



Full length articles

Trade fragmentation, inflationary pressures and monetary policy^{☆,☆☆,★}Ludovica Ambrosino^a, Jenny Chan^b, Silvana Tenreyro^{c,d,e}^{✉,*}^a London Business School, United Kingdom^b Bank of England, United Kingdom^c London School of Economics, United Kingdom^d CFM, United Kingdom^e CEPR, United Kingdom

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ABSTRACT

How does trade fragmentation affect inflationary pressures? What is the response of monetary policy needed to sustain inflation at target? To address these questions, we develop a two-sector, small open-economy model that features imperfect international risk-sharing and household heterogeneity, capturing both the supply-side and demand-side effects of fragmentation. In the model, fragmentation takes the form of import-price increases or a decline in tradable-sector productivity. The sign and magnitude of its impact on inflationary pressures, and the appropriate policy response, depend not only on the direct effect of higher import prices or lower productivity on supply but also, crucially, on how aggregate demand adjusts to lower real incomes. In turn, this depends on the pace of fragmentation (gradual versus front-loaded) and other key structural factors highlighted by the model. We compare outcomes under Taylor-type monetary policy rules to a constrained-efficient allocation.

1. Introduction

Global trends have shifted noticeably in recent decades. The protracted postwar increase in trade openness has stalled, amidst a resurgence in trade wars and protectionism. This shift is visible in [Fig. 1](#), which plots the long-term trajectory of global trade flows

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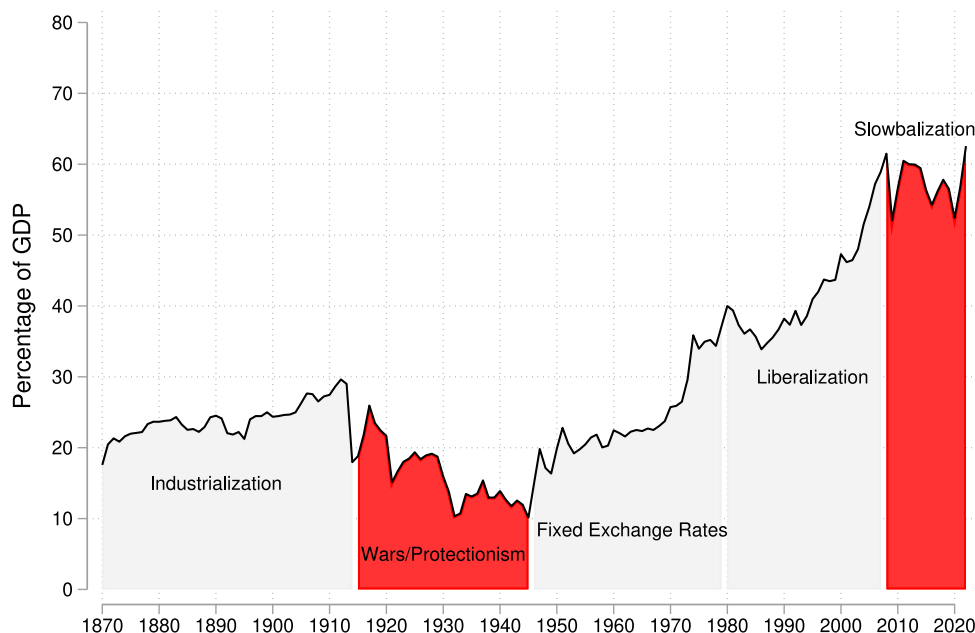


Fig. 1. Sum of exports and imports,% of GDP.

Source: Peterson Institute for International Economics; Jordà–Schularick–Taylor Macroeconomic Database; Penn World Table (10.0); World Bank; OWID.

(imports plus exports) relative to world GDP, as well as in Fig. 2, which tracks a broad index of economic fragmentation since the 1970s (Fernández-Villaverde et al., 2024). Both figures show a turning point around the global financial crisis, with trade openness plateauing and fragmentation steadily increasing, before rising sharply during the pandemic and Russia's invasion of Ukraine. The geopolitical factors driving these changes are likely to persist. New trade paradigms, such as friendshoring or fragmentation into trading blocs of geopolitically aligned countries are becoming normalised (Yellen, 2022). This reconfiguration of trade patterns raises concerns about potential losses in efficiency and aggregate output (Javorcik et al., 2024; Georgieva, 2023).

A key question for policymakers is how trade fragmentation will affect inflationary pressures and, in turn, what the appropriate monetary policy response would be. The conventional view suggests that as nations retreat from global integration and supply chains duplicate, production costs will rise, exerting upward pressure on inflation (e.g., Lagarde, 2023; Goodhart and Pradhan, 2020). Indeed, disinflationary trends of the 1990s and 2000s have often been linked to the rapid increase in trade integration during that period, leading to expectations that its reversal will be inflationary. However, this relationship remains contentious. Other forces besides globalisation may have contributed to the era of disinflation, including the shift to inflation-targeting regimes (Roberts, 2006) and the lower bound constraint on interest rates in many countries (Attinasi and Balatti, 2021). Taking the United States as an example, estimates of the disinflationary effects of increased trade integration appear modest at best (Yellen, 2006).¹

The conventional view is built around the direct or partial-equilibrium impact of trade integration on supply, abstracting from its indirect impact on aggregate demand. This paper addresses this gap by studying the broader, general equilibrium effects of trade fragmentation in a setting in which aggregate demand is also affected through changes in real incomes. We model fragmentation in two ways: the first consists of an increase in the price of imported goods (which could result, for example, when firms switch from the cheapest or more efficient suppliers to geopolitically-aligned, but more expensive suppliers; or when tariffs or non-tariff barriers are imposed). The second form of fragmentation entails a fall in tradable sector productivity in the domestic economy (relative to its original trend). Through these alternative forms of fragmentation, we illustrate how the inflationary impact depends crucially on the adjustment of aggregate demand. Higher import prices or lower tradable sector productivity not only constrain supply through higher marginal costs, but also demand through lower real incomes and consumption, reflecting general equilibrium effects. Consequently, the net impact on inflationary pressures is a priori ambiguous.

We capture these competing channels in a two-sector (tradable and non-tradable), small open economy New Keynesian model featuring household heterogeneity and home bias in consumption. Specifically, following Debortoli and Gali (2017), the economy is populated by two types of consumers. The first type consists of *unconstrained* agents, with access to international and domestic

¹ Kamin et al. (2004), for example, show that the impact of Chinese exports on global prices has been fairly modest. Moreover, these studies do not explicitly take into account real exchange-rate adjustments. As Kohn (2005) argues, during the second half of the 1990s, the dollar experienced a substantial appreciation, driven by increased investment flows drawn to the prospect of higher productivity growth. This may have amplified the downward trend in dollar prices of U.S. imports.

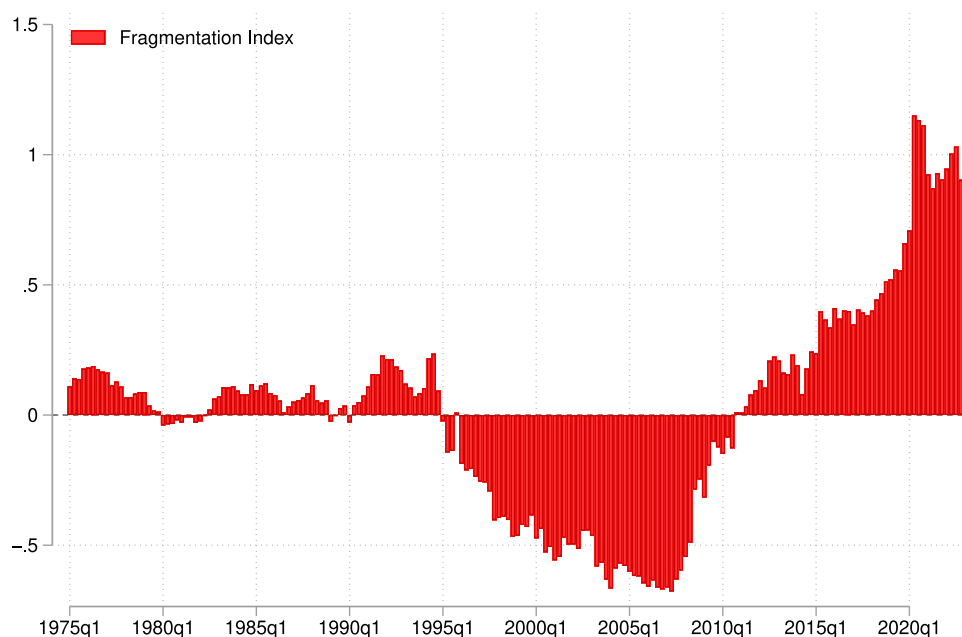


Fig. 2. Fragmentation has increased since 2008.
Source: Fernández-Villaverde et al. (2024).

financial markets. To account for frictions in international financial markets, we introduce imperfect international risk sharing: unconstrained agents trade risk-free foreign bonds, with a convex cost of holding assets in quantities that deviate from some long-run level (Schmitt-Grohé and Uribe, 2003). The second type consists of *constrained* hand-to-mouth households, who consume only out of their labour income and have no access to financial markets. The domestic economy trades with the rest of the world, importing goods for direct consumption, for use as intermediate inputs, or both.

We consider three scenarios to show how different forms of fragmentation can have distinct macroeconomic implications. First, we consider a *gradual* (and permanent) increase in the price of imported goods. This yields a persistent increase in imported inflation, which lasts until the import price stabilises at a higher level in the medium-to-longer term. Aggregate consumption falls in response to fragmentation, as both financially constrained and unconstrained households suffer losses in real income: the real disposable income of hand-to-mouth consumers falls as a direct consequence of higher prices, restricting their spending; in turn, financially unconstrained households, who take into account their permanent-income losses, also reduce their consumption in anticipation of lower future incomes. This further accentuates the fall in aggregate demand, spilling over to hand-to-mouth consumers. Real wages fall both because of the negative terms-of-trade effect and because of the fall in domestic demand. Financially constrained households make up for some of the fall in income by increasing their labour supply. The fall in aggregate demand pushes down on domestic inflation. Aggregate CPI (consumer price index) inflation, a composite of domestic and imported goods inflation, falls, given the larger weight of domestic components on the basket. The reduction in demand is reflected in the real natural rate of interest, which decreases with the fragmentation shock. This suggests that when demand adjusts, the overall effect is not inflationary. This scenario leads to a long period of stagnation, with weak demand and subdued inflation. In this setting, monetary policy needs to loosen in order to bring inflation back to target.

Next, we consider a fully *front-loaded*, permanent increase in the price of imported goods.² The shock creates a sharp temporary trade-off, with inflation increasing and aggregate demand falling on impact. Both financially unconstrained and constrained households lower their consumption. The fall in real wages (relative to the price of imported inputs) triggers an increase in labour supply from both types of households. On impact, the short-term real interest rate increases, as a tightening in monetary policy is required to bring inflation back to target. The result is a temporary overshoot in inflation, with longer-term losses in income and consumption.

Finally, we study a *gradual and permanent* fall in the total factor productivity (TFP) of tradable goods as a potential consequence of increased fragmentation. As in the standard New Keynesian model, this shock results in two changes in the domestic tradable sector: more employment per unit of output and an increase in inflation as marginal costs rise. Compared to the gradual import price shock, a gradual deterioration in TFP redistributes resources differently. Real wages do not fall by as much, which mitigates the fall in consumption. Aggregate employment also increases by less. In this scenario, the fall in non-tradable inflation is not enough to

² This is akin to the recent U.S. and E.U. tariffs on Chinese electric vehicles, reaching up to 100 percent and 38 percent, respectively, as well as the increase in energy prices after Russia's invasion of Ukraine.

outweigh the increase in home tradable inflation, and aggregate CPI inflation increases moderately. In principle, the impact of this shock on the natural real rate is ambiguous. In our calibration, there is a small decrease in the natural rate, a fall in non-tradable components of inflation and a moderate, temporary increase on CPI inflation.

In summary, all three fragmentation scenarios lead to a contraction in aggregate supply, but their effects on demand differ. Conventional assessments of the impact of fragmentation on inflation often abstract from the demand-side or general-equilibrium impact that fragmentation can have through lower real incomes, focusing primarily on its adverse supply-side effects. While the direct (or partial equilibrium) effect of fragmentation might be inflationary, the general equilibrium effect could dampen inflation, as lower real incomes weigh on aggregate demand. The effects of fragmentation on inflation dynamics and the direction of monetary policy cannot be decoupled from its impact on the natural real interest rate (r^*). As trade fragmentation affects the desired levels of savings and spending, the balance between these supply and demand forces ultimately determines the sign and magnitude of changes in the natural rate of interest.

To build intuition, we start the analysis with a representative-agent New Keynesian (RANK) version of our model as a special case of our TANK baseline model, where there are no constrained households. Next, we compare the RANK model to our TANK baseline: the presence of hand-to-mouth households leads to a larger fall in consumption and a smaller fall in output. Regarding consumption, while in principle the presence of constrained households reduces the anticipation effect from lower future incomes, the demand spillovers are stronger, leading to a larger fall in consumption. By contrast, output declines less because constrained households increase their labour supply more than unconstrained households in response to the import price shocks. Our conclusions across the three scenarios remain the same and in particular, the demand adjustment in the gradual-fragmentation scenario is still sufficient to lower domestic inflationary pressures and offset the increase in imported goods inflation.

Following Drechsel et al. (2025), we benchmark the small open economy's response to various fragmentation shocks against a constrained-efficient allocation to isolate the sources of inefficiencies in the decentralised equilibrium. Nominal frictions that delay the adjustment of non-tradables prices to shocks and frictions in the adjustment of foreign bond holdings limit the efficient reallocation of resources within and across sectors, as well as intertemporally and externally in response to shocks. As a result, there is too much reallocation towards home tradables following the import price shocks and too little towards non-tradables after an adverse productivity shock in the home tradable sector.

To sharpen our understanding of the underlying mechanisms, we vary two key parameters in our simulations: the degree of home bias in consumption and the Cobb–Douglas weight of foreign inputs in domestic production. The extent of home bias in consumption plays an important role. More open economies are more exposed to shocks in foreign prices, which is reflected in the responses of consumption and production. In the scenarios with a persistent increase in foreign prices, we see a deeper fall in the natural real rate in the more open economy. However, in the case of a negative and permanent TFP shock, openness mitigates supply pressures by allowing for diversification away from home tradables and facilitating reallocation between the two sectors domestically. The permanent nature of the shock also affects the consumption of forward-looking households, which weighs on demand.

We show that our main results are robust to extensions that incorporate additional domestic supply-side constraints, such as a higher share of imported inputs in domestic production and wage rigidities. Increased reliance on imported inputs leads to higher employment responses in our various scenarios, driven by factor substitution, as import prices increase or as productivity deteriorates.

An extension of the RANK model with nominal wage rigidities moderates the degree of disinflationary pressures in the gradual fragmentation scenario and worsens the policy trade-off in the front-loaded scenario. However, the demand-side impacts are maintained, as a more modest decline in real wages is offset by a sharper fall in output and employment.

Related literature. We build on a rich literature studying monetary policy in small open economies (SOEs), including the seminal work of Benigno and Benigno (2003), Gali and Monacelli (2005), and Corsetti et al. (2010). Other important contributions to this line of research include but are not limited to, Santacreu (2005) and De Paoli (2009), who study tradable and non-tradable sectors in SOEs, and Schmitt-Grohé and Uribe (2003), who introduce imperfect international risk sharing.

We also draw on an extensive literature that studies the impact of external shocks on macroeconomic outcomes using structural models, such as Romero (2008), Catao (2013), Hevia and Nicolini (2013), Wills (2014), Bergholt (2014), Ferrero and Seneca (2019), Drechsel et al. (2019), Siena (2021), Comin et al. (2023), Broadbent et al. (2023), Guerrieri et al. (2023) and Nispi Landi and Moro (2024).³ Recent contributions to this literature have explored the transmission of external shocks in models with household heterogeneity (Ferra et al., 2020; Auclert et al., 2021, 2023; Chan et al., 2024). As in Comin and Johnson (2020), we highlight general-equilibrium effects. Our focus is on fragmentation rather than offshoring, and our scenarios capture a broader range of possibilities: instead of modelling a transition to a steady state with a different degrees of openness, we consider fragmentation shocks that differ in the speed of adjustment, their origin (domestic versus foreign), and the variable directly affected (foreign input prices versus productivity).

Finally, we build on the vast literature that has examined the macroeconomic effects of globalisation. While increased competition in import prices has placed downward pressure on prices of manufactured goods, studies have shown that globalisation has had a negative, but economically small (if not negligible) effect on core inflation (Carluccio et al., 2023). Moreover, there is evidence that global disinflationary forces, such as the shift to inflation targeting regimes (Roberts, 2006; ECB, 2021; Ascari and Fosso,

³ The balance between global demand and supply pressures shapes aggregate outcomes and inflationary dynamics. Guerrieri et al. (2025) show that while individual central banks typically take global supply conditions as given, their collective actions influence global demand and the transmission of supply shocks to global inflation.

2024) or the lower bound constraint on interest rates (Attinasi and Balatti, 2021) may offer a better explanation for the observed disinflationary trends. Theoretical results provide support for these findings. Sbordone (2008) shows that in a model in which firms' desired markup is a function of its relative market share, an increase in the number of traded goods can generate real rigidities that affect the slope of the Phillips curve. As the economy reaches a steady state with higher trade, the elasticity of demand that firms face increases, but the elasticity of the desired markup declines. These opposing forces determine how the inflation-marginal cost component of the Phillips curve slope varies. Estimates on trade data from 1960 to 2006 suggest that it remains uncertain whether trade growth observed during the globalisation era is sufficient to have driven a decline in this component of the slope. On the empirical front, Chen et al. (2009) provide evidence of short-run pro-competitive effects from increased openness. They also show that trade liberalisation can have ambiguous effects in the long run, as firms can respond to increased competition by locating to protected markets.⁴

Our paper also relates to the strand of literature pioneered by Rogoff (2003) and Rogoff (2007), which looks at how economic integration affects global inflationary trends. We abstract, however, from the political economy factors studied by Afrouzi et al. (2024), who suggest that globalisation would worsen the trade-offs faced by central banks, leading them to succumb to political pressures and deviate from or abandon their inflation targets. The question we ask in this paper is a different one: what would it take for central banks to bring inflation back to target under different fragmentation scenarios? As we show, in some scenarios, activity and inflation both fall, leading to stagnation (that is, without a trade-off); in others, activity and inflation move in opposite directions, creating short-term trade-offs or temporary stagflation. What is required of monetary policy to return inflation to target depends on how aggregate demand responds to lower incomes in general equilibrium. This is contingent on a number of structural parameters that we consider, as well as on the trajectory of fragmentation, particularly on the extent to which the impact on import prices is gradual or front-loaded.

Outline. Section 2 sets out the theoretical framework. Section 3 describes the model calibration and analyses shocks that are linked to trade fragmentation in a RANK and TANK framework. Section 4 studies the efficient allocation of a benevolent social planner. Finally, Section 5 presents concluding remarks and potential directions for future research. We consider various extensions in the Appendix, varying the degree of home bias, the dependence on imported inputs in domestic production, nominal wage rigidity, price flexibility, and alternative elasticities of substitution across goods.

2. Baseline model

The goal of this section is to deliver qualitative insights into shocks associated with trade fragmentation. We present a small open economy model that builds on Drechsel et al. (2019) and Ferrero and Seneca (2019). To capture a more realistic response of aggregate demand to international shocks, we introduce constrained and unconstrained households as in Debortoli and Galí (2017). To study the impact of fragmentation, we introduce an imported input used in the production of domestic goods and study the impact of shocks to import prices. We also consider the impact of changes in productivity in the tradable sector of the domestic economy. Fig. 3 presents an illustration of the model described in this section.

2.1. Households

There is a continuum of households with identical preferences at any given point in time t . A constant measure $(1-\lambda)$ of households are *unconstrained* (U): they are able to smooth consumption through their access to international and domestic financial markets. The remaining fraction (λ) of households are fully *constrained* (C), meaning that they have no access to financial markets.

Each type of household $j \in \{U, C\}$ consumes C_t^j and supplies labour N_t^j , at wage W_t , leading to expected lifetime utility given by

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left\{ \frac{(C_t^j)^{1-\sigma}}{1-\sigma} - \kappa_{\ell} \frac{(N_t^j)^{1+\phi}}{1+\phi} \right\}.$$

The parameters β , σ , and ϕ capture the discount factor, the inverse intertemporal elasticity of substitution and the inverse Frisch elasticity, respectively, while κ_{ℓ} is the disutility weight placed on labour.

Unconstrained households: The period budget constraint of these households is given by:

$$P_t C_t^U + B_t + \mathcal{E}_t B_t^* = B_{t-1}(1 + i_{t-1}) + \mathcal{E}_t B_{t-1}^*(1 + i_{t-1}^*) + W_t N_t^U + P_t \Psi_t - \frac{\chi}{2} \mathcal{E}_t P_t^* \left(\frac{B_t^*}{P_t^*} - b^* \right)^2 \quad (1)$$

where P_t is the aggregate price level and B_t denotes the holdings of a risk-free one-period nominal bond in domestic currency, which pays the nominal interest rate i_t . The risk-free one-period nominal bond in foreign currency is denoted by B_t^* . The foreign interest rate is denoted by i_t^* and the nominal exchange rate (expressed in terms of domestic currency relative to foreign currency)

⁴ Recent developments in global trade policy have motivated a growing body of research on the macroeconomic effects of tariffs (Bergin and Corsetti, 2023; Bianchi and Coulibaly, 2025; Meng et al., 2023; Campos et al., 2023; Auclert et al., 2025; Kalemli-Özcan et al., 2025; Werning et al., 2025; Cuba-Borda et al., 2025; Mehrotra and Waugh, 2025; Mix and Hoang, 2025; Gnato et al., 2025). This paper studies the macroeconomic consequences of a realignment in global trading patterns that may be less efficient overall. While tariffs can contribute to this inefficiency, realignment may also reflect a reorientation towards less efficient suppliers, making our framework applicable to a range of factors that may increase import costs.

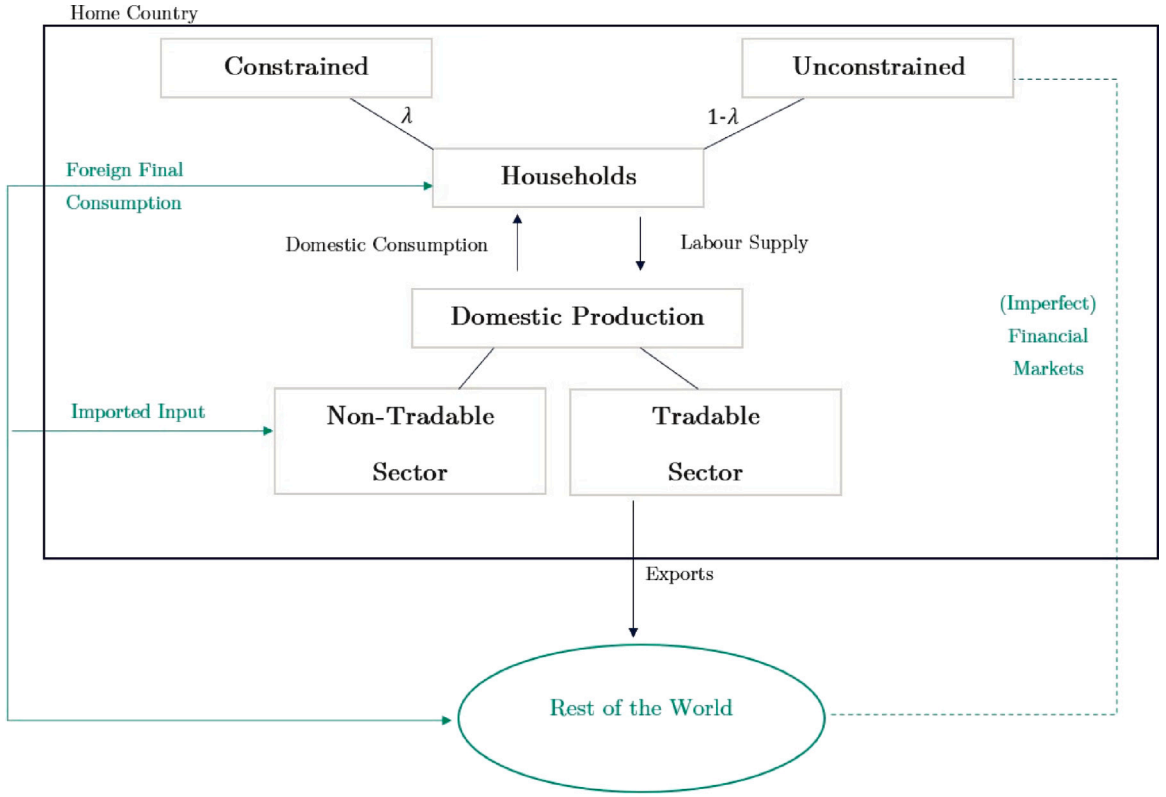


Fig. 3. Model structure from the perspective of the home country.

is denoted by $\mathcal{E}_t$. The real profits from firms in both tradable and non-tradable sectors (Ψ_t) are rebated to the unconstrained agents. Following Schmitt-Grohé and Uribe (2003), we assume that there is a quadratic cost of changing the real bond position relative to a real steady-state value (b^*) when trading in the foreign bond market. This cost is a common feature of small open economy models and ensures that the economy returns to a unique steady-state net foreign asset position following a transitory shock. The cost (in units of the consumption index) is denoted by a non-negative parameter, χ , while P_t^* is the aggregate price level in the foreign country. Unconstrained households maximise their expected lifetime utility by choosing a sequence $\{C_t^U, N_t^U, b_t, b_t^*\}_{t=0}^\infty$ subject to the series of budget constraints (1), where $b_t = \frac{B_t}{P_t}$, $b_t^* = \frac{B_t^*}{P_t^*}$. Consequently, the optimality conditions are as follows,

$$\kappa_{\mathcal{E}}(N_t^U)^\phi = (C_t^U)^{-\sigma} \frac{W_t}{P_t} \quad (2)$$

$$\frac{1}{(1+i_t)} = \beta \mathbb{E}_t \left[\left(\frac{C_{t+1}^U}{C_t^U} \right)^{-\sigma} \frac{1}{1+\pi_{t+1}} \right] \quad (3)$$

$$[1 + \chi(b_t^* - b^*)] = \beta \mathbb{E}_t \left[\left(\frac{C_{t+1}^U}{C_t^U} \right)^{-\sigma} \frac{1+i_t^*}{1+\pi_{t+1}^*} \frac{S_{t+1}}{S_t} \right] \quad (4)$$

where $\Pi_{t+1} = (1+\pi_{t+1}) = \frac{P_{t+1}}{P_t}$ is the gross inflation rate, $\Pi_{t+1}^* = (1+\pi_{t+1}^*) = \frac{P_{t+1}^*}{P_t^*}$ is the foreign gross inflation rate, and $S_t = \frac{\mathcal{E}_t P_t^*}{P_t}$ is the real exchange rate. We define $\Lambda_{t,t+1}^U = \beta \left(\frac{C_{t+1}^U}{C_t^U} \right)^{-\sigma}$ as the relevant stochastic discount factor, since only the unconstrained households have access to financial markets. The household's optimality condition for labour yields the labour supply relation (2). The Euler equation (3) follows from the first order condition for b_t . Finally, households' choices of foreign and domestic bonds give rise to an uncovered interest rate parity condition, which links the expected change in the exchange rate to the differential between the domestic and foreign interest rates. The conditions on b_t and b_t^* imply Eq. (4), the deviation from the uncovered interest-rate parity (UIP). According to this equation, international risk sharing will generally be imperfect, and aggregate demand across countries will fluctuate inefficiently,

$$\chi(b_t^* - b^*) = \mathbb{E}_t \left[\Lambda_{t,t+1}^U \left(\frac{(1+i_t^*)}{(1+\pi_{t+1}^*)} \frac{S_{t+1}}{S_t} - \frac{1+i_t}{1+\pi_{t+1}} \right) \right].$$

Constrained households: These households do not have access to financial markets and therefore they cannot smooth their consumption over time without adjusting their leisure. Instead, they only consume their labour income in each period,

$$P_t C_t^C = W_t N_t^C,$$

which implies

$$C_t^C = \frac{W_t}{P_t} N_t^C. \quad (5)$$

Their optimal labour supply condition is given by

$$\kappa_\ell (N_t^C)^\phi = (C_t^C)^{-\sigma} \frac{W_t}{P_t}. \quad (6)$$

Aggregate consumption is a weighted average of the consumption of the two types of households, $C_t = (1 - \lambda)C_t^U + \lambda C_t^C$. Similarly, aggregate labour is given by $N_t = (1 - \lambda)N_t^U + \lambda N_t^C$.

As in [Santacreu \(2005\)](#), aggregate consumption is a CES aggregate of both *tradable* (T) and *non-tradable* (N) goods,

$$C_t \equiv \left[(1 - \varsigma)^{\frac{1}{\iota}} C_{T,t}^{\frac{\iota-1}{\iota}} + \varsigma^{\frac{1}{\iota}} C_{N,t}^{\frac{\iota-1}{\iota}} \right]^{\frac{\iota}{\iota-1}}$$

where ς is the share of non-tradable goods in domestic consumption and ι is the elasticity of substitution between tradable and non-tradable goods. $C_{T,t}$ is a CES aggregate of tradable goods produced in the domestic and foreign economy,

$$C_{T,t} = \left[(1 - \theta)^{\frac{1}{\mu}} C_{H,t}^{\frac{\mu-1}{\mu}} + \theta^{\frac{1}{\mu}} C_{F,t}^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{\mu-1}} \quad (7)$$

where $1 - \theta$ captures the home bias: smaller values of θ imply that the economy consumes less foreign goods. The elasticity of substitution between home-produced tradable and foreign tradable goods is given by μ .

The aggregate CPI price index (P_t) and the tradable good price index ($P_{T,t}$) are respectively given by

$$P_t \equiv \left[(1 - \varsigma) P_{T,t}^{1-\iota} + \varsigma P_{N,t}^{1-\iota} \right]^{\frac{1}{1-\iota}}$$

$$P_{T,t} \equiv \left[(1 - \theta) P_{H,t}^{1-\mu} + \theta P_{F,t}^{1-\mu} \right]^{\frac{1}{1-\mu}}$$

where $P_{F,t} = \mathcal{E}_t P_{F,t}^*$ and $P_{F,t}^*$ follows an AR(1) process.⁵ In our simulations, we consider alternative stochastic processes for this variable to capture the increase in trade fragmentation. In particular, we vary the foreign-currency price of imported goods, $P_{F,t}^*$, which will lead to changes in the terms of trade, defined as the relative price of imported to domestically produced tradable goods ($P_{F,t}/P_{H,t}$). This amounts to a terms-of-trade shock, distinct from a general change in the foreign country's price level, and affects the composition and level of the tradable price index $P_{T,t}$.

Aggregate prices are a function of the prices for both tradable and non-tradable goods. In turn, tradable prices are a composite of prices for domestically-produced tradable goods and foreign-produced tradable goods, with weights reflecting the degree of home bias. The non-tradable goods and price index are given, respectively, by

$$C_{N,t} \equiv \left(\int_0^1 C_{N,t}(i)^{\frac{\epsilon-1}{\epsilon}} di \right)^{\frac{\epsilon}{\epsilon-1}}, \quad P_{N,t} \equiv \left(\int_0^1 P_{N,t}(i)^{1-\epsilon} di \right)^{\frac{1}{1-\epsilon}},$$

where ϵ captures the substitutability across different non-tradable consumption varieties i .

2.2. Firms

Households supply labour to both the tradable and non-tradable sectors, such that

$$N_t = N_{H,t} + N_{N,t} = \lambda N_t^C + (1 - \lambda) N_t^U. \quad (8)$$

Labour is completely mobile across sectors, therefore there is only one wage rate in equilibrium.

2.2.1. Non-tradable goods sector

Final goods producers Competitive final goods producers assemble intermediate goods. We denote by $Y_{N,t}(i)$ the quantity demanded of each variety i , and by $P_{N,t}(i)$ the price charged by the individual firm producing variety i . The final good producer's optimisation problem is to choose $\{Y_{N,t}(i)\}$, $i \in [0, 1]$ to maximise profits

$$\max_{Y_{N,t}(i)} \left\{ P_{N,t} Y_{N,t} - \int_0^1 P_{N,t}(i) Y_{N,t}(i) di \right\}$$

⁵ See Appendix A for the specifications of all exogenous variables.

subject to an aggregation technology with constant elasticity of substitution,

$$Y_{N,t} = \left(\int_0^1 Y_{N,t}(i)^{\frac{\epsilon-1}{\epsilon}} di \right)^{\frac{\epsilon}{\epsilon-1}}.$$

Profit maximisation, taking as given the final goods price $P_{N,t}$ and the prices for the intermediate goods $P_{N,t}(i)$, yields the set of demand schedules

$$Y_{N,t}(i) = \left[\frac{P_{N,t}(i)}{P_{N,t}} \right]^{-\epsilon} Y_{N,t}. \quad (9)$$

Intermediate goods producers Intermediate goods firms use labour and an *intermediate imported input* $M_{F,t}$ in production,

$$Y_{N,t}(i) = A_{N,t} M_{F,t}^\kappa N_{N,t}^{1-\kappa}(i) \quad (10)$$

where $A_{N,t}$ is the exogenous sector-specific productivity.

Firms are monopolistically competitive and adjust prices according to Rotemberg (1982), incurring an adjustment cost each time,

$$AC_t(i) = \frac{\xi}{2} \left(\frac{P_{N,t}(i)}{P_{N,t-1}(i)} - \Pi_N \right)^2 Y_{N,t} P_{N,t}$$

where ξ summarises the degree of nominal rigidity in the economy and Π_N denotes steady-state non-tradable gross inflation. Finally, we obtain the Phillips Curve for non-tradable goods,

$$\Pi_{N,t} (\Pi_{N,t} - \Pi_N) = \mathbb{E}_t \left[\Lambda_{t,t+1}^U \Pi_{N,t+1} (\Pi_{N,t+1} - \Pi_N) \frac{Y_{N,t+1} P_{N,t+1}}{Y_{N,t} P_{N,t}} \right] + \frac{\epsilon}{\xi} \left(\frac{MC_t}{P_{N,t}} - \frac{\epsilon-1}{\epsilon} \right) \quad (11)$$

where MC_t is the marginal cost obtained from differentiating the total cost function.⁶ Using the demand relation and the labour market clearing condition $N_{N,t} = \int_0^1 N_{N,t}(i) di$, we can write the aggregate production function as

$$Y_{N,t} \Delta_t = A_{N,t} M_{F,t}^\kappa N_{N,t}^{1-\kappa}$$

where $\Delta_t = \left(1 - \frac{\xi}{2} (\Pi_{N,t} - \Pi_N)^2 \right)$ captures the output loss caused by the costly adjustment of prices.

2.2.2. Tradable goods sector

The tradable sector is internationally competitive. Domestic firms in this sector take prices as given at $P_{H,t} = \mathcal{E}_t P_{H,t}^*$. We assume that foreign price dynamics ($P_{H,t}^*$) are driven by developments in world markets and therefore exogenous from the perspective of our small open economy. Tradable sector production is given by

$$Y_{H,t} = A_{H,t} N_{H,t}^{1-\zeta} \quad (12)$$

where $A_{H,t}$ is the exogenous sector-specific productivity. The problem of a firm in the tradable sector is to maximise profits

$$\max_{N_{H,t}} P_{H,t} Y_{H,t} - W_t N_{H,t}$$

subject to the production technology (12). This yields

$$\frac{W_t}{P_{H,t}} = (1 - \zeta) A_{H,t} N_{H,t}^{-\zeta}. \quad (13)$$

2.3. Monetary policy

The monetary policy authority sets the interest rate according to the following Taylor rule,

$$\frac{I_t}{I} = \left(\frac{\Pi_t}{\Pi} \right)^{\phi_\pi} \left(\frac{Y_t}{Y} \right)^{\phi_y} \quad (14)$$

where $I_t = (1 + i_t)$ is the gross nominal interest rate and I, Π, Y are the steady state level of nominal interest rate, inflation and output, respectively.⁷

⁶ See Appendix A for derivations.

⁷ We chose a Taylor rule that targets the inflation rate, rather than unobservable variables such as the natural rate or the output gap. This type of rule approximates the remit of most central banks that follow a price stability mandate, and is in line with the literature (Gali, 2015).

2.4. Equilibrium

Given the tradable and foreign import prices $P_{T,t}^*, P_{F,t}^*$, the monetary policy rule determining i_t , foreign output Y_t^* , inflation Π_t^* and interest rates i_t^* , and an initial condition on price dispersion, the equilibrium is given by a sequence of quantities $\{C_{H,t}, C_{T,t}, C_{N,t}, C_{F,t}, C_t, C_t^U, C_t^C, N_t^U, N_t^C, N_{H,t}, N_{N,t}, B_{t+1}^H, B_{t+1}^*, Y_{N,t}, Y_{H,t}, M_{F,t}, \Psi_t\}_{t=0}^\infty$ and prices $\{A_{t,t+1}^U, \Pi_{H,t}, \Pi_{N,t}, \Pi_{T,t}, \Pi_{F,t}, \Pi_t, W_t, \tau_t, S_t, \varepsilon_t, A_t\}_{t=0}^\infty$ such that firms and households maximise their objectives, and the goods, labour and financial markets clear,

$$\begin{aligned} Y_t &= C_{H,t} + C_{H,t}^* + C_{N,t} \\ Y_{H,t} &= C_{H,t} + C_{H,t}^* \\ Y_{N,t} &= C_{N,t} \\ B_t &= 0 \\ B_t^* &= B^* \\ N_t &= N_{H,t} + N_{N,t} = \lambda N_t^C + (1 - \lambda) N_t^U \\ Y_t^* &= C_t^*. \end{aligned}$$

2.5. Natural real interest rate and natural level of output

To understand the impact of our shocks and to determine the appropriate real policy interest rate, we calculate the natural level of output (Y_t^n) and the natural real interest rate (r_t^n).

Y_t^n is the level of output that would arise under flexible prices. To derive it, we need to determine the profit-maximising flexible price for the domestic non-tradable good firms, which is the only sector facing nominal rigidities. Profit-maximising firms set the flexible optimal price in order to equalise marginal cost and marginal revenue. This is equivalent to setting the real marginal cost to the inverse of the desired markup,

$$MC_{N,t} = \frac{\epsilon - 1}{\epsilon}.$$

This yields

$$\frac{\epsilon - 1}{\epsilon} = \frac{(1 - \tau)}{A_{N,t}} ((C_t^n)^\sigma (N_t^n)^\phi)^{1-\kappa} \left(\frac{P_{F,t}}{P_t} \right)^\kappa \left[\left(\frac{\kappa}{(1 - \kappa)} \right)^{1-\kappa} + \left(\frac{(1 - \kappa)}{\kappa} \right)^\kappa \right]. \quad (15)$$

Using the UIP condition as well as the equilibrium condition for output, we can express the natural real interest rate as the risk-free real interest rate consistent with the Euler equation when output is at its natural level at all times,

$$\begin{aligned} (C_{t+1}^n)^\sigma &= \beta(1 + r_t^n)(C_t^n)^\sigma \\ (1 + r_t^n) &= \frac{1}{\beta} \left[\left(\frac{Y_{t+1}^n}{Y_t^n} \right) \frac{\Sigma_{\zeta\theta,t}}{\Sigma_{\zeta\theta,t+1}} \right]^\sigma \end{aligned}$$

$$\text{where } C_t = \frac{1}{\Sigma_{\zeta\theta,t}} Y_t \text{ and } \Sigma_{\zeta\theta,t} \equiv \left[\zeta \left(\frac{P_t}{P_{N,t}} \right)^l + (1 - \theta)(1 - \zeta) \left(\frac{P_{T,t}}{P_{H,t}} \right)^\mu \left(\frac{P_t}{P_{T,t}} \right)^l + \theta \left(\frac{P_t}{P_{H,t}} \right)^\mu \frac{S_t^{\mu-1}}{D_t^{\frac{1}{\sigma}}} \right].^8$$

3. Calibration

We calibrate the model at a quarterly frequency. Our baseline aggregate calibration adopts standard preference and technology parameters from the New Keynesian literature. We assume a discount factor $\beta = 0.9877$ which implies an annual nominal rate of 5% in steady state. In our baseline scenario, we set the share of hand-to-mouth consumers in the population equal to 30%, following Kaplan et al. (2014), Kaplan et al. (2018) and Kaplan and Violante (2022). We set the elasticity of intertemporal substitution $\sigma = 2$. This is consistent with recent literature (Jones, 2023; Kimball et al., 2024) documenting the limitations of log-utility assumptions in economic models. For simplicity, we consider unitary elasticities of substitution between foreign and domestic tradable goods (μ), and between tradable and non-tradable goods (ι), and the Frisch elasticity.⁹ In the baseline calibration, we set $\theta = 0.6$, which implies a steady-state import share of approximately 25 percent, consistent with Harrison and Oomen (2010). We set κ , the income share of foreign primitive input in the production of non-tradable goods, close to 0 in the baseline. A positive κ (around 0.3 to match the non-labour share of income) amplifies the quantitative impact of the fragmentation scenarios we study, while leaving the qualitative interpretation unchanged.¹⁰ Finally, we calibrate ζ , the share of non-tradable goods in the consumption basket to be 0.6.

⁸ See Appendix A for a full derivation.

⁹ This is consistent with the view that elasticities of substitution are high in the medium- to long-run, if fragmentation is a permanent, phased-in process. However, results are robust to usual variation in these parameters (Corsetti et al., 2009). See Appendix C.4.

¹⁰ See Section C.2.

Table 1

This table presents the baseline quarterly calibration.

Parameter	Definition	Value	Source/Target
β	Household discount factor	0.9877	Annual net nominal rate $r_{ss} \approx 5\%$
σ	Household risk aversion	2	Corsetti et al. (2009)
κ_ℓ	Labour disutility	≈ 5	Literature
ϕ	Inverse Frisch elasticity	1	Galí and Monacelli (2005)
λ	Share of constrained households	0.3	Kaplan et al. (2018)
θ	Share of foreign tradables	0.6	Harrison and Oomen (2010)
ς	Share of non-tradables	0.6	Literature
μ	Elasticity of substitution between home and foreign goods	1	Literature
ι	Elasticity of substitution between tradables and non-tradables	1	Literature
ϵ	Elasticity of substitution between non-tradable varieties	11	10% gross final markup
ϕ_π	Interest sensitivity to inflation	1.5	Literature
ϕ_y	Interest sensitivity to output	0	Literature
ξ	Rotemberg adjustment cost	57	Avg lifetime of prices 3Q
ζ	Labour share in tradables	0.8	Literature
κ	Foreign input share in non-tradables	$\approx 0; 0.3$	Literature
ρ_s	Persistence coefficient	0.9	$s \in \{N, H^*, C^*, r^*\}$
ρ_H	Tradable TFP persistence coefficient	0.85	
ρ_F	Persistence coefficient of foreign price	0.75; 1	
χ	Portfolio adjustment cost	0.001	Literature

3.1. Special case: RANK

To establish some basic intuition for our results, we study our three fragmentation scenarios in a representative agent model. This corresponds to a special case of our baseline model, where the share of constrained households is $\lambda = 0$.

Gradual fragmentation To simulate a gradual shift towards a more restrictive trade environment, Fig. 4 plots the impulse response functions (IRFs) of various macroeconomic aggregates to a gradual increase in import prices ($P_{F,t}^*$). In this scenario, import prices stabilise in the medium term, with a cumulative increase of 100 percent. The price of imported goods, $P_{F,t}^*$, will affect demand directly, both through foreign goods in the consumption basket ($C_{F,t}$) and through imported inputs ($M_{F,t}$) in non-tradable goods production. Additionally, it indirectly affects demand through real wages.

An increase in imported inflation follows from the gradual increase in the price of foreign goods. This places upward pressure on CPI inflation, but is more than offset by the fall in domestic inflation, which declines due to the falls in both non-tradable and tradable inflation. This fall in domestic inflation is driven by the fall in consumption, which responds to the drop in households' permanent real income. Households partly compensate for the fall in real wages by increasing labour supply, which mitigates the impact of higher import prices on aggregate supply. Overall, the anticipation effect of lower real incomes leads to demand falling by more than supply, and consequently, to a fall in domestic inflation. Aggregate CPI inflation, which is a composite of domestic and imported goods inflation, falls on balance. This is reflected in a decrease in the natural real rate of interest, indicating that when demand materially adjusts in anticipation, the effect can be disinflationary. This prompts the central bank to ease policy, by lowering the nominal interest rate, in line with the Taylor-type rule characterising its reaction function.

Front-loaded fragmentation Fig. 5 shows the effect of a permanent and immediate increase in foreign prices $P_{F,t}^*$. This type of shock is intended to capture rapid 'fragmentation events', such as export controls on imported goods, supply chain disruptions, or tariff hikes that are immediately and fully implemented, without any anticipation.¹¹

The increase in the price of foreign goods leads to a sharp increase in imported inflation, which quickly reverts to its steady-state level. Aggregate consumption falls on impact and stabilises at a lower steady state. Non-tradable inflation falls, following the fall in consumption demand. Domestic tradable inflation also decreases initially, following the fall in consumption. Tradable inflation rises sharply, reflecting the surge in imported-goods inflation. Altogether, this leads to a significant spike in aggregate CPI inflation. Non-tradable output falls temporarily as the higher price of the foreign input restricts supply, but then partially recovers as households increase labour supply to compensate for losses in real income. The economy enters a temporary period of stagflation, with prices increasing and aggregate demand decreasing. Unlike the gradual scenario, there is no change in the natural real rate. The Taylor rule followed by the central bank leads to an increase in the nominal rate in order to return inflation to target.

¹¹ A caveat is in order: our analysis does not account for the use of fiscal proceeds from tariffs. One way to justify this would be to assume that proceeds from tariffs are used to stimulate supply and demand in equal amounts, without affecting the output gap or inflation. Alternatively, we can assume that import restrictions take the form of non-tariff barriers (which comprise the majority of trade restrictions), in which case there is no tax revenue to be rebated. More broadly, this exercise is intended to capture the realignment of trade, whereby geopolitics forces domestic firms to switch from low-cost to geopolitically friendly suppliers, leading to efficiency losses.

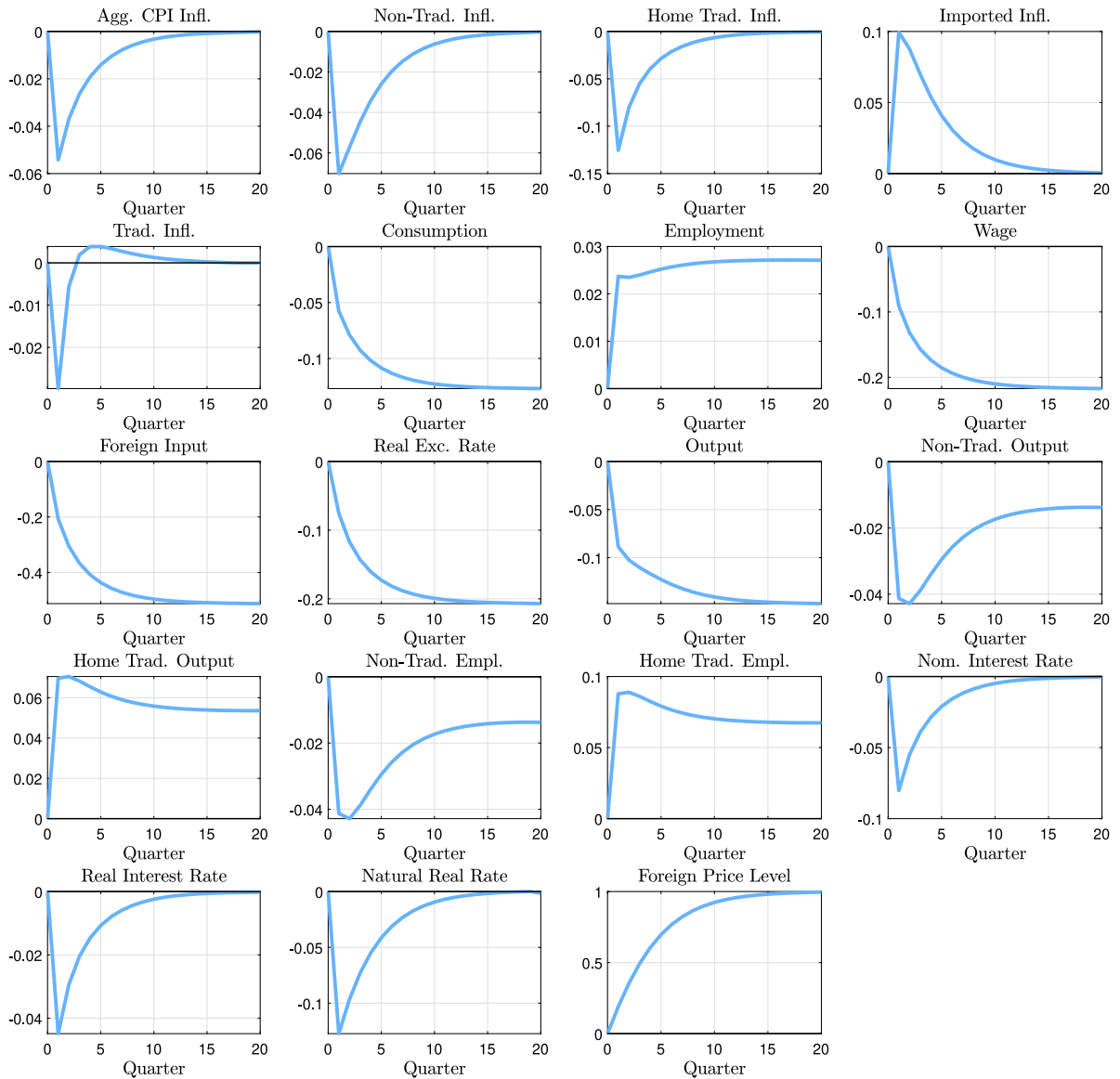


Fig. 4. IRFs to a 100% gradual increase in foreign price level.

Notes: The results are generated under a RANK calibration ($\lambda = 0$). All the other parameters are calibrated according to Table 1.

Fall in tradables productivity $A_{T,t}$ We consider an additional shock that can result from ‘trade fragmentation’: a persistent and permanent decrease in the productivity of the tradable goods sector, which makes domestic production of tradable goods less competitive in the global market. In Fig. 6, we show the response to a negative one standard deviation shock to total factor productivity in the tradable sector, $A_{T,t}$.

As in the standard New Keynesian model, this constraint on home tradable supply results in more employment per unit of output and an increase in inflation as marginal costs rise. With the gradual deterioration in TFP, real wages and consumption fall, reflecting the negative wealth effect. Inflation in the non-tradable sector is negligible as both demand and marginal costs decrease in line with the decline in real wages. As a result, the fall in non-tradable inflation is not enough to outweigh the increase in home tradable inflation, leading to a moderate increase in aggregate CPI inflation in this scenario. Monetary policy, which tracks CPI inflation, is initially contractionary, as this is needed to bring CPI inflation back to target, while the natural rate falls (reflecting lower domestic inflationary pressures), and gradually returns to steady state as the economy recovers.

In summary, as all three scenarios consider shocks that constrain supply capacity, the supply-side effects are unambiguous. To capture general equilibrium effects, this section uses a simple framework to demonstrate how aggregate demand adjusts differently in various scenarios that model aspects of trade fragmentation. In the gradual fragmentation scenario, a steady increase in import prices

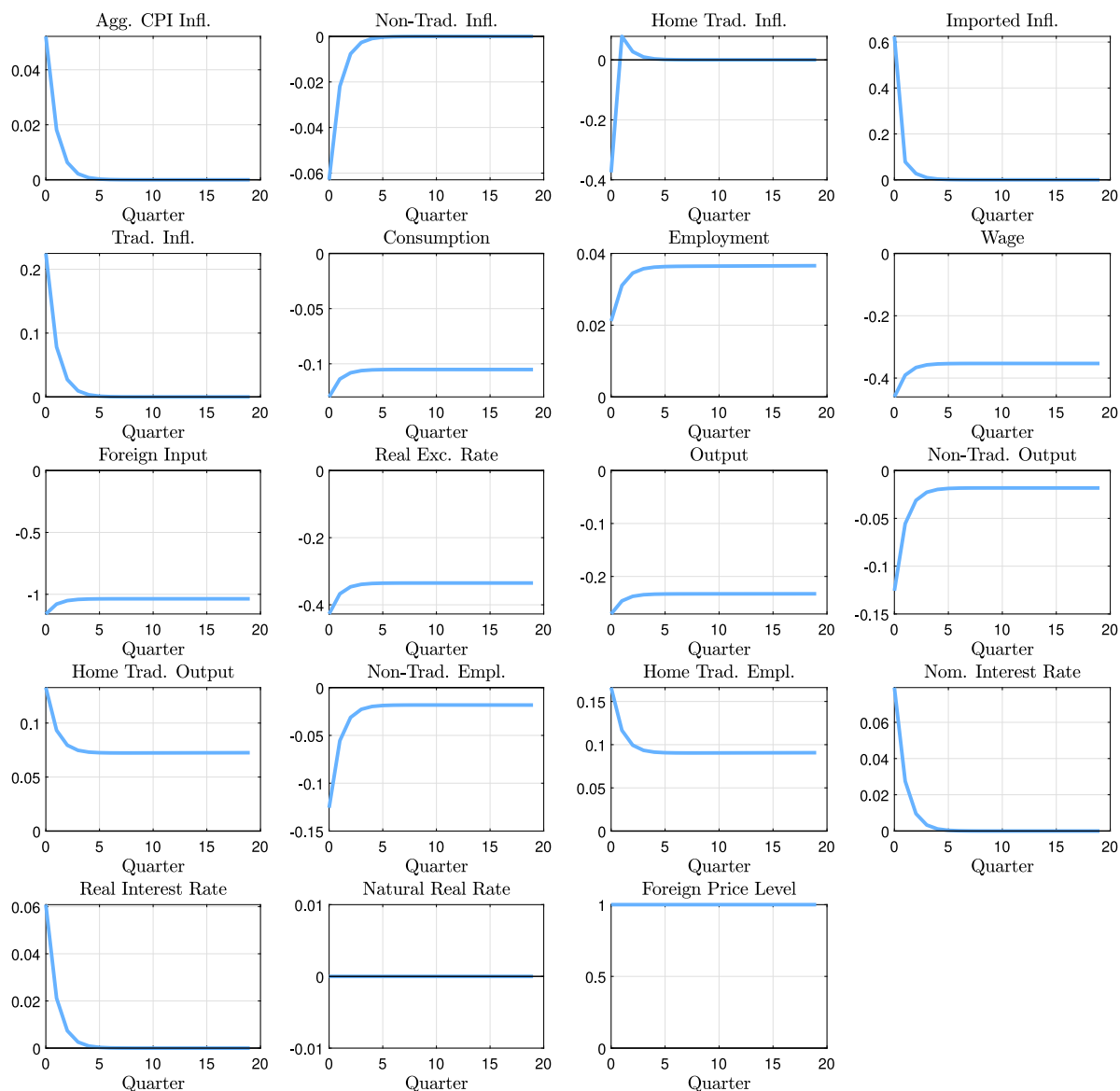


Fig. 5. IRFs to a 100% front-loaded increase in foreign price level.

Notes: The results are generated under a RANK calibration ($\lambda = 0$). All the other parameters are calibrated according to Table 1.

reduces the purchasing power of labour income, through an increase in the price of imported consumption goods as well as through a fall in nominal wages. If this change is expected to be permanent, then households also expect a permanent fall in purchasing power, leading to a fall in consumption spending. Therefore, a fall in permanent labour income leads to a fall in demand, which affects the price-level response to the initial increase in import prices. This scenario leads to stagnation, with lower real incomes and disinflationary pressures. In contrast, a front-loaded fragmentation scenario, which takes the form of a sharp permanent increase in import prices, may create a short-term tradeoff for policymakers, with weaker activity and higher CPI inflation. Finally, a fall in tradable sector productivity has, in principle, an ambiguous impact on CPI inflation, but it is moderately inflationary in our calibration.

These results suggest that the form in which fragmentation materialises, the extent to which it is anticipated by households, and households' ability to smooth consumption over time, all matter. The next section will consider the case where a proportion of households are unable to smooth consumption in response to changes in their permanent income.

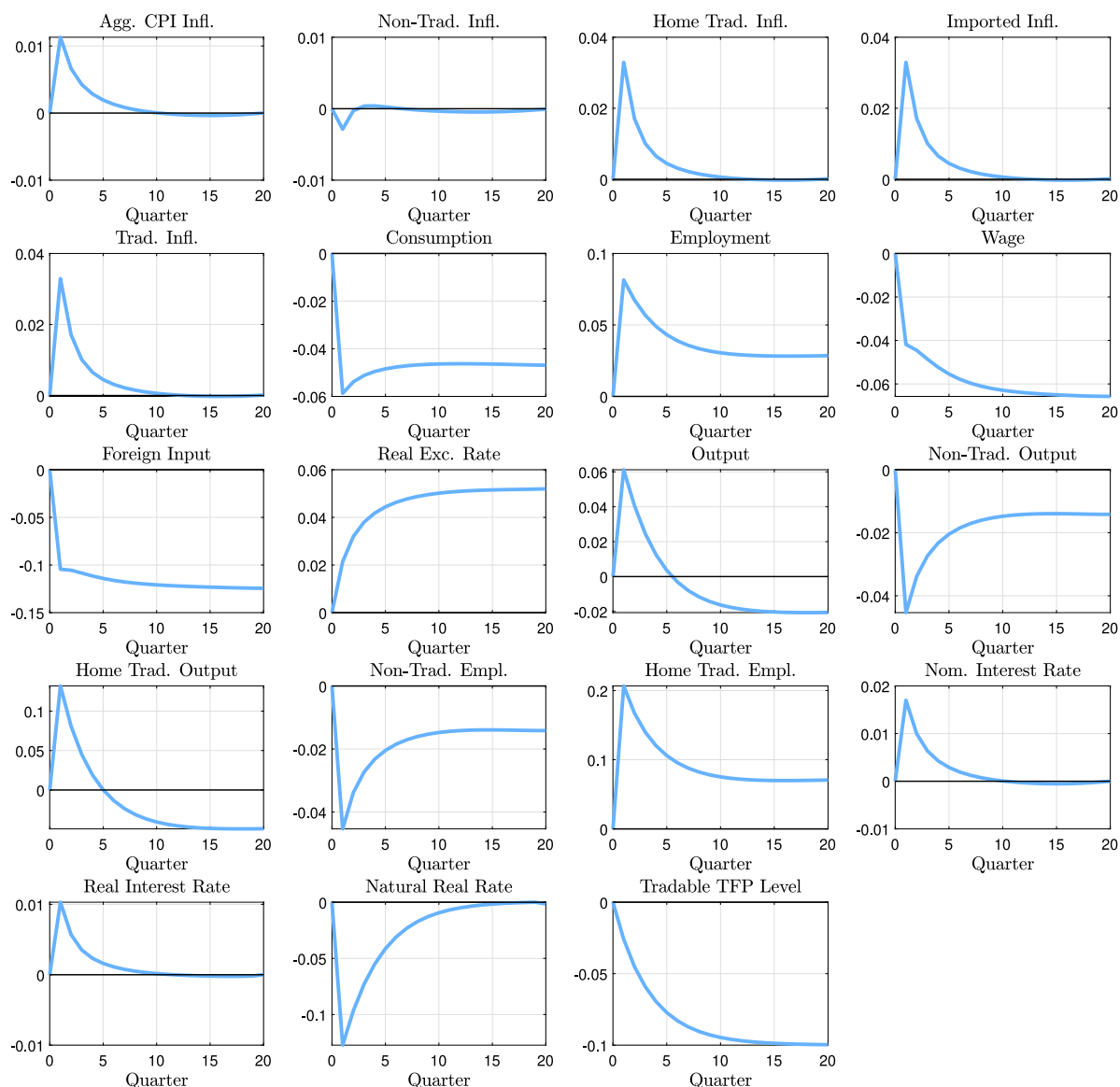


Fig. 6. IRFs to a 10% gradual and permanent decrease in tradable TFP.

Notes: IRFs to a negative TFP shock in the tradable sector. The results are generated under a RANK calibration ($\lambda = 0$). All the other parameters are calibrated according to Table 1.

3.2. Baseline model: TANK

Two important factors in gauging how inflation will respond to these trade-related shocks are the degree of forward-looking behaviour in demand and the extent to which households can effectively smooth consumption in the presence of a shock. This section considers a more general framework that allows for household heterogeneity on this front.

Relative to the previous section, the presence of constrained households introduces agents who cannot smooth consumption in response to the shock, although they can adjust their labour supply. The fall in real incomes affects these households directly, while the fall in labour demand and aggregate demand by unconstrained households affects them indirectly. As in the previous section, we consider three scenarios to show how the form of fragmentation will affect the demand-side adjustment.

The fall in permanent income highlighted in the previous section will be mitigated by the proportion of constrained households. While all households consume out of permanent income in a RANK model, only a proportion λ of households do so in a TANK model. The presence of constrained households lessens the adverse demand-side effect since they cannot cut consumption in anticipation of the shock. However, the fall in consumption from unconstrained households also affects constrained households, who consume out of labour income only and cannot smooth consumption over time.

Gradual fragmentation To simulate a gradual shift towards a more restrictive trade environment, Fig. 7 plots the impulse response functions to an increase in the price of imported goods, which stabilises at a 100 percent higher level in the medium term. As in the RANK case, the price of imported goods, $P_{F,t}^*$, affects demand directly, both through the consumption basket (via $C_{F,t}$) and through imported inputs in production ($M_{F,t}$). Additionally, it indirectly affects demand through real wages. The aggregate responses in the TANK model are largely similar to the RANK setting (Fig. 4), however the responses of constrained and unconstrained households differ. Unconstrained households, who can smooth consumption through borrowing, reduce consumption by less than constrained households. Constrained households partially compensate for the decline in real wages by increasing labour supply, which mitigates the adverse effect of the shock on supply. Output and hours worked fall by more in the non-tradable sector, reallocating to the tradable sector, where both increase. Overall, the contraction in output is smaller in the TANK case. On the demand side, unconstrained households lower spending in response to lower permanent incomes, while constrained households reduce consumption given higher prices and the aggregate fall in domestic demand. Overall, the anticipation effect of lower real incomes on demand by unconstrained households and the effect of lower current income on demand by constrained households lead to aggregate demand falling more than supply, generating downward pressure on domestic inflation. As in the RANK model, this decline than offsets the persistent increase in imported inflation, leading to a fall in aggregate CPI inflation. The natural real rate of interest declines, suggesting that when demand adjusts, the effect can be disinflationary. The policy rate falls in response, in line with the rule characterising the central bank's reaction function.

Front-loaded fragmentation Fig. 8 shows the effect of a permanent and immediate increase in foreign prices $P_{F,t}^*$. This scenario leads to a sharp increase in imported inflation, which quickly reverts back to the steady-state level. The responses of nominal variables in a TANK model are similar to the RANK case. In the TANK model, aggregate consumption falls by more due to the larger response of the hand-to-mouth consumers. Consumption falls significantly on impact, before settling at a lower steady state level for both constrained and unconstrained consumers, and in the aggregate. Non-tradable output and employment fall temporarily as the higher price of the foreign input restricts supply, but both recover as households increase their labour supply to compensate for income losses. Relative to the RANK case, the TANK setting features a larger fall in non-tradable output and employment, which is reallocated to the tradable sector, where output and employment increase by more. As in the RANK case, aggregate inflation increases in this scenario, driven by largely by the surge in imported inflation, and the economy enters a temporary period of stagflation. The policy rule followed by the central bank leads to an increase in the policy rate. Unlike the gradual fragmentation scenario, the natural real rate remains unchanged.

Fall in tradables productivity Finally, we consider a permanent and gradual decrease in the productivity of the tradable goods sector, which makes domestic production less competitive relative to foreign production. Fig. 9 plots the responses of all variables to a one standard deviation negative shock to total factor productivity in the tradable sector, $A_{T,t}$. Home tradable employment increases relative to home tradable output. Inflation in this sector also increases, due to the rise in the marginal cost of production. Comparing the RANK and TANK models highlights how the tradable TFP shock affects labour income and firm profits differently from an import price shock. Constrained households, who only consume out of labour income, experience a much smaller drop in consumption than unconstrained households, whose consumption also depends on firm profits. While constrained employment increases only moderately, unconstrained employment rises to a much greater extent. Overall, there is a smaller fall in consumption in the TANK model, as labour incomes are supported by higher hours of work. Non-tradable output and employment fall by a smaller extent, relative to the RANK model. As a result, aggregate output falls by less overall. Nevertheless, this scenario is still moderately inflationary, as non-tradable inflation falls by a small amount, failing to outweigh the spike in tradables inflation.

In summary, the form in which fragmentation takes place will matter for the balance of supply and demand. A sudden increase in import prices has effects that differ from those of a gradual increase or an adverse shock to productivity in the tradable sector. The presence of hand-to-mouth households mitigates the adverse impact of the fragmentation scenarios on aggregate supply. In the TANK model, the demand-side impact features competing effects: while fewer forward-looking agents reduce their consumption in anticipation of lower future incomes, this still affects the demand of hand-to-mouth households, who have a higher marginal propensity to consume out of labour income.¹² Finally, the TANK model highlights how aggregate demand can depend on the distributional effects of the various shocks. This is most salient with the adverse TFP shock, which has a less negative effect on labour income relative to an import price shock. Nevertheless, the net inflationary impact and the appropriate monetary policy response in each of the fragmentation scenarios remain the same across the RANK and TANK models.

Robustness and extensions We assess the robustness of our results and clarify the underlying mechanisms in Appendix C by varying several key parameters of the model, including the degree of home bias in consumption and the share of imported inputs in domestic production. Greater openness increases the economy's exposure to foreign shocks. In the scenarios where import prices increase, more open economies experience a greater fall in demand. This is reflected in a more pronounced decline in the natural real rate of interest in the gradual case. In the contrast, in response to a negative TFP shock to the domestic tradables sector, openness allows for diversification away from home tradables.

¹² Including investment would increase the importance of forward-looking behaviour for our results. As firms are more forward-looking than households, a gradual increase in import prices or a deterioration in productivity would lead to a fall in investment, deepening the contraction in demand and intensifying disinflationary pressures. Similarly, including uncertainty around the price path will tend to reinforce the anticipation effect, depressing demand more in response to the gradual shocks to import prices or productivity.

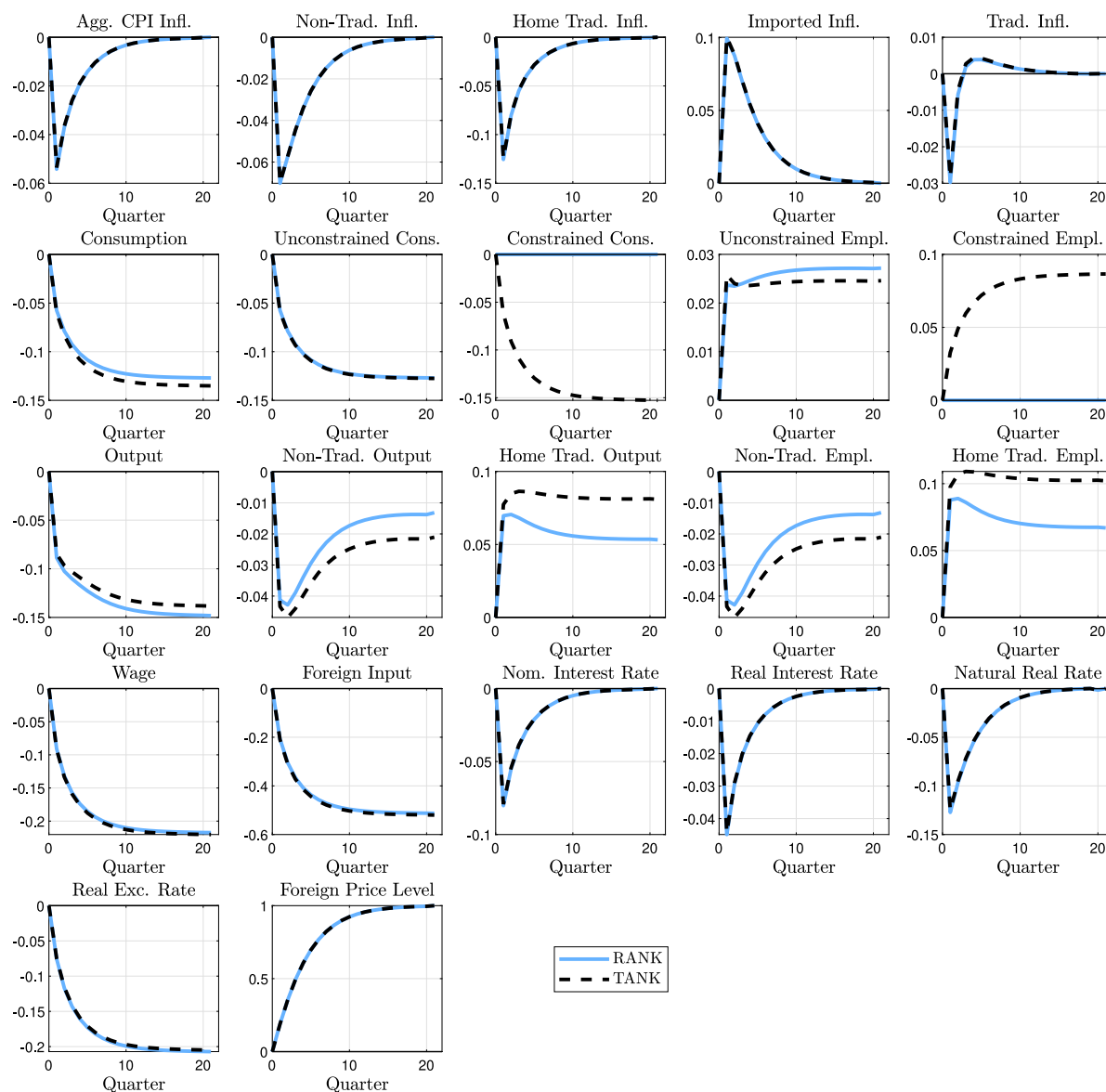


Fig. 7. IRFs to a 100% gradual increase in foreign price level.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the TANK case ($\lambda = 0.3$) is shown in the black dashed lines. All other parameters are calibrated according to Table 1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

We also extend the analysis to incorporate additional domestic supply-side constraints, including greater reliance on imported inputs in production and nominal wage rigidities. A higher share of imported inputs in production raises employment across the scenarios, as labour demand increases when import prices rise or productivity falls. However, this stimulates demand only moderately through labor income. Introducing wage stickiness leads to a less disinflationary outcome in the gradual fragmentation scenario and more persistent inflation in the front-loaded case. The demand-side effect of our various shocks are preserved: while wage stickiness moderates the fall in real wages, output and employment decline more sharply relative to the baseline.

Finally, our results across the three scenarios remain robust to additional sensitivity checks, such as allowing for greater price flexibility or alternative substitution elasticities. Allowing prices to adjust more frequently increases disinflationary pressure in the gradual scenario, while reducing the trade-off between higher inflation and lower activity in the front-loaded case. Increased substitutability between home and foreign tradables, and lower substitutability between tradables and non-tradables attenuates the impact of the terms-of-trade shock. This scenario matters most for the gradual scenario, where it leads to a less stagnation relative to the baseline calibration.

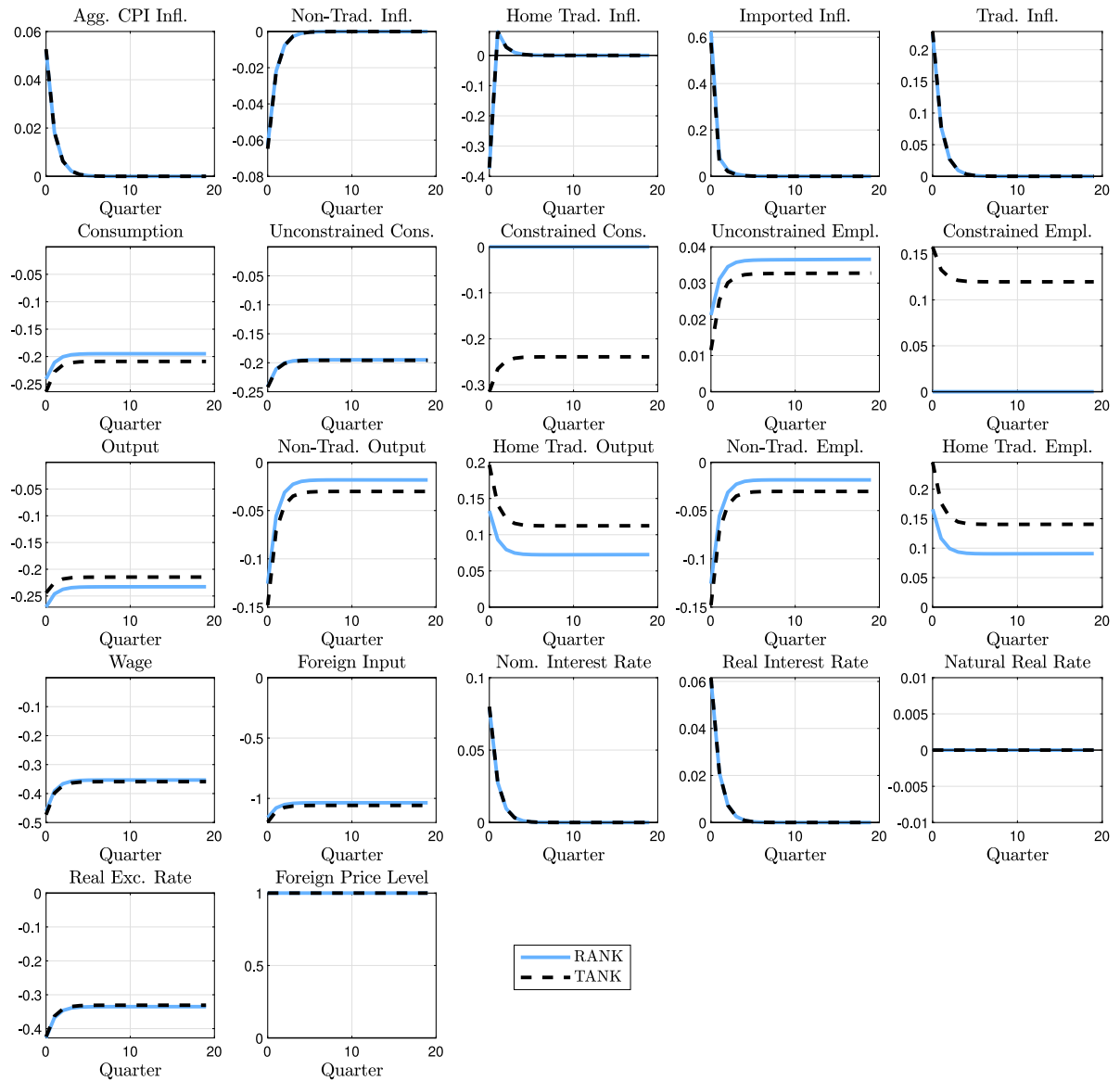


Fig. 8. IRFs to a 100% front-loaded increase in foreign price level.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the TANK case ($\lambda = 0.3$) is shown in the black dashed lines. All other parameters are calibrated according to Table 1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

4. Welfare

In this section, we study the welfare optimal response to the range of fragmentation scenarios in our model, following Drechsel et al. (2025).

4.1. Social planner's solution

We characterise the social planner's solution in a small open economy. To maximise household utility, the social planner chooses the composition of consumption ($C_{H,t}$, $C_{F,t}$, $C_{N,t}$), input intensity in non-tradable production ($M_{F,t}$), resource allocation across sectors ($N_{N,t}$, $N_{H,t}$), and the external asset position (B_t^*), taking preferences, production, resource constraints, and international prices as

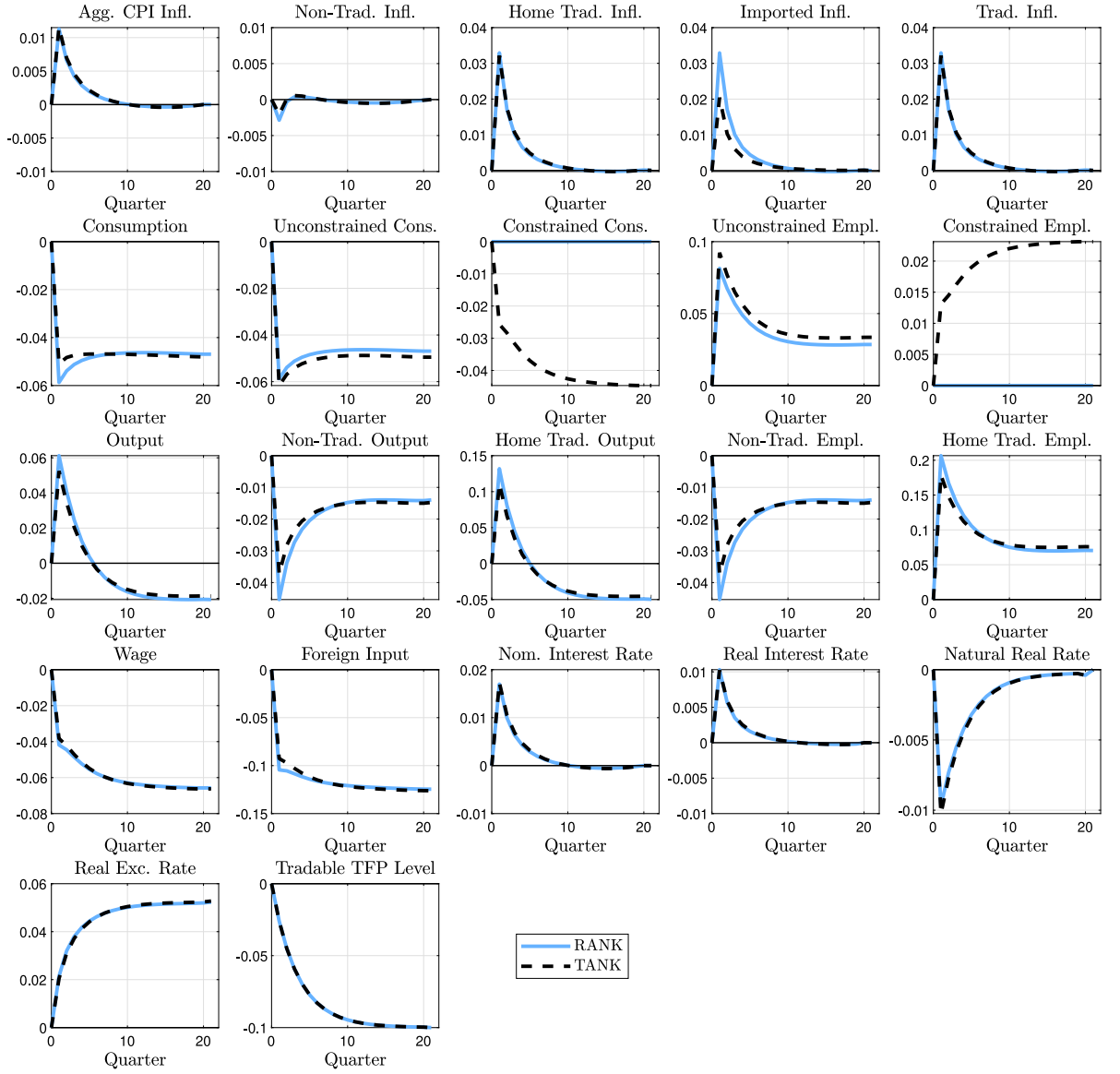


Fig. 9. IRFs to a 10% gradual and permanent decrease in tradable TFP.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the TANK case ($\lambda = 0.3$) is shown in the black dashed lines. All other parameters are calibrated according to Table 1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

given

$$\max_{\{C_{H,t}, C_{F,t}, C_{N,t}, N_{H,t}, N_{F,t}, M_{F,t}, B_t^*\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t \left[(1-\zeta)(\theta \log C_{F,t} + (1-\theta) \log C_{H,t}) + \zeta \log C_{N,t} - \frac{(N_{H,t} + N_{N,t})^{1+\phi}}{1+\phi} \right]$$

subject to

$$A_{N,t} M_{F,t}^{\kappa} N_{N,t}^{1-\kappa} + A_{H,t} N_{H,t}^{1-\zeta} = C_{H,t} + C_{N,t} + C_{H,t}^* \quad (16)$$

$$P_{F,t}^* C_{F,t} - P_{H,t}^* C_{H,t}^* + P_{F,t}^* M_{F,t} = (1 + i_{t-1}^*) B_{t-1}^* - \frac{\chi}{2} (B_t^* - \bar{B}^*)^2 - B_t^* \quad (17)$$

$$C_{H,t}^* = \frac{C_{H,t}}{C_{F,t}} \frac{\theta}{(1-\theta)} \theta^* C_t^*. \quad (18)$$

The first constraint is a resource constraint, the second captures the trade balance, while the third describes foreign demand for home-produced goods. The solution to the planner's problem is sketched in Appendix B.

Comparing efficient and decentralised outcomes highlights the distortionary effects of price rigidity in the non-tradable sector, an inefficient use of foreign bonds to smooth shocks due to the cost of changing bond positions, and a suboptimal policy response to the shocks. Abstracting from frictions in the decentralised economy, the social planner is able to find a more optimal allocation of inputs within and across sectors and a more optimal choice of household consumption and employment. In this analysis, we focus on a RANK model under Cole–Obstfeld preferences ($\sigma = \mu = \iota = 1$).

Gradual fragmentation Fig. 10 shows the response of the social planner to a gradual increase in import prices. The import price shock affects the optimal intensity of imported inputs in the non-tradable sector, which becomes more labour-intensive instead. As the marginal product of labour falls in this sector, labour reallocates towards the home tradable sector. This shock is effectively an adverse terms-of-trade shock, increasing the relative price of foreign tradables to home tradables. As a result, there is also a change in the composition of domestic consumption, which switches from foreign tradables to home tradables.

The most notable difference with respect to the decentralised equilibrium is a small expansion, not a sharp contraction in the non-tradable sector, and a much smaller expansion in the home-tradable sector. This comparison suggests that although some reallocation between sectors is efficient, nominal rigidities in the non-tradable sector result in too much reallocation: in the decentralised equilibrium, there is a sharp fall in quantities (output and employment) in the non-tradable sector, and an increase in labour in the home tradable sector. In addition, the labour intensity in the home-tradable sector resulting from the shock is higher in the decentralised equilibrium. In the decentralised equilibrium, this excess contraction in output and employment in the non-tradable sector may also be attributable to a policy rule targeting aggregate CPI inflation.

The outcomes in the efficient allocation suggest that the social planner relies less on a large reallocation of resources from non-tradables to tradables and more on accumulating foreign bonds to smooth the shock intertemporally in response to import prices that increase gradually and permanently. The social planner is able to achieve a better trade-off between consumption and employment, by tolerating a slightly larger fall in consumption over time in exchange for a much smaller increase in employment.

Front-loaded fragmentation In Fig. 11, we show the response of the social planner to a front-loaded increase in import prices. Qualitatively, we see some of the same patterns from the gradual case: there is a fall in imported consumption goods and imported inputs for non-tradable production and an increase in consumption of home tradables relative to foreign tradables. Unlike the gradual scenario, these adjustments take place immediately and there is a mild contraction in the non-tradable sector.

As in the decentralised equilibrium (Fig. 5), the domestic adjustment in response to this shock involves a reallocation of resources towards the home tradable sector. However, this reallocation occurs to a much smaller extent than in the decentralised case, as the social planner does not face nominal rigidities in the non-tradable sector. Consequently, the decline in output and employment in the non-tradable sector is much more moderate relative to the decentralised equilibrium. Finally, as in the gradual case, the social planner is able to trade off a slightly larger fall in consumption (driven by a large fall in consumption of foreign tradables) for a small increase in aggregate employment.

Tradables productivity Finally, we consider the response of the social planner to a gradual and permanent deterioration in home tradables productivity in Fig. 12. As expected, the home tradable sector contracts as consumption switches from home tradables to foreign tradables. In the decentralised equilibrium, the non-tradable sector contracted, while labour intensity in the home tradable sector increased. However, in the efficient allocation, there is an expansion in non-tradables production and a contraction in home tradables production with no increase in labour intensity. This suggests the reallocation from home tradables to non-tradables is inefficiently low in the decentralised equilibrium due to nominal rigidities in the non-tradable sector. Finally, most notably, consumption increases in the efficient allocation, while it decreases in the decentralised equilibrium. The increase in consumption is driven by an increase in the consumption of foreign tradables. In the efficient allocation, employment increases gradually to a higher steady-state level.

To summarise, this section considered the efficient allocation across the three fragmentation scenarios. This exercise highlights the following inefficiencies in the decentralised equilibrium. First, sticky non-tradables prices prevent optimal domestic reallocation between sectors. Second, the cost of adjusting bond positions results in a suboptimal intertemporal response to shocks. A social planner chooses different allocations for the composition of consumption, the intensity of imported production inputs, the allocation of labour across sectors, and external assets to attain better outcomes for aggregate consumption and employment. The efficient allocation suggests that in the decentralised equilibrium, there is generally too much reallocation to the home-tradable sector in the scenarios with import price shocks, and too little reallocation to the non-tradable sector in the case of an adverse shock to TFP in the home tradable sector.¹³

¹³ A social planner in a TANK framework internalises the distribution of consumption and income risk across households. Even under utilitarian welfare weights, the TANK planner reallocates resources differently than in a RANK economy because constrained households have higher marginal utility of consumption, are unable to smooth consumption intertemporally, and consume entirely out of labour income. Under both gradual and front-loaded import price shocks, the TANK planner would mitigate the sharp fall in real incomes that would otherwise affect constrained households most in the decentralised equilibrium. Accordingly, in response to import price shocks, the TANK planner would choose less reallocation from non-tradables to home tradables and a smoother adjustment of non-tradables prices and employment relative to the RANK model. In the front-loaded case, where real income losses materialise immediately, the planner would rely more heavily on foreign bond adjustment to prevent a sudden fall in constrained households' consumption. In the scenario with a decline in domestic tradables productivity, the TANK planner would opt for greater reallocation towards non-tradables in order to preserve labour income. In this scenario, expenditure switching towards foreign tradables would also help sustain constrained households' consumption.

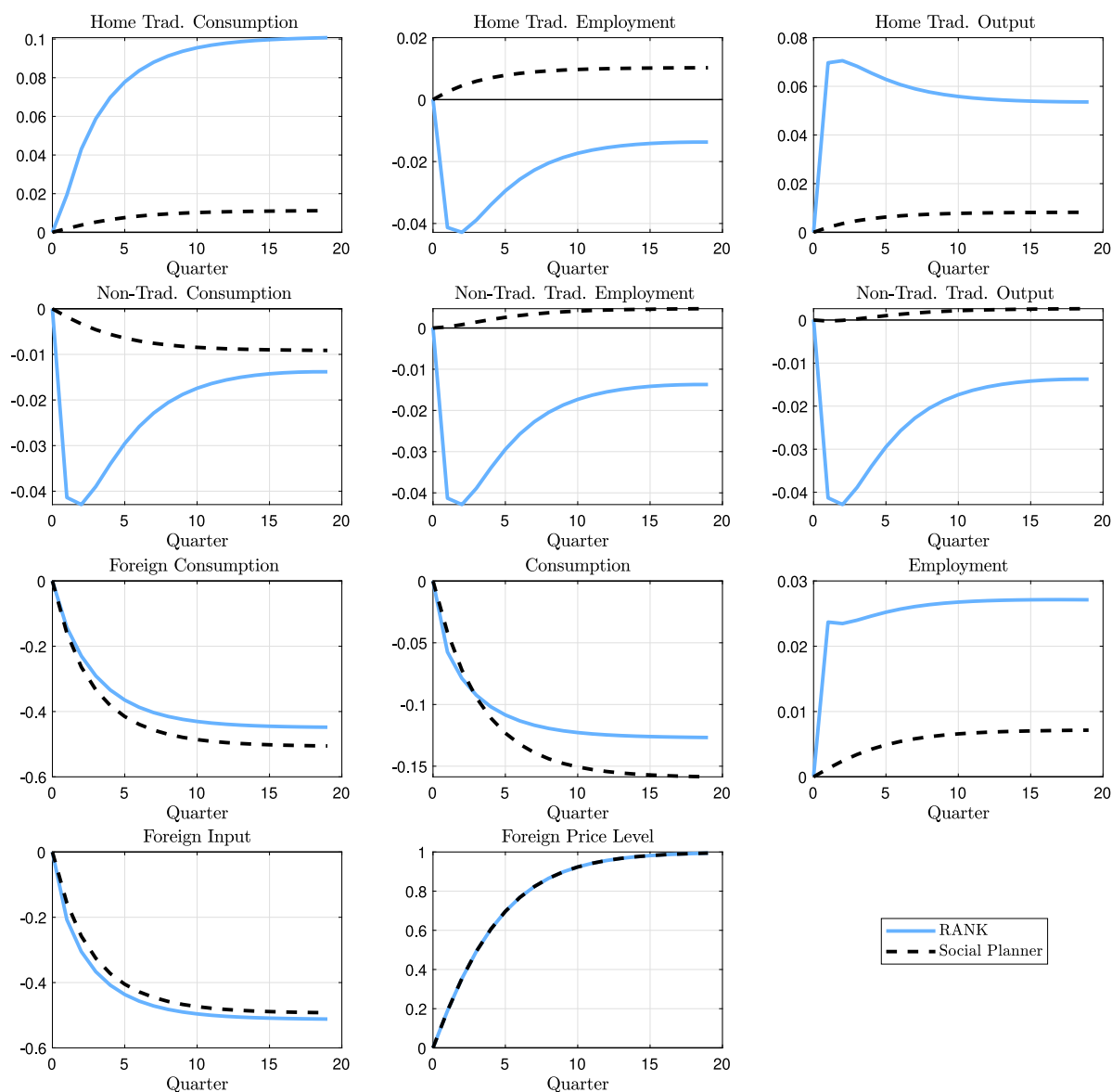


Fig. 10. IRFs to a 100% gradual increase in foreign price level.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the social planner case is shown in the black dashed lines. The results for the social planner case are generated under $\sigma = \mu = \iota = 1$, $\lambda = 0$ and $\theta^* = 0.01$. All the other parameters are calibrated according to Table 1.

5. Conclusion

There is broad consensus that a realignment of trading patterns is taking place. While fragmentation, understood as a shift from efficient suppliers towards geopolitically aligned suppliers, is likely to result in higher imported goods prices and lower real incomes, we show that the inflationary impact and the appropriate monetary policy response depend crucially on how demand adjusts to lower incomes, which, in turn, depends on the pace and shape that fragmentation takes.

We study the macroeconomic effects of fragmentation using a two-sector, open economy New Keynesian model featuring imperfect risk sharing and heterogeneous households. We consider different fragmentation scenarios by varying the speed at which foreign prices adjust to a permanently higher level, as well as a negative shock to tradable sector productivity. The scenarios we consider capture the standard supply-side channels through which higher input prices affect inflation, while emphasising that the overall inflationary effect depends on how demand adjusts to lower real incomes. The balance between supply and demand differs across scenarios, with implications for inflationary pressures and, consequently, monetary policy.

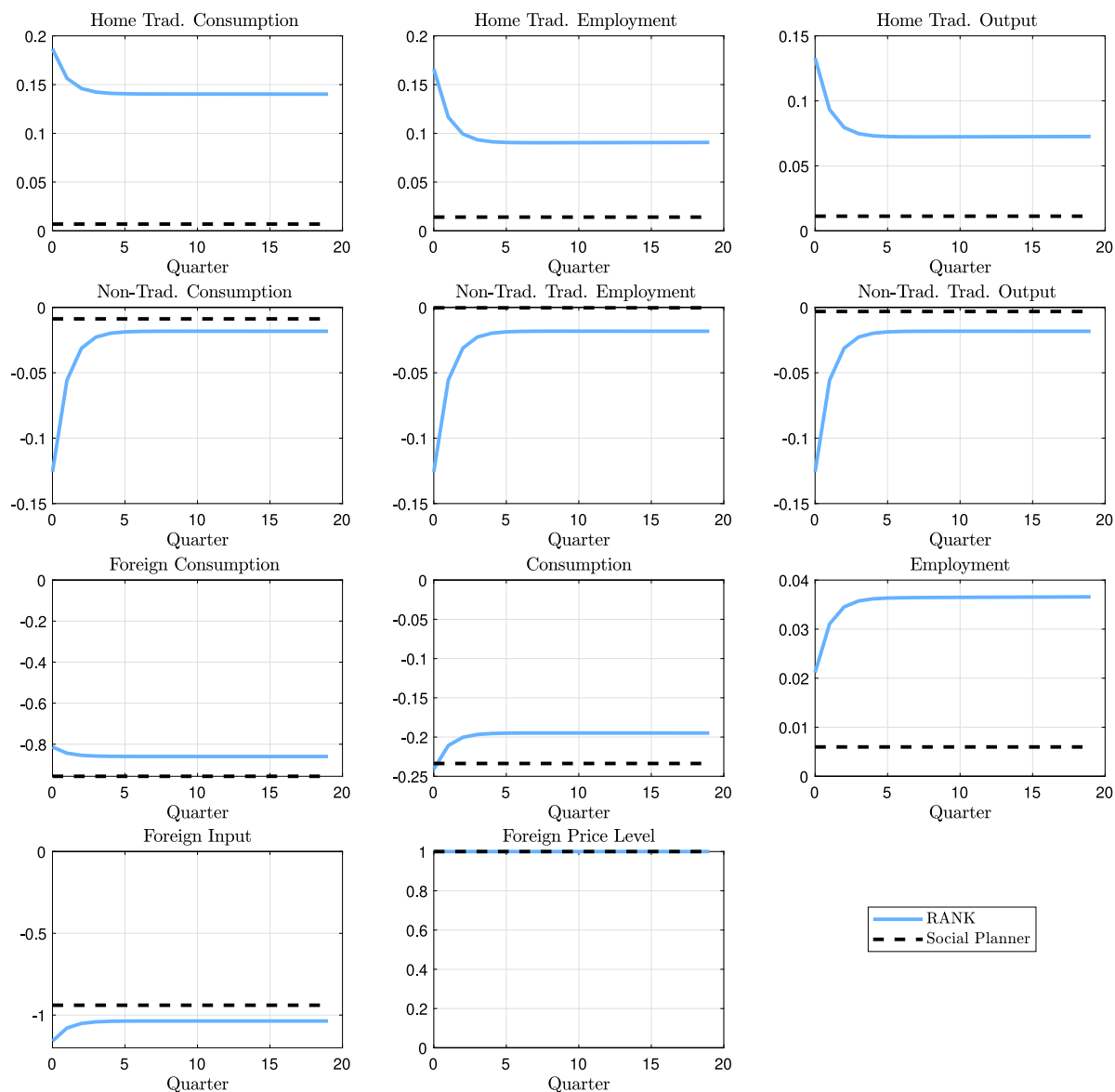


Fig. 11. IRFs to a 100% front-loaded increase in foreign price level.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the social planner case is shown in the black dashed lines. The results for the social planner case are generated under $\sigma = \mu = \iota = 1$, $\lambda = 0$ and $\theta^* = 0.01$. All the other parameters are calibrated according to Table 1.

Our results suggest that trade fragmentation is not necessarily inflationary. In our first scenario, while the gradual and permanent increase in foreign prices yields a persistent increase in imported good price inflation, the impact on aggregate inflation is counteracted by a fall in domestic inflation. The key mechanism for this result is that forward-looking households reduce their spending in anticipation of more restrictive future supply, as they respond to lower permanent income by smoothing consumption and thus saving more. The natural rate of interest decreases, suggesting that, when we allow for demand to adjust, the overall effect is not inflationary. The economy enters a period of stagnation, with lower real incomes, lower demand and lower inflationary pressures. Adding investment and uncertainty to the model should exacerbate the negative impact on demand and its disinflationary effects. In our second scenario, a front-loaded and persistent increase in the price of imported goods leads to a temporary period of stagflation, with lower consumption and higher short-term inflationary pressures. Finally, a fall in the productivity of domestic tradable goods production is moderately inflationary. This scenario leads to higher marginal costs in the domestic tradable sector. However, the demand-side effects are different from the import price shocks, as labour income is less adversely affected.

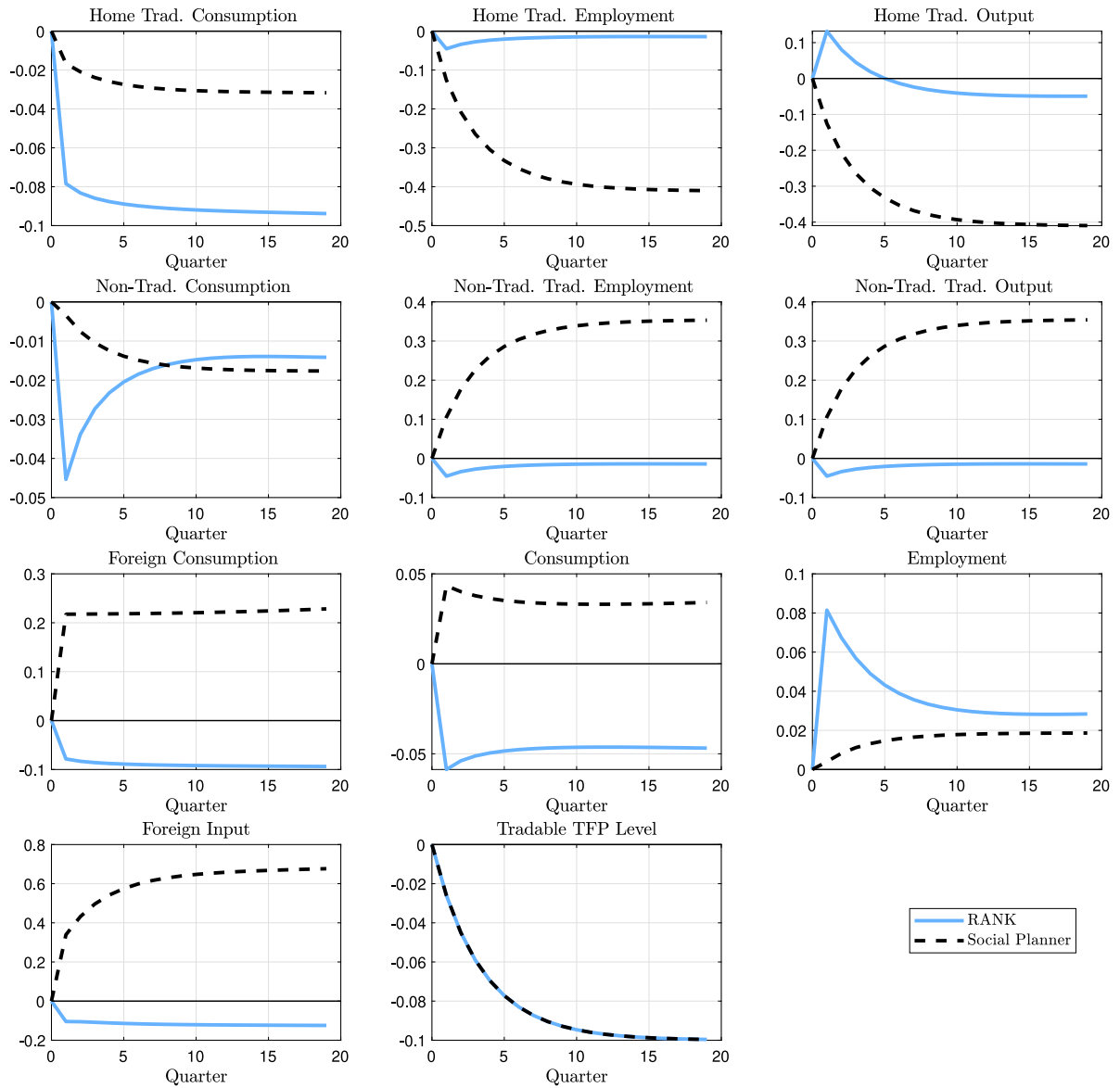


Fig. 12. IRFs to a 10% gradual and permanent decrease in tradable TFP.

Notes: The RANK case ($\lambda = 0$) is shown in the solid blue lines, while the social planner case is shown in the black dashed lines. The results for the social planner case are generated under $\sigma = \mu = \iota = 1$, $\lambda = 0$ and $\theta^* = 0.01$. All the other parameters are calibrated according to Table 1.

To understand the various channels shaping the response of demand and supply under fragmentation, we compare our baseline results to a RANK model: the degree of forward-looking behaviour, the extent of demand spillovers between domestic agents, and the differential impact of the shock on labour and profit income are all important determinants of the aggregate demand response.

We also analyse the social planner's response to the shocks across the different fragmentation scenarios. Comparing the efficient allocation with the decentralised equilibrium allows us to identify the sources of inefficiencies in the economy's adjustment to fragmentation shocks. Sticky prices in the non-tradable sector generate a wedge between prices and marginal costs, while bond adjustment costs result in a suboptimal intertemporal response to shocks. In response to import price shocks, the decentralised equilibrium features an overallocation of resources to the home tradable sector, whereas an adverse shock to home tradable productivity leads to an underallocation of resources to the non-tradable sector. When import prices increase gradually, foreign assets are insufficiently used to smooth the shock over time. More generally, both domestic reallocation and external adjustment are inefficient in the decentralised equilibrium, resulting in an excess of hours worked. In all cases, by choosing a different composition for consumption, production input intensity, and labour allocation, the social planner is able to trade off a slightly larger fall in aggregate consumption for a much smaller increase in employment.

We also consider extensions with varying degrees of home bias, greater dependence on imported inputs in production, wage rigidities, price flexibility, and non-unitary elasticities of substitution. We find that macroeconomic outcomes in response to an increase in imported good prices are more adverse in open economies, as they are more exposed to foreign shocks. However, in the case of purely domestic shocks to tradables TFP, openness mitigates the supply-side impact by allowing for diversification away from home tradables, as in Caselli et al. (2020)).

We show that our results are robust to a higher share of imported inputs in domestic production and higher wage rigidity, which capture additional domestic supply-side constraints. In the case of greater reliance on imported inputs in production, our various fragmentation shocks lead to a rise in employment, either through factor substitution (towards the cheaper input) or adverse TFP. However, this only stimulates the demand-side moderately through labour income. Our extension with wage rigidities leads to more moderate disinflation in the gradual fragmentation case and more persistent inflation in the front-loaded fragmentation case. While wage stickiness moderates the fall in real wages, it also leads to a fall in labour demand. The demand-side effect of our various shocks are therefore preserved, as real wages fall more moderately but employment falls more steeply. Allowing prices to adjust more frequently increases disinflationary pressures in the gradual scenario, while reducing the trade-off for policymakers in the front-loaded case.

Finally, increased substitutability between home and foreign tradables, and lower substitutability between tradables and non-tradables leads to a less adverse terms-of-trade shock for the domestic economy. This specification seems to matter most for the gradual scenario, where it leads to less stagnation relative to the baseline calibration. Overall, these extensions highlight the robustness of our main conclusions across the different fragmentation scenarios as well as the underlying mechanisms. They also underscore the need to carefully tailor the calibration to specific economies and contexts, when trying to derive policy implications.

Declaration of competing interest

The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.jinteco.2026.104219>.

Data availability

Trade Fragmentation, inflationary pressures and monetary policy (Replication files) (Mendeley Data)

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