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Trade wars and global spillovers. A quantitative assessment with ECB-global

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Abstract

This paper examines the macroeconomic impact of substantial tariffs imposed by the second Trump administration on imports from China and the euro area and their transmission through direct and indirect channels. Using the ECB-Global 3.0 semi-structural model, we show that tariffs raise US import prices and lead to tighter US monetary policy, with the managed float of the renminbi partly offsetting adverse effects in China, while appreciation of the dollar undermines US export competitiveness. In the euro area, euro depreciation provides limited output support but intensifies imported inflation and triggers additional policy tightening. We assess the sensitivity of these results to key assumptions, such as the global amplification of inflation via dominant US dollar invoicing, partial trade diversion, and alternative monetary policy frameworks that attenuate monetary tightening and output contraction. Quantitative assessments of tariffs enacted up to 26 May 2025 and of an escalation scenario indicate significant global output losses and heightened inflationary pressures, requiring widespread policy rate increases. Further escalation of the trade conflict magnifies these effects. These findings quantify the economic cost of tariff related trade disputes and highlight the challenges central banks face in navigating the trade off between price stability and growth.

JEL: F12, F41, F42

Keywords: Tariffs, dominant-currency pricing, semi-structural model, open-economy

Non-technical summary

The implementation of substantial tariffs by the second Trump administration has significantly increased global economic uncertainty and posed considerable risks to international economic stability. Tariffs not only directly affect trade flows and price dynamics but also propagate indirectly through multiple channels, such as the dominance of the US dollar in international trade invoicing, trade diversion to alternative suppliers, and the intricacies of global value chains. Additionally, tariff-related price pressures are transmitted into the economy through exchange rate movements and subsequent adjustments in monetary policy, highlighting the complex interplay between trade and macroeconomic stability.

This paper assesses the macroeconomic effects of these tariffs through simulations conducted with the ECB-Global 3.0 model, a semi-structural framework that captures key economic relationships, including trade linkages, financial spillovers, and monetary policy reactions. In illustrative scenarios focusing on tariffs imposed by the US on imports from China and from the euro area, the analysis emphasises critical economic mechanisms. In the scenario involving China, tariffs lead to increased US import prices and tighter US monetary policy. The managed float regime of China's currency (renminbi) partially shields its economy from the adverse effects of tariffs, whereas US dollar appreciation exacerbates losses in US export competitiveness. In contrast, in the euro area scenario, a freely floating euro partially offsets output losses through depreciation but simultaneously contributes to higher imported inflation, prompting tighter monetary policy.

To deepen the understanding of the mechanisms driving these results, the paper explores their sensitivity to critical assumptions. Specifically, it examines the relative importance of dominant currency pricing, highlighting how the significant invoicing of trade in US dollars amplifies the inflationary impact of tariffs globally. Moreover, the role of trade diversion is analysed, illustrating how shifting import demand to untargeted countries partially mitigates the adverse trade effects but does not prevent overall global trade contractions. Alternative monetary policy strategies are also examined, demonstrating that policy rules which target producer prices or smooth short-term fluctuations in inflation can mitigate the scale of monetary tightening and associated output impacts.

Finally, the paper explicitly quantifies the macroeconomic impact of tariffs enacted by the second Trump administration up to 26 May 2025 (baseline scenario), as well as a hypothetical further

escalation of the trade conflict (severe scenario). Under the baseline scenario, significant output contractions and inflationary pressures emerge globally, necessitating most central banks to increase interest rates substantially. A further hypothetical escalation involving broader and more severe tariff increases and retaliation amplifies these adverse effects considerably. These findings underscore the pronounced economic costs associated with tariff-based trade disputes, and highlight important policy trade-offs facing central banks in managing inflationary pressures while seeking to limit damage to economic growth.

1 Introduction

The implementation of broad United States (US) tariffs in 2025 (up to May 26, 2025) is anticipated to reshape global trade flows and negatively impact economic activity, with retaliation by trading partners expected to compound these effects. Beyond their immediate influence on trade volumes and price levels, tariffs operate through a variety of interconnected mechanisms that amplify their macroeconomic consequences. These mechanisms include the preeminence of the US Dollar (USD) in international trade, the redirection of trade flows through diversion effects, and the extensive interdependencies embedded within global value chains (GVCs). Collectively, these channels shape the broader economic ramifications of tariff policies. Additionally, monetary policy responses to inflationary pressures will critically mediate the scale and distribution of these impacts. A rigorous examination of the interplay between these mechanisms is essential for advancing the understanding of tariff transmission pathways and their implications for the global economy.

The contribution of this paper lies in its quantitative assessment of the recent complex global trade shock using a multi-country framework that explicitly models key features of the modern global economy. We provide a timely and detailed quantification of the macroeconomic effects of the specific tariff measures enacted by the second Trump administration up to 26 May 2025, as well as a hypothetical escalation of the trade conflict. To do this, we leverage the ECB-Global 3.0 model, a comprehensive multi-region semi-structural framework. This large-scale model, encompassing eight economic regions, allows for a granular analysis of global spillovers, trade diversion, and critical asymmetries, such as China's managed float exchange rate regime versus the euro area's freely floating currency, that are central to the transmission of the shocks. Second, we systematically dissect two key transmission channels, finding that US dominant currency pricing (DCP) is quantitatively more important in shaping the macroeconomic outcomes than trade diversion effects. This provides empirical weight to the theoretical importance of the currency of invoicing in international trade. Third, we contribute to the ongoing monetary policy debate, regarding the reaction to tariff shocks, by simulating alternative policy rules. Our simulations of tariff shocks show that a standard CPI-targeting rule prompts policy tightening that, while curbing inflation, exacerbates the contraction in output. In our framework, we find that a monetary policy rule targeting domestic producer price inflation would be slightly more beneficial in terms of the resulting GDP and inflation impact.

In an era of heightened macroeconomic uncertainty and structural transformation, scenario analysis using macroeconomic models has become an indispensable tool for central banks and international institutions in policy preparation and decision-making. The need for robust scenario analysis arises from the inherent limitations of traditional point forecasting approaches, particularly when facing unprecedented shocks, structural breaks, and high uncertainty about key economic parameters Ciccarelli et al. (2024), Darracq Pariès et al. (2021). As highlighted in the European Central Bank's recent strategic review, macroeconomic models serve as analytical frameworks that combine structural economic relationships with reduced-form elements, enabling policymakers to explore 'what if' scenarios that illuminate potential policy trade-offs and transmission mechanisms under different economic conditions Ciccarelli et al. (2024). While macroeconomic models remain stylised representations of complex economies, they nonetheless make meaningful contributions to policy preparation under highly uncertain conditions, particularly by structuring thinking about transmission mechanisms and policy effectiveness Blanchard (2018). Moreover, scenarios bridge the gap between judgmental narrative approaches and statistical forecasting by providing a systematic framework to evaluate and integrate risks from different scenarios, while also supporting clear communication of evolving risks to market participants Adrian et al. (2025).[1]

In order to illustrate the mechanisms at play we first consider bilateral tariffs by the US on either Chinese or euro area imports. In the China scenario, tariffs raise US import costs and trigger tighter US monetary policy and USD appreciation, which jointly dampen export competitiveness. China's managed float of the renminbi and substantial USD-denominated export pricing (DCP) shape the transmission: renminbi adjustments and lower USD export prices partially offset output losses, while trade diversion mechanisms determine the allocation of displaced US import demand across regions.

In the EA scenario, the euro's free-floating exchange rate leads to a sharp depreciation that cushions EA export losses but intensifies import inflation. US export competitiveness also weakens via USD real appreciation, and monetary tightening responds to imported inflation. The juxtaposition of floating versus managed exchange rates highlights the distinct channels at work in each scenario.

[1] The European Commission's extensive use of model-based scenario quantification for impact assessments and policy analysis further underscores the critical role of these tools in evaluating complex policy interactions and their economy-wide consequences European Commission (2021).

Having laid out how tariffs propagate in the model we conduct sensitivity analysis with regard to the degree of trade diversion, producer currency pricing instead of dominant currency pricing, and alternative monetary policy rules. The former two modulate the strength of the model implied trade elasticities. Our analysis shows that pricing assumptions are quantitatively more important than changing the degree of trade diversion.

Monetary policy rules have an important indirect effect in determining the economic dynamics following a tariff shock. Targeting producer price index (PPI) inflation instead of consumer price index (CPI) inflation reduces the sensitivity of monetary policy to import price shocks, resulting in more moderate interest rate increases. Likewise, shifting from quarterly to annual CPI targeting smooths monetary policy adjustments by focusing on longer-term inflation trends, illustrating how the design of nominal policy frameworks shapes the transmission and macroeconomic impacts of tariffs.

Equipped with these insights, we assess the macroeconomic consequences of the tariff measures announced by the second Trump administration up to 26 May 2025, under the assumption that all duties remain fixed at their specified levels. The first "baseline" scenario follows the tariff related assumptions of the June 2025 Eurosystem staff Broad Macroeconomic Projection Exercise[2], in which average US tariffs on goods increase by approximately 10 percentage points relative to pre-announcement levels for most trading partners, and by about 20 p.p. for China. Under this scenario, the US dollar realises a 3.6% appreciation, imports contract by 8.5%, GDP declines by 0.45%, and year-on-year CPI inflation rises by 0.7 p.p., prompting a nominal policy rate increase of 130 basis points. China, as the principal target of the US tariffs, experiences a 0.75% GDP contraction with muted inflationary effects under its managed exchange rate regime, leading the central bank to ease by 40 basis points. The euro area, less directly exposed, records a 0.1% GDP decline and a 0.2 percentage point rise in CPI inflation, driven by euro depreciation and higher import prices, and sees its policy rate tightened by 30 basis points.

By contrast, the "severe" scenario envisions US tariffs rising by 32 p.p. relative to pre-announcement levels, peaking at 50% on EU imports and 120% on Chinese goods, and provoking full retaliatory duties by the EU, China and Canada. In this case, the US dollar appreciates by 8.0% in real terms, imports collapse by 26.0%, GDP contracts by 1.8%, and CPI inflation jumps by 2.0 p.p.,

[2] See https://www.ecb.europa.eu/press/projections/html/ecb.projections202506_eurosystemstaff~16a68fbaf4.en.html#toc4

necessitating a 380 basis point policy rate hike. China endures a severe 2.8% GDP contraction with inflation rising by 0.35 p.p., prompting a 115 basis point monetary easing. The euro area sees GDP fall by 0.85% and CPI inflation increase by 0.6 p.p., leading to a 115 basis point tightening of ECB rates.

The subsequent literature review will further contextualise these findings within the existing body of research.

Literature Review The extant literature on the macroeconomic impacts of tariffs highlights the intricate relationship between trade policies and monetary frameworks, with considerable ramifications for global economic welfare.

Auray et al. (2024) investigate how different monetary policy regimes, namely commitment versus discretion, influence the outcomes of trade wars. Through an open-economy model, they demonstrate that flexible inflation targeting can alleviate the severity and welfare costs of these conflicts by moderating tariff levels and enhancing output level. Auray et al. (2025b) explore the role of monetary policy in trade wars within a New Keynesian (NK) open-economy model, showing that policy rule choices significantly affect the impact of tariffs. They find that while tariffs can improve a country's terms of trade, they also introduce deflationary costs that are better managed through CPI inflation targeting rather than PPI targeting, which reduces average tariffs and enhances welfare outcomes by mitigating adverse economic impacts. Building on these insights, Auray et al. (2025a) use a NK two-country model to explore the effects of the "Liberation Day" tariffs, examining scenarios of both unilateral US tariff increases and global retaliation. They find that such tariffs are contractionary for US GDP, causing an initial output drop of 3%, which worsens to 5% under global retaliation, while also heightening inflation and worsening the trade deficit.

Further exploration of optimal monetary responses to tariffs reveals a consensus on the expansionary nature of monetary policy as a countermeasure to tariff induced economic disruptions. Bergin and Corsetti (2023), utilising a NK model with global value chains and firm dynamics, conclude that an expansionary monetary response to tariff shocks effectively supports economic activity and producer prices, albeit at the cost of increased short-run headline inflation. They argue that tariff shocks fundamentally differ from typical supply shocks and necessitate temporary inflation prioritisation to mitigate adverse output impacts. Similarly, Werning et al. (2025) demonstrates that tariffs in an open economy model with imported intermediate inputs warrant a policy response that allows inflation to temporarily exceed its target. Bianchi and Coulibaly (2025) also advocate for an expansionary response within an open-economy NK framework, finding that this approach results in inflation rising beyond the direct effects of tariffs. In contrast, Monacelli (2025) examines the economic effects of import and export tariffs, finding that import tariffs typically lead to either a slight expansion or even a contraction in domestic output when CPI inflation is targeted, unlike the effects seen with PPI-inflation targeting. Moreover, the author demonstrates that optimal monetary policy should include some manipulation of the exchange rate to surpass the outcomes of flexible-price allocation, closely associated with PPI-inflation targeting. Essentially, this involves adjusting international relative prices to improve resource allocation and reduce distortions caused by domestic nominal price rigidities.

Auclert et al. (2025) investigate the short-term effects of import tariffs on GDP and the trade balance within an open-economy NK model that incorporates intermediate input trade. Their findings suggest that unilateral tariffs can lead to a recession when the potential for intertemporal and export substitution exceeds that for import substitution. This scenario is deemed likely in practice, given the significant potential for intertemporal substitution in durable goods and the comparative ease with which international consumers can substitute between export types, as opposed to domestic consumers replacing foreign goods. Additionally, retaliatory actions by other countries tend to intensify the recession and generally result in a worsening trade balance. Meanwhile, Kalemli-Ozcan et al. (2025) develop a NK open economy model that incorporates international production networks and sectoral price rigidities to examine the interplay between monetary policy and trade, showing that tariffs act as both demand and supply shocks, leading to endogenous fragmentation through changes in trade and production networks. In their analysis of the "Liberation Day" tariffs, they find that supply-side effects dominated, resulting in increased inflation and reduced output. Finally, Ignatenko et al. (2025) use a trade model with flexible tariff pass-through and endogenous trade deficits to evaluate the long-term impacts of the "Liberation Day" tariffs, concluding that while the tariffs could potentially reduce the US trade deficit and improve terms of trade if there is no retaliation, any welfare gains are modest and disappear if trading partners retaliate.

The remainder of the paper is structured as follows. Section 2 outlines the key mechanisms of the ECB-Global 3.0 model. Section 3 quantifies the impact of hypothetical bilateral tariffs and highlights the channels at play. Section 4 explores the relative importance of US DCP and trade diversion as well as different monetary policy rules. Then, we discuss the macroeconomic impacts of the tariff measures in place as of May 2025 and a subsequent escalation scenario in Section 5. Lastly, Section 6 concludes.

2 Relevant model mechanisms

The model is a multi-country semi-structural framework, with structural equations grounded in a standard linearised open-economy New Keynesian DSGE approach. It encompasses eight regions: Emerging Asia, China, the EA, Japan, oil-exporting economies, the United Kingdom, the US, and the Rest of the World.

Domestic consumption and investment are treated as a composite bundle and evolve according to an IS curve, augmented to include financial variables such as equity prices, risk premia, and oil consumption. Domestic producer price inflation is modelled through a NK Phillips curve, with marginal costs influenced by oil prices and imported intermediates, reflecting the interconnectedness of global production networks. Consumer price inflation reflects a combination of producer prices, oil prices, and non-oil import prices. Domestic GDP is defined by an identity that incorporates consumption, investment, government spending, and net exports.

Imports (exports) are determined by domestic (foreign) absorption and the relative prices of domestic and foreign goods. Pricing frameworks, such as US Dollar dominant currency pricing (USD DCP), and mechanisms like trade diversion play a crucial role in shaping trade flows across regions, as detailed in the next subsection. Exchange rates follow uncovered interest rate parity conditions, but China manages its currency through an additional policy instrument targeting the foreign exchange market. This creates a wedge in China's UIP condition, limiting arbitrage by restricting foreign access to its domestic money markets. Further details on the region specific model specifications are provided in sub-section 3.1.

Monetary policy follows a standard Taylor rule, while the financial sector determines key variables, including equity prices, credit spreads, bank-lending conditions, and sovereign risk premia. These financial factors influence domestic economic activity through mechanisms akin to the financial accelerator effect and generate spillovers across regions.

While oil production is mainly concentrated in the oil-exporting region, all other economies rely on imports to meet their oil needs as well as potentially also producing oil. The price of oil is influenced by global demand, which is tied to overall economic GDP, and by supply decisions made by each region.

Tariffs are modelled as an exogenous shock that introduces a wedge between export prices and the effective prices paid by importers. However, they should not be interpreted as a direct shock to export prices themselves but rather as a policy-imposed cost specifically affecting import prices in the destination market. Owing to price rigidity, export prices adjust only partially to reduced demand, limiting the extent to which exporters can absorb the tariff impact. Consequently, tariffs largely affect effective importer prices, transferring higher costs to consumers and firms in the importing region. Additionally, tariffs raise domestic production costs by increasing the price of imported inputs.

The model version is based on Dieppe et al. (2025), which includes an expanded oil block, as well as an update of key parameters reflecting more recent trade and financial linkages as well as key characteristic of the regions.

The majority of variables are represented in log-linearised form around their steady-state values, as follows:

$$\widehat{x}_{i,t} \equiv \log x_{i,t} - \log x_i^{ss}$$

where i denotes a region. Coefficients are represented by $\alpha_i^{\ell,m}$, where i indicates the region associated with the parameter, ℓ specifies the equation in which it appears, and m identifies the related variable. Bilateral weights or shares are denoted by ω_{ij}^x, with i representing the domestic region and j the partner region, and x the type of weight or share. Elasticities are expressed as θ_i^x. Table 1 provides the definitions and interpretations of all coefficients, weights, shared parameters, and elasticities.

2.1 Consumption and Investment

For all countries except oil producers (OP), private consumption and investment (bundled) are determined by an augmented IS curve as follows:[3]

$$\widehat{ci}_{i,t} = \alpha_i^{ci,ci}\, E_t\widehat{ci}_{i,t+1} + \left(1-\alpha_i^{ci,ci}\right)\widehat{ci}_{i,t-1} + \alpha_i^{ci,q}\,\widehat{q}_{i,t} - \alpha_i^{ci,p^{oil}}\left(\widehat{Q}_{i,t} + \widehat{p}_t^{oil}\right)$$
$$- \alpha_i^{ci,r^3}\left((1-\alpha_i^{ci,r^L})\,\widehat{r}_{i,t}^3 + \alpha_i^{ci,r^L}\,\widehat{r}_{i,t}^L + \widehat{\varpi}_{i,t}\right) \quad (1)$$

where $\hat{r}_{i,t}^3$ is the real interbank rate, $\hat{r}_{i,t}^L$ is the long-term real rate, $\varpi_{i,t}$ is the private-sector credit spread, $\hat{q}_{i,t}$ represents equity prices, $\widehat{p}_t^{oil}$ is the real oil prices in USD, and $\widehat{Q}_{i,t}$ denotes the real exchange rate against the USD.

2.2 Exchange rates, relative prices and inflation rates

Exchange rates The real exchange rate, denoted as $\widehat{Q}_{i,t}$, for region i is defined relative to the USD:

$$\widehat{Q}_{i,t} = \widehat{S}_{i,t} + \widehat{P}_{us,t}^{cpi} - \widehat{P}_{i,t}^{cpi}$$

where $\widehat{S}_{i,t}$ is the nominal exchange rate and $\widehat{P}_{i,t}^{cpi}$ the foreign consumer price index. As per the definition, an increase in $\widehat{Q}_{i,t}$ signifies a depreciation of the currency of region i relative to the USD. Exchange rates between non-US currencies can be derived by using their exchange rates against the USD. For instance, the exchange rate between the currency of region i and the currency of region k is calculated as $\widehat{Q}_{i,k,t} = \widehat{Q}_{i,t} - \widehat{Q}_{k,t}$. An increase in $\widehat{Q}_{i,k,t}$ indicates a depreciation of region i's currency relative to region k's currency.

For all regions, except China, the following UIP condition holds:

$$E_t\widehat{Q}_{i,t+1} - \widehat{Q}_{i,t} = \widehat{r}_{i,t}^3 + \widehat{\varpi}_{i,t} - \left(\widehat{r}_{us,t}^3 + \widehat{\varpi}_{us,t} - \alpha_i^{uip,nfa}\,\widetilde{nfa}_{i,t}\right) \quad (2)$$

where $\widetilde{nfa}_{i,t}$ is the net foreign asset position relative to GDP.

[3] For OP, oil revenues expressed in terms of PPI prices are additionally included in the IS curve. More details in Georgiadis et al. (2021).

The exchange rate of the Chinese renminbi is under a managed float system:

$$E_t\widehat{Q}_{cn,t+1} - \widehat{Q}_{cn,t} = \widehat{r}^3_{cn,t} + \widehat{\varpi}_{cn,t} + \alpha^{iuip,reer}_{cn} \sum_{k \in K \backslash \{i\}} \omega^X_{i,k} \, \widehat{Q}_{i,k,t} - \left(\widehat{r}^3_{us,t} + \widehat{\varpi}_{us,t} - \alpha^{uip,nfa}_{cn} \, \widetilde{nfa}_{cn,t}\right) \tag{3}$$

where $\omega^X_{i,k}$ is the share of bilateral exports from region i to region k in region i's total exports, and K denotes the set of all regions.

China's managed float system actively stabilises its exchange rate by targeting the real effective exchange rate against a basket of advanced economies.[4]

Relative prices and inflation rates CPI inflation is derived implicitly using $\widehat{p}^{ry}_{i,t}$, which represents the price of output relative to consumption and investment:

$$\widehat{p}^{ry}_{i,t} - \widehat{p}^{ry}_{i,t-1} = \widehat{\pi}^{ppi}_{i,t} - \widehat{\pi}^{cpi}_{i,t} \tag{4}$$

where $\widehat{\pi}^{ppi}_{i,t}$ denotes producer price inflation and $\widehat{\pi}^{cpi}_{i,t}$ consumer price inflation.

For the US, non-oil export prices are equivalent to producer prices (PCP pricing):

$$\widehat{p}^{rx,\backslash oil}_{us,t} = \widehat{p}^{ry}_{us,t} \tag{5}$$

For all other regions, a portion of exports conform to the USD DCP assumption. Consequently, the non-oil export prices in domestic currency for a region i, excluding the US, are given by:

$$\widehat{p}^{rx,\backslash oil}_{i,t} = (1 - \Xi_i) \, \widehat{p}^{ry}_{i,t} + \Xi_i \left(\widehat{Q}_{i,t} + \widehat{p}^{rx,us}_{i,t}\right) \tag{6}$$

where Ξ_i is the share of USD DCP exports from region i to all regions. Export prices are therefore a weighted sum of region's i producer prices (PCP) and USD DCP export prices. The term $\widehat{p}^{rx,us}_{i,t}$ refers to non-oil export prices from region i denominated in USD.

[4] Advanced economy regions in this context are the US, EA, Japan and the UK.

For all regions except the US, non-oil import prices are determined by:

$$\widehat{p}^{rm,\backslash oil}_{i,t} = \omega^{M,\backslash oil}_{i,us}\left(\widehat{Q}_{i,t} + \widehat{p}^{ry}_{us,t} + \widehat{\tau}^{T}_{i,us,t}\right) + \sum_{k\in K\backslash\{us,i\}} \omega^{M,\backslash oil}_{i,k}\left(\Xi^{\backslash us}_{k}\left[\widehat{Q}_{i,k,t} + \widehat{p}^{rx,us}_{k,t} + \widehat{\tau}^{T}_{i,k,t}\right]\right.$$
$$\left. + (1-\Xi^{\backslash us}_{k})\left[\widehat{Q}_{i,k,t} + \widehat{p}^{ry}_{k,t} + \widehat{\tau}^{T}_{i,k,t}\right]\right) \tag{7}$$

where $\Xi^{\backslash us}_{k}$ is the share of USD DCP exports from region k to a non-US region i, $\omega^{M,\backslash oil}_{i,k}$ is the share of bilateral non-oil imports of region i from region k in region i's total non-oil imports, $\widehat{p}^{rm,\backslash oil}_{i,t}$ is the non-oil import price index of region i, and $\widehat{\tau}^{T}_{i,k,t}$ is the tariff applied by region i on goods from region k. For non-US regions, a portion of import prices is converted either from USD under the DCP or from the foreign region's currency in all other cases.

US non-oil import prices are given by:

$$\widehat{p}^{rm,\backslash oil}_{us,t} = \sum_{k\in K\backslash\{us\}} \omega^{M,\backslash oil}_{us,k}\left(\Xi^{us}_{k}\left[\widehat{p}^{rx,us}_{k,t} + \widehat{\tau}^{T}_{us,k,t}\right] + (1-\Xi^{us}_{k})\left[-\widehat{Q}_{k,t} + \widehat{p}^{ry}_{k,t} + \widehat{\tau}^{T}_{us,k,t}\right]\right) \tag{8}$$

When the USD DCP is active, $\Xi^{us}_{k} = 1$, the assumption is made that the import of goods and services in the US is denominated in USD, an LCP assumption.

Import tariffs and exchange rate movements influence import prices differently depending on the currency pricing mechanism in each region. For non-US regions, tariffs on goods and services imported under USD DCP and PCP increase costs, reducing their competitiveness relative to domestic alternatives. This effect is intensified when the pricing currency appreciates against the domestic currency, further elevating import costs. Conversely, an appreciation of the domestic currency can offset part of these increases, mitigating the impact of tariffs on import prices. For the US, where all imports are priced in USD under LCP, tariffs raise import costs, but exchange rate fluctuations have no impact on prices due to the uniform use of USD pricing.

2.3 Phillips curves

Producer price index (PPI) inflation is determined by the following Phillips curve:

$$\widehat{\pi}^{ppi}_{i,t} = \alpha^{\pi,\beta}_{i}\ \alpha^{\pi,\pi}_{i}\ E_t\widehat{\pi}^{ppi}_{i,t+1} + \frac{1-\alpha^{\pi,\pi}_{i}}{\alpha^{\pi,\beta}_{i}}\ \widehat{\pi}^{ppi}_{i,t-1} + \alpha^{\pi,mc}_{i}\ \widehat{mc}_{i,t} - \xi^{\pi}_{i,t} \tag{9}$$

where $\widehat{mc}_{i,t}$ are real marginal costs (detailed in 2.4), and $\xi^{\pi}_{i,t}$ is a cost-push shock.

The export inflation rate for exports priced under USD DCP is defined as follows:

$$\widehat{\pi}^x_{i,t} = \alpha_i^{\pi^x,\beta^x}\ \alpha_i^{\pi^x,\pi^x}\ E_t\widehat{\pi}^x_{i,t+1} + \frac{1-\alpha_i^{\pi^x,\pi^x}}{\alpha_i^{\pi^x,\beta^x}}\ \widehat{\pi}^x_{i,t-1} + \alpha_i^{\pi^x,mc^x}\ \left(-\widehat{Q}_{i,t} + \widehat{mc}^x_{i,t}\right) - \xi^{\pi^x}_{i,t} \tag{10}$$

where $\widehat{mc}^x_{i,t}$ are real marginal costs of DCP export production (detailed in 2.4) and $\xi^{\pi^x}_{i,t}$ a cost-push shock. For the US, the domestic and export Phillips curves are unified because DCP does not apply to this region.

2.4 Marginal costs

Domestic marginal costs For all regions except the US, the real marginal costs of production for the domestic market are determined by:

$$\begin{aligned}
\widehat{mc}_{i,t} = {} & \alpha_i^{mc,y}\widehat{y}_{i,t} + \alpha_i^{mc,oil}\left(\widehat{Q}_{i,t} + \widehat{p}^{oil}_t - \widehat{p}^{ry}_{i,t}\right) \\
& + \alpha_i^{mc,\pi}\Bigg[\omega^{imp,int}_{i,us}\ \left(\widehat{Q}_{i,t} + \widehat{p}^{ry}_{us,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^T_{i,us,t}\right) \\
& + \sum_{k\in K\setminus\{us,i\}} \omega^{imp,int}_{i,k}\ \Bigg(\left(1-\Xi_k^{\setminus us}\right)\left(\widehat{Q}_{i,k,t} + \widehat{p}^{ry}_{k,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^T_{i,k,t}\right) \\
& + \Xi_k^{\setminus us}\left(\widehat{Q}_{i,t} + \widehat{p}^{rx,us}_{k,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^T_{i,k,t}\right)\Bigg)\Bigg]
\end{aligned} \tag{11}$$

Increased domestic output ($\widehat{y}_{i,t}$) raises costs due to the higher resource demands required. Rising real oil prices and imported input prices drive up production costs. However, imported inputs priced under PCP and USD DCP from non-US regions become cheaper when the domestic currency appreciates against the pricing currency.

US real marginal costs are given by:

$$\begin{aligned}
\widehat{mc}_{us,t} = {} & \alpha_{us}^{mc,y}\widehat{y}_{us,t} + \alpha_{us}^{mc,oil}\left(\widehat{p}^{oil}_t - \widehat{p}^{ry}_{us,t}\right) \\
& + \alpha_{us}^{mc,\pi}\Bigg[\sum_{k\in K\setminus\{us\}} \omega^{imp,int}_{us,k}\ \Bigg(\left(1-\Xi_k^{us}\right)\left(-\widehat{Q}_{k,t} + \widehat{p}^{ry}_{k,t} - \widehat{p}^{ry}_{us,t} + \hat{\tau}^T_{us,k,t}\right) \\
& + \Xi_k^{us}\left(\widehat{p}^{rx,us}_{k,t} - \widehat{p}^{ry}_{us,t} + \hat{\tau}^T_{us,k,t}\right)\Bigg)\Bigg]
\end{aligned} \tag{12}$$

In contrast to other regions, where exchange rate fluctuations have a significant impact on input costs, the US imports under LCP ($\Xi_k^{us} = 1$). This configuration negates the effect of exchange rate fluctuations on US real marginal costs.

Export marginal costs Export marginal costs for countries other than the US exist only under DCP, which in this context is assumed to be USD DCP. This approach divides the costs into components influenced by USD DCP and PCP, as determined by the share $\Xi_k^{\setminus us}$.[5]

For all regions except the US, real marginal costs for DCP exports $\widehat{mc}_{i,t}^{x}$ are given by:

$$\begin{aligned}
\widehat{mc}_{i,t}^{x} &= \alpha_i^{mc^x,x}\,\widehat{x}_{i,t} + \alpha_i^{mc^x,oil}\left(\widehat{Q}_{i,t} + \widehat{p}_t^{oil} - \widehat{p}_{i,t}^{ry}\right) \\
&\quad + \alpha_i^{mc^x,\pi^x}\Bigg[\,\omega_{i,us}^{imp,int}\left(\widehat{Q}_{i,t} + \widehat{p}_{us,t}^{ry} - \widehat{p}_{i,t}^{ry} + \hat{\tau}_{i,us,t}^{T}\right) \\
&\quad + \sum_{k\in K\setminus\{us,i\}} \omega_{i,k}^{imp,int}\Bigg(\left(1 - \Xi_k^{\setminus us}\right)\left(\widehat{Q}_{i,k,t} + \widehat{p}_{k,t}^{ry} - \widehat{p}_{i,t}^{ry} + \hat{\tau}_{i,k,t}^{T}\right) \\
&\quad + \Xi_k^{\setminus us}\left(\widehat{Q}_{i,t} + \widehat{p}_{k,t}^{rx,us} - \widehat{p}_{i,t}^{ry} + \hat{\tau}_{i,k,t}^{T}\right)\Bigg)\Bigg]
\end{aligned} \tag{13}$$

As export volumes increase ($\widehat{x}_{i,t}$), marginal costs rise due to the increased demand for resources. Increases in oil and imported input prices raise marginal costs. As previously explained for domestic real marginal costs, appreciation of the domestic currency against the pricing currency reduces both imported input costs and export marginal costs.

The impact of import tariffs on domestic and export marginal costs depends on imported inputs. Tariffs raise imported input costs, but domestic currency appreciation against the pricing currency can partially offset this. However, for the US, this mechanism has no effect when DCP is active, as all trade flows for this region are denominated in USD.

2.5 Oil prices

The model used in this analysis differs from the previous ECB-Global version (Georgiadis et al. (2021)) in the specification of the oil sector. The global oil market has changed over the last 10 years with the US and other countries becoming net oil exporter. Therefore, oil production is now explicitly modelled in each country block.

[5]Absent the DCP, export marginal costs would be aligned with domestic marginal costs.

Oil supply in region i is given by

$$\widehat{oil}^{s}_{i,t} = \theta^{oil,s}_{i} \widehat{p}^{oil}_{t} + \xi^{oil}_{i,t} \tag{14}$$

where $\theta^{oil,s}$ is the price elasticity of oil supply, $\widehat{p}^{oil}_{t}$ the price of oil and $\xi^{oil}_{i,t}$ a shock to region-specific oil supply. The global oil supply $\widehat{oil}^{s}_{t}$ is then given by

$$\widehat{oil}^{s}_{t} = \sum_{k \in K} \omega^{oil,s}_{k} \widehat{oil}^{s}_{k,t} \tag{15}$$

where $\omega^{oil,s}_{k}$ is the share of country k in the global exports of oil. Hence, each country increases oil production in response to a local supply shock or an increase in the global oil price.[6] We calibrate $\omega^{oil,s}_{k}$ according to average shares of oil producers over 2019-2022.

2.6 Imports and exports

Imports For all countries except the US, non-oil imports $\widehat{m}^{\setminus oil}_{i,t}$ are determined by:

$$\begin{aligned} \widehat{m}^{\setminus oil}_{i,t} &= \theta^{da}_{i} \, \widehat{da}_{i,t} \\ &- \theta^{Q}_{i} \times \Bigg(\omega^{M,\setminus oil}_{i,us} \Big\{ \left(\widehat{Q}_{i,t} + \widehat{p}^{ry}_{us,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^{T}_{i,us,t} \right) + \theta^{div} \left(\widehat{Q}_{i,t} + \widehat{p}^{ry}_{us,t} - \widehat{p}^{rm,\setminus us}_{i,t} + \hat{\tau}^{T}_{i,us,t} \right) \Big\} \\ &+ \sum_{k \in K \setminus \{us,i\}} \omega^{M,\setminus oil}_{i,k} \Big\{ \Xi^{\setminus us}_{k} \Big[\left(\widehat{Q}_{i,t} + \widehat{p}^{rx,us}_{k,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^{T}_{i,k,t} \right) + \theta^{div} \left(\widehat{Q}_{i,t} + \widehat{p}^{rx,us}_{k,t} - \widehat{p}^{rm,\setminus k}_{i,t} + \hat{\tau}^{T}_{i,k,t} \right) \Big] \\ &+ (1 - \Xi^{\setminus us}_{k}) \Big[\left(\widehat{Q}_{i,k,t} + \widehat{p}^{ry}_{k,t} - \widehat{p}^{ry}_{i,t} + \hat{\tau}^{T}_{i,k,t} \right) + \theta^{div} \left(\widehat{Q}_{i,k,t} + \widehat{p}^{ry}_{k,t} - \widehat{p}^{rm,\setminus k}_{i,t} + \hat{\tau}^{T}_{i,k,t} \right) \Big] \Big\} \Bigg) \end{aligned} \tag{16}$$

Higher domestic absorption ($\widehat{da}_{i,t}$), which is the sum of consumption, investment and government spending, leads to an increase in imports.

Import volumes from region i decrease as export prices from region k rise relative to domestic prices. Moreover, bilateral import volumes decline further when prices from region k increase compared to competitors' export prices ($\widehat{p}^{rm,\setminus k}_{i,t}$), resulting in trade diversion from region i.[7] Conversely, when the domestic currency appreciates against the pricing currency, import volumes

[6] The previous model for oil is nested in the above model specification. It is obtained by setting $\omega^{oil,s}_{\text{op}} = 1$, $\omega^{oil,s}_{k} = 0$ for $k \in K \setminus \{\text{op}\}$.

[7] More details on ECB-Global competitor prices in Georgiadis et al. (2021).

rise.

For the US, non-oil imports are defined as:

$$
\begin{aligned}
\widehat{m}_{us,t}^{\backslash oil} &= \theta_{us}^{da}\, \widehat{da}_{us,t} \\
&- \theta_{us}^{Q} \times \left(\sum_{k \in K \backslash \{us\}} \omega_{us,k}^{M,\backslash oil} \left\{ \Xi_k^{us} \left[\left(\widehat{p}_{k,t}^{rx,us} - \widehat{p}_{us,t}^{ry} + \hat{\tau}_{us,k,t}^{T} \right) + \theta^{div} \left(\widehat{p}_{k,t}^{rx,us} - \widehat{p}_{us,t}^{rm,\backslash k} + \hat{\tau}_{us,k,t}^{T} \right) \right] \right. \right. \\
&+ \left. \left. (1 - \Xi_k^{us}) \left[\left(-\widehat{Q}_{k,t} + \widehat{p}_{k,t}^{ry} - \widehat{p}_{us,t}^{ry} + \hat{\tau}_{us,k,t}^{T} \right) + \theta^{div} \left(-\widehat{Q}_{k,t} + \widehat{p}_{k,t}^{ry} - \widehat{p}_{us,t}^{rm,\backslash k} + \hat{\tau}_{us,k,t}^{T} \right) \right] \right\} \right)
\end{aligned} \tag{17}
$$

For the US, import volumes are primarily influenced by domestic absorption ($\widehat{da}_{us,t}$), with increased absorption driving higher import demand. Similarly, US imports diminish when export prices from region k become higher relative to domestic prices or compared to competitors' export prices, resulting in trade diversion.

Import tariffs initially raise import costs, leading to a reduction in import volumes. This increase triggers trade diversion towards more competitive alternatives. Domestic currency appreciation mitigates these costs, though this effect does not apply to the US region.

Exports Total exports of goods and services $\widehat{x}_{i,t}$, except for the US and OP regions, are as follows:[8]

$$
\begin{aligned}
\widehat{x}_{i,t} = \omega^X_{i,us} \Bigg\{ & \theta^{da}_{us} \, \widehat{da}_{us,t} \\
& - \Xi^{us}_i \left[\theta^Q_{us} \left(\widehat{p}^{rx,us}_{i,t} - \widehat{p}^{ry}_{us,t} + \widehat{\tau}^T_{us,i,t} \right) + \theta^Q_i \, \theta^{div} \left(\widehat{p}^{rx,us}_{i,t} - \widehat{p}^{rm,\backslash i}_{us,t} + \widehat{\tau}^T_{us,i,t} \right) \right] \\
& - (1 - \Xi^{us}_i) \left[\theta^Q_{us} \left(-\widehat{Q}_{i,t} + \widehat{p}^{ry}_{i,t} - \widehat{p}^{ry}_{us,t} + \widehat{\tau}^T_{us,i,t} \right) + \theta^Q_i \, \theta^{div} \left(-\widehat{Q}_{i,t} + \widehat{p}^{ry}_{i,t} - \widehat{p}^{rm,\backslash i}_{us,t} + \widehat{\tau}^T_{us,i,t} \right) \right] \Bigg\} \\
& + \sum_{k \in K \backslash \{us,i\}} \omega^X_{i,k} \Bigg\{ \theta^{da}_k \, \widehat{da}_{k,t} \\
& - \Xi^{\backslash us}_i \left[\theta^Q_k \left(\widehat{Q}_{k,t} + \widehat{p}^{rx,us}_{i,t} - \widehat{p}^{ry}_{k,t} + \widehat{\tau}^T_{k,i,t} \right) + \theta^Q_i \, \theta^{div} \left(\widehat{Q}_{k,t} + \widehat{p}^{rx,us}_{i,t} - \widehat{p}^{rm,\backslash i}_{k,t} + \widehat{\tau}^T_{k,i,t} \right) \right] \\
& - (1 - \Xi^{\backslash us}_i) \left[\theta^Q_k \left(\widehat{Q}_{k,i,t} + \widehat{p}^{ry}_{i,t} - \widehat{p}^{ry}_{k,t} + \widehat{\tau}^T_{k,i,t} \right) + \theta^Q_i \, \theta^{div} \left(\widehat{Q}_{k,i,t} + \widehat{p}^{ry}_{i,t} - \widehat{p}^{rm,\backslash i}_{k,t} + \widehat{\tau}^T_{k,i,t} \right) \right] \Bigg\}
\end{aligned}
\tag{18}
$$

Greater foreign absorption results in increased exports. Conversely, the export volumes of region i decline when its export prices rise relative to foreign prices. Furthermore, bilateral export volumes decrease if region i's export prices increase compared to those of competitors, prompting trade diversion from region k. When a foreign currency appreciates against the pricing currency of exported goods and services, the competitiveness of those goods improves, leading to increased export volumes.

US total exports are determined by:

$$
\begin{aligned}
\widehat{x}_{us,t} = \sum_{k \in K \backslash \{us\}} \omega^X_{us,k} \Bigg\{ & \theta^{da}_k \, \widehat{da}_{k,t} - \theta^Q_k \left(\widehat{Q}_{k,t} + \widehat{p}^{ry}_{us,t} - \widehat{p}^{ry}_{k,t} + \widehat{\tau}^T_{k,us,t} \right) \\
& - \theta^Q_{us} \, \theta^{div} \left(\widehat{Q}_{k,t} + \widehat{p}^{ry}_{us,t} - \widehat{p}^{rm,\backslash us}_{k,t} + \widehat{\tau}^T_{k,us,t} \right) \Bigg\}
\end{aligned}
\tag{19}
$$

For the US, export volumes are chiefly affected by foreign absorption, with increased absorption driving higher export demand. US exports decline when its export prices rise relative to foreign prices or compared to competitors' export prices, resulting in trade diversion.

[8] Total OP exports consist of non-oil and oil exports, for more details see Georgiadis et al. (2021).

Import tariffs imposed by a foreign region initially reduce export competitiveness and volumes. However, if the domestic currency depreciates against the importing currency, it offsets part of the tariff's impact by making exports relatively cheaper in the importing market, thereby mitigating the decline in export volumes.

Bilateral trade weights ($\omega^X_{us,k}$, $\omega^M_{us,k}$) reflect the share of exports (or imports) from importer (or exporter block). They are are constructed with IO like matrix with trade flows aggregated up for each region. Bilateral goods trade are taken from IMF direction of trade and bilateral services from OECD/WTO trade in services. The averages for goods and services are taken over 2019-2022, in order to average out the Covid period Dieppe et al. (2025).

2.7 Monetary Policy

We use a standard Taylor rule as a benchmark and then perform a sensitivity analysis in Section 4.2. The rule is as follows:

$$\hat{\imath}_{i,t} = \alpha^i_{i,i}\,\hat{\imath}_{i,t-1} + (1-\alpha^i_{i,i})\left[\alpha^{i,\pi}_i\,\hat{\pi}^{cpi}_{i,t} + \alpha^{i,y}_i\,\hat{y}_{i,t}\right] + \xi^i_{i,t} \tag{20}$$

where $\xi^i_{i,t}$ is a monetary policy shock, $\hat{\imath}_{i,t}$ is the nominal policy rate, $\hat{\pi}^{cpi}_{i,t}$ denotes consumer price inflation, and $\hat{y}_{i,t}$ represents GDP.

The size of the countries and regions, their trade shares as a percent of GDP, and oil production and consumption shares are averages over 2019–2022. ECB-Global also includes financial spillovers across regions. These are not detailed here but nonetheless play an important role Dieppe et al. (2025).

3 Illustrative tariff simulations

We analyse two distinct illustrative simulations: one in which the US imposes a 10% tariff on imports of goods and services (excluding oil) from China, and another in which the US imposes the same tariff on imports from the EA, each lasting for a period of five years.

3.1 Channel specifications

The simulations are conducted given a benchmark specification for the ECB-Global 3.0 model (see Table 2). The specification is important in determining the primary transmission channels across the regions. For a detailed explanation of these channels, refer to Georgiadis et al. (2021). Globally, the model includes active trade and financial linkages, with trade linkages impacting all regions and financial linkages affecting all regions except China. It also considers global oil price dynamics and elevated levels of trade diversion. Additionally, the model acknowledges the significance of oil consumption across all regions and incorporates USD DCP.

The model further distinguishes between specific region characteristics, highlighting the unique attributes of Emerging Asia, oil producers, and China, setting them apart from other regions. Notably, the Emerging Asia region incorporates a financial channel for the exchange rate. In addition, bank lending constraints in Emerging Asia are primarily influenced by Chinese financial conditions. China also has distinct features, such as a managed float exchange rate regime and the lack of inward financial spillovers. For oil producers, the model considers the impact of oil revenues on domestic demand. The model's flexible design allows these specifications to be activated or deactivated at the region or global level, enabling a comprehensive assessment of each channel's impact worldwide.

3.2 Tariff specifications

An import tariff shock by region i on region j is characterised by an AR(1) process as follows:

$$\tau_{i,j,t} = \rho^{\tau}_{i,j}\, \tau_{i,j,t-1} + \xi^{\tau}_{i,j,t} \qquad (21)$$

The shock is assumed to exhibit significant persistence, with $\rho^{\tau}_{i,j} = 0.975$. We simulate the global impact of tariffs using conditional forecasts that are based on constrained tariff trajectories. It is crucial to highlight that, although the tariff paths are conditioned, they remain unanticipated from the perspective of the model's agents.

When evaluating our tariff simulations within the constraints of our linear model, several considerations and limitations must be acknowledged. Firstly, the model's assumption of a temporary shock confines the analysis to short-term dynamics, thereby failing to account for long-term hysteresis effects, as tariff shocks do not influence underlying trend dynamics. Furthermore, substantial tariff increases, such as those implemented and subsequently paused in the US as of April 2, 2025, can induce non-linear global impacts and introduce macroeconomic and financial uncertainties that our linear model is ill-equipped to capture. Finally, the model simplifies trade between regions into a single composite good, which precludes the examination of sector-specific tariff effects.

3.3 Results

3.3.1 US tariffs on Chinese imports

As illustrated in Figure 1.A, shows that the US tariffs on Chinese imports trigger significant economic adjustments in the US (black solid lines). Primarily, US import volumes decline by over 1.3% as the tariffs elevate the cost of Chinese goods. This reduction in imports, coupled with an increase in the real interbank and short-term rate as well as a drop in equity prices, collectively results in a 0.1% decline in consumption and investment. Export activities are hindered by rising producer prices and a 0.6% REER appreciation, reducing the competitiveness of US goods and services abroad, and consequently decreasing export volumes by 0.6% on impact.

Tariffs result in elevated marginal costs for US producers due to a significant pass-through of imported input costs, with USD appreciation offering no relief under LCP. Consequently, these increasing costs contribute to consumer price inflation, raising the y-o-y rate by 0.1 p.p. on impact. In response to these inflationary pressures, the nominal policy rate is increased by 20 annual b.p. This monetary policy adjustment further exacerbates declines in GDP, consumption and investment.

The 10% US tariffs on Chinese imports significantly impact Chinese GDP, initially causing a 0.3% decline (Figure 1.B, black solid lines). This downturn is primarily driven by a substantial drop in foreign demand, as the US redirects trade away from China, leading to a 2.2% decrease in export volumes. However, this decline is partially offset by a notable reduction in DCP Chinese export prices, which boosts demand from other trading partners.

CPI inflation is only modestly impacted by the tariff shock, as the decline in producer prices and weaker foreign demand partially offset the effects of imported inflation. Given these price pressures and the managed float of the renminbi, the central bank adopts a supportive monetary policy stance (10 annual basis point reduction in the nominal policy rate) that mitigates the decline in GDP.

The USD DCP assumption is fundamental to shaping global trade dynamics due to the significant share of exports priced in USD (see Table 3). Consequently, USD appreciation becomes a critical factor for regions heavily reliant on imports from regions where USD pricing prevails.

Finally, the US tariffs on Chinese imports result in a limited spillover effect on the EA economy, as illustrated in Figure 1.C (black solid lines).

3.3.2 US tariffs on EA imports

A 10% US tariff on EA imports generates transmission effects on the US economy akin to those observed with tariffs on Chinese imports (see Figure 1.A, blue dashed lines). However, differences in exchange rate responses occur because the Euro floats freely against the USD, whereas China manages its currency float. Furthermore, the EA's relatively lower reliance on DCP compared to China also plays a role in shaping these differences.

Tariffs on EA imports result in a significant 0.7% REER appreciation of the USD, largely driven by a sharp increase in the Euro-USD exchange rate at the time of impact. This appreciation reduces the competitiveness of US exports, resulting in an initial decline of 0.8%. Meanwhile, import volumes experience a sharp initial decrease of 1.4%, driven by the higher prices caused by the tariffs, although this decline is partially offset by the mitigating effects of the real appreciation.

Elevated costs for producers, along with the pass-through of tariffs to import and producer prices, lead to an increase in y-o-y consumer price inflation by 0.1 p.p. In response to these developments, the monetary authority raises the nominal policy rate by 20 annual b.p.

In comparison, the tariffs imposed on EA imports result in a significant contraction in the EA's export volumes, primarily driven by the decline in US demand. Export volumes initially decrease by 1.4%, as illustrated by the blue dashed lines in Figure 1.C. This reduction in external demand, combined with a decline in domestic consumption and investment, stemming from higher real interest rates and falling equity prices, leads to a 0.25% decline in GDP upon impact.

The 0.7% depreciation of the Euro's REER mitigates some of the tariff's impacts on trade by enhancing the attractiveness of EA goods in foreign markets outside the US. Conversely, this depreciation penalises import volumes, resulting in a prolonged decline of about 1% and causing high y-o-y import inflation of 0.9 p.p. on impact, which subsequently channels through to y-o-y CPI inflation by 0.1 p.p. In response, the nominal policy rate is increased by 20 annual b.p.

US tariffs on EA imports have only limited impact on China. The impact is negative for Chinese GDP growth and trade (see Figure 1.B blue dashed lines). The limited impact can partially be explained by the limited financial spillovers between China and the rest of the world as well as the managed float of the renminbi.

4 Sensitivity Analysis

4.1 Trade transmission channels

Section 3 highlights two key channels shaping the effects of US tariffs on imports: the prevalence of USD DCP and the degree of trade diversion. These channels are particularly important for China because a large share of its exports is priced in USD, as shown in Table 3.

Figures 2.A and 2.B compare the effects of a 10% US tariff on Chinese imports under two alternative settings. In one case trade diversion returns to its normal intensity, in the other USD DCP is switched off for every region. Figures 2.C and 2.D show how these choices alter bilateral real imports and exports.[9]

When trade diversion is normal, tariffs reduce US imports by less (Figure 2.A, blue dashed lines). Columns (a) and (b) of Figure 2.C indicate that the US no longer reroutes the 0.6 p.p. of imports previously shifted from China to the RoW and, to a smaller extent, to the EA. Although this reallocation does not alter the initial drop in total imports, it gradually offsets the decline. The resulting GDP impact becomes negligible.

Because the US redirects fewer orders away from China, the contraction in Chinese exports shrinks by 0.5 p.p. (Figure 2.B, blue dashed lines). As a result, Chinese GDP falls by 0.1 p.p. less relative to the simulation with elevated trade diversion.

[9]Impacts on the EA when USD DCP is switched off or trade diversion resumes its normal strength are presented in Figure A.1 in the appendix.

Turning off USD DCP has a different impact. All regions move to PCP, so exchange rate swings matter more. The US must convert currencies when importing, as set out in equation (8) with $\Xi_k^{us} = 1$. Under USD DCP no such conversion was needed. This change modifies the pass-through of tariffs on Chinese exports and shifts total US imports (Figure 2.A, orange dotted lines).

Column (c) of Figure 2.C reveals that US imports drop more persistently once DCP is removed. Imports from China stay weak even though the USD appreciates, and the strong dollar shifts demand towards cheaper untariffed goods from the RoW. These shifts depress domestic demand, leading to deeper falls in US consumption, investment, and GDP than under the USD DCP regime.

Chinese trade also changes markedly (Figure 2.B). Lower US demand causes Chinese exports to drop by around 2%, as illustrated in Figures 2.C and 2.D. When trade is fully priced in renminbi rather than in USD, imports from the RoW fall by less, improving competitiveness. These shifts support consumption and investment, so the fall in Chinese GDP is 0.1 p.p. smaller than with USD DCP active. The impacts of US tariffs on EA imports when USD DCP is deactivated and trade diversion is set to its normal level are presented in the appendix in Figures A.2–A.6. Overall, the direction of impacts induced by these specification changes is similar to the case of US tariffs on China; however, the magnitude differs due to the Euro's free float.

4.2 Alternative monetary policy rules

The role of monetary policy rules in shaping the economic effects of tariffs has been extensively explored in the literature (see Section 1). In our benchmark specification, which employs a CPI-targeting rule (see equation (20)), the central bank in the tariff-imposing region responds by tightening monetary policy to counteract CPI inflationary pressures. However, this policy response exacerbates the decline in GDP, further suppressing aggregate demand. We now examine how alternative specifications of the Taylor rule modify the economic impacts of tariffs.

We consider two alternative monetary policy specifications applicable to all regions: one in which the inflation target shifts from CPI ($\hat{\pi}_{i,t}^{cpi}$) to PPI ($\hat{\pi}_{i,t}^{ppi}$), and another where the target remains CPI but is based on an annual target $\left(\sum_{h=0}^{3} E_{t+h}\hat{\pi}_{i,t+h}^{cpi}\right)$ rather than a quarterly target.

Figures 3.A and 3.B illustrate the effects of a 10% US tariff on Chinese imports on both the US and Chinese economies, focusing on simulations with a PPI rule and an annual CPI rule applied across all regions.

Switching to a PPI rule results in a smaller increase in the US policy rate, thereby mitigating the amplifying effect of monetary tightening (Figure 3.A, blue dashed lines). This is because the central bank responds to PPI inflation, which reflects domestic price pressures and is less directly influenced by tariffs, in contrast to a CPI-targeting rule, which is inherently more sensitive to the sharp rise in foreign prices induced by tariffs.

These nominal adjustments reduce the increase in real interest rates and moderate the decline in equity prices, thereby alleviating the negative effects on consumption and investment. As a result, the contraction in aggregate demand is constrained, producing a temporary positive response in GDP, which subsequently reverses.

Switching to an annual CPI rule further attenuates the amplifying effects of monetary tightening on the US economy (Figure 3.B, blue dashed lines). Compared to a quarterly CPI rule, foreign demand and equity prices are strengthened, stabilising consumption, investment, and GDP. At the same time, consumer, producer, and export prices exhibit larger and more persistent increases.

The effects of these alternative monetary policy rules on the Chinese economy are relatively limited (see 3.B). A notable distinction, however, lies in the response of the policy rate under the PPI rule. As PPI inflation declines more significantly than CPI inflation in response to the tariffs, the monetary policy stance under this rule becomes more accommodative, thereby modestly mitigating the adverse effects of tariffs on Chinese economic activity.

Finally, it is important to emphasise that the positive GDP effect observed in the US under these alternative monetary policy specifications is confined to the very short run and becomes nearly negligible when US unilateral tariffs are imposed on another region, such as the EA, as illustrated in Figures A.7–A.10 in the appendix. This GDP outcome is largely driven by the dominant role of USD DCP in global trade flows. A decline in the prominence of USD DCP results in a negative GDP response across all alternative monetary policy rules. Furthermore, as discussed in the next section, the introduction of US multilateral tariffs, combined with retaliatory measures, further intensifies the negative GDP impact across all trade and monetary policy frameworks.

5 Model based impact assessment of 2025 US trade war

We simulate the global impacts of increased tariffs by examining the effects of the differential between the tariff measures in effect as of May 26, 2025, and those prevailing prior to President Trump's inauguration in 2025. Tariffs are assumed to remain at the specified level for a duration of five years. The model consistent effective tariff rates[10] are presented in Table 4, with the majority imposed by the US on countries spanning all regions represented in the model. For regions comprising multiple countries, tariffs imposed on an individual country within the region were adjusted to account for the relative economic significance of the targeted country within the region as a whole. On aggregate, the increase in weighted average US tariff rate amounts to 10.7 p.p.. The remaining tariffs primarily consist of retaliatory measures implemented by China and Canada, with Canada being part of the oil-producing region. This scenario corresponds to the baseline case of the June 2025 BMPE.[11]

In the severe scenario, we explore the implications of an escalation in tariffs in which the weighted average US tariff rate experiences a substantial increase of 32.4 p.p. compared to pre-2025 levels. This escalation assumes that US tariffs return to the levels announced on April 2, including tariffs of up to 50% on EU imports (not included in the severe scenario of the June 2025 BMPE). Additionally, tariffs on Chinese imports are assumed to rise to levels before the May 12 pause, reaching nearly 120%.

5.1 Baseline scenario: 2025 US trade war tariffs

The simulation results reveal that the tariffs induce significant macroeconomic adjustments. In the US (see Figure 4.A black solid lines), the measures result in a 3.6% real appreciation of the US dollar, an 8.5% reduction in imports, a peak GDP decline of 0.45%, and a 0.7% increase in year-on-year CPI inflation. These dynamics necessitate a 130 annual basis point increase in the nominal interest rate. China, as the primary target of the tariffs, undergoes a GDP contraction of 0.75%, although inflationary pressures remain muted due to the accommodative monetary policy reaction (40 annual basis point easing) given the managed exchange rate regime (see Figure 4.B black solid lines). The EA, being less directly exposed, experiences a GDP decline of 0.1% and a

[10]Tariffs in the model concern goods and services.

[11]More information about the June 2025 Eurosystem staff BMPE can be found here: https://www.ecb.europa.eu/press/projections/html/ecb.projections202506_eurosystemstaff~16a68fbaf4.en.html#toc4.

0.2% increase in y-o-y CPI inflation, driven primarily by euro depreciation and higher import prices (see Figure 4.C black solid lines). In response to this inflationary pressure, monetary policy in the region is tightened by 30 annual basis points.

The uneven tariff level increases explain the majority of the impact. The US increasing tariffs vis-a-vis all trading partners is particularly hit, while China being subject to the highest tariff increases from the US and retaliating facing substantial economic costs in this scenario. The euro area, is subject to modest tariff increases but as an open economy it is subject to trade and financial spillovers. While Chinese exports drop in response to the tariffs, Chinese exports to the euro area slightly increase (see Figure 4.D black solid lines). At the same time, euro area exports increase disproportionally to the US in the medium-term. Taken together, the euro area trade balance improves and the highlights the potential benefits of trade diversion but also the potential threats of cheap Chinese imports competing with domestic production in the euro area.

However, several caveats apply. The analysis omits channels such as heightened trade policy uncertainty, which may have exerted additional downside risks on firm investment and trade volumes beyond the direct tariff shocks. Anticipation effects could have prompted frontloading of imports, yielding a short-run boom in trade that our model does not capture at quarterly frequency. Empirically, following the significant tariff announcement on 2 April, the USD depreciated and US government bond yields rose, signalling capital outflows from dollar-denominated assets. Such financial-market responses may reflect a loss of confidence in the dollar's future role amid reduced trade or eroded credibility of US economic policymaking under the current administration. These mechanisms are not part of our model nor featured in most canonical trade–macroeconomic frameworks.

5.2 Severe scenario: further escalation

Under the severe scenario, the US experiences an 8% real appreciation of the USD, a 26% collapse in imports, a peak GDP contraction of 1.8%, and a 2 p.p. surge in y-o-y CPI inflation (see Figure 4.A blue dashed lines). These developments necessitate a sharp monetary tightening, with the US nominal interest rate rising by 380 annual basis points. China, as the primary target of the tariff escalation and responding with significant countermeasures, suffers a severe GDP contraction of 2.8% (see Figure 4.B blue dashed lines). Inflationary pressures remain moderate, with y-o-y CPI increasing by 0.35 p.p., due to the managed exchange rate regime. This prompts a substantial monetary easing of 115 annual basis points. The EA, affected by US tariffs as well as its own retaliatory measures, undergoes a GDP contraction of 0.85% and a 0.6% rise in y-o-y CPI inflation. This inflationary environment necessitates a 115 annual basis point tightening of the region's monetary policy (see Figure 4.C blue dashed lines).

Trade reconfiguration plays out in favour of the least tariffed regions under this scenario (see Figure 4.E). While China, the US, the euro area substantially increase tariffs on their bilateral trade relationships (except for trade between China and the euro area), the remaining regions benefit from the possibility of relatively low tariffs vis-a-vis China and the euro area. Trade between the regions other than the US and China as well as trade between China and regions other than the US and the euro area increase substantially. Furthermore, the euro area and China become more important export markets for their respective firms, with export increases being larger for China.

6 Conclusion

This paper analyses the macroeconomic ramifications of the tariffs introduced by the United States in 2025 (up until May 26, 2025), quantifies the importance of trade related transmission channels, and explores alternative monetary policy rules. Using the ECB-Global 3.0 model to simulate the impact of the tariffs announced or implemented as of May 26, 2025, our results suggest US consumer price inflation to increase by 0.7 p.p. and GDP to drop by 0.45%, while potential escalation would lead to a 2.0 p.p. inflation surge and a 1.8% contraction in GDP.

The analysis reveals the critical role of several interconnected transmission mechanisms. A key finding is the profound influence of US-dominant currency pricing (DCP) in international trade. Under DCP, the pass-through of tariffs to import prices is significant, and the exchange rate's capacity to buffer shocks is altered. For the United States, where imports are largely priced in its own currency, real dollar appreciation offers no offsetting relief from higher import costs, which directly feed into producer and consumer prices. For other economies, currency depreciation against the dollar can mitigate the decline in export competitiveness but concurrently fuels imported inflation, complicating the monetary policy response. Furthermore, the model demonstrates the importance of trade diversion, whereby tariff induced price shifts redirect global demand towards untariffed suppliers, altering international trade patterns but failing to prevent an overall decline in global trade volumes.

The monetary policy response emerges as a critical determinant of the ultimate macroeconomic impact. Our benchmark simulations, which assume central banks target CPI inflation, show that the inflationary pressure from tariffs necessitates policy tightening in both the US and the euro area. This response, while aimed at curbing inflation, exacerbates the initial contractionary effect on GDP and demand. In contrast, China's managed exchange rate regime and the resulting muted inflation allow for a more accommodative policy stance to cushion the GDP decline. The sensitivity analysis further shows that alternative monetary policy frameworks, such as targeting producer prices (PPI) or longer-term inflation, could moderate the negative GDP effects by reducing the immediate impetus for interest rate hikes, though this comes at the cost of higher short-run headline inflation.

The contribution of this work lies in its quantitative assessment of a complex global trade shock using a multi-country framework that explicitly models key features of the modern global economy. However, several caveats must be acknowledged, as the linear model does not capture potential non-linearities, and the observed financial market responses related to a loss of confidence in US economic policymaking are underestimated in the model. Future research could therefore seek to integrate these channels to provide a more holistic understanding of the far-reaching consequences of trade policy.

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7 Tables

Table 1: Model Coefficients and Definitions

Parameter	Definition
$\alpha_i^{ci,ci}$	Response to future consumption and investment
$\alpha_i^{ci,q}$	Response to equity prices
$\alpha_i^{ci,p^{oil}}$	Response to oil prices
α_i^{ci,r^3}	Response to real interbank rate
α_i^{ci,r^L}	Response to long-term real rate
$\alpha_i^{uip,nfa}$	Response to net foreign asset position
$\alpha_i^{uip,reer}$	Response to the real effective exchange rate
$\alpha_i^{\pi,\beta}$	Household's discount factor
$\alpha_i^{\pi,\pi}$	Forward lookingness of the PC
$\alpha_i^{\pi,mc}$	Response to real marginal costs
$\alpha_i^{\pi^x,\beta^x}$	Household's discount factor
$\alpha_i^{\pi^x,\pi^x}$	Forward lookingness of the export PC
$\alpha_i^{\pi^x,mc^x}$	Response to export real marginal costs
$\alpha_i^{mc,y}$	Response to domestic output (domestic PC)
$\alpha_i^{mc,\pi}$	Response to relative input prices (domestic PC)
$\alpha_i^{mc,oil}$	Response to oil price changes (domestic PC)
$\alpha_i^{mc^x,x}$	Response to exports (export PC)
$\alpha_i^{mc^x,\pi^x}$	Response to relative input prices (export PC)
$\alpha_i^{mc^x,oil}$	Response to oil price changes (export PC)
$\alpha_i^{i,i}$	Interest rate smoothing
$\alpha_i^{i,\pi}$	Response to CPI inflation
$\alpha_i^{i,y}$	Response to output
θ_i^{da}	Import demand elasticity to domestic absorption
θ_i^{Q}	Import demand elasticity to relative prices
θ^{div}	Degree of trade diversion
Ξ_i	Share of USD DCP exports in exports of region i to all regions
$\Xi_i^{\backslash us}$	Share of USD DCP exports in exports of country i to non-us regions
$\omega_{i,k}^{imp,int}$	Share of imported inputs from region k
$\omega_{i,k}^{X}$	Share of exports from region i to region k
$\omega_{i,k}^{M,\backslash oil}$	Share of bilateral non-oil imports from region k

Table 2: Benchmark model specification

Transmission channel	region
Global	
Trade linkages	World
Financial linkages	World ex China
Oil prices	World
Trade diversion	World
Oil in consumption	World
USD dominant currency pricing (DCP)	World ex US
Region specific	
Risk taking channel of FX appreciation	EMEs Asia
Larger weight of China in emerging Asia financial conditions	EMEs Asia
FX intervention	China
Oil revenues	Oil producers

Table 3: Shares of USD DCP exports by region

region	All	Excluding US
Emerging Asia	0.86	0.83
China	0.86	0.83
Euro Area	0.32	0.19
Japan	0.50	0.38
Oil-exporting Economies	0.69	0.56
Rest of the World	0.59	0.48
United Kingdom	0.29	0.13

Notes: More details on the ECB-Global USD DCP parametrisation can be found in Georgiadis and Mösle (2020).

Table 4: Tariff levels and increases: pre-Trump 2025 baseline vs. simulated

Imposing region	Target region	Pre-Trump 2025	Increase in tariff (%)	
			As of 26 May 2025	Escalation
United States	Emerging Asia	2.6	7.9	22.8
United States	China	10.0	25.9	106.7
United States	Euro Area	1.4	5.4	28.1
United States	Japan	1.6	10.9	18.1
United States	Oil-exporters	0.5	9.8	10.1
United States	Rest of the World	0.6	8.4	14.0
United States	United Kingdom	0.5	2.6	4.1
China	United States	10.9	6.5	55.1
Euro Area	United States	1.0	-	19.6
Oil-exporters	United States	2.3	2.7	2.7
Rest of the World	United States	1.5	-	0.8

Sources: Conteduca and Mancini (2025), CEPII MAcMap-HS6, Fajgelbaum et al. (2024), WITS, CEPII BACI, and ECB staff calculations.
Notes: The weighted average increase in effective U.S. tariffs, calculated based on 2023 import shares, amounts to 10.7 p.p. under the baseline scenario and 32.4 p.p. under the "severe" scenario, as labelled in the table "As of 26 May 2025" and "Escalation" respectively. Shown tariff rates refer to the average effective tariff rate on goods and services. Tariff rates in the severe scenario reflect a hypothetical case in which initial reciprocal tariffs (2 April) apply, the full escalation with China holds, tariffs on the EU rise to 50 percent,and no temporary product-level exemptions from reciprocal tariffs are granted.

8 Figures

Figure 1.A: 10% US unilateral tariff shocks, impacts on the US

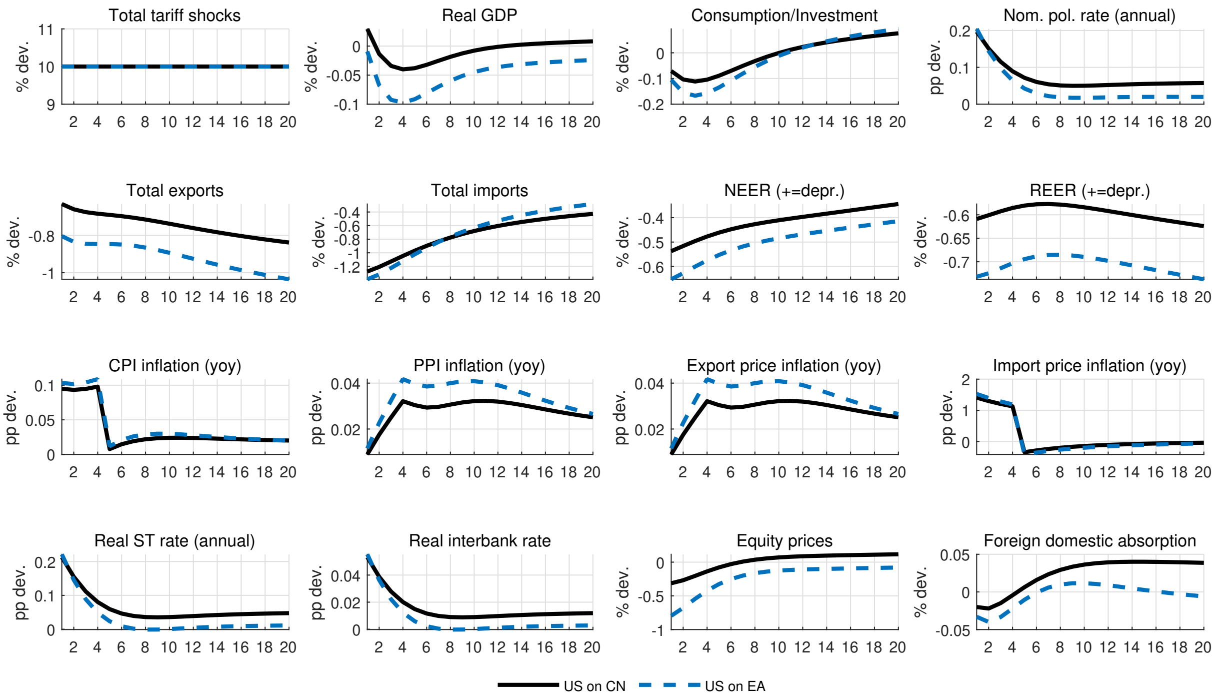


Figure 1.B: 10% US unilateral tariff shocks, impacts on China

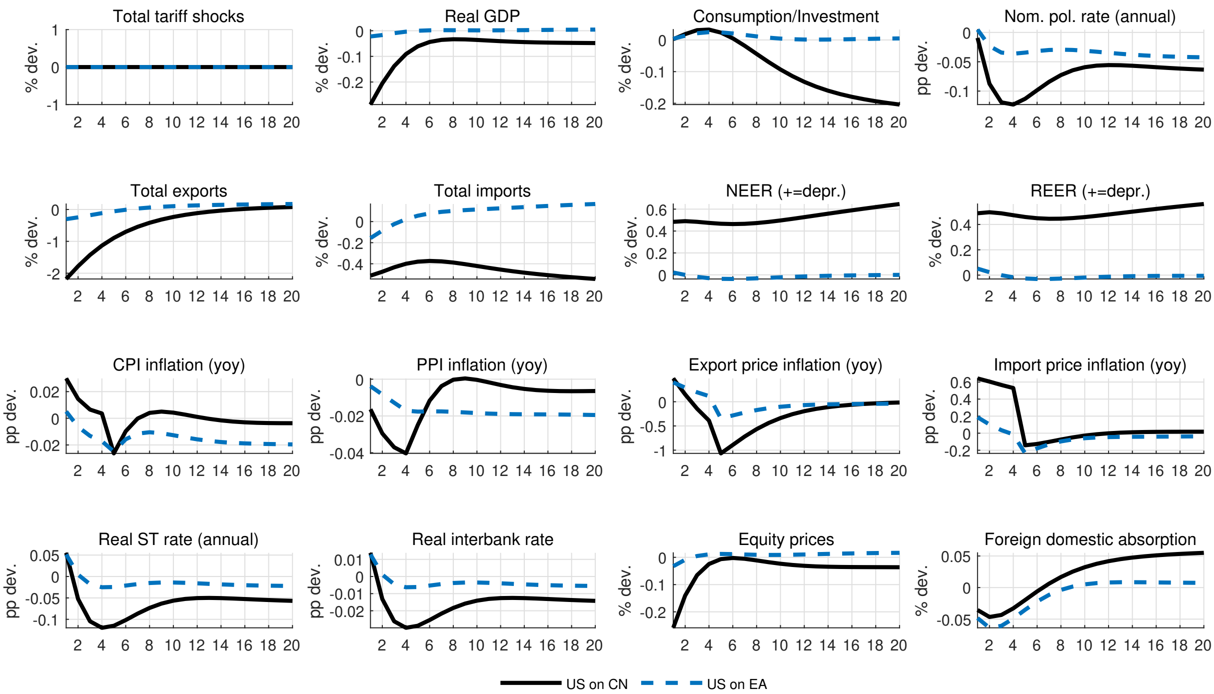


Figure 1.C: 10% US unilateral tariff shocks, impacts on the EA

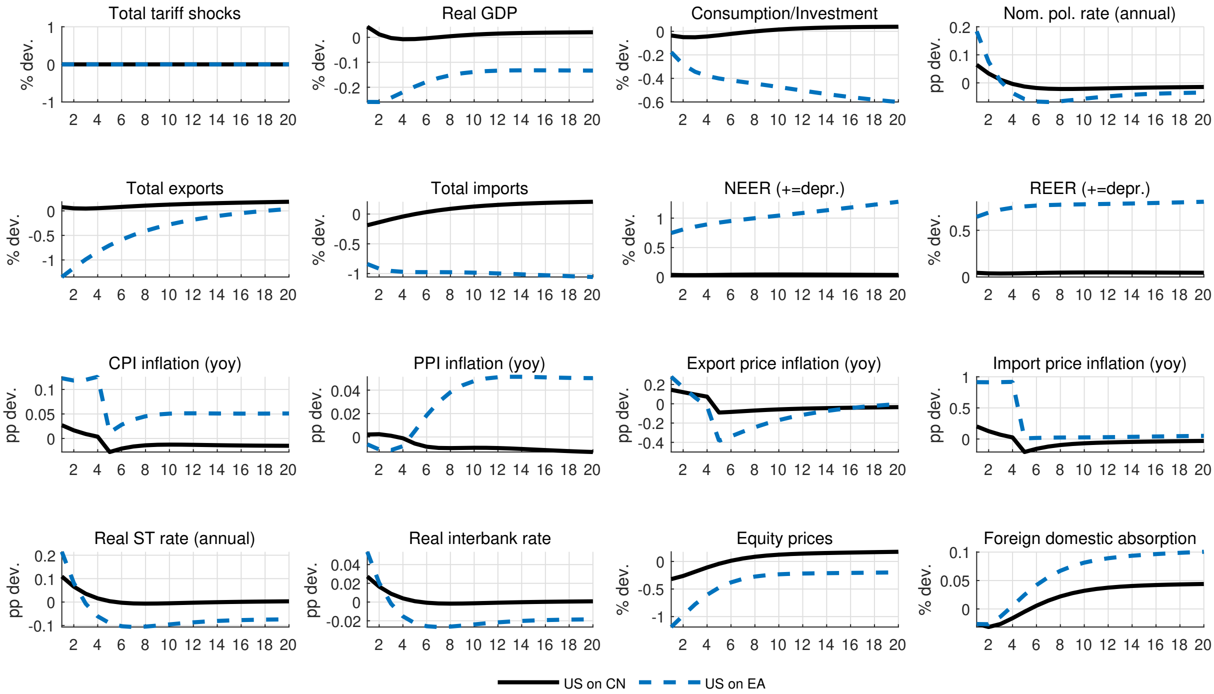


Figure 2.A: Channels sensitivity, 10% US tariffs on China, impacts on the US

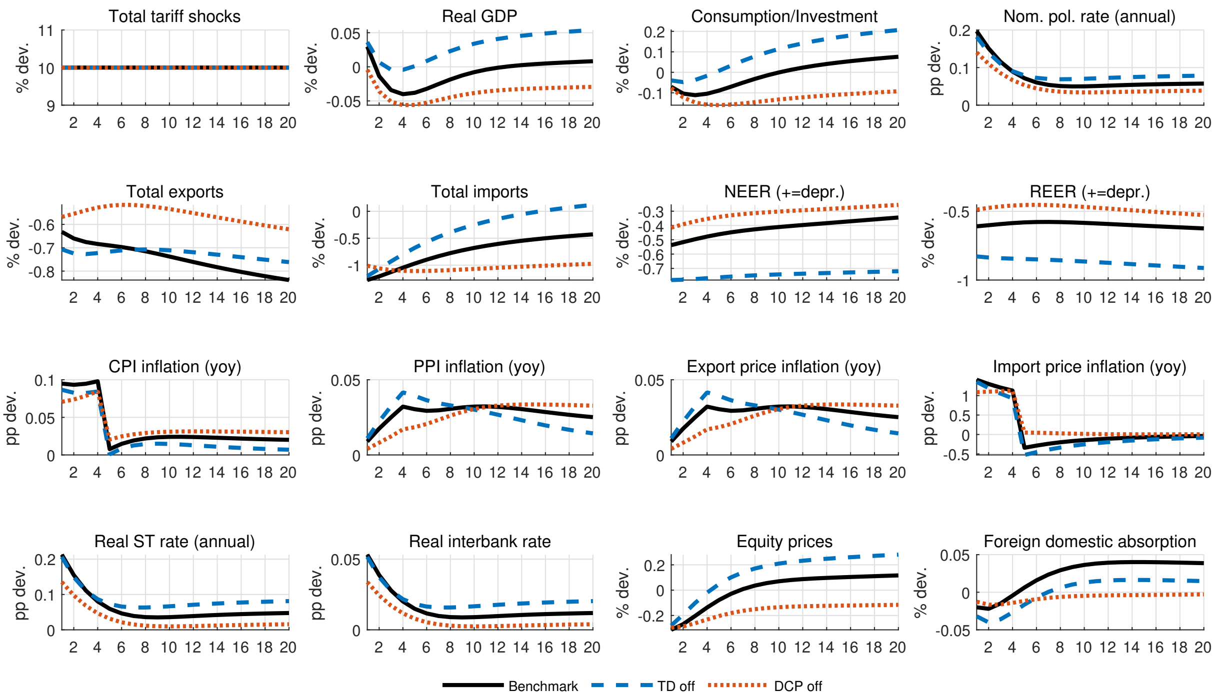


Figure 2.B: Channels sensitivity, 10% US tariffs on China, impacts on China

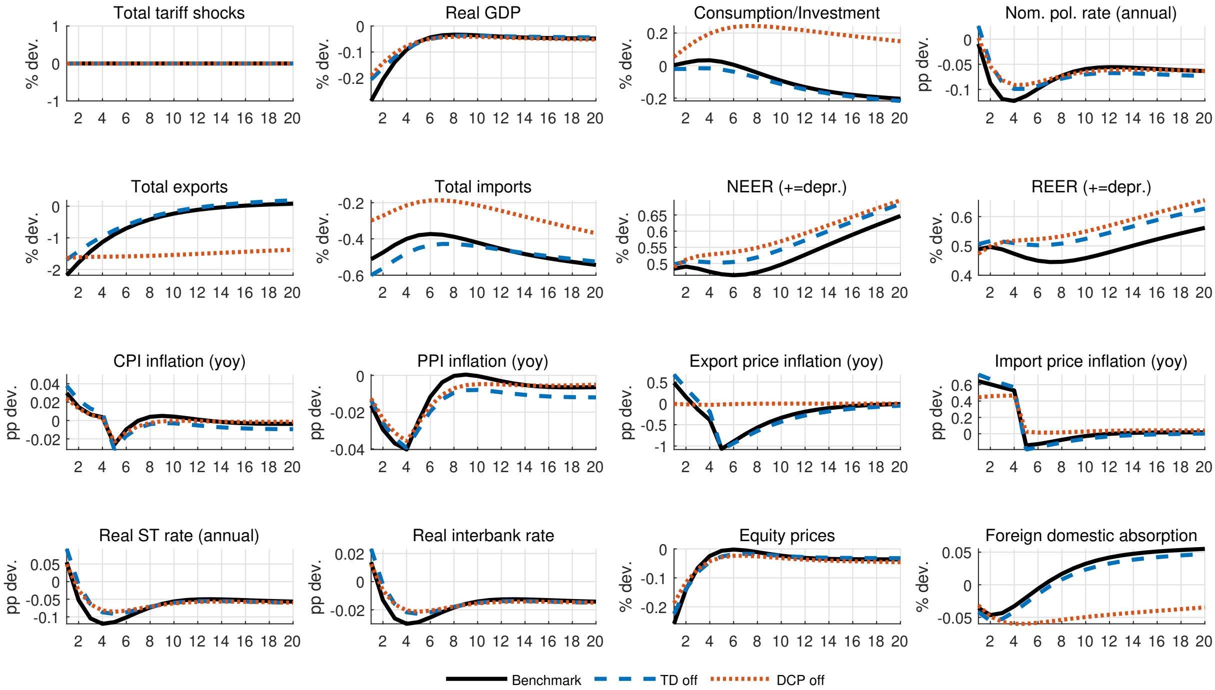
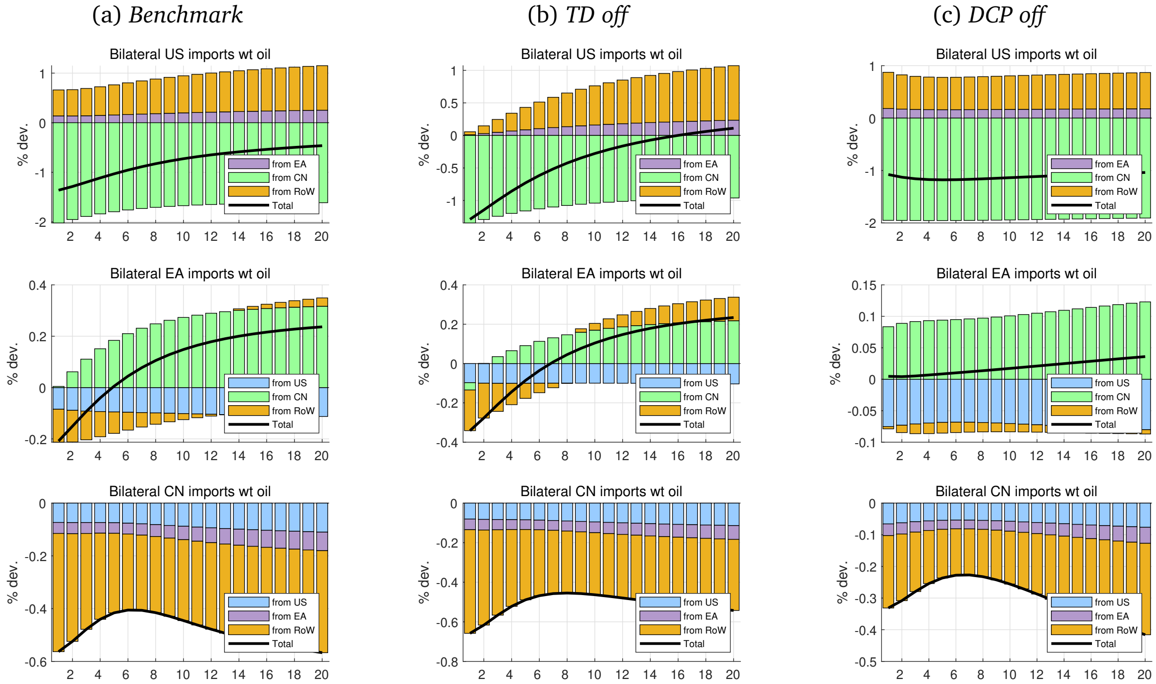


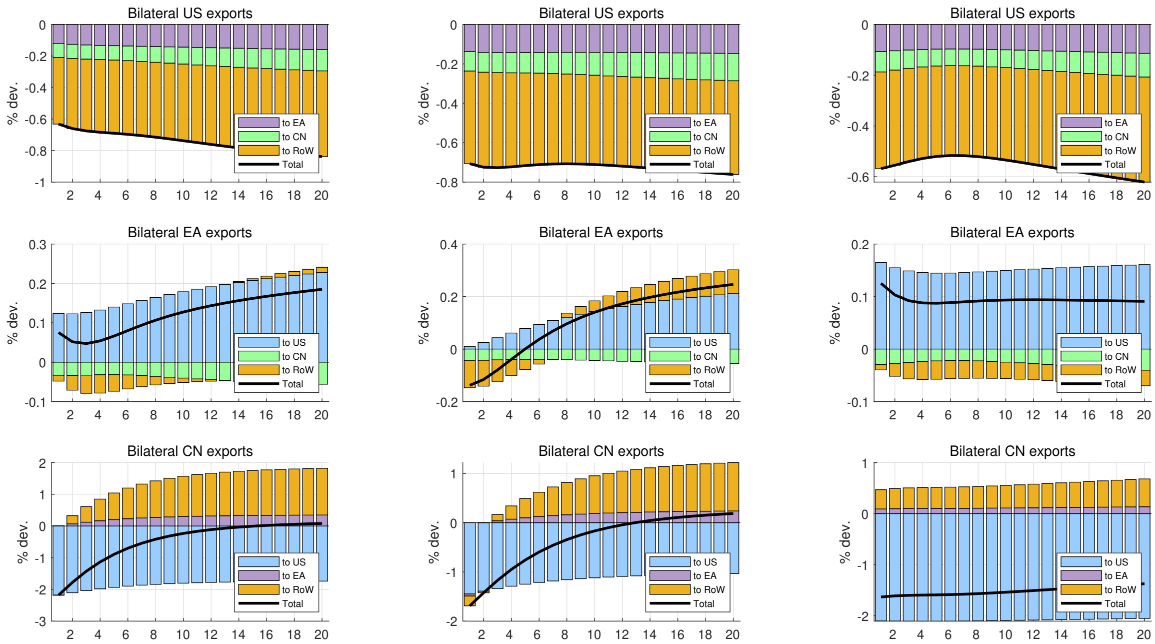
Figure 2.C: 10% US tariffs on China, bilateral real imports



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

Figure 2.D: 10% US tariffs on China, bilateral real exports

(a) *Benchmark* (b) *TD off* (c) *DCP off*



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

Figure 3.A: Monetary policy rule sensitivity, 10% US tariffs on China, impacts on the US

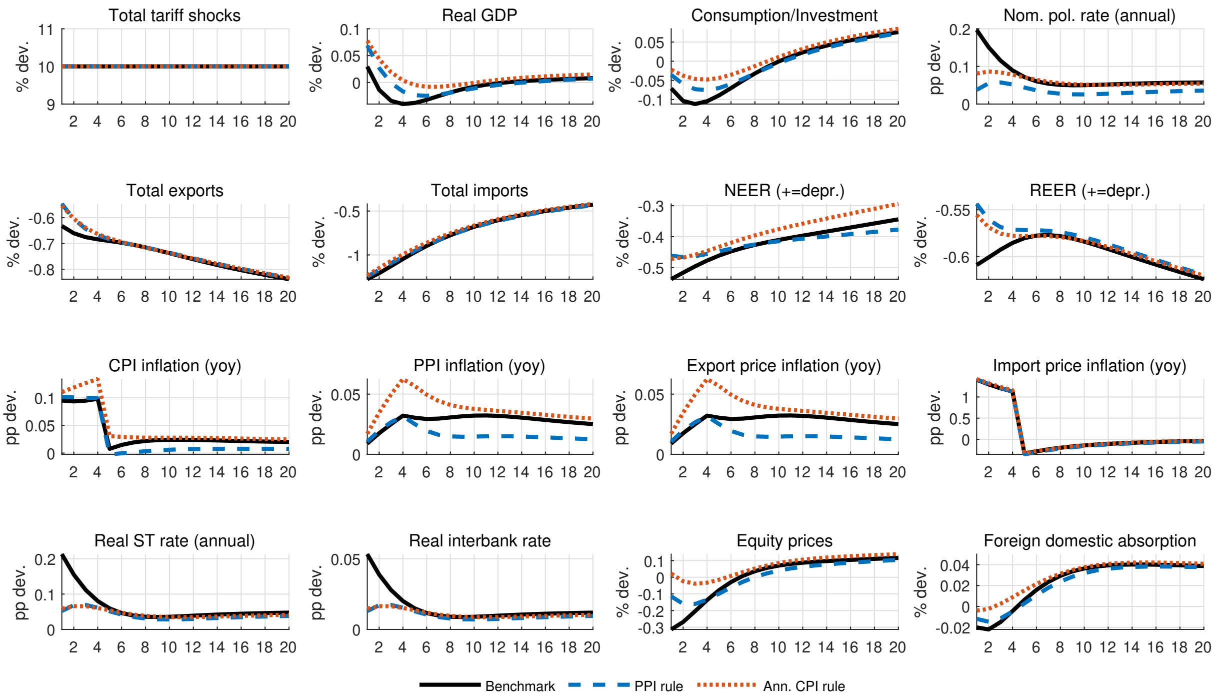


Figure 3.B: Monetary policy rule sensitivity, 10% US tariffs on China, impacts on China

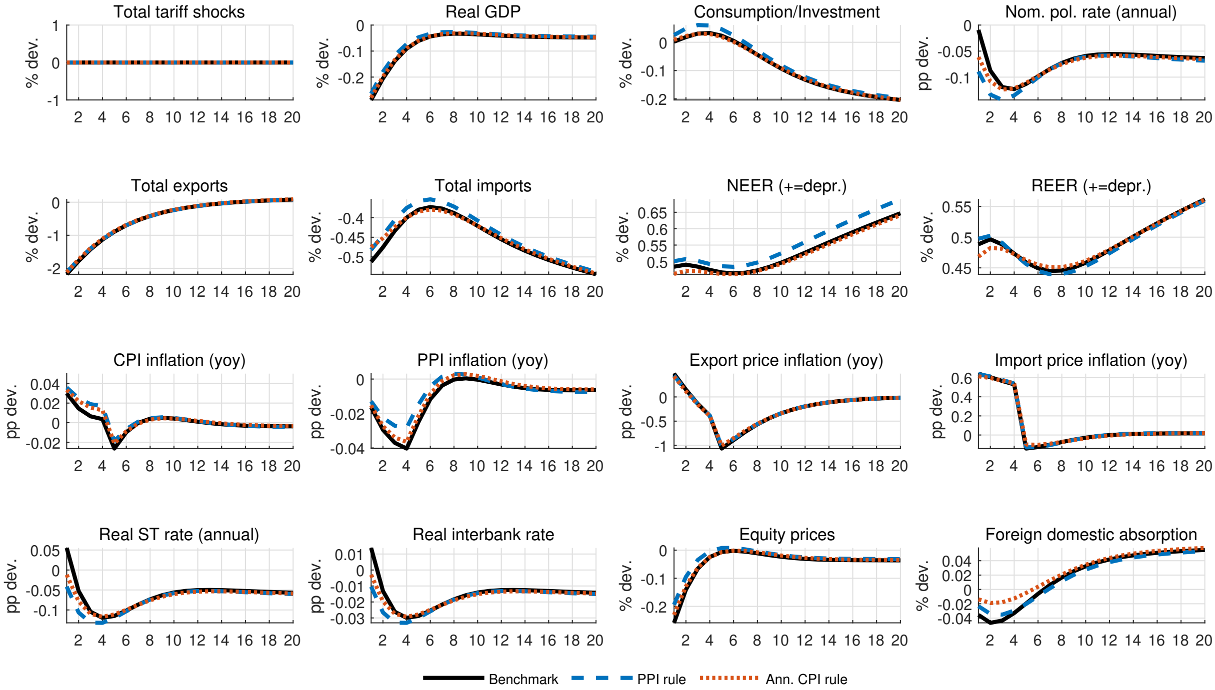


Figure 4.A: Increased tariff simulations, impacts on the US

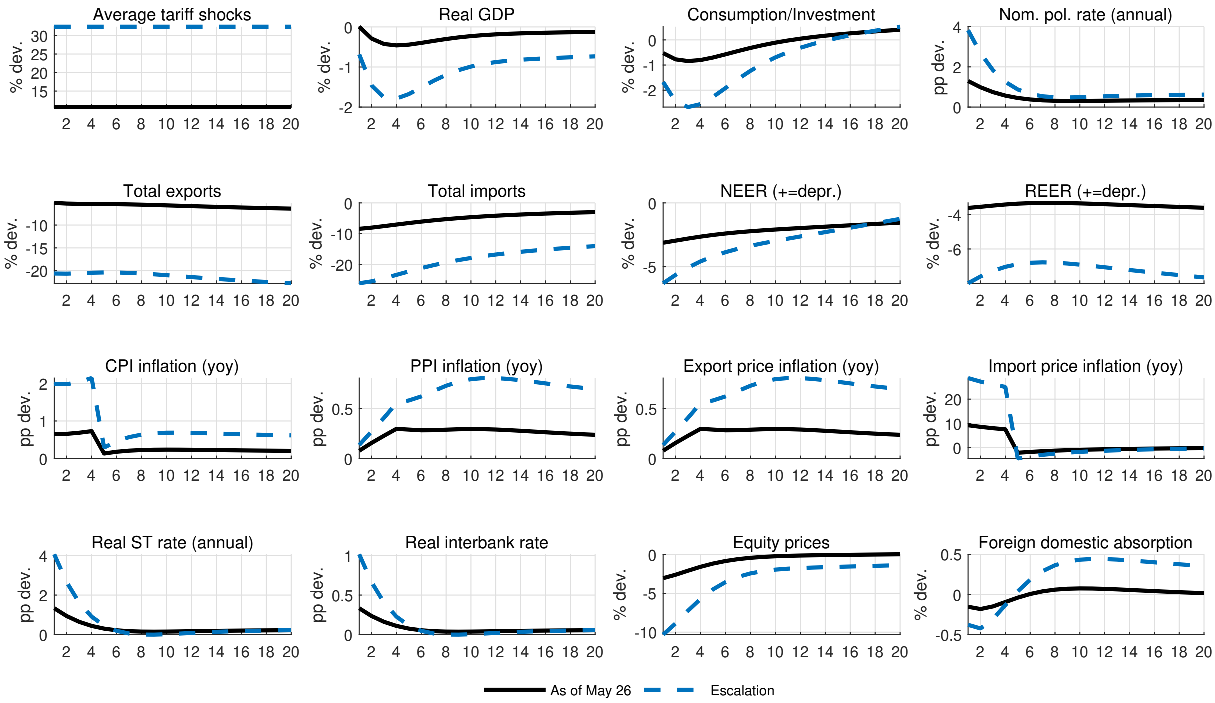


Figure 4.B: Increased tariff simulations, impacts on China

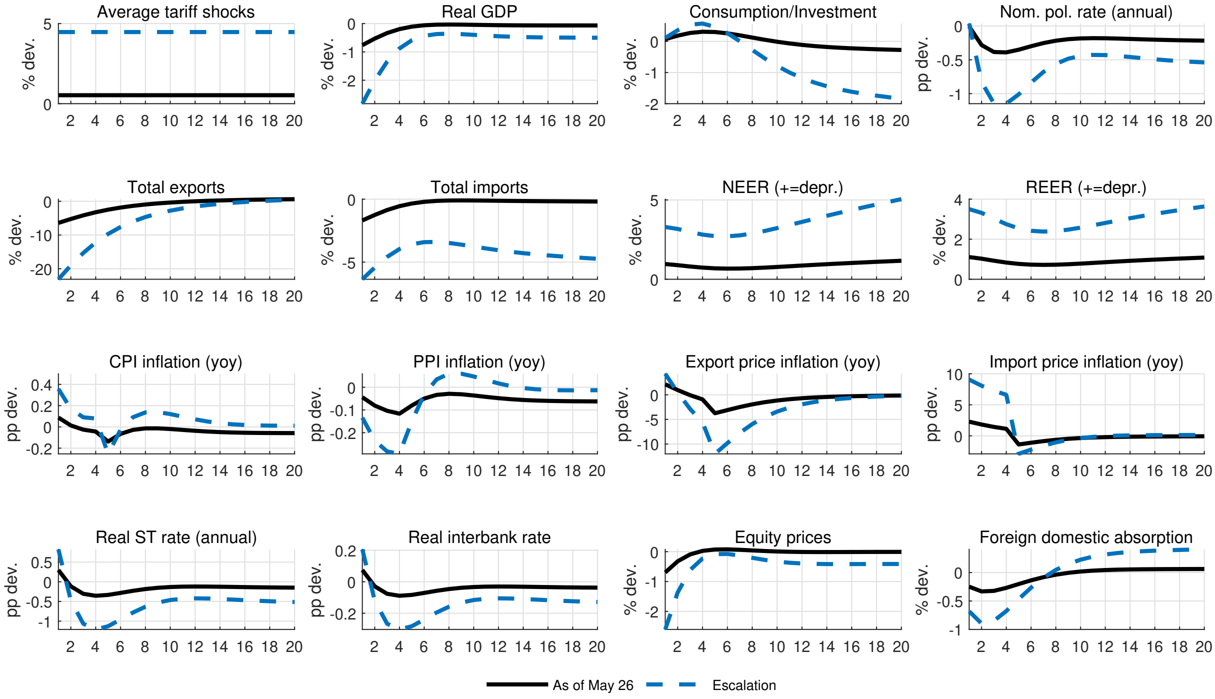


Figure 4.C: Increased tariff simulations, impacts on the EA

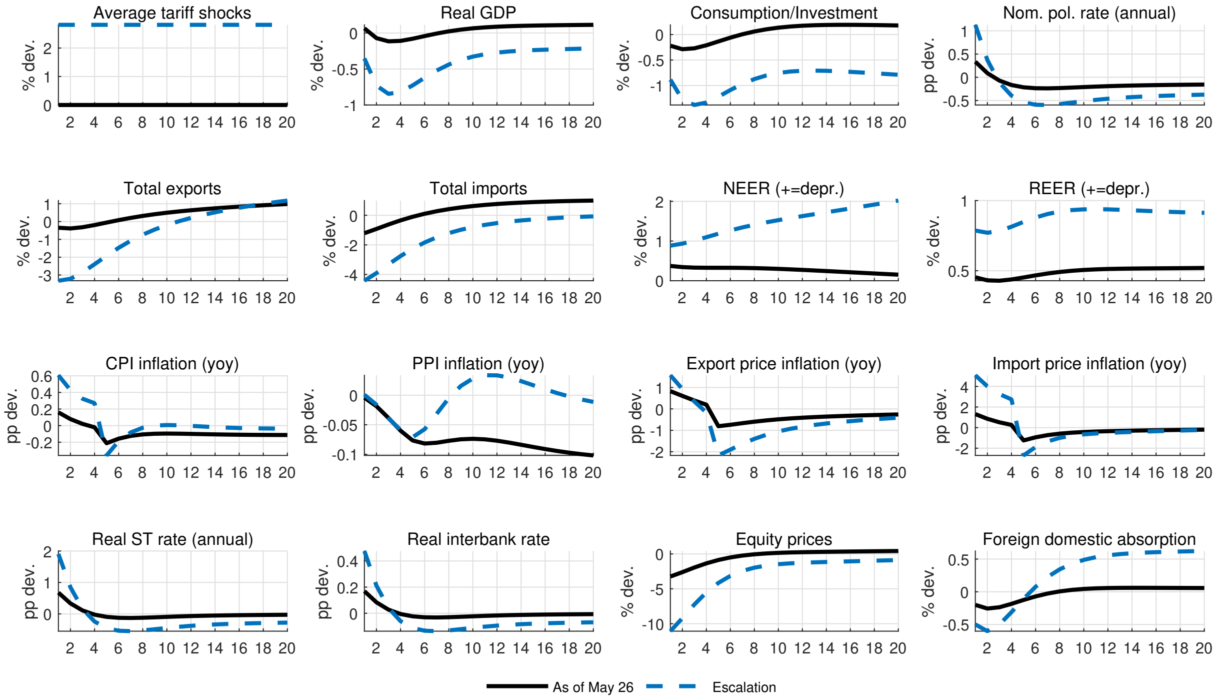
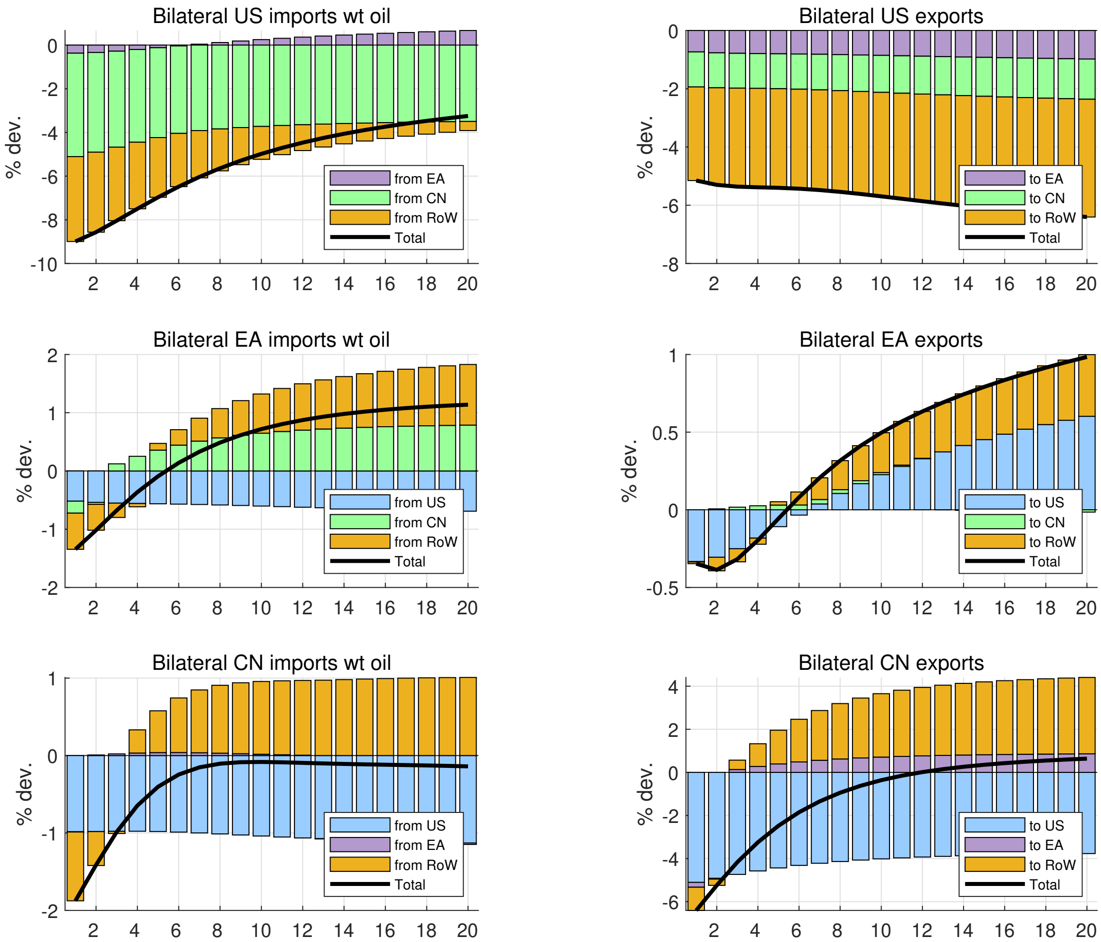


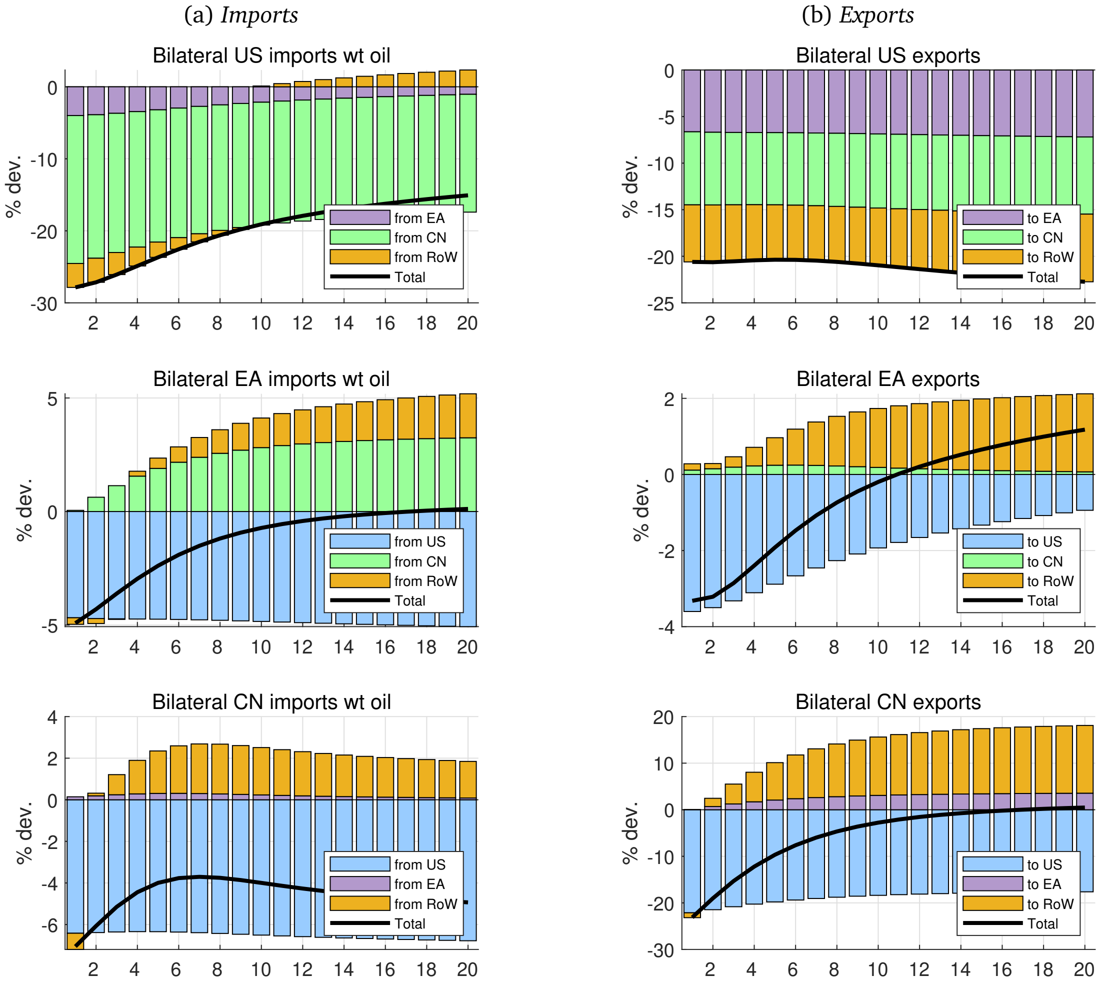
Figure 4.D: Increased tariffs as of May 26, bilateral real import and export responses

(a) *Imports* (b) *Exports*



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

Figure 4.E: Increased tariffs escalation, bilateral real import and export responses



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

A Appendix

Figure A.1: Channels sensitivity, 10% US tariff on China, impacts on the EA

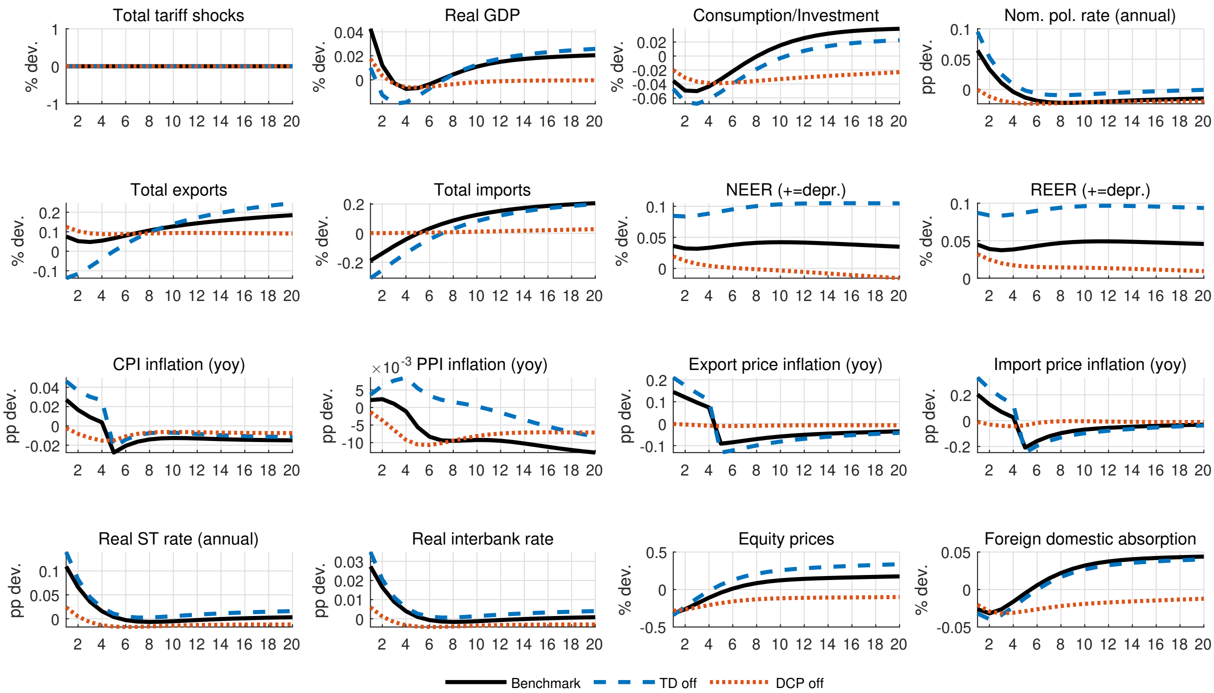


Figure A.2: Channels sensitivity, 10% US tariffs on the EA, impacts on the US

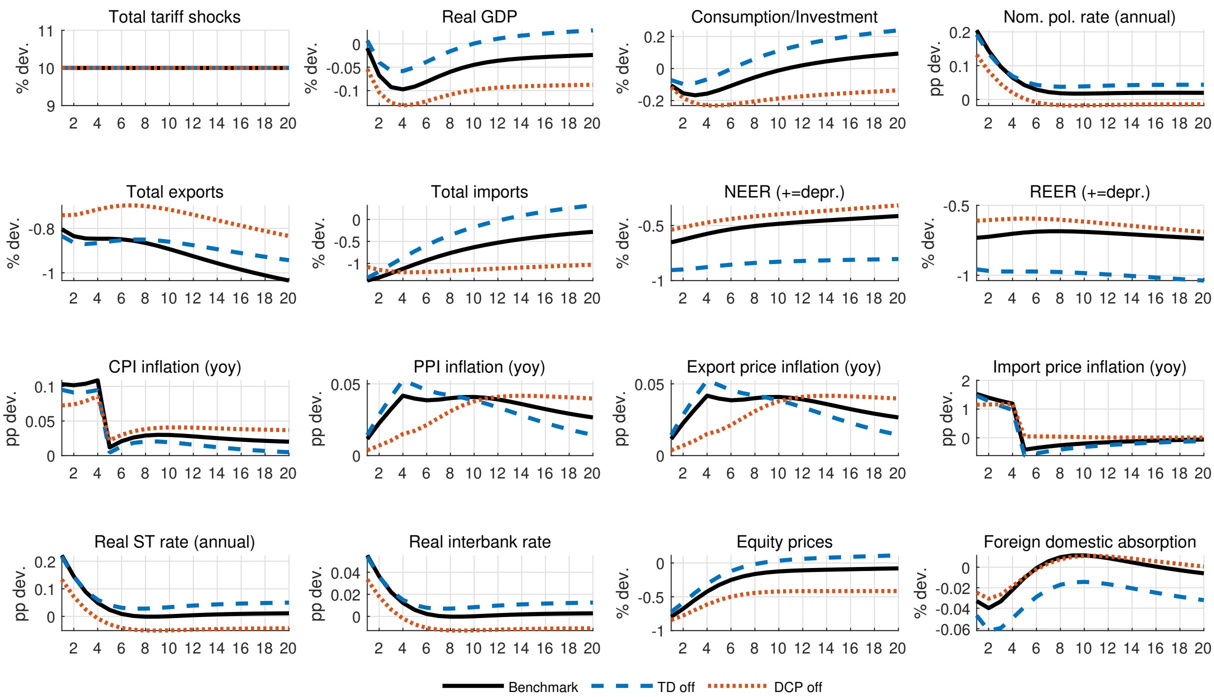


Figure A.3: Channels sensitivity, 10% US tariffs on the EA, impacts on the EA

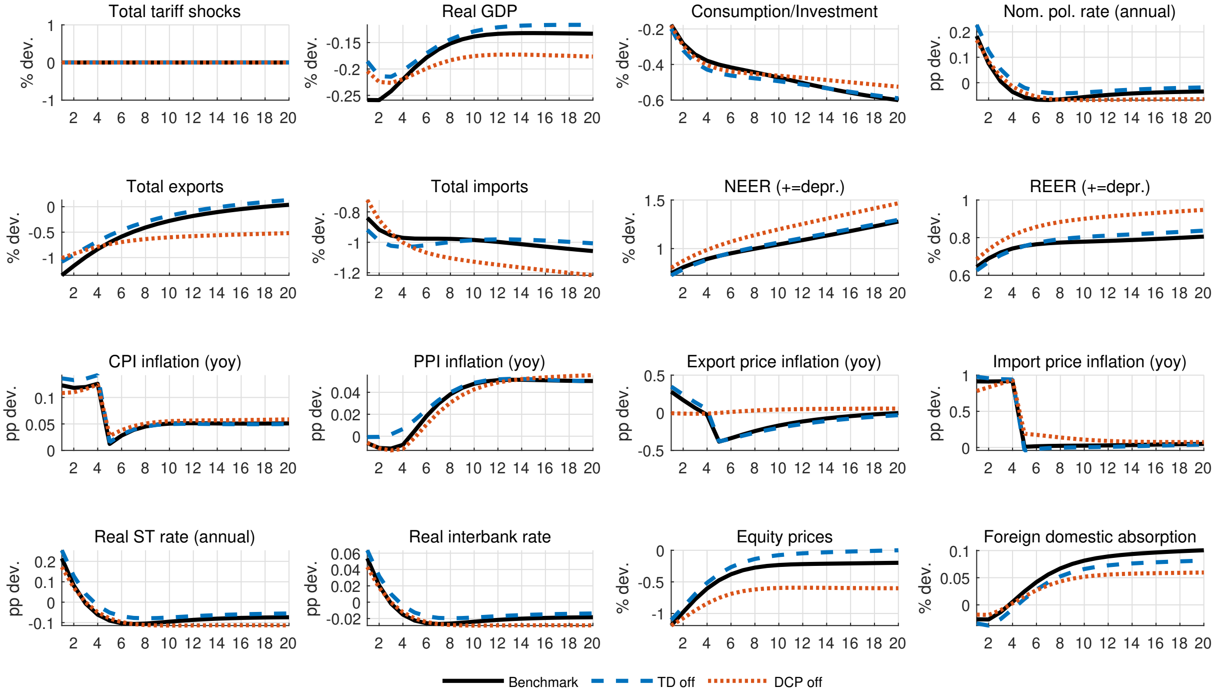


Figure A.4: Channels sensitivity, 10% US tariffs on the EA, impacts on CN

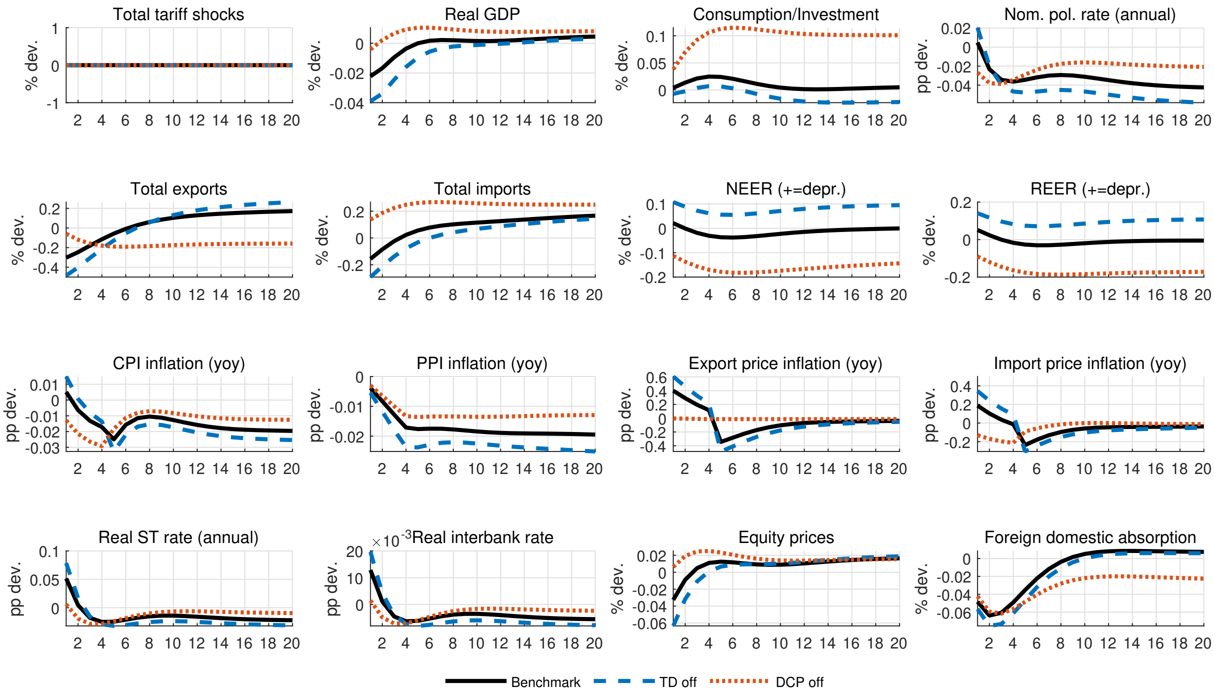
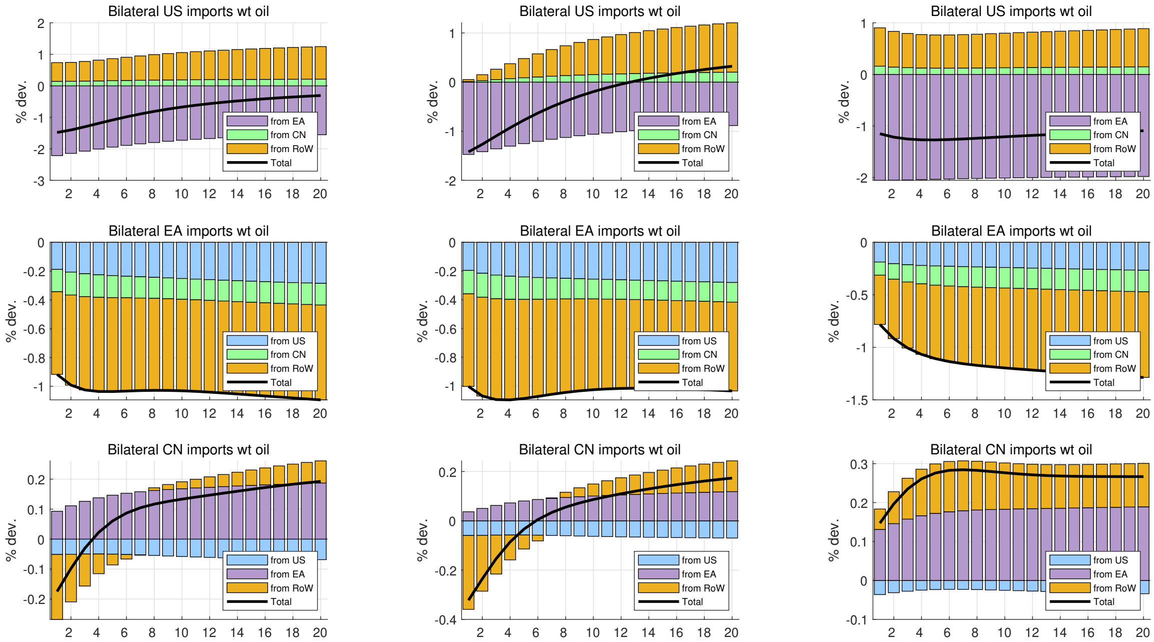


Figure A.5: 10% US tariffs on the EA, bilateral real imports

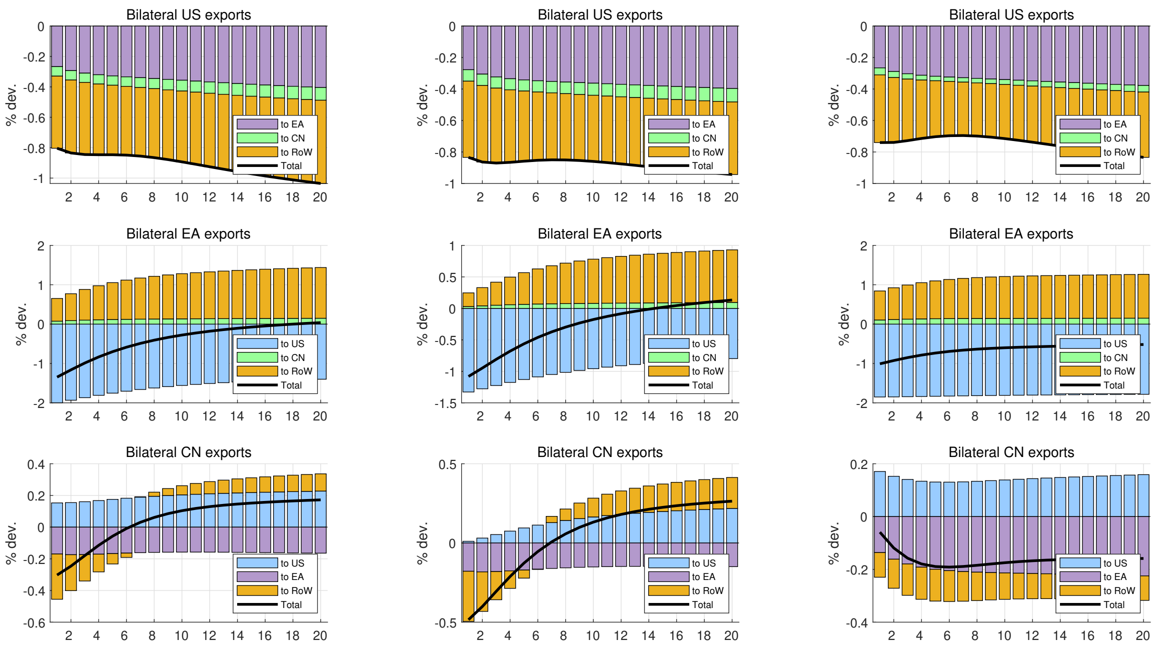
(a) *Benchmark* (b) *TD off* (c) *DCP off*



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

Figure A.6: 10% US tariffs on the EA, bilateral real exports

(a) *Benchmark* (b) *TD off* (c) *DCP off*



Notes: In the figure, "RoW" denotes all the other regions, excluding the US, EA, and CN.

Figure A.7: Monetary policy rule sensitivity, 10% US tariffs on China, impacts on the EA

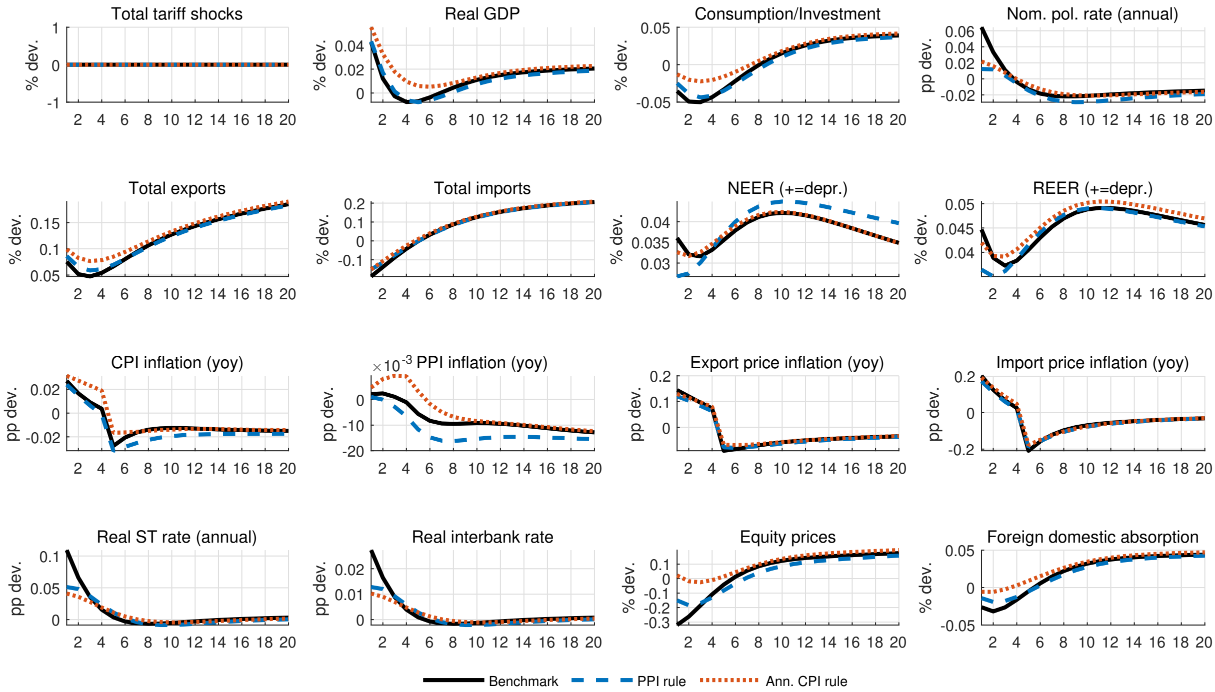


Figure A.8: Monetary policy rule sensitivity, 10% US tariffs on EA, impacts on the US

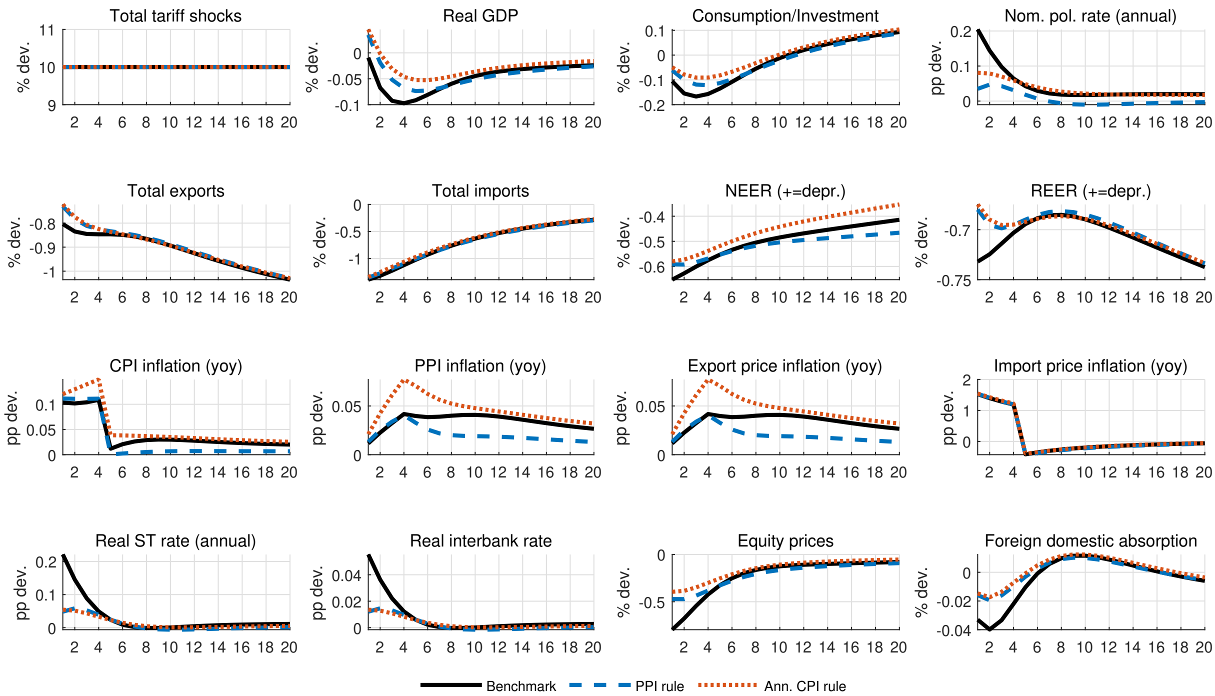


Figure A.9: Monetary policy rule sensitivity, 10% US tariffs on EA, impacts on the EA

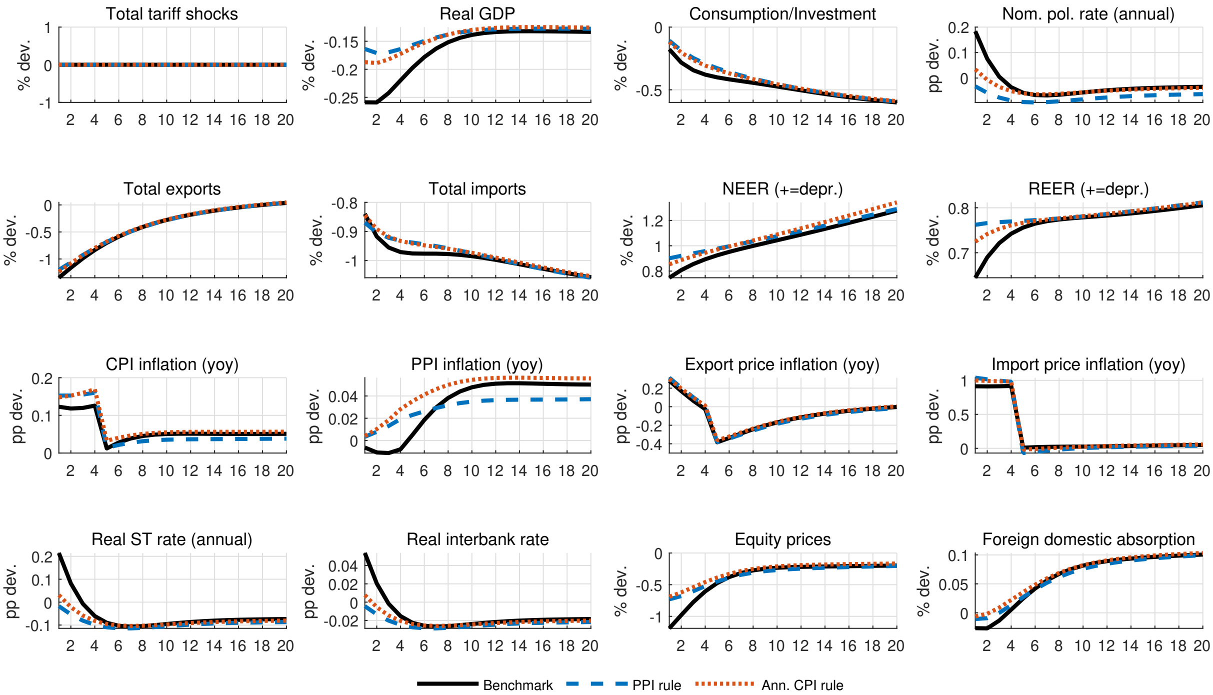
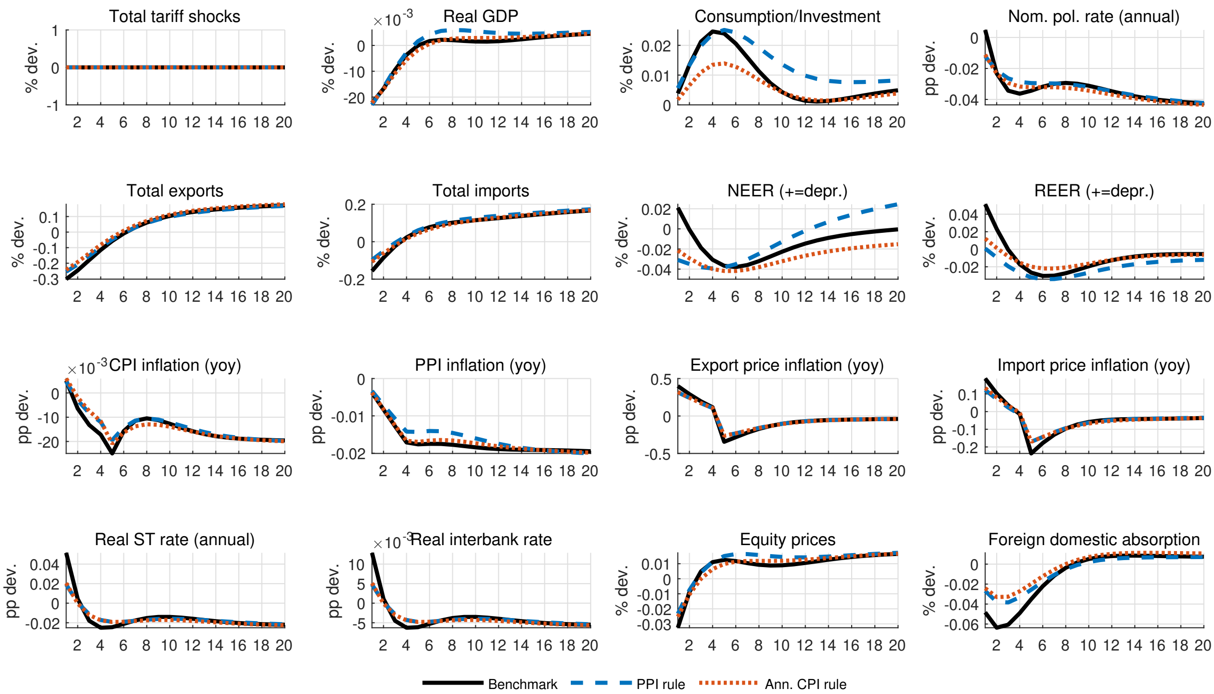


Figure A.10: Monetary policy rule sensitivity, 10% US tariffs on EA, impacts on CN



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