + (P_{1,t}^c M_{1,t}^{c^*} - P_{1,t}^{c^*} E_t M_{1,t}^c) + (P_{2,t}^c (I_{2,f,t}^{c^*} + Z_{2,f,t}^{c^*}) - P_{2,t}^{c^*} E_t (I_{2,f,t}^c + Z_{2,f,t}^c)) + div_{2,t}^{c,S} E_t + V_{f,t-1}^c - div_{2,t}^{c^*,S} - V_{f,t-1}^{c^*}.$$

III. Calibration

We consider a highly stylized, two-country US-RoW model of the world economy. The two countries are identical concerning preference and technology parameters. The US produces 25% of the World's GDP. The economy is initially (prior to 2016) in a steady state. To be realistic, a home bias is included, i.e. the share parameters in CES aggregates for consumption and investment are consistent with a US import share of 14.6 percent of GDP (of 2016). The share parameters in the CES aggregate for imports and FDI production are consistent with a share of US outward FDI stock of 28.9 percent of US GDP in 2016. This calibration also provides a good match with the US outward FDI-US capital stock ratio of 9.8 percent in 2016. The calibrated values and their corresponding references are detailed in Table 1.

The rate of time preference is set to 0.02. The household planning horizon is assumed to be 40 years. Consistent with empirical evidence as surveyed by Thimme (2017), we set the intertemporal elasticity of substitution to 0.5. We assume a constant equity premium of 4% (see Caballero et al.

(2017)) prior to 2016. All firm types use a Cobb-Douglas technology with output elasticity for capital and labor of 0.4 and 0.6, respectively. The depreciation rate on capital is set to 5 percent p.a.. We set the adjustment cost parameter to 4 which ensures that investment is between 2 and 3 times as volatile as GDP. There is monopolistic competition with a mark-up of 10 percent. This is consistent with estimates for the US provided by Barkai (2020) using a similar production technology.

TABLE 1. PARAMETERS AND REFERENCES FOR MODEL CALIBRATION

Parameter	**Calibrated Value**	**References**
US GDP Share	23.7%	Based on World Bank World Development Indicators data, 2016.
US Import Share of GDP	14.6%	Based on BEA, 2016.
US Outward FDI Stock at Historical Cost to Capital Stock Ratio	9.86%	Based on BEA, 2016, using current-cost net stock of fixed assets.
US Outward FDI Stock at Historical Cost as a Share of US GDP	28.93%	Based on BEA, 2016.
Rate of Time Preference	0.02	Matches the average real rate on safe assets before 2016, see Farhi and Gourio (2018).
Household Planning Horizon	40 years	Consistent with standard overlapping generations models.
Intertemporal Elasticity	0.5	Consistent with empirical evidence (Thimme, 2017).
Equity Premium	4%	Constant equity premium, see Caballero et al. (2017).
Output Elasticity of Labor	0.6	Based on US non-farm business sector.
Output Elasticity of Capital	0.4	Implied by constant returns to scale assumption.
Depreciation Rate	5% p.a.	Standard value in the literature.
Adjustment Cost Parameter	4	Ensures investment volatility is 2-3 times GDP volatility.
Markup	10%	Consistent with Barkai (2020) for US data.
Elasticity of Substitution (Domestic vs Foreign)	2	Matches EoS between domestic and foreign goods, as reported by Boehm et al. (2023), Francois and Woerz (2009).
Elasticity of Substitution (Imports vs FDI-Products)	6	Helpman et al (2004)
Elasticity of Substitution (Type 1 vs Type 2)	6	See discussion in this section, Footnote 6.

We assume uniform preferences across the 4 types of goods consumed and invested, with an elasticity of substitution equal to 2. This also makes sure that we are matching the EoS between domestic and foreign goods as reported in empirical studies. (see e. g. Boehm et al. (2023) and Francois and Woerz (2009)). These values have also been used by Klein and Linnemann (2021) and Benigno and Thoenissen (2008).

For our analysis the response of US inward FDI sales to imports and of US outward FDI to exports to a US tariff shock and RoW retaliation is important. This response is determined by relative cost impacts of tariffs for importers/exporters and subsidiaries of foreign and US MNCs.

But it also depends on preferences, in particular on the EoS between imports/exports and sales of subsidiaries of foreign/US MNCs (IM/inFDIS, and EX/outFDIS respectively). For the calibration of this parameter, we use existing elasticity estimates of trade to FDI sales ratio w. r. t. tariffs. Helpman et al. (2004) provide a comprehensive assessment of determinants of the US EX/outFDIS ratio. For the calibration of the EoS parameter, we rely on the estimated coefficients from Helpman et al. (2004), specifically focusing on the results obtained from the "wide sample" and the "Aggregate Europe" sample.[4] In total, five estimated coefficients are available, derived from different samples and estimation techniques. These values range from −0.241 to −0.004 for the USA. As the range of estimates is relatively wide and we aim to mitigate potential outlier issues, we use the median value of -0.077 as our baseline. At an average tariff rate of 4.3%, a 10 percentage point Trump-tariff corresponds to an increase of about 230%. To match a median elasticity of −0.077, we want the model to generate a percentage change of IM/inFDIS in the range of 15% to 20% in the case of no retaliation[5]. This can be generated with an EoS between imports and FDI sales of 6[6]. Given the uncertainties surrounding the elasticity estimates, we provide a sensitivity analysis in the appendix.

IV. Implications of Trump 2.0

We consider fairly stylized scenarios in which the US increases average import tariffs by 10 percentage points, with and without retaliation from the RoW, and with two alternative uses of tariff revenues. Given Donald Trump's statement about imposing tariffs on all imports, we include a tariff shock on both type 1 and type 2 imports for the Trump 2.0 simulations.

As Figure 1 (solid blue line) shows, a unilateral US tariff represents a negative demand shock for the RoW, resulting in a real appreciation of the US dollar, which offsets the tariff by about 35%. Nevertheless, the tariff increase dominates the exchange rate effect, resulting a decline in the US (tariff adjusted) terms of trade. As the higher US tariff revenues are passed on to households, US consumption initially rises by about 0.4%, then declines toward 0.32% by the end of the simulation in 2040. US investments decline by about 1% in the long run due to higher import

[4] In the case of "Aggregate Europe," the authors aim to address the potential interdependence of residuals across countries, which may persist even after controlling for country fixed effects.

[5] We assume that the tariff shock used for estimation are not associated with systematic retaliations of the US.

[6] We assume that the EoS of 7 between imports and inward FDI sales (which corresponds to the EoS between purchases of foreign type 1 goods and foreign type 2 goods) is identical to the EoS between domestic type 1 and type 2 goods.

prices, which also cause a decline in US output. RoW consumption and investment also decrease, particularly due to the appreciation of the US dollar, which leads to higher consumer prices and higher capital costs. Since capital costs increase less in the RoW, the negative impact on GDP is smaller than in the US. In both regions, FDI production increases, while sector 1 production declines, particularly due to the loss of export markets. This tariff-jumping behavior is somewhat more pronounced in the RoW since the appreciation of the US dollar makes US outward FDI more attractive – a phenomenon known as the Froot-Stein effect (Froot and Stein 1991).[7] Nevertheless, considering both imports and FDI production, the RoW's overall sales to the US decline more than those of the US: US imports decline by about 7.5%, while US MNEs' production abroad initially increases by about 1.9%, resulting in a net decline of about 5.6%. For the RoW, total sales to the US drop by around 7.2% (1.8% - 9%). All in all, there is a welfare gain for the US in this scenario, but no investment boom and no benefits for the tradable sector.

The second scenario, depicted in Figure 1 (dashed orange line), shows the simulation results for a 10% tariff shock with full retaliation by the RoW. In contrast to the first scenario, US consumption is negatively affected – more so than RoW consumption – primarily due to the depreciation of the US dollar caused by the retaliatory measures of the RoW. Here, the US is more open compared to a fully coordinated RoW, in which all RoW countries impose tariffs only on US imports. This leads to a smaller effect on capital costs for the RoW, explaining why the decline in RoW investment (−0.2%) is smaller than in the US (−2.2%). Imports in both regions decline by about 15%, while tariff-jumping behavior is again observed among both RoW and US MNEs.

[7] As shown in the Appendix, for an elasticity between imports and FDI sales smaller than 2.5 the tariff-jumping effect disappears and inward FDI sales also decline, but less compared to imports. In this case the competitiveness loss against domestic producers (because of higher import share) of subsidiaries dominates the competitiveness gain against imports.

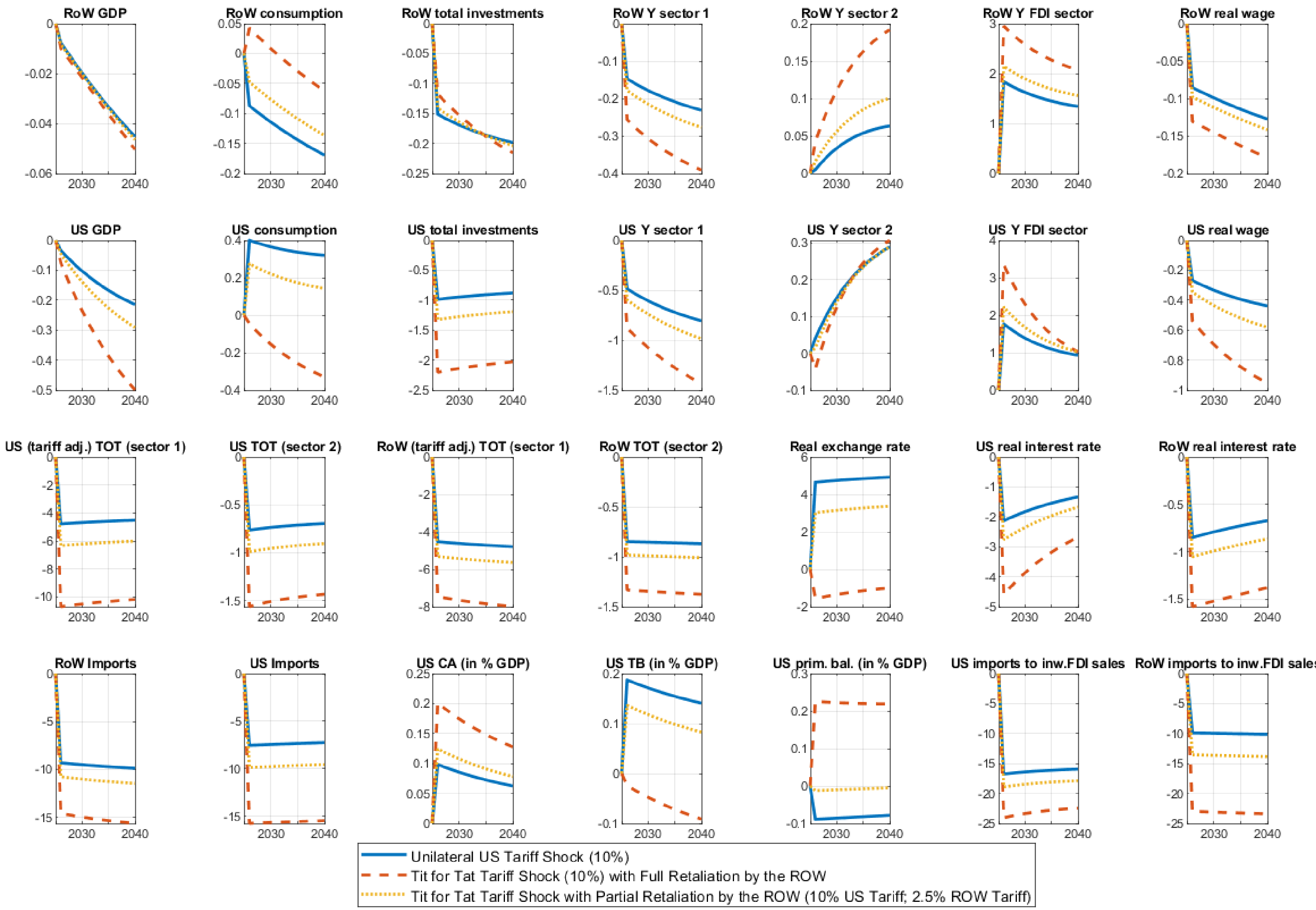

FIGURE 1. TARIFF SHOCKS AND RETALIATION SIMULATIONS WITH TRANSFERS TO HOUSEHOLDS

The third scenario – see Figure 1 (dotted yellow line) – shows the outcome if the RoW partially retaliates, as done during Donald Trump's first term.[1] First, compared to the full retaliation simulation, milder tariff measures by the RoW leads to an appreciation of the US dollar. Compared to the previous simulation, where US consumption declined, it is remarkable that it now increases. However, the positive effects on US welfare are not jeopardized by a rather mild countermeasure from the RoW. Thus, a 25% retaliation is not deterrent to US welfare, whereas the full retaliation would have negative consequences for both the US and the RoW.

In Figure 2, several simulations incorporating investment subsidies are displayed together. The fourth scenario (solid blue line) shows the outcome of the simulation with unilateral US tariff, where the tariff gains are used as investment subsidies. Remarkably, the reallocation of tariff revenues from consumption to investment results in substantial changes. In addition to boosting US consumption (by about 1.9% in the long run) and investment (by about 15%), it also leads to increased production across all three US sectors accompanied by higher US wages. In this scenario, FDI production in the US increases significantly more than in the RoW, primarily due to investment subsidies that attract MNEs from the RoW. Besides that, the higher investment demand positively impacts the US interest rate. The inclusion of the US subsidy has an overall negative impact on the RoW. Compared to the simulation without the subsidy, the GDP, consumption, and investment of the RoW are more strongly affected. All in all, the US experiences substantial welfare and production gains, whereas the RoW faces negative effects in both areas.

The dashed orange line in Figure 2 illustrates the fifth scenario, in which the RoW again partially retaliates, but the US tariff revenues are used for investment subsidies. The relatively mild countermeasure hardly changes the outcome comparing this with the previous simulation without any retaliation. Thus, the partial retaliation in this setup appears to be a weak deterrent against US tariffs.

The simulation in Figure 1 (dotted yellow line) and Figure 2 (dashed orange line) differ solely in how the US tariff revenues are allocated – either as transfers to households or as investment subsidies. Besides the impact of this reallocation on the US economy, the spillover effects on the RoW are particularly noteworthy. Redirecting US tariff revenues toward investment subsidies significantly increases the negative effects of the tariff increase for the RoW. Above all, the RoW

[1] Based on estimates of the CATO institute (Lincicome 2024) we assume that the RoW retaliated on average by about 25% to US tariffs.

welfare loss is about seven times larger. RoW investments decline more sharply: from an initial decrease of about 0.15% to 1.5%. In the long run, the RoW's GDP contraction is increasing by the tariff revenue reallocation, falling by 0.24% instead of the previously estimated 0.075%. These findings highlight that from the RoW perspective, not only the introduction and level of US tariffs play a crucial role, but also how US tariff revenues are utilized.

In the last scenario – see Figure 2 (dotted yellow line) – we consider the case in which the RoW fully retaliates, implementing an investment subsidy measure similar to that of the US. Firstly, it is noticeable that GDP and investment in the RoW are now rising in this scenario, while consumption is still negatively impacted. Since the US is a more open economy in our model, the positive effects on consumption, investment, and GDP are greater for the US than for the RoW. In both countries, the initial increase in FDI production is around 3.5%. However, in the long run, FDI production in the US (by RoW MNEs) further increases to about 4.5%, whereas it declines in the RoW.

A comparison of our results between the transfer and subsidy case reveals the importance of how tariff revenues are used. Table 2 and Table 3 present the long-run effects of different tariff shock simulations on key economic variables, with results projected for 2040. In the transfer case we get the classical result that a unilateral tariff gives positive welfare effects for the country imposing the tariff, but strong retaliation reverses the welfare gain and leaves the RoW with similar losses. However, in both cases there is a sizeable increase of FDI investment both in the US and the RoW. In the subsidy case, results differ along various dimensions. First, the effects of a unilateral tariff become significantly more positive for consumption and lead to higher investment. The spillover to the RoW is more negative because the US investment boom increases world interest rates. Interestingly, the results do not turn negative for the US in case of full retaliation and become positive for the RoW in the long run. This result is explained by the fact that the subsidy is partially correcting a distortion implied by the monopoly rent. In this case FDI increases substantially more compared to the transfer case. From a strategic policy perspective, the threat of retaliation is substantially reduced since both countries can gain from an increase of investment subsidies financed by trade tariffs.

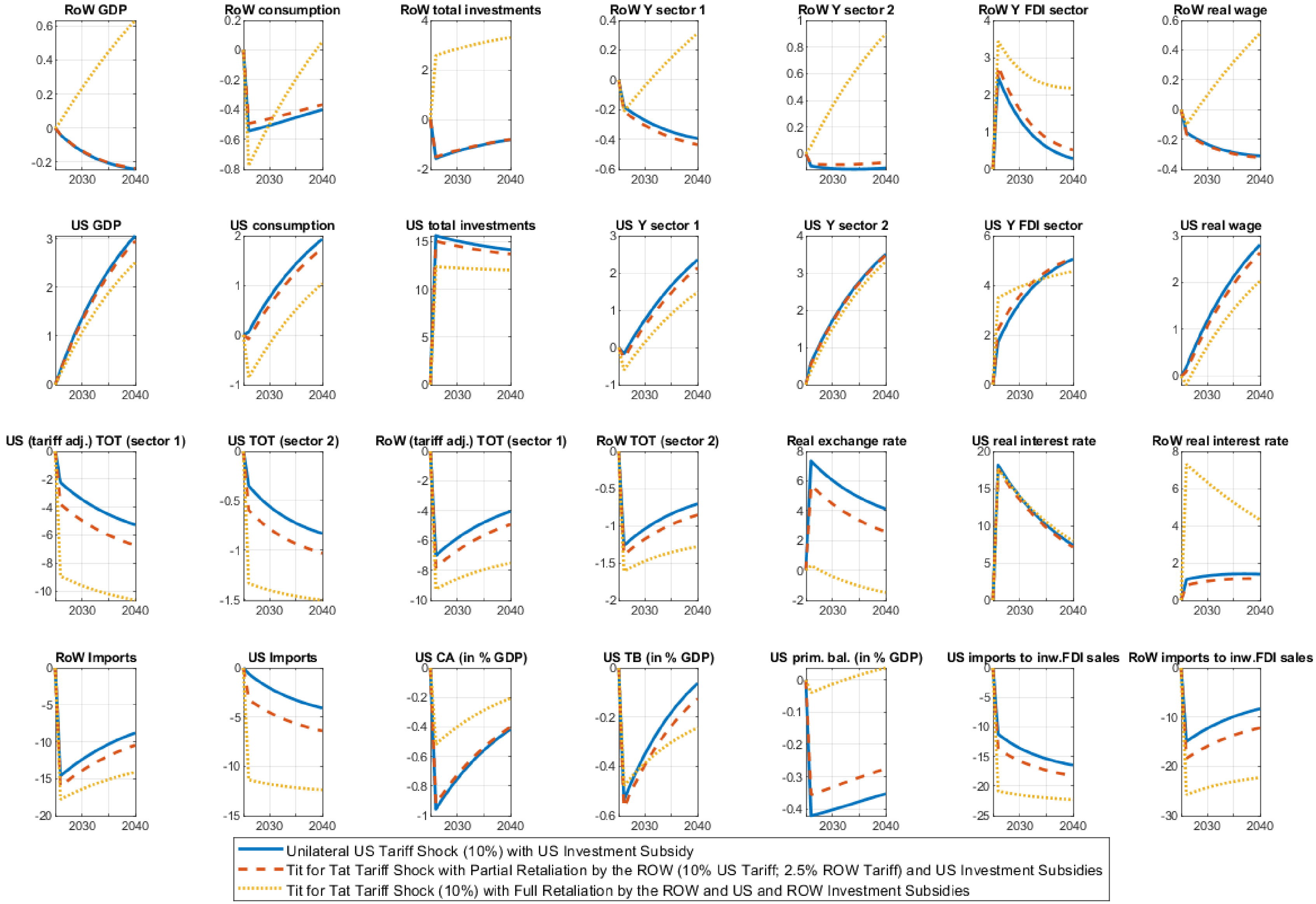

FIGURE 2. TARIFF SHOCKS AND RETALIATION SIMULATIONS WITH INVESTMENT SUBSIDIES.

TABLE 2. LONG-RUN IMPACT OF TARIFF SHOCKS ON KEY ECONOMIC VARIABLES WITHOUT INVESTMENT SUBSIDIES

	Unilateral US Tariff Shock (10%)		Tit for Tat Tariff Shock (10%) with Full Retaliation by the ROW		Tit for Tat Tariff Shock with Partial Retaliation by the ROW (10% US Tariff; 2.5% ROW Tariff)	
	USA	RoW	USA	RoW	USA	RoW
GDP	-0.21%	-0.05%	-0.50%	-0.05%	-0.29%	-0.05%
Consumption	0.32%	-0.17%	-0.33%	-0.06%	0.14%	-0.14%
Investment	-0.88%	-0.20%	-2.03%	-0.22%	-1.19%	-0.20%
FDI production	0.93%	1.34%	1.02%	2.07%	1.02%	1.56%
Imports	-7.26%	-9.88%	-15.47%	-15.64	-9.56%	-11.46%

TABLE 3. LONG-RUN IMPACT OF TARIFF SHOCKS ON KEY ECONOMIC VARIABLES INCLUDING INVESTMENT SUBSIDIES

	Unilateral US Tariff Shock (10%) with US Investment Subsidy		Tit for Tat Tariff Shock with Partial Retaliation by the ROW (10% US Tariff; 2.5% ROW Tariff) and US Investment Subsidies		Tit for Tat Tariff Shock (10%) with Full Retaliation by the ROW and US and ROW Investment Subsidies	
	USA	RoW	USA	RoW	USA	RoW
GDP	3.02%	-0.24%	2.96%	-0.24%	2.51%	0.61%
Consumption	1.93%	-0.40%	1.75%	-0.37%	1.04%	0.06%
Investment	14.17%	-0.81%	13.71%	-0.81%	12.05%	3.31%
FDI production	5.10%	0.28%	5.10%	0.51%	4.57%	2.17%
Imports	-4.08%	-8.81%	-6.41%	-10.47%	-12.38%	-14.13%

V. Conclusion

Our dynamic two-country US vs. RoW model includes monopolistically competitive firms that make both export and FDI decisions. This framework models the international supply linkages of domestic producers and foreign subsidiaries, as well as the effects of FDI sales on domestic products and imports, thus taking into account the cost and demand channels that influence FDI decisions. By using trade elasticities and estimates on the effect of tariffs on the import to inward FDI sales ratio, we analyze how the use of tariff revenues influences the economic impact of protectionist measures.

In conclusion, our analysis demonstrates that the new US administration's agenda – to reduce imports and attract FDI by lowering tariffs and reallocating tariff revenues toward domestic investment – has multiple effects on both the US and the RoW. In particular, the results point to the crucial role of tariff revenue allocation in determining the economic impact of protectionist policies. We find that a unilateral US tariff with transfers to households has positive effects on US consumption and leads to rising inward FDI and reduces US imports. However, rising production and investment cost reduce total US investment. A real dollar appreciation cushions the effect of tariffs on RoW exporters but increase the cost for production and investment, generating a negative spillover to the RoW. If tariffs are accompanied by investment subsidies the expansionary effects for the US are significantly larger and total US investment becomes positive. This holds especially for FDI flows to the US. The investment boom generated in the US increases world interest rates. This contributes to larger negative spillovers to the RoW. The use of tariff revenues also affects how the US and RoW are affected in case of (full) retaliation. In case of transfers, the US is hit more since higher openness increases cost of production and investment more in the US. This ranking is reversed in case of subsidies. Higher US openness generates more tariff revenues as a share of GDP and therefore more investment subsidies.

Considering the results of the various simulations, the tariff-jumping FDI will likely become an increasingly important factor in a more protectionist environment, which will shape future trade and capital flows. Therefore, it is crucial to account for this channel in international macroeconomic modeling to capture its impact on trade and investment dynamics. Beyond tariff policies, future research should explore the impact of export restrictions as an additional countermeasure, which could be adopted by the RoW. Such restrictions could offset and shift tariff revenues and welfare gains. A further topic for research is the field of digital trade barriers and digital FDI. MNEs, particularly in the tech sector, are increasingly confronted by data localization requirements that force them to store data within national borders, which act like an import restriction on digital services. Similarly, taxes on cross-border data transfers or requirements to provide services exclusively through domestic infrastructure can also influence investment decisions, leading firms to establish local data centers or regional headquarters. As digital services become an increasingly important part of both global and domestic economies, it is crucial to understand how these new forms of trade barriers affect trade and FDI flows.

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APPENDIX A

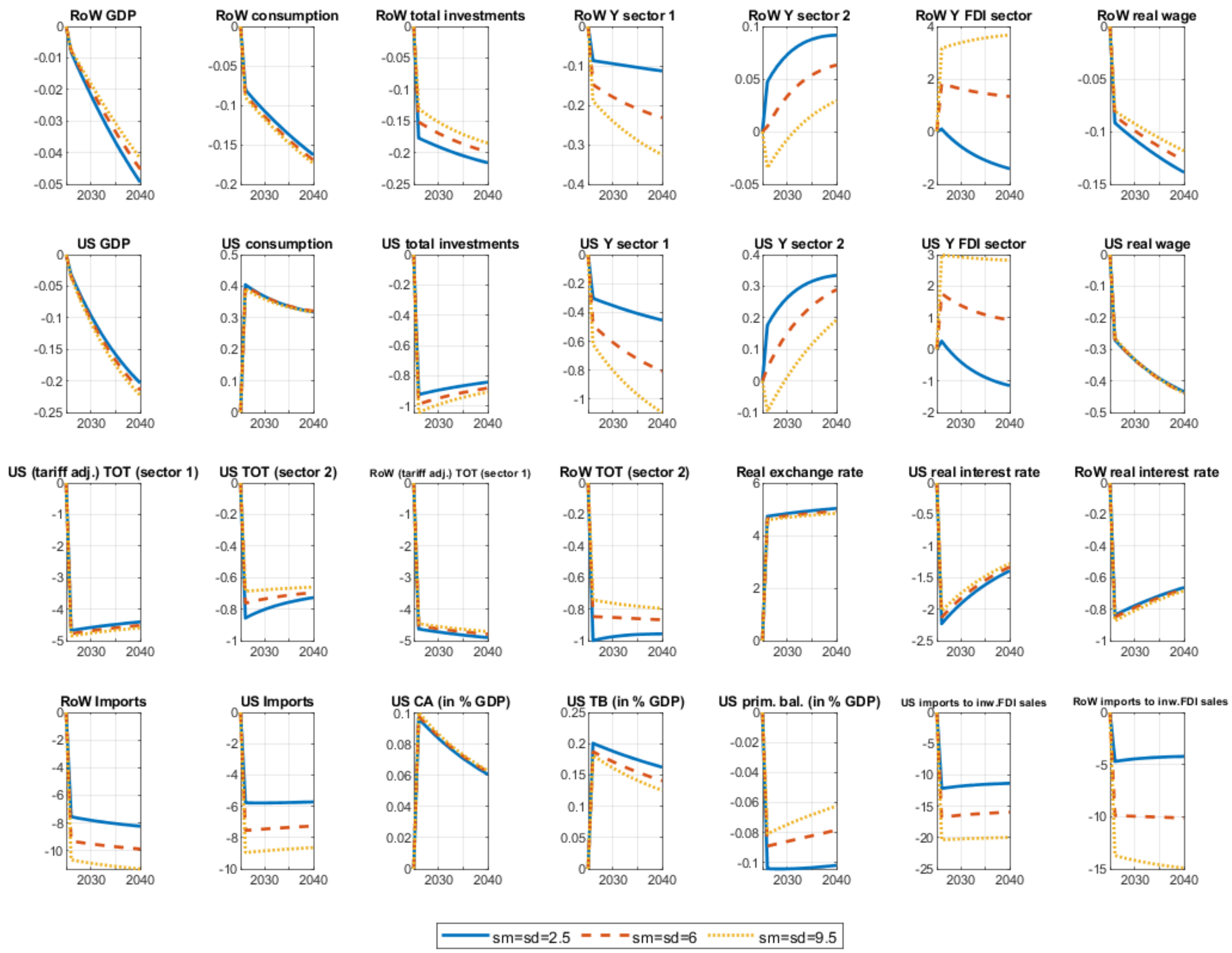

FIGURE A 1. IMPACT OF A 10% UNILATERAL US TARIFF SHOCK: EOS SENSITIVITY ANALYSIS.

Note: This Figure shows the outcome of the sensitivity analysis for various elasticity of substitution between imports/exports and sales of subsidiaries of foreign/US MNCs. The corresponding Helpman et al. (2004) elasticities for sm=sd=[2.5, 6, 9.5] are -0.052, -0.077, and -0.087, respectively.

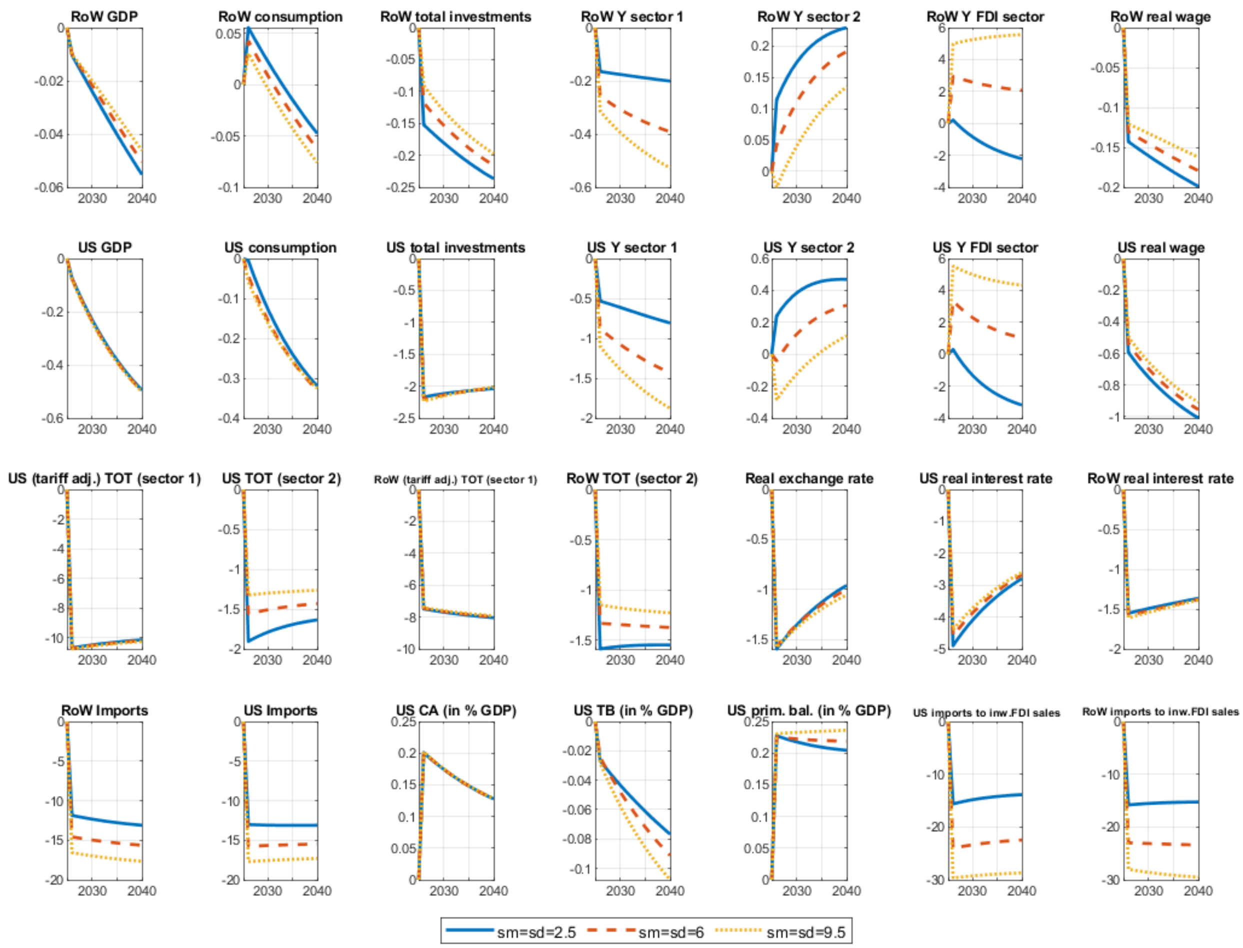

FIGURE A 2. IMPACT OF A TIT FOR TAT TARIFF SHOCK (10%) WITH FULL RETALIATION BY THE ROW: EOS SENSITIVITY ANALYSIS.

Note: This Figure shows the outcome of the sensitivity analysis for various elasticity of substitution between imports/exports and sales of subsidiaries of foreign/US MNCs. The corresponding Helpman et al. (2004) elasticities for sm=sd=[2.5, 6, 9.5] are -0.068, -0.103, and -0.129, respectively.