Inevitable Policy Response 1.8°C Forecast Policy Scenario 2021 (IPR FPS 2021): Macroeconomic Results

Preparing financial markets for climate-related policy and regulatory risks

January 2022

IPR was commissioned by the Principles for Responsible Investment (PRI) and supported by world class research partners and leading financial institutions

PRI Principles for Responsible Investment

PRI commissioned the Inevitable Policy Response in 2018 to advance the industry's knowledge of climate transition risk, and to support investors' efforts to incorporate climate risk into their portfolio assessments

:vivideconomics putting economics to good use

Energy Transition Advisors ETA

A research consortium led by Energy Transition Advisors and Vivid Economics conducts the initiative's policy research and scenario modelling and includes 2Dii, Carbon Tracker Initiative, Climate Bonds Initiative, Quinbrook Infrastructure Partners and Planet Tracker

The consortium was given the mandate to bring leading analytic tools and an independent perspective to assess the drivers of likely policy action and their implications on the market

Planet Tracker | quinbrook infrastructure PARTNERS | 2° investing initiative | Carbon Tracker Initiative | Climate Bonds Initiative

Who supports the Inevitable Policy Response ?

Leading financial institutions joined the IPR as Strategic Partners in 2021 to provide more in-depth industry input, and to further strengthen its relevance to the financial industry

Core philanthropic support has been provided since 2018. The IPR is funded in part by the Gordon and Betty Moore Foundation through The Finance Hub, which was created to advance sustainable finance, and the ClimateWorks Foundation striving to innovate and accelerate climate solutions at scale

The IPR offers a range of applications to help navigate the climate transition

IPR Policy Forecast

A **high-conviction policy-based forecast** of forceful policy response to climate change and implications for energy, agriculture and land use

IPR Forecasted Policy Scenario (FPS)

A **fully integrated climate transition scenario** modelling the impact of the forecasted policies on the real economy up to 2050, tracing detailed effects on all emitting sectors

IPR 1.5°C Scenario

A 1.5°C **'Required Policy Scenario'** (RPS) building on the IEA NZE by deepening analysis on policy, land use, emerging economies, NETs and value drivers. This can be used by those looking to align to 1.5°C

IPR Value Drivers

A set of publicly available **outputs from the FPS and 1.5°C RPS** that offer significant granularity at the sector and country level allowing investors to assess their own climate risk

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IPR's Forecast Policy Scenario (FPS) value add

A high conviction policy-based forecast, anchored in realistic policy and technology expectations rather than hypothetical 'optimal' pathways

Complete forecast includes macroeconomic, energy and land use models linking crucial aspects of climate across the entire economy

Transparent on expectations for policy and deployment of key technologies, such as Negative Emission Technologies

Covers all regions of the world, with specific policy forecasts for key countries and regions

Applicable to TCFD reporting and regulatory stress testing, with a 1.5°C Required Policy Response (RPS) scenario being developed for late 2021

Fully integrating land-use to examine the full system impacts of policies, and highlight the critical role of land

A 1.5°C '**Required Policy Scenario'** (RPS) has also now been developed building on the IEA NZE, deepening analysis on land use and deriving polices required to reach a rapid Net Zero 2050 outcome

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Note: IPR does not model physical risk

The Inevitable Policy Response: FPS scenario

January 2022

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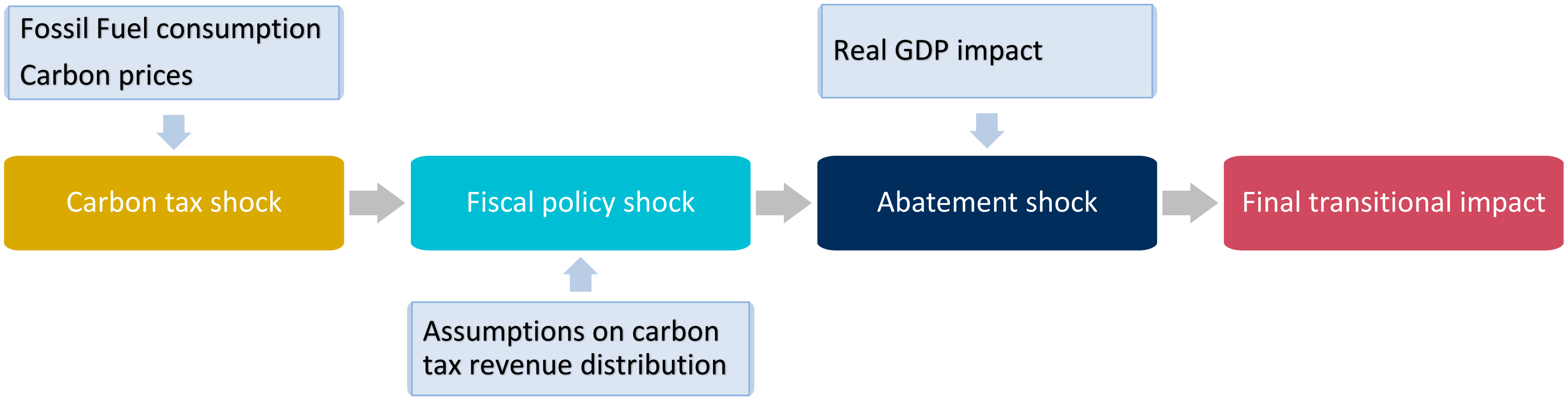
Vivid Economics projected macroeconomic variables in collaboration with the National Institute for Economic and Social Research (NIESR)

Vivid Economics worked with NIESR to expand the results from Vivid Economics' energy models into macroeconomic variables across different economies using a variety of shocks. None of the modelled shocks include physical risks.

Vivid Economics/NIESR implemented the following shocks using the National Institute Global Econometric Model (NIGEM):

- Carbon tax shock: it introduces a carbon tax in the economy. It flows through inflation directly based on the emissions levels and carbon prices by country/region. As a result of rising carbon taxes, consumption of Fossil Fuels (FF) demand decline with impact to countries/regions that export FFs. The basket imports prices changes to reflect a decline in in FF consumption.
- Fiscal shock: once the carbon tax is introduced in each economy it generates additional revenues to the government. The amount of revenues depend on the emissions and the carbon prices in each country/region. Revenues are distributed with the following allocations: 40% to payoff debt, 30% as household transfers, and 30% as government investment.
- Abatement shock: a supply shock to the economy. This is the real GDP cost of a costlier energy system of decarbonizing the economy (OPEX and CAPEX across eight technologies). Abatement cost were produced by Vivid Economics.



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Each shock has unique drivers based on the inputs and modelling options available in NIGEM

Carbon tax shock drivers

- Carbon prices: increased price for all countries/regions but at different speeds. Sharper rises would have larger impacts on inflation.
- FF emissions profile: countries with higher emissions would expect to see larger inflationary impacts.
- NIGEM applies the carbon tax to the inflation equation, import prices, and FF export market shares.

Fiscal shock

- Revenues are recycled through debt repayments, government investment, taxes, and household transfers.
- Differences in the tax base (personal vs corporate) in each country will create differences in the impact of the fiscal shock.
- Countries with higher carbon prices or emission may accumulate larger carbon revenues.

Abatement shock

- Abatement impacts (CAPEX and OPEX) depend on the cost of technologies relative to the cost of fossil fuels in each country (set outside NIGEM).
- These cost have been calculated by Vivid Economics Energy Modelling team.

Cumulative Transitional Impacts

- Impacts are presented below as the percentage (absolute) difference against baseline. This baseline was constructed as a hypothetical counterfactual to the RPS and FSP scenarios. We presented high level commentary for a few macroeconomic variables.

Monetary policy

- Monetary policy is determined within the model based on a two-pillar rule targeting Nominal GDP and Inflation rate.

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Key findings

IPR Energy results

- Economies decarbonise at different speeds; OECD countries tend to decarbonise early on the scenario. Most Non-OECD countries decarbonise only after 2030 (including FFDC).
- Carbon prices increase for all countries but at different speeds based on their policy ambitions. Countries with ambitious decarbonisation policies, raise carbon prices earlier.
- Under IPR the share of fossil fuels in primary energy falls from 80% in 2020 to 40% or less in 2050.

IPR macroeconomic modelling and impacts

- Macroeconomic impacts were modelled using NIGEM a quarterly macro-econometric model. The model introduced a series of transitional shocks. This included the introduction of a carbon tax shock, a fiscal shock that recycles carbon tax revenues, and an abatement shock which represents the economic costs of a costlier energy system (see appendix).
- In both IPR scenarios there are short- and medium-term economic costs (lower real GDP and higher inflation compared to the baseline) but most of these impacts dissipate over time. Non-OECD and FFDC see worse outcomes compared to OECD countries in both inflation and real GDP.
- A high conviction scenario like RPS doesn't necessarily yield worse long-term outcomes when compared to FPS, making an ambitious transformation of energy systems economic neutral by 2050 (see accompanying RPS slide pack)
- Unemployment rate only see minor differences compared to baseline as a result of moderate changes in real GDP. For a few economies with significant impacts from FPS and RPS differences against the baseline can be significant.
- In most economies long term interest rates react moderately to monetary policy rate hikes to contain inflationary pressures early in the scenario. In a few countries monetary policy increase rates more aggressively, with impacts on long term interest rates.

Results update

- Macroeconomic impacts were calculated in Q4 2021. Assumptions and results have not incorporated any 2022 developments in the macroeconomic environment or energy markets.
- Data presented in the charts correspond to IPR Energy and Land Use countries/regions for each shock based on mapping with NIGEM's countries/regions coverage. Supporting macroeconomic excel files contain final IPR impacts for NIGEM's countries/regions coverage only.

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Key findings

Inflationary impacts

- Most economies see inflationary pressures compared to the baseline early in the transition for both FPS and RPS. Inflation is triggered primarily as the result of the introduction of carbon taxes in the economy. These inflationary pressures do not appear permanent given economies eventually decarbonise.
- For IPR we assumed a significant reduction of consumption of Fossil Fuels which leads to a gradual decline in Fossil Fuel prices over the forecast horizon. As a result, inflation could be subdued over the forecast period if higher projections for Fossil Fuels prices had been considered.
- There are also emerging arguments that point to medium term risks over inflation as a result of the transition to cleaner energies and disruption on the energy markets as a result of this shift . These arguments point to circumstances that could create permanent inflationary pressures during the transition including high demand of mineral used in renewable technologies coupled with limitation in the supply, readiness of technologies for full deployment over the next decade and increasing governance pressure over FF investments that can push FF prices even higher.
- We considered these argument should be taken in consideration, and this reflect the inherent uncertainty of forecasting macroeconomic variables over long periods of time.
- Minerals, although more relevant now in greener technologies, may not be the single driver for renewable technologies deployment given these technologies are expected to evolve. Also, investors disinvestments in FF could expand the supply of minerals for green technologies.
- We considered that shocks to the energy markets (specially for FF) will gradually reduce its impact as the economies decarbonise. This can lead to less pressure from Fossil Fuels (FF) price fluctuation on inflation.

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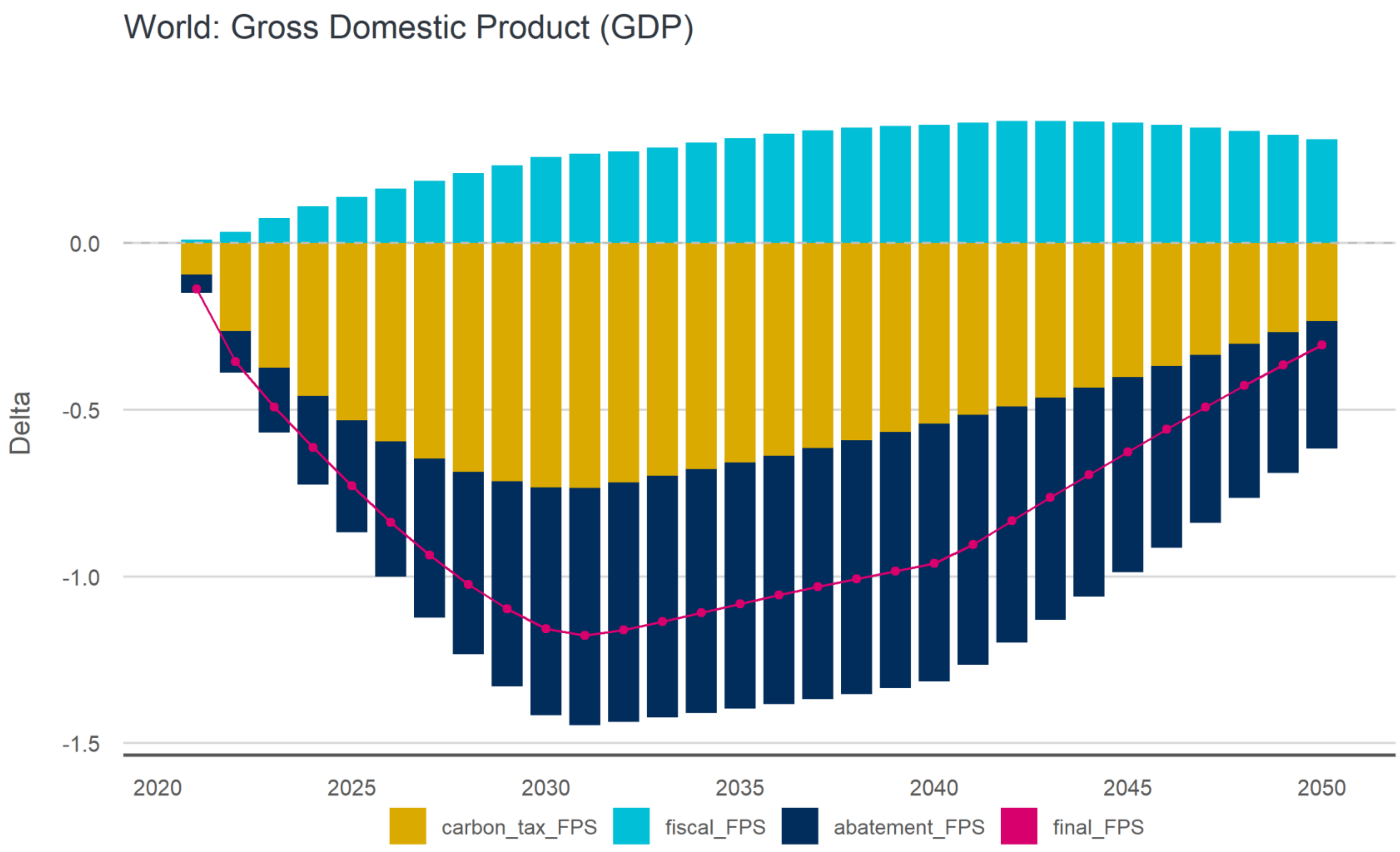
Real GDP cumulative transitional impacts: Global



- The majority of negative final impacts are significantly mitigated by 2050 (see the pink line in the left-hand side chart).
- The next 10 years appear to be crucial to cut emissions but also for economic cost to erupt.
- FPS's carbon tax and abatement shocks could have a mild impact in the global economy by 2030 (less than 1.5%).
- This is partly offset by carbon revenue recycling back into the economy (through a combination of debt repayment, transfers, or government investments).

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

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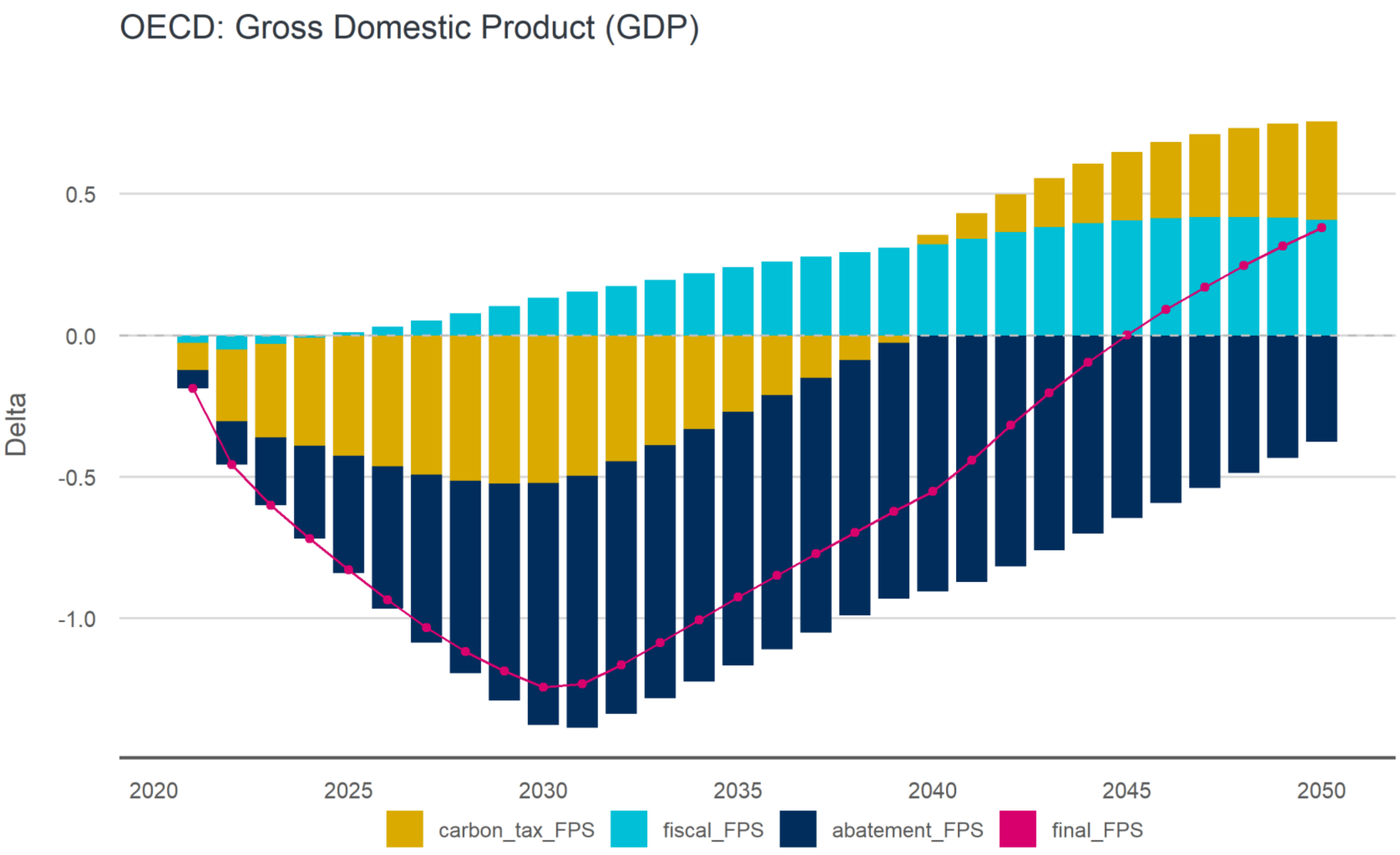
Real GDP cumulative transitional impacts: OECD



- OECD countries see negative real GDP impacts before 2045.
- Real GDP impacts from the carbon taxes are moderate when introduced given these economies decarbonise rapidly. As inflation dissipates over the medium term, these economies can grow faster.
- Fiscal revenues support the economy moderately.
- However, these countries can repay some of their gov. debt quicker when fiscal revenues surge.
- High abatement costs in OECD countries are caused by ambitious policy targets.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis
Source: NIGEM based on Vivid Economics inputs

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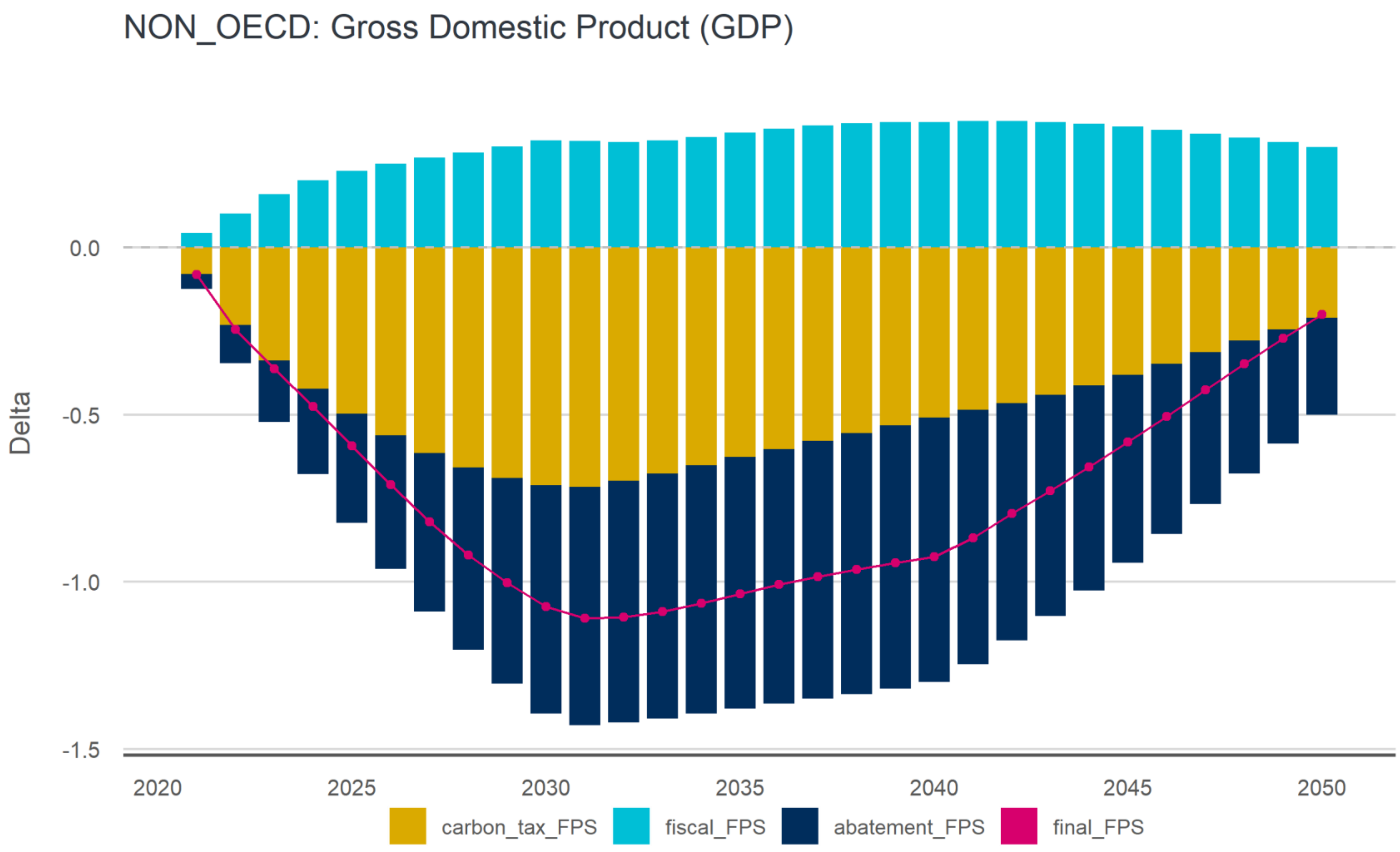
Real GDP cumulative transitional impacts: Non-OECD



- Non-OECD countries see a -1.1% impact on real GDP compared to the baseline by 2030.
- This is driven by large abatement costs in these economies, given their reliance on FF exports and further vulnerabilities towards higher inflation.
- Non-OECD countries face higher real GDP impacts as a result of their reliance in FF exports.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

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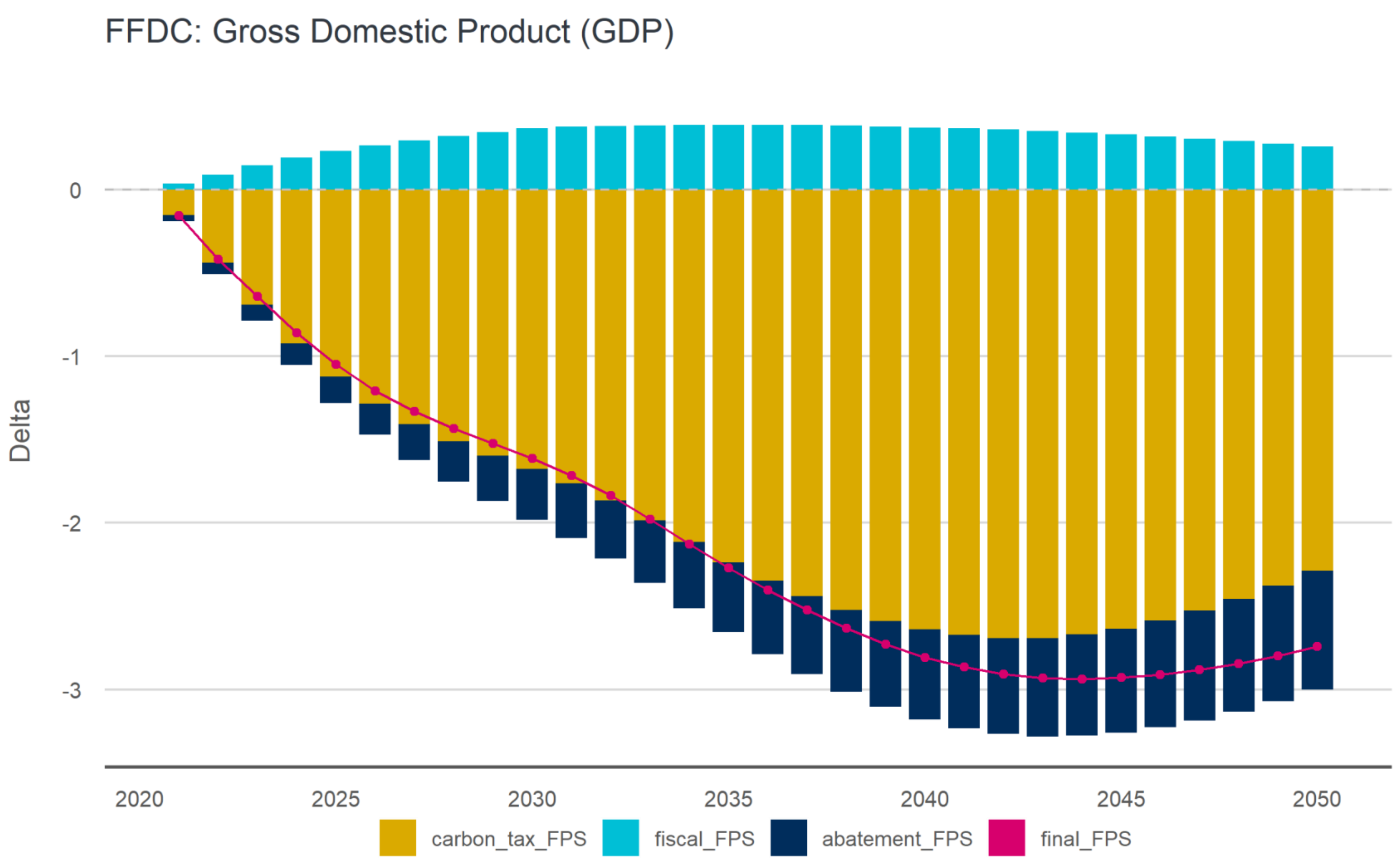
Real GDP cumulative transitional impacts: FFDC

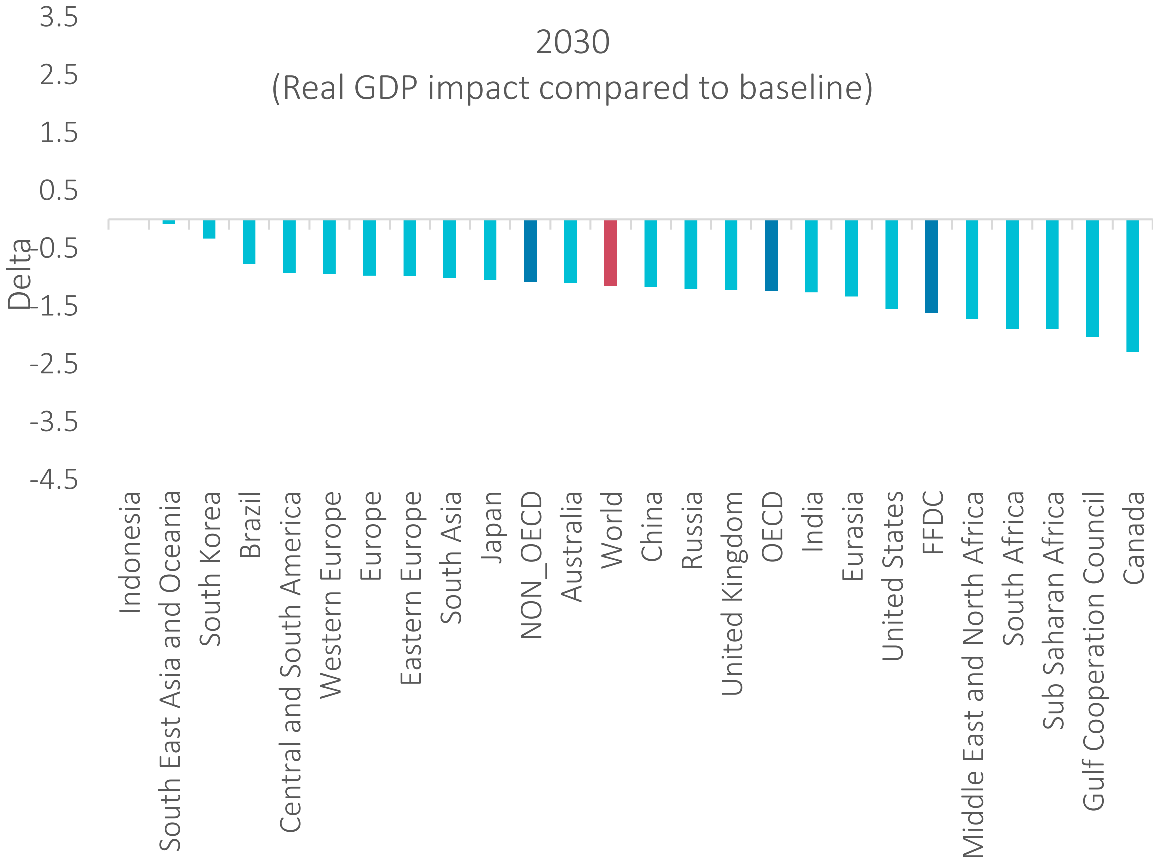


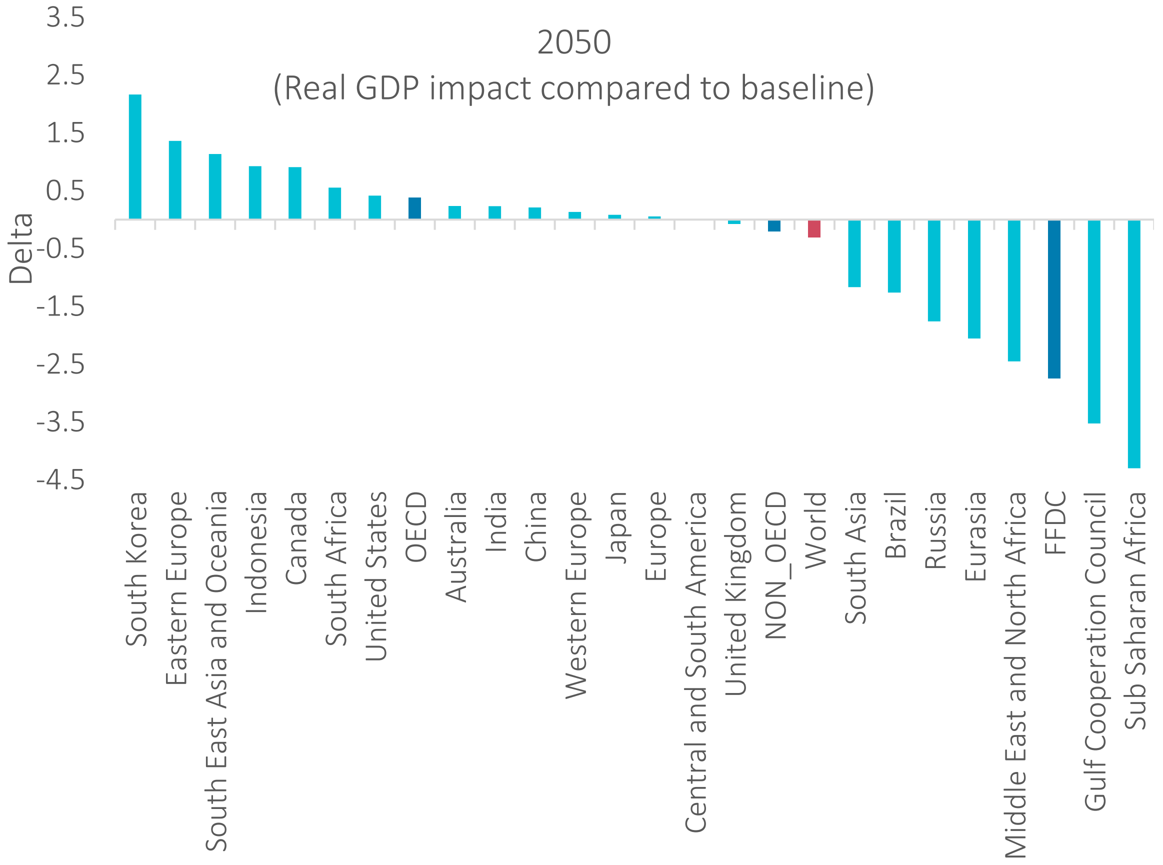
- FFDC countries see larger impacts under FPS compared to Non-OECD and OECD countries.
- This is driven by significant impacts from carbon taxes.
- FFDC economies see negative real GDP impacts over the forecast horizon as a result of short-term inflationary pressures (which has an impact on disposable income) coupled with a decrease in demand for FF exports.
- Lower World FF prices do not benefit these economies as it does in more developed economies.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

FPS final cumulative transitional impacts on real GDP by 2030 and 2050 by country (across all shocks)

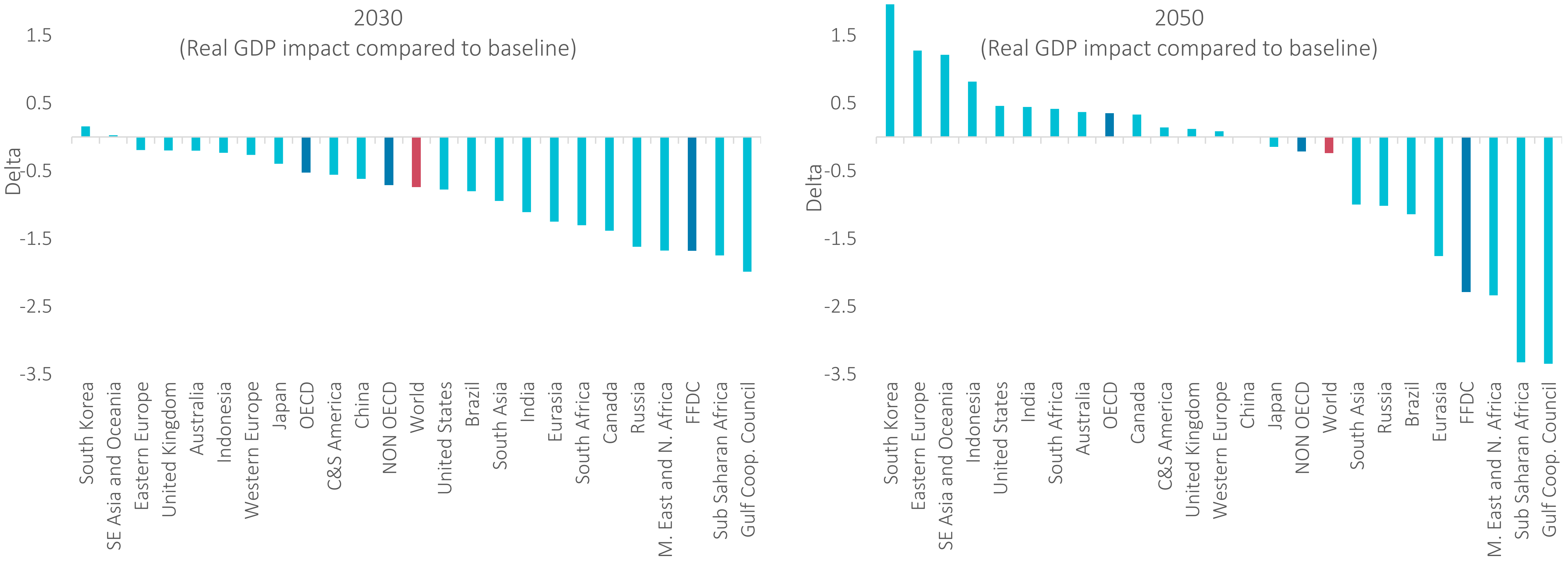




INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Sub-component of final cumulative transitional impact (1/3): FPS carbon tax impacts on real GDP

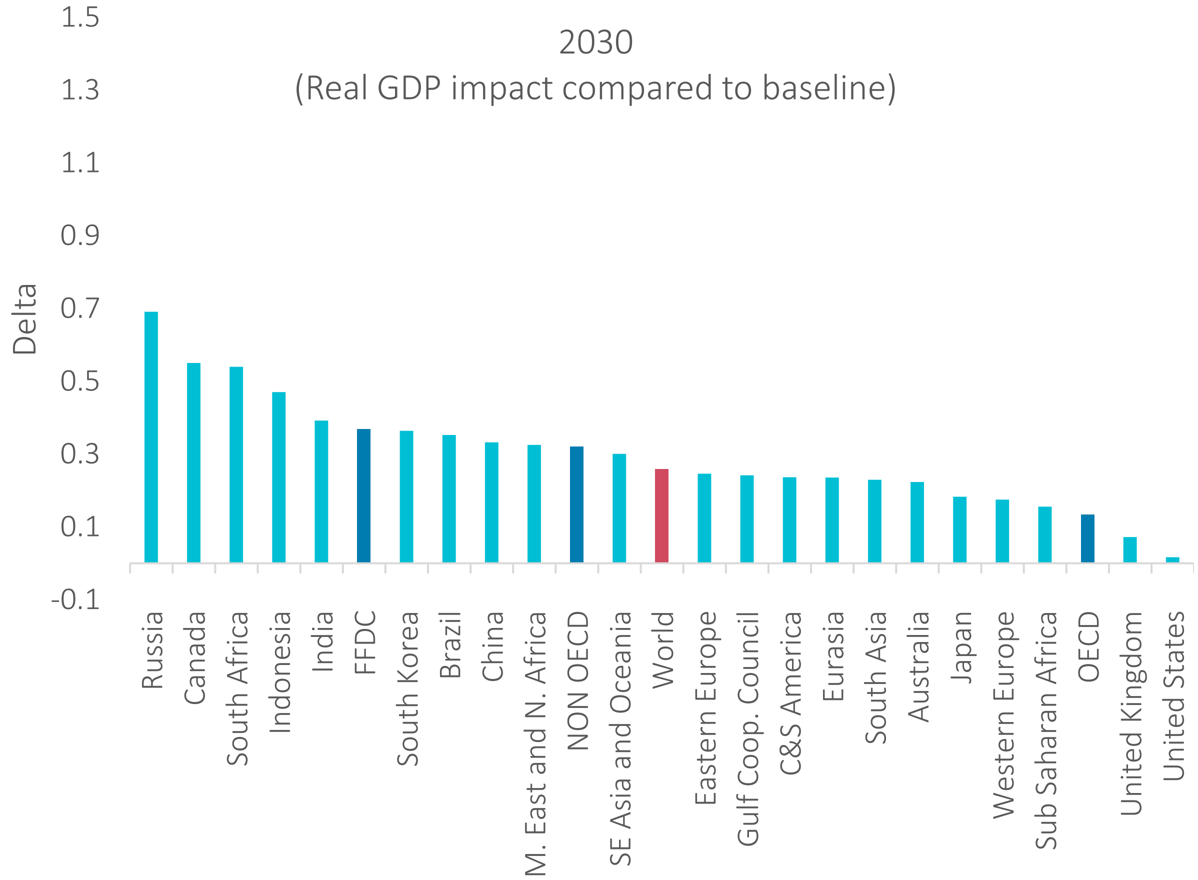


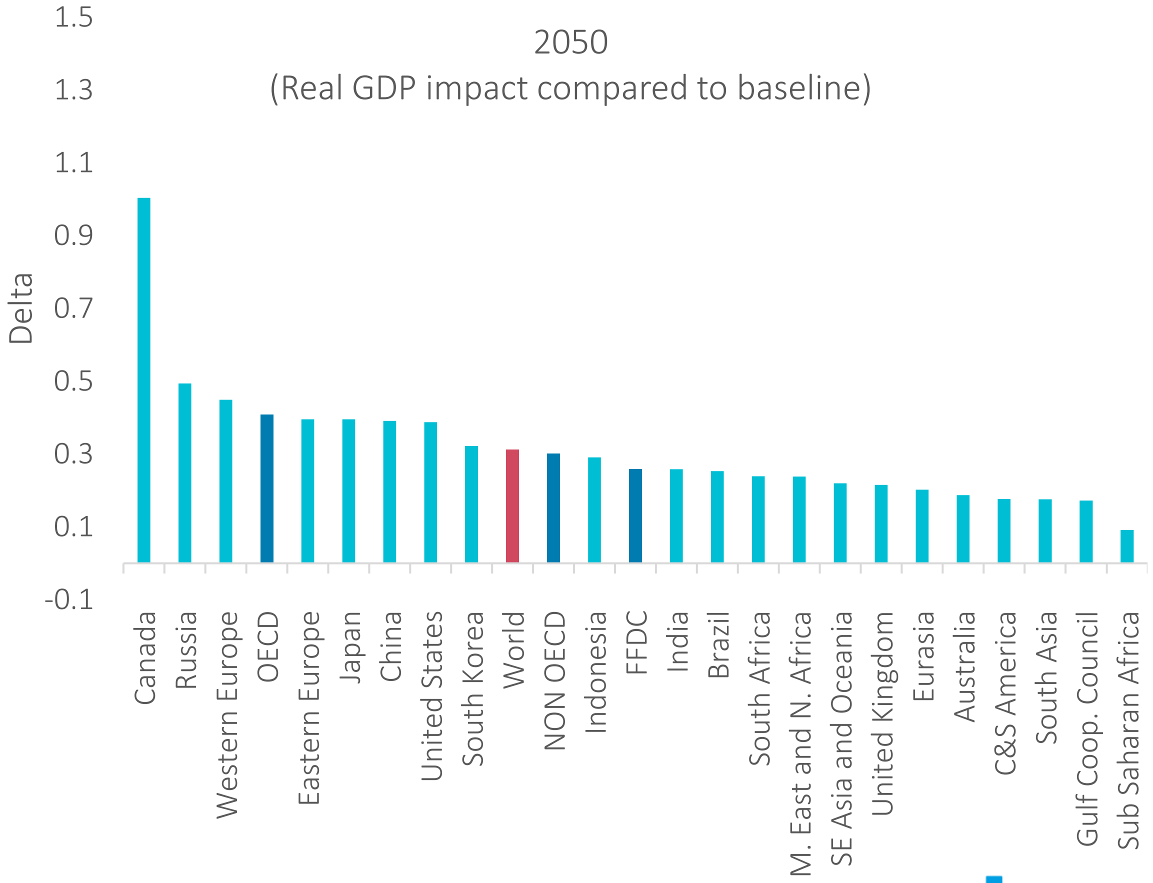
INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.

Source: NIGEM based on Vivid Economics inputs

Sub-component of final cumulative transitional impact (2/3): FPS fiscal impacts on real GDP

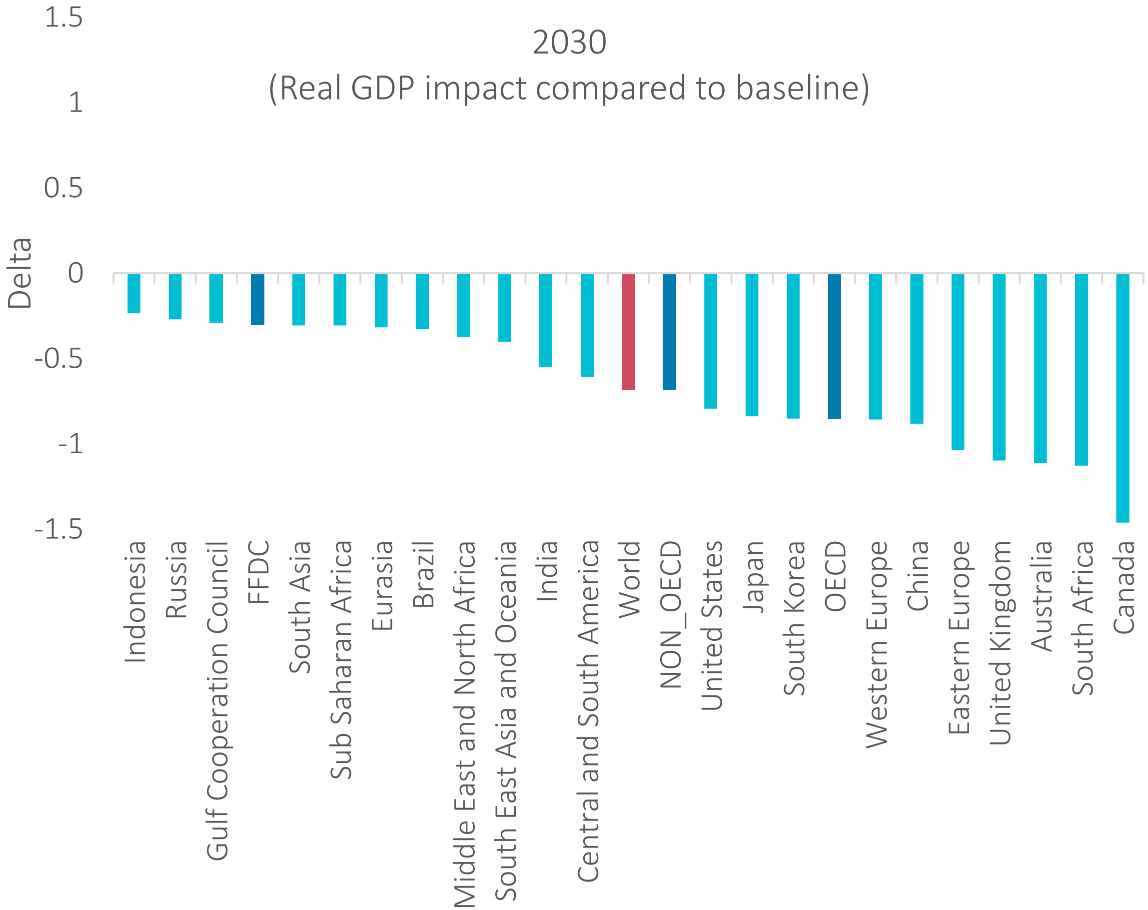


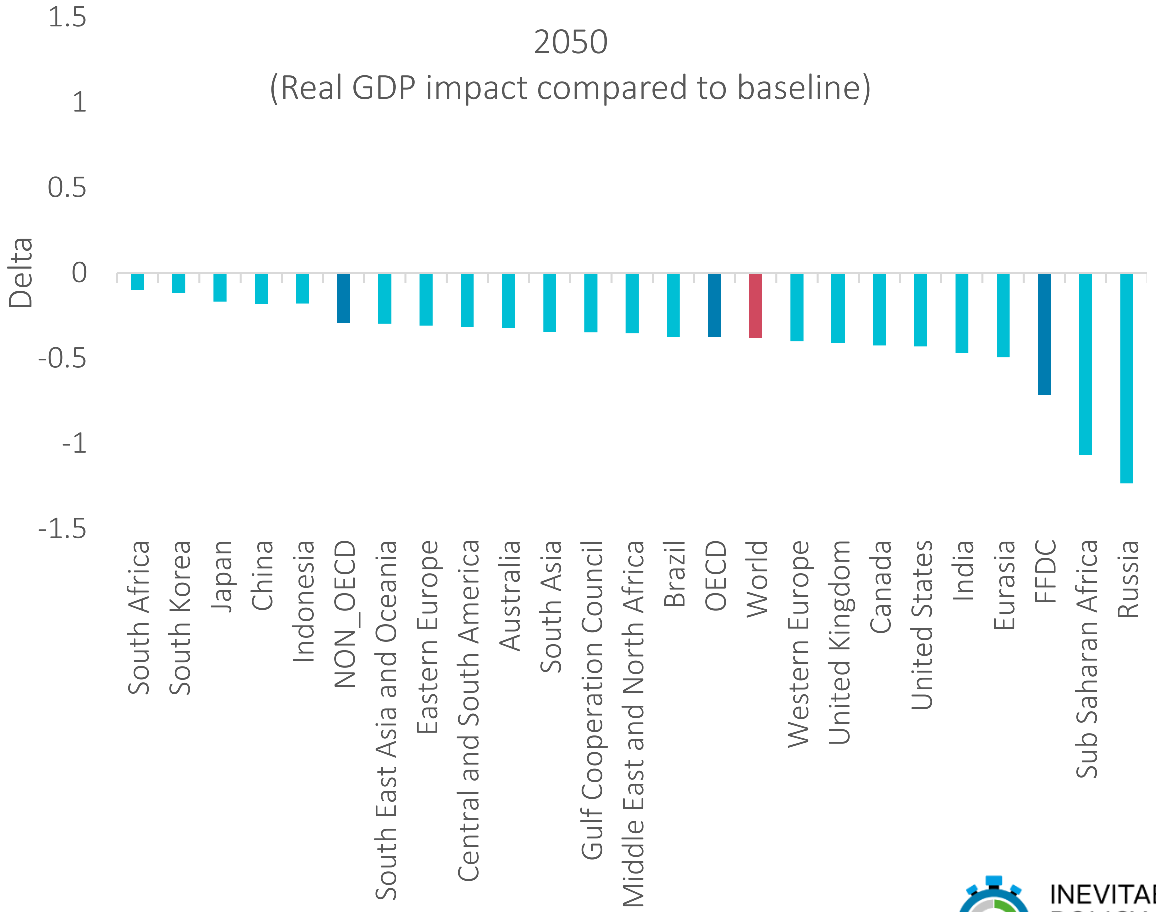


INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

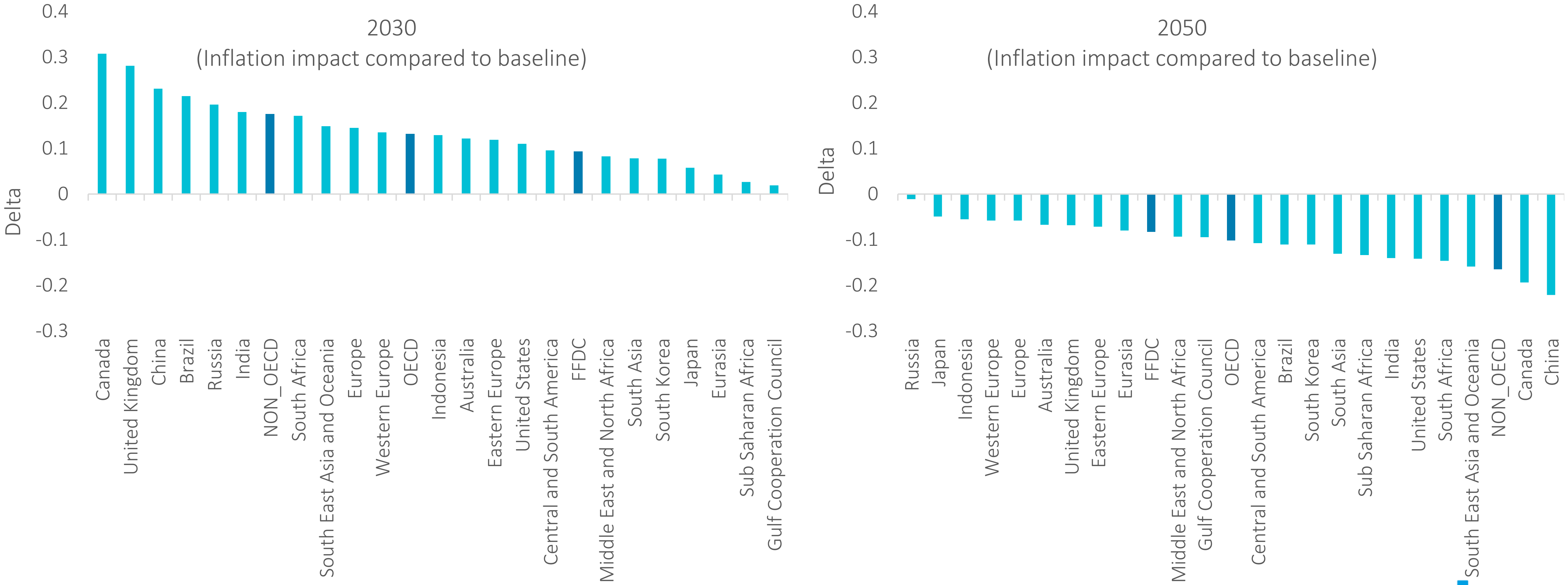
Sub-component of final cumulative transitional impact (3/3): FPS abatement impacts on real GDP





Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

FPS final transitional cumulative impacts on inflation by 2030 and 2050 by country (across all shocks)



INEVITABLE POLICY RESPONSE

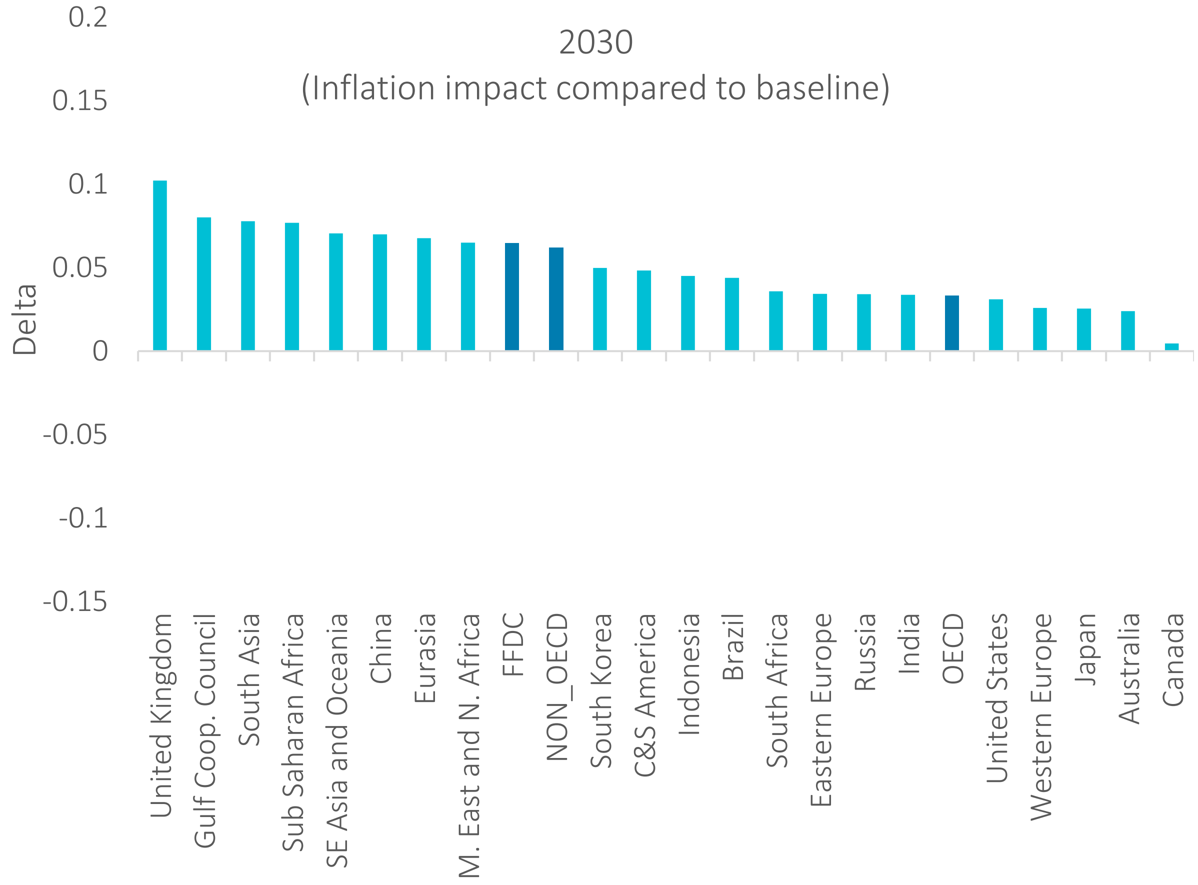
Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

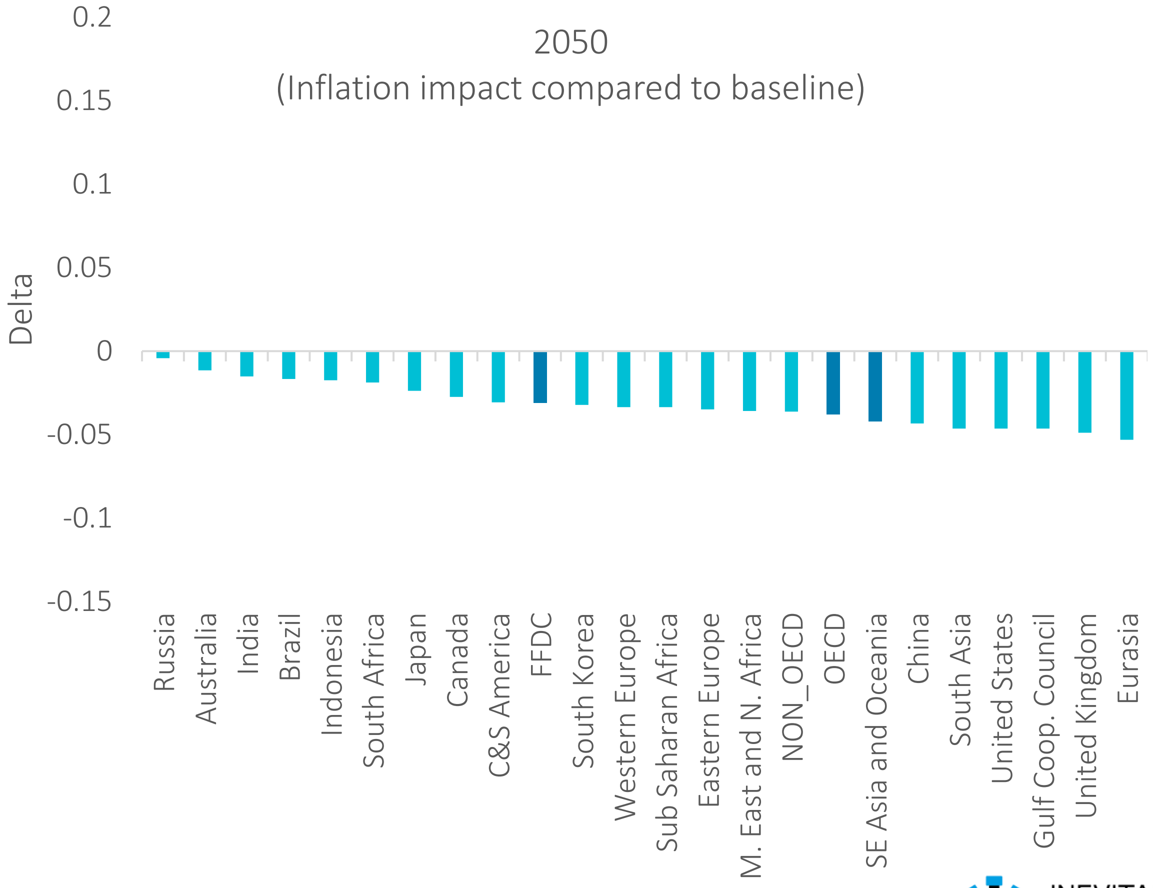
Sub-component of final cumulative transitional impact (1/3): FPS carbon tax impacts on inflation

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Sub-component of final cumulative transitional impact (2/3): FPS fiscal impacts on inflation



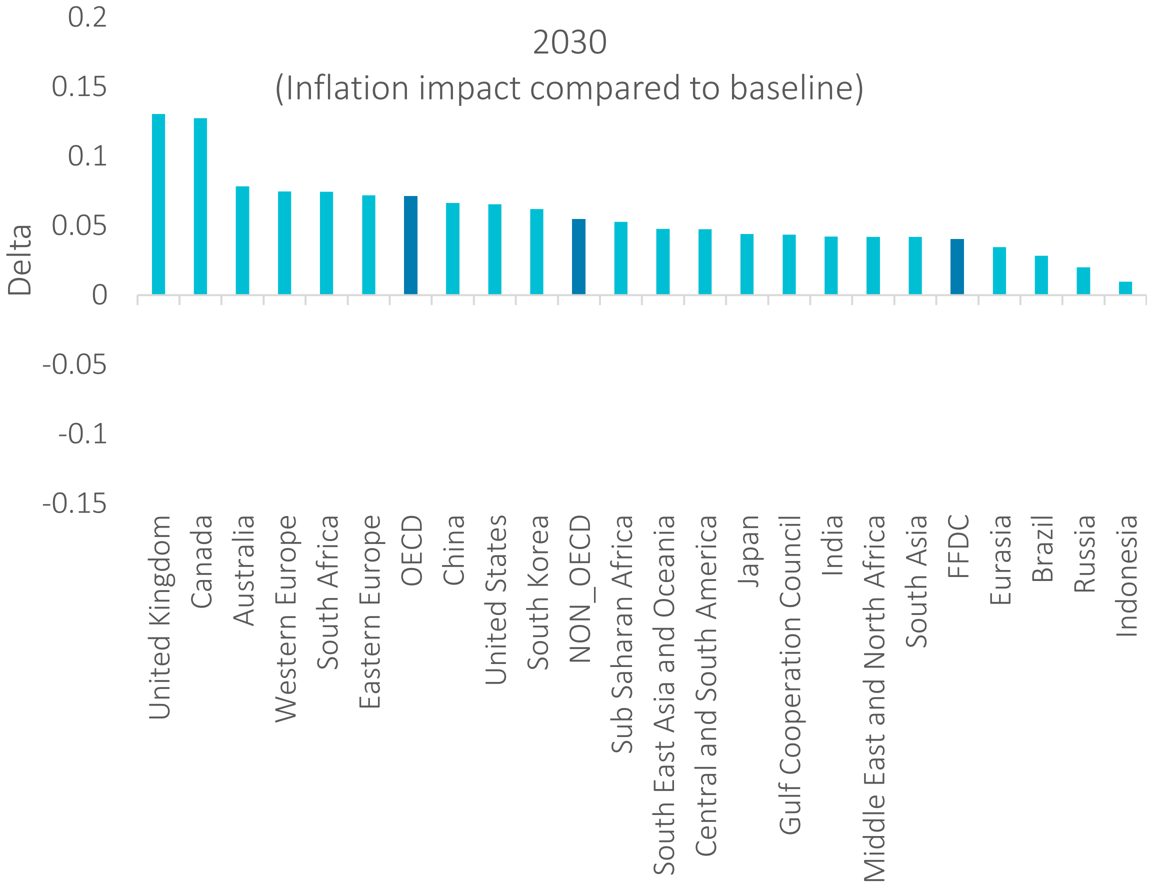


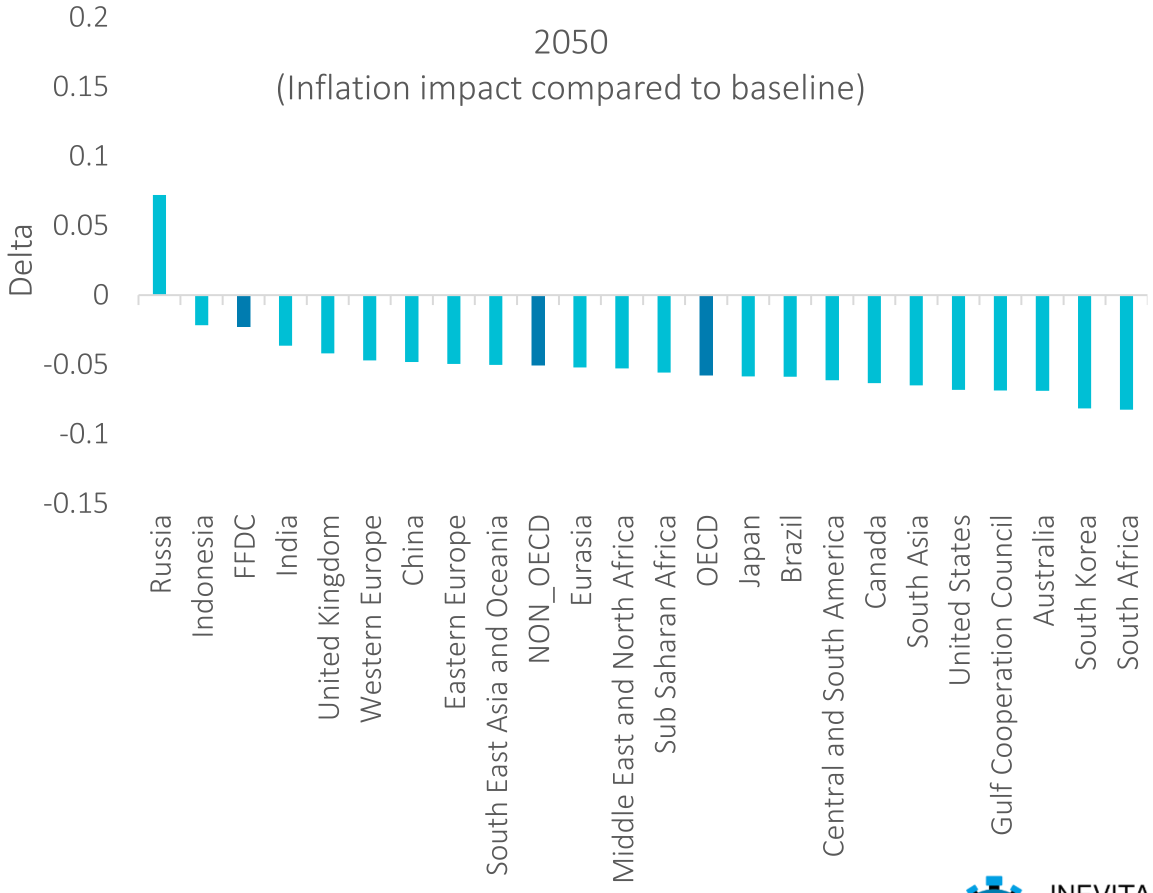
INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.

Source: NIGEM based on Vivid Economics inputs

Sub-component of final cumulative transitional impact (3/3): FPS abatement impacts on inflation





INEVITABLE POLICY RESPONSE

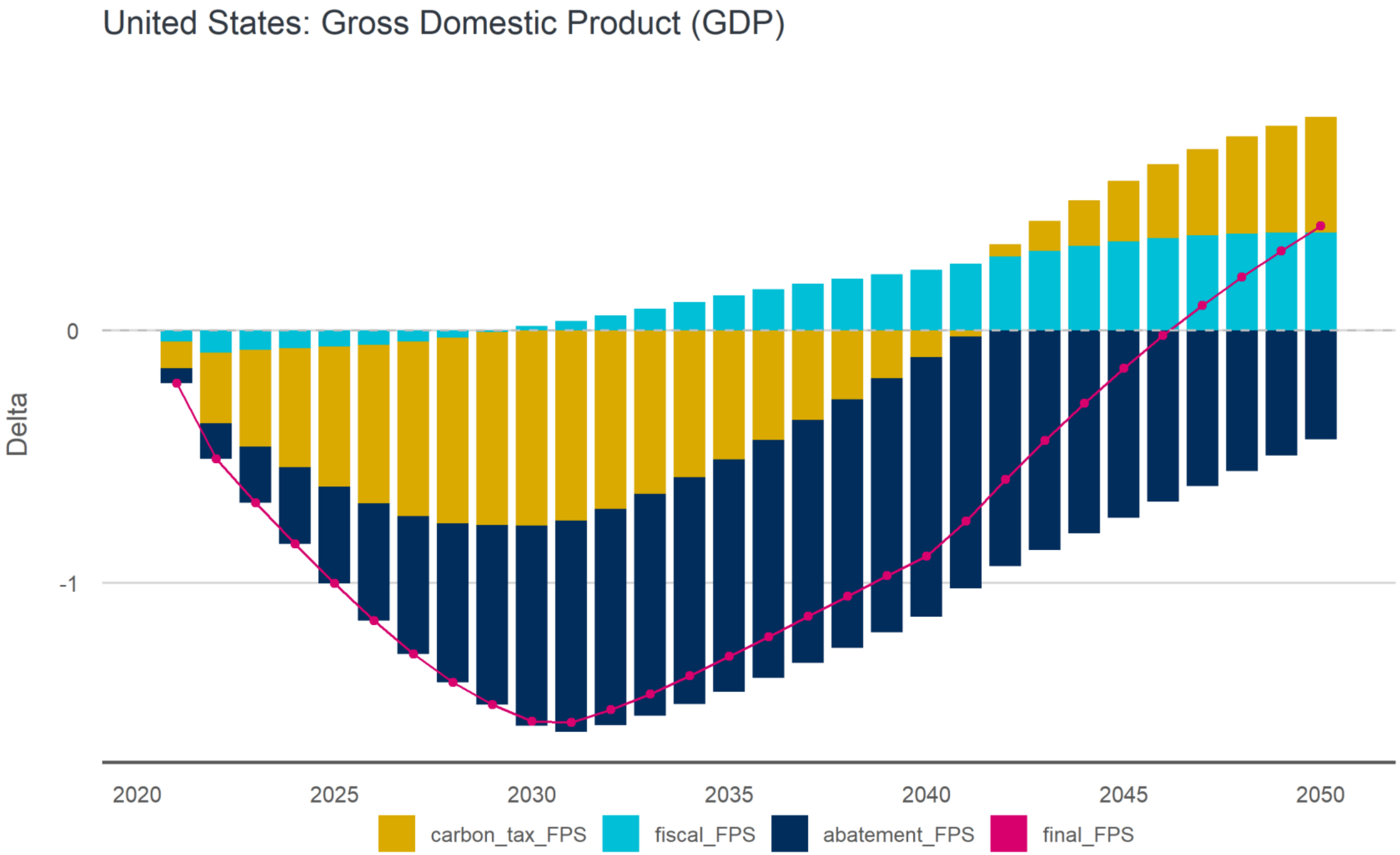
Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.

Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Real GDP

INEVITABLE POLICY RESPONSE

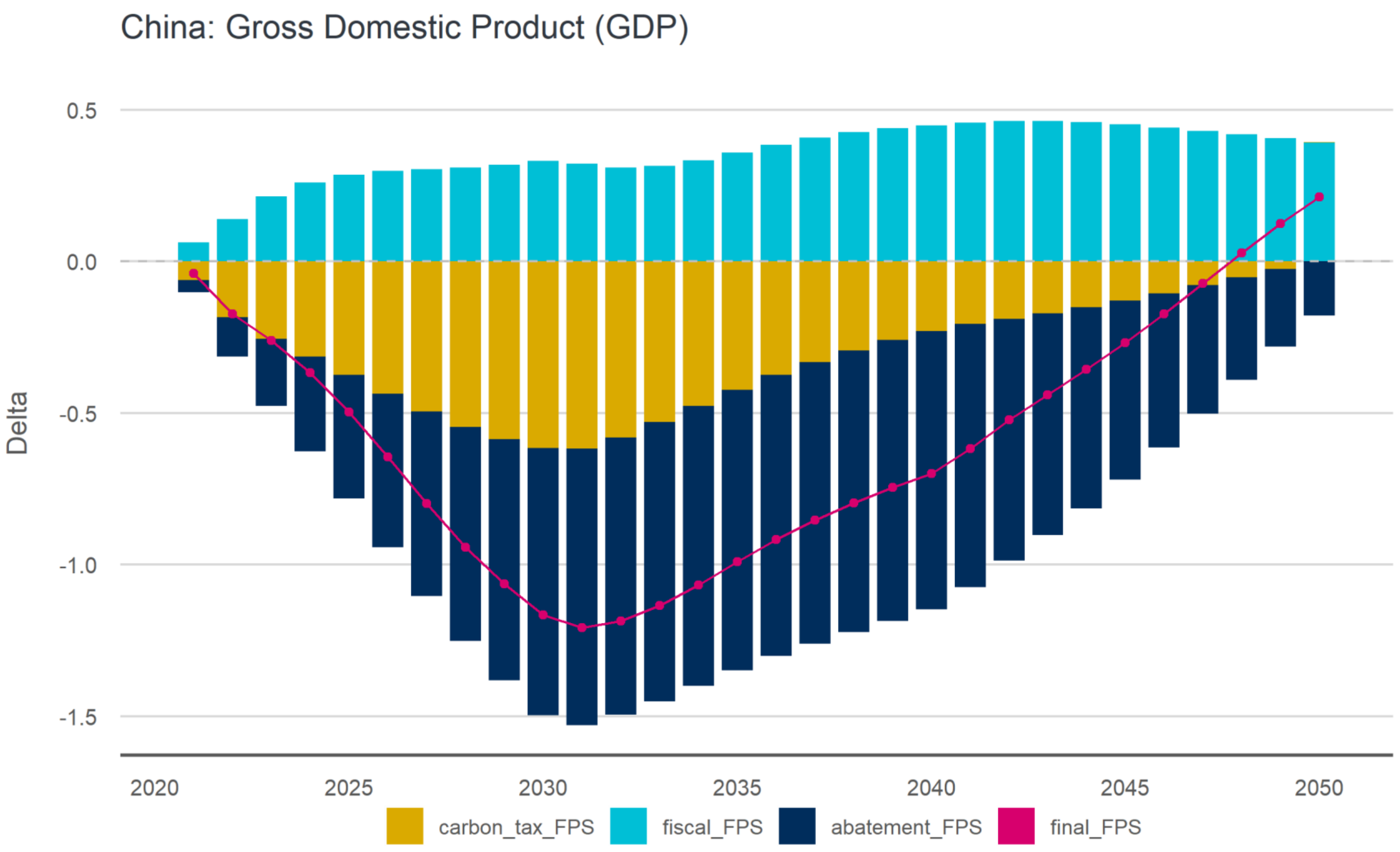
Real GDP cumulative transitional impacts: United States



- The FPS transition is expected to hit the US economy the most by early 2030s, with real GDP decreasing by -1.5% vs. the baseline. Negative impacts dissipate by 2047.
- Abatement costs are above the world average, and are a key driver of final impact of the transition.
- The US sees a mild fiscal impact as a result of early timing of the policy.
- As a result of lower demand for FF compared to baseline, world FF prices decline overtime, acting as a deflationary force that boosts GDP. This is counteracted by transitional abatement cost.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

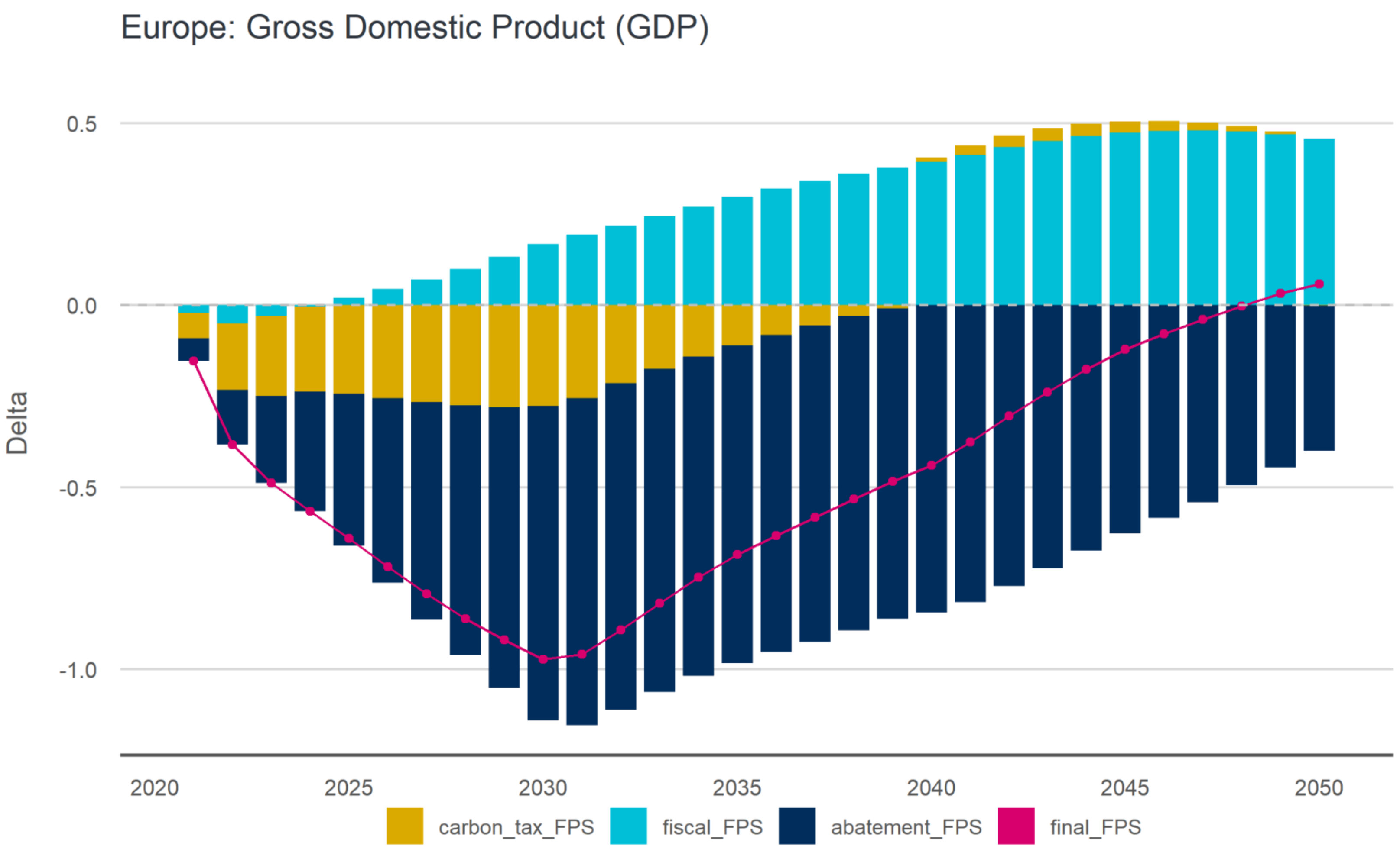
Real GDP cumulative transitional impacts: China



- The climate change transition is expected to hit Chinese economy the most by early 2030.
- Carbon tax shock is expected to hit US and Chinese economies in a similar way (due to carbon prices and emissions combination) with more inflation in China.
- However, the Chinese economy will see the fiscal shock offsetting this impact as a result of the slower pace of decarbonisation relatively to the US.
- By 2050 most transitional impacts would have dissipated (pink line).

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

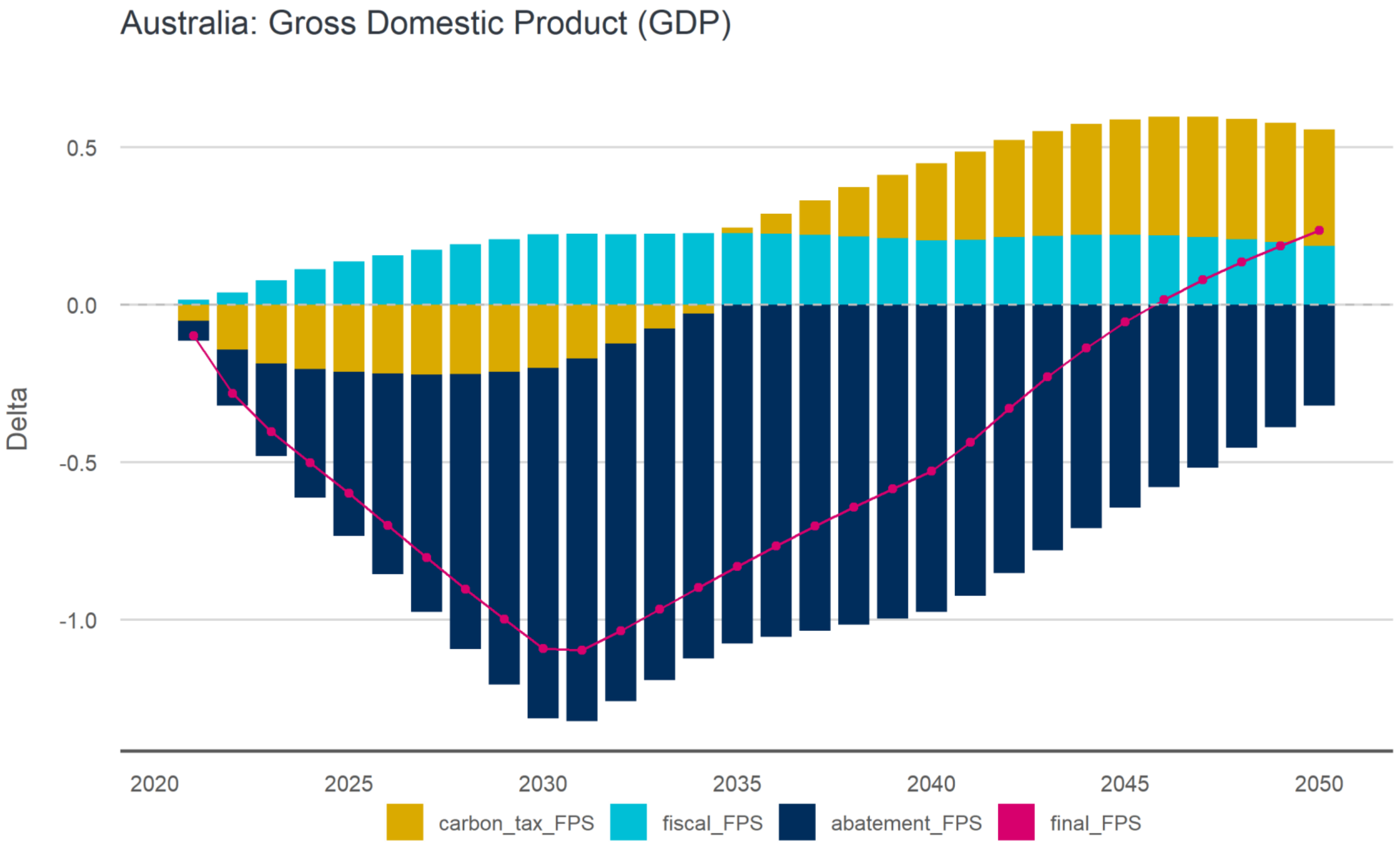
Real GDP cumulative transitional impacts: Europe



- Europe will see a milder impact from the RPS relative to the US and China.
- Given a more rapid decarbonisation of the EU economy compared to China and the US, real GDP impacts from carbon taxes are limited.
- Fiscal policy can offset significant abatement costs as carbon prices increase more rapidly than in other economies.
- Abatement costs in Europe are above world average given the region frontloads the transition effort over the next decade.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: Australia

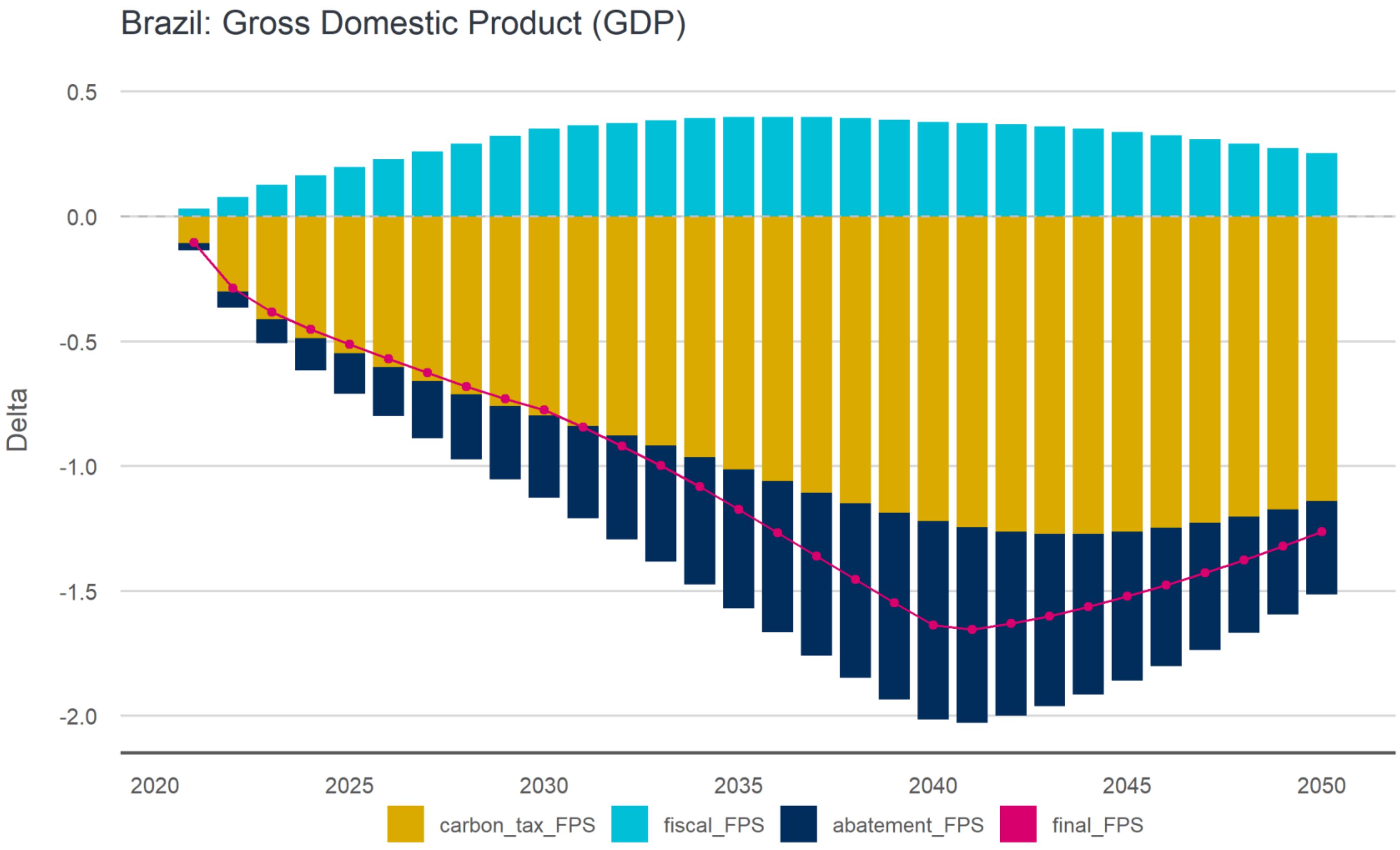


- FPS is expected to hit Australian economy the most by early 2030s (-1.2% vs baseline).
- Australia sees a similar carbon tax impact to the one in Europe. It also benefits from less inflationary pressures from FF prices. A reduction of FF prices creates deflationary pressures that boost real GDP later in the scenario (via stable policy rates after 2030 compared to baseline).
- This is offset by a significant reduction in emissions which limits the impact of carbon taxes.
- Abatement costs are similar to other OECD economies.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

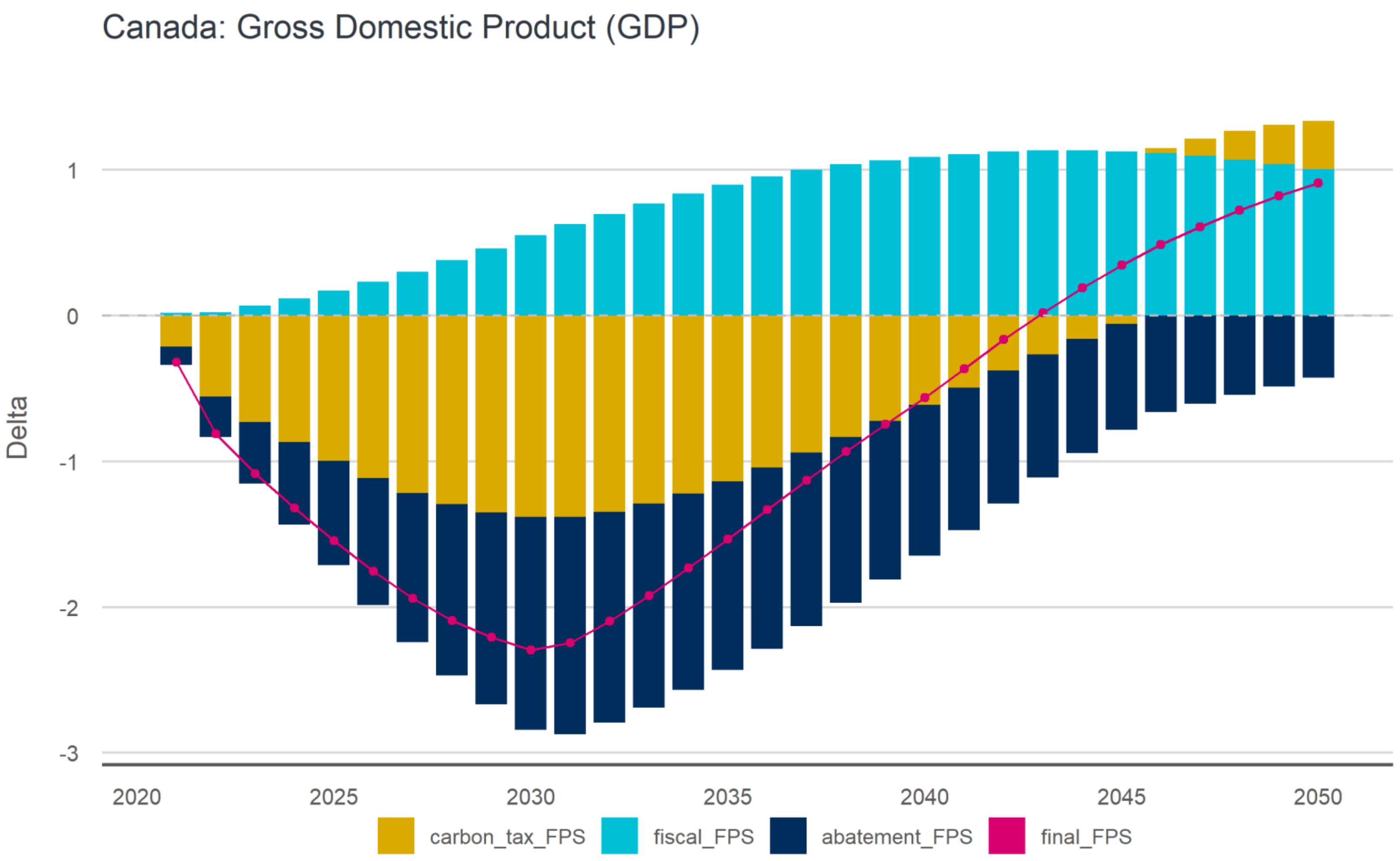
Real GDP cumulative transitional impacts: Brazil



- FPS is expected to hit Brazilian economy the most by early 2040s, with real GDP decreasing by -1.7% vs. the baseline.
- A decrease in global consumption of FF and world FF prices has a significant impact on Brazil's economy. This is reflected in the carbon tax shock.
- Mild abatement costs only start to bite after 2030.
- The fiscal shock partially offsets the carbon tax and abatement impacts, given Brazil's decarbonisation only speeds up until 2040.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: Canada

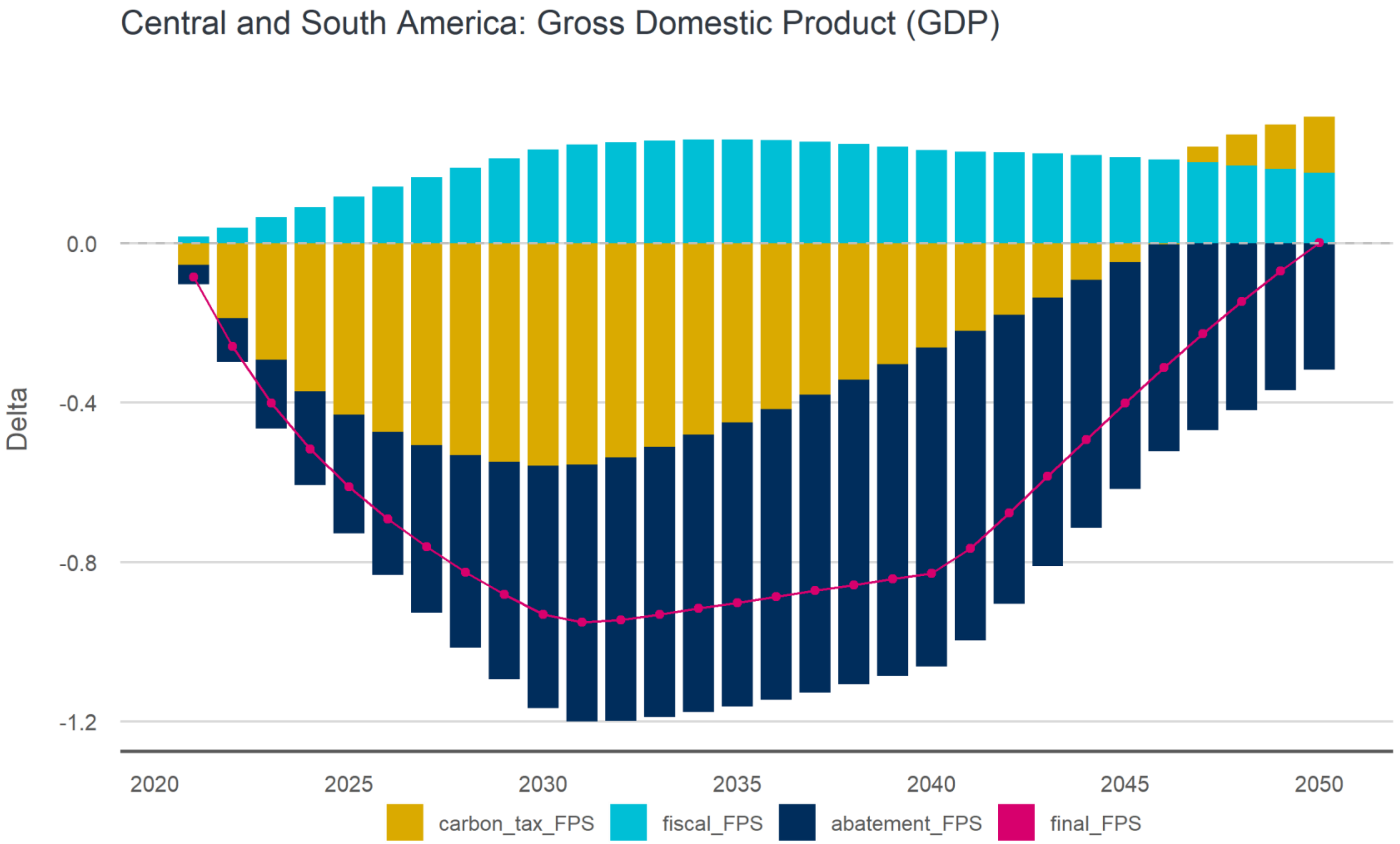


- FPS is expected to hit the Canadian economy the most by early 2030s, with real GDP decreasing by -2.3% vs. the baseline.
- Similar to Brazil, Canada see negative impacts from FF exports decreases.
- However, unlike Brazil, Canada decarbonises their economy faster and raise carbon prices more rapidly (than any economy) to accelerate the transition.
- Abatement costs in Canada (% GDP) by 2030 are the highest across all regions/countries.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

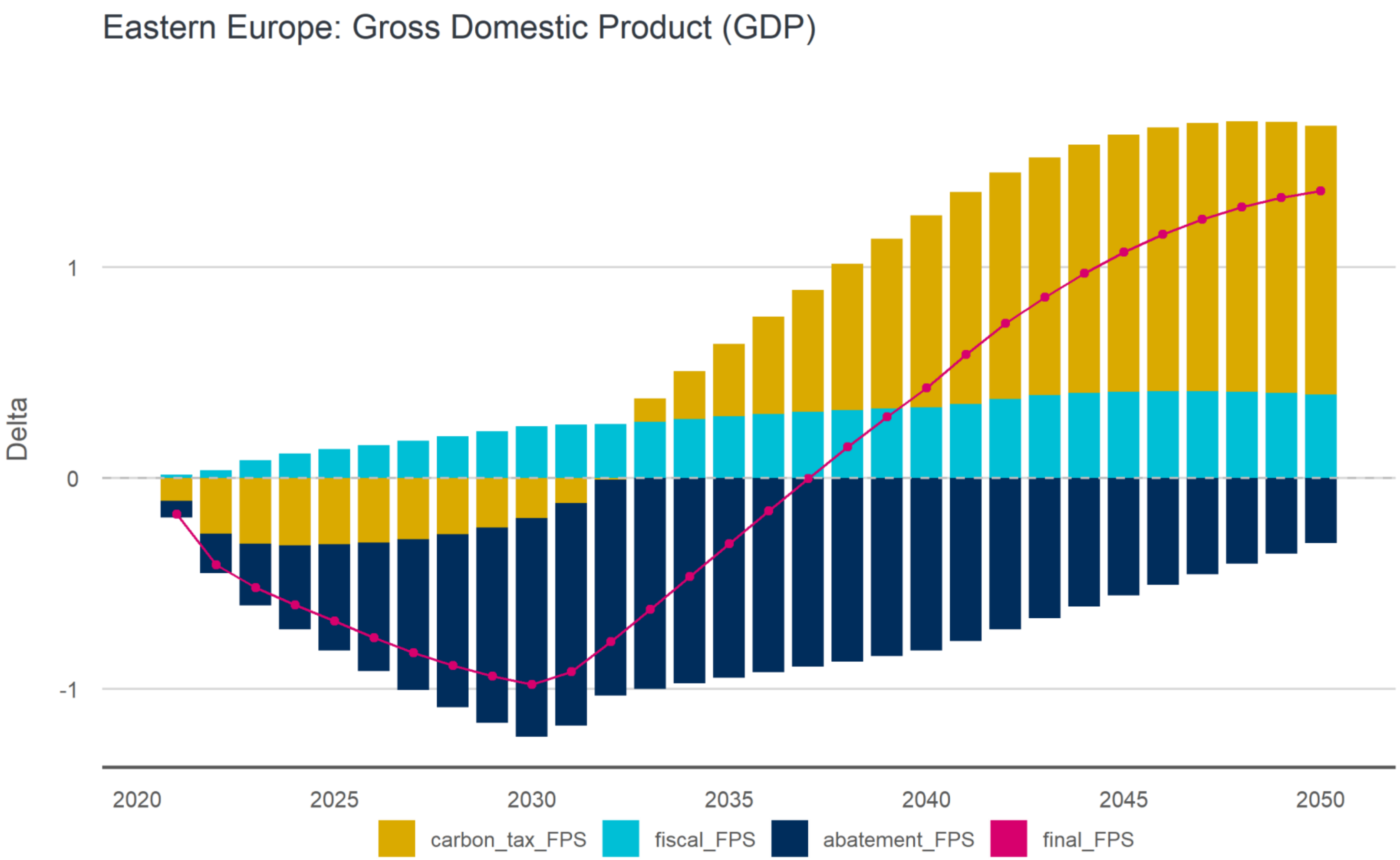
Real GDP cumulative transitional impacts: Central and South America



- Central and South America (CSA) sees no impact from FPS by 2050. However, the impact is -1.0% by 2030.
- Similar to Brazil, CSA suffers from a decrease in FF exports (volumes and prices), with relatively mild inflationary pressures from Carbon taxes.
- Carbon taxes increase more gradually and as result, carbon tax impacts are milder compared to Brazil's impacts.
- Abatement costs are one of the highest across countries and regions by 2040.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: Eastern Europe

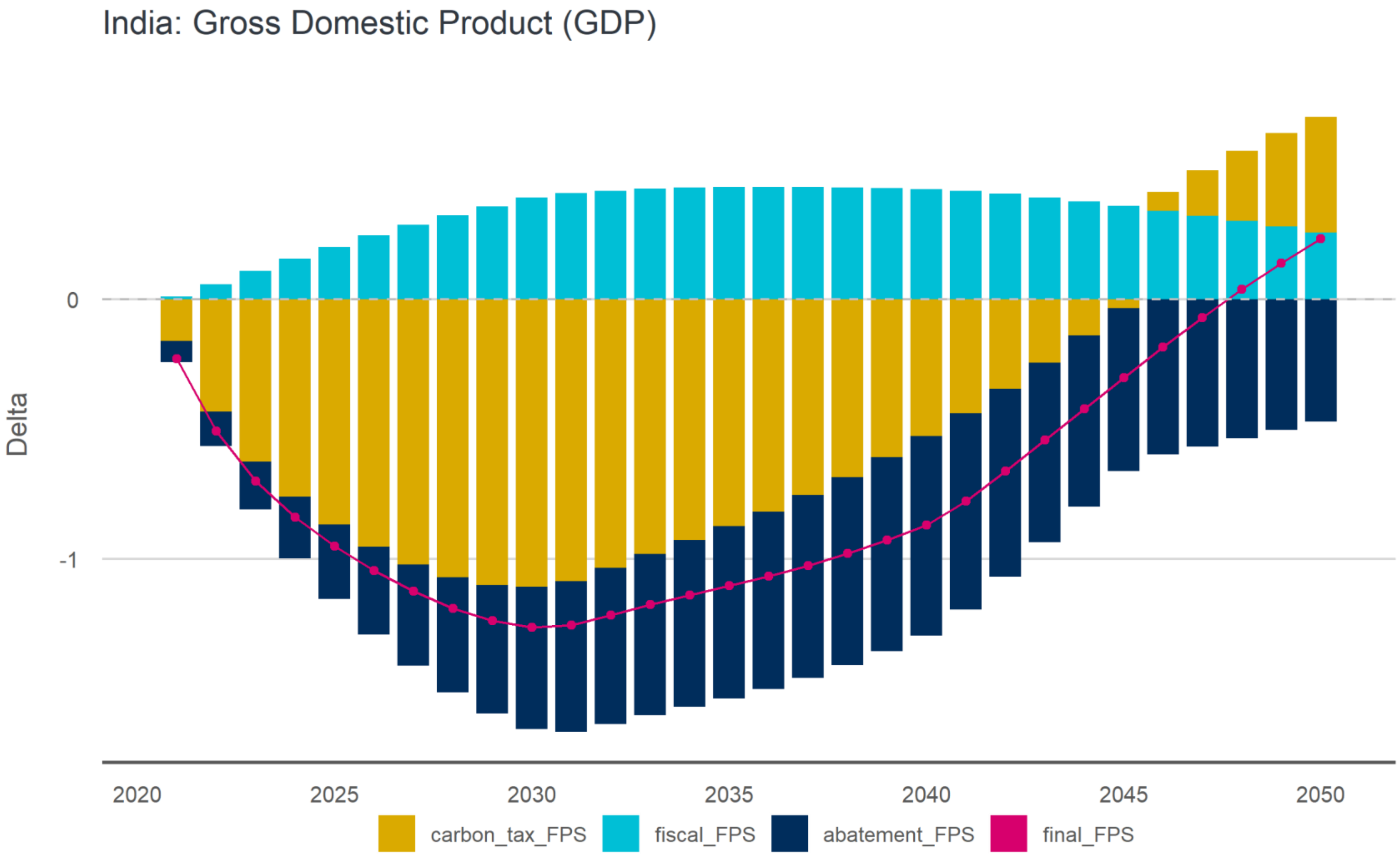


- FPS is expected to hit Eastern European economies the most by early 2030s, with real GDP being -1.0% lower vs. the baseline.
- EE countries see positive carbon taxes impacts by 2030 as a result of deflationary pressures due to declining FF prices. That leaves room for an expansionary policy rate that boosts real GDP. Trade also contributes positively to the economy after 2030.
- FF exports are low in this region and therefore no additional impacts come through this channel.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Real GDP cumulative transitional impacts: India

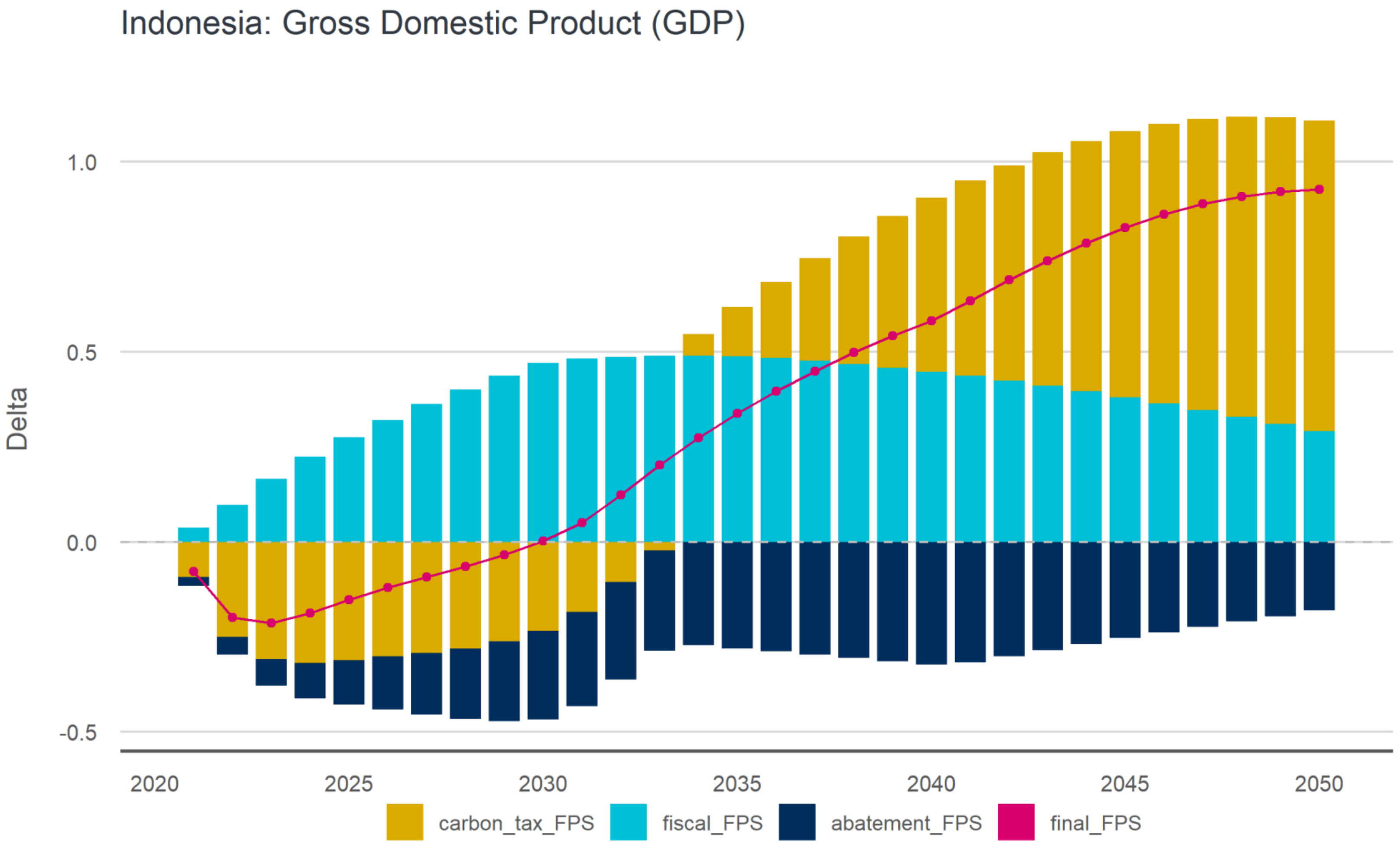


- India sees a positive impact from FPS by 2050 (close to 0.8%). However, the final real GDP impact by 2030 is -1.5%.
- Real GDP in India see a significant impact from carbon taxes given emissions only start decreasing significantly after 2030.
- Abatement costs are close to the average of all countries for the full projection period.
- Fiscal revenues provide some support in the transition that offset some of the negative impacts.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Real GDP cumulative transitional impacts: Indonesia

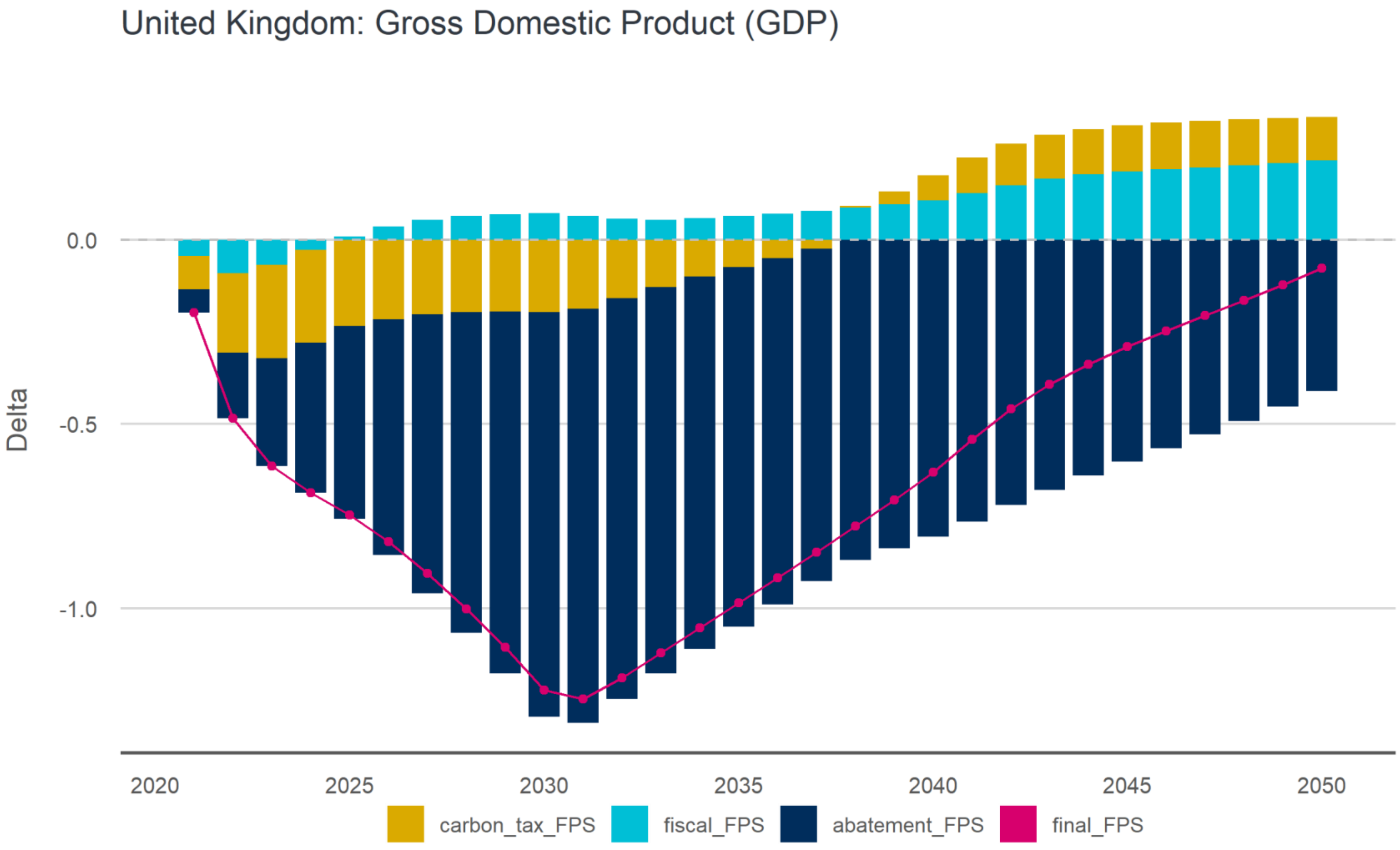


- FPS is expected to have a positive impact in the Indonesian economy by 2050.
- A gradual decarbonisation of the economy coupled with slow raising carbon prices counteracts any abatements costs arising from the transition. Trade supports the economy as well, providing a comparative advantage against other countries.
- Given inflationary pressures do not materialise , monetary policy boost real GDP after 2030.
- Abatement costs are among the lowest across countries.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Real GDP cumulative transitional impacts: United Kingdom

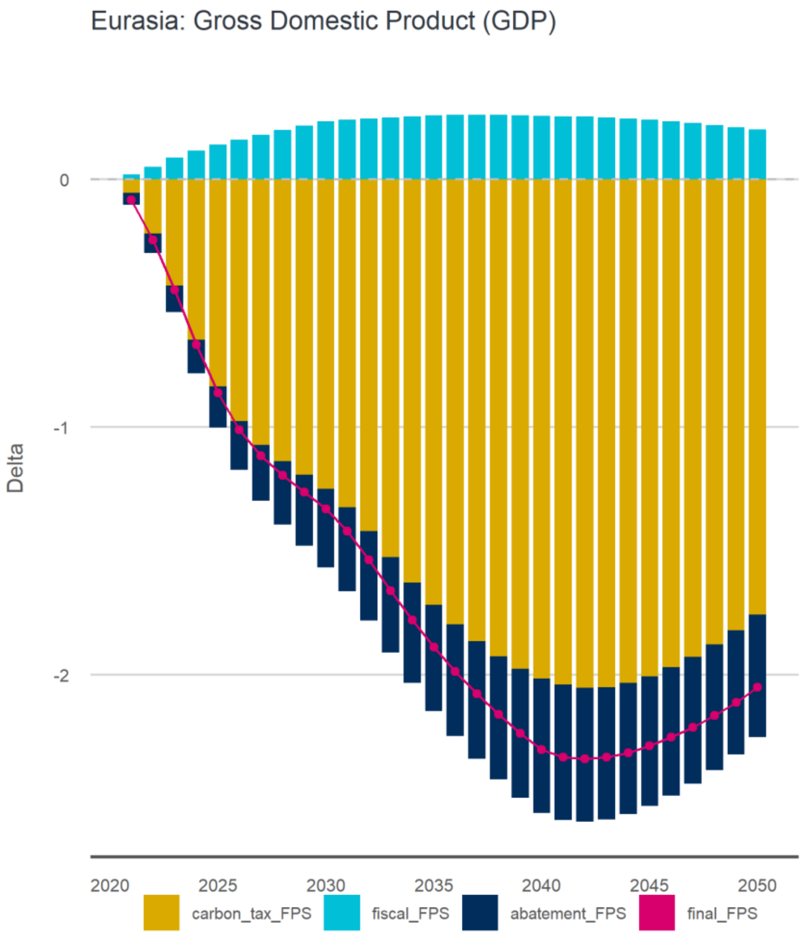


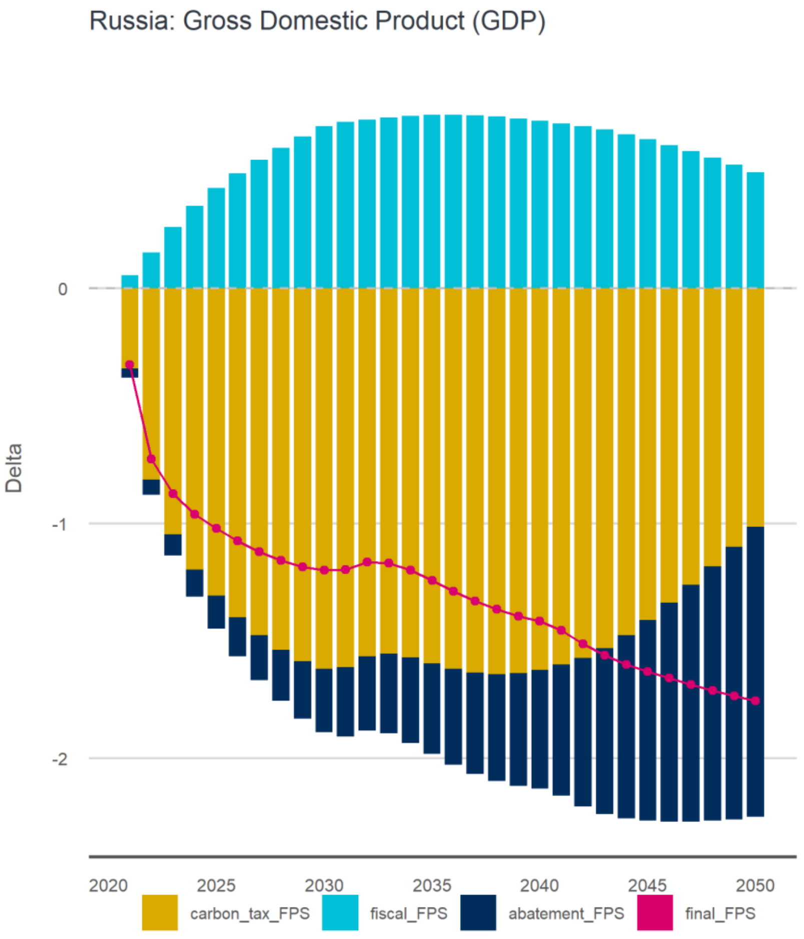
- The UK sees a negative impact in its economy from FPS by 2050 of -0.07% compared to baseline.
- The UK economy sees a similar impact from carbon taxes compared to Europe. Lower FF prices allows boost GDP as a result of deflationary pressures.
- Fiscal impact is slightly more muted than in Europe as a result of a more gradual reduction in emissions compared with Europe (carbon prices are identical).
- Abatement costs by 2030 are slightly higher in the UK compared to other European economies.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Real GDP cumulative transitional impacts: Eurasia, Russia



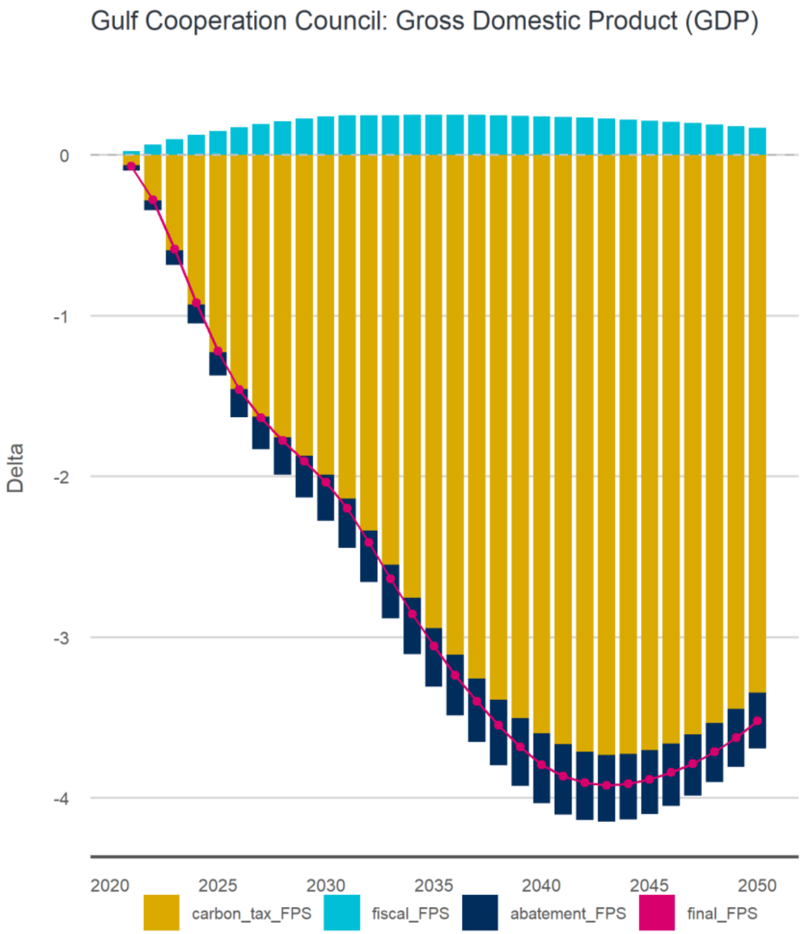


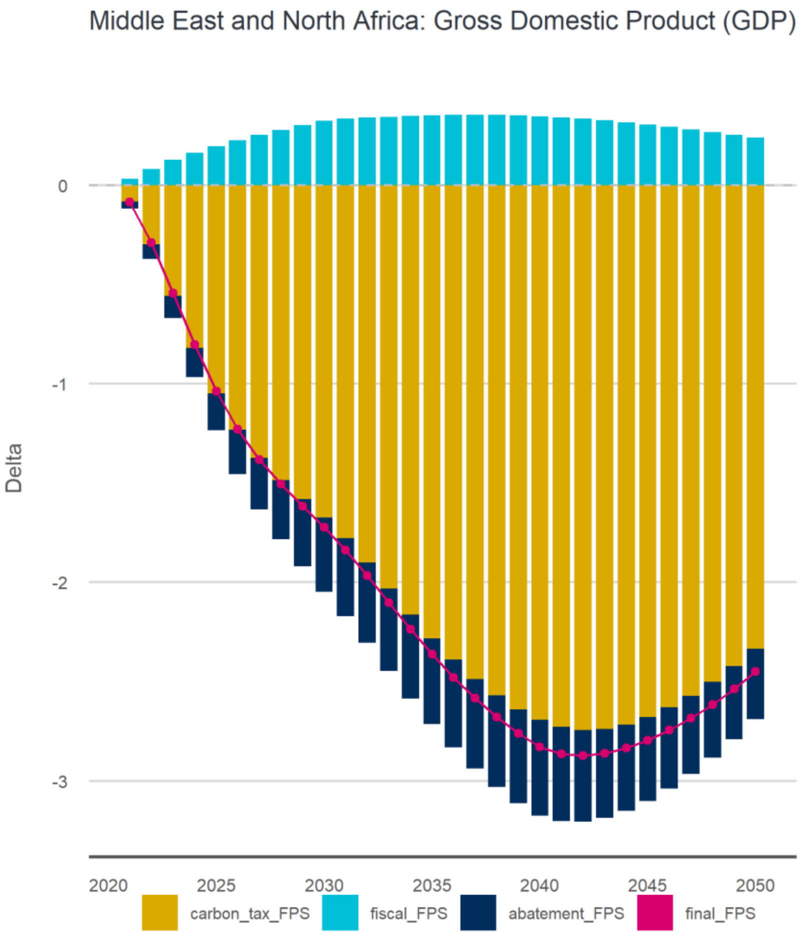
- Russia and Eurasia see a significant impact from FPS in their economies by 2050.
- Carbon tax impacts in these two economies/regions are one of the highest across countries. Volume and price of exports from FF in both economies decline as a result of lower demand for these commodities.
- Abatement costs are mild in Russia before 2040. By 2050 Russia has the highest abatement impact across all countries.

INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: Gulf Coop. Council, Middle East and North Africa

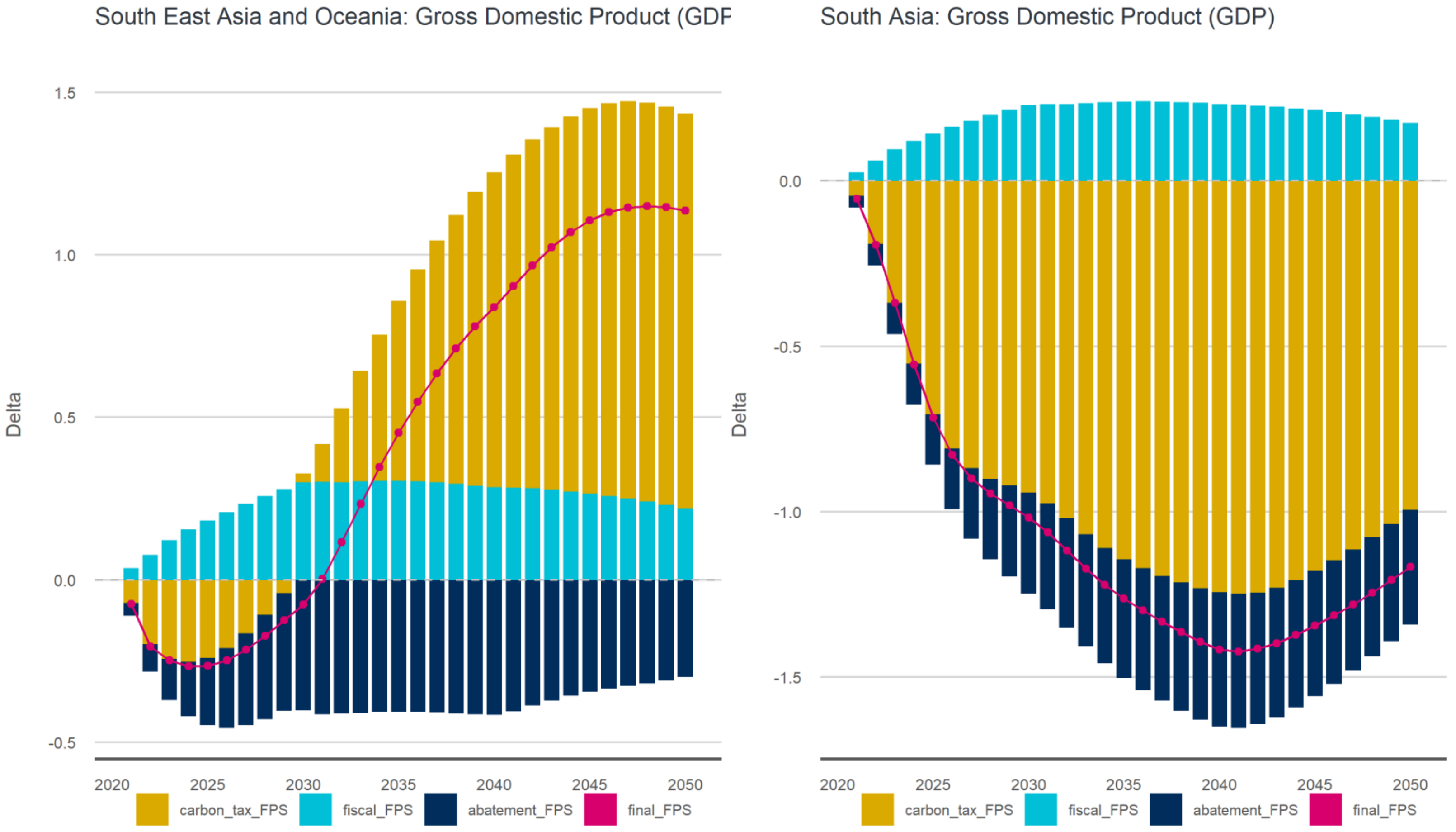




- Middle East/North Africa and GCC economies see substantial impacts from FPS by 2043.
- Carbon taxes impact these economies the most as a result of a reduced demand for FF exports.
- Fiscal shock benefits are close to the average given these economies start to decarbonise by early 2030s, despite a gradual increase in carbon prices.
- Abatements costs are the lowest for GCC and below average for Middle east/North Africa.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: South East Asia and Oceania, South Asia

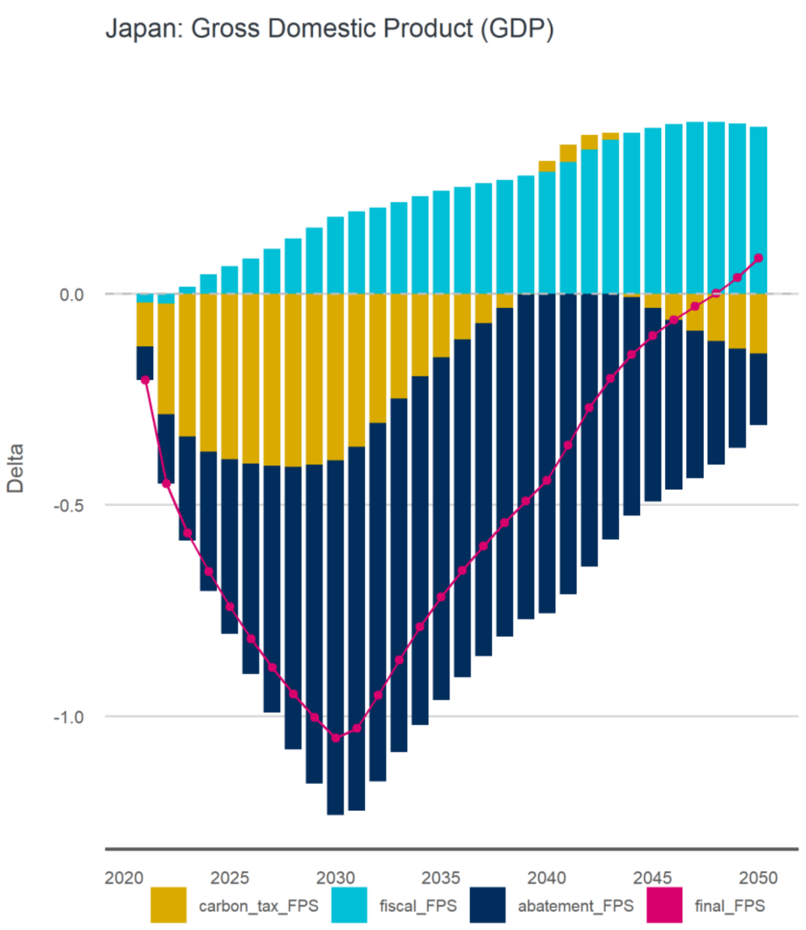


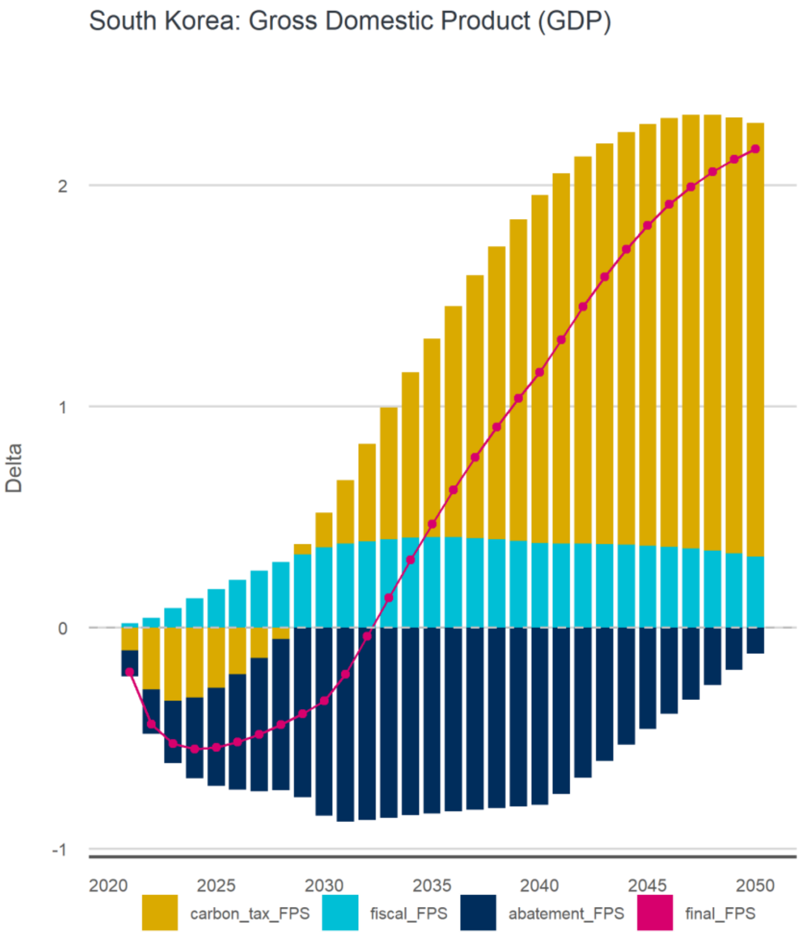
- South East Asia and Oceania (SEAO) sees only minor impacts from FPS in contrast to the South Asia (SA) region.
- Whilst SA see no significant reduction of emission until late 2040s, SEAO sees emissions cuts after the 2030s. This has an impact on the size of the carbon taxes.
- More importantly, SA relies heavily on FF exports which are expected to decline in volume and price.
- SEAO countries also see trade contributing positively to the economy in the second half of the scenario.

INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: Japan, South Korea



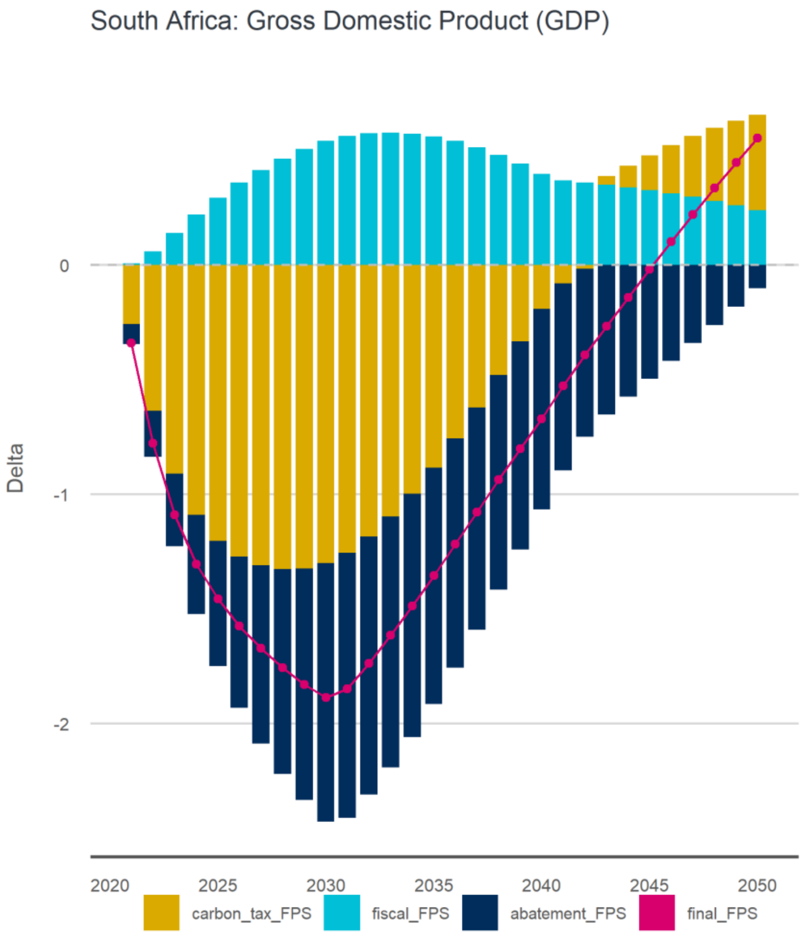


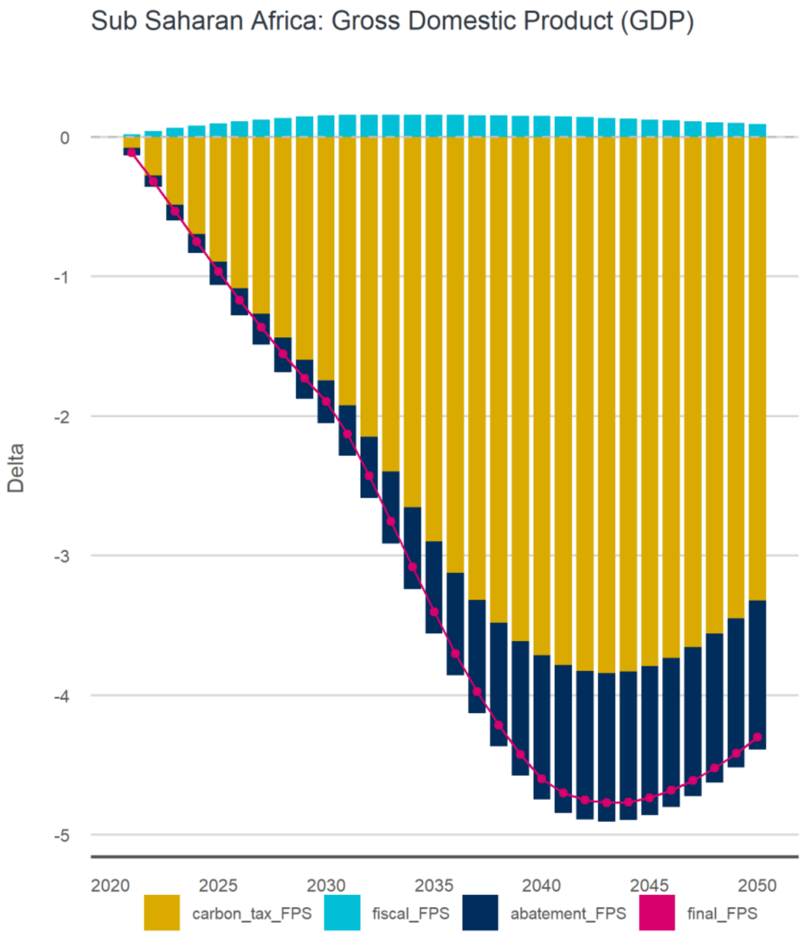
- Impacts in Japan and South Korea (SK) are distinctively different. Whilst both achieve a positive impact by 2050, Japan's carbon tax shock impact is more severe compared to SK.
- Differences in the array of imports between countries drive differences in inflation paths under FPS. Lower inflation in SK support household consumption after 2030, boost real GDP, and provide a more supportive monetary policy compared to Japan.
- Abatements costs are similar in both economies (close to the average of all countries).

INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Real GDP cumulative transitional impacts: South Africa, Sub Saharan Africa



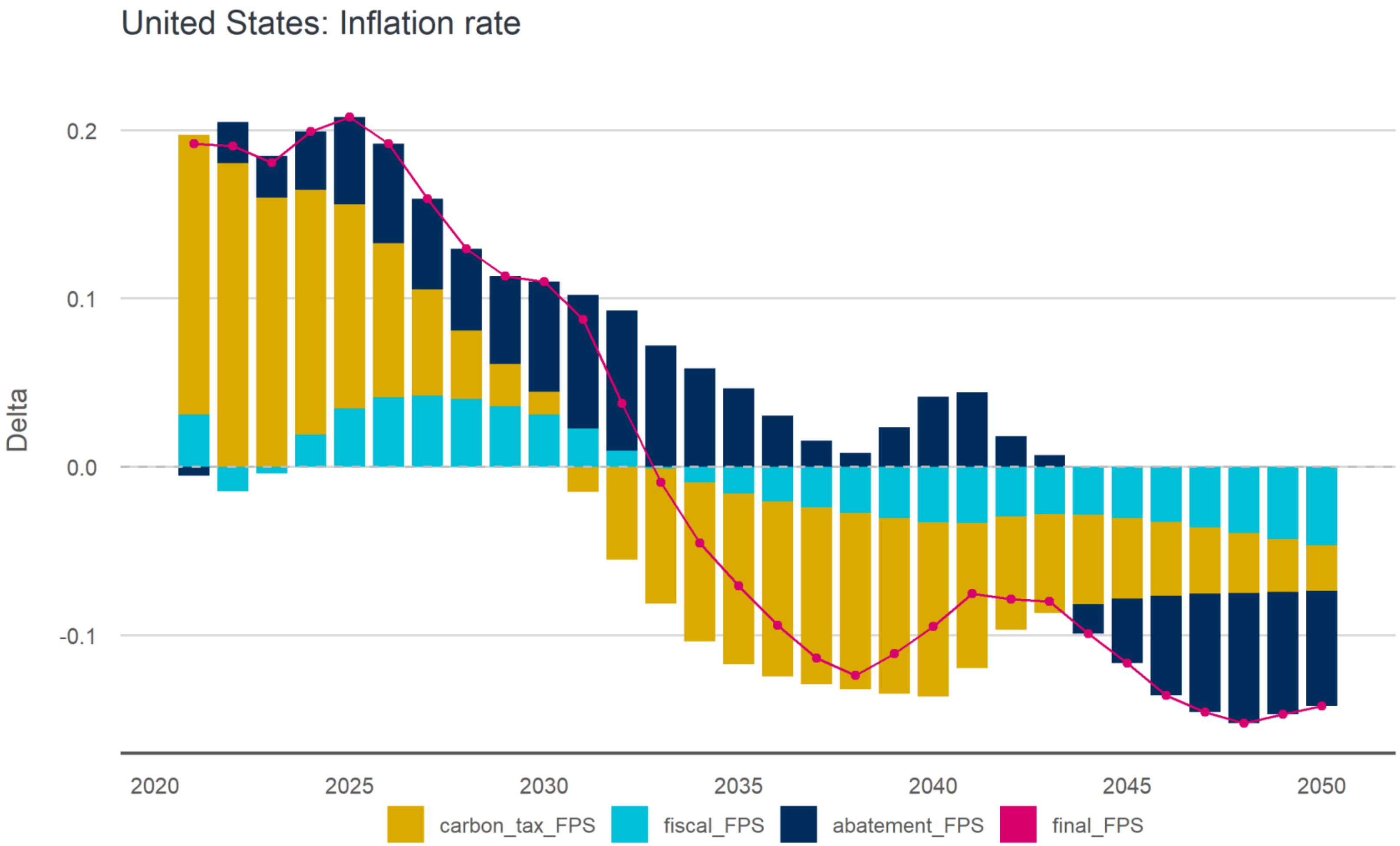


- Sub-Saharan Africa (SSA) sees significant impacts from the transition.
- This is driven by lower demand for FF exports vs baseline. Declining FF prices has a negative impact on these economies as well.
- Abatement impacts are relatively high for SSA after 2040 compared to other economies.
- South Africa (SA) sees a quick decarbonisation with carbon prices increasing as per OECD countries. As a result, impacts appear similar to OECD countries.

Note: Delta is calculated as the % difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Inflation rate

Inflation rate cumulative transitional impacts: United States

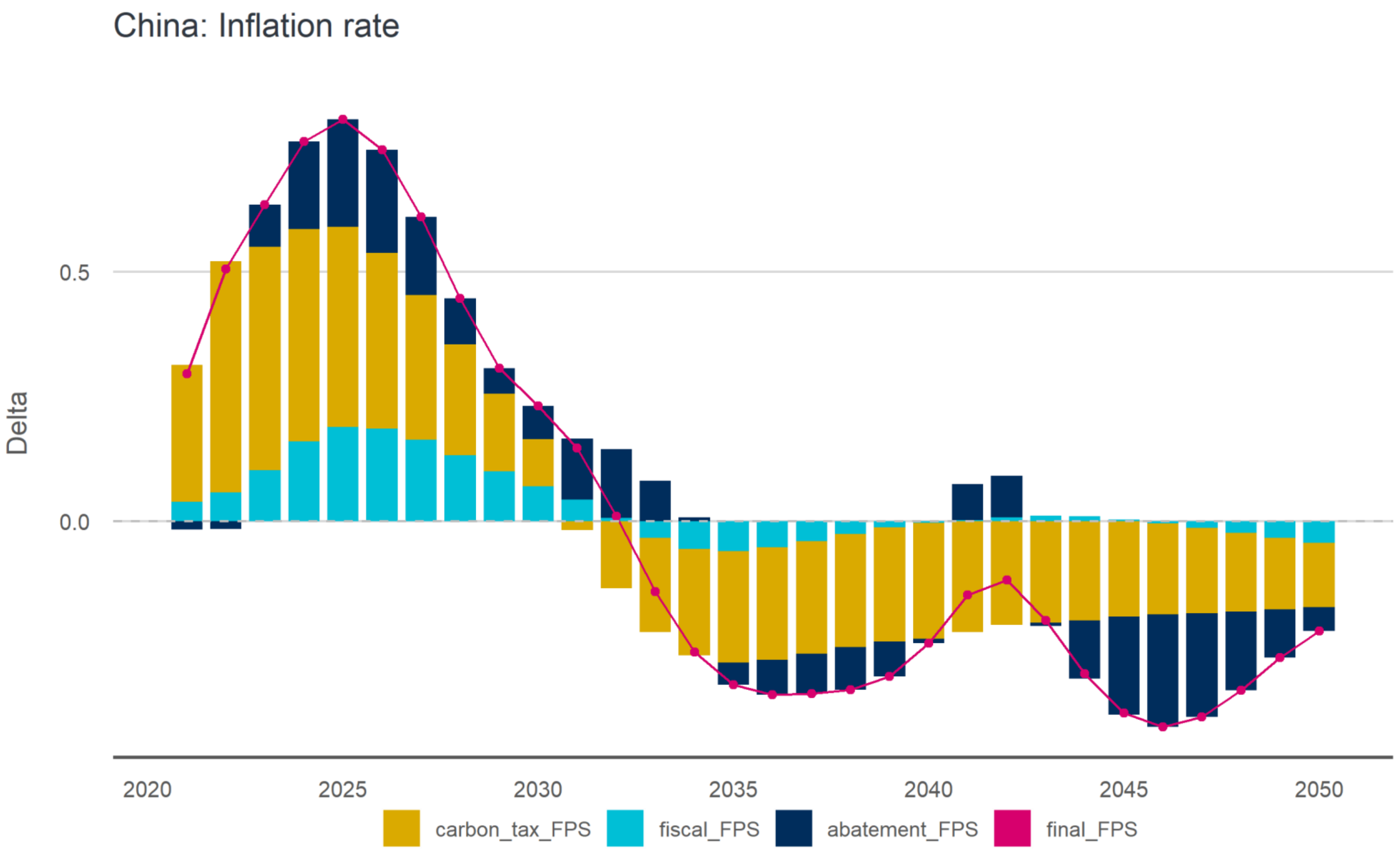


- United States inflation is higher in FPS than in the baseline scenario until 2034, although not significantly.
- Inflationary pressures before 2030 comes through the introduction of carbon taxes. This is the result of increments of carbon prices, despite falling emissions.
- The US see deflationary pressures compared to baseline as climate policy action drives down emissions and the basket of imports of goods reflect lower consumption of FF.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: China

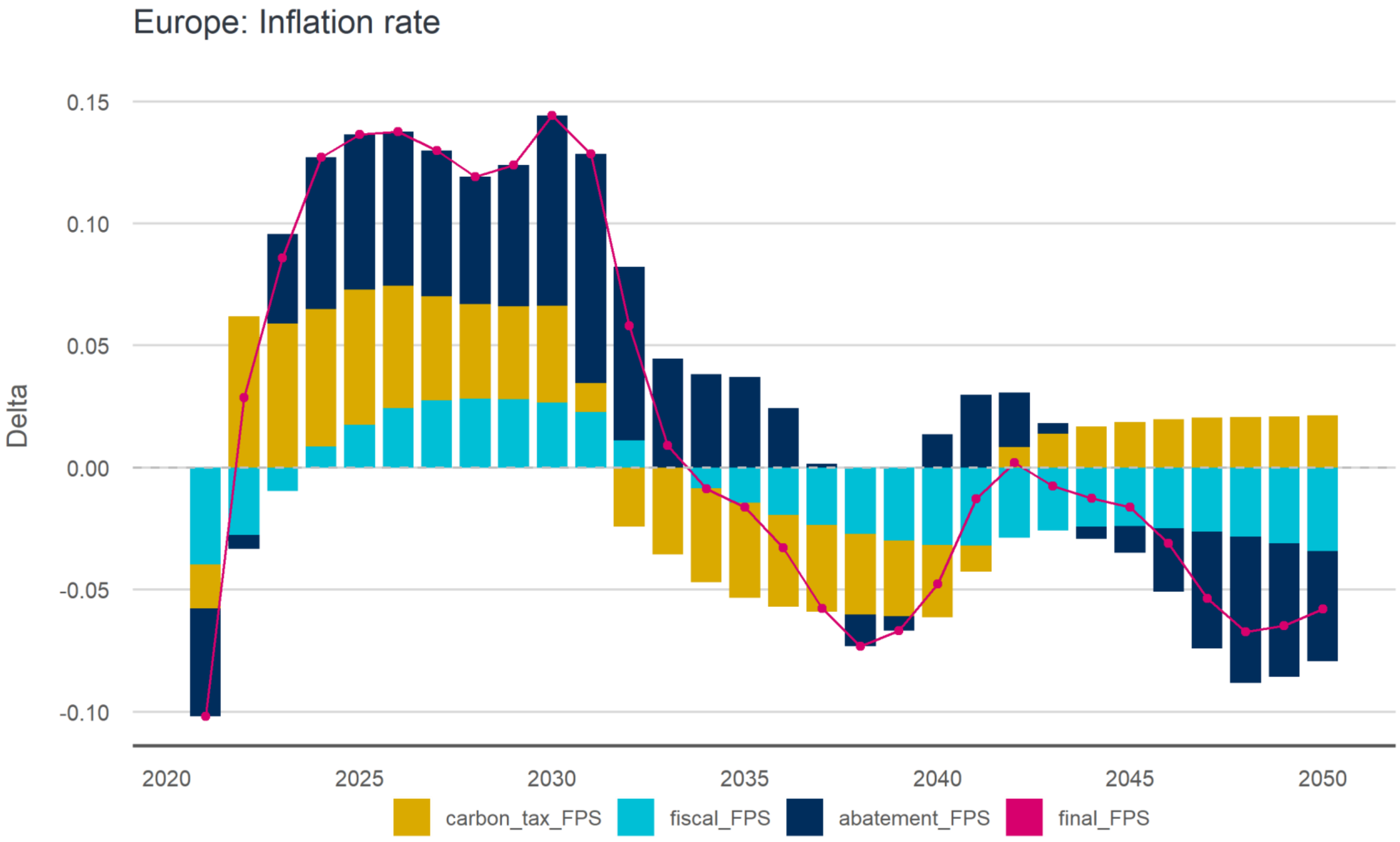


- Inflation rate in China under FPS is expected to be higher compared to baseline until 2032. Differences are significant in the first decade of projections.
- In line with the US, inflation in the first decade comes predominately from carbon taxes.
- Inflation projections in China are slightly more volatile than in other economies as a result of the monetary policy in China to be aligned to the US's which doesn't allow monetary policy to provide more stability to prices.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Europe

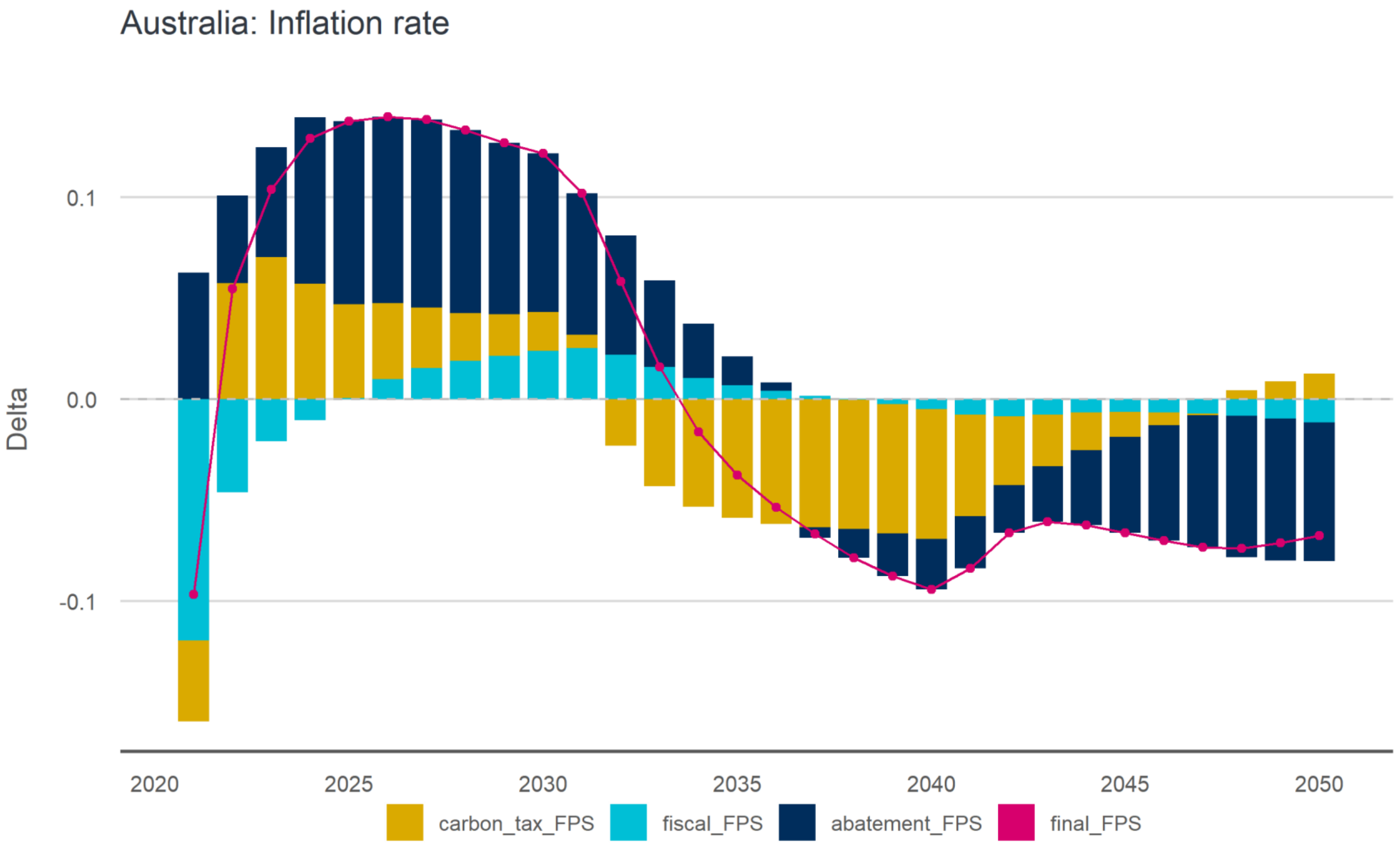


- Inflation rates in Western Europe are expected to be slightly higher in FPS than in baseline until 2034.
- However, differences against baseline are not significant (see left hand side axis).
- Inflation in these countries is driven primarily by carbon taxes and abatement costs over the first 10 years of projections.
- Carbon taxes feed into inflation based on the price of carbon and the amount of emissions.
- Given the rapid decarbonisation early on the FPS, inflation from carbon taxes is short-lived.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Australia

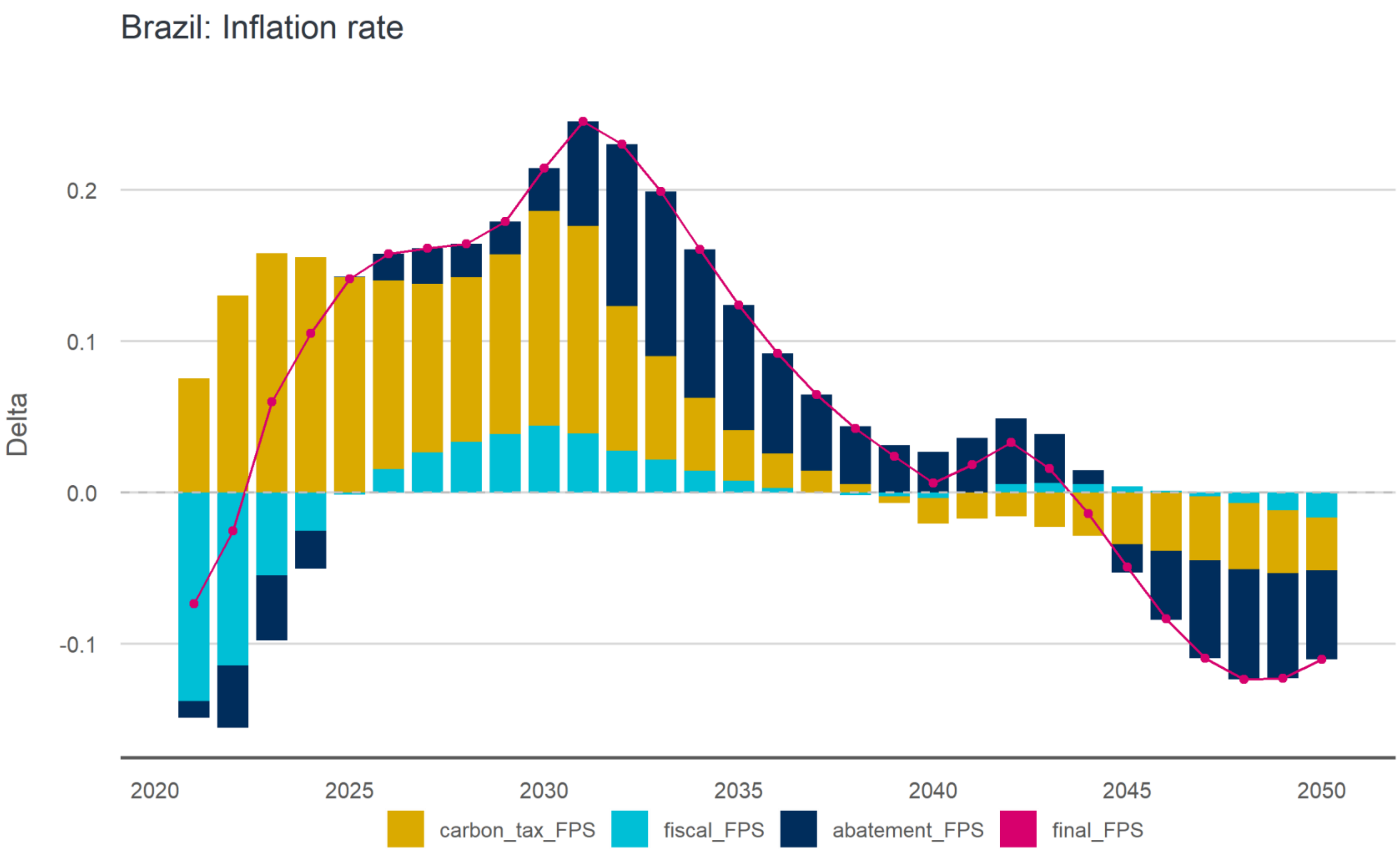


- In Australia, the inflation rate in the FPS scenario is expected to remain above the baseline until 2033, although not significantly. After 2033, the inflation rate in FPS is lower than in baseline.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Brazil

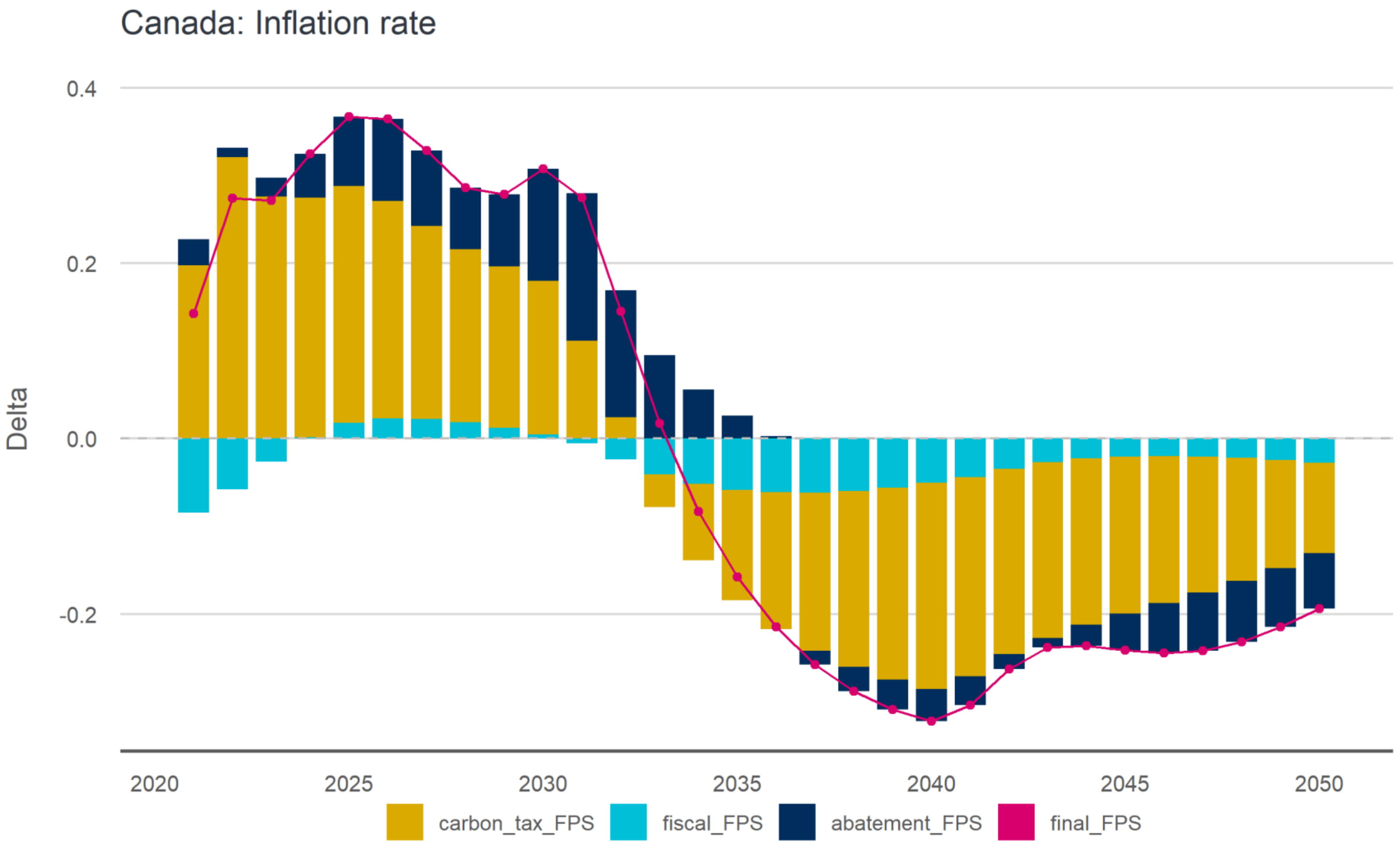


- The inflation rate in Brazil in the FPS scenario is expected to remain above the baseline until 2044, although differences are not significant.
- Afterwards, inflation rate in FPS is slightly below the baseline.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Canada

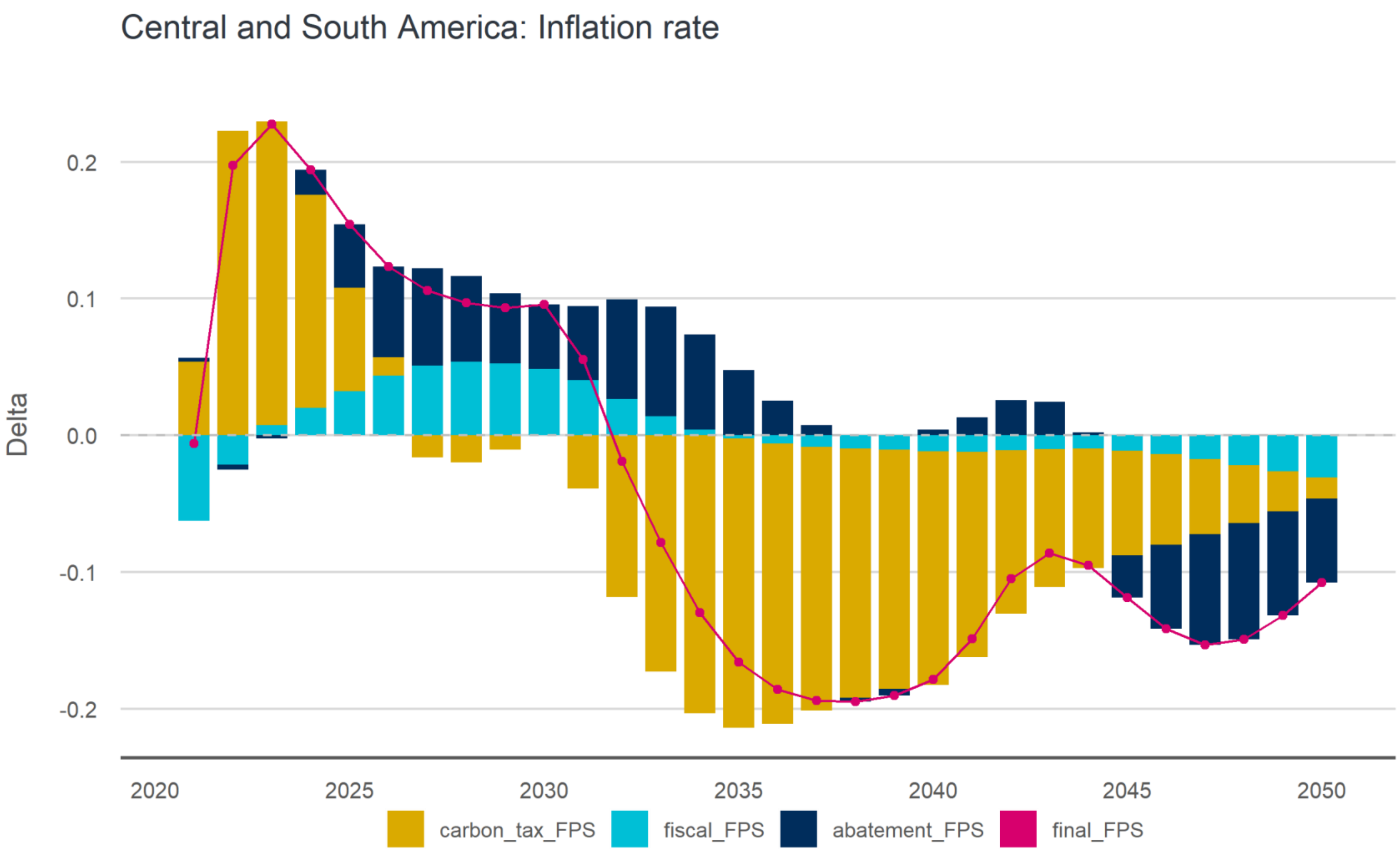


- In Canada, the inflation rate in FPS is expected to be significantly higher compared to baseline until 2033, the year after which it drops below the baseline until 2050.
- Inflation impact on FPS is significant as a result of higher carbon prices compared to all countries by 2030.
- As a result, impacts are front loaded, leaving the period after 2030 with deflationary impacts that boost real GDP and creates lower path for inflation up to 2050.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Central and South America

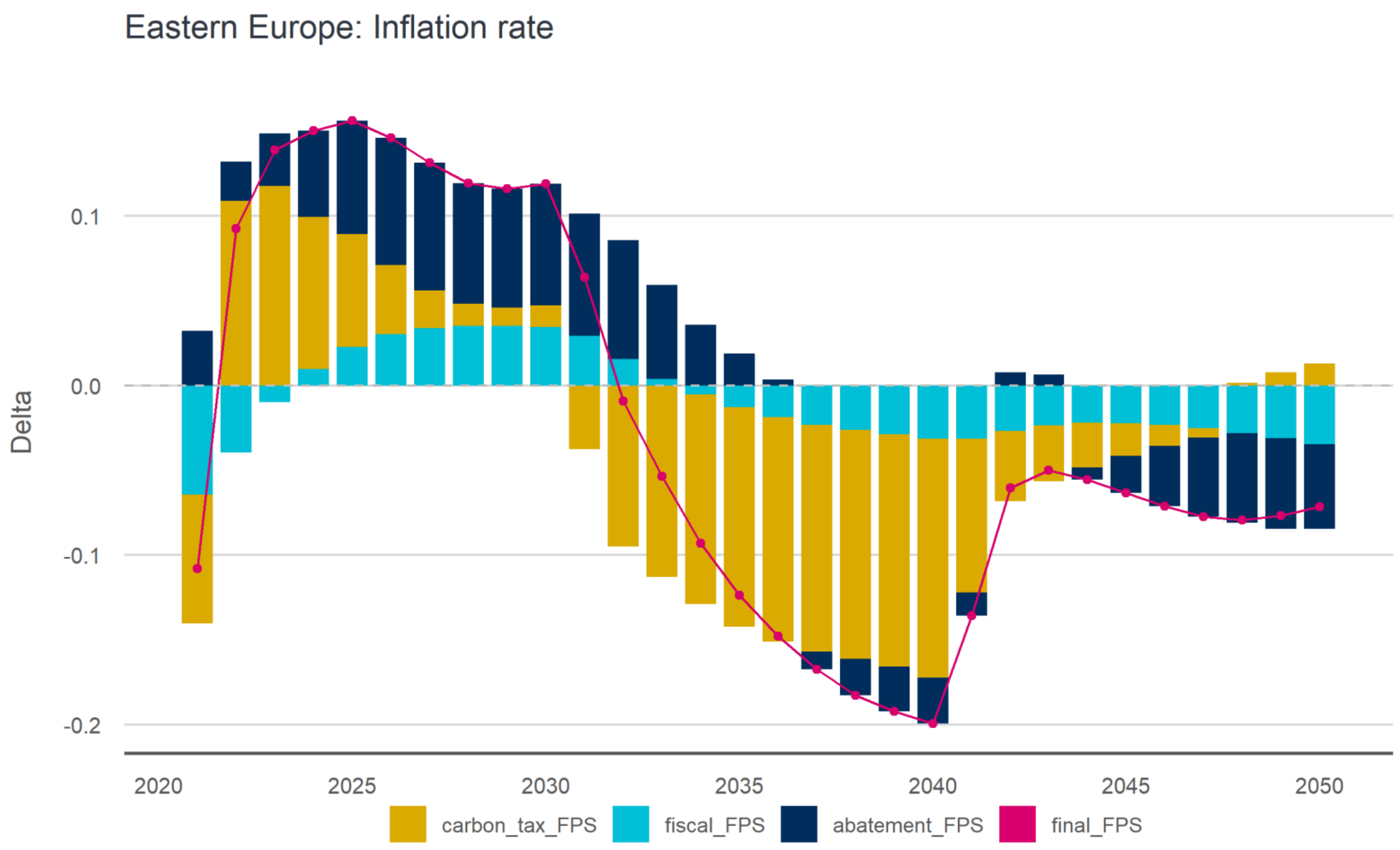


- In line with other countries, Central and South America see a surge in inflation over the first decade of projections.
- In Central and South America, the inflation rate is not expected to differ significantly between the baseline and the FPS scenarios.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Eastern Europe

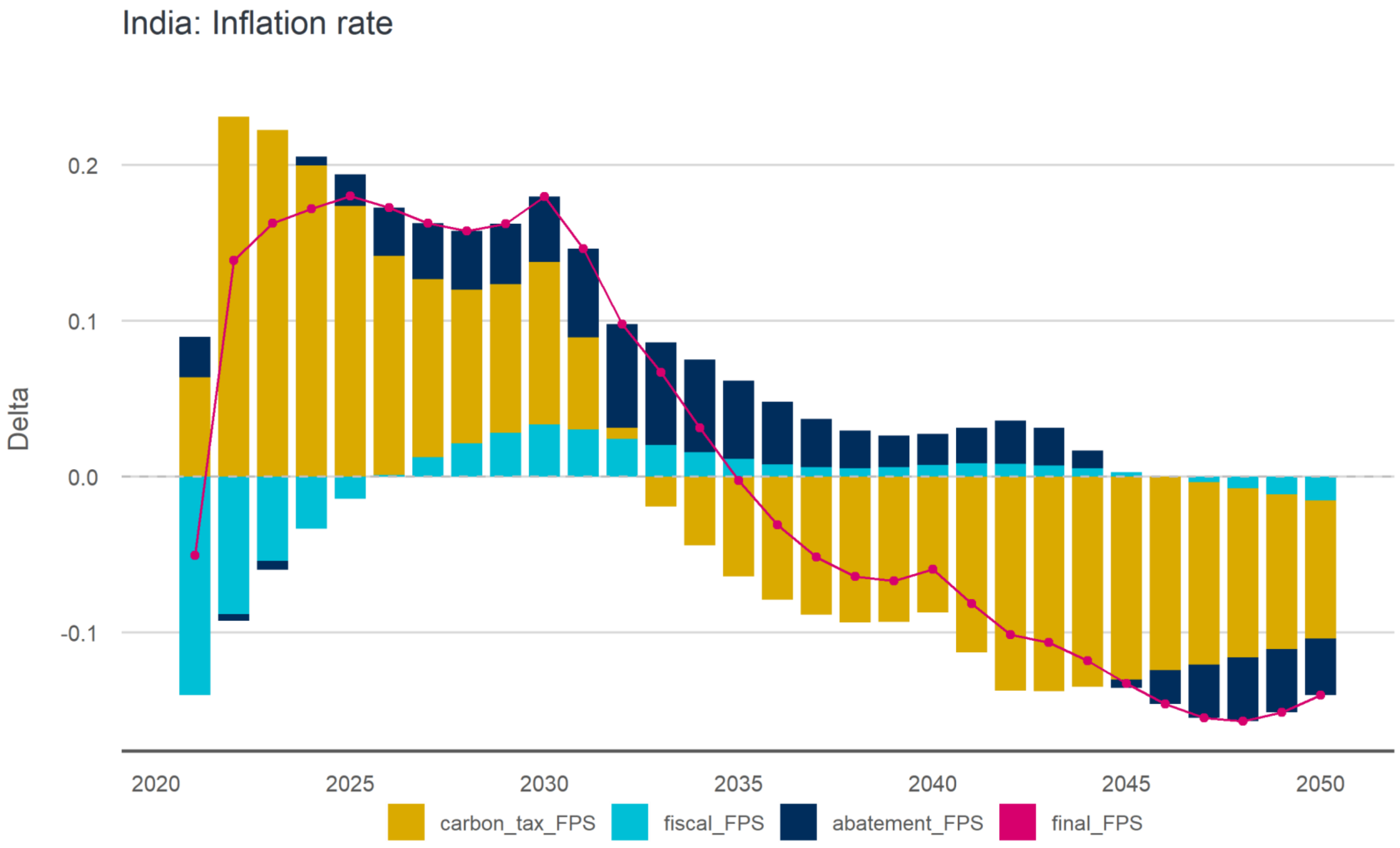


- In Eastern Europe, the inflation rate in the FPS scenario is expected to remain above the baseline until 2032, although it does not differ significantly. After 2032, the inflation rate in FPS is lower than the baseline.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: India

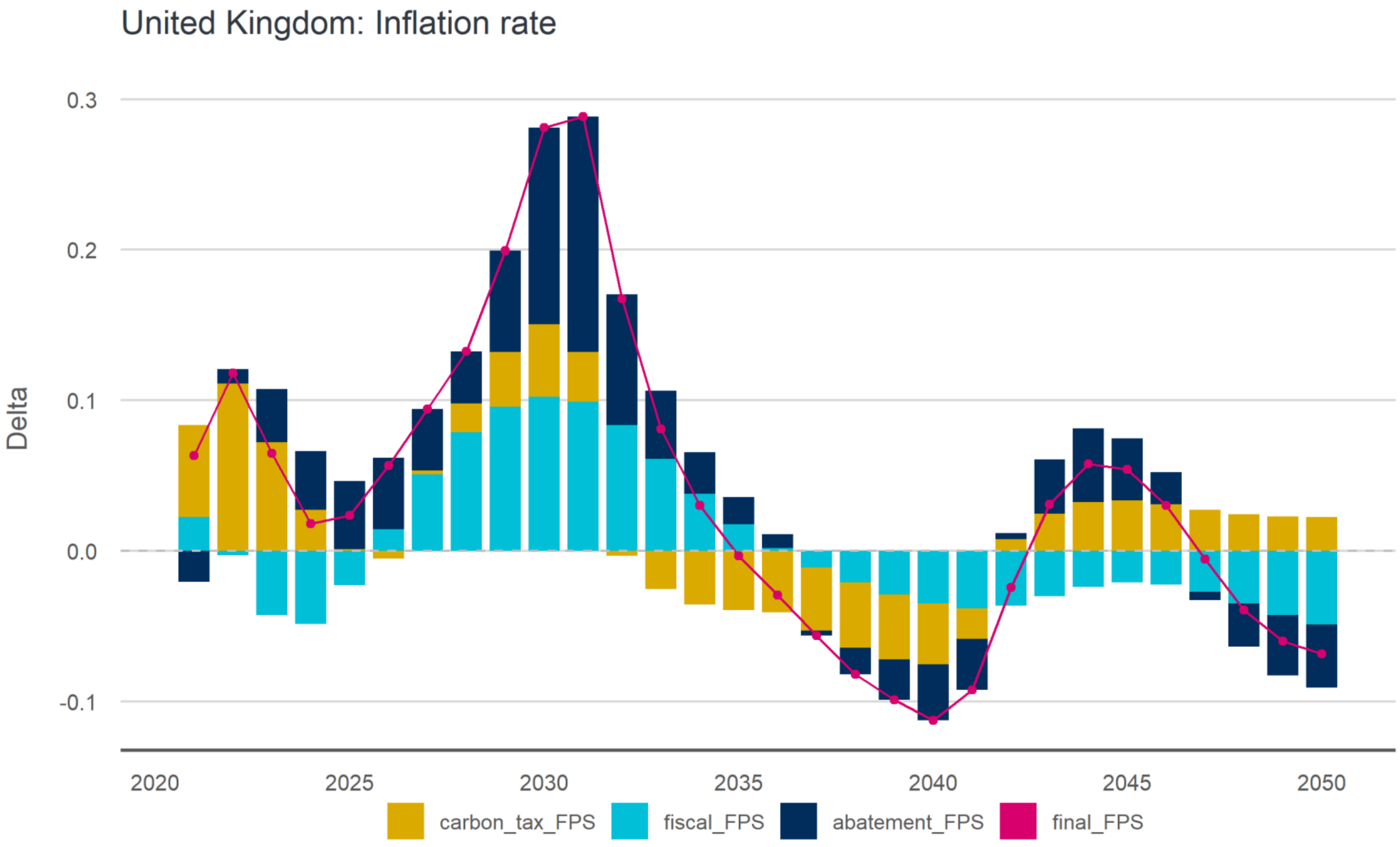


- In India, the inflation rate under FPS is not significantly different when compared to the baseline (see left-hand side axis).
- For the first decade of the projection period, inflation is mostly above baseline as a result of carbon taxes introduced in the economy. Carbon prices do not raise as quickly in India as in other economies which puts a limit to the impact of carbon taxes on inflation. However, emissions only start to decrease in India under FPS after 2030, prolonging the inflationary pressures until 2035.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

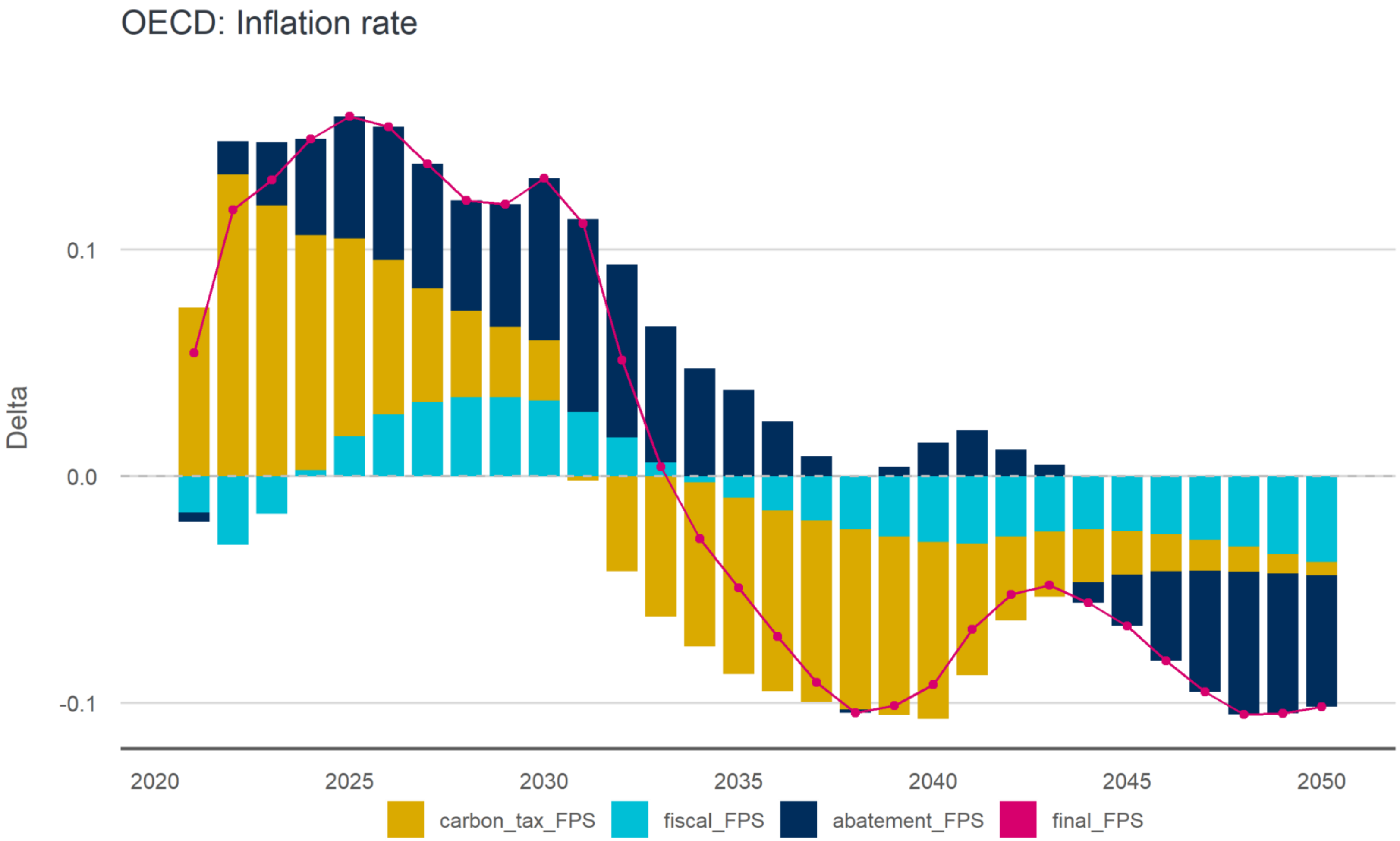
Inflation rate cumulative transitional impacts: United Kingdom



- In the UK, inflation rates show a surge in inflation for the first decade of projection as a result of increasing carbon prices.
- Fluctuations in inflation compared to baseline after 2034 respond to lower FF prices and other business cycle factors.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Inflation rate cumulative transitional impacts: OECD

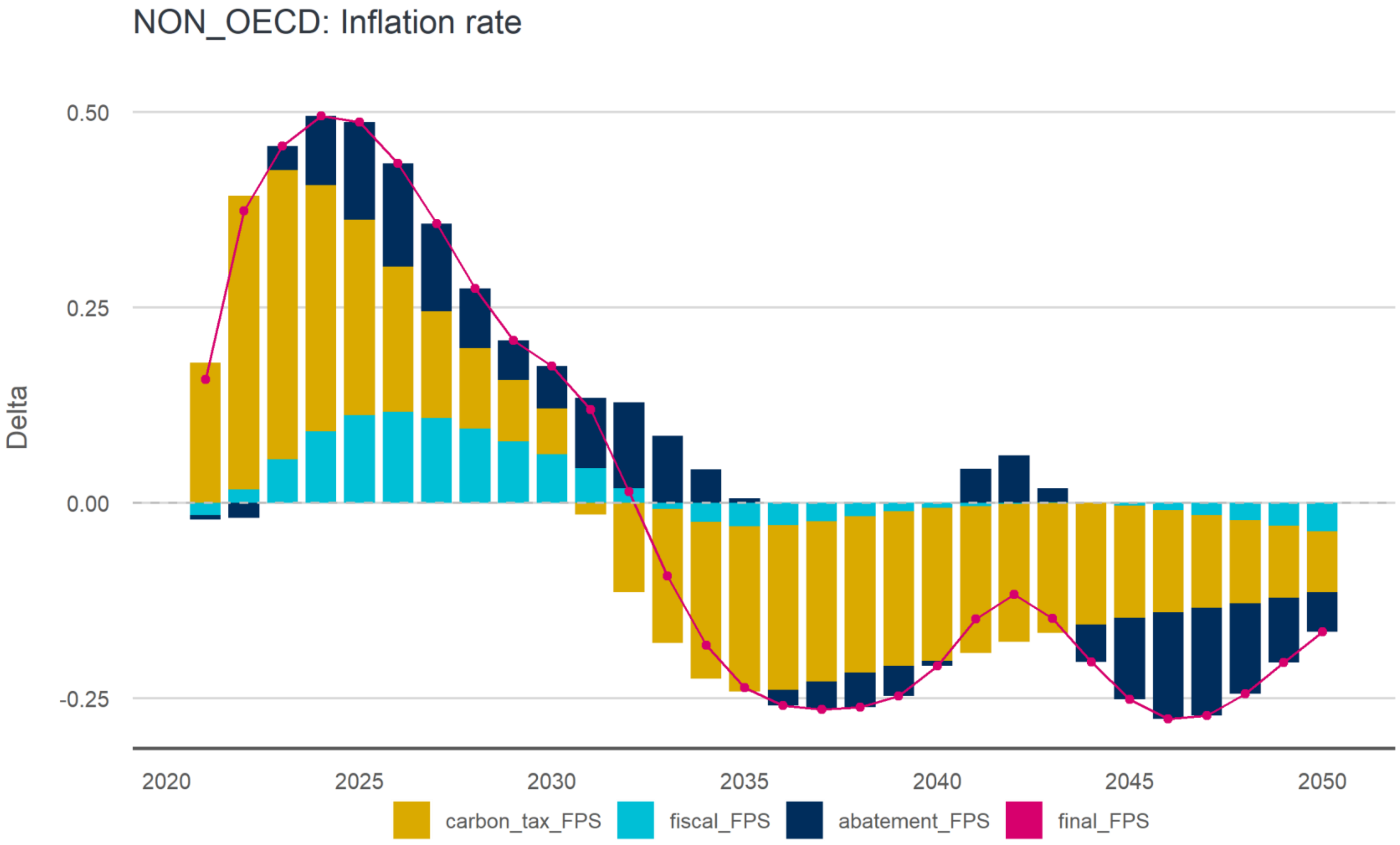


- In the OECD, inflation rates will not differ significantly compared to baseline.
- In line with other countries, a minor surge in inflation will appear in the first decade of projections, driven by the introduction and increase in carbon prices.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: Non-OECD

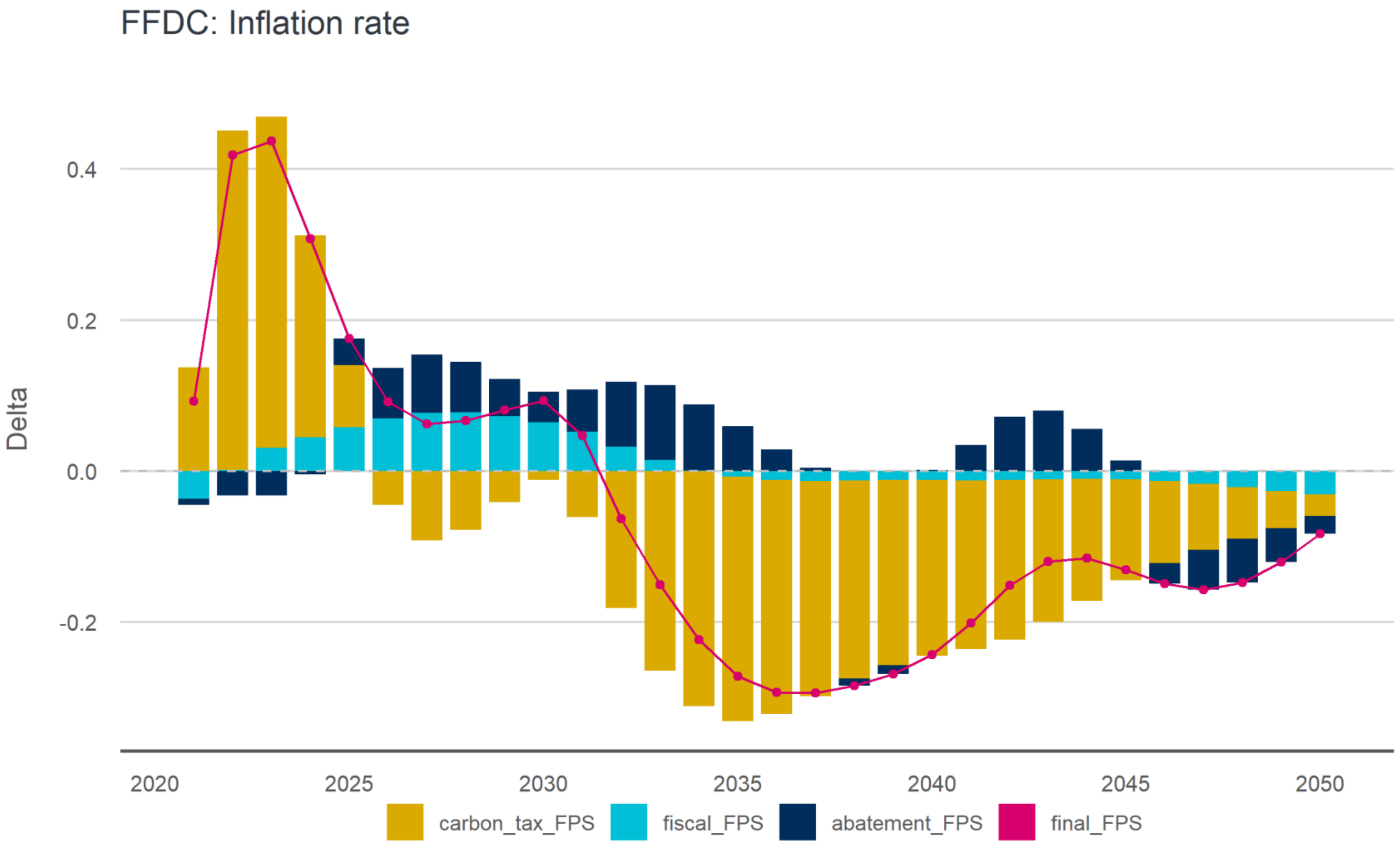


- Inflation rates in Non-OECD countries are expected to be higher in FPS compared to the baseline until 2032, after which the inflation rate is lower than in baseline.
- A combination of slow decarbonisation and increasing carbon prices will push inflation higher than in OECD countries.
- As the demand for FFs decline, the impact of FF prices on inflation shrinks. Non-OECD countries that decarbonise more slowly are at risk of significant inflationary pressures from FF price fluctuations.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Inflation rate cumulative transitional impacts: FFDC



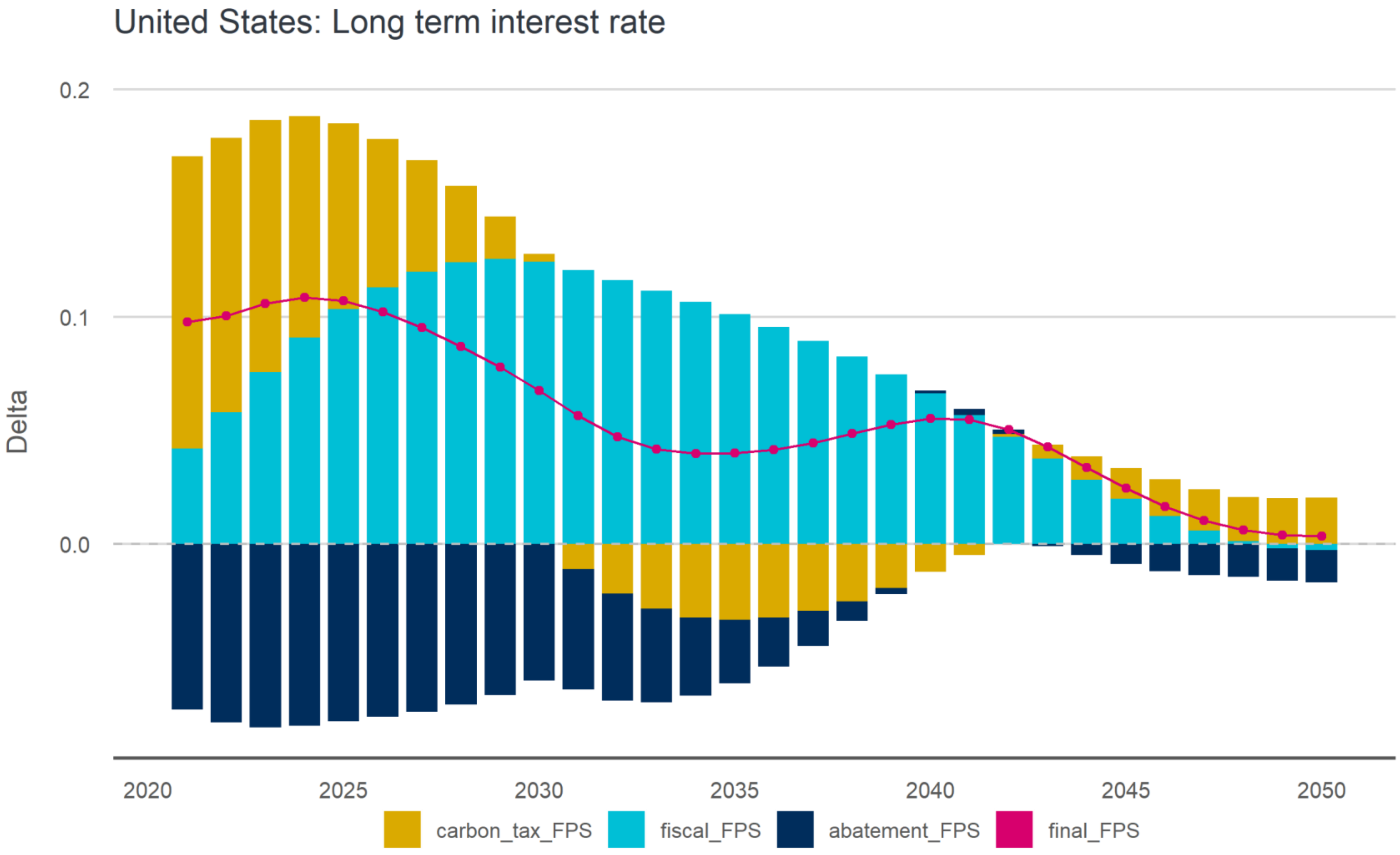
- Inflation rates in FFDC countries are expected to be higher in the FPS compared to the baseline until 2031.
- After that, FPS inflation remains below the baseline until 2050. Some of these difference are significant.
- Carbon taxes drive the majority of inflation over the next 5 years as a result of slow decarbonisation in these economies and rising carbon prices.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

The Inevitable Policy Response:
FPS scenario – Long term interest rates

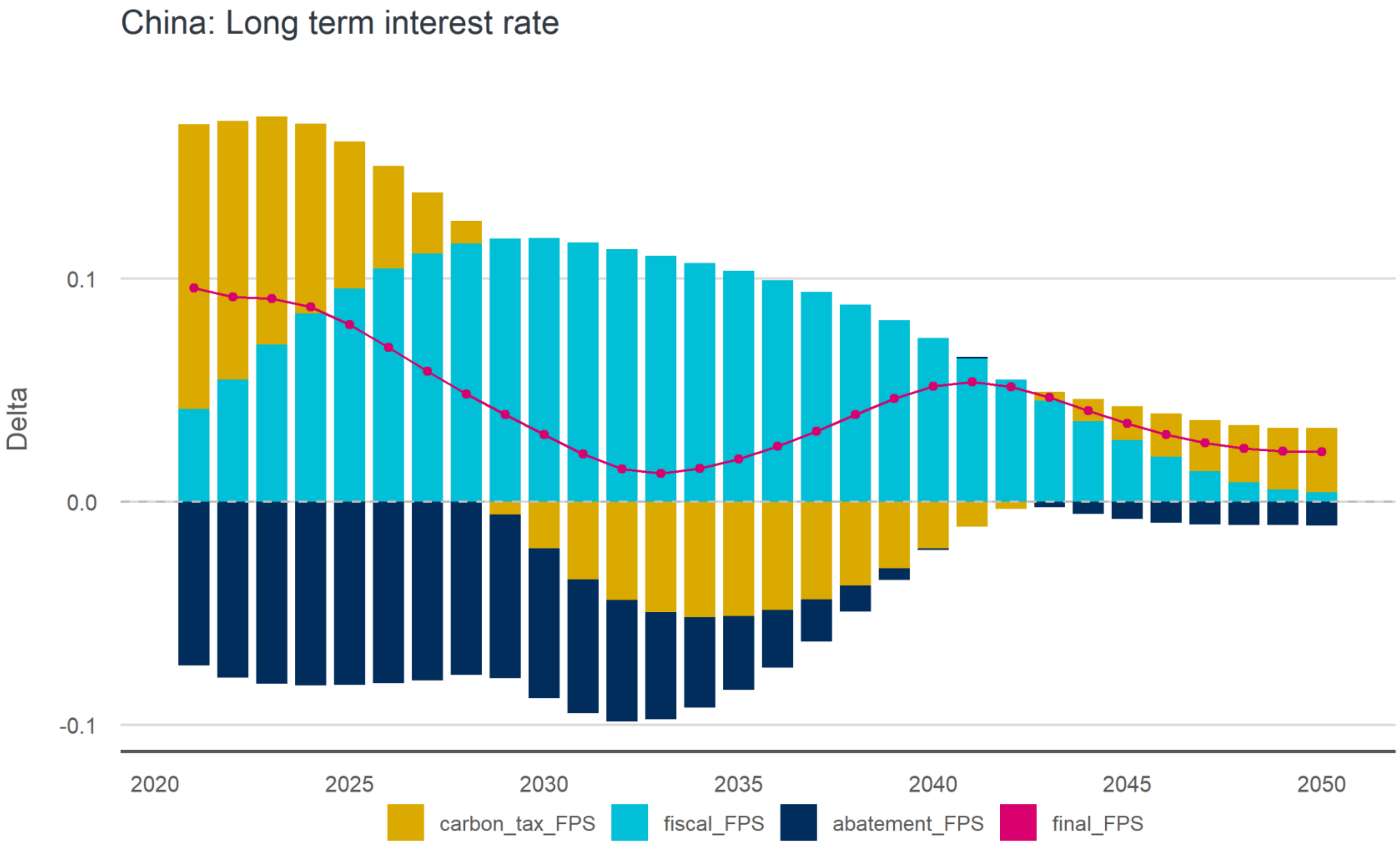
Long term interest rate cumulative transitional impacts: United States



- Long term interest rates in the US are expected to remain higher in the FPS compared to the baseline for most of the projection period. Difference are not significant though.
- As a result of inflationary pressures, the policy rate remains above baseline for most of the projection period, pushing long term interest rates higher.
- Fiscal shocks would also contribute to higher interest rates given its positive impact on real GDP.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: China

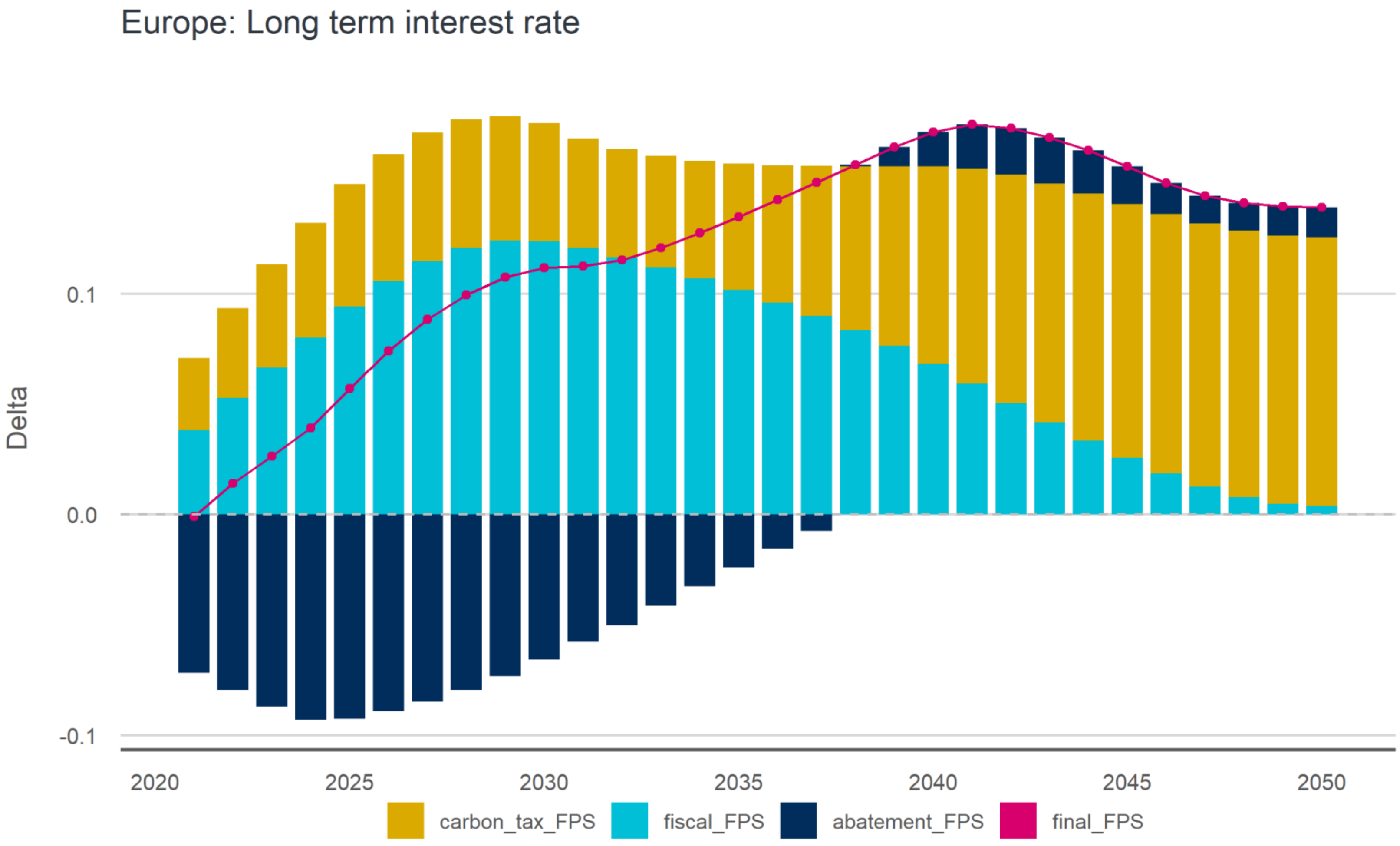


- Chinese long term interest rate path delta follows a similar path to the US as Chinese monetary policy is pegged to the US's.
- China's currency is classified as a fixed exchange rate currency with reference to a basket of currencies, with the US dollar having the largest share in that basket.
- Until 2005 it was pegged to the US dollar, so US monetary policy continues to have influence in the monetary policy in China.
- Similar to the US, interest rates in China follow high inflation and a positive fiscal response.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Long term interest rate cumulative transitional impacts: Europe



- Similar to the US case, Europe's long term interest rates are above the baseline for the entire forecast period but differences are not significant (see the left-hand axis).
- Differences in the short term are driven by higher inflation in FPS compared with baseline as a result of the carbon tax and fiscal shock.
- As the abatement costs shrink in the second half of the forecast horizon in FPS, nominal GDP is above target triggering further interest rate hikes.
- Fiscal response would also contribute to higher interest rates given its positive impact on real GDP.

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

The Inevitable Policy Response:
FPS scenario – Appendix: methodology

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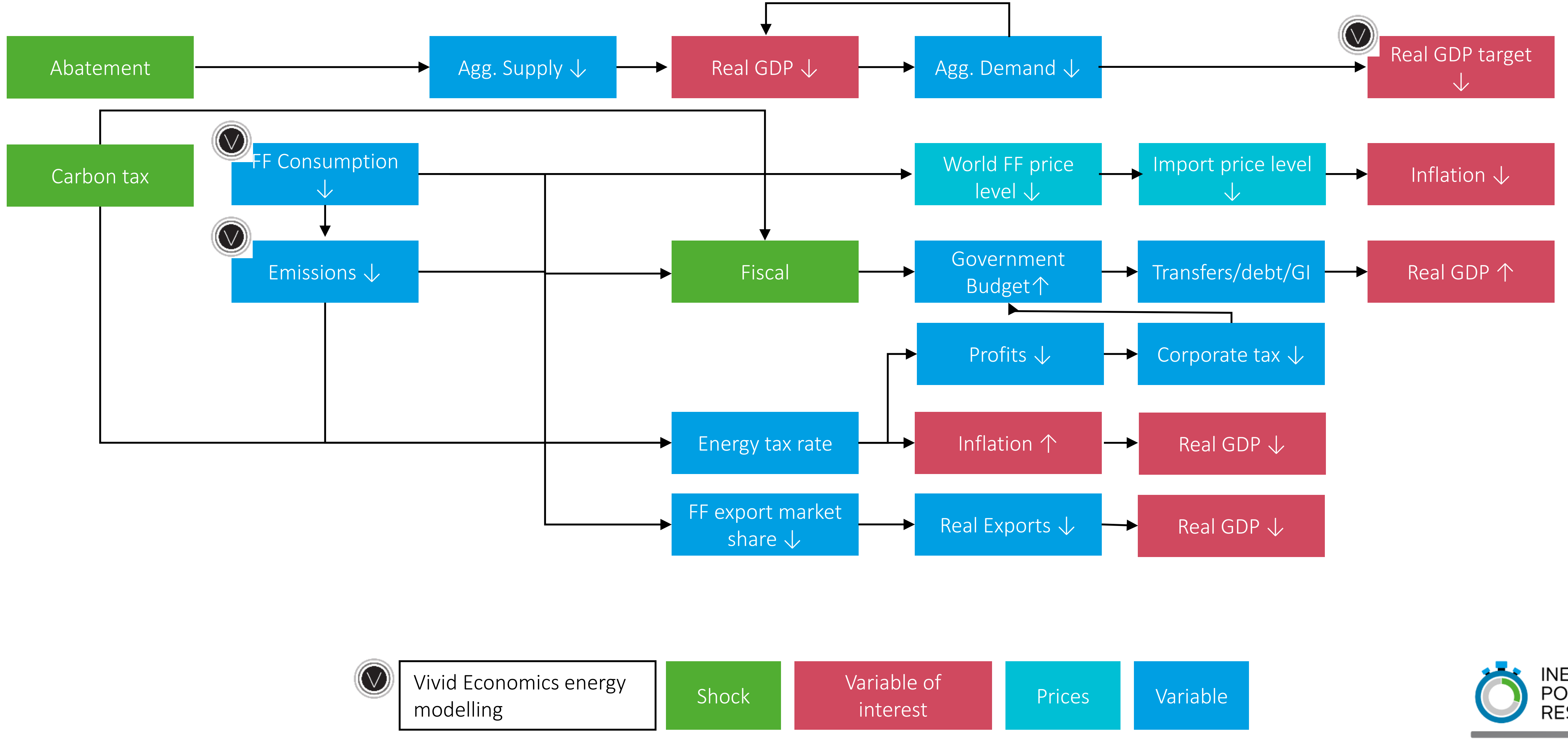
IPR FPS shocks flow through different variables in a sequential way



INEVITABLE POLICY RESPONSE

Source: Vivid Economics

Each shock aims to capture a different aspect of the climate change transition with some limitations

	What is included	What is excluded
Carbon tax shock	• Impact of carbon tax into domestic energy fossil fuel prices, and lower consumption of FF into world FF prices • Impact on profits and inflation • Impact on exports for FF producer	• Impact of carbon tax into FF consumption and emissions (this is modelled in the Energy model) • Impacts from carbon tax revenues are modelled in the fiscal shock • Impact from disinvestment on FF supply and World FF prices
Fiscal policy shock	• Recycling of carbon tax revenues through government investment, household transfers, and debt payment	• Any distributional or sectoral impacts from carbon tax revenue recycling • Any endogenous changes in the profile of tax payers • Government investment doesn't change the productive capacity of the economy. • Knock-on effects on interest rates and premia from debt changes.
Abatement shock	• Costlier energy system (energy becomes more expensive, so less needs to be produced in the economy). This includes any CAPEX and OPEX costs by technology country and year	• Sectoral breakdown of abatement costs. NIGEM doesn't have sectoral breakdown of sectors.

INEVITABLE POLICY RESPONSE

Vivid Economics built the assumptions for the macroeconomic model based on the IPR's energy results

Energy

- Climate change scenarios made public (by NGFS, BoE) assume that energy intensity (energy used per unit of output) in the economy decreases as a result of the transition. In IPR, it was assumed that a costlier energy system will not come at the expense of a decrease in energy intensity.
- As a result, Vivid Economics produced abatement costs (CAPEX and OPEX as a share of GDP) which capture the cost to the economy of making the transition. In other climate change scenarios, the cost to the economy from the transition comes due to lower energy intensity, which creates a productivity shock that propagates through the economy.
- The impact of carbon taxes on fuel consumption are modelled within the macroeconomic model in other climate change scenarios. For IPR this happens within Vivid's energy model. Similarly, emissions in IPR (FPS and RPS) are modelled in Vivid's energy model and not in the macroeconomic model.

Carbon tax revenues recycling

- In other climate change scenarios carbon tax revenue is recycled through 50% towards debt and 50% towards government investment. IPR's FPS and RPS scenarios take a wider set of options by including other forms of government intervention (household transfers) in revenue recycling.

NIGEM model highlights

Why a Global Macro-econometric model?

- Explicitly deals with interrelationships between different countries in the world.
- Represents the circular flow of income and secondary effects.
- Simulates behaviour of all economic agents (e.g., firms, households, government and central bank).
- Models intertemporal decisions of the economic agents (rational or adaptive expectations).
- Stacks shocks to see how each the impact of each on the economy.
- Estimates historical relationships of macroeconomic variables.

Upside

- It models the financial side of the economy alongside with the real side.
- Calculates interest rates, inflation, exchange rates and other financial variables.
- Includes more than 50 countries/regions.
- It includes energy as an input into the production function.
- It was used for the NGFS's and BoE's climate change scenarios released in 2021.

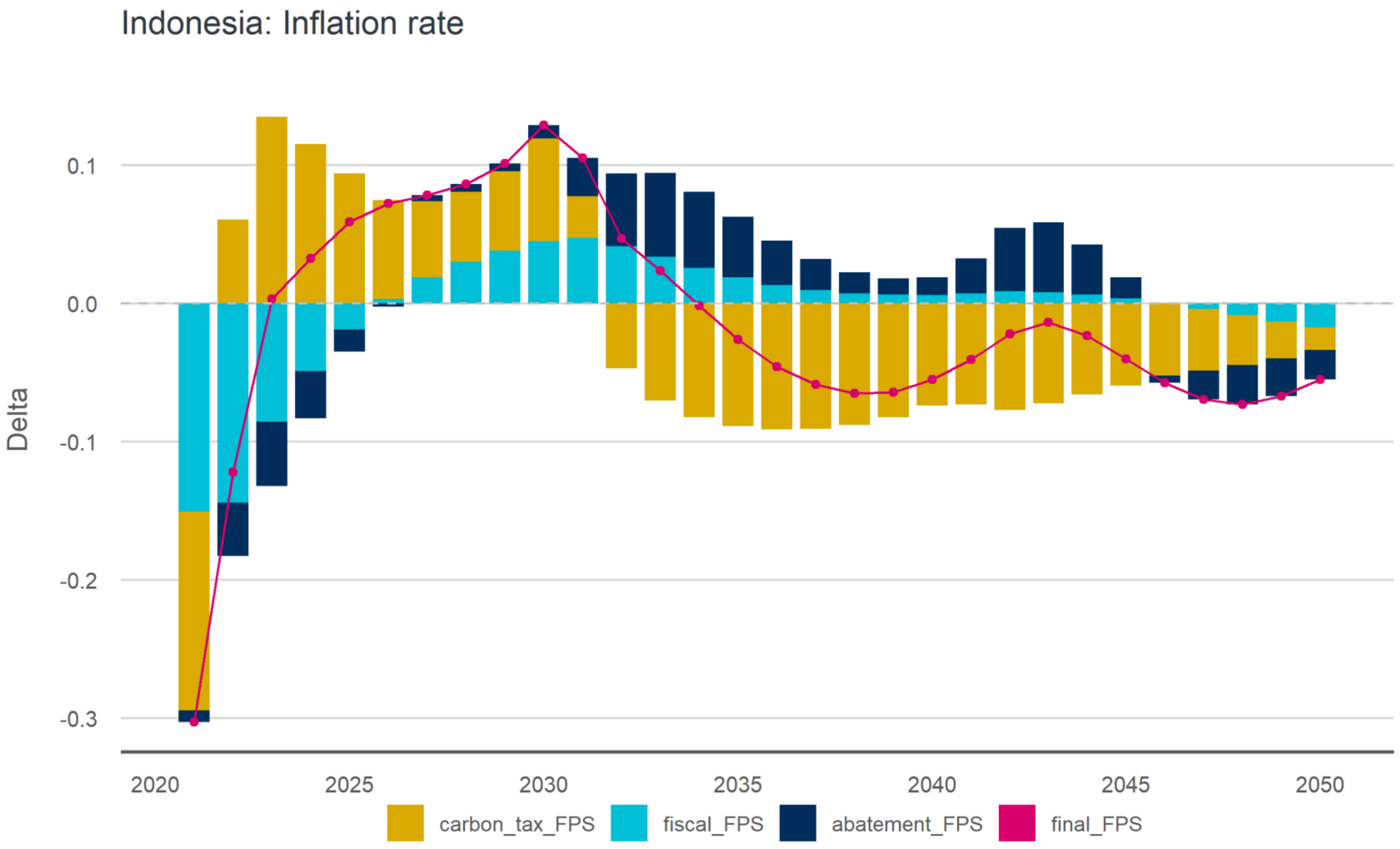
Limitations

- Does not provide a sectoral breakdown of the economy
- Not all countries have a full economic structure. Reduced forms of the economy are used in these cases which could create volatility in the results.

INEVITABLE POLICY RESPONSE

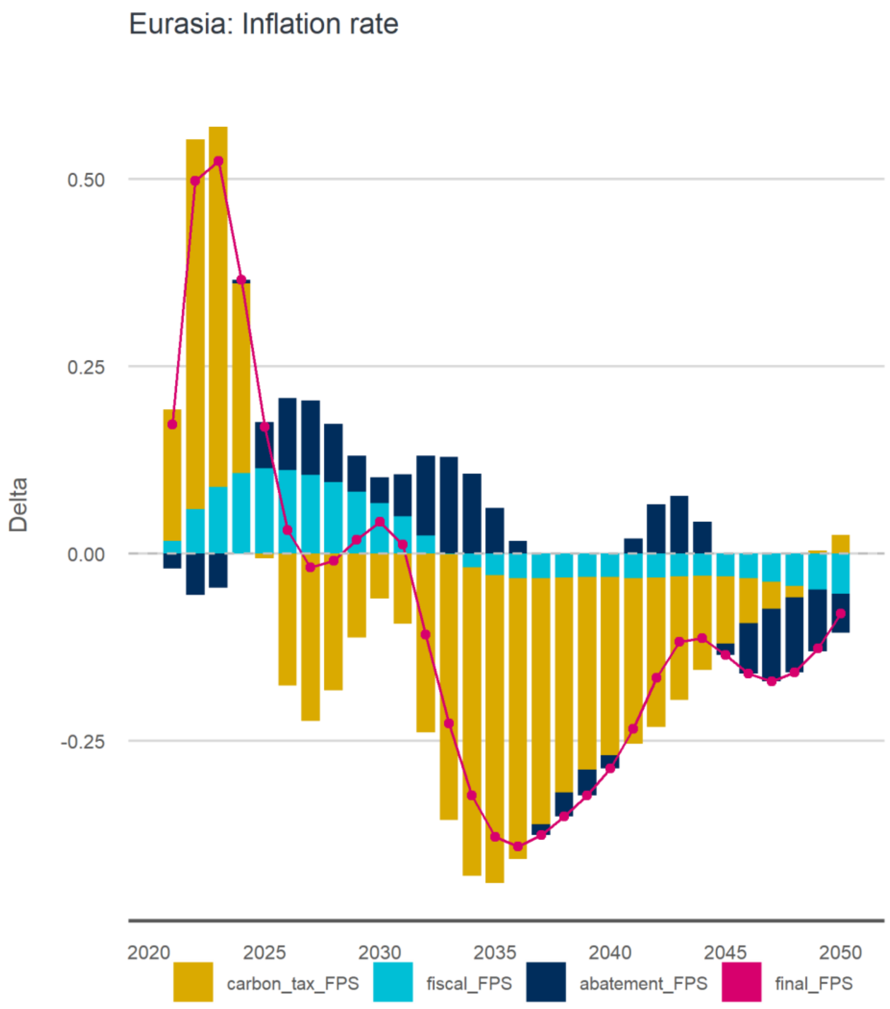
The Inevitable Policy Response: FPS scenario – Appendix: Inflation rate

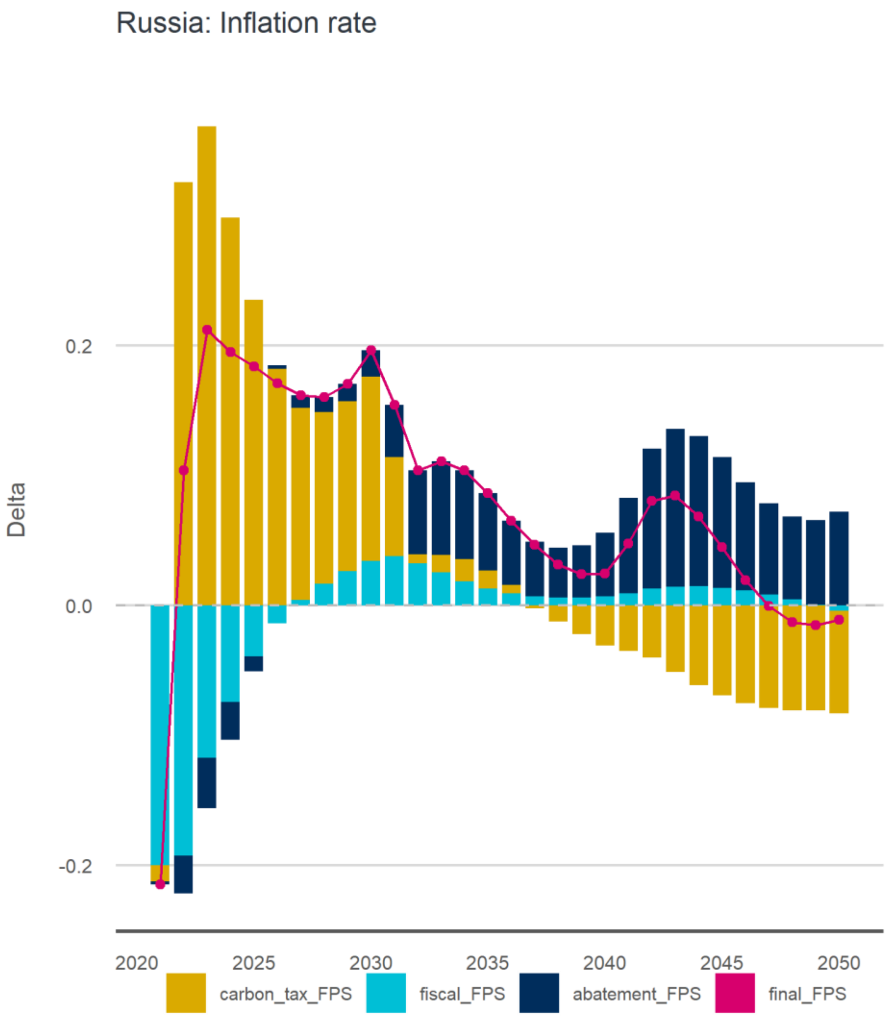
Inflation rate cumulative transitional impacts: Indonesia



Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

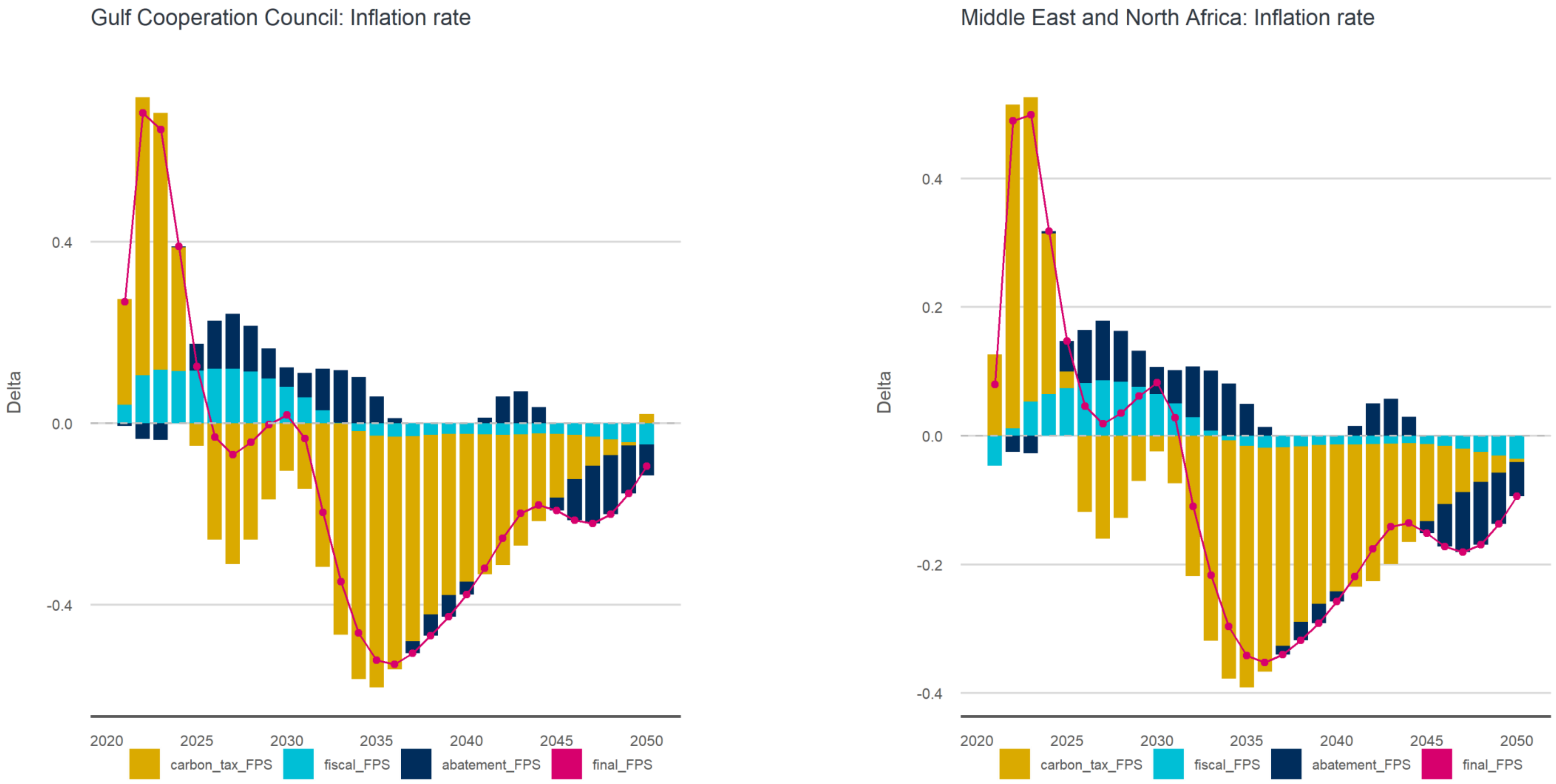
Inflation rate cumulative transitional impacts: Eurasia, Russia





Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

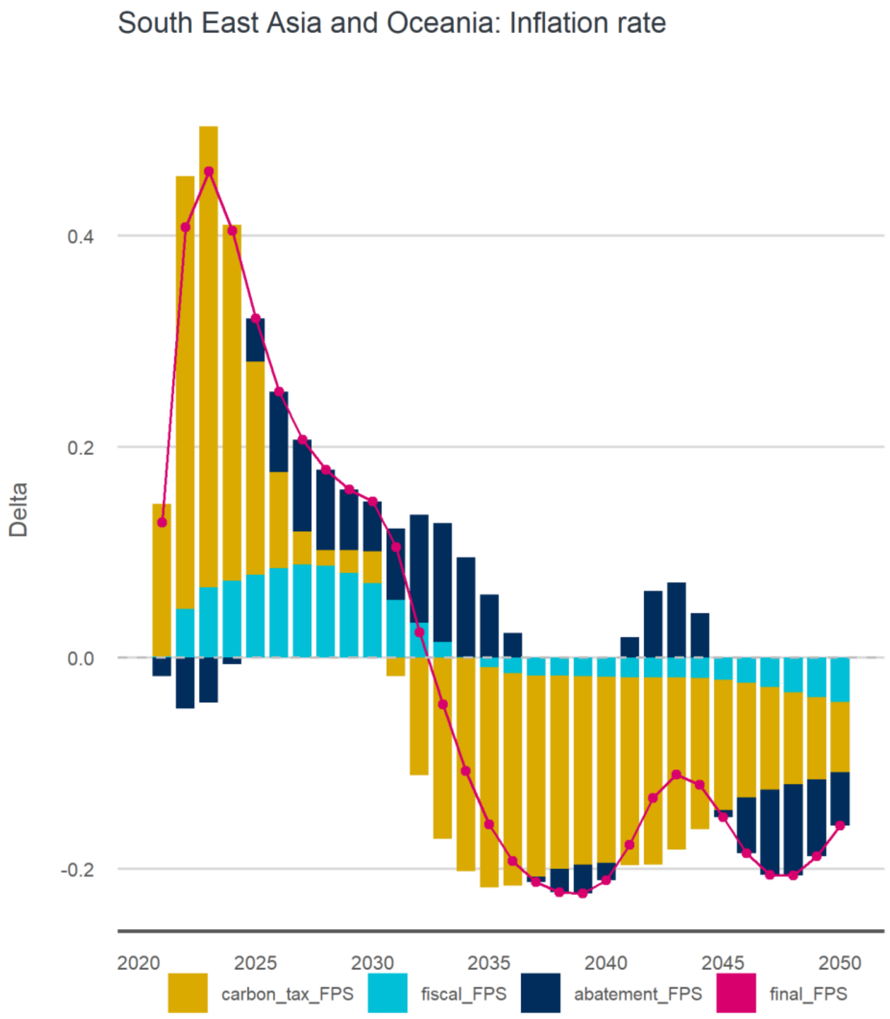
Inflation rate cumulative transitional impacts: Gulf Coop. Council, Middle East and N. Africa

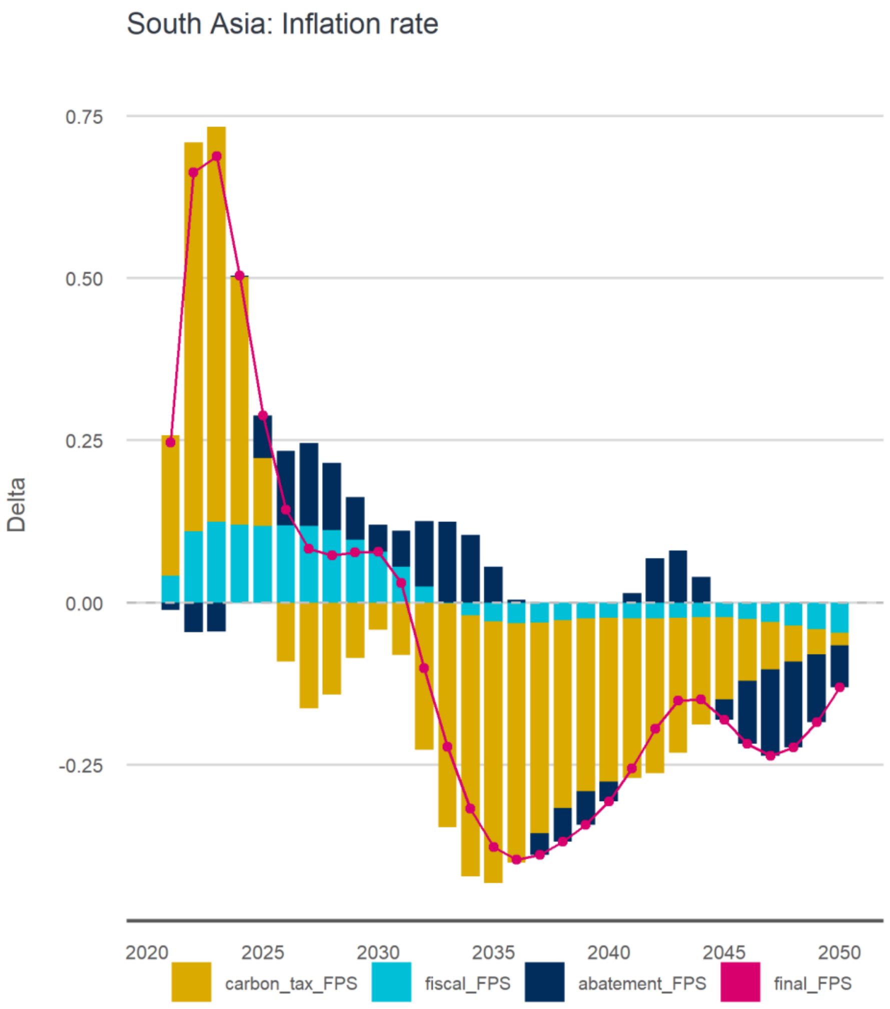


Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

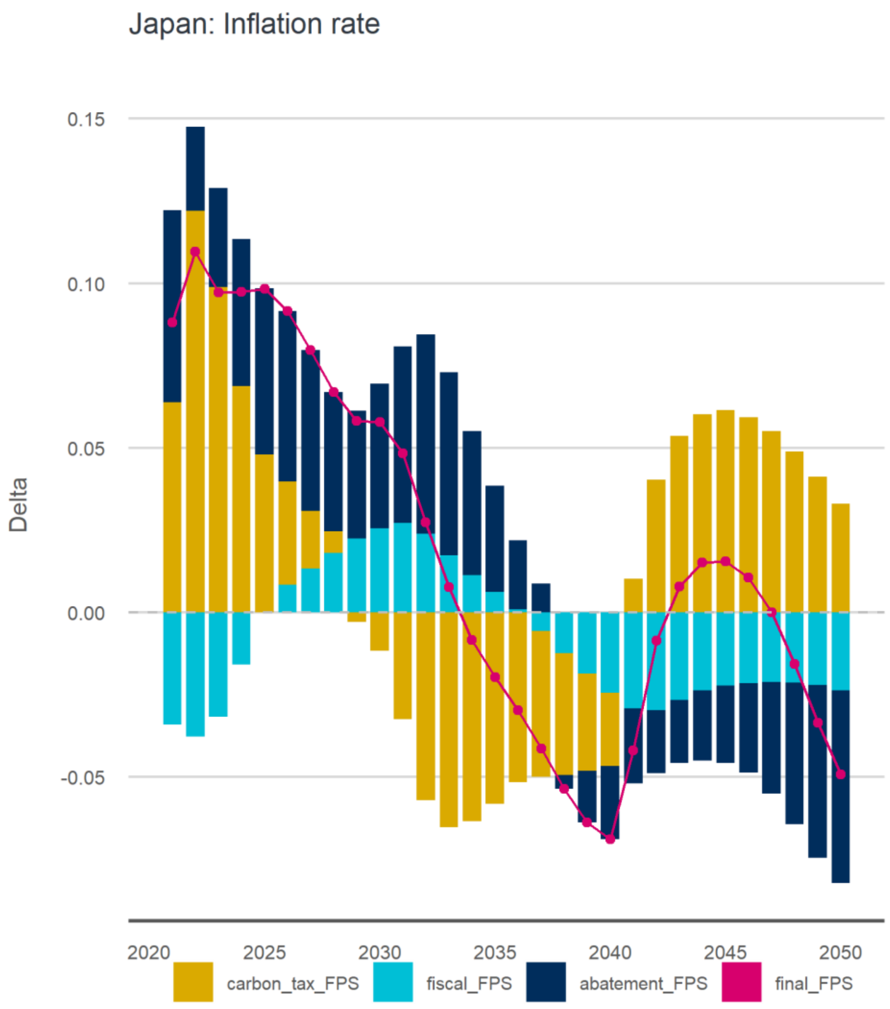
Inflation rate cumulative transitional impacts: South East Asia and Oceania, South Asia

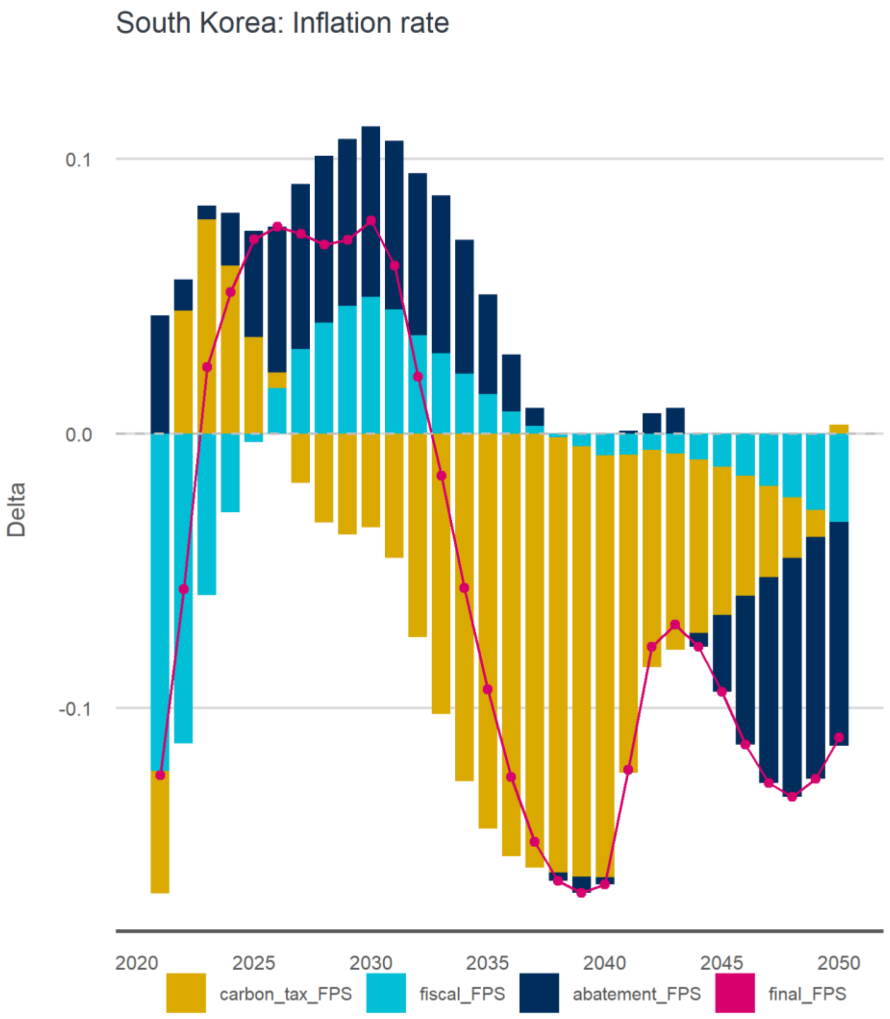




Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Inflation rate cumulative transitional impacts: Japan, South Korea

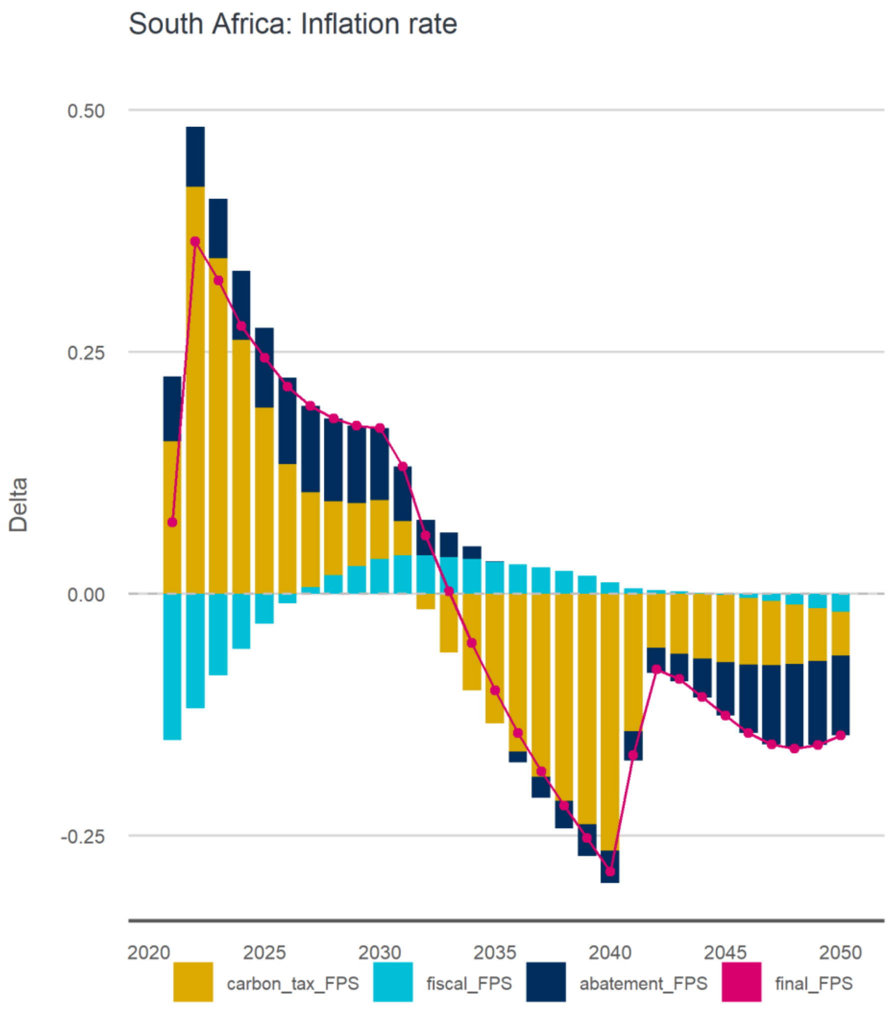


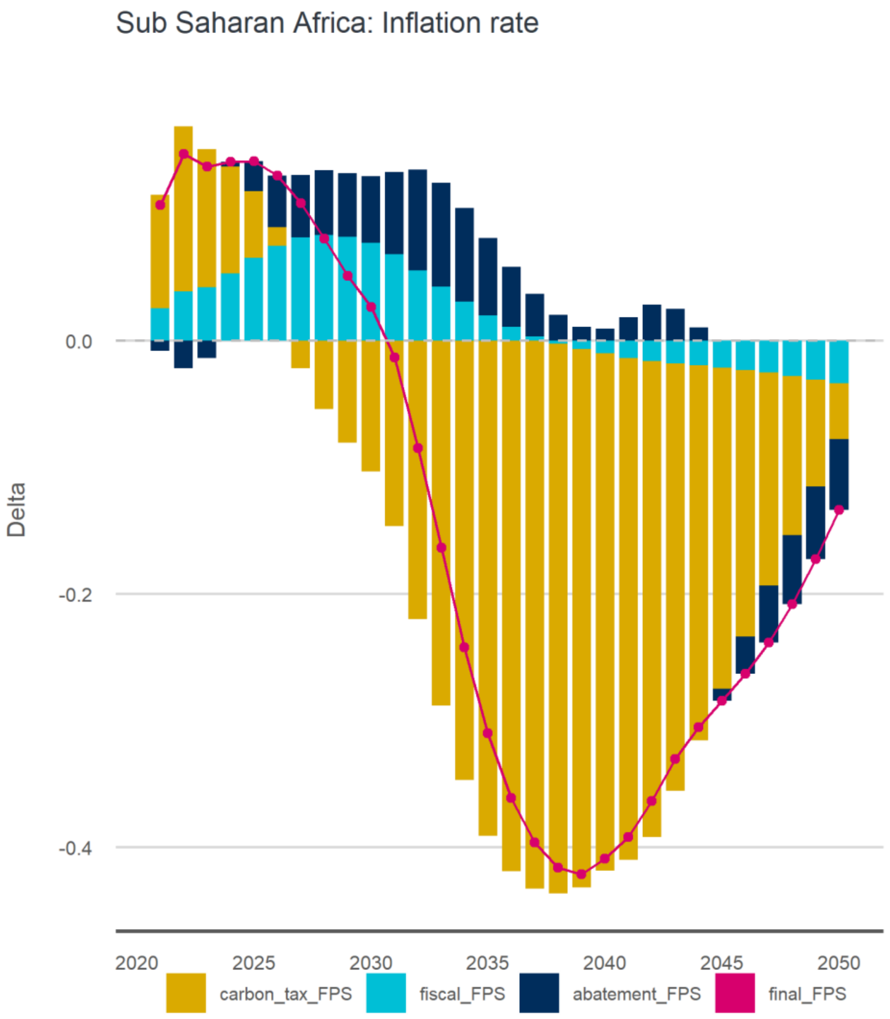


INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Inflation rate cumulative transitional impacts: South Africa, Sub Saharan Africa





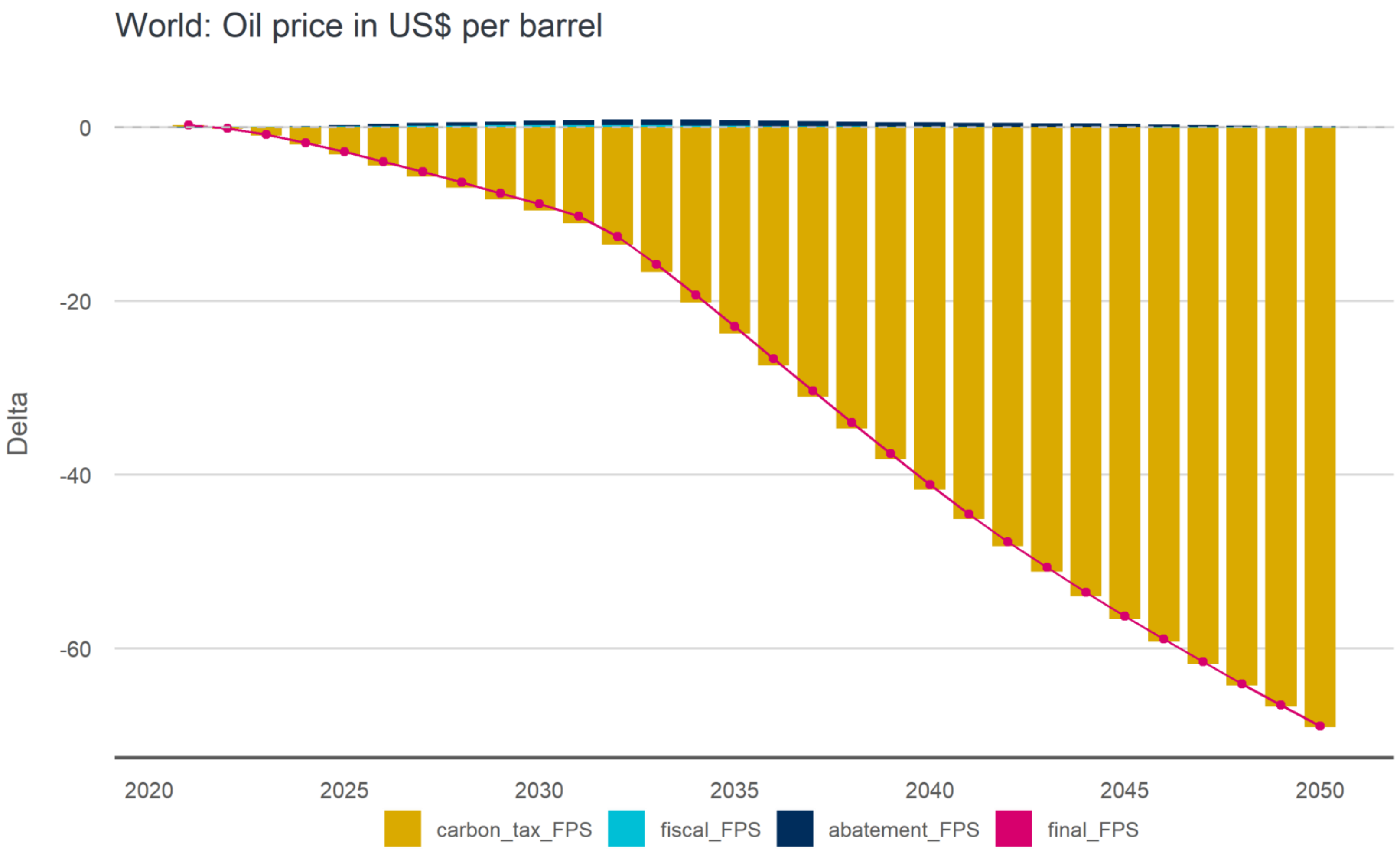
Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

The Inevitable Policy Response: FPS scenario – Appendix: Fossil fuel prices

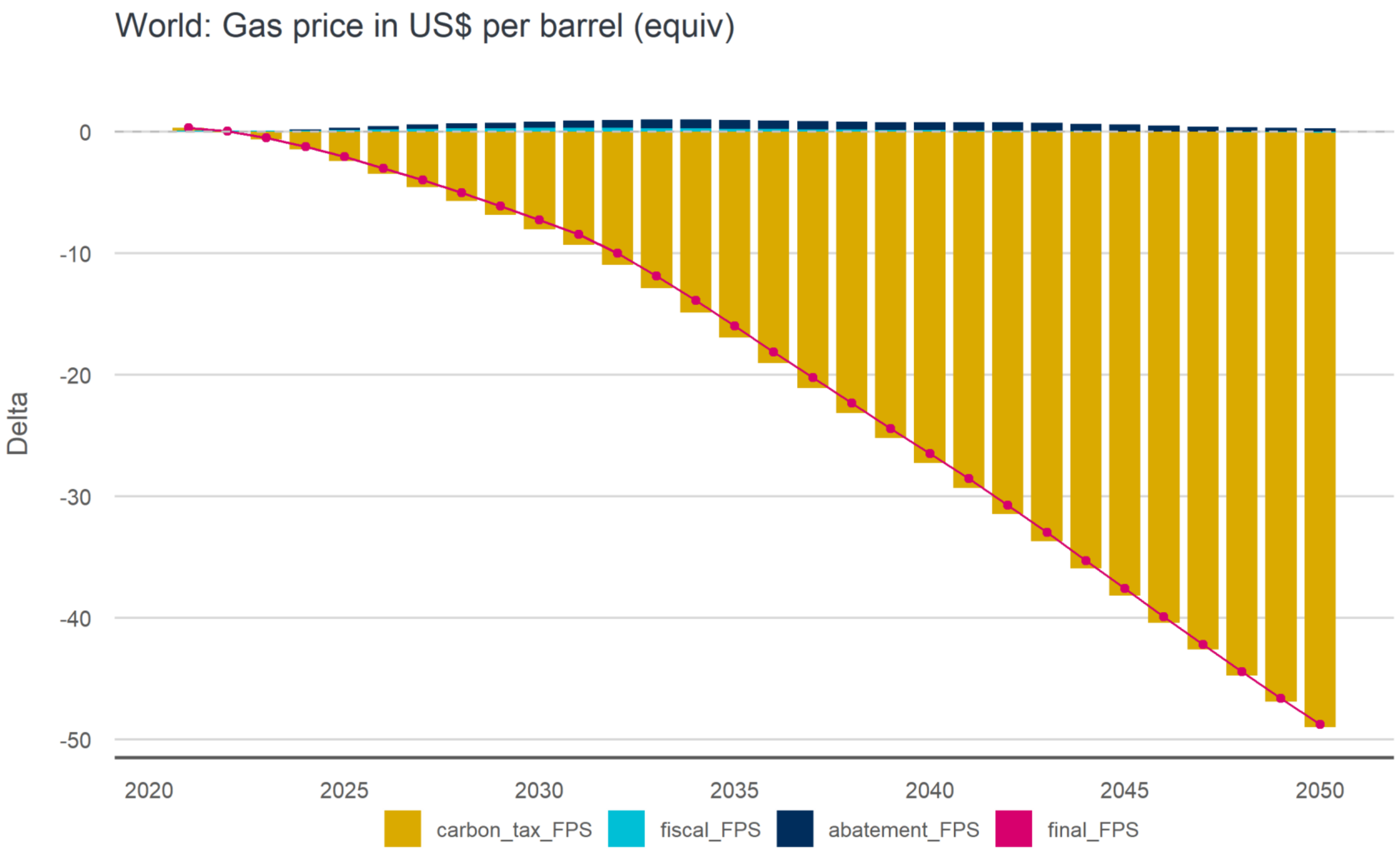
INEVITABLE
POLICY
RESPONSE

Oil price cumulative transitional impacts: Global



Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

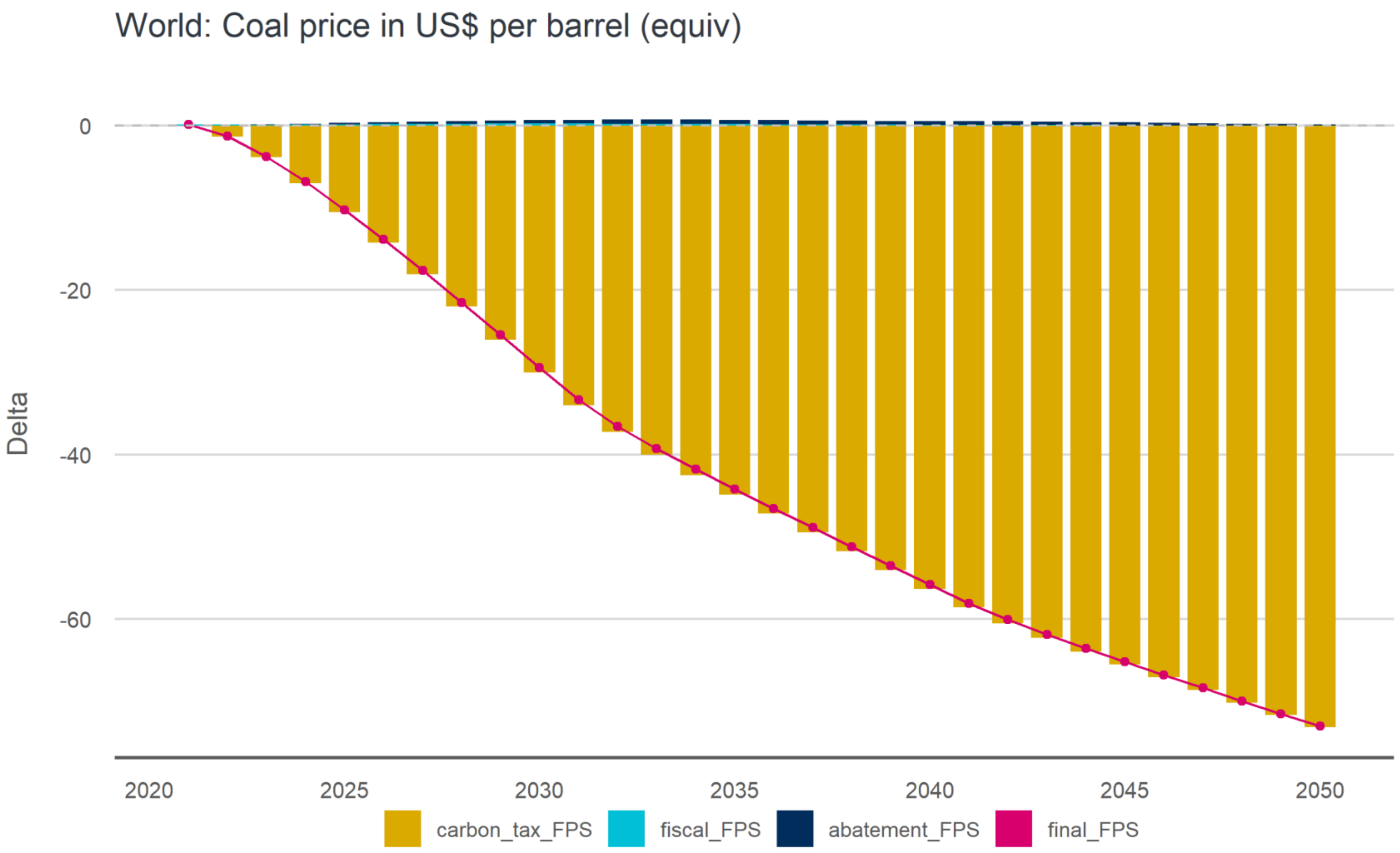
Gas price cumulative transitional impacts: Global



INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Coal price cumulative transitional impacts: Global

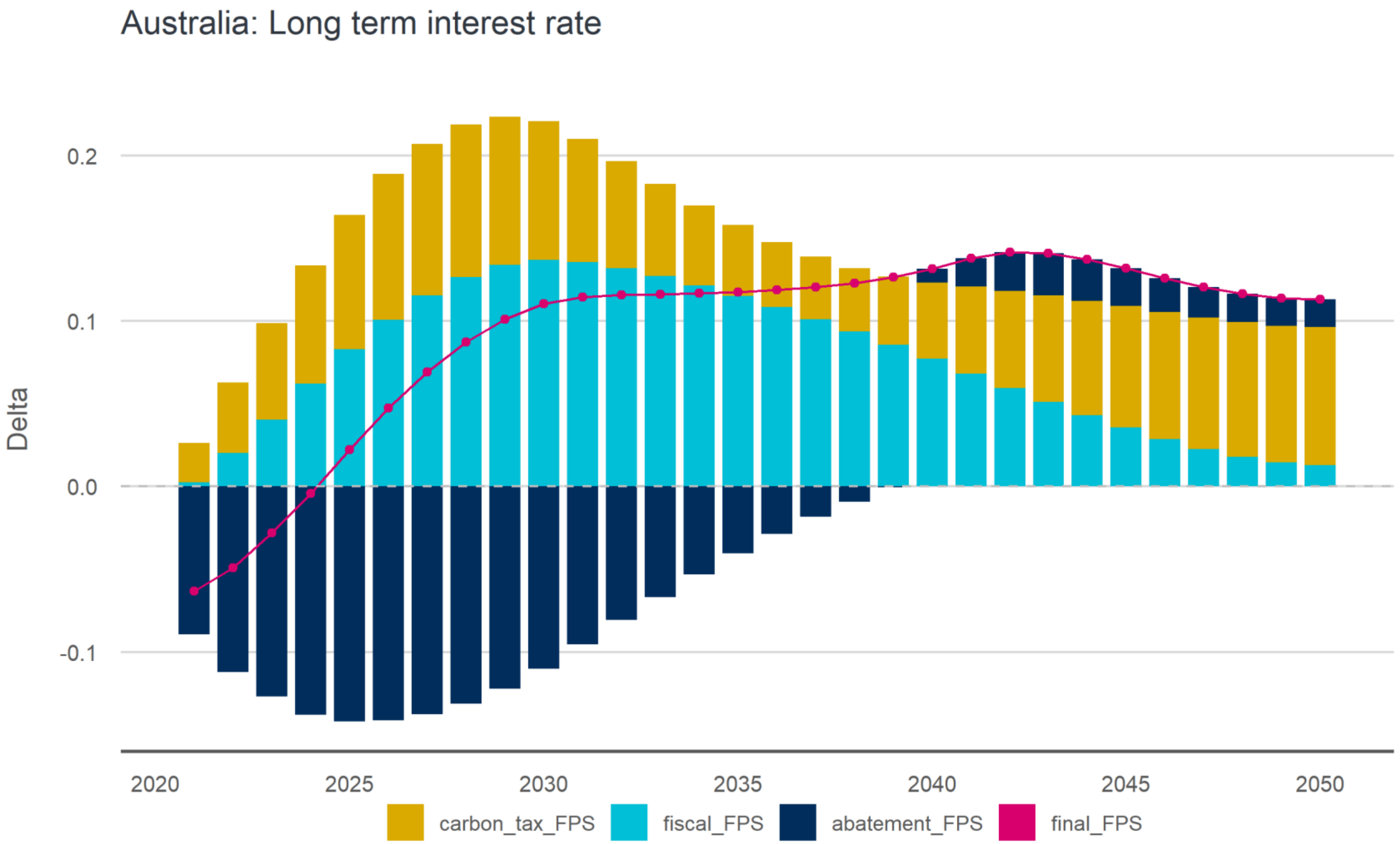


Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Appendix: Long term interest rates

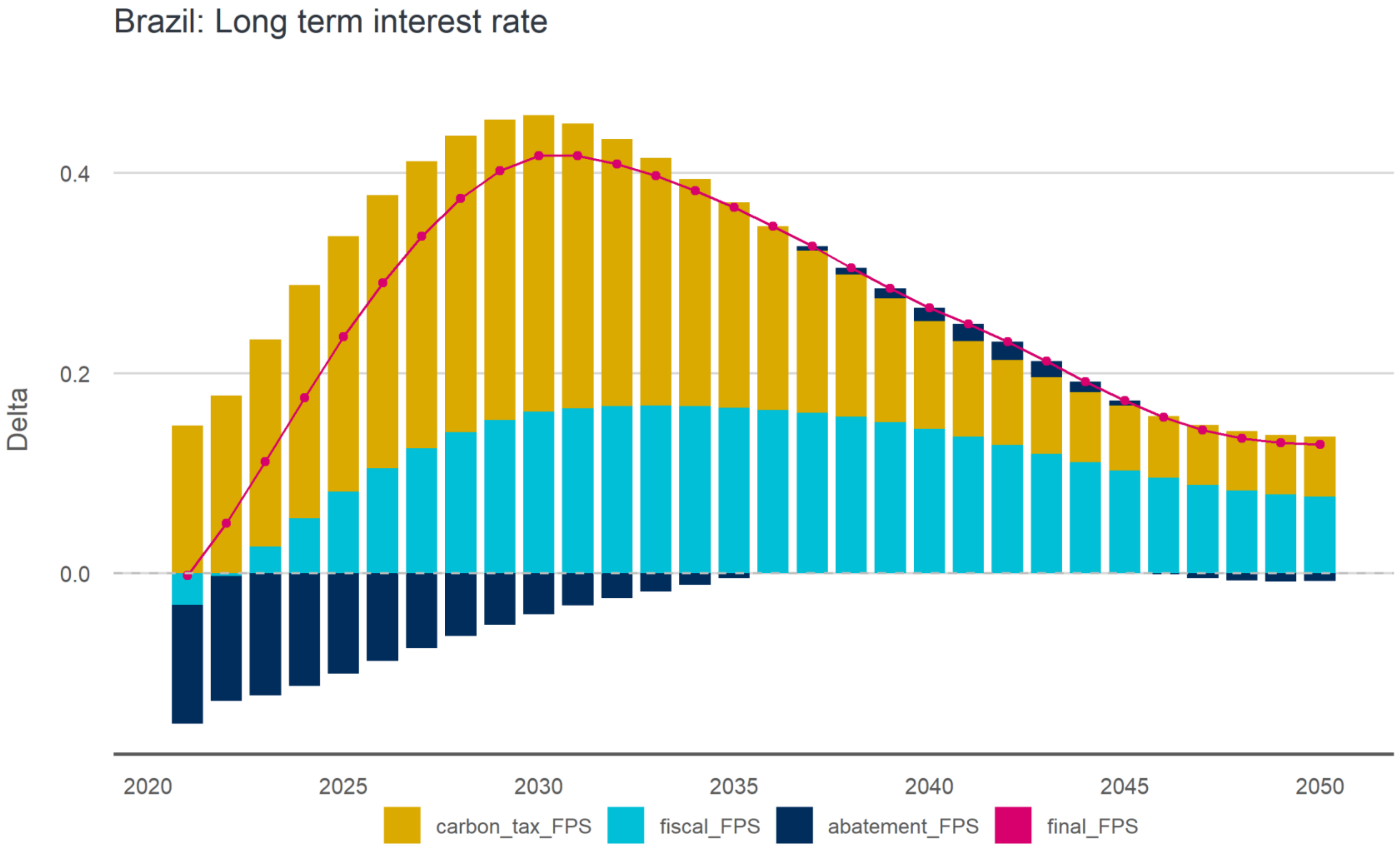
INEVITABLE
POLICY
RESPONSE

Long term interest rate cumulative transitional impacts: Australia



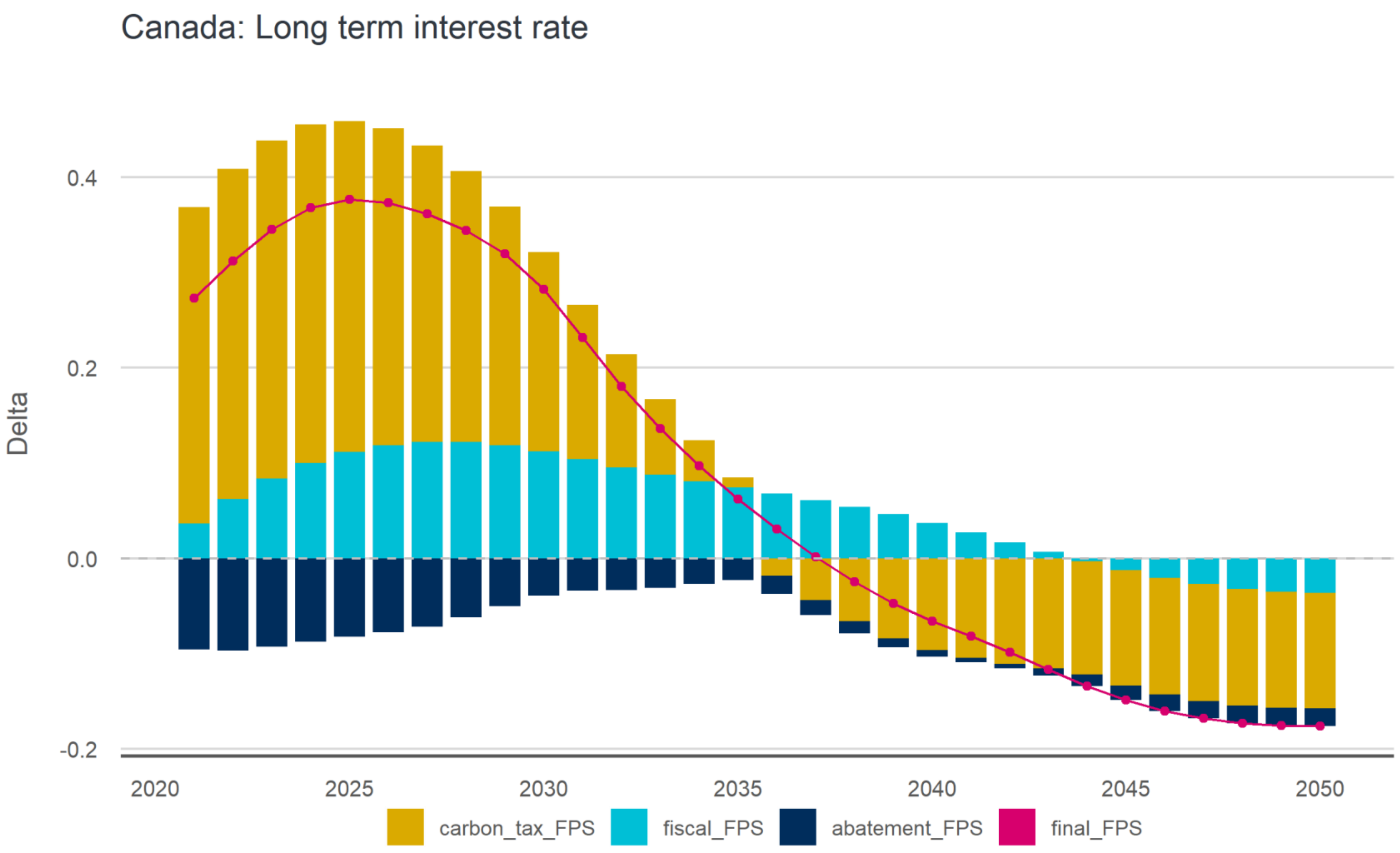
Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: Brazil



Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

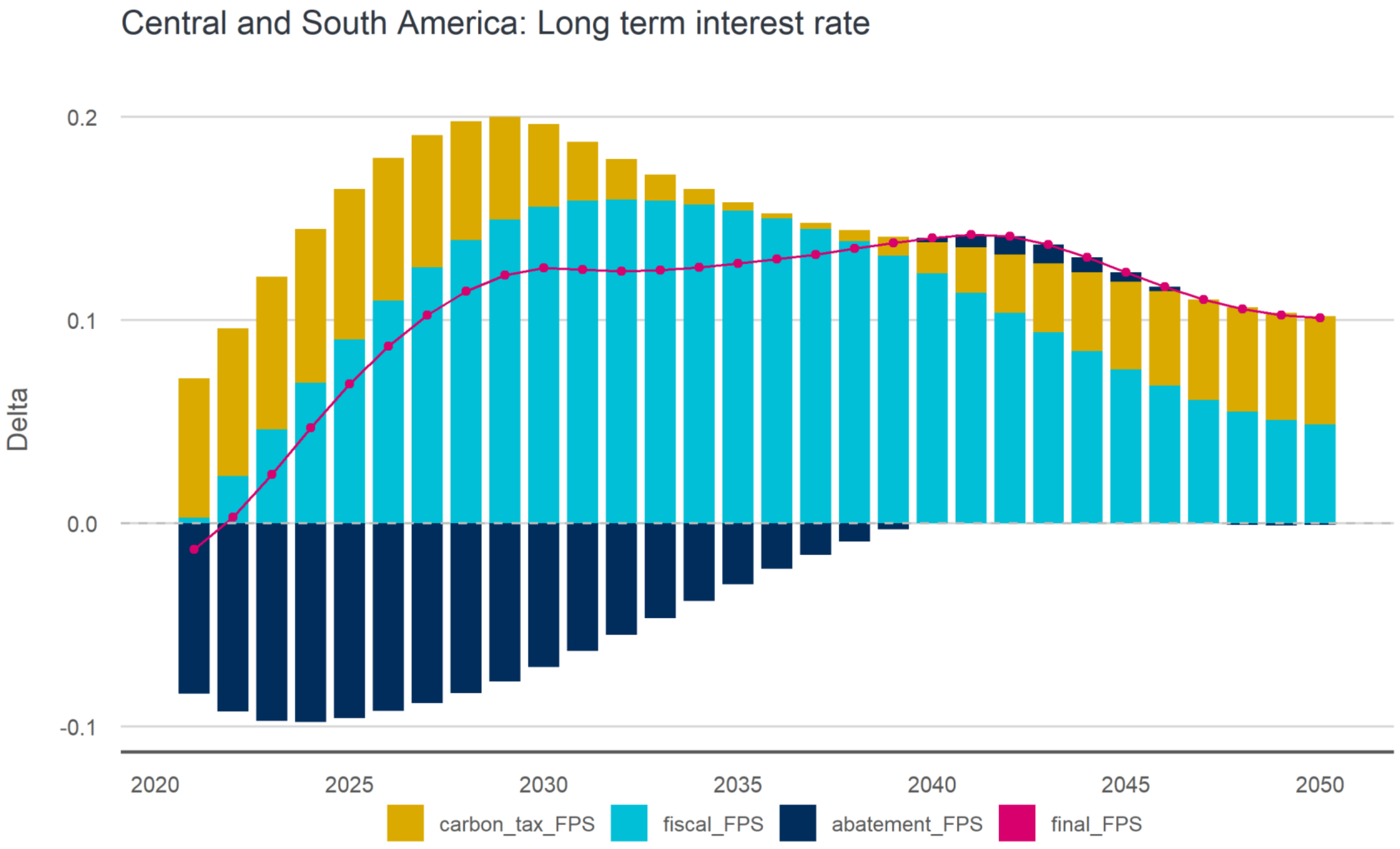
Long term interest rate cumulative transitional impacts: Canada



INEVITABLE POLICY RESPONSE

Note: Delta is calculated as the absolute difference compared to the baseline scenario; no physical impacts are included in this analysis.
Source: NIGEM based on Vivid Economics inputs

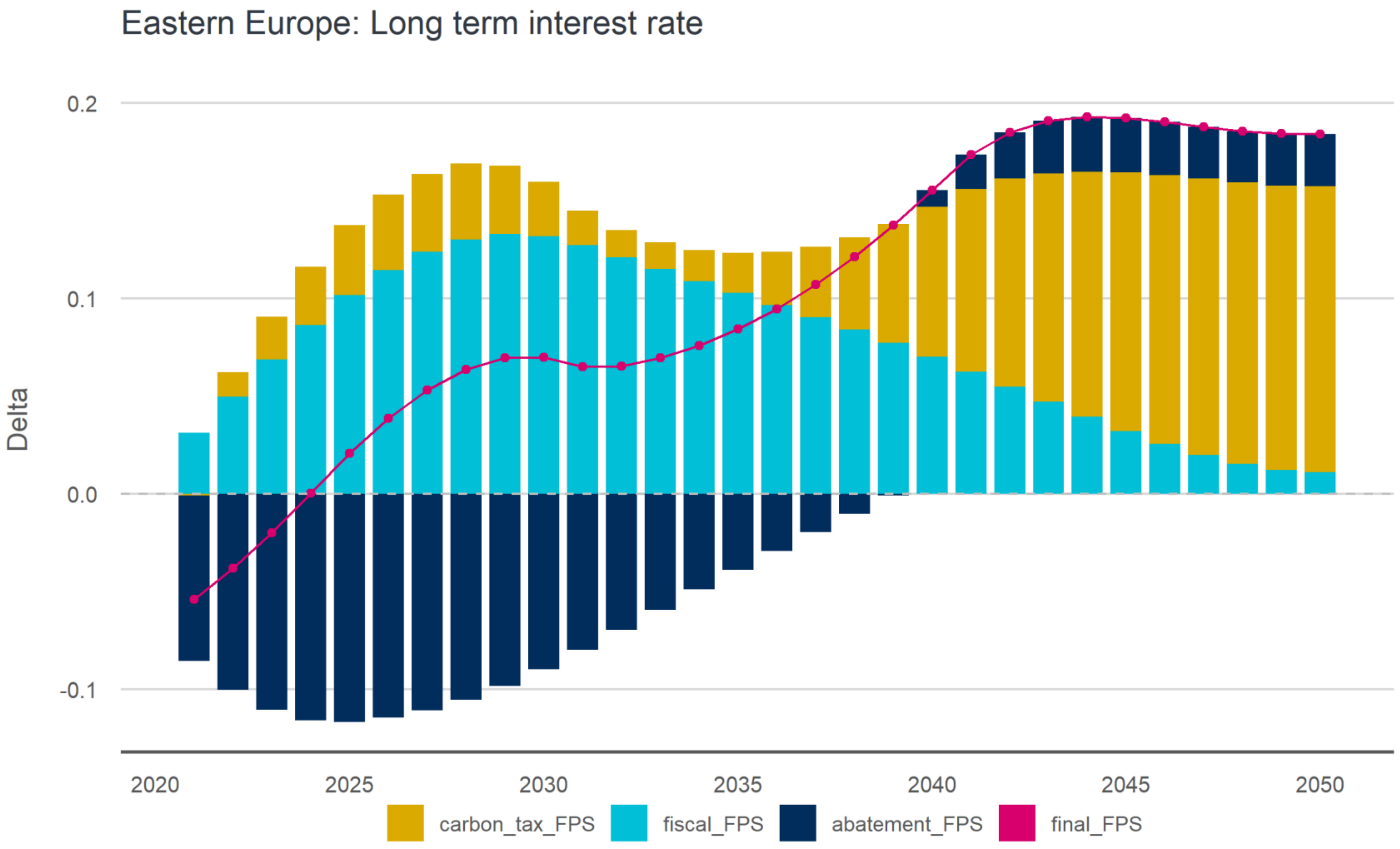
Long term interest rate cumulative transitional impacts: Central and South America



Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

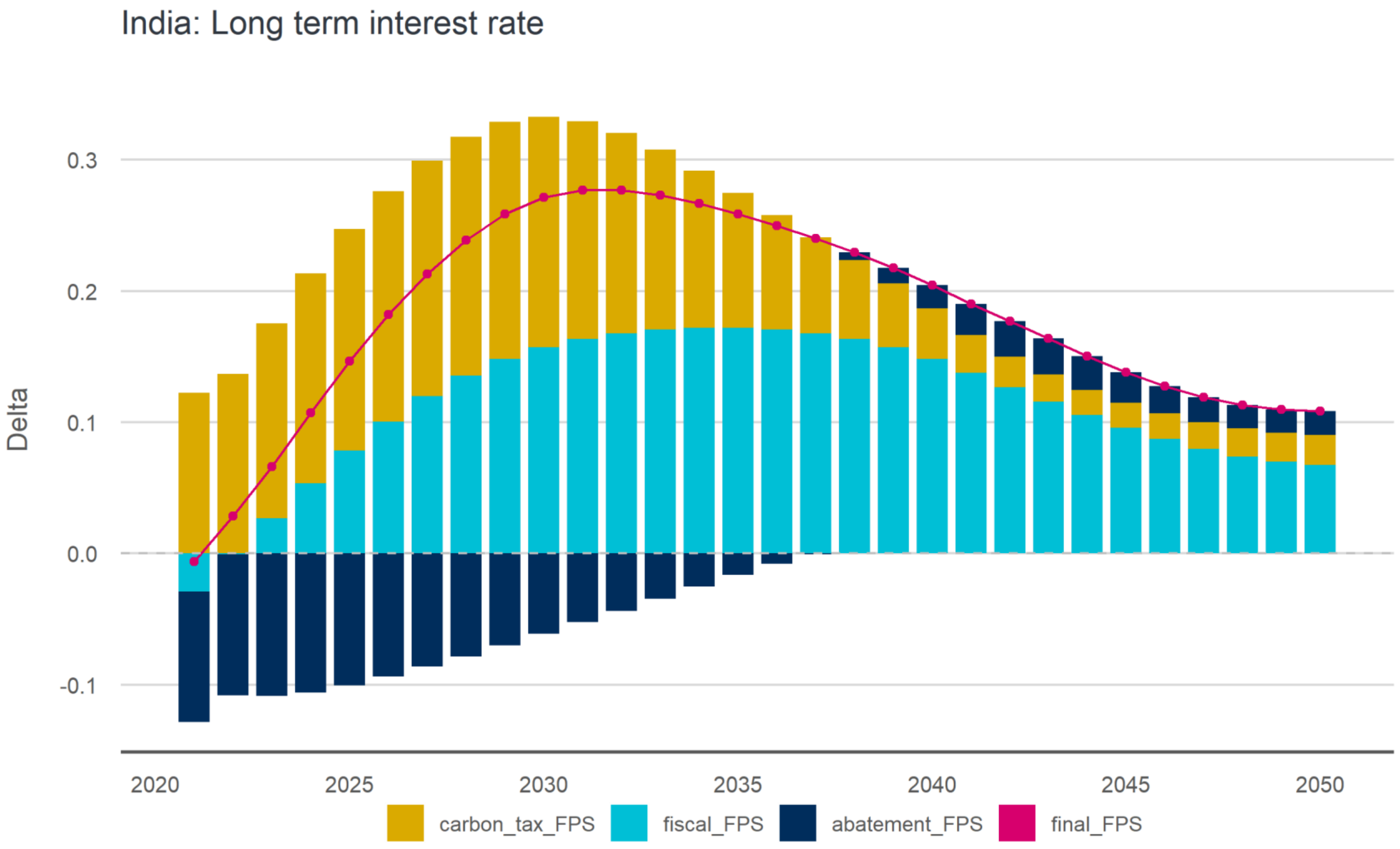
Long term interest rate cumulative transitional impacts: Eastern Europe



INEVITABLE POLICY RESPONSE

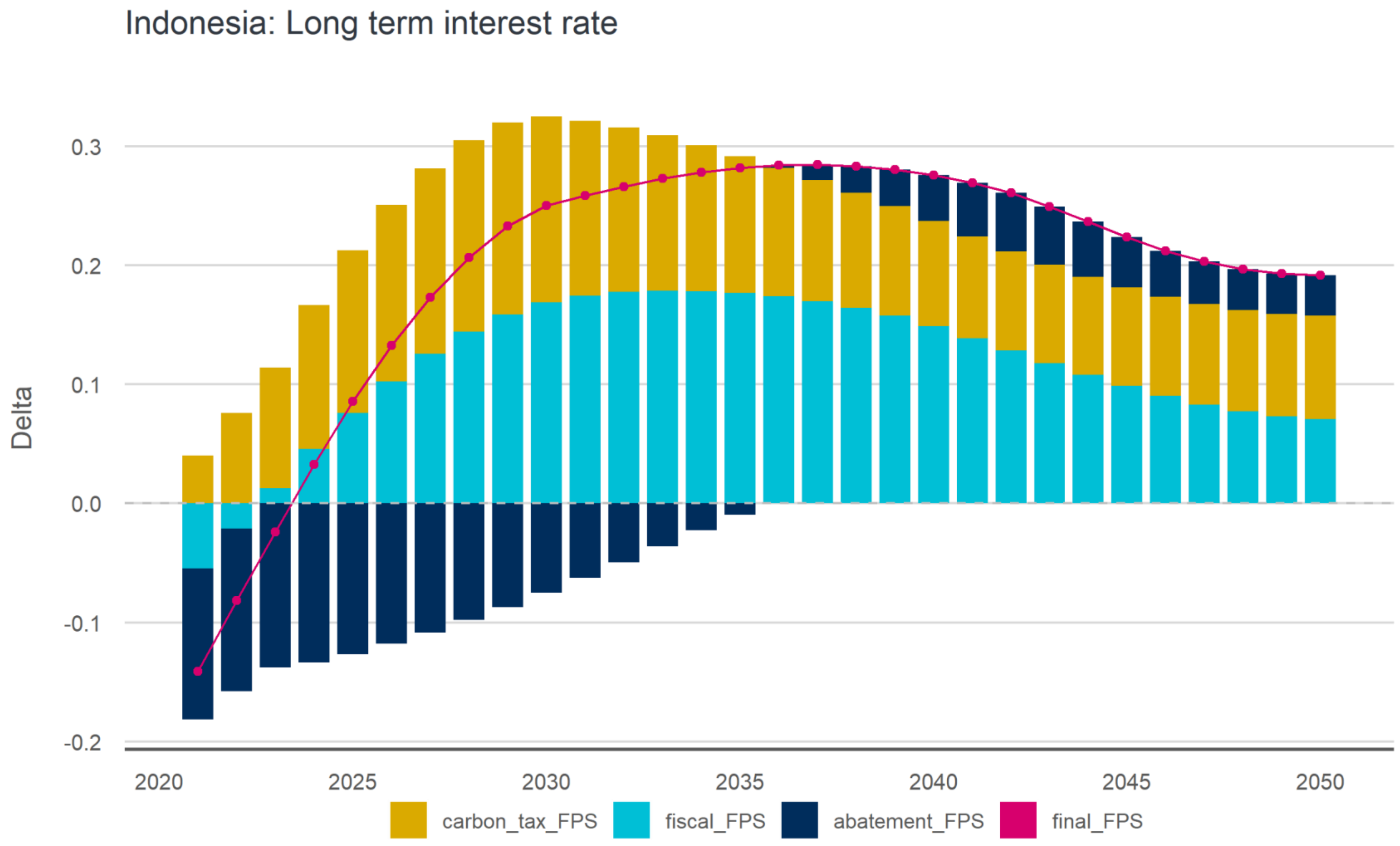
Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: India



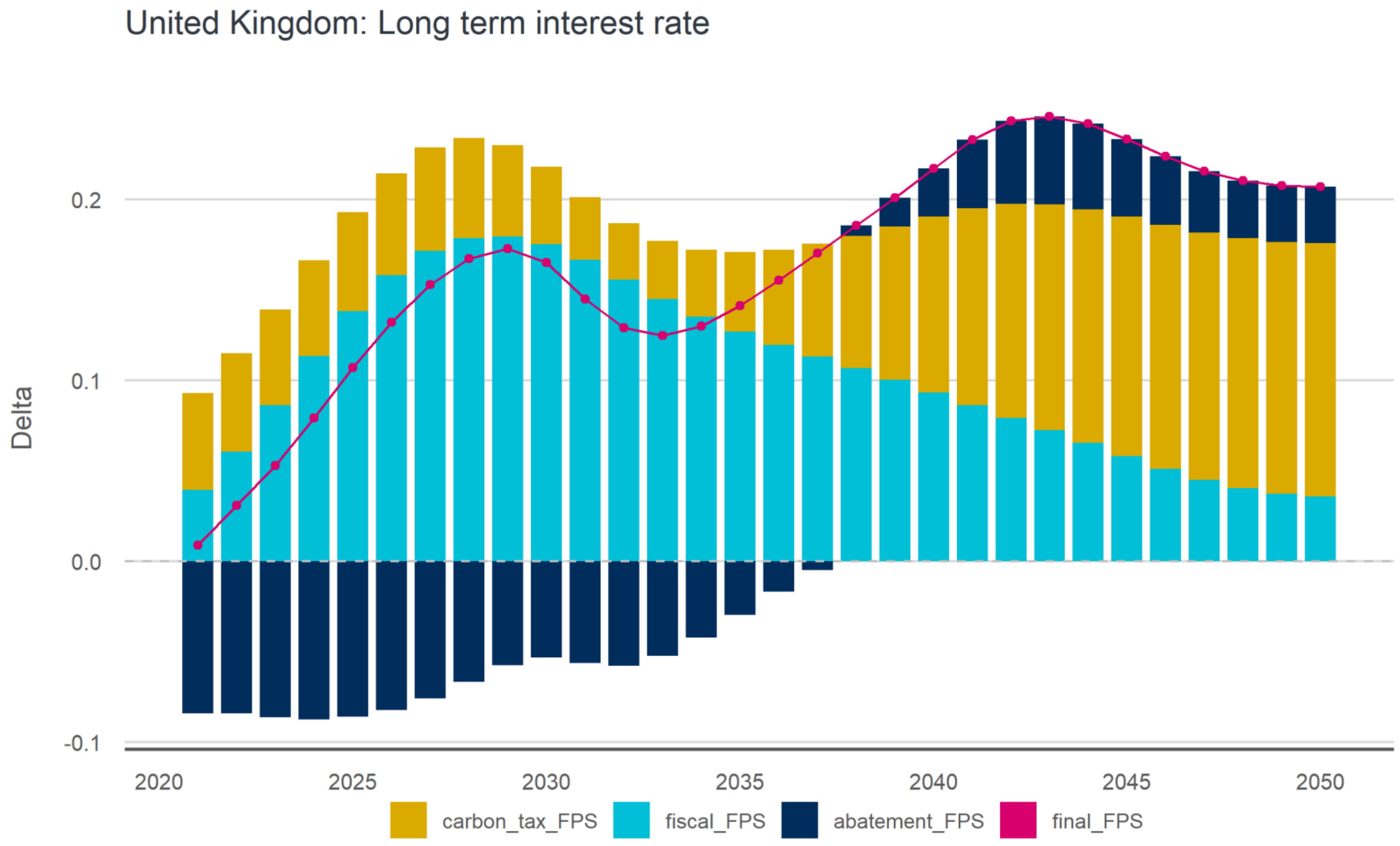
Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: Indonesia



Source: NIGEM based on Vivid Economics inputs

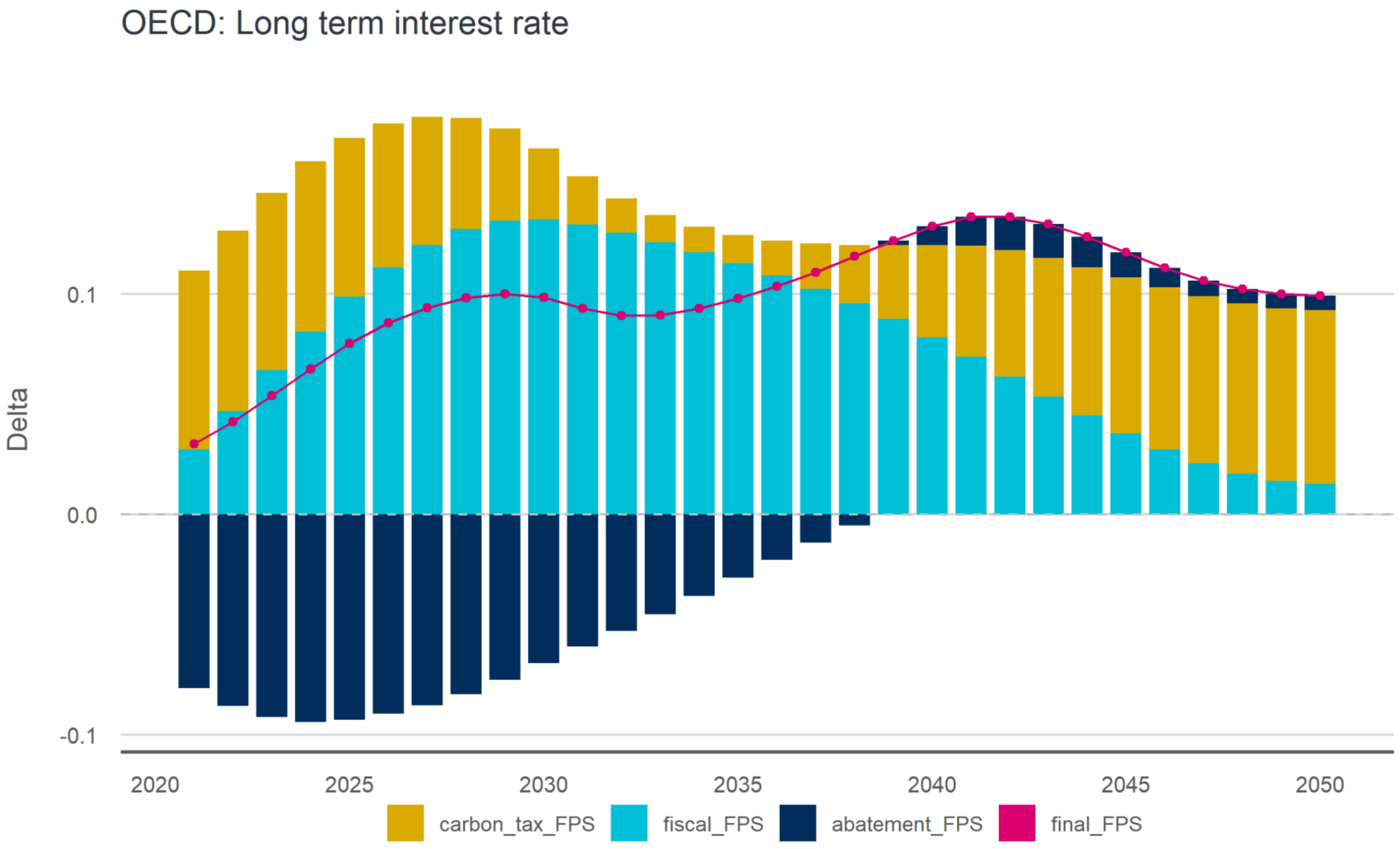
Long term interest rate cumulative transitional impacts: United Kingdom



INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

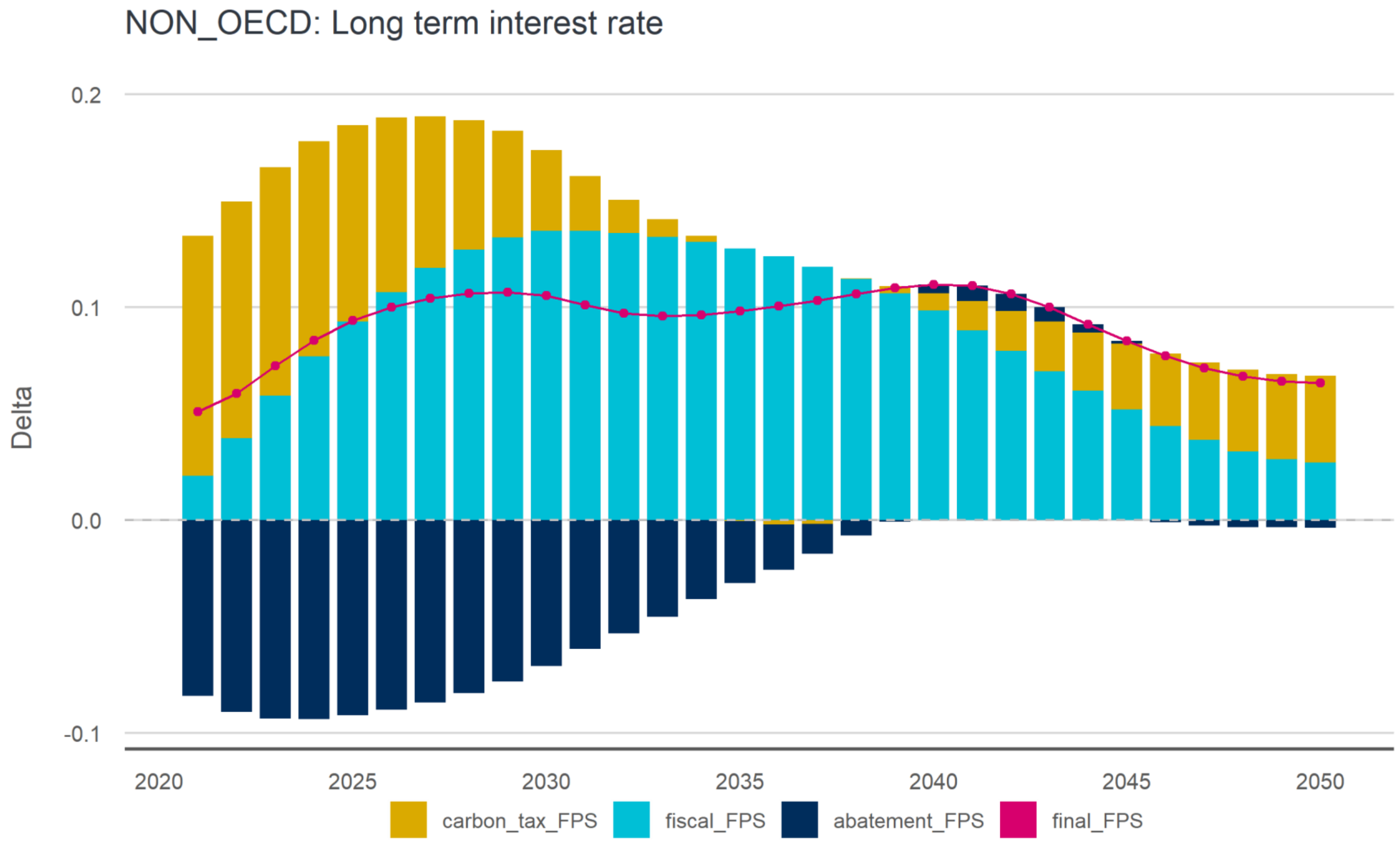
Long term interest rate cumulative transitional impacts: OECD



Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

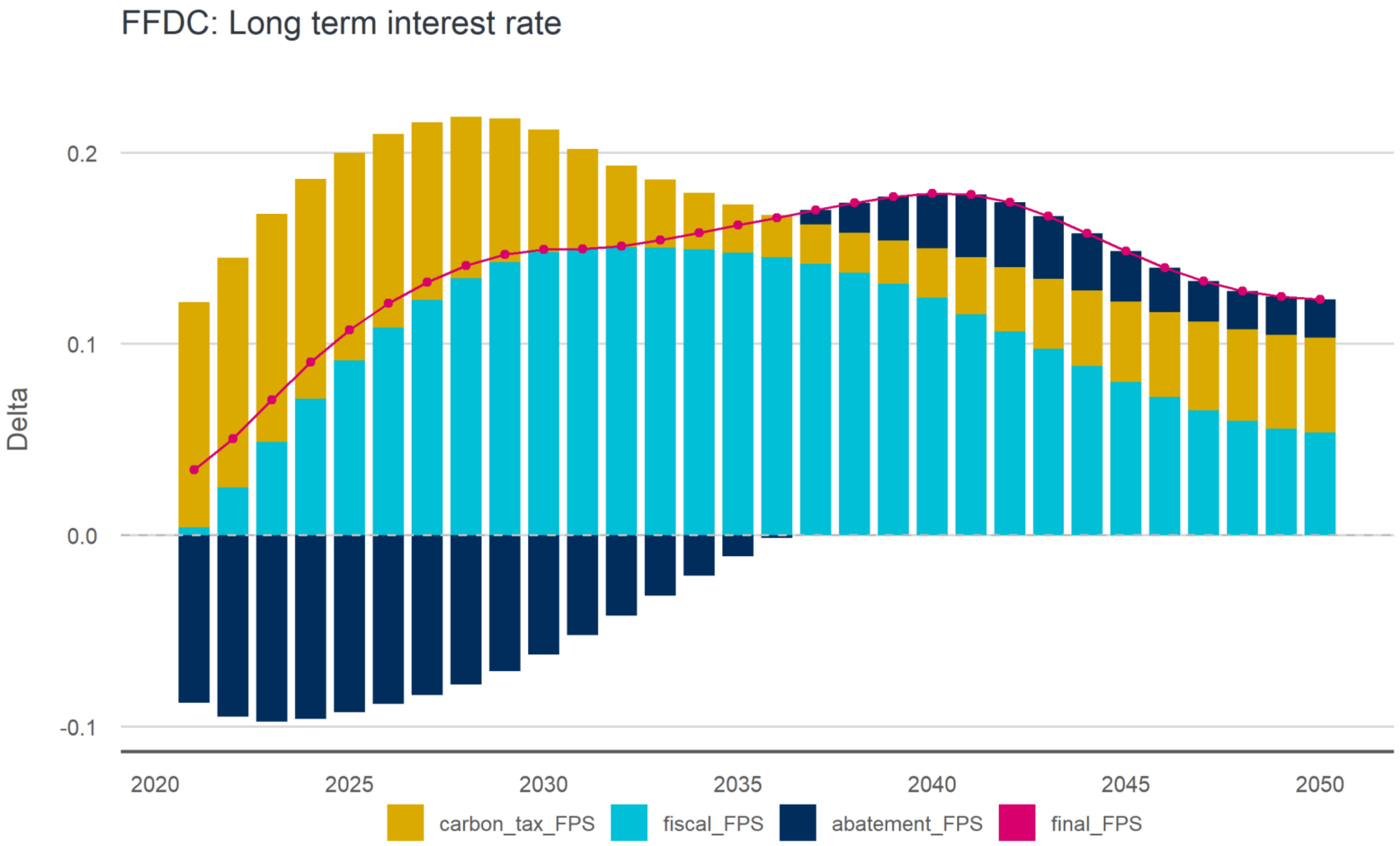
Long term interest rate cumulative transitional impacts: Non-OECD



INEVITABLE POLICY RESPONSE

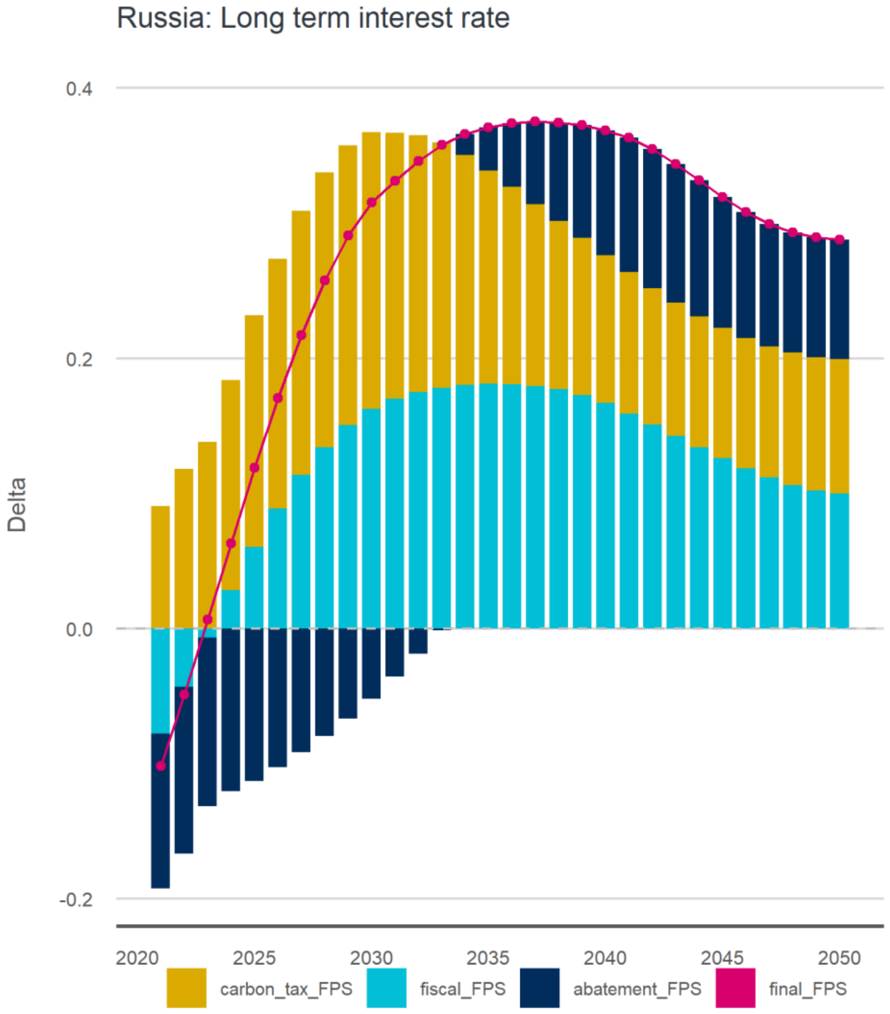
Source: NIGEM based on Vivid Economics inputs

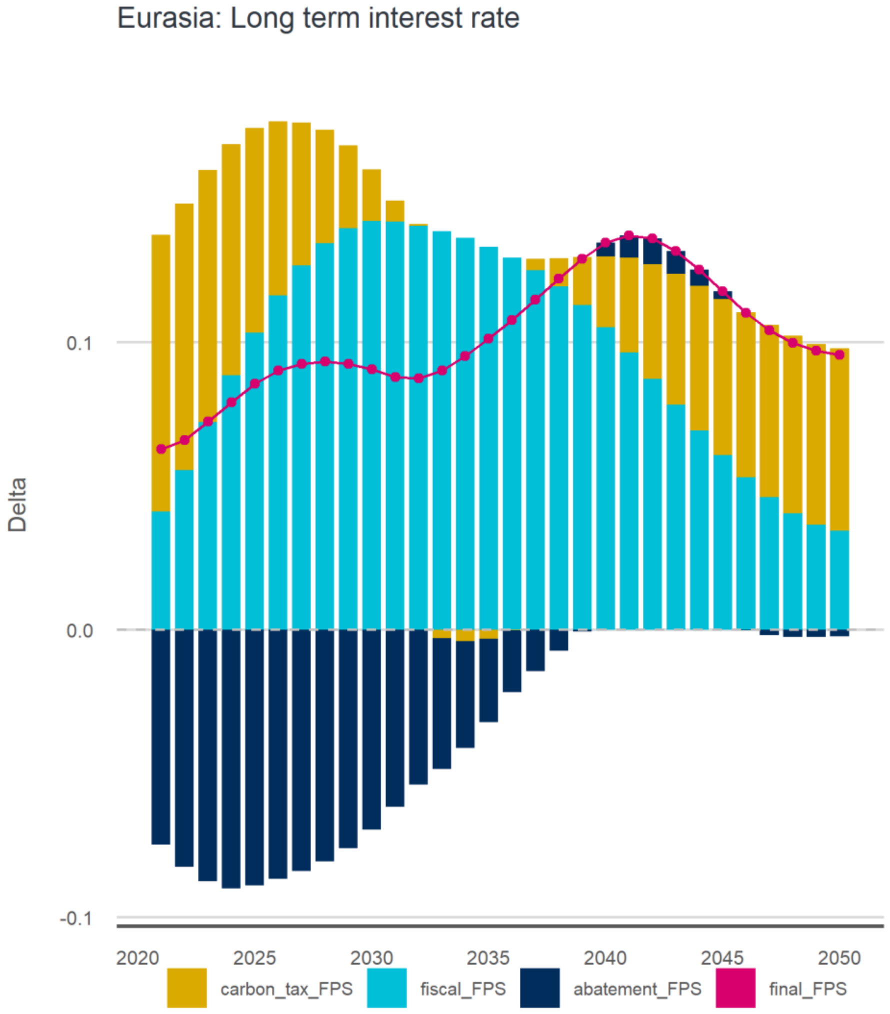
Long term interest rate cumulative transitional impacts: FFDC



Source: NIGEM based on Vivid Economics inputs

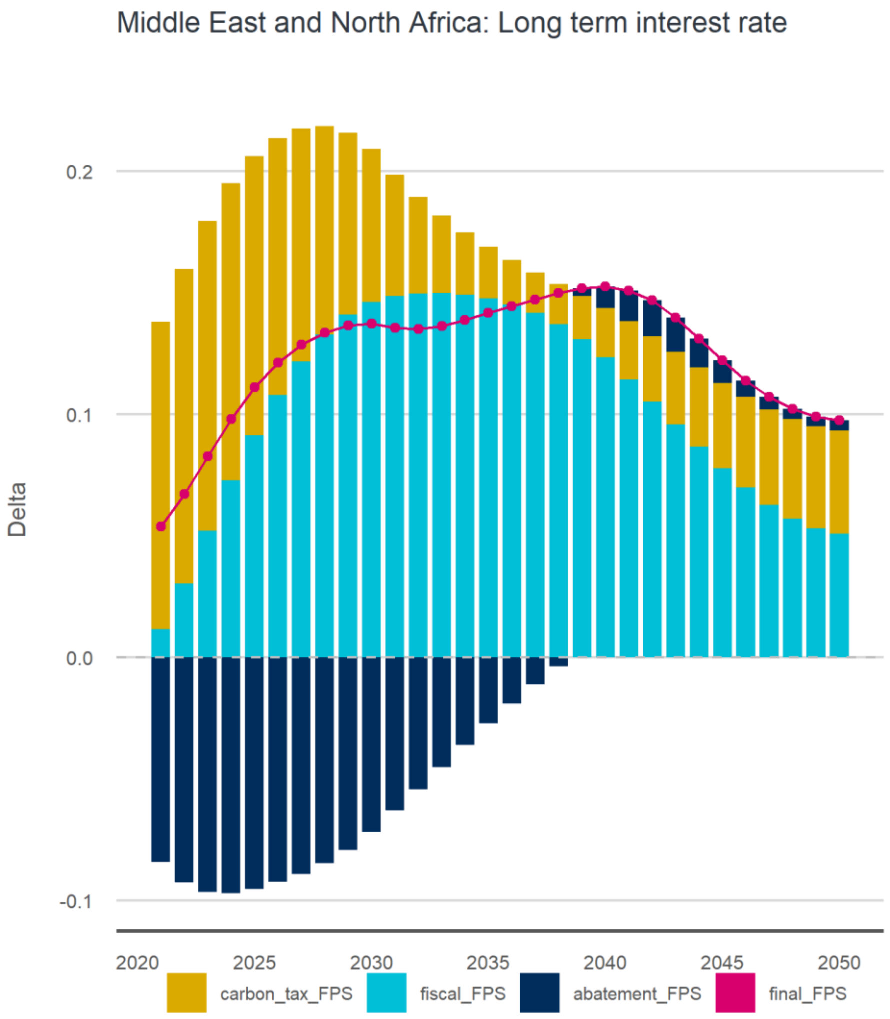
Long term interest rate cumulative transitional impacts: Russia, Eurasia

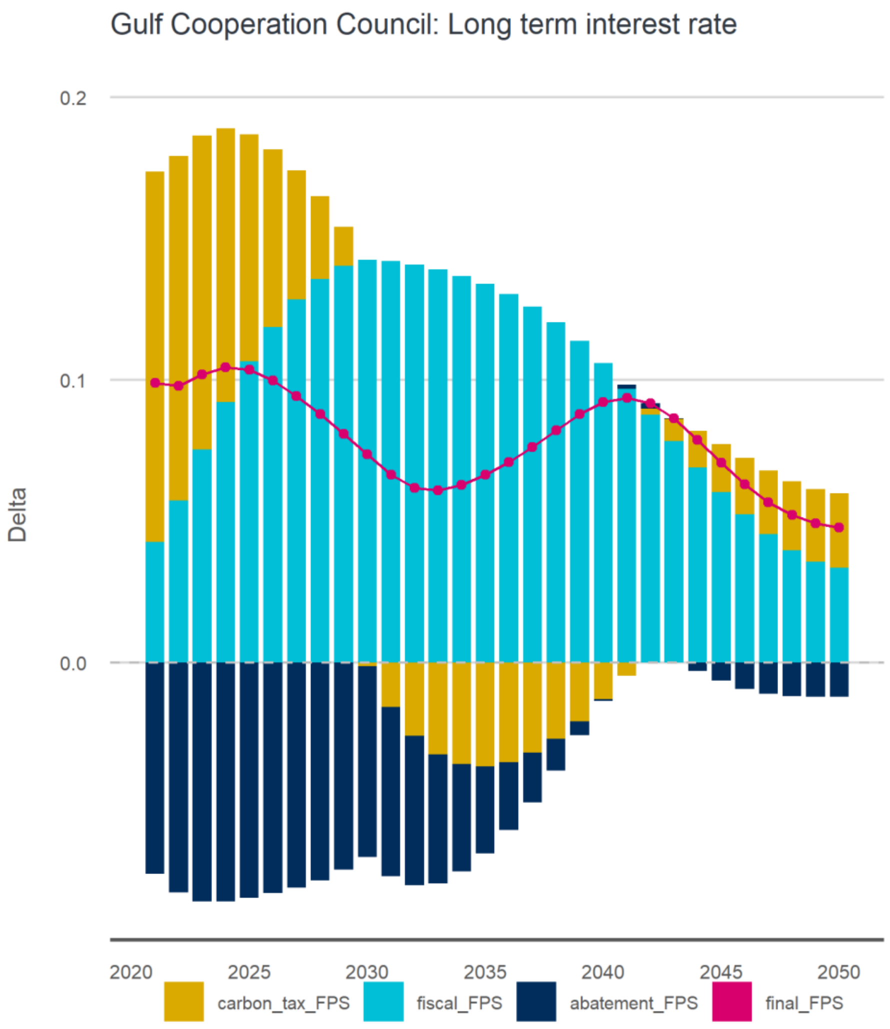




Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: Middle E. and N. Africa, Gulf CC.,

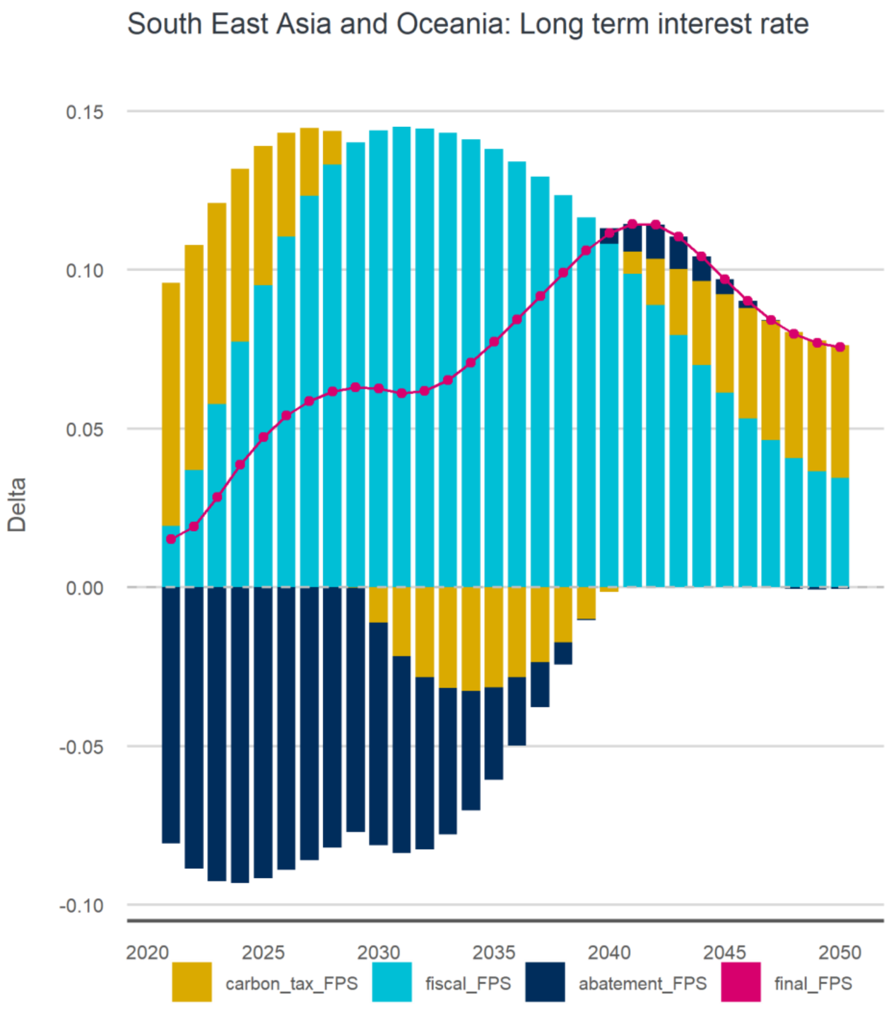


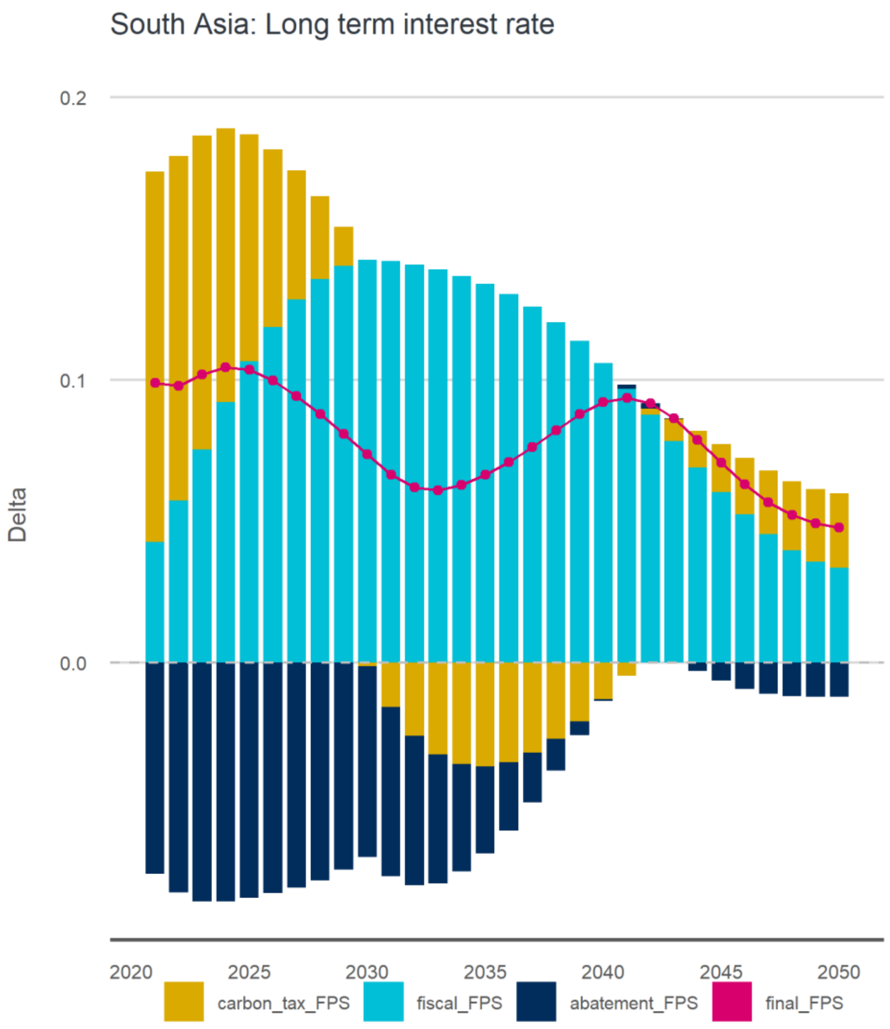


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: S.E. Asia and Oceania, S. Asia

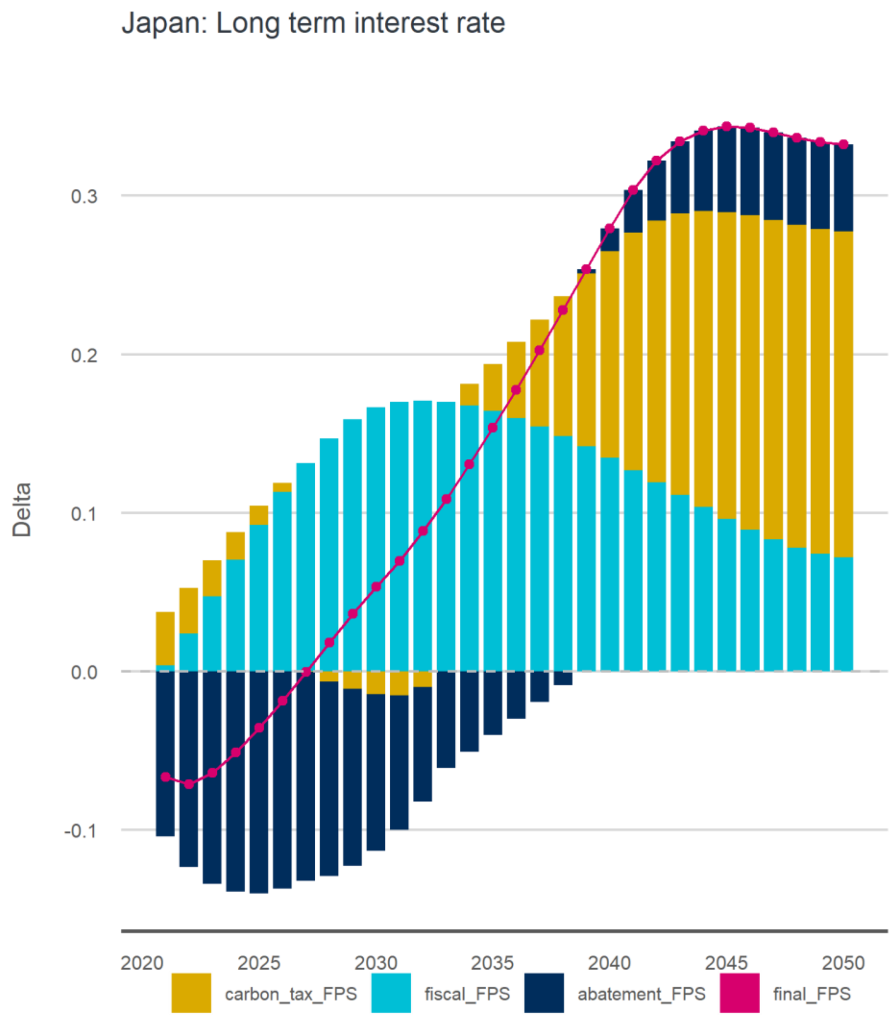


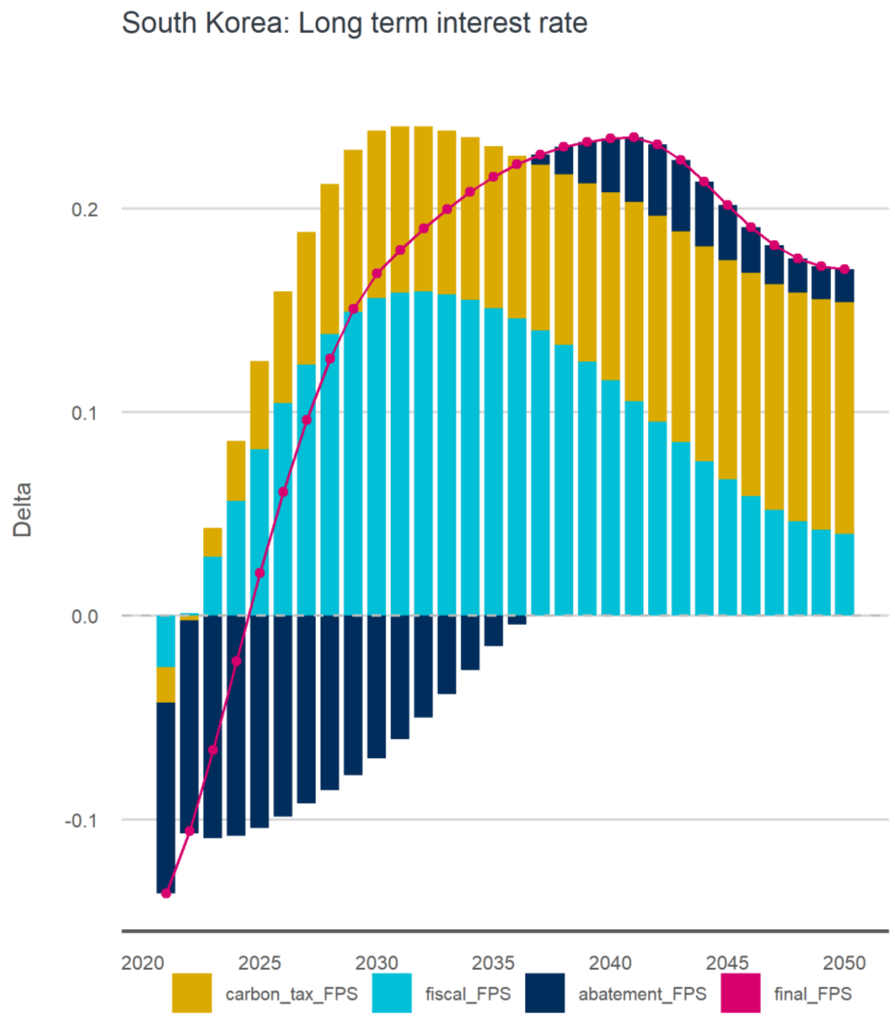


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: Japan, South Korea

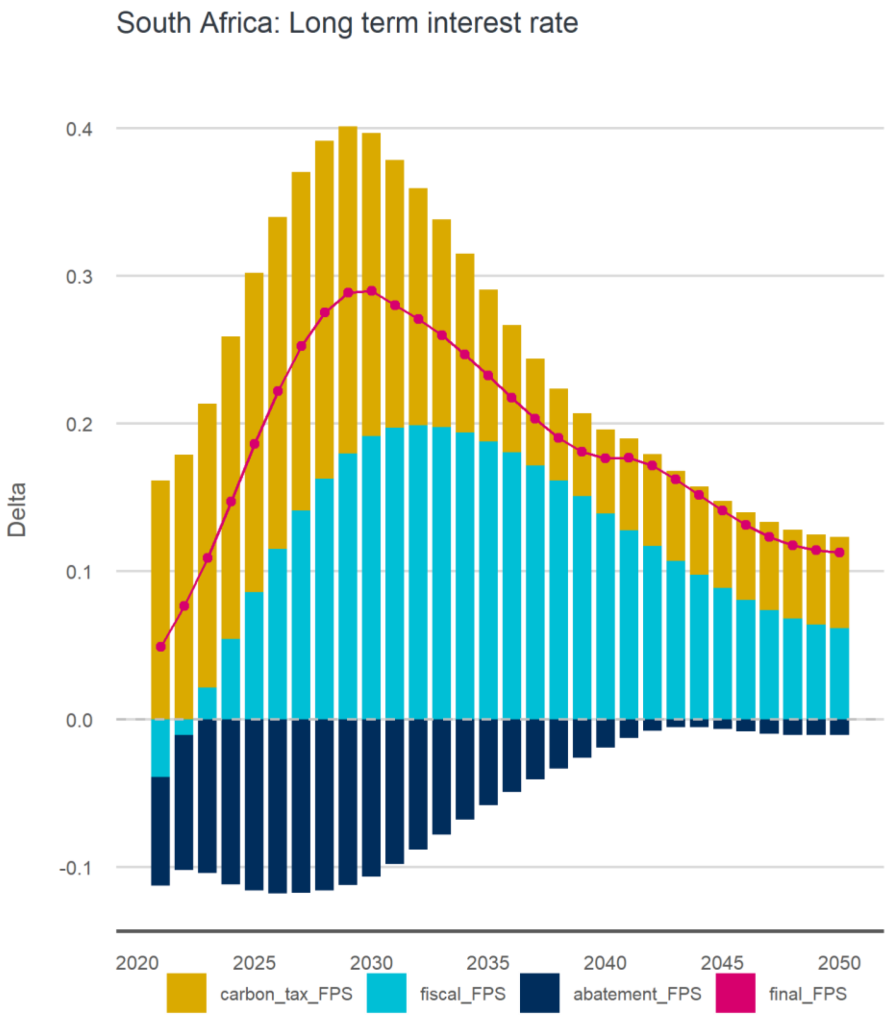


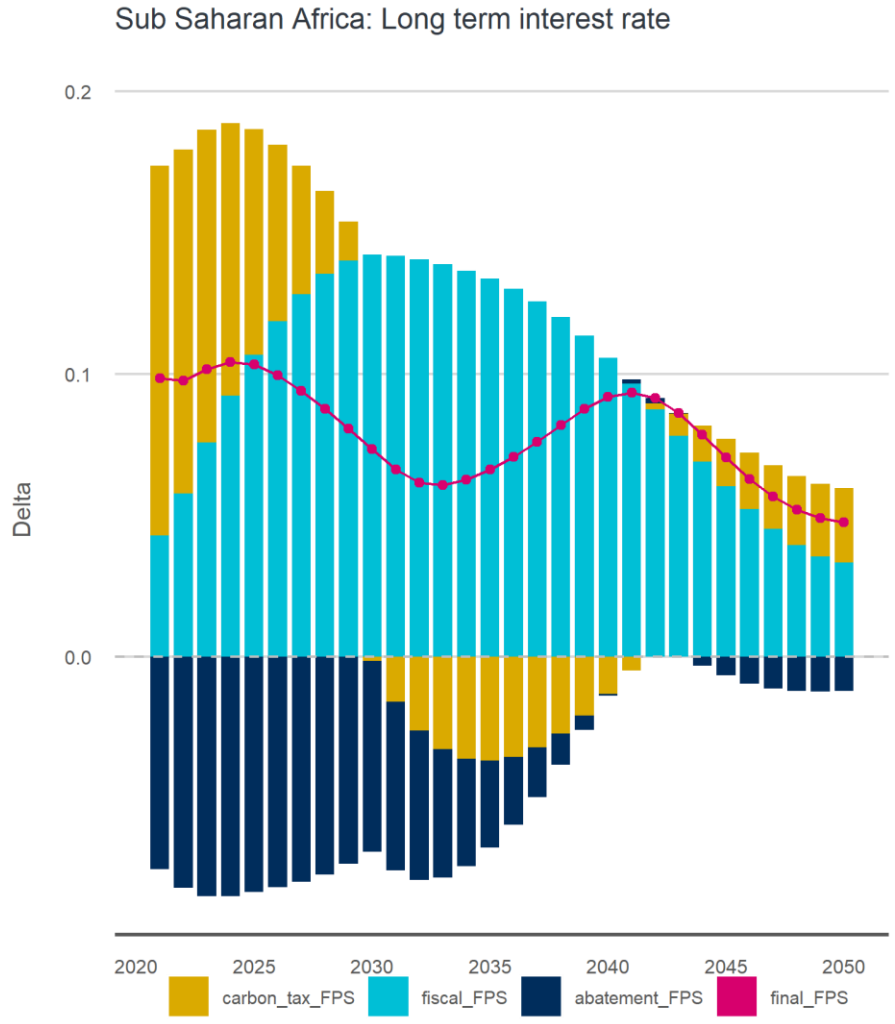


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Long term interest rate cumulative transitional impacts: South Africa, Sub Saharan Africa





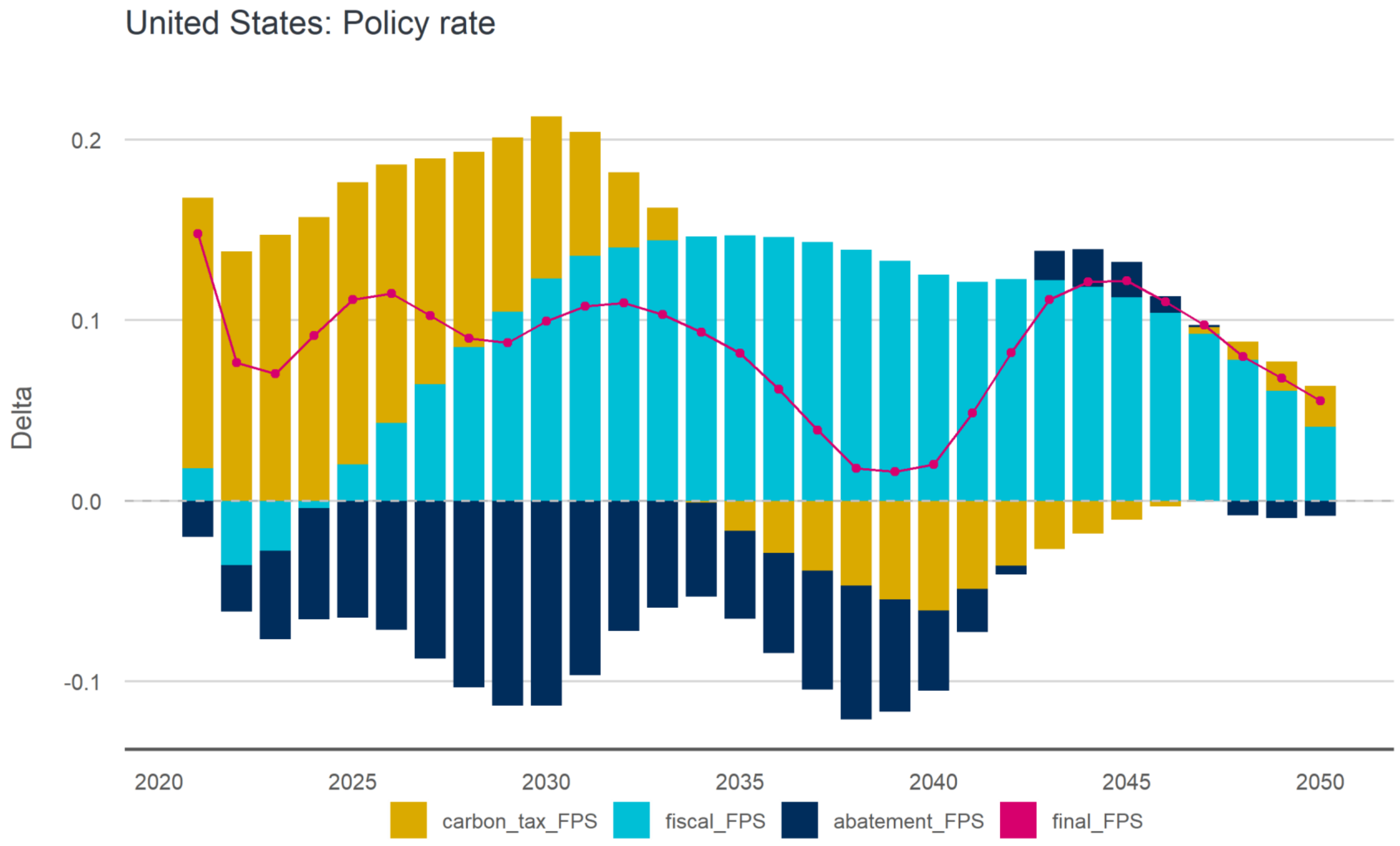
INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Appendix: Policy rates

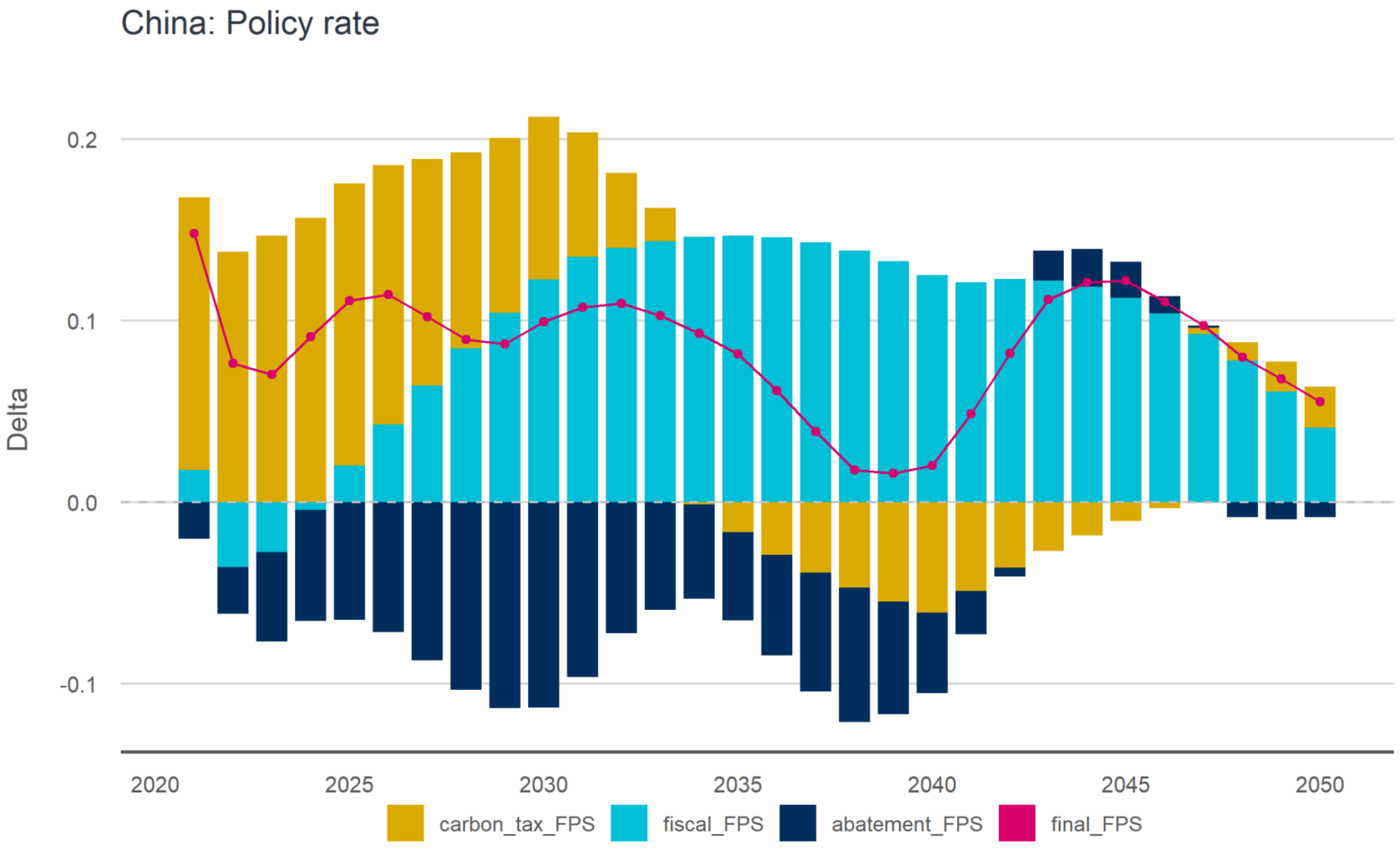
INEVITABLE
POLICY
RESPONSE

Policy rate cumulative transitional impacts: United States



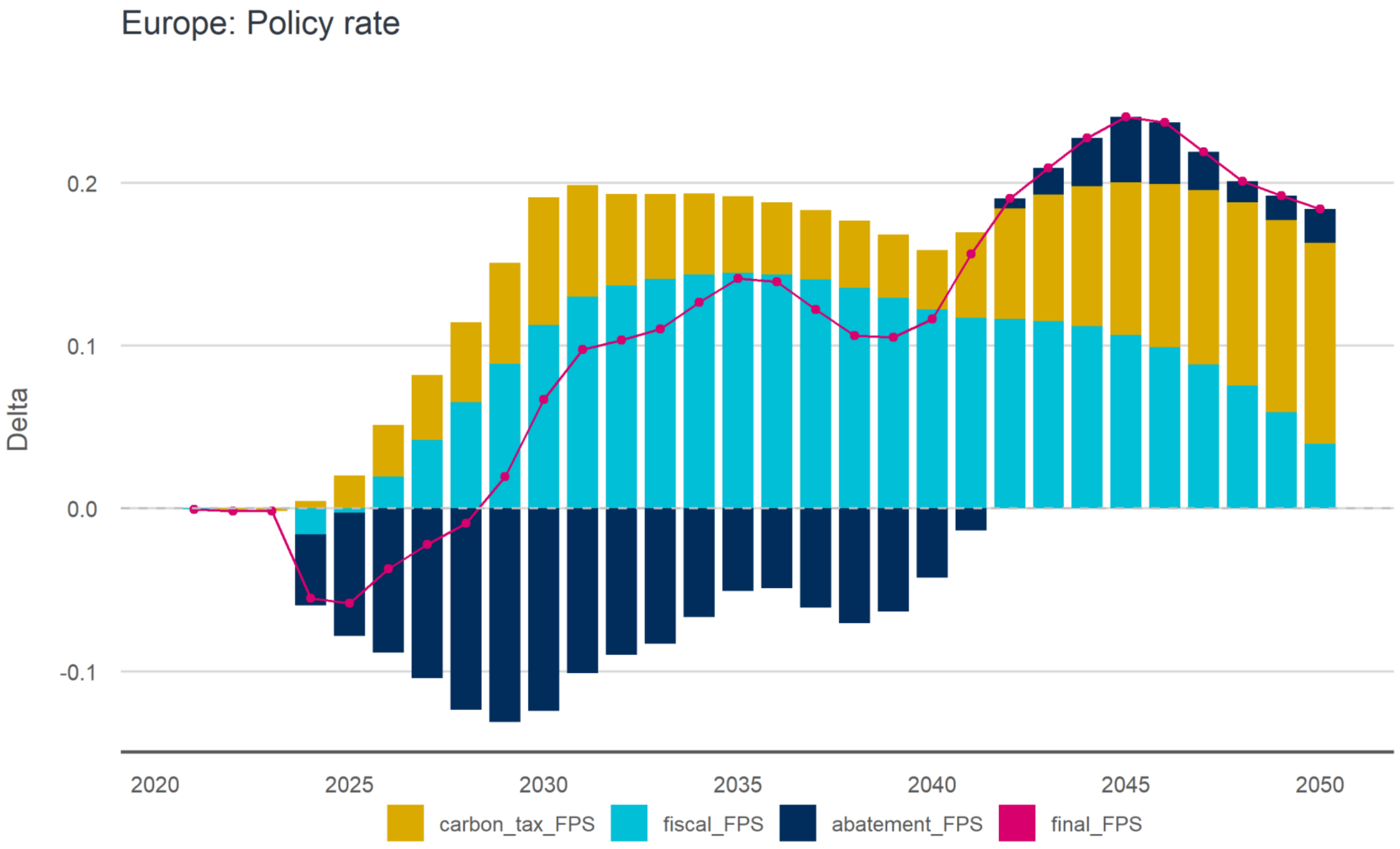
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: China



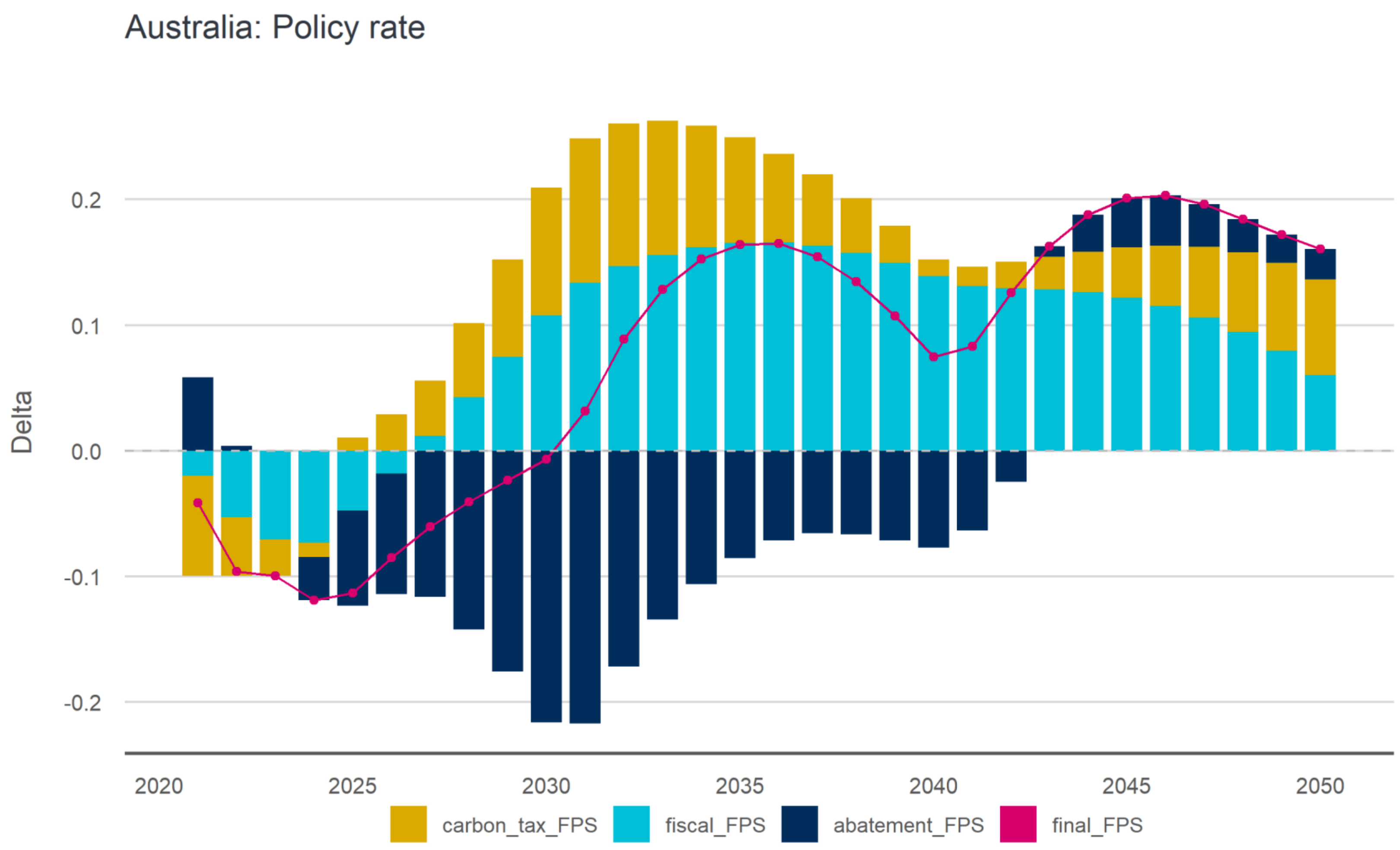
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: Europe



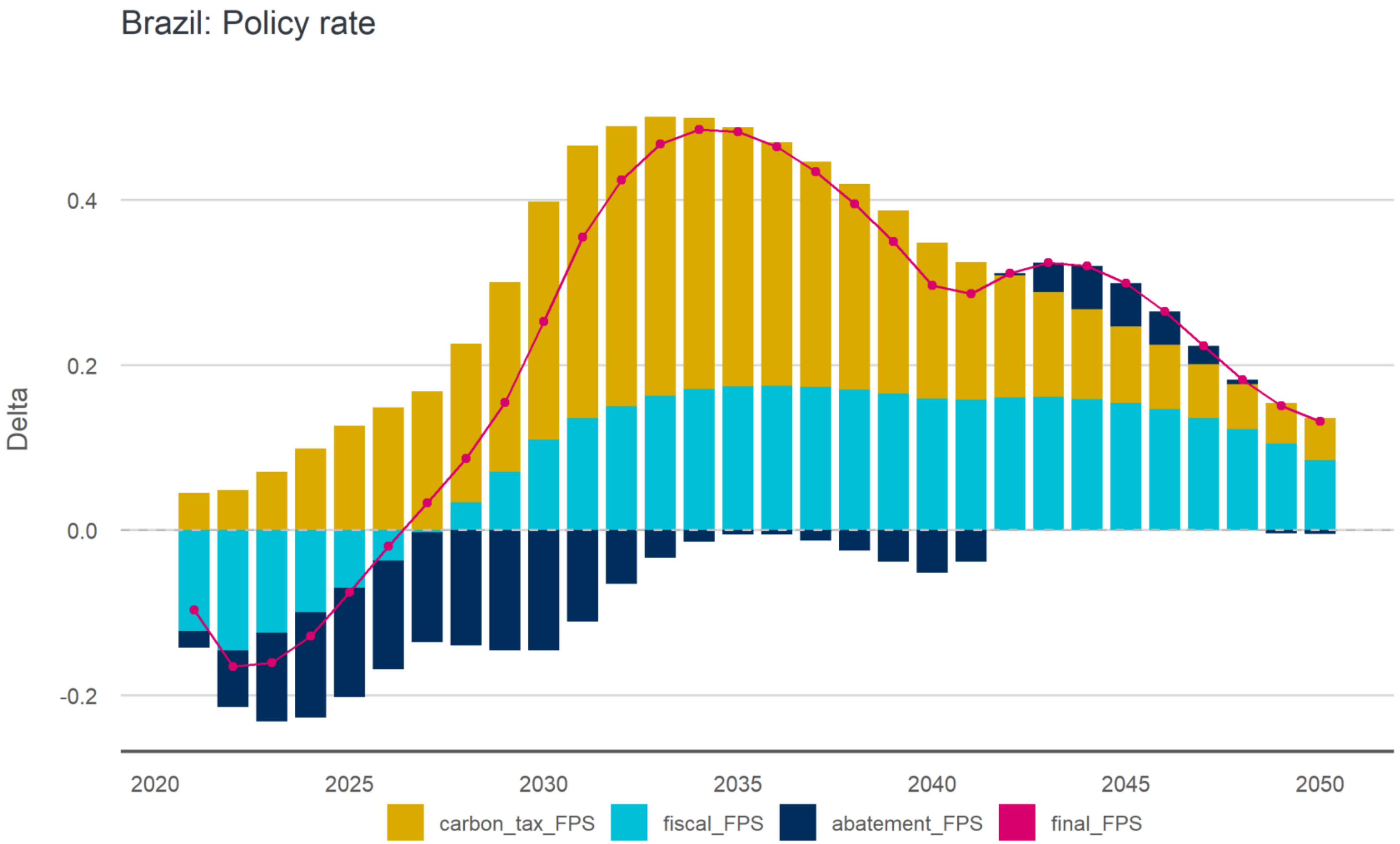
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: Australia



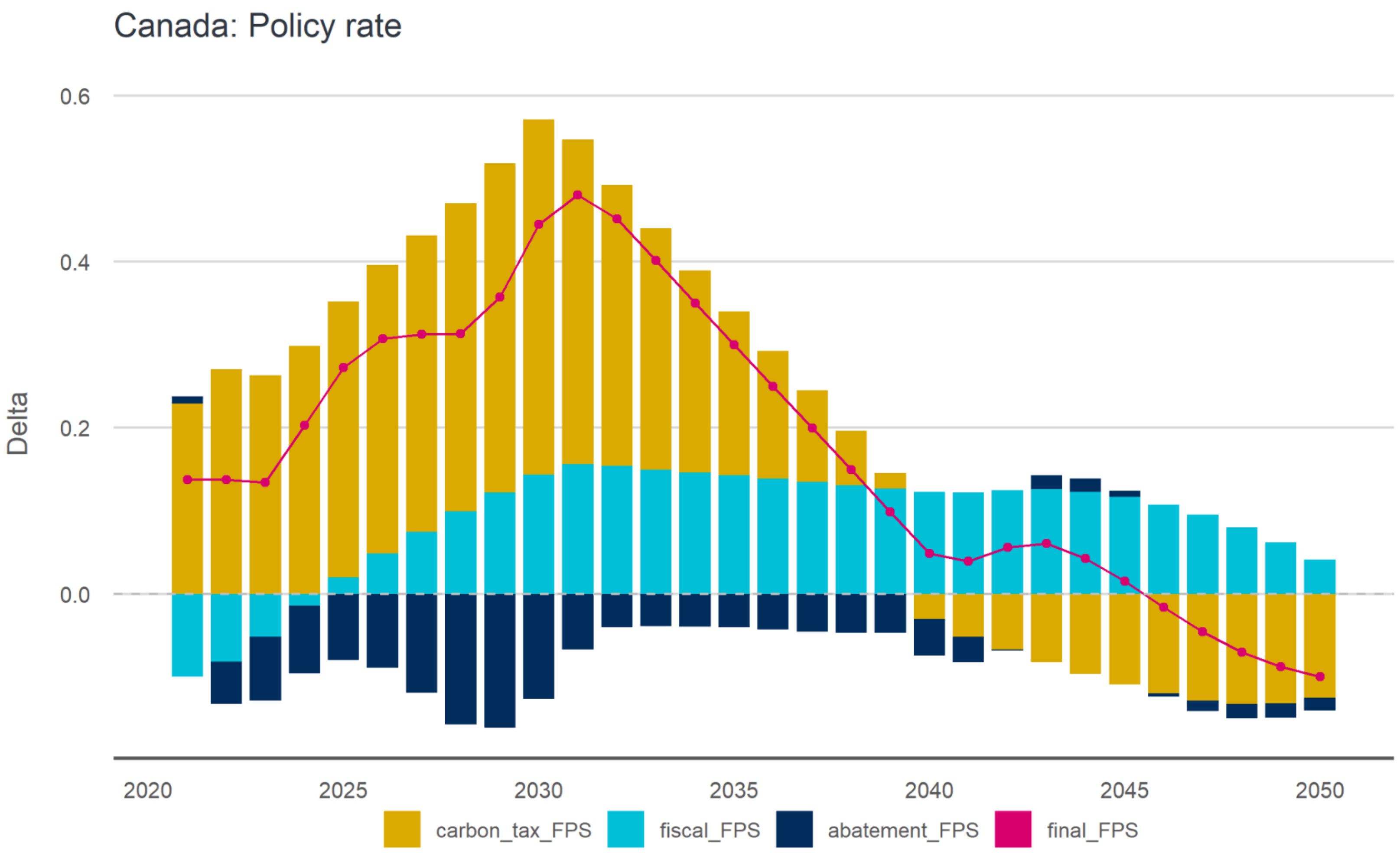
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: Brazil



Source: NIGEM based on Vivid Economics inputs

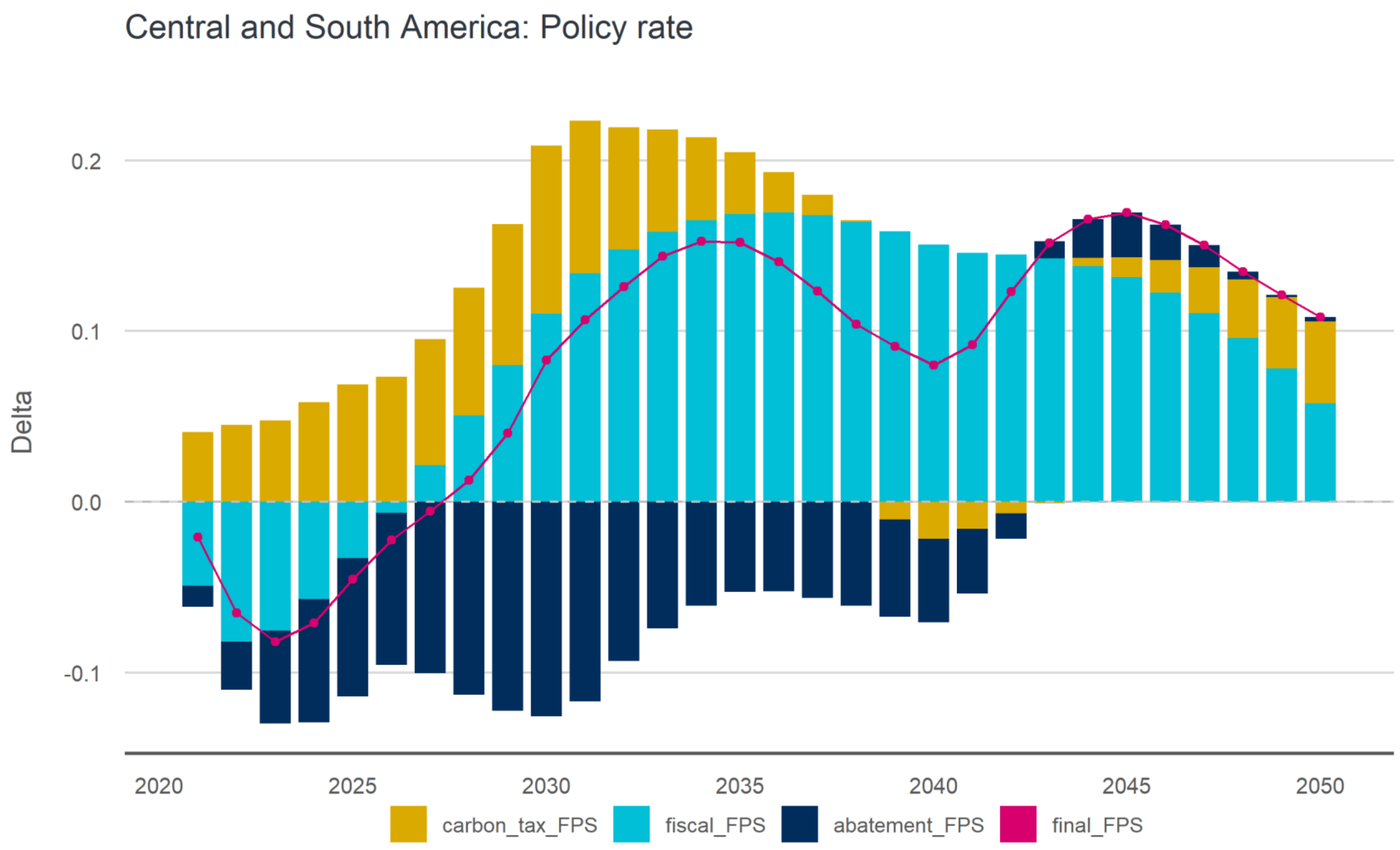
Policy rate cumulative transitional impacts: Canada



Source: NIGEM based on Vivid Economics inputs

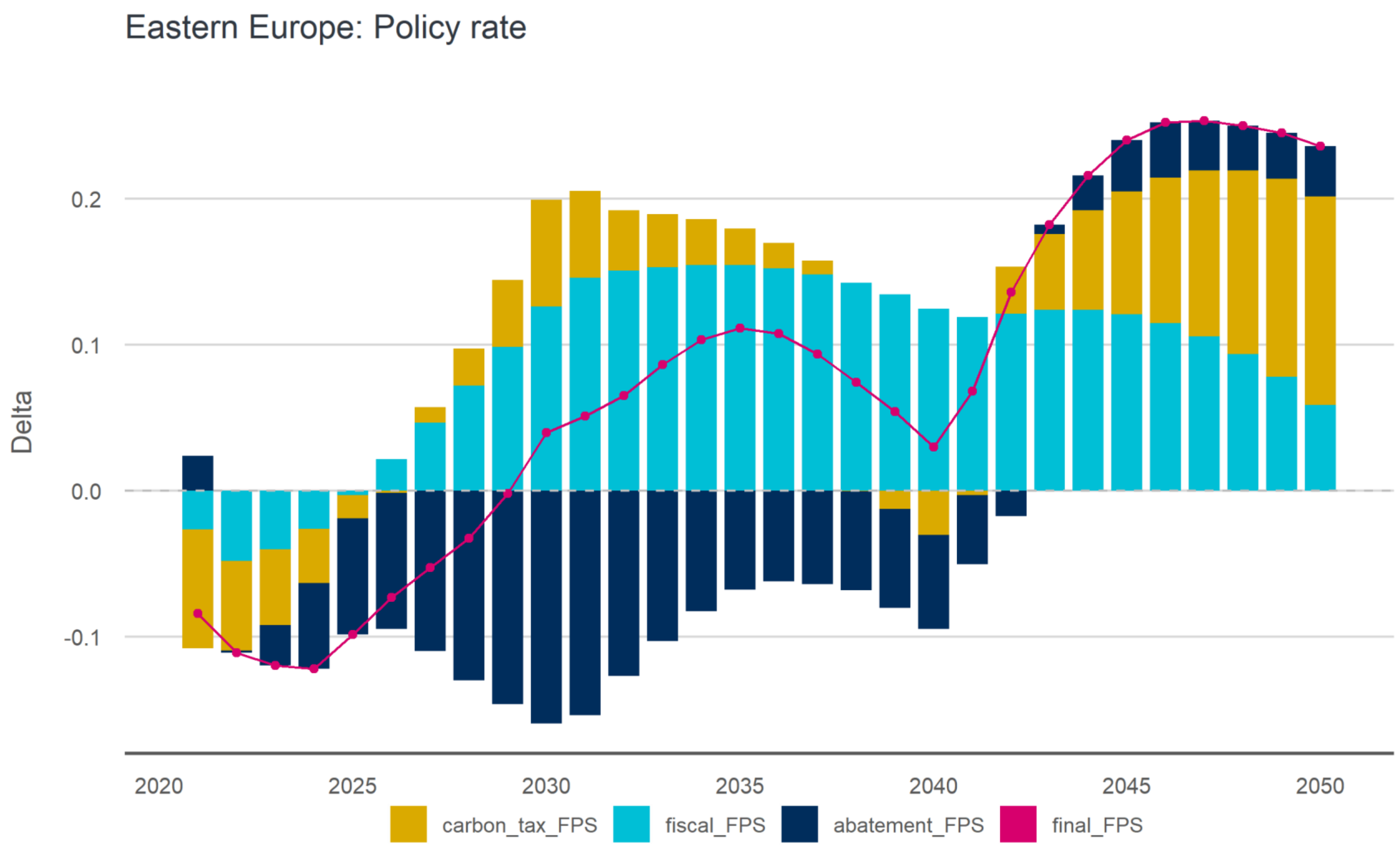
INEVITABLE POLICY RESPONSE

Policy rate cumulative transitional impacts: Central and South America



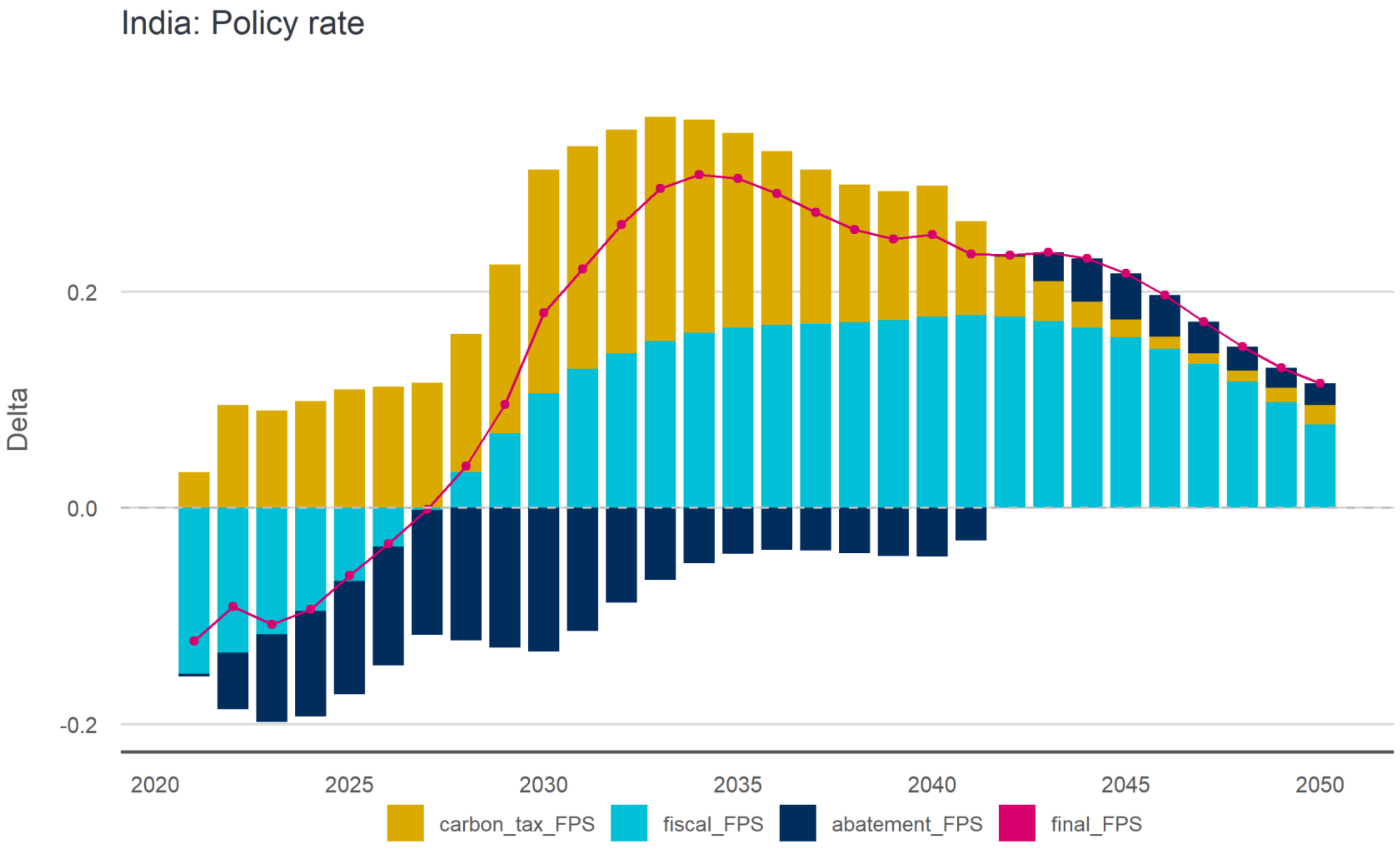
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: Eastern Europe



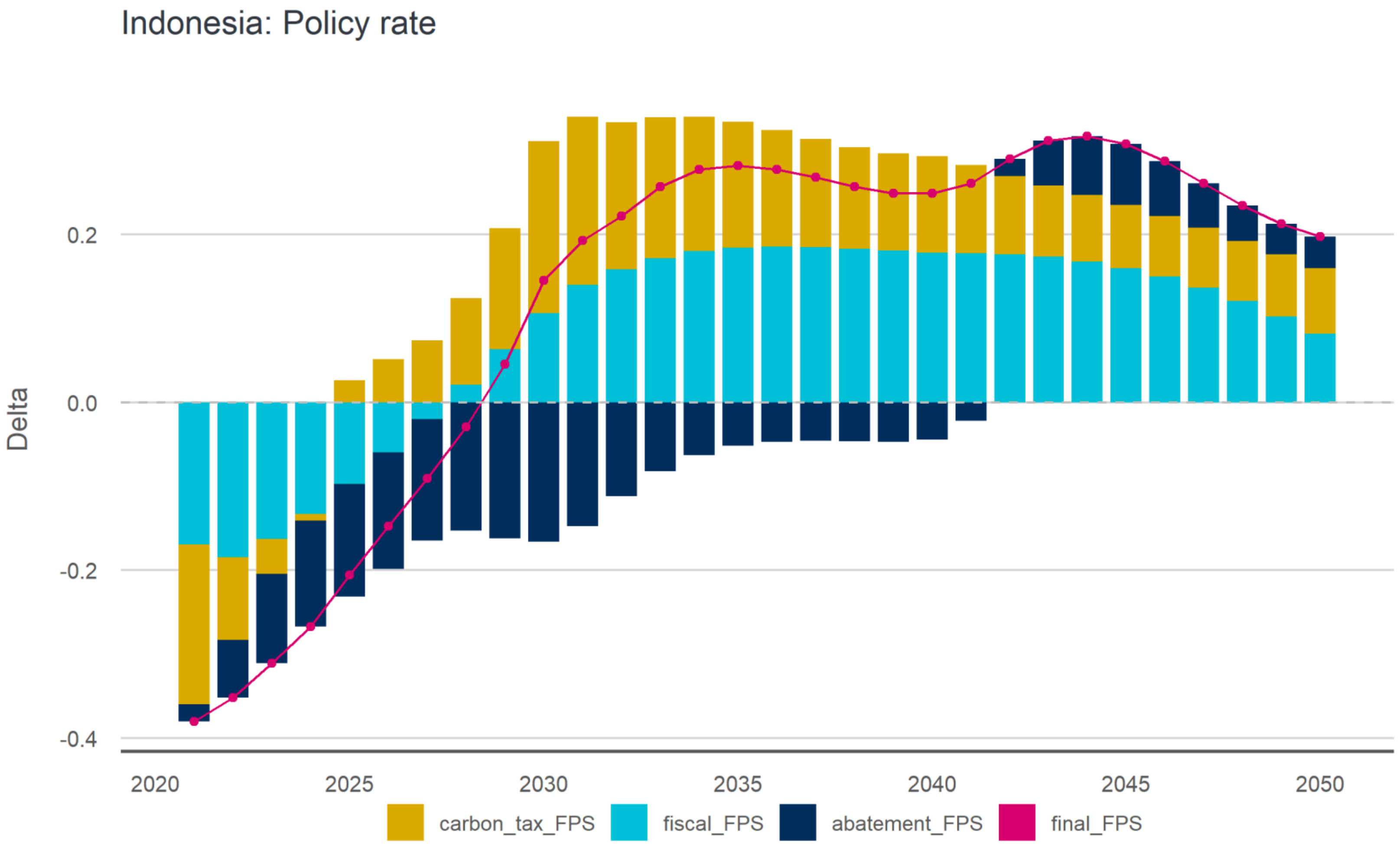
Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: India



Source: NIGEM based on Vivid Economics inputs

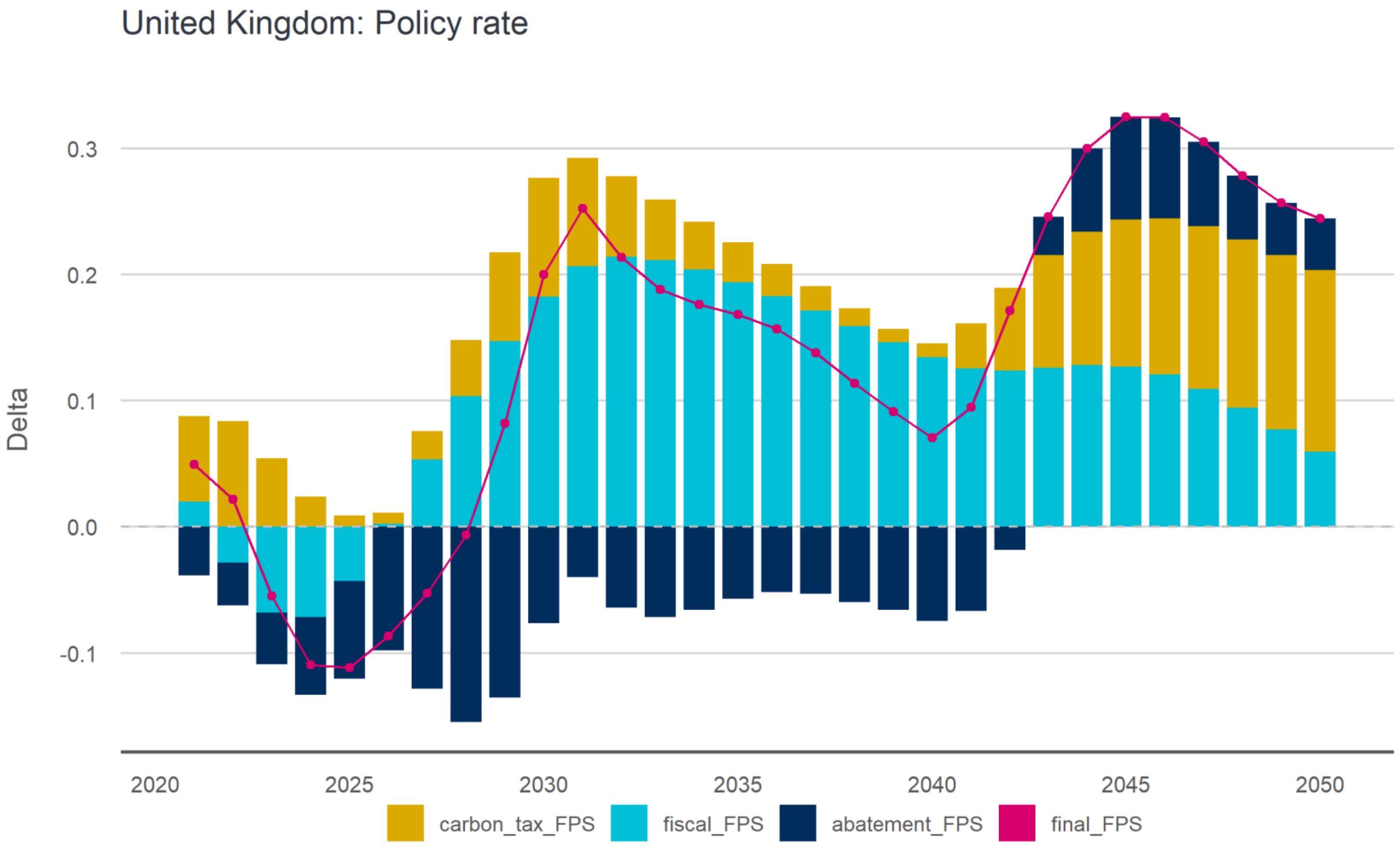
Policy rate cumulative transitional impacts: Indonesia



INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

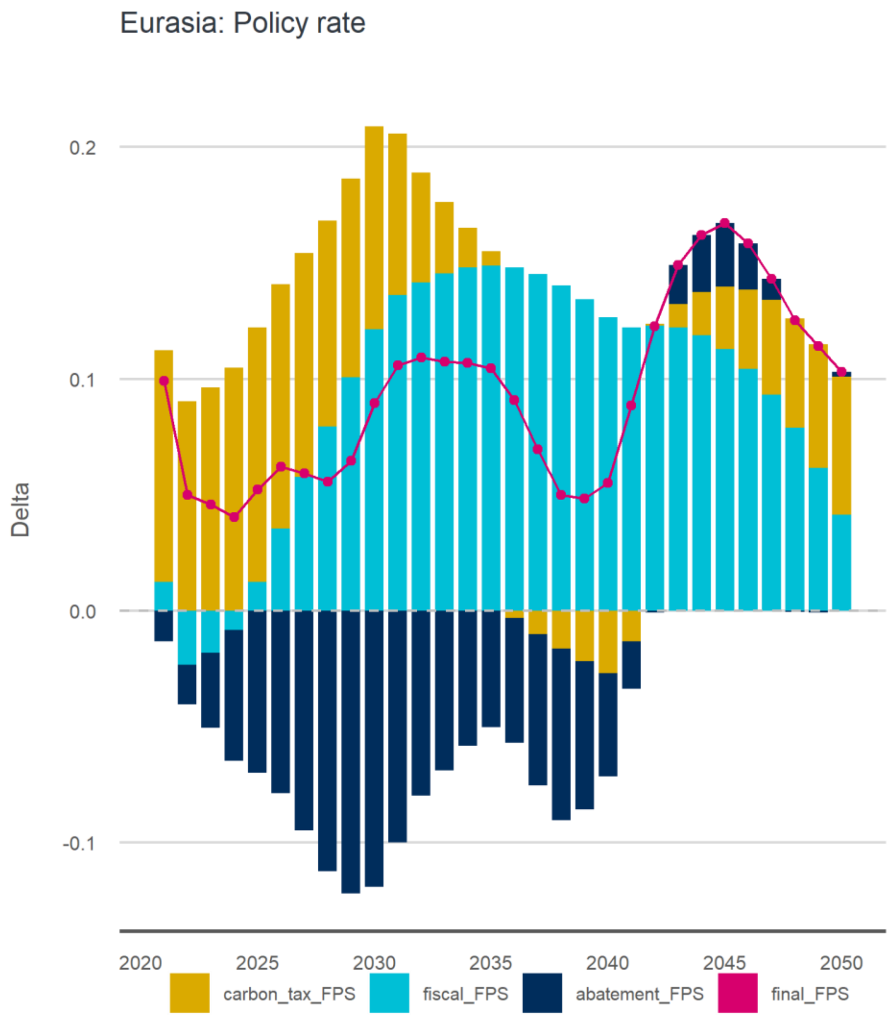
Policy rate cumulative transitional impacts: United Kingdom

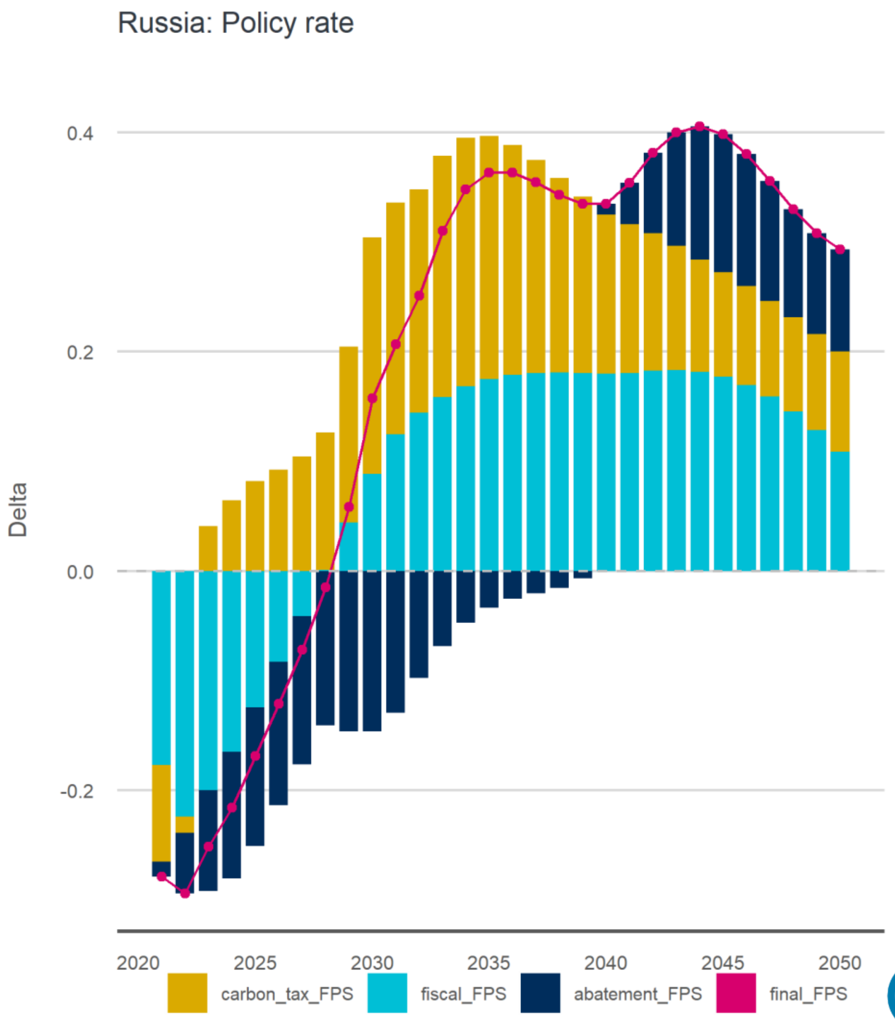


Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Central bank intervention rate impact: Eurasia, Russia

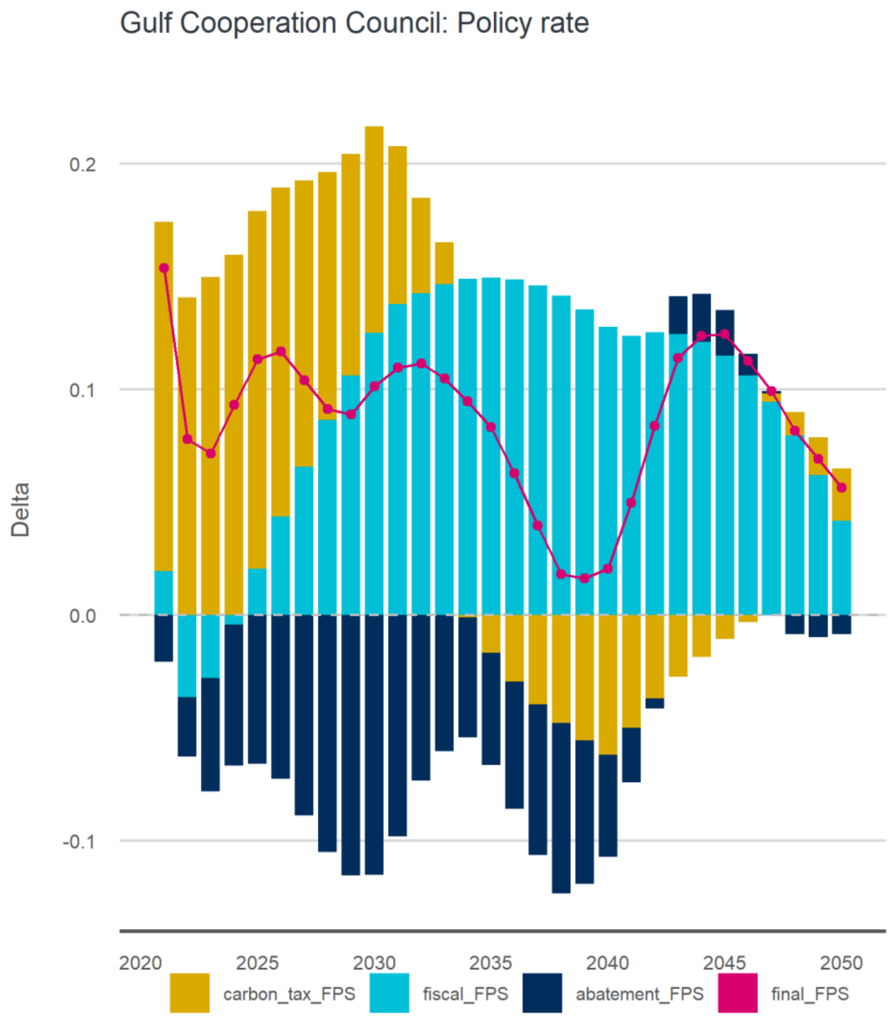


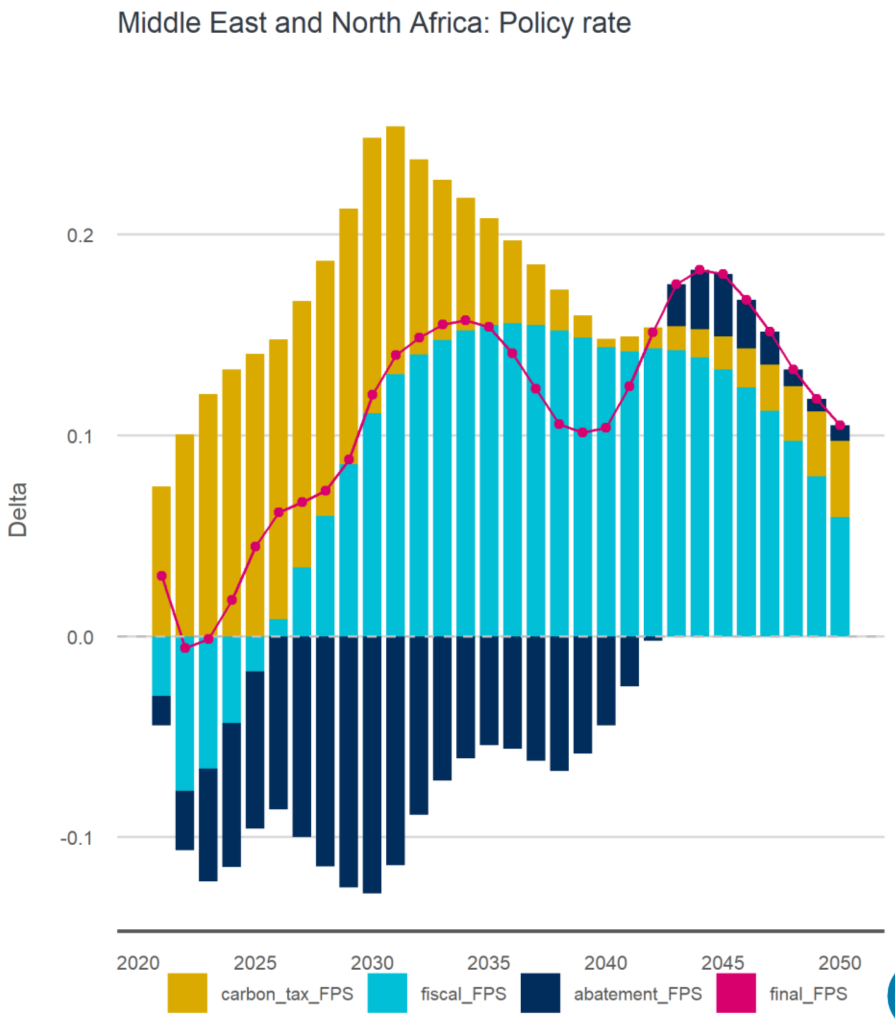


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts : Gulf Cooperation Council, Middle East and N.A

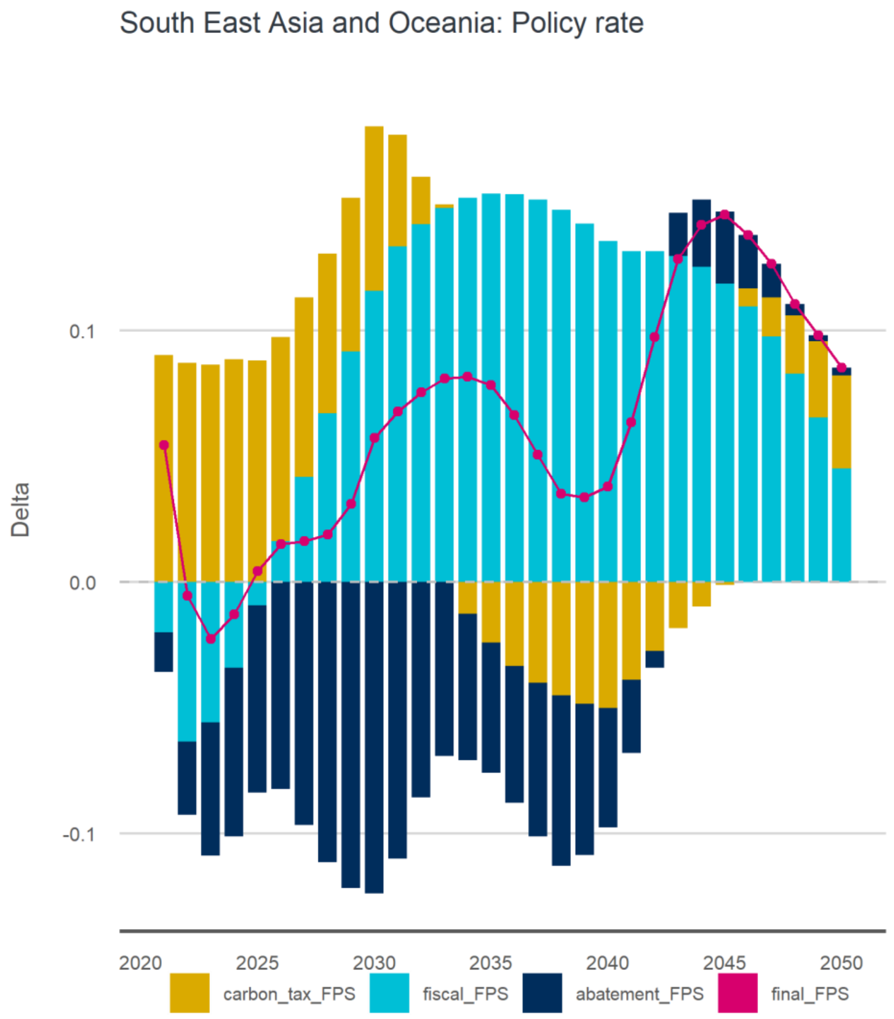


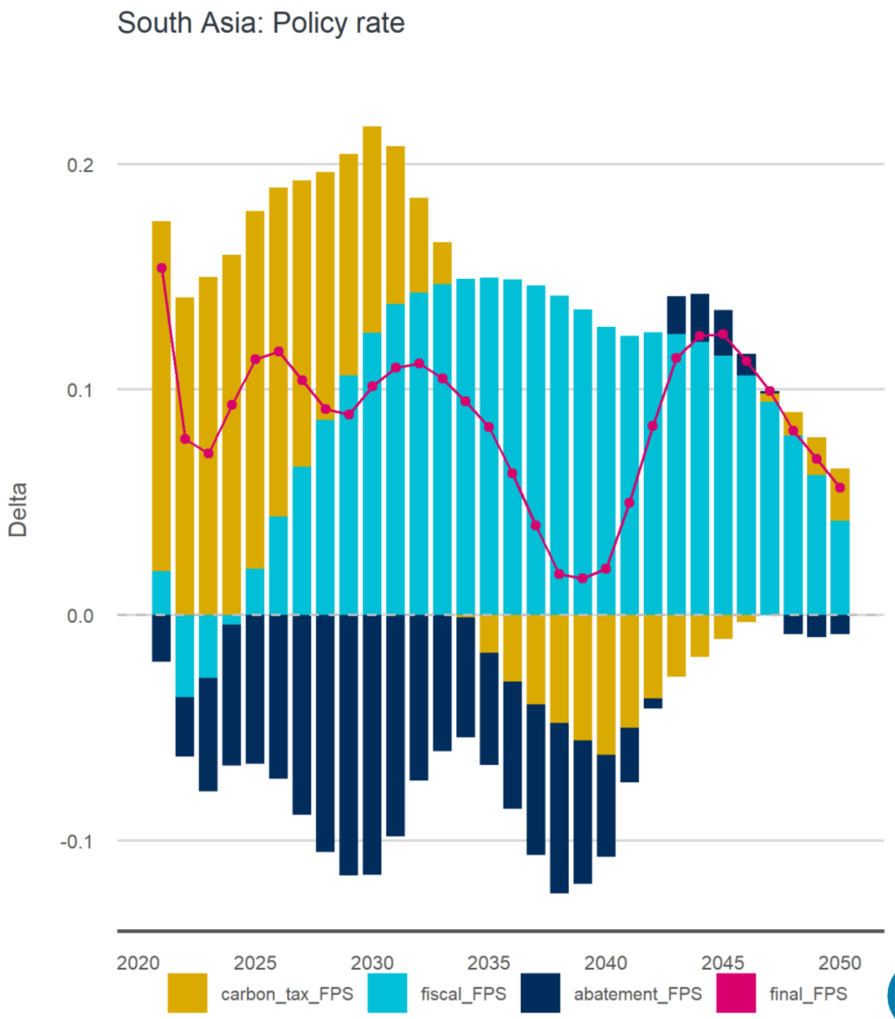


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: South East Asia and Oceania, South Asia

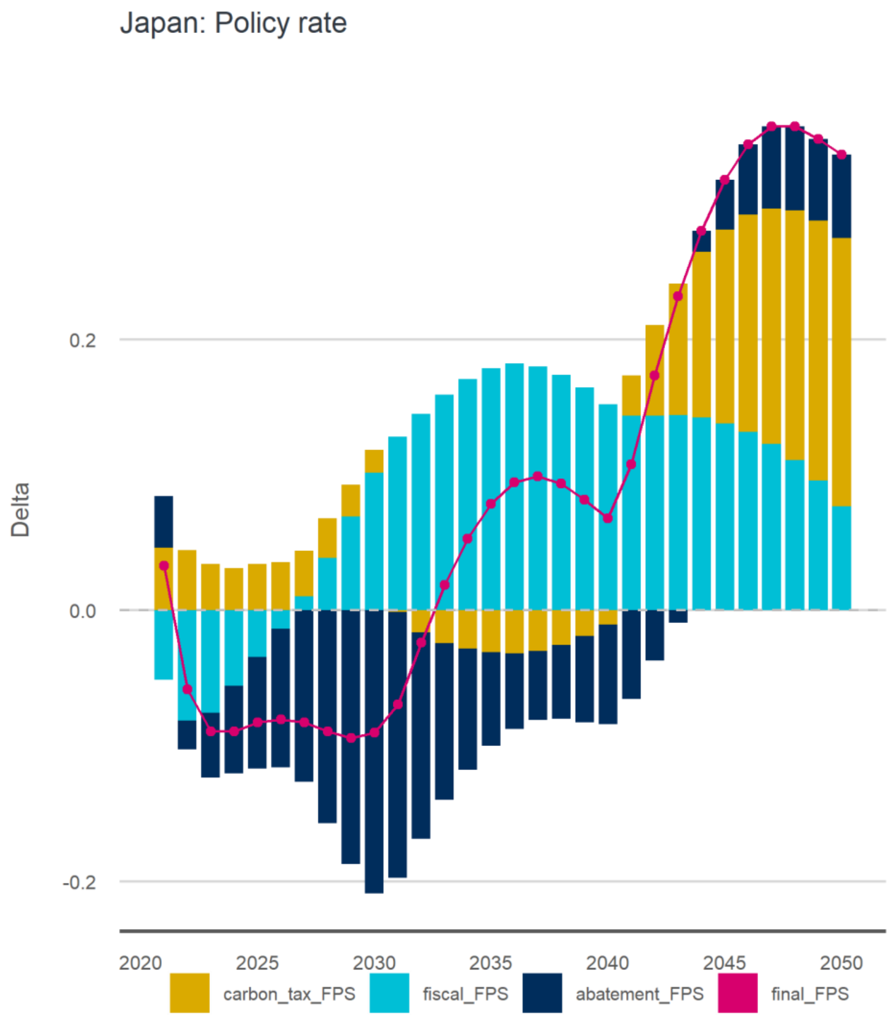


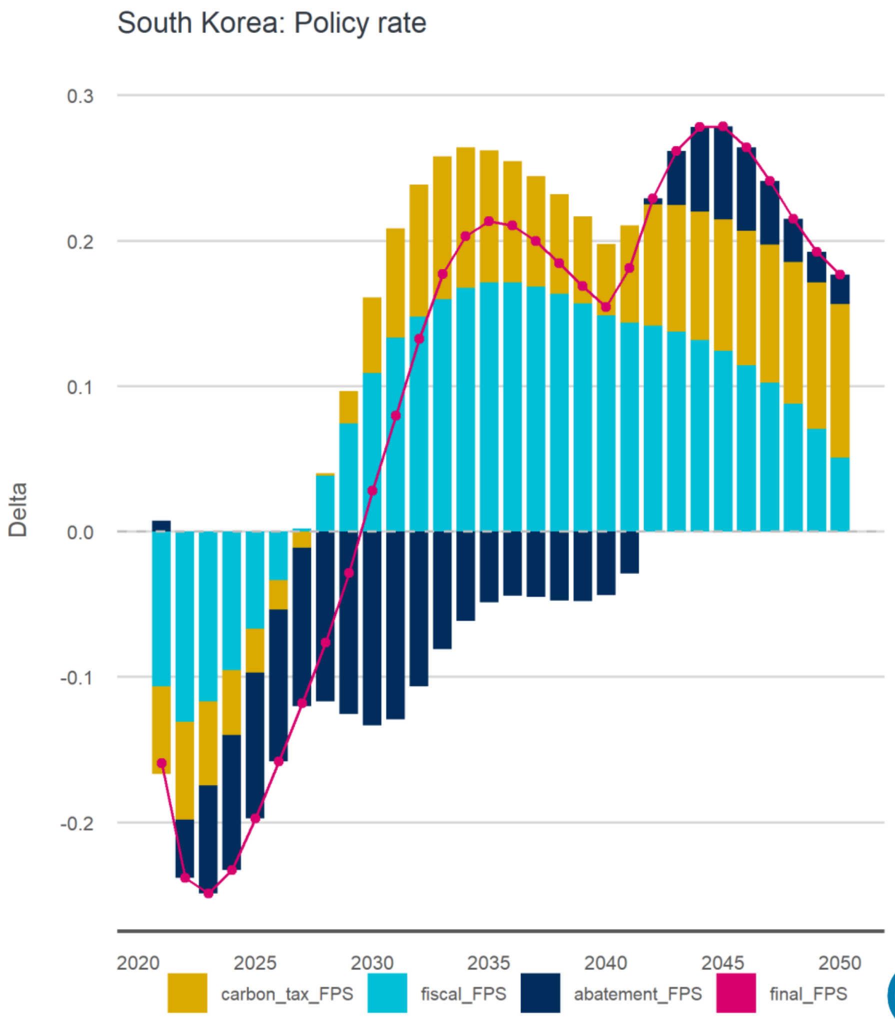


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: Japan, South Korea

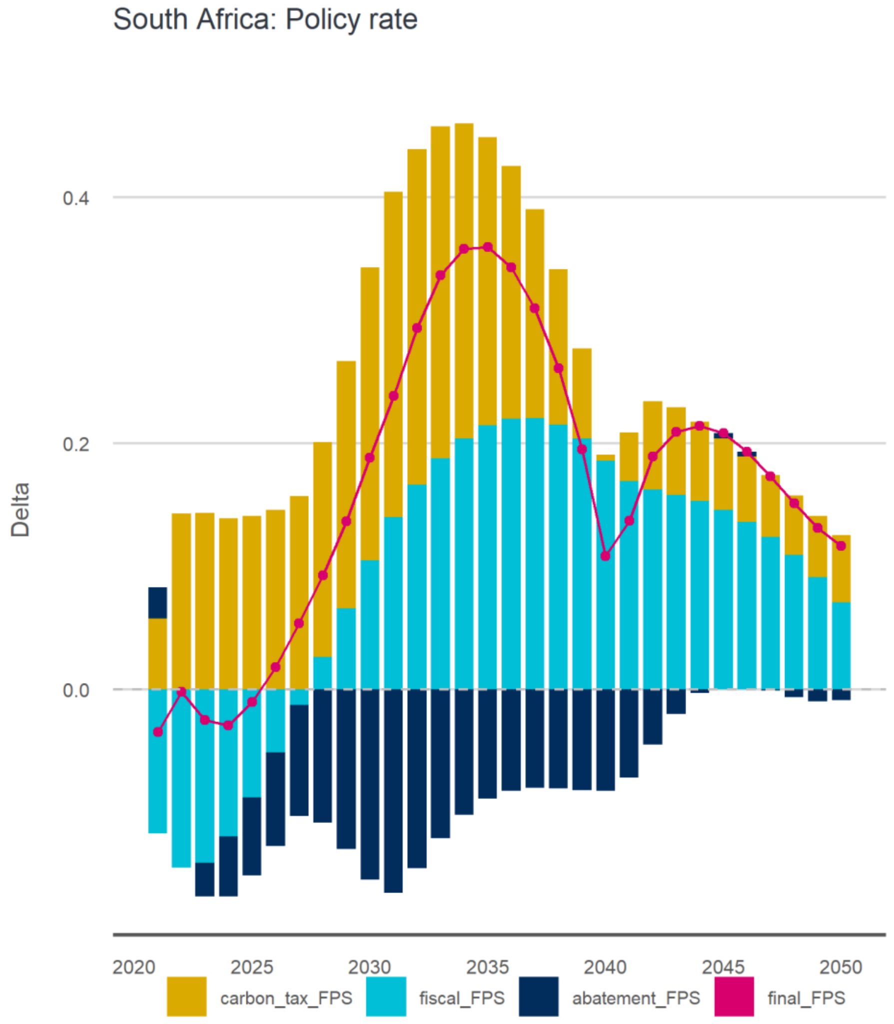


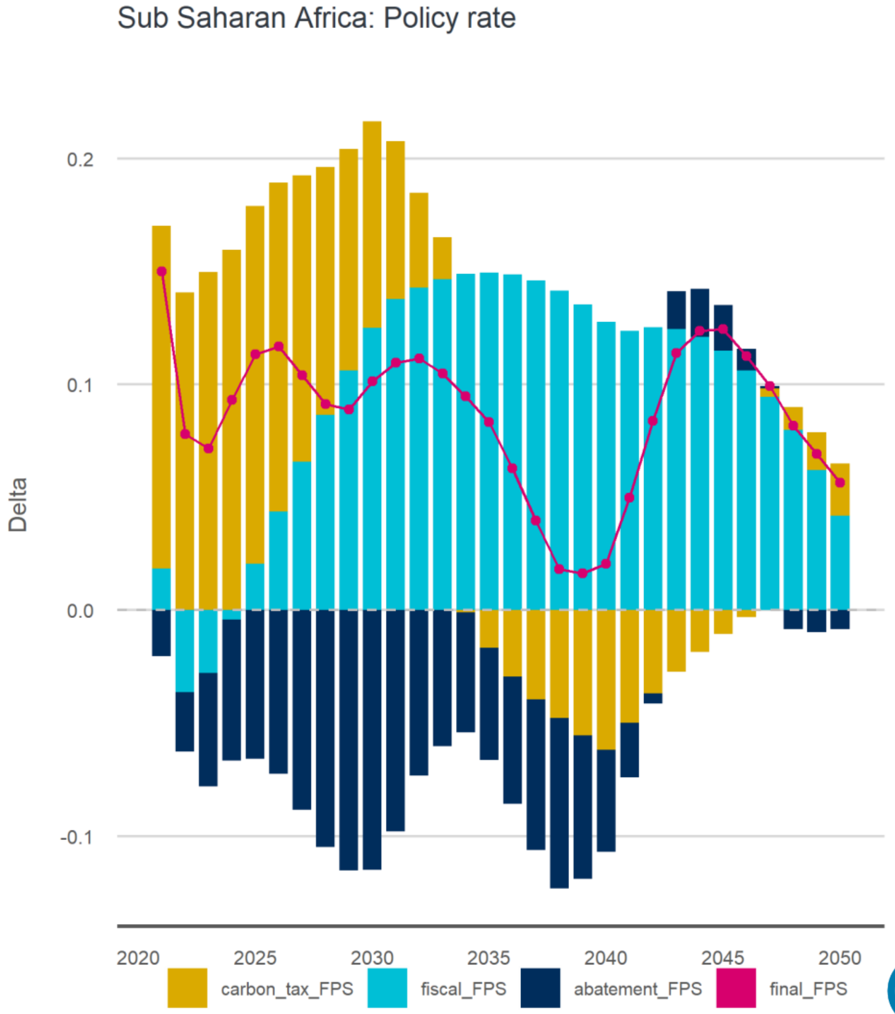


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

Policy rate cumulative transitional impacts: South Africa, Sub Saharan Africa



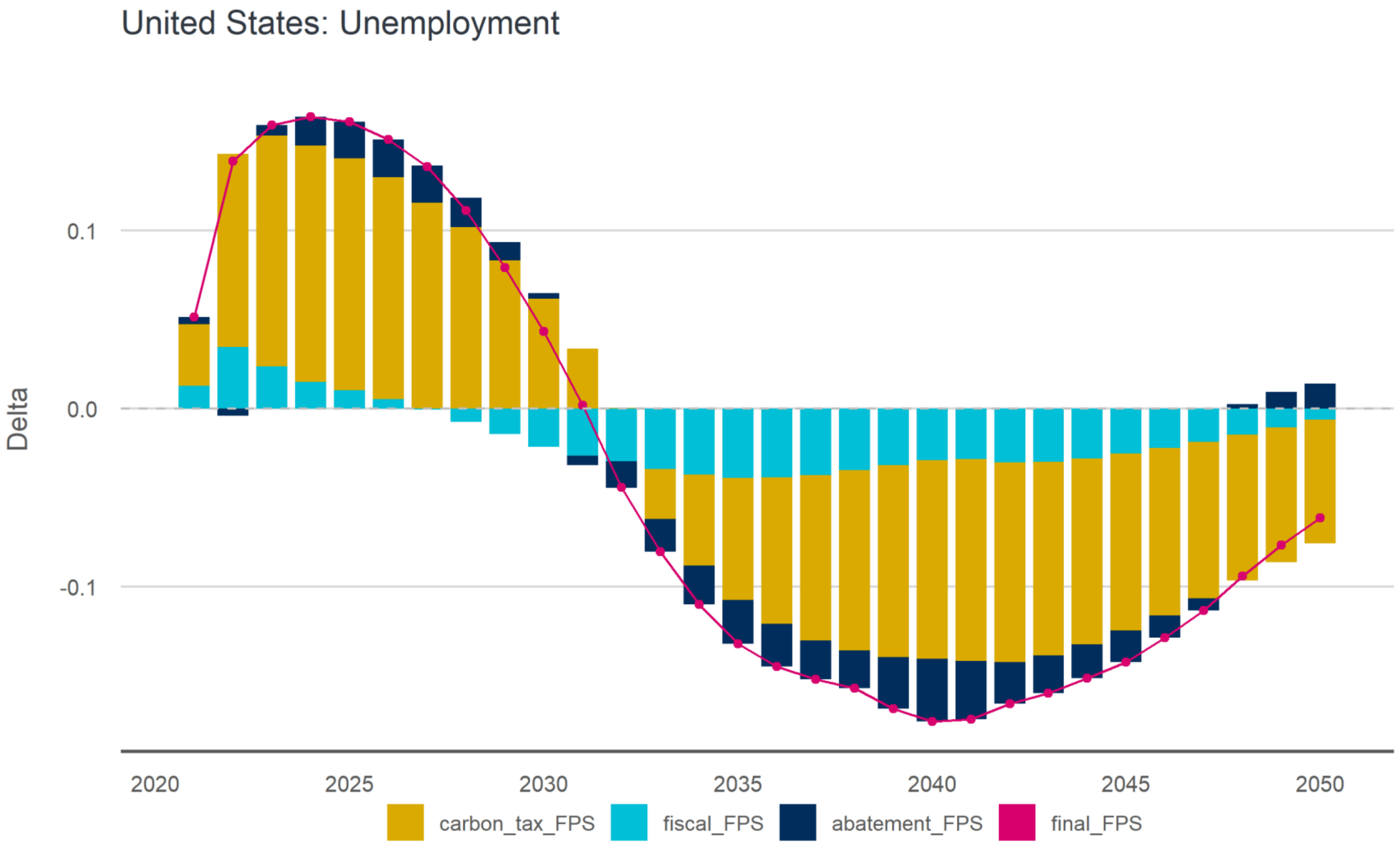


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

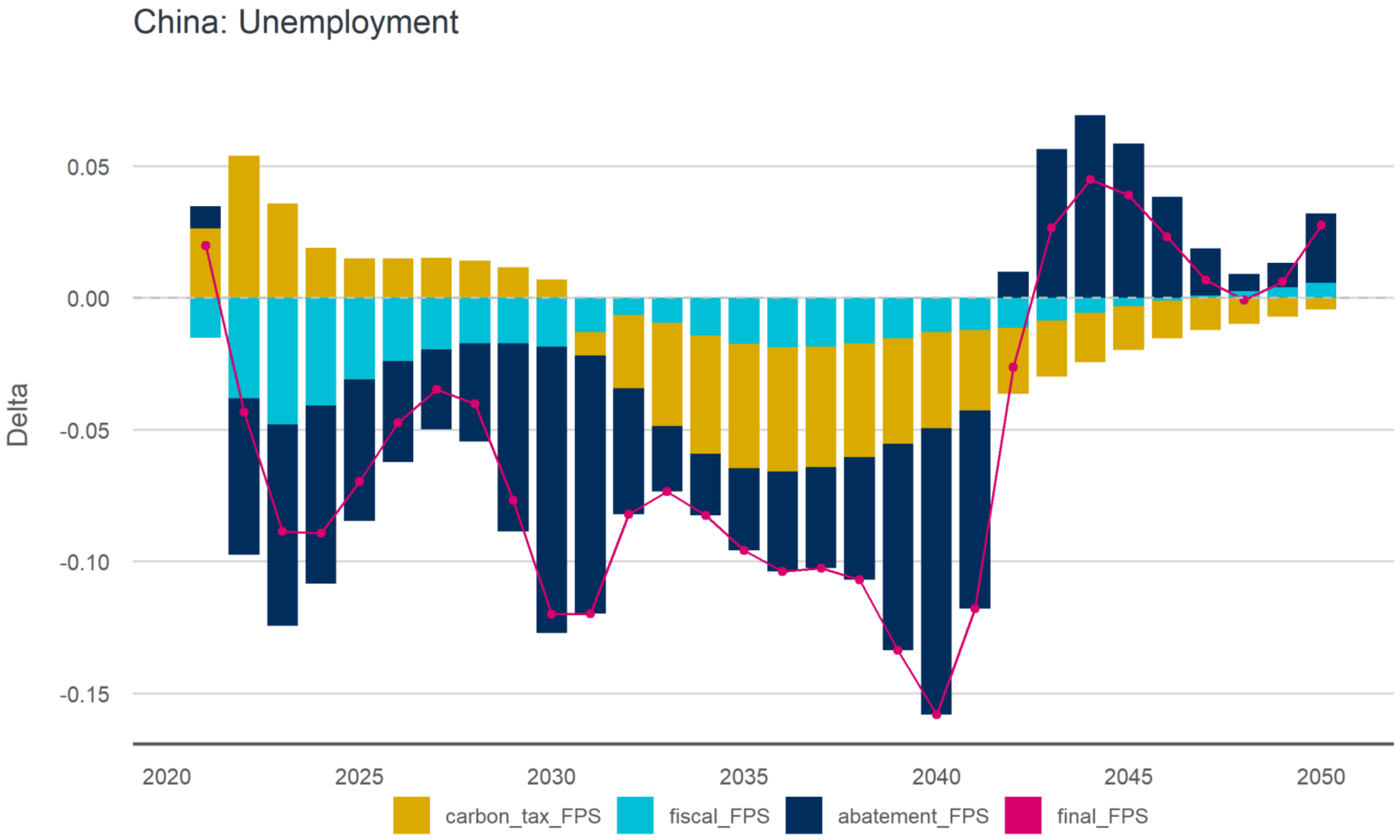
The Inevitable Policy Response: FPS scenario – Appendix: Unemployment rate

Unemployment rate cumulative transitional impacts: United States



Source: NIGEM based on Vivid Economics inputs

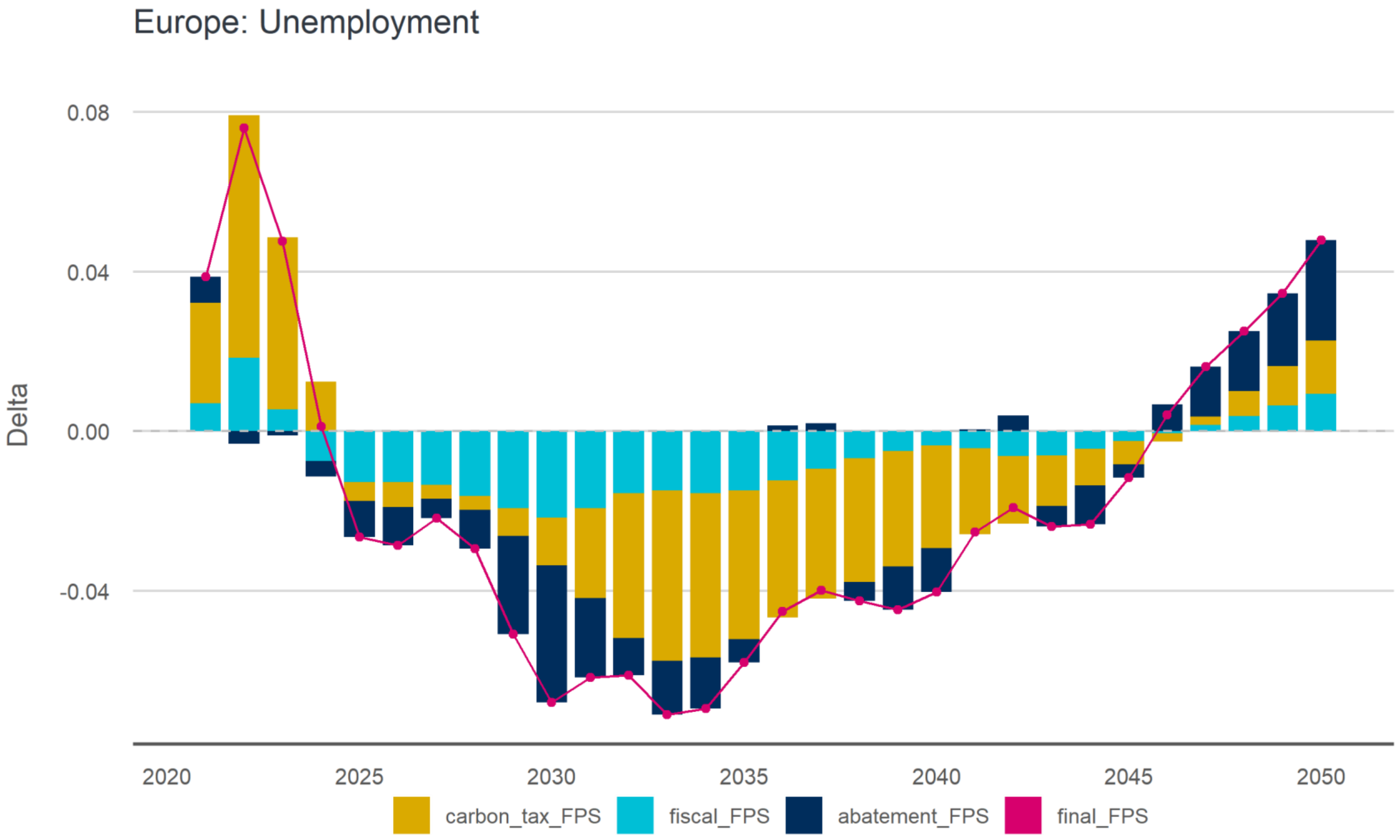
Unemployment rate cumulative transitional impacts: China



INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

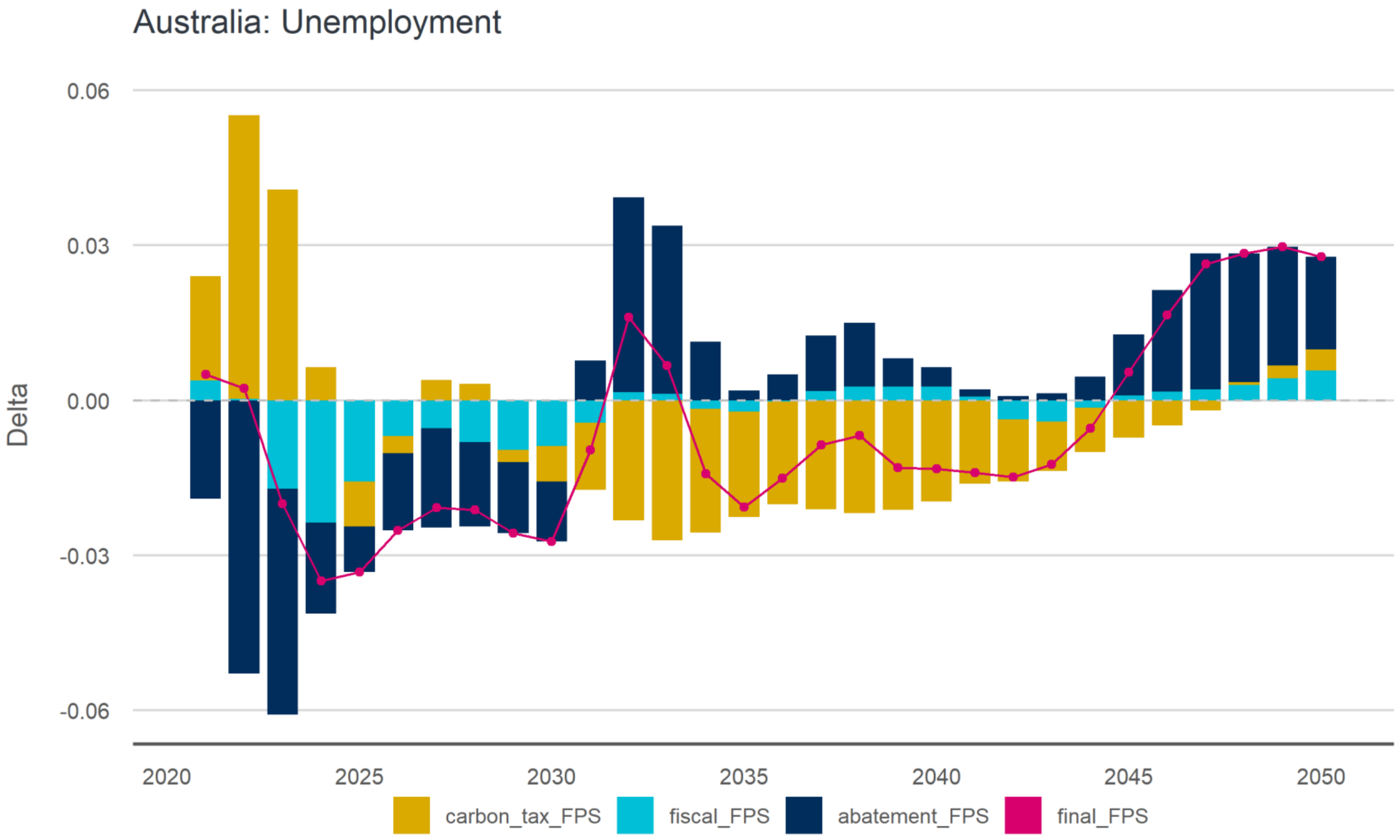
Unemployment rate cumulative transitional impacts: Europe



Source: NIGEM based on Vivid Economics inputs

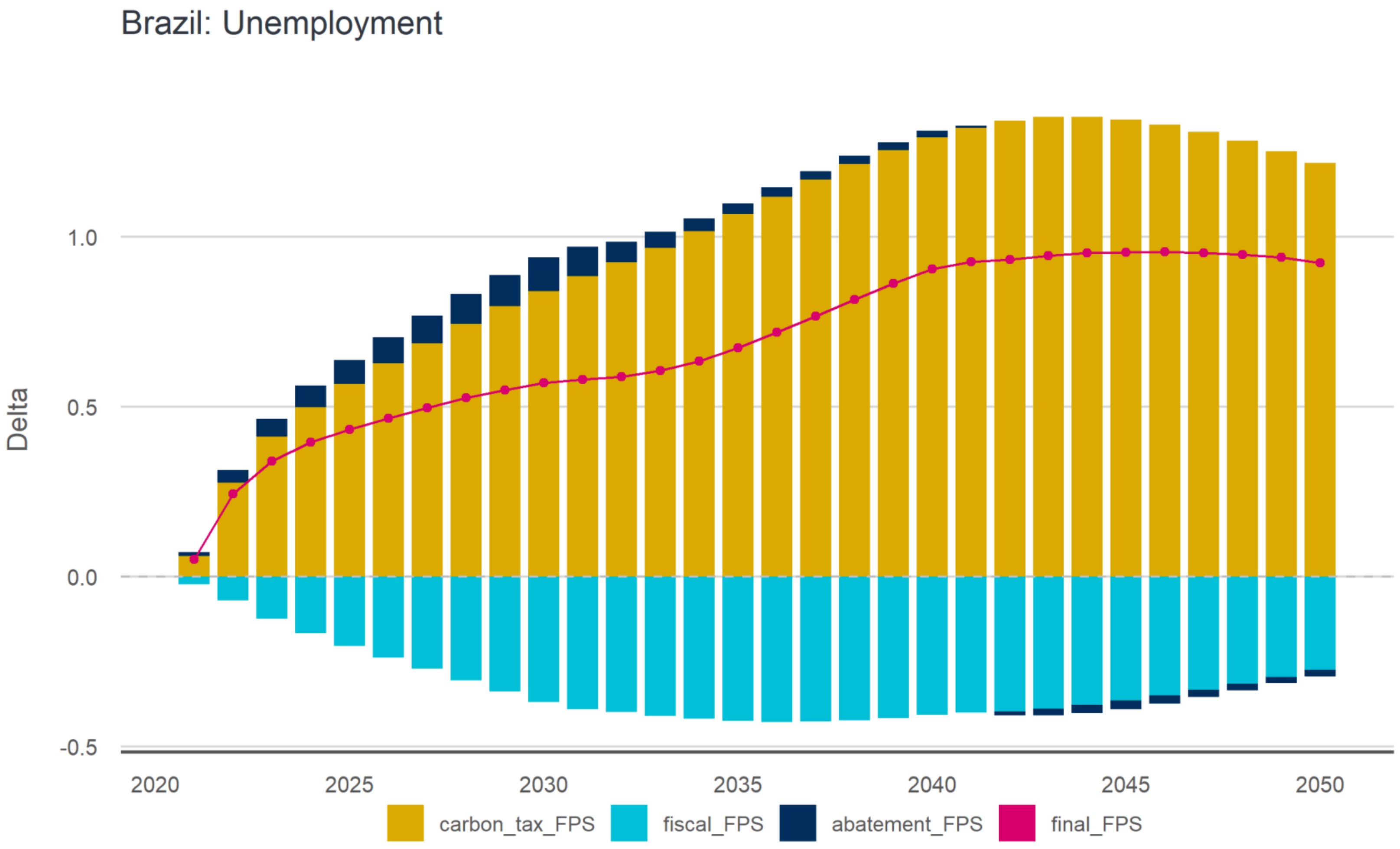
INEVITABLE POLICY RESPONSE

Unemployment rate cumulative transitional impacts: Australia



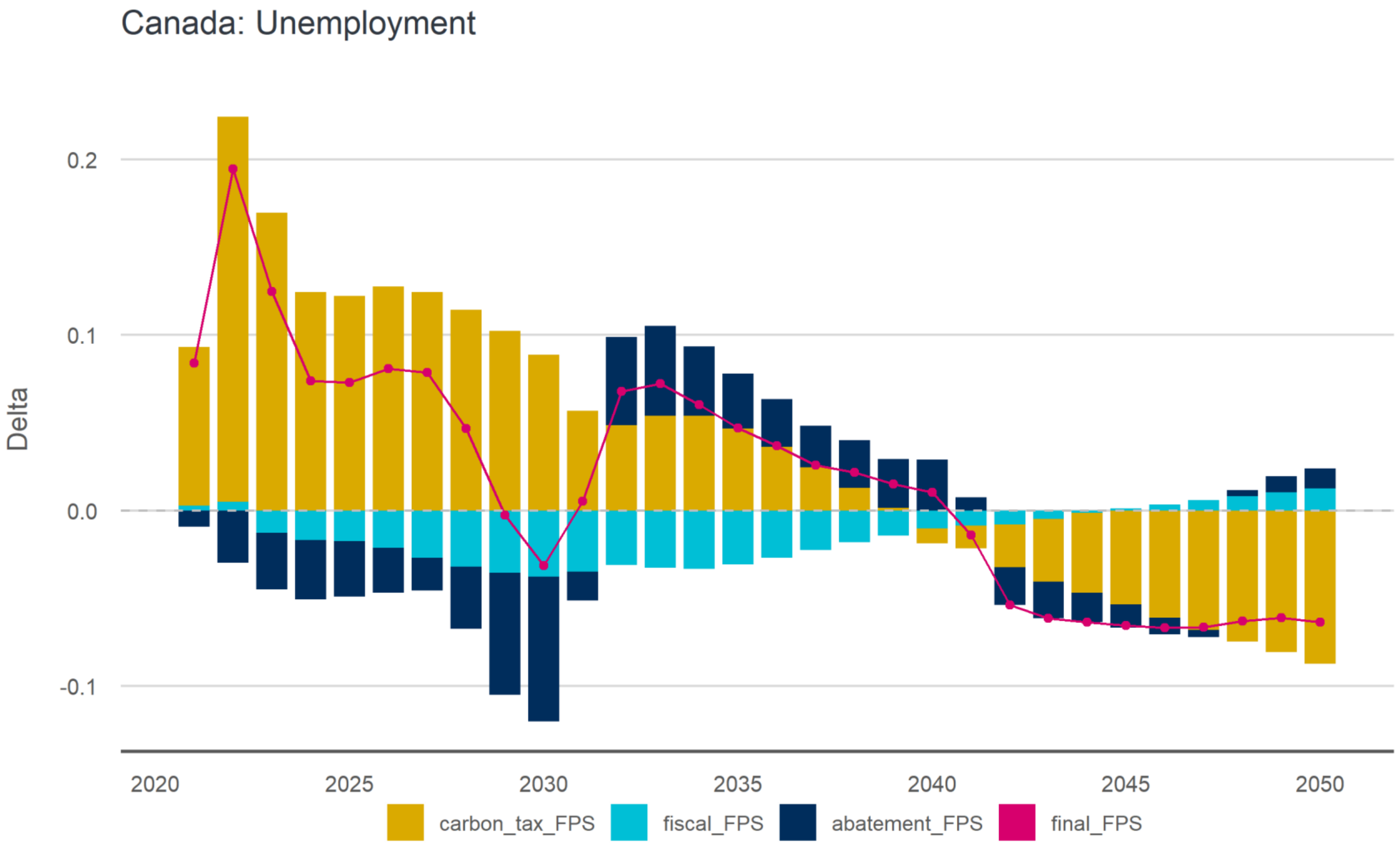
Source: NIGEM based on Vivid Economics inputs

Unemployment rate cumulative transitional impacts: Brazil



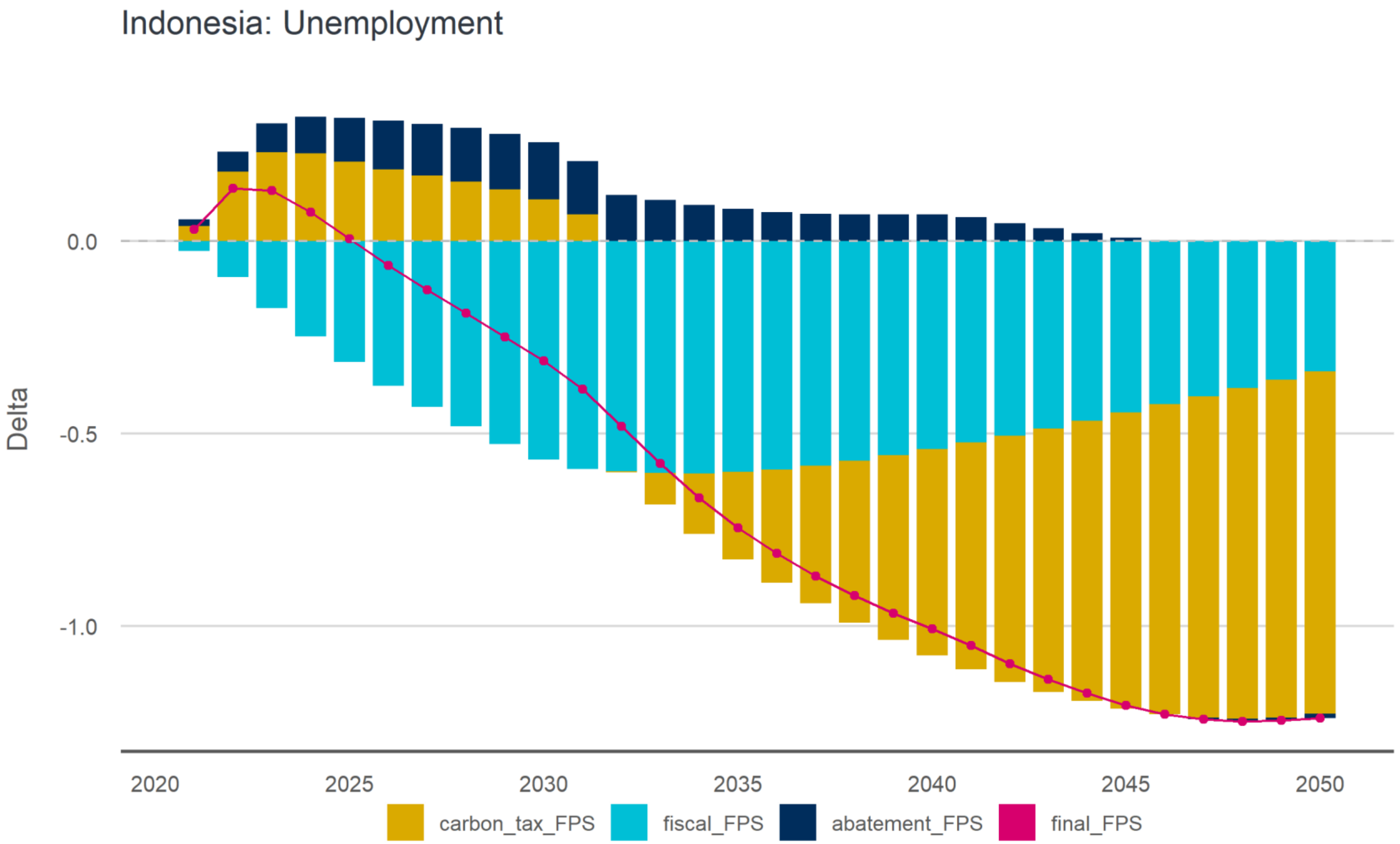
Source: NIGEM based on Vivid Economics inputs

Unemployment rate cumulative transitional impacts: Canada



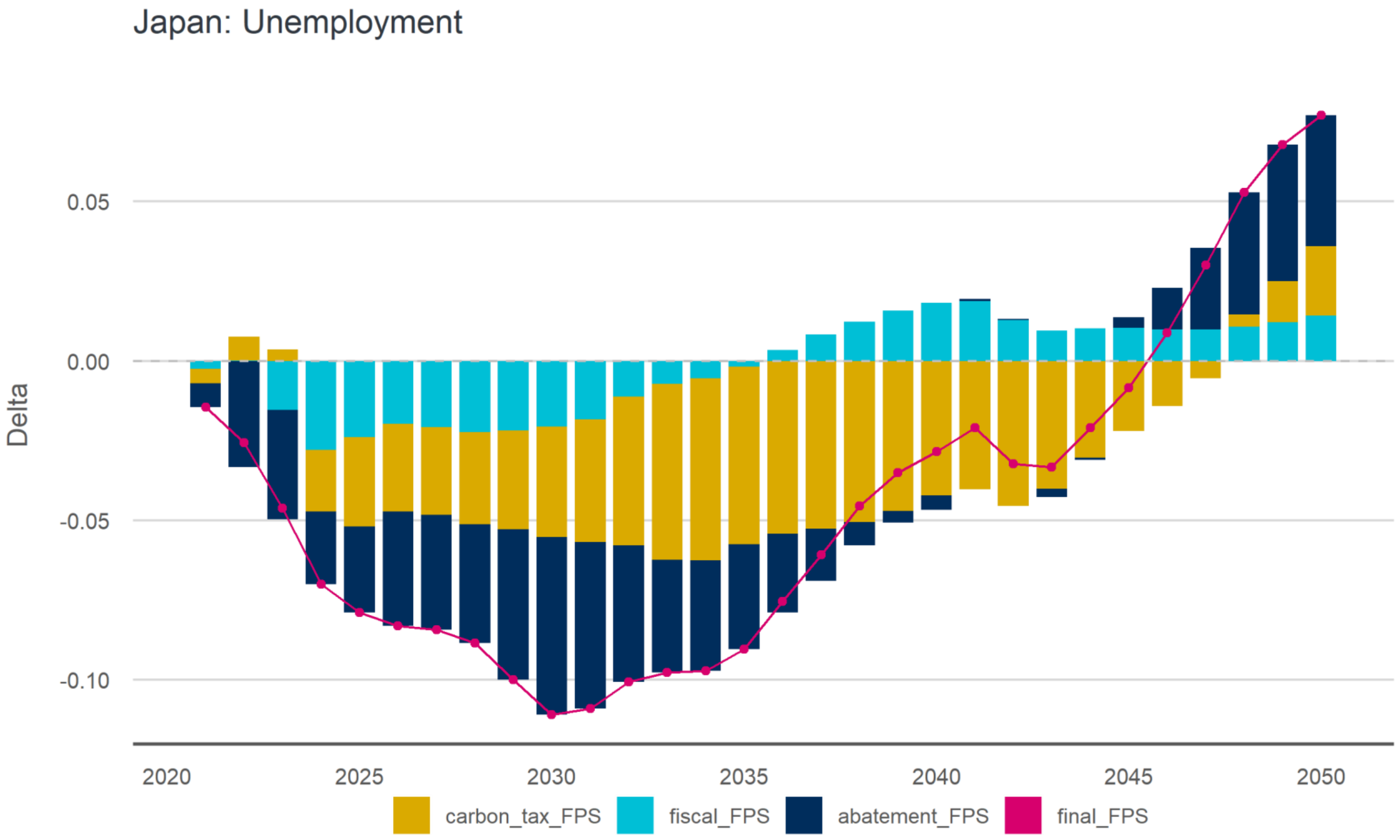
Source: NIGEM based on Vivid Economics inputs

Unemployment rate cumulative transitional impacts: Indonesia



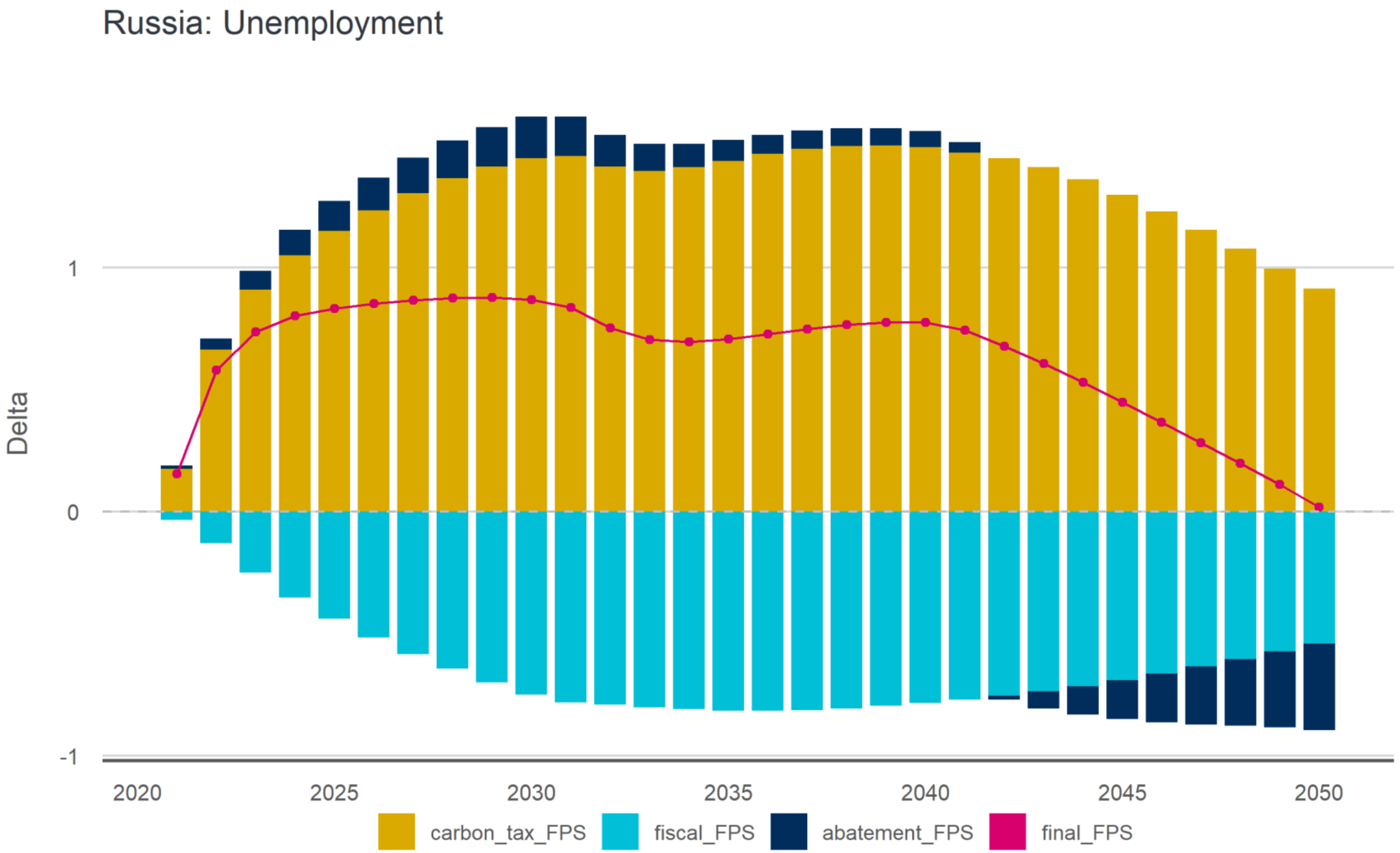
Source: NIGEM based on Vivid Economics inputs

Unemployment rate cumulative transitional impacts: Japan



Source: NIGEM based on Vivid Economics inputs

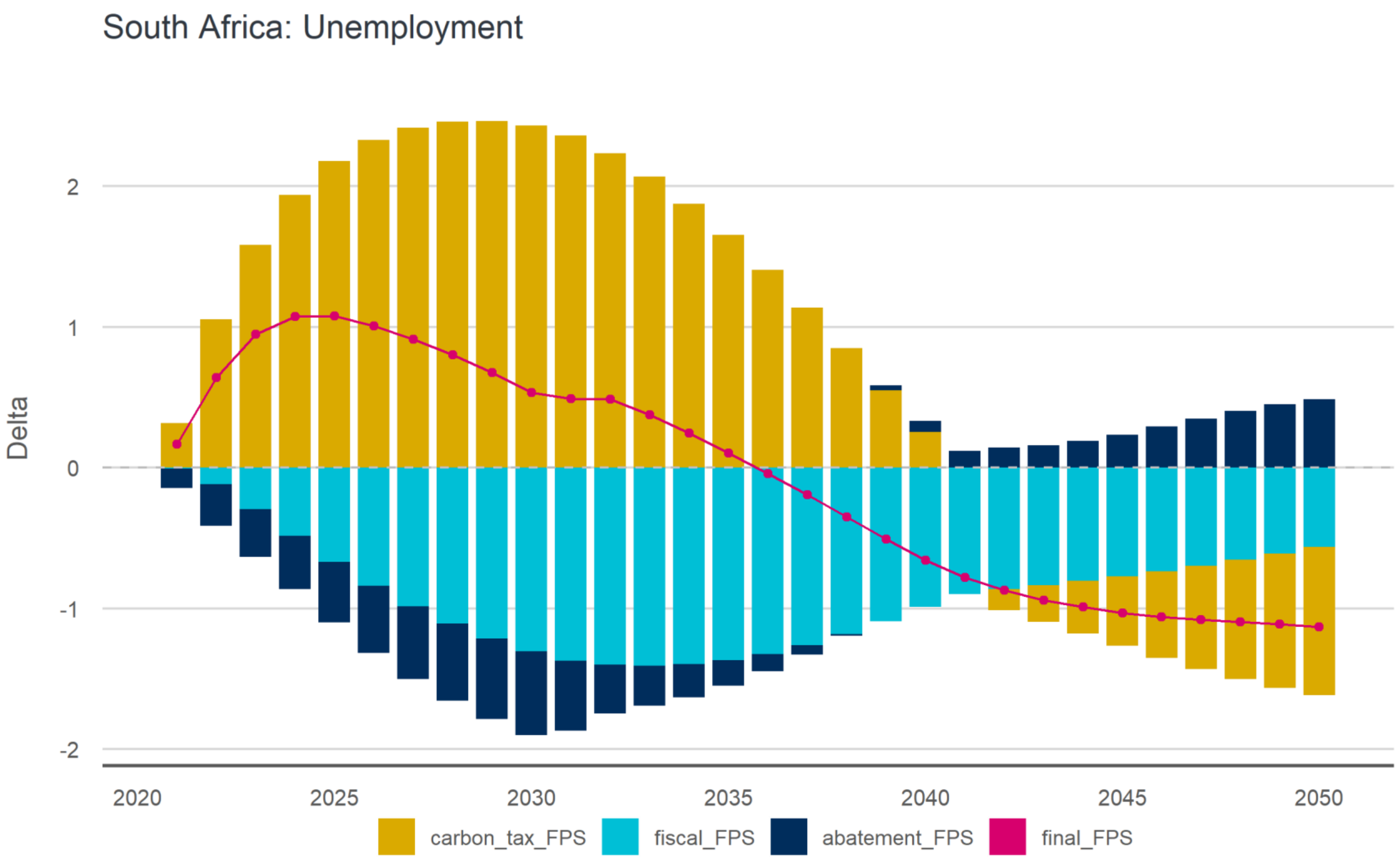
Unemployment rate cumulative transitional impacts: Russia



Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

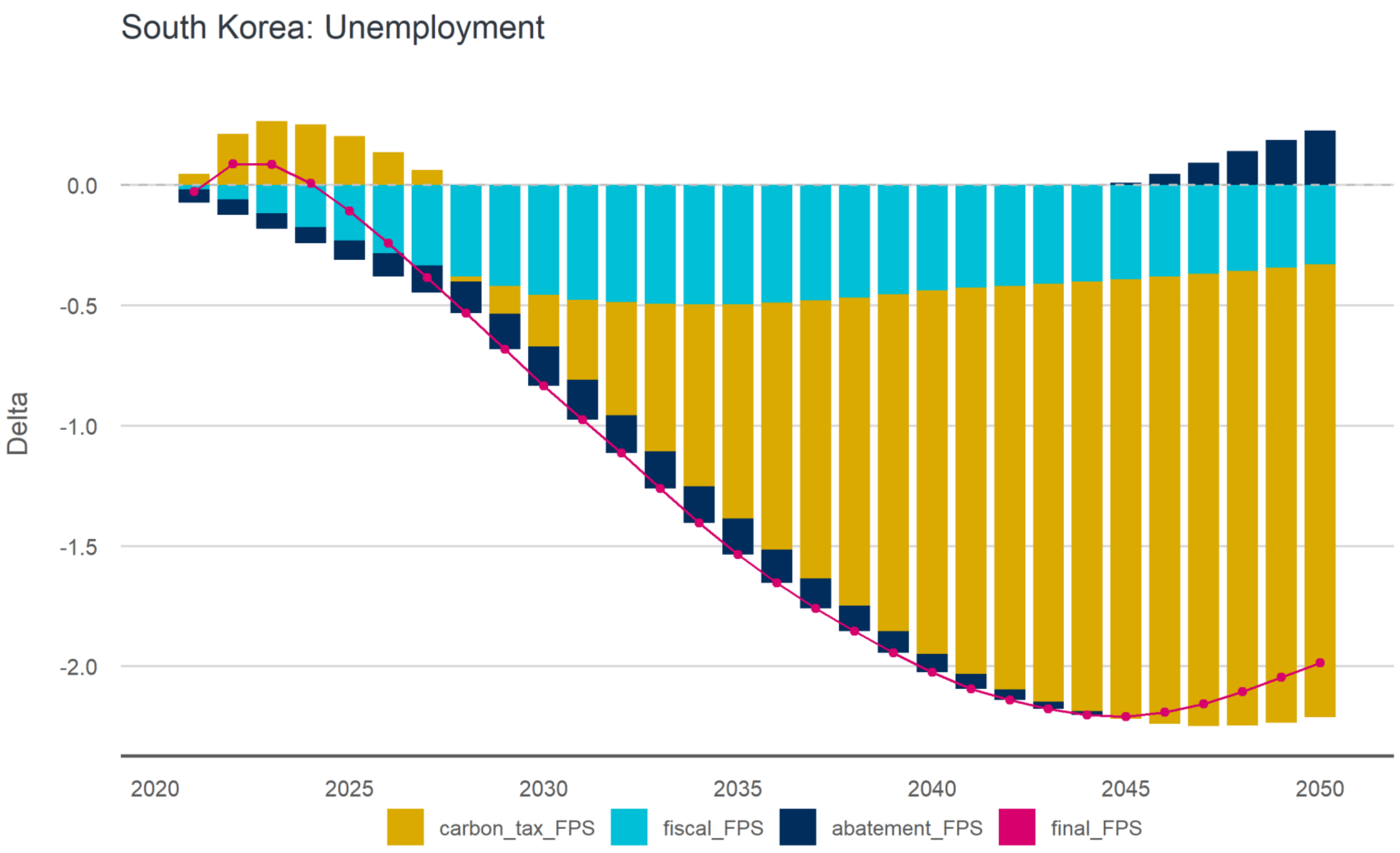
Unemployment rate cumulative transitional impacts: South Africa



INEVITABLE POLICY RESPONSE

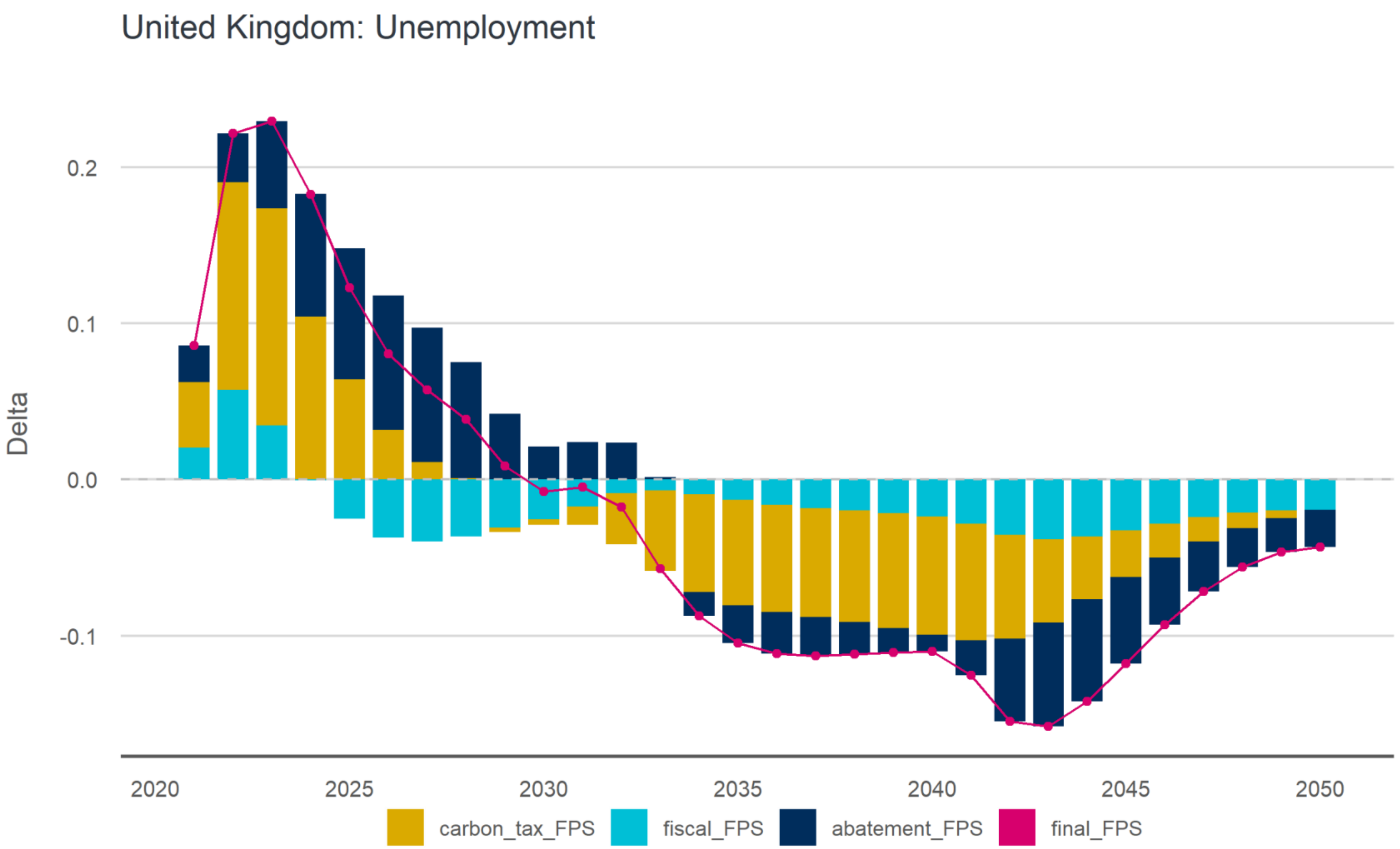
Source: NIGEM based on Vivid Economics inputs

Unemployment rate cumulative transitional impacts: South Korea



Source: NIGEM based on Vivid Economics inputs

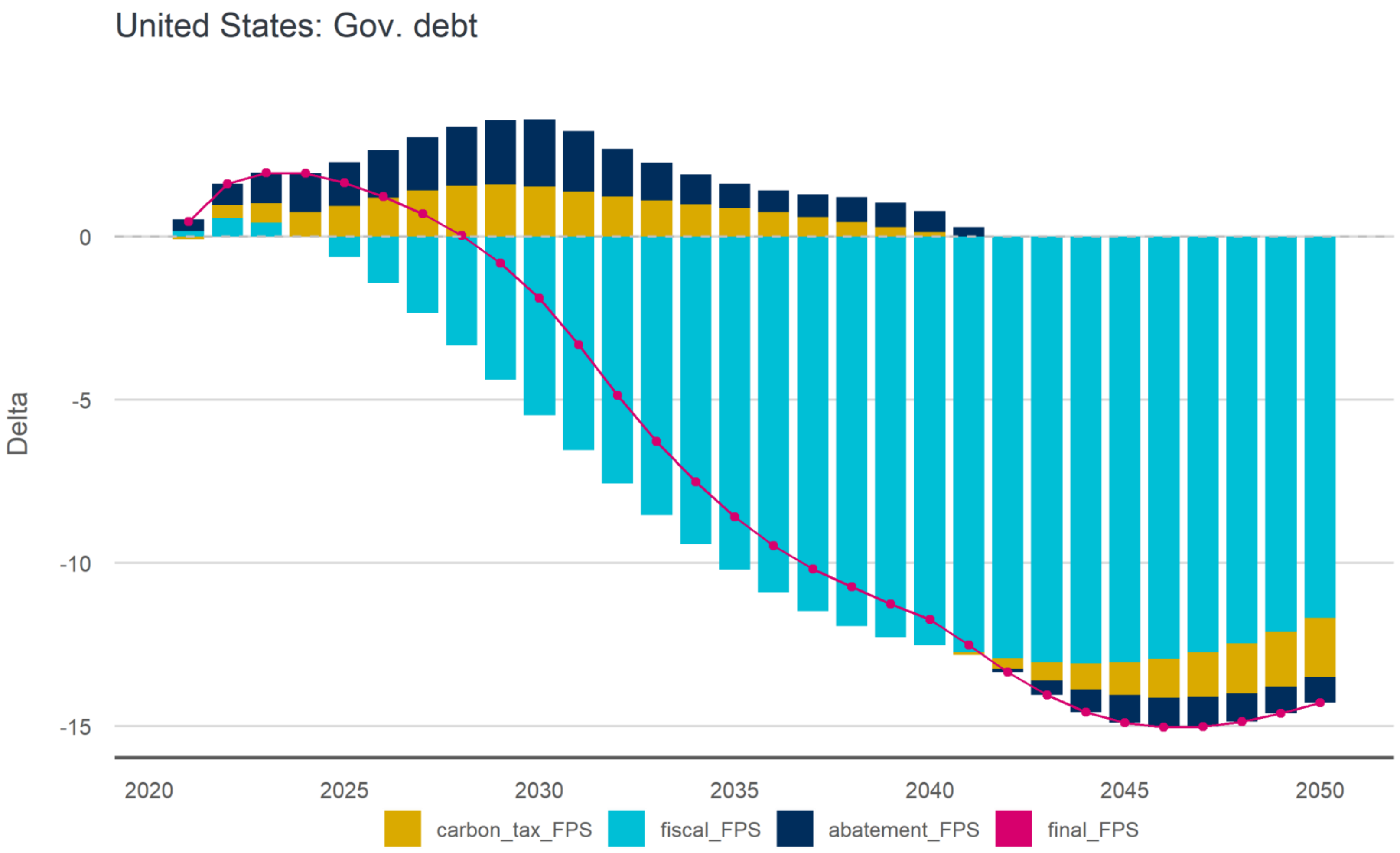
Unemployment rate cumulative transitional impacts: United Kingdom



Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Appendix: Government debt

Government debt cumulative impact: United States

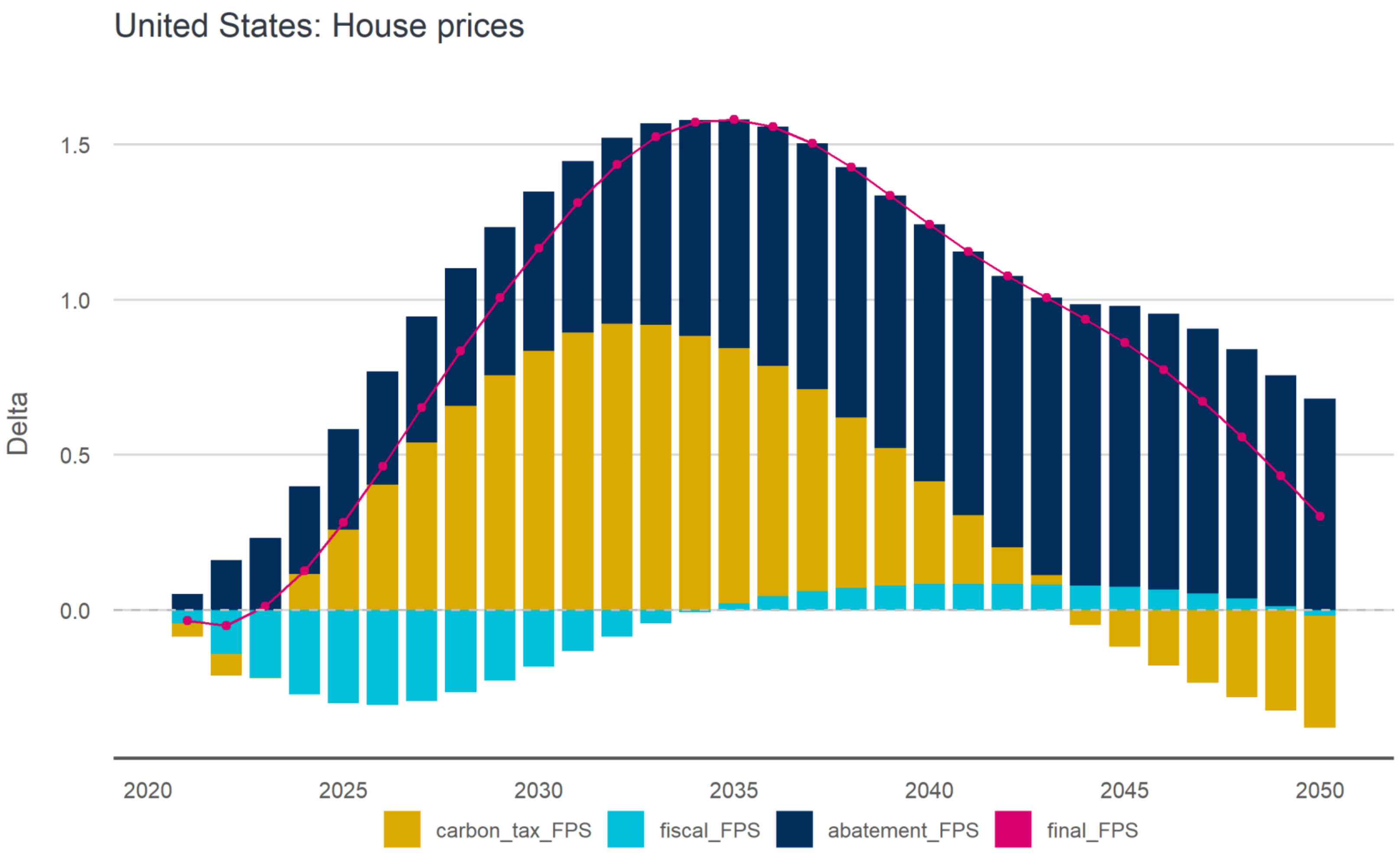


INEVITABLE POLICY RESPONSE

Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Appendix: House Prices

House prices cumulative transitional impacts: United States



Source: NIGEM based on Vivid Economics inputs

The Inevitable Policy Response: FPS scenario – Appendix: Effective exchange rates

INEVITABLE
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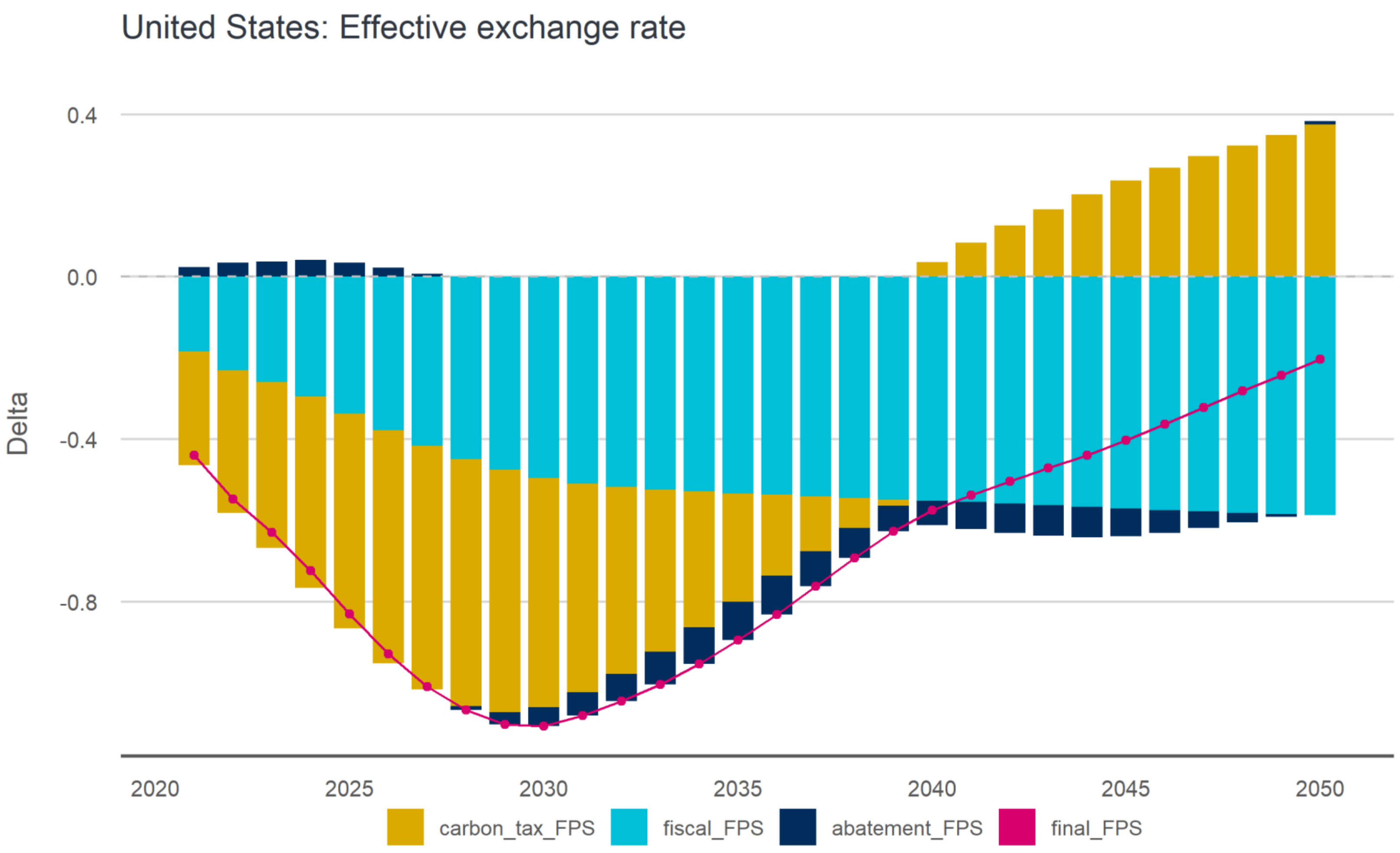
Effective exchange rate cumulative transitional impacts: Global

	2030 Baseline FX	2030 FPS FX	2050 Baseline FX	2050 FPS FX
Australia	3%	4%	12%	13%
Brazil	-20%	-19%	-53%	-55%
Canada	0%	-2%	4%	1%
China	5%	3%	13%	13%
Central and South America	-5%	-4%	-14%	-14%
Eastern Europe	0%	1%	1%	3%
Europe	7%	7%	20%	20%
Eurasia	-11%	-12%	-34%	-34%
Gulf Cooperation Council	-11%	-12%	-32%	-33%
India	-4%	-2%	-9%	-9%
Indonesia	4%	7%	18%	18%
Japan	7%	8%	21%	22%
Middle East and North Africa	-9%	-10%	-25%	-25%
Russia	1%	4%	9%	7%
South Asia	-12%	-13%	-35%	-35%
South Africa	6%	7%	21%	20%
South East Asia and Oceania	-5%	-5%	-15%	-14%
South Korea	2%	5%	11%	13%
Sub Saharan Africa	-11%	-12%	-32%	-32%
United Kingdom	-1%	-1%	2%	2%
United States	2%	0%	7%	7%
Western Europe	4%	4%	10%	11%

INEVITABLE POLICY RESPONSE

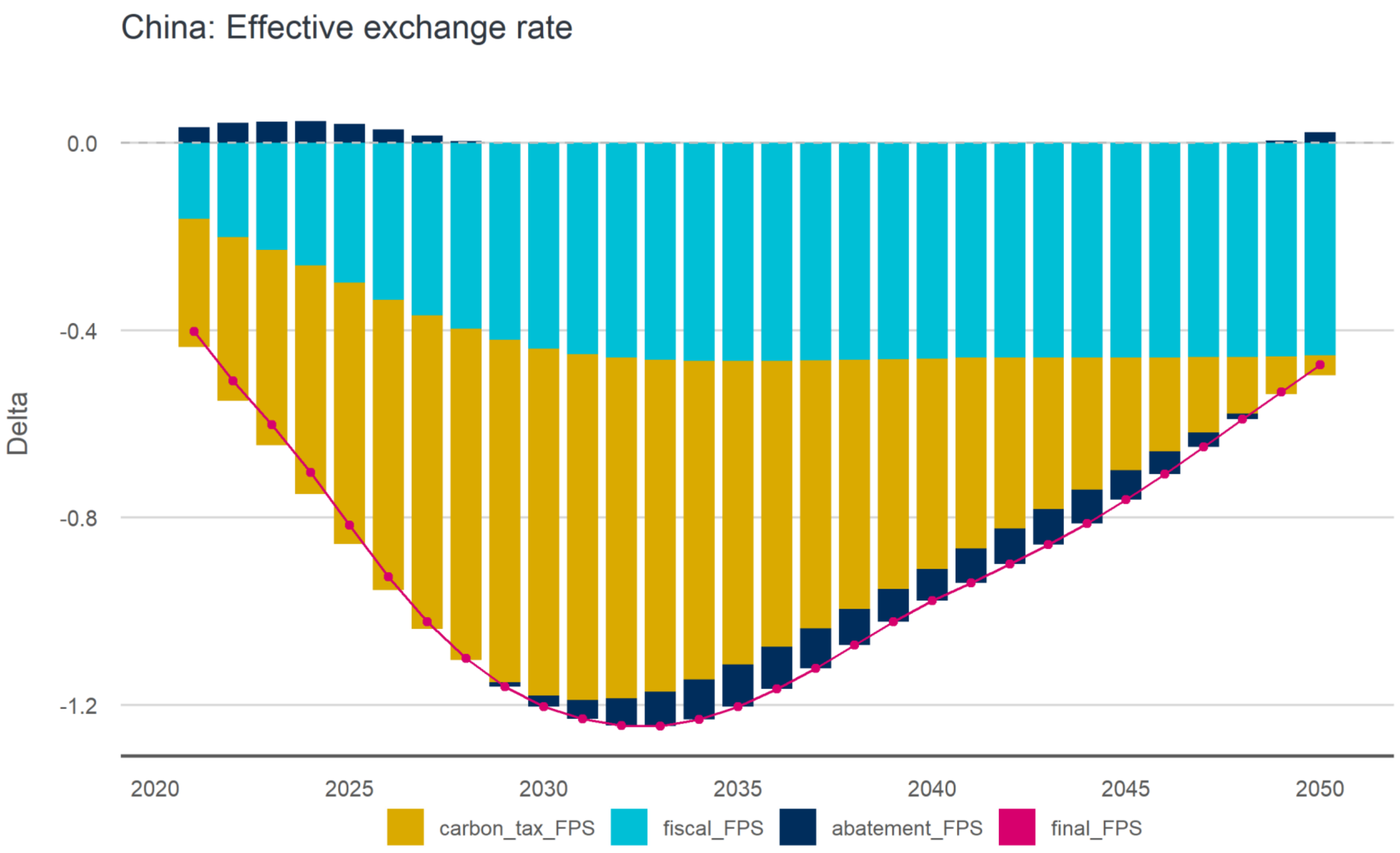
Source: NIGEM based on Vivid Economics inputs; depreciation in 2020 is calculated as the % change compared to the effective exchange rate value in 2021. In 2050 it is calculated as the % change compared to the effective exchange rate value in 2030.

Effective exchange rate cumulative transitional impacts: United States



Source: NIGEM based on Vivid Economics inputs

Effective exchange rate cumulative transitional impacts: China



Source: NIGEM based on Vivid Economics inputs

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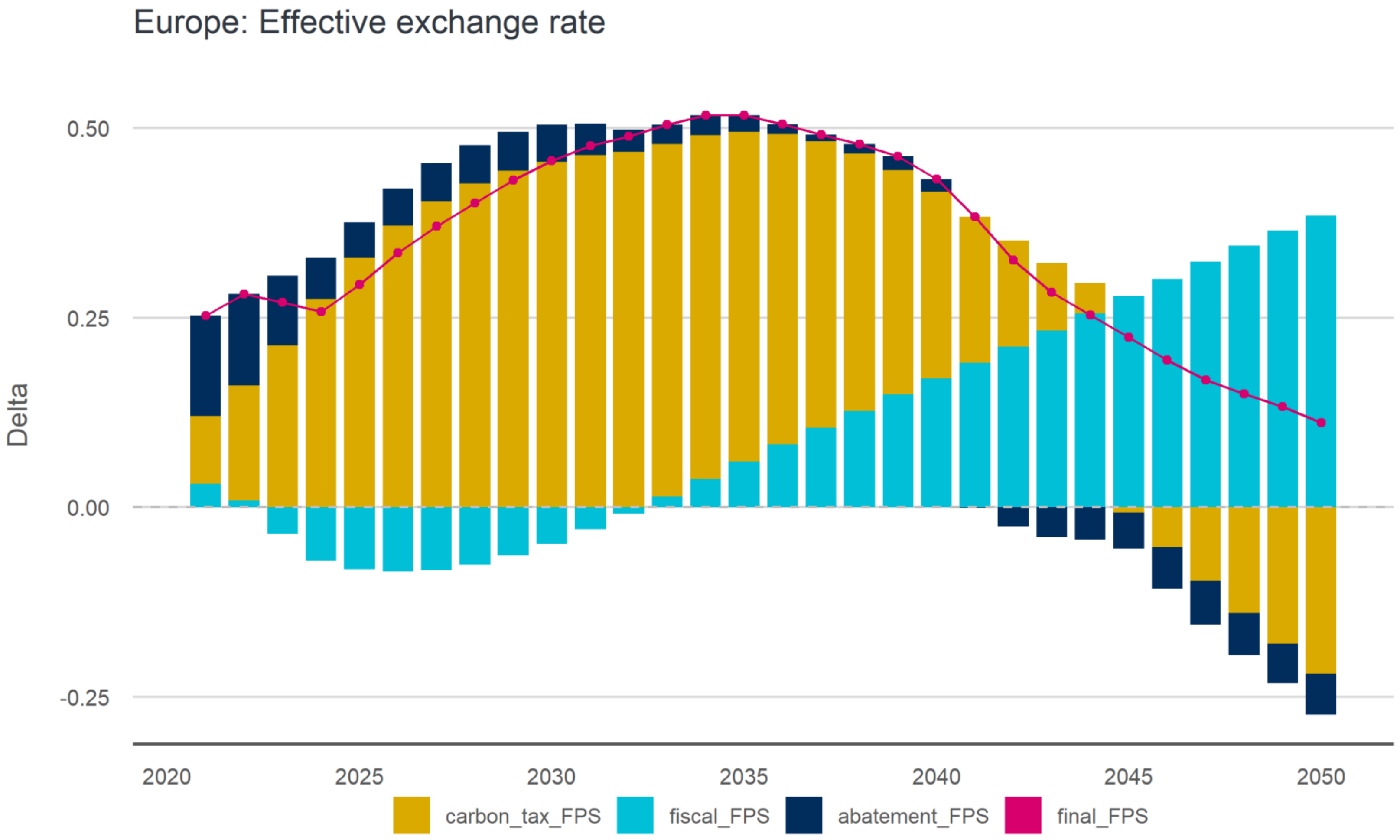
Effective exchange rate cumulative transitional impacts: Europe



Source: NIGEM based on Vivid Economics inputs

INEVITABLE POLICY RESPONSE

Thank you!

Please see PRI website for further details:

https://www.unpri.org/climate-change/what-is-the-inevitable-policy-response/4787.article

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