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THE MACROECONOMIC EFFECTS OF AI ADOPTION: AN ASSESSMENT USING A MULTI-COUNTRY MODEL

by Anna Bartocci*, Alessandro Cantelmo*, Pietro Cova* and Stefania Villa*

Abstract

This paper examines the macroeconomic impact of AI-driven productivity gains and the resulting exchange-rate dynamics, accounting for geographical and sectoral asymmetries as well as potential precautionary saving behaviour related to AI. In a four-country New Keynesian DSGE model, AI is represented as an anticipated permanent increase in productivity. Demand initially outpaces productive capacity, temporarily raising inflation. Alternative scenarios show that the intensity of these effects crucially depends on the different speed of adoption at the country and sectoral level as well as on possible perceptions that AI adoption can increase job insecurity. The exchange-rate response may vary in both magnitude and direction across scenarios.

JEL Classification: E31, F31, F41, O33.

Keywords: artificial intelligence, business cycle, exchange-rate dynamics, productivity, open economy DSGE model.

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1 Introduction

Artificial intelligence (AI) may generate lasting productivity gains, but its macroeconomic effects are unlikely to be uniform across countries and sectors. Differences in the timing and intensity of AI adoption may produce sizeable movements in international relative prices and exchange rates, with potentially important consequences for inflation. This paper studies these mechanisms using a multi-country New Keynesian DSGE model comprising the euro area (EA), the United States (US), China, and the rest of the world, building on the paper by Cova et al. (2020).

We model the diffusion of AI as a gradual and anticipated increase in total factor productivity (TFP) over a five-year horizon.[1] Because productivity gains are anticipated, forward-looking households and firms adjust consumption and investment before production capacity has fully expanded. Aggregate demand therefore initially rises faster than aggregate supply, generating temporary inflationary pressures. As productivity and productive capacity progressively increase, supply catches up with demand and inflation returns towards its target.

The analysis considers four scenarios. The benchmark assumes a gradual and symmetric increase in TFP across countries and sectors. The remaining scenarios introduce cross-country differences in AI adoption, sectoral asymmetries, and households' concerns on possible adverse effects of AI on labor demand. The simulations isolate the real and trade mechanisms represented in the model.

AI diffusion leads to a permanent increase in GDP and a temporary rise in inflation. Should AI diffusion be stronger in the United States and more tilted toward the non-tradable sector, the impact on euro area activity and inflation would be more contained. The expansionary impact could be delayed should AI trigger an increase in precautionary savings due to fears of higher unemployment. Likewise, short-run inflationary pressures

[1] For a closed economy exercise, focusing on monetary policy and the natural rate of interest, see Esposito et al. (2026).

would further abate.

The direction of the exchange-rate response is, however, not unambiguous. It depends on the relative size of productivity gains, the trade structure of each economy, and the response of exports and imports. Symmetric productivity gains may generate exchange-rate movements because countries differ in their trade openness and sectoral composition. When AI adoption is asymmetric across countries, differences in the expansion of productive capacity and trade flows introduce an additional source of exchange-rate adjustment. The exchange rate may therefore be subject to opposing pressures depending on the relative intensity and timing of AI adoption across countries. We also discuss financial forces that may reinforce or offset the real and trade mechanisms captured by the model, including international investment in US AI-related assets and changes in the demand for dollar-denominated safe assets.

The remainder of the paper is organized as follows. Section 2 describes the model. Section 3 presents the simulated scenarios and examines the implications for GDP, inflation and exchange-rate movements. Section 4 discusses additional financial forces affecting exchange-rate dynamics in the AI era. Section 5 concludes.

2 Model

We assess the macroeconomic effects of AI using a multi-country New Keynesian DSGE model of the world economy (see Cova et al., 2020; Bartocci et al., 2025). The model is calibrated to four economic areas: the euro area (EA), the United States (US), China (CH), and the rest of the world (RW). Each region contains tradable and non-tradable intermediate-good sectors and is linked to the other regions through bilateral trade and international financial markets. AI adoption is represented by exogenous sector-specific TFP shocks. Our model structure allows productivity gains to differ both across countries and between tradable and non-tradable activities, which is central to the scenarios

considered below.

In each region, households consume, accumulate physical capital and supply differentiated labour services. A fraction of households is Ricardian and smooths consumption intertemporally by trading financial assets; the remaining households are hand-to-mouth and consume their current labour income. Consumption features habit formation, while investment adjustment costs imply a gradual capital-stock response. Nominal wages are sticky due to quadratic adjustment costs and indexation to past inflation.

Final consumption and investment goods are produced under perfect competition by combining intermediate goods. The consumption basket distinguishes between energy and non-energy goods. The non-energy component is a CES aggregate of tradable and non-tradable goods, while the tradable bundle combines domestically produced and imported goods. The investment basket has an analogous structure but does not include energy. Bilateral trade is therefore governed by imperfect substitutability across goods produced in different regions. A local distribution sector, intensive in non-tradable inputs, creates a wedge between border and retail prices and implies incomplete exchange-rate pass-through to consumer prices.

Intermediate tradable and non-tradable goods are produced under monopolistic competition using capital, labour and energy. To highlight the channel relevant for our simulations, let $s \in \{T, N\}$ denote the tradable and non-tradable sectors and $r \in \{EA, US, CH, RW\}$ the region. The production technology of a representative intermediate firm can be written as

$$Y^r_{s,t}(h) = A^r_{s,t}\left[(1-a^r_{FU,s})^{1/\xi_{Y,s}}\left(V^r_{s,t}(h)\right)^{(\xi_{Y,s}-1)/\xi_{Y,s}} + (a^r_{FU,s})^{1/\xi_{Y,s}}\left(FU^r_{s,t}(h)\right)^{(\xi_{Y,s}-1)/\xi_{Y,s}}\right]^{\xi_{Y,s}/(\xi_{Y,s}-1)}, \tag{1}$$

$$V^r_{s,t}(h) = \left[(1-a^r_{L,s})^{1/\xi_s}\left(K^r_{s,t}(h)\right)^{(\xi_s-1)/\xi_s} + (a^r_{L,s})^{1/\xi_s}\left(L^r_{s,t}(h)\right)^{(\xi_s-1)/\xi_s}\right]^{\xi_s/(\xi_s-1)}. \tag{2}$$

Here $A^r_{s,t}$ is sector-specific TFP, $FU^r_{s,t}$ denotes energy use, and $V^r_{s,t}$ is a value-added

composite of capital and labour. The original model has the same production structure in the tradable and non-tradable sectors; in our simulations the explicit TFP shifter $A^r_{s,t}$ is the variable through which AI affects productive efficiency. An increase in $A^r_{s,t}$ raises the amount of output that can be produced from given quantities of capital, labour and energy and, other things equal, lowers real marginal costs.

The distinction between the two sectors is important for the international transmission of AI. A productivity improvement in tradables directly changes a region's export supply and international relative prices, thereby affecting bilateral trade flows and exchange rates. It also affects the real exchange rate via a standard Balassa-Samuelson effect.[2] A productivity improvement in non-tradables acts more directly on domestic production and prices; its international effects arise indirectly through domestic absorption, factor demand, the distribution sector and general-equilibrium movements in the exchange rate. The model can therefore accommodate both broad-based AI gains and the possibility that the technology is initially more effective in service activities, which are proxied by the non-tradable sector.

Intermediate-good firms set destination-specific prices in the currency of the destination market. Price adjustment is costly in both tradable and non-tradable sectors, according to Rotemberg-type quadratic adjustment costs. Together with sticky wages, these nominal rigidities imply that the increase in productive capacity generated by AI need not be matched immediately by an equivalent adjustment in prices and quantities. This is especially relevant when future productivity gains are anticipated. Forward-looking households and firms can raise consumption and investment before the full increase in productive capacity has materialized, so that aggregate demand may temporarily expand faster than aggregate supply. In this case inflation can rise in the short run even though higher TFP reduces marginal costs as the productivity gains progressively

[2]According to the Balassa–Samuelson effect (Balassa, 1964; Sameulson, 1964) faster productivity growth in the tradable sector raises economy-wide wages and, because productivity grows less in non-tradables, pushes up their prices, leading to higher inflation and a real exchange-rate appreciation.

materialize.

The model also contains an energy sector. Crude oil is traded in a global market and its price is denominated in US dollars. Regional oil supply is exogenous, and oil enters both final consumption and the production of intermediate goods. Exchange-rate movements consequently affect headline inflation not only through the domestic-currency prices of imported non-energy goods, but also through energy prices. This channel is particularly relevant for the analysis below, which focuses on the interaction between AI-driven productivity gains, exchange rates and inflation.

Financial markets include one-period domestic bonds and an internationally traded US-dollar-denominated bond. Uncovered interest parity (UIP) conditions link interest-rate differentials to expected bilateral exchange-rate movements, up to risk-premium terms, modeled as debt-elastic interest-rate premia following Schmitt-Grohé and Uribe (2003). Hence differences in the size or timing of AI-induced productivity gains across regions affect exchange rates through the endogenous responses of activity, inflation and monetary policy. In the baseline simulations, these exchange-rate movements reflect the model's nominal and real channels; additional portfolio-rebalancing forces are considered separately in Section 4.

Monetary policy in each region follows a Taylor-type rule. Abstracting from region superscripts, the policy rate evolves according to

$$\frac{R_t}{\bar{R}} = \left(\frac{R_{t-1}}{\bar{R}}\right)^{\phi_R} \left(\frac{\Pi_{C,t}}{\bar{\Pi}_C}\right)^{(1-\phi_R)\phi_\pi} \left(\frac{RGDP_t}{RGDP_{t-1}}\right)^{(1-\phi_R)\phi_{gY}}, \tag{3}$$

where $\Pi_{C,t}$ is headline consumer price inflation and $RGDP_t$ is real GDP. Interest-rate smoothing makes the monetary response gradual. Fiscal policy is passive: a standard fiscal rule stabilizes public debt in the medium term by adjusting lump-sum taxes.

2.1 Calibration

The model is calibrated at quarterly frequency. The calibration closely follows Bartocci et al. (2025). Table 1 reports the main steady-state ratios for the four regions, while Table 2 reports the bilateral trade matrix. The remaining parameters are calibrated to match these quantities and in line with the existing literature. Tables 3–6 report the implied quarterly calibration.

Table 3 reports the preference and technology parameters. Preferences are the same across households in the different regions. The intertemporal elasticity of substitution is set equal to 1.0, the habit-persistence parameter to 0.7, and the inverse of the Frisch elasticity of labour supply to 1.5. The elasticity of substitution among tradable goods other than oil is set to 1.5. For the investment basket, the elasticity of substitution between domestic and imported goods is the same as that of the consumption basket. The elasticity of substitution between tradable and non-tradable goods is set to 0.8. The parameter η^{distr} governing the distribution sector is set to 1.2.

In the production function, the elasticity of substitution between fuel and value added is set to 0.8, while that between capital and labour is set to 1. Thus, fuel and the other production inputs are relatively difficult to substitute. The weight of fuel in the production function of intermediate goods is set to 0.04 in the tradable sector and 0.02 in the non-tradable sector. In the consumption basket, the elasticity of substitution between fuel and other goods is equal to 0.4. We further assume a quarterly depreciation rate of physical capital of 0.025.

The weight of domestically produced tradable goods in the consumption and investment tradable baskets differs across regions in order to match the corresponding multilateral import-to-GDP ratios. The weights of bilateral imports other than oil are then set to reproduce the trade matrix reported in Table 2.

Table 4 reports the real and nominal rigidities. The parameter governing adjustment

costs on investment changes is set to 4.5 in all regions. As for nominal rigidities, the Rotemberg adjustment-cost parameter is set to 300 for wages, to 120 for the prices of domestically produced and imported tradable goods, and to 400 for the prices of non-tradable goods. The price- and wage-indexation parameters are both set to 0.75.

Table 5 reports the price and wage markups. We identify the intermediate non-tradable and tradable sectors in the model with the services and manufacturing sectors in the data, respectively. In each region, the markups in the non-tradable sector and in the labour market are assumed to be higher than in the tradable sector.

Finally, Table 6 reports the parameters of the monetary policy rules in Eq. (3). The monetary policy rate responds to its lagged value, with the corresponding coefficient set to 0.85, to headline inflation, with a coefficient of 1.6, and to real output growth, with a coefficient of 0.1. As discussed in Bartocci et al. (2025), this calibration delivers responses of euro-area GDP and inflation to a domestic monetary policy shock that are in line with those obtained from other structural models of the euro area.

Relative to Bartocci et al. (2025), the new exogenous processes in the present paper are the sector- and region-specific TFP shocks used to represent AI adoption and, in the relevant exercises, the shocks to desired households' savings and the US dollar's UIP conditions. Their calibration is described together with the corresponding simulated scenarios in Sections 3 and 4.

3 Results of simulated scenarios

The simulations are designed to assess how the macroeconomic consequences of AI depend on its geographical and sectoral diffusion and on households' perceptions of its labour-market effects. Particular attention is given to the exchange rate as a transmission mechanism between AI-driven productivity gains and inflation.

3.1 Benchmark: symmetric productivity gains

In the benchmark scenario, the diffusion of AI leads to a gradual increase in TFP, reaching a level that is permanently higher by 1 per cent in all economic areas and sectors: as a result, world TFP increases permanently by 1 per cent after 5 years (see Aldasoro et al., 2024; Melina and Villa, 2025, for similar exercises). The assumed magnitude lies within a highly uncertain range of estimates in the literature: while Acemoglu (2025) predicts relatively modest aggregate productivity gains, Aghion and Bunel (2024) obtain larger effects by considering broader applications of AI and drawing parallels with previous general-purpose technologies.

Real GDP increases permanently as a result of the lasting improvement in productivity, as shown in Figure 1. Consumption and investment rise in anticipation of higher future income and returns to capital. Since the productivity gains are assumed to materialize gradually, aggregate demand initially increases more than aggregate supply. Inflation therefore rises in the short run and returns towards its target as productive capacity expands.

Despite the symmetric TFP shock, exchange rates move because the economies differ in their trade openness and structural characteristics. In this simulation, the euro depreciates against the US dollar because the increase in exports is larger in the euro area than in the United States due to its higher trade openness. The depreciation reinforces inflationary pressures through a direct increase in the euro prices of imported final goods, intermediate inputs, and energy. It also operates indirectly by shifting expenditure towards euro-area production, supporting net exports and economic activity and increasing domestic marginal costs. To assess the importance of the exchange rate channel for the transmission of the AI shocks, we further re-run the same scenario imposing that the bilateral nominal exchange rates remain unchanged at their initial levels. Fixing the exchange rate would mildly reduce inflationary pressures in the EA thus re-

quiring a smaller increase in the policy rate and yielding a larger increase in GDP (black lines, Figure A.2) compared to the results described above for the model's setup with endogenous exchange rate adjustments.

It should be noted that if the shock is sudden or unexpected, it can have disinflationary effects in the short run, as we show in Figure A.1 reported in the Appendix.[3]

3.2 Sectoral asymmetries between tradables and non-tradables

In this scenario we assume that the improvement in productivity stemming from AI adoption mainly affects the services sector, consistent with the idea that AI, at its current stage of development, seems particularly well-suited to increase productivity of white-collar jobs, whose weight is relatively higher for services (see, e.g., Cazzaniga et al., 2024 and Baslandze et al., 2026). In the model this possibility is introduced by assuming that the TFP shock is limited to the non-tradables sectors, which is a proxy for services. Tradable goods benefit from AI only indirectly. For the sake of comparability with the benchmark scenario, shocks are simulated so that world TFP is permanently higher by 1 per cent after 5 years.

Figure 2 compares the sectoral-asymmetry scenario with the benchmark and the other simulated scenarios which will be discussed in the subsequent subsections. When the productivity improvement is confined to the non-tradable sector, the responses of euro-area GDP, inflation, investment, exports and the policy rate are all smaller than in the benchmark. The more muted macroeconomic effects reflect the limited propagation of productivity gains through international trade: since the shock directly raises efficiency only in the domestic non-tradable sector, it generates less pronounced increases in productive capacity, capital accumulation and trade flows than a broad-based pro-

[3]The size of the disinflationary impact rises with the frequency of price adjustments. Initial evidence suggests that indeed AI diffusion could lead to a significant increase in the frequency of price adjustments in response to unexpected changes in market conditions and monetary policy (see Bossone, 2025; European Central Bank, 2025, Ch. 3.3; Adams et al., 2026; Avaradi et al., 2026).

ductivity improvement.

To clarify the exchange-rate response, Figure 3 compares the effects of the non-tradable productivity shock in the euro area and the United States. GDP, inflation, exports and interest rates follow very similar paths in the two economies. US consumption, investment and imports increase somewhat more than their euro-area counterparts, but these differences remain limited. As a result, the bilateral exchange rate between the euro and the US dollar responds only modestly, with the euro depreciating slightly. The small size of this adjustment is consistent with the largely symmetric macroeconomic responses in the two economies. Therefore, in this scenario, fixing the exchange rates at their initial levels yields almost identical responses (the red dashed lines in Figure A.2 are essentially the same as those in Figure 3).

3.3 Cross-country asymmetries in AI adoption

The third scenario allows AI-driven productivity gains, confined to the non-tradable sectors, to differ across economic areas. In particular, we assume that the TFP increase is stronger in the US and China than in the euro area and the rest of the world, while we still impose that world TFP is permanently higher by 1 per cent after 5 years. This assumption is consistent with cross-country differences in digital infrastructure, skills, innovation capacity, and preparedness to adopt AI technologies (Cazzaniga et al., 2024; Haag, 2025).

Figure 2 further compares this scenario with the benchmark and the previous (symmetric shocks to non-tradables) scenario. The effects on euro-area GDP and inflation are smaller than in the benchmark scenario. The response of GDP is also more muted than when productivity gains in non-tradables are symmetric across economic areas, reflecting both the smaller domestic productivity improvement and the fact that the larger productivity gains in the United States and China occur in their non-tradable sectors. As these sectors are less directly integrated into international trade, the stronger foreign

productivity shock generates only limited spillovers to euro-area activity. Consumption, investment, imports, and exports increase, but generally to a lower extent than in the benchmark.

The cross-country mechanisms underlying these results are shown in Figure 4. The stronger US productivity shock produces larger increases in US GDP, consumption, investment, imports, and exports than in the euro area. The divergence becomes more pronounced over time as the permanent productivity gains feed through to productive capacity and domestic expenditure. The stronger expansion of productive capacity and exports in the United States and China relative to the euro area is accompanied by an appreciation of the euro against the US dollar and the Chinese renminbi. The appreciation is particularly pronounced against the US dollar, whereas the euro exchange rate against the currency of the rest of the world changes only marginally, as also this latter regional bloc experiences the same TFP expansion as the euro area and shares a similar trade openness.

The appreciation dampens euro-area inflation primarily through its direct effect on import prices, as it reduces, compared to the benchmark scenario, the prices in euro of imported goods, production inputs, and energy. At the same time, the appreciation affects the composition of demand. On the one hand, it makes euro area goods relatively more expensive and therefore moderates the increase in exports. On the other hand, lower import prices raise households' purchasing power and support consumption. In the simulations, the positive effect on domestic demand outweighs the drag on exports, so that euro-area GDP increases more under exchange-rate appreciation than under fixed exchange rates (blue lines, Figure A.2). Overall, exchange rate appreciation reduces euro area inflation, but its disinflationary effect is partly attenuated by the associated increase in domestic demand. Appreciation therefore partly insulates euro area inflation from the global demand effects of AI adoption, although this insulation is incomplete because cheaper imports simultaneously support domestic demand. This

result also illustrates that stronger foreign productivity growth does not mechanically imply a stronger foreign currency, as suggested, among others, by Corsetti et al. (2010) when studying productivity gains in the US tradable sector. Note also, that the model abstracts from international portfolio reallocations. If stronger US AI adoption raises expected returns on US corporate assets and attracts foreign capital, the dollar could appreciate rather than depreciate, weakening or reversing the exchange-rate response generated by the model's trade channel (see Section 4).

3.4 Household concerns on the labor market and precautionary savings

The fourth scenario extends the previous one by introducing a deterioration in households' expectations associated with fears that AI will reduce labor demand. Although the model does not explicitly represent substitution between AI and labor, the shock to households' perceptions (applied to all economic areas) provides a modelling device for capturing precautionary behavior stemming from concerns of possible employment and income losses. Increasing evidence points to strong labor market effects of AI (see, e.g., Acemoglu et al., 2022; Cazzaniga et al., 2024; Melina and Villa, 2025). Greater uncertainty about future labor income may induce households to reduce consumption and increase precautionary savings (Lane, 2026). The preference shock is calibrated so that consumption remains unchanged on impact and then gradually increases, reaching after almost two years the level recorded on impact in the other scenarios. The resulting moderation in domestic demand growth dampens output and inflation relative to the benchmark. With higher precautionary savings, no additional effects on the exchange rate arise compared with the previous scenario. Therefore, also fixing the exchange rates yields similar effects as those discussed in the previous subsection (green lines, figure A.2).

Figure 2 compares the fourth scenario with the benchmark and the two scenarios considered above. The introduction of precautionary-saving behavior further reduces the

expansion of euro-area GDP and consumption relative to the other scenarios. Lower consumption weakens domestic demand and reduces firms' incentives to expand productive capacity. Consequently, investment also increases by less than in the benchmark, particularly over the medium horizon. The responses of imports and exports are similarly more muted, reflecting the weaker expansion of domestic expenditure and economic activity. As a consequence, inflation and the policy interest rate rise by less. The comparison therefore shows that adverse household perceptions can offset part of the expansionary effects of AI-driven productivity growth, even though the underlying productivity improvements remain permanent.

Figure 5 illustrates the corresponding responses in the euro area and the United States. The negative demand effects associated with the worsening in households' perceptions moderate consumption, GDP, and inflation in both economies. Given the symmetry of the shocks across countries the dynamics of imports and exports remains substantially unchanged compared to the previous scenario.

4 Additional drivers of exchange rate dynamics

The DSGE simulations capture the effects of AI through productivity, demand, trade, and relative prices. They do not explicitly account for international portfolio choices, currency-specific liquidity services, or cross-border investments in AI-related assets. These financial mechanisms may become particularly important if the diffusion of AI is uneven across countries.

A first mechanism operates through expected returns on AI-related assets. If investors expect the US to capture a disproportionate share of future AI profits, global demand for equity and corporate claims issued by US firms may increase (see, e.g., Panetta, 2026). The associated capital inflows would tend to appreciate the dollar. This mechanism could offset the depreciation generated in the model by stronger US

productivity.

To capture this mechanism, we augment the scenario with sectoral and cross-country productivity asymmetries introduced in Section 3.3 by adding a shock to the UIP condition, calibrated to have a US dollar appreciation of 1 per cent. The shock increases the relative attractiveness of US financial assets and generates capital inflows into the United States, thereby providing a stylized representation of higher global demand for equity and corporate claims issued by US AI firms. Figure 6 compares the responses obtained in the third scenario with and without the UIP shock (black lines refer to responses in the EA, red lines refer to the US). The additional demand for US assets supports the dollar and therefore mitigates the appreciation of the euro. The effects on real activity are relatively limited in the EA but more expansionary in the US, while inflation is mildly higher in the EA due to the initial exchange rate depreciation and lower in the US. Overall, the results suggest that international portfolio reallocation mainly affects exchange-rate and inflation dynamics, while leaving the real effects of AI-driven productivity gains largely unchanged.

A second mechanism may operate through the financing of AI investment. Substantial issuance of long-term corporate debt could induce investors to shift from US Treasuries towards higher-yielding AI-related corporate debt issued by US and foreign AI companies, reducing the convenience yield associated with Treasuries' liquidity and safety services (Financial Times, 2026a,c; New York Times, 2026). Unlike the first mechanism, which supports the US dollar, this portfolio reallocation could weaken the demand for US safe assets (and raise the yields on US government debt) and the value of the US dollar. More broadly, recent studies have discussed a possible erosion of the traditional role of US Treasuries as the world's premier safe asset.[4] In particular, Jiang et al. (2026) show that a decline in foreign demand for the liquidity and safety services

[4]See, for example, Jiang et al. (2026) and Kekre and Lenel (2026). Eichengreen (Financial Times, 2026b) interprets the recent US Treasury intervention to shore up the US dollar as further evidence on the reduced attractiveness of the US dollar's reserve currency status.

provided by dollar-denominated assets reduces US seignorage income and household wealth, lowers demand for US goods, and leads to a real depreciation of the dollar. AI financing could accelerate this process, especially amid a broader diversification away from dollar-denominated government debt, and thereby indirectly weaken the dollar's reserve-currency status.[5]

All in all, the above mechanisms imply that AI may further affect exchange-rate dynamics even when its long-run productivity effects are positive.

5 Conclusions

The AI boom is modelled as a gradual and permanent increase in total factor productivity (TFP), capturing the nature of AI as a general-purpose technology that can raise efficiency across a broad range of economic activities. While the diffusion of AI increases productivity and GDP permanently, its short- and medium-run effects on inflation depend on the timing and distribution of the productivity gains. Because the TFP shock is anticipated, consumption and investment respond before productive capacity has fully adjusted. Aggregate demand consequently expands faster than supply during the initial phase of AI adoption, generating temporary inflationary pressures.

Exchange rates play a non-trivial role in transmitting these effects across countries. A depreciation raises inflation directly through imported final goods, intermediate inputs, and energy, and indirectly through stronger net exports and domestic activity. An appreciation produces the opposite effects. The simulations show that the direction of

[5]The Appendix provides an illustrative simulation of this channel by introducing a decline in households' desired holdings of internationally traded bonds denominated in US dollars into the scenario with asymmetric productivity gains in non-tradable sectors. The shock is calibrated so as to lower the ratio of these holdings to GDP by 1 percentage point. Figure A.3 shows the transmission of the US dollar erosion shock relative to the third scenario, where AI-driven productivity gains are confined to the non-tradable sectors and stronger in the US and China. The US dollar depreciates further against the euro (solid black line with circle markers in Figure A.3). Despite the boost to US exports, investment in the US is much lower than in the benchmark case, thus the overall impact on GDP is mild, whereas inflation is somewhat higher. As regards the EA, the effects are limited.

the exchange-rate response depends on cross-country and sectoral asymmetries in AI adoption.

Broader financial forces may amplify or offset these effects. Strong demand for US AI assets could support the dollar and limit euro appreciation, while weaker demand for dollar safe assets could deepen dollar depreciation. Thus, despite positive long-run productivity effects, the AI transition may be characterized by uncertain exchange-rate dynamics .

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Table 1: Great ratios (% of GDP)

	EA	US	CH	RW
Private consumption	60.2	60.4	36.5	61.5
of which: HTM consumption	6.02	7.9	6.1	7.4
Investment	19.8	19.6	43.5	18.5
Public consumption	20.0	20.0	20.0	20.0
Imports	25.5	12.4	16.7	15.4
Consumption goods	15.4	8.2	9.0	12.0
Investment goods	7.8	4.1	4.5	5.9
Oil (net imports)	2.3	0.1	3.2	−2.5
Distribution margin	0.18	0.26	0.13	0.35
Share of world GDP	16.5	22.8	19.3	41.3

Note: EA = euro area; US = United States; CH = China; RW = rest of the world.

Table 2: International linkages (% of GDP, tradables different from oil)

	EA	US	CH	RW
Imported consumption goods from				
EA	...	1.5	1.4	5.2
US	2.5	...	0.8	3.1
CH	2.0	1.3	...	3.7
RW	10.9	5.4	6.8	...
Imported investment goods from				
EA	...	0.8	0.7	2.6
US	1.3	...	0.4	1.5
CH	1.0	0.6	...	1.8
RW	5.5	2.7	3.4	...

Note: EA = euro area; US = United States; CH = China; RW = rest of the world.

Table 3: Households and firms behavior

	EA	US	CH	RW
Households				
Subjective discount factor β	0.9996	0.9996	0.9996	0.9996
Intertemporal elasticity of substitution $1/\sigma$	1.00	1.00	1.00	1.00
Habit persistence ζ	0.70	0.70	0.70	0.70
Inverse of the labor Frisch elasticity τ	1.50	1.50	1.50	1.50
Distribution margin η^{distr}	1.2	1.2	1.2	1.2
Population share of HTM n^{rot}	40	40	40	40
Final consumption goods				
Substitution btw fuel and other goods ρ	0.40	0.40	0.40	0.40
Substitution btw domestic and imp. goods η_T	1.5	1.5	1.5	1.5
Substitution btw tradables and nontrad. η	0.80	0.80	0.80	0.80
Bias toward fuel $a_{FU,C}$	0.05	0.05	0.1	0.1
Bias toward tradable goods $a_{T,C}$	0.50	0.40	0.60	0.60
Bias toward domestic tradable goods a_C	0.27	0.47	0.41	0.32
Final investment goods				
Substitution btw domestic and imp. goods $\eta_{T,I}$	1.5	1.5	1.5	1.5
Substitution btw tradables and nontrad. η_I	0.80	0.80	0.80	0.80
Bias toward tradable goods $a_{T,I}$	0.70	0.60	0.70	0.70
Bias toward domestic goods a_I	0.29	0.48	0.80	0.16
Intermediate tradable goods				
Substitution btw value added and fuel $\xi_{Y,T}$	0.80	0.80	0.80	0.80
Substitution btw labor and capital ξ_T	1.00	1.00	1.00	1.00
Bias toward fuel a_{FU}	0.04	0.04	0.04	0.04
Bias toward capital $(1 - a_L)$	0.50	0.40	0.40	0.40
Intermediate nontradable goods				
Substitution btw value added and fuel $\xi_{Y,N}$	0.80	0.80	0.80	0.80
Substitution btw labor and capital ξ_N	1.00	1.00	1.00	1.00
Bias toward fuel a_{FU_N}	0.02	0.02	0.02	0.02
Bias toward capital $(1 - a_{L_N})$	0.4	0.36	0.36	0.36
Fuel distribution margin η^{FU}	1.3	0.3	0.3	0.3
Depreciation rate of capital δ	0.025	0.025	0.025	0.025

Note: EA = euro area; US = United States; CH = China; RW = rest of the world. In each region, the corresponding parameter is set equal to the reported value. The HTM households' population share is expressed as a percentage of the country's population.

Table 4: Real and nominal rigidities

Real rigidities	
Investment adjustment ϕ_I	4.50
Net foreign asset adjustment costs	
ϕ_{b1}, ϕ_{b2}	0.01, 0.01
Nominal adjustment costs	
Households	
Wage stickiness κ_W	300
Tradable goods	
Price stickiness (domestically produced goods) κ	120
Price stickiness (imported goods) κ	120
Nontradable goods	
Price stickiness κ_N	400
Indexation	
Prices a_P	0.75
Wages a_W	0.75

Note: In each region, the corresponding parameter is set equal to the reported value. The United States does not have adjustment costs on its net foreign asset position.

Table 5: Gross price and wage markups

Tradables price markup θ_T	1.20
Nontradables price markup θ_N	1.33
Wage markup θ_W	1.30

Note: In each region, the corresponding parameter is set equal to the reported value.

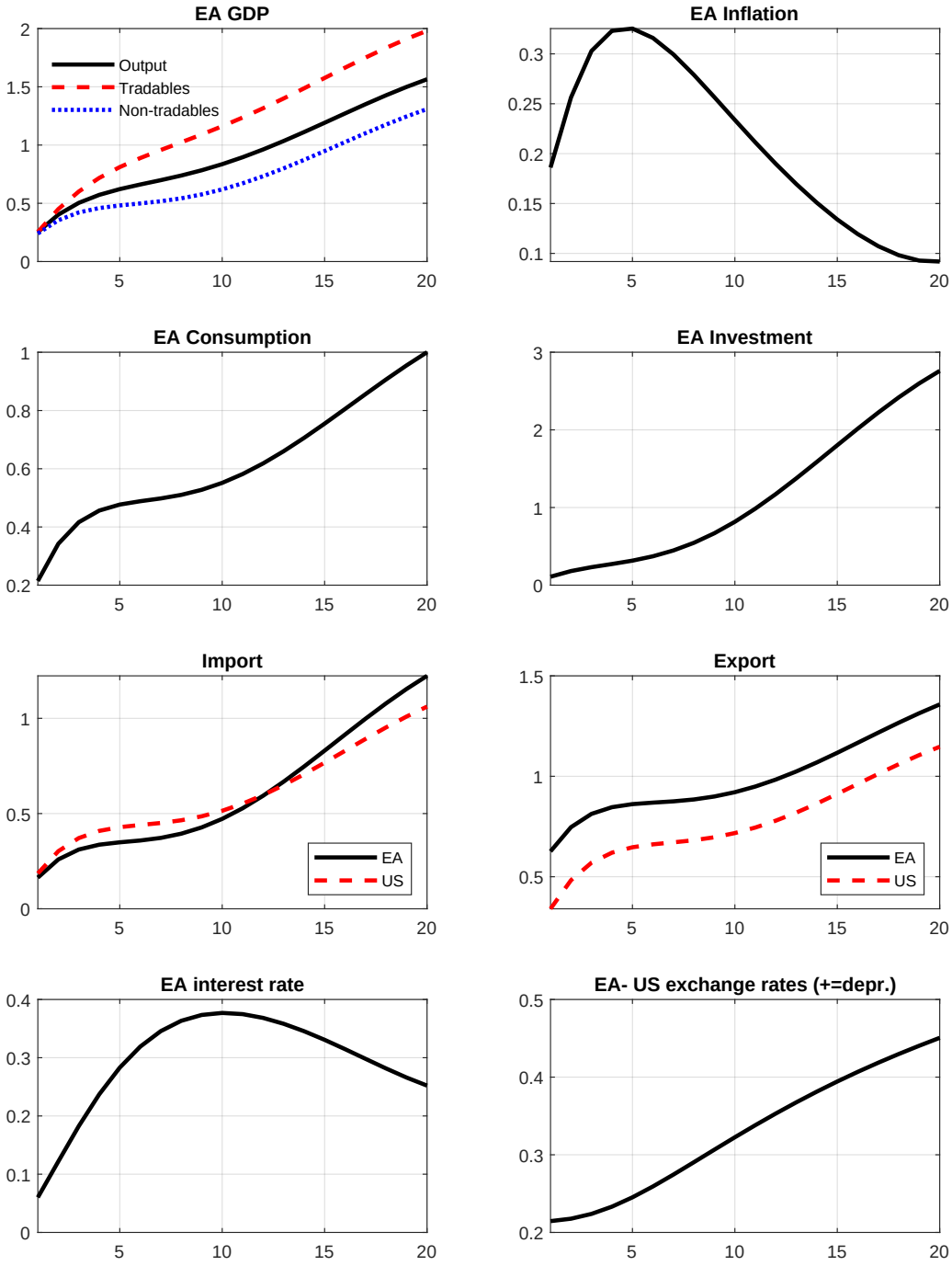
Table 6: Monetary policy rule

Interest rate inertia ϕ_R	0.85
Interest rate response to inflation gap ϕ_Π	1.60
Interest rate response to output growth ϕ_{gY}	0.10

Note: In each region, the corresponding parameter is set equal to the reported value.

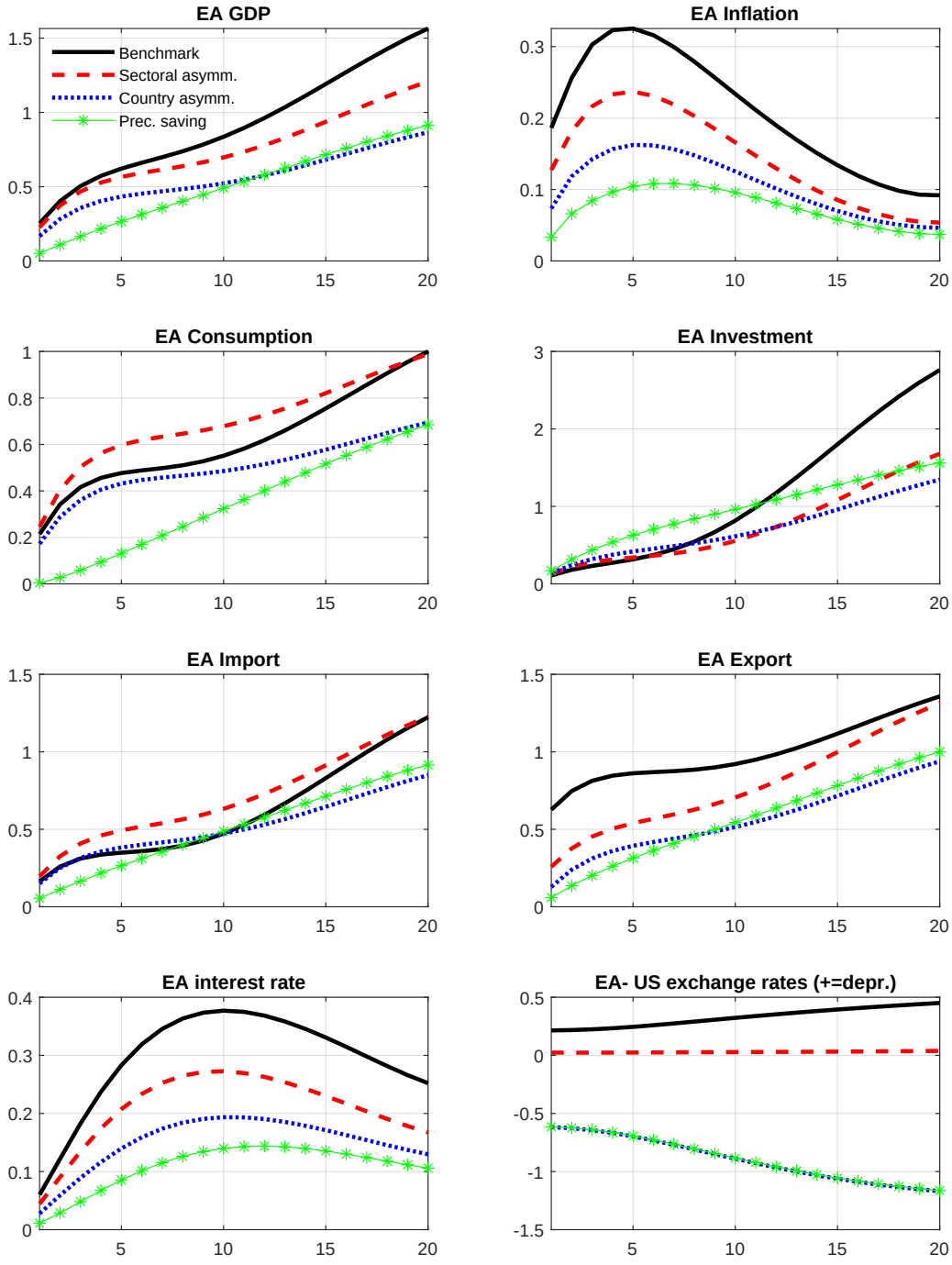
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Figure 1: Impact of AI adoption in the euro area - Symmetric shock



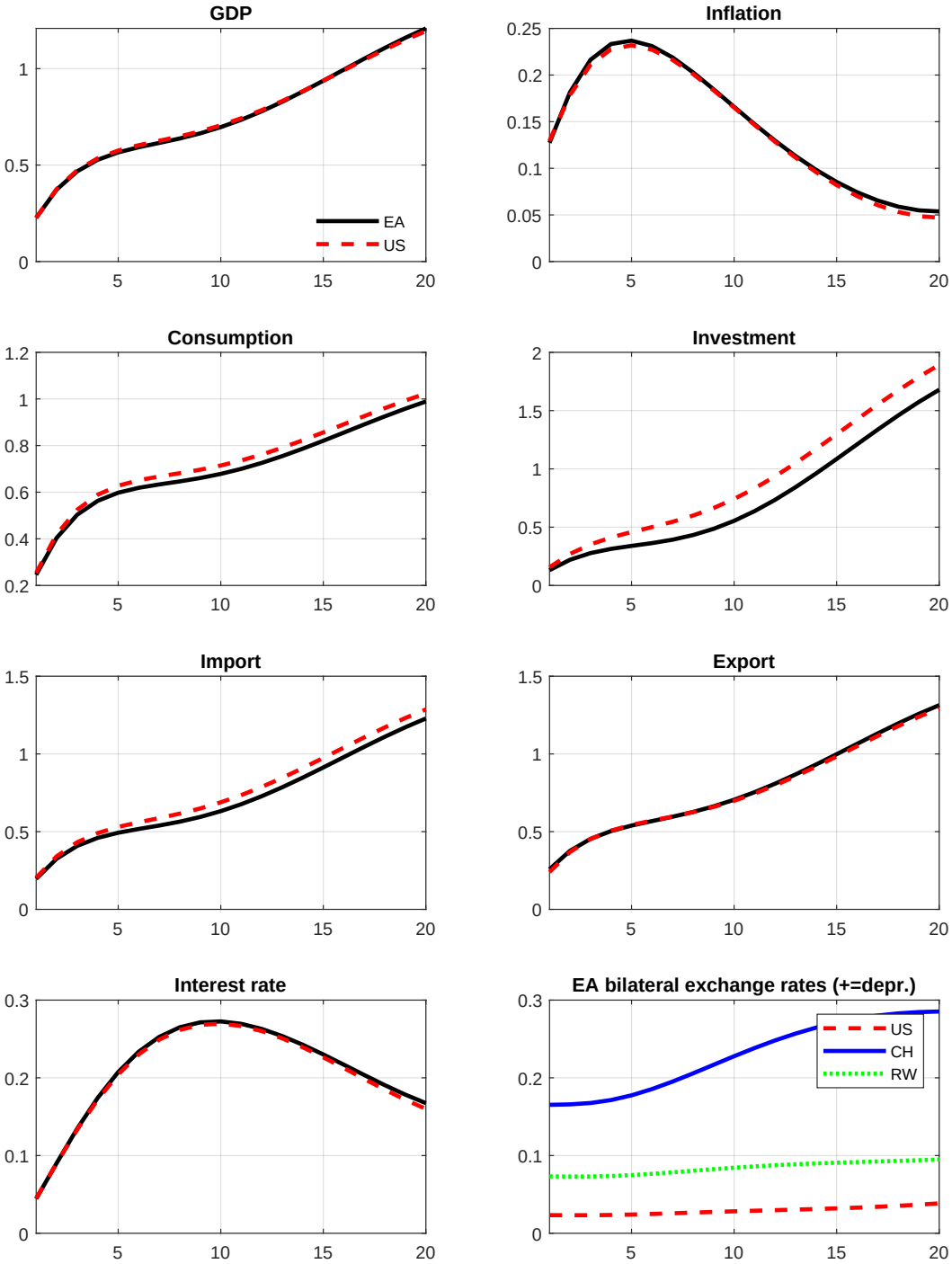
Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure 2: Impact of AI adoption in the euro area - alternative scenarios



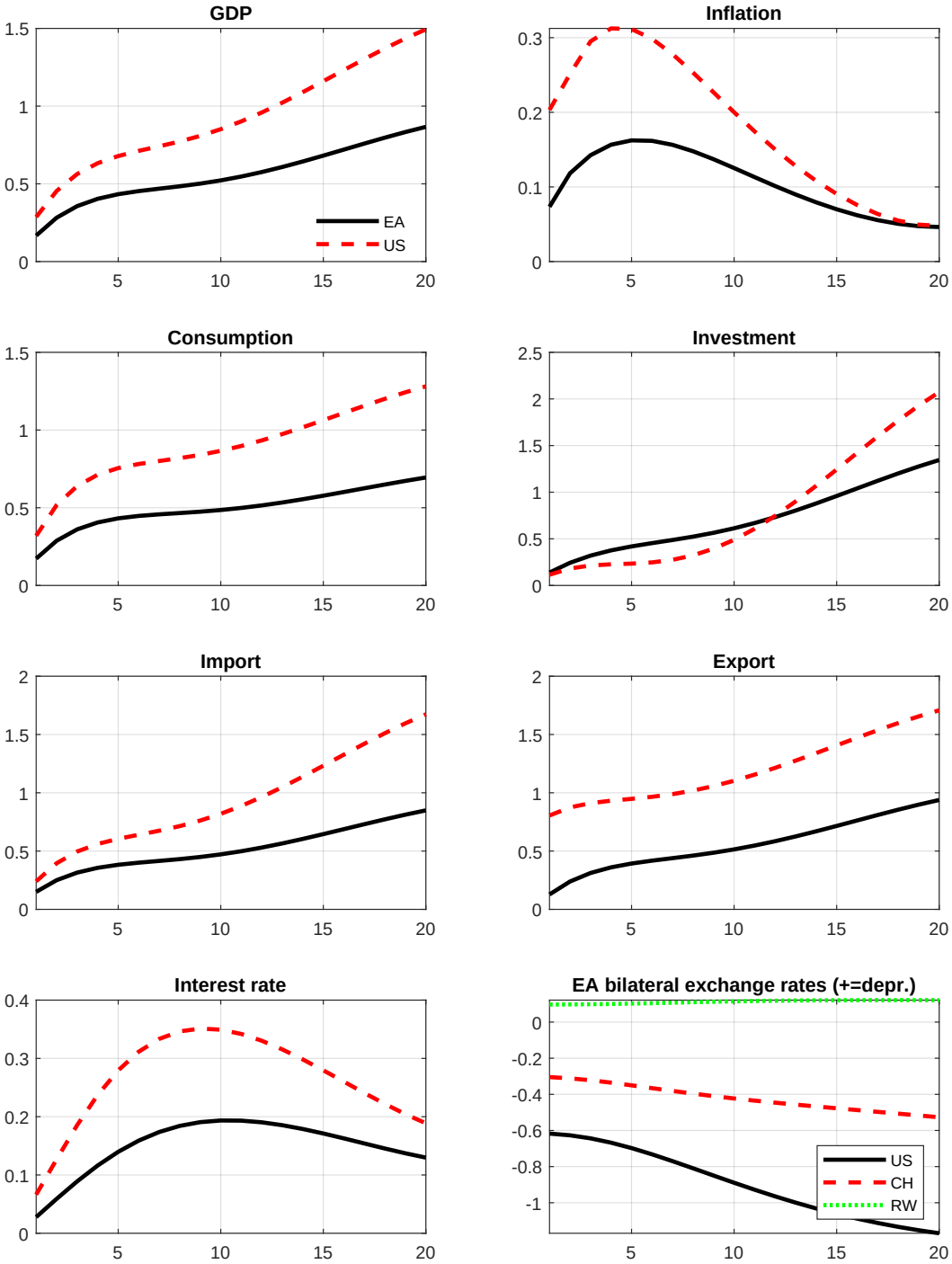
Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure 3: Impact of AI adoption in the euro area and the US - shock to non-tradable goods



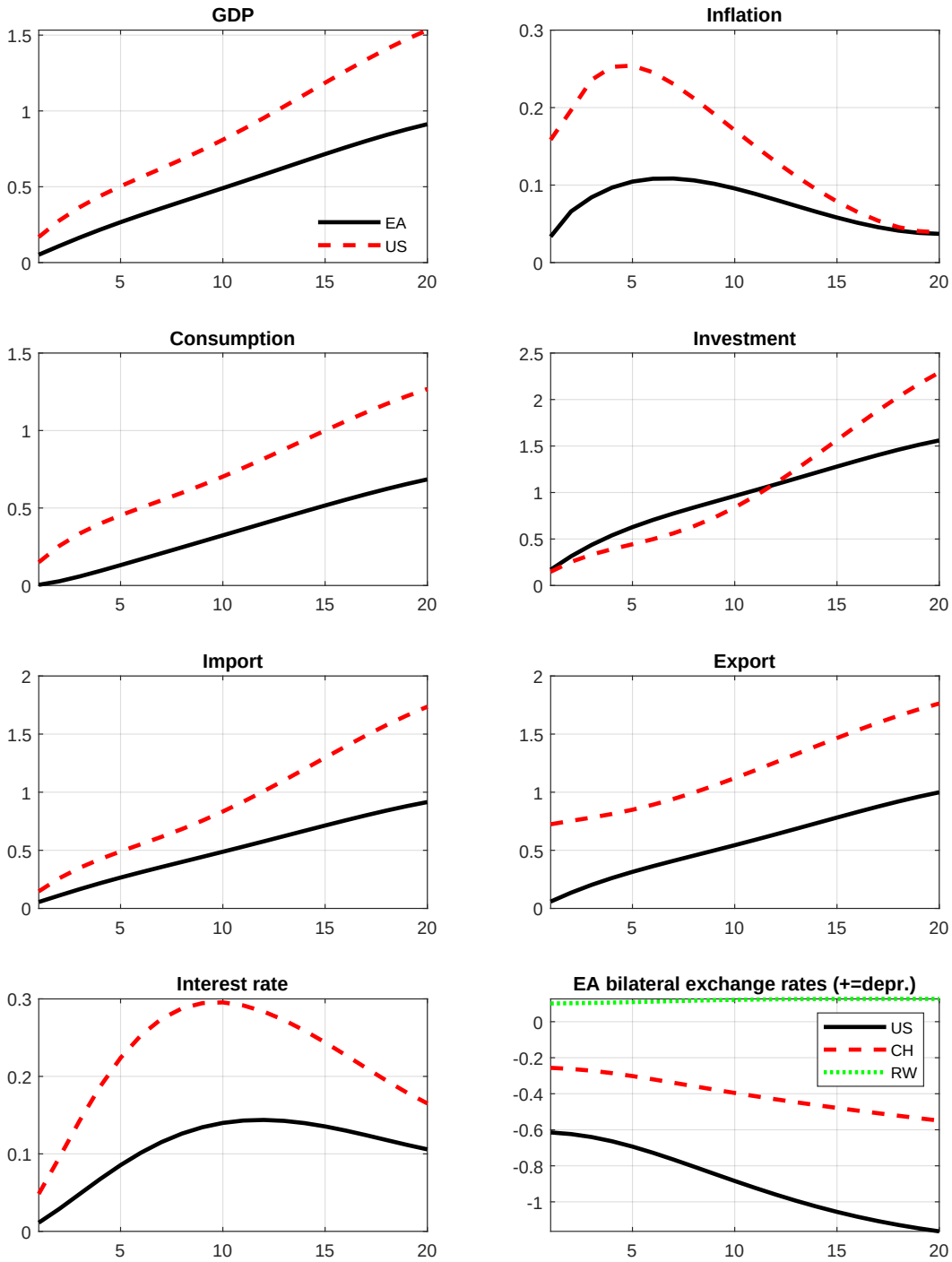
Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure 4: Impact of AI adoption in the euro area and the US - country-asymmetric shock to non-tradable goods



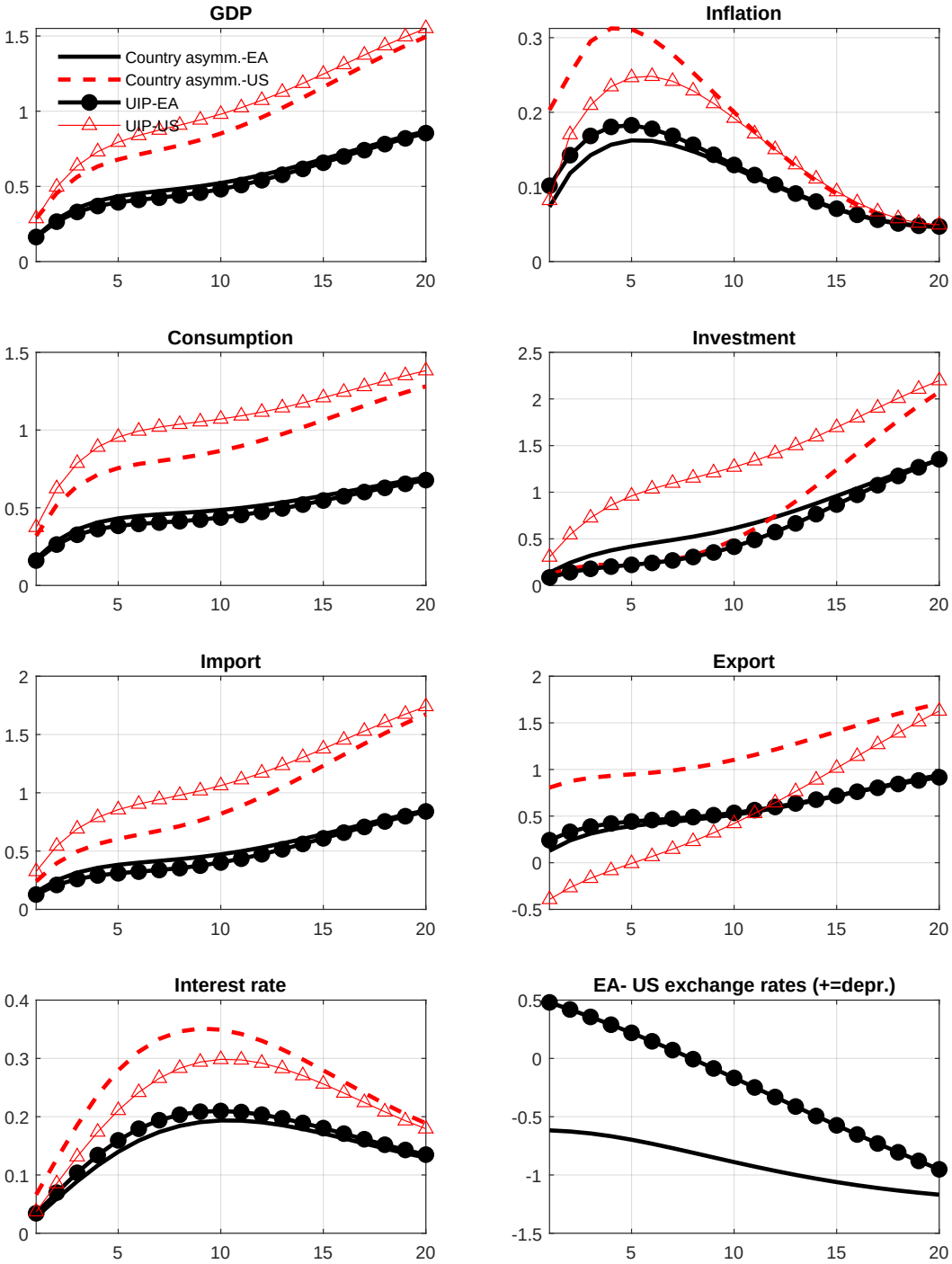
Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure 5: Impact of AI adoption in the euro area and the US - country-asymmetric shock to non-tradable goods and precautionary savings on the euro area



Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure 6: Impact of AI adoption in the euro area and the US - country-asymmetric shock to non-tradable goods and UIP shock

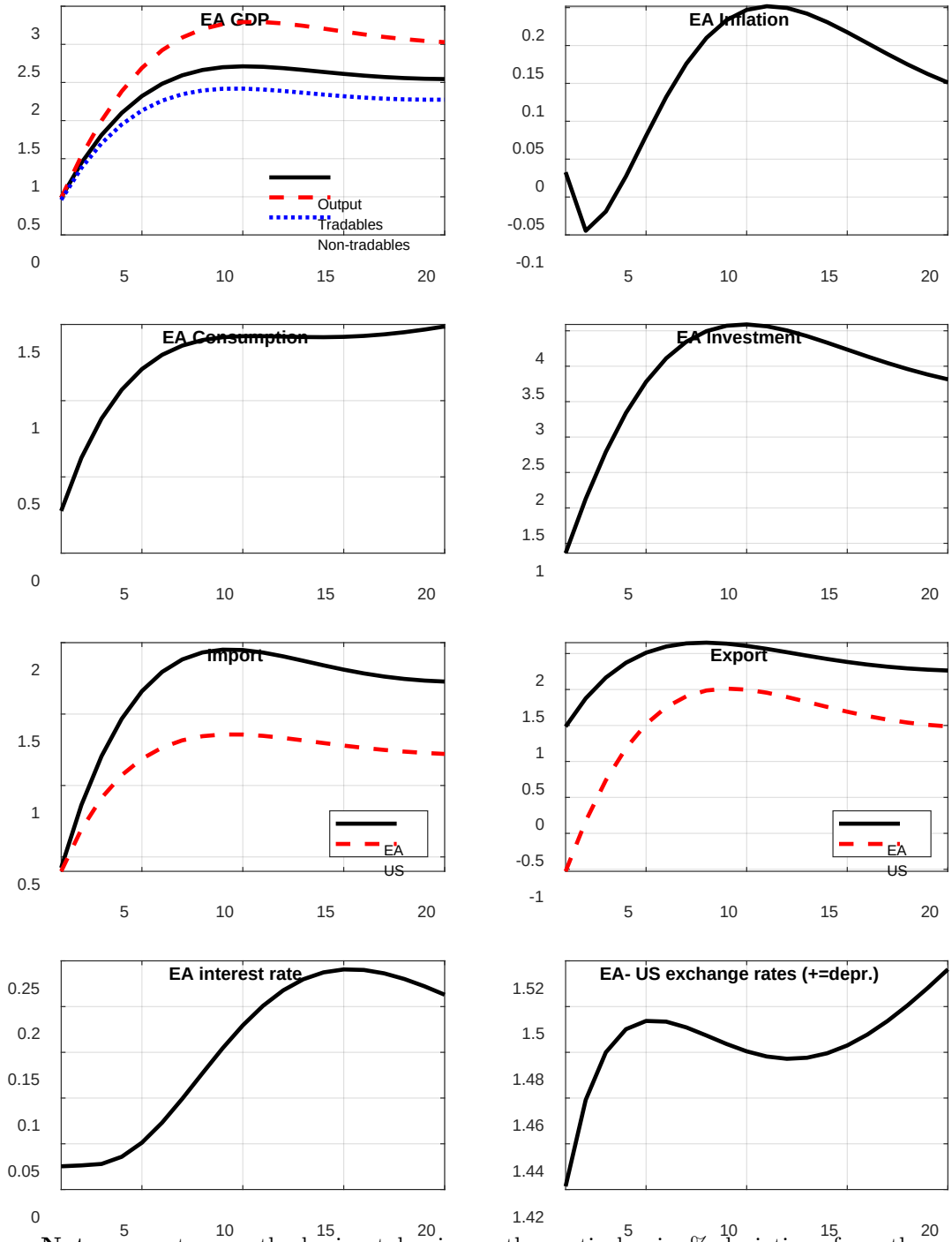


Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Appendix

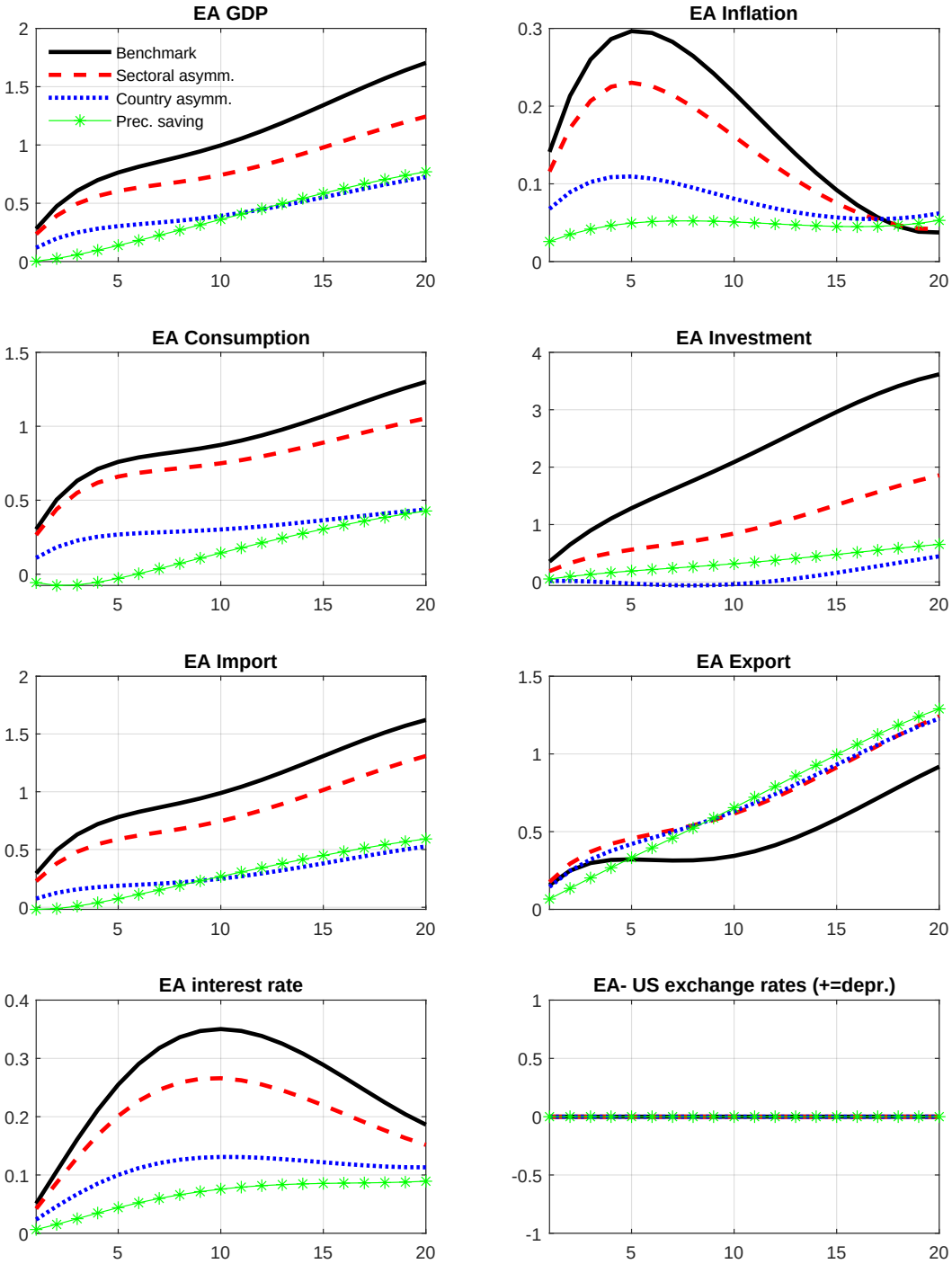
A Appendix: additional figures

Figure A.1: Impact of AI adoption in the euro area - sudden shock



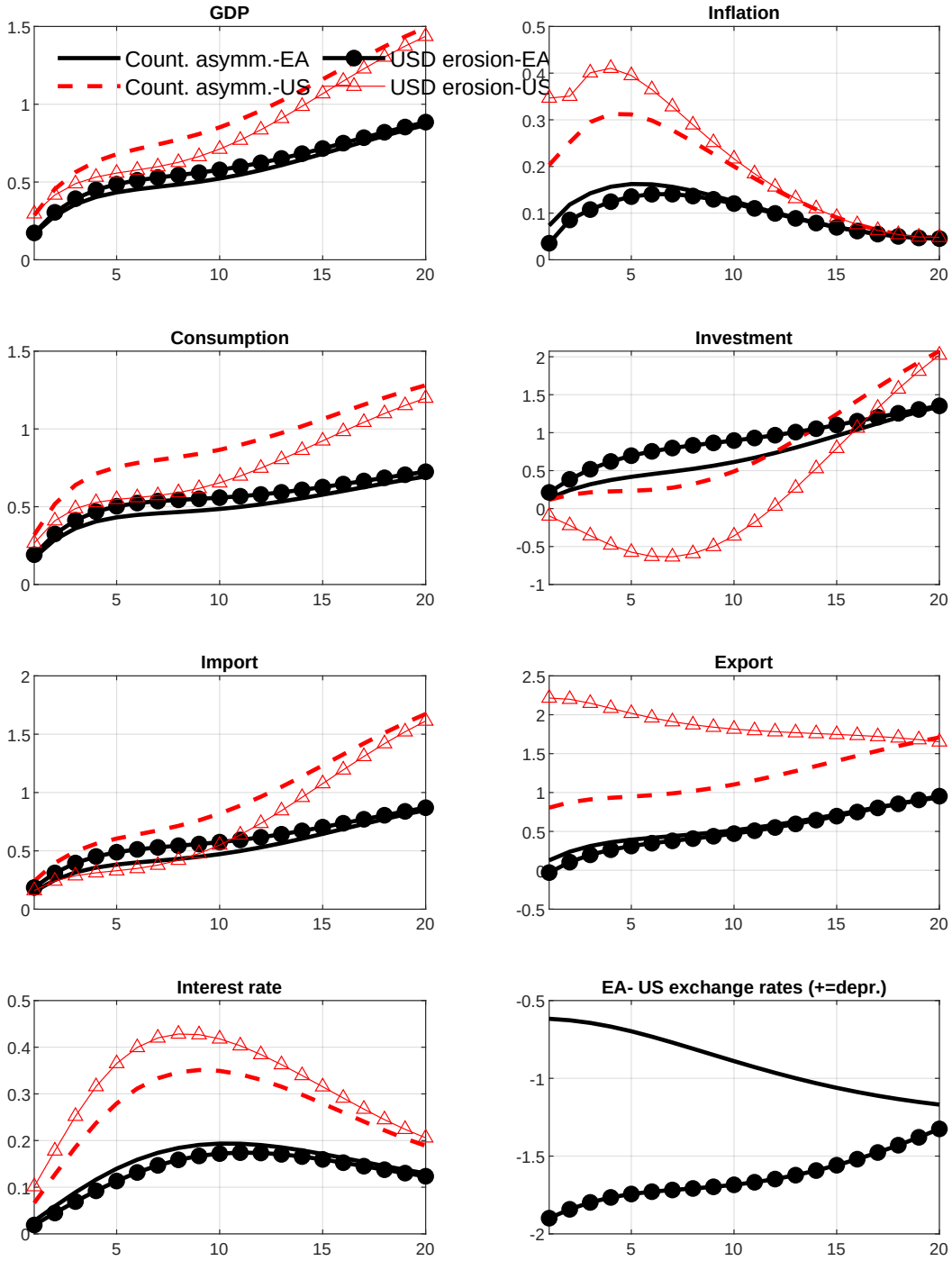
Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar. Sudden 1% permanent increase in the level of TFP across countries and sectors

Figure A.2: Impact of AI adoption in the euro area - alternative scenarios with fixed exchange rate



Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.

Figure A.3: Impact of AI adoption in the euro area and the US - country-asymmetric shock to non-tradable goods and US dollar erosion



Notes: quarters on the horizontal axis; on the vertical axis, % deviations from the baseline; inflation rate: annualized pp deviations; exchange rate: nominal terms, + (-) = depreciation (appreciation) of the US dollar.