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# RE-ESTIMATION OF STREAM: THE MACRO-ECONOMETRIC MODEL OF THE MALTESE ECONOMY

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**The views expressed in the presentation are the authors' own and should not be interpreted as reflecting the views of the Central Bank of Malta.**

# INTRODUCTION

- STREAM is a **semi-structural model** of the **Maltese economy**
- **Updated to Version 3.2** from Version 3.1 in 2019
- Remains **congruent** with its **3 key objectives**:
  - **1.** To allow for the **assessment** of the impact of **shocks** by conducting **simulations**
  - **2.** To act as the **main model** for the **Bank's forecasts**
  - **3.** To provide **insight** on the functioning of **the Maltese economy**
- Underlying macroeconomic principles are **neo-classical**:

**supply** drives output in the **long run**, **demand** drives output in the **short run**

# HISTORY OF THE MODEL



**Version 1.0**

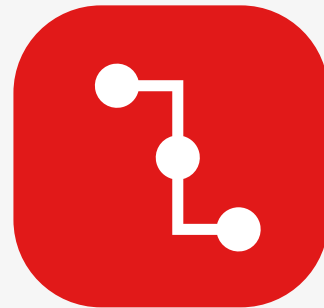
**2013**

Development of model by Modelling and Research Office

**2014**

Refined fiscal & financial blocks, macro-financial linkages, responsiveness of price block to domestic activity

**Version 2.0**



**Version 3.0**

**2016**

Financial block, chain-linked data

**2019**

Re-estimation up to 2016Q4

**Version 3.1**



**Extensions to Version 3.1**

**2020**

Housing block and sectoral extension

# STREAM VERSION 3.2

- **Database** updated until **2022Q4**
- **Re-estimation** of behavioural equations up to **2019Q4** at a **quarterly frequency**
- **213 equations** of which **21** are estimated **behavioural equations** in error-correction form
- **213 endogenous** variables, **57 exogenous** variables
- **5 blocks: supply, demand, fiscal, price-wage and financial**
- **Economic regime** of the **last decade** is **reflected** in the **extended sample**
  - Strong **economic growth**
  - **Labour market** characterised by **low unemployment** and **high inflows of foreign workers**
  - **Stability of local prices** in an environment of strong growth

# STREAM VERSION 3.2 – SHORT RUN ELASTICITIES

- **Smaller magnitude of short run elasticities**
  - **Lower marginal propensity to consume** → increasing share of **savings** in disposable income
  - **Weaker response of exports to foreign demand** → **resilience** of Maltese **services exports**
  - More **practical response of imports** to model-consistent **import indicator** → further **disaggregation** of **demand components** in the computation of **import demand indicator**

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	Version 3.1	<b>Version 3.2</b>
Consumption wrt disposable income	0.30	<b>0.13</b>
Consumption wrt unemployment rate	-1.58	<b>-1.39</b>
Exports wrt world demand	1.18	<b>0.80</b>
Exports wrt real effective exchange rate	-1.46	<b>-1.07</b>
Imports wrt import demand	1.60	<b>0.96</b>
GDP deflator wrt output gap	0.41	<b>0.07</b>

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# STREAM VERSION 3.2 – LONG RUN ELASTICITIES

- **Smaller error-correction terms** in behavioural equations **partly** due to **longer time series**
- **Slower adjustment of imbalances** in the economy **from long-run equilibrium**

	Version 3.1	<b>Version 3.2</b>
Private consumption	-0.22	<b>-0.11</b>
Non-dwelling private investment	-0.42	<b>-0.35</b>
Non-SPE exports of goods and services	-0.36	<b>-0.13</b>
GDP deflator	-0.34	<b>-0.05</b>
Import deflator	-0.19	<b>-0.19</b>
Employment	-0.35	<b>-0.14</b>
Private wages	-0.42	<b>-0.23</b>

# SIMULATIONS

- **4 simulations** in line with ECB request for Basic Model Elasticities
  - 1. Foreign demand shock**
  - 2. Interest rate shock**
  - 3. Energy price shocks**
  - 4. Exchange rate shock**
- Impulse response functions (**IRFs**) for **4 key macroeconomic variables**
- **Orthogonality principle** underlies the simulations
- **One exogenous variable is shocked** while keeping other exogenous variables constant
- **An overall more muted and prolonged propagation of shocks to macroeconomic variables** compared to Version 3.1

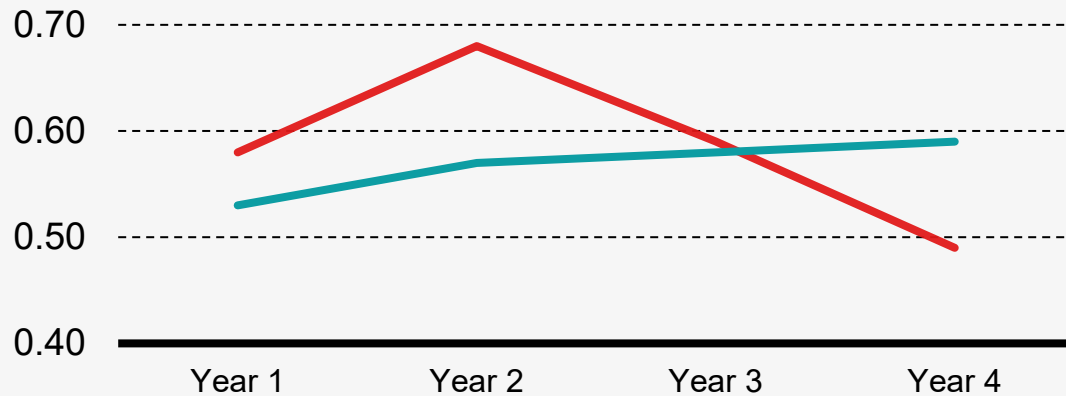


# FOREIGN DEMAND SHOCK

## permanent 1% increase in foreign demand

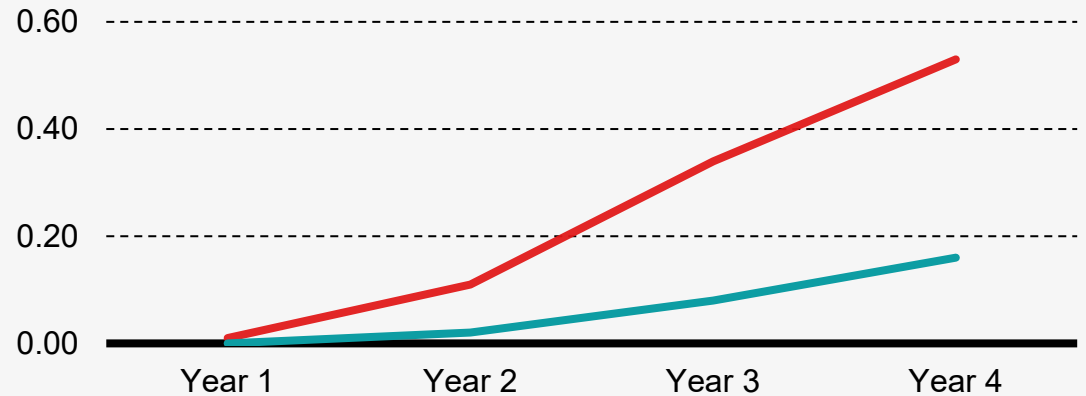
### ECONOMIC ACTIVITY: GDP

*(percentage change from baseline level)*



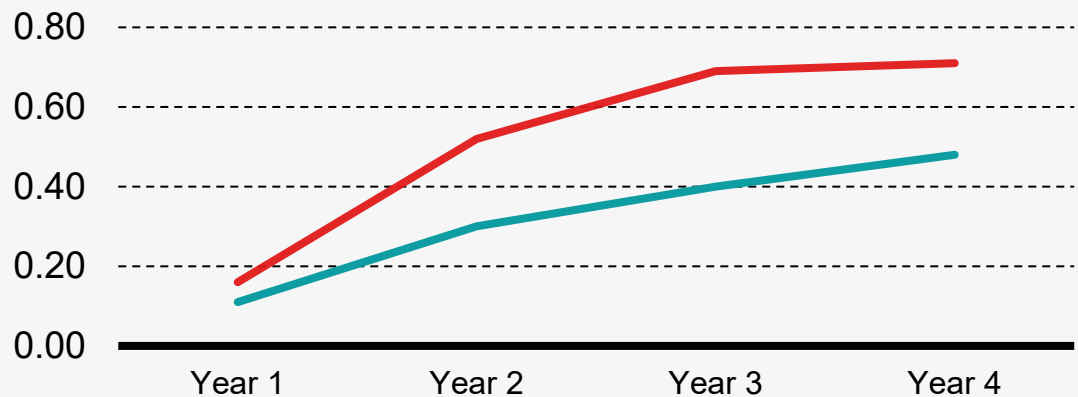
### PRICE DEVELOPMENTS: HICP

*(percentage change from baseline level)*



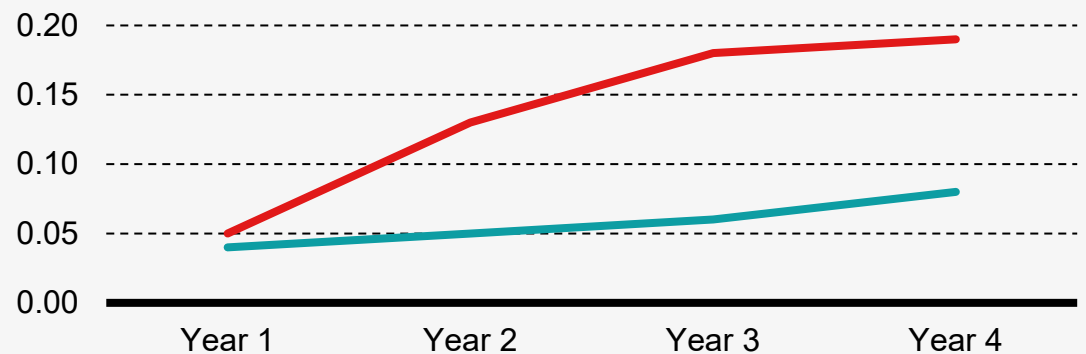
### LABOUR MARKET: EMPLOYMENT

*(percentage change from baseline level)*



### FISCAL SECTOR: BALANCE

*(absolute change from baseline as per cent of GDP)*



— Version 3.1

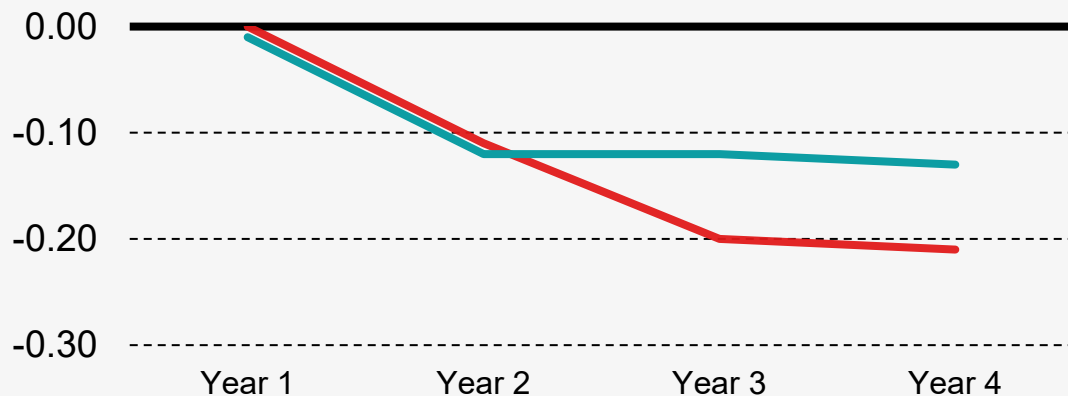
— Version 3.2

# INTEREST RATE SHOCK

permanent increase in policy interest rate by 100 basis points

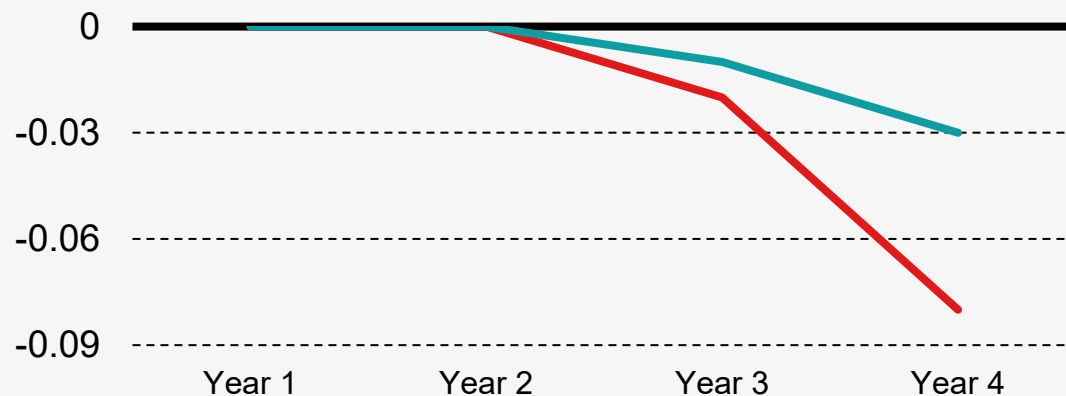
## ECONOMIC ACTIVITY: GDP

*(percentage change from baseline level)*



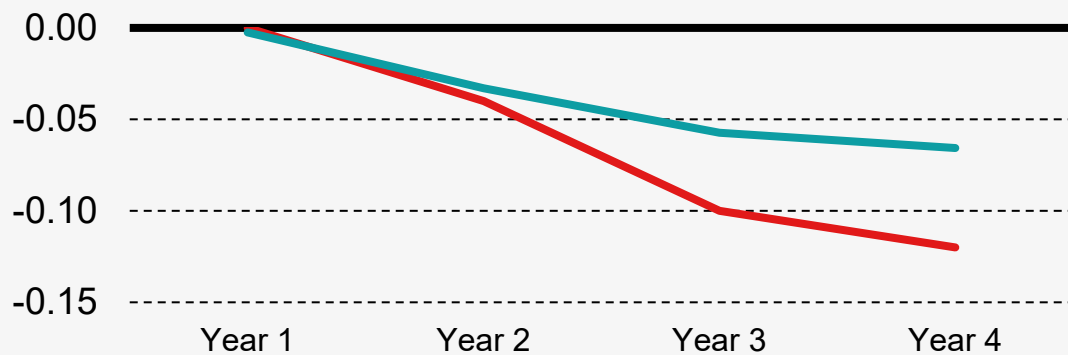
## PRICE DEVELOPMENTS: HICP

*(percentage change from baseline level)*



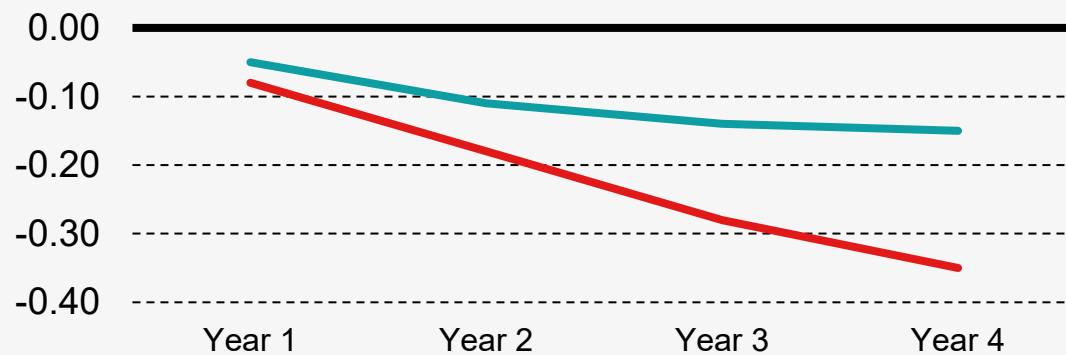
## LABOUR MARKET: COMPENSATION PER EMPLOYEE

*(percentage change from baseline level)*



## FISCAL SECTOR: BALANCE

*(absolute change from baseline as per cent of GDP)*



— Version 3.1

— Version 3.2

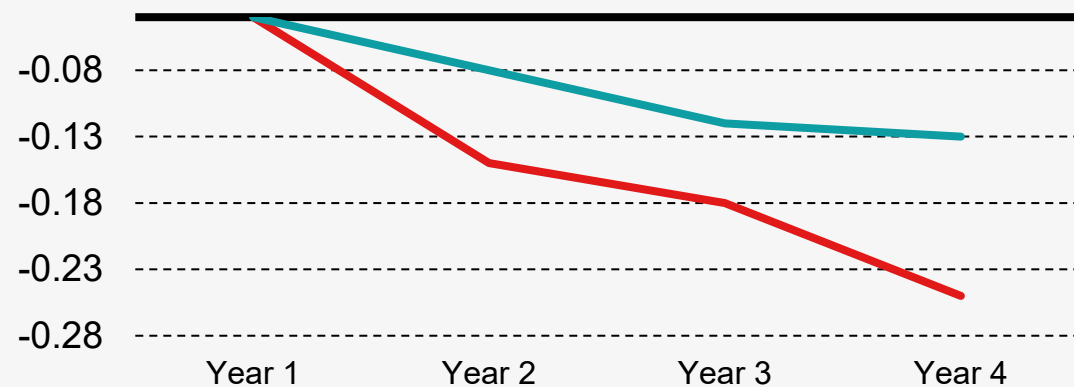
# ENERGY PRICE SHOCK

permanent 10% increase in the price of oil at the

€85 per barrel level

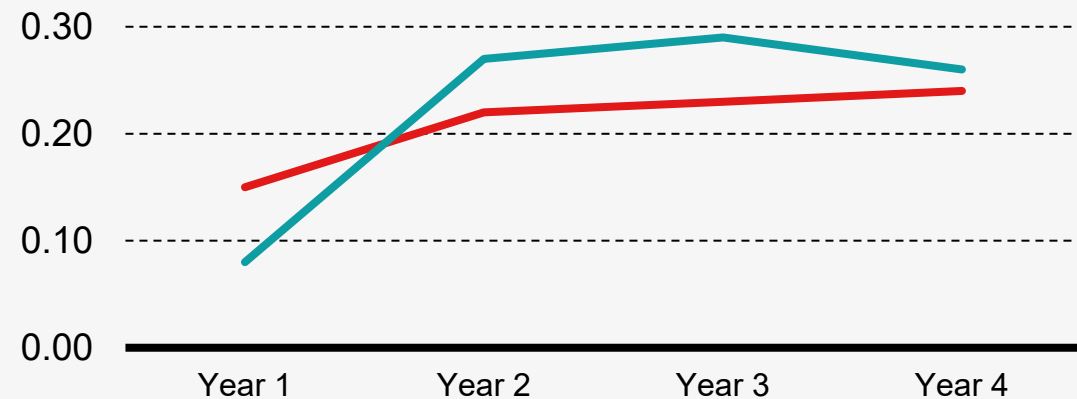
## ECONOMIC ACTIVITY: GDP

(percentage change from baseline level)



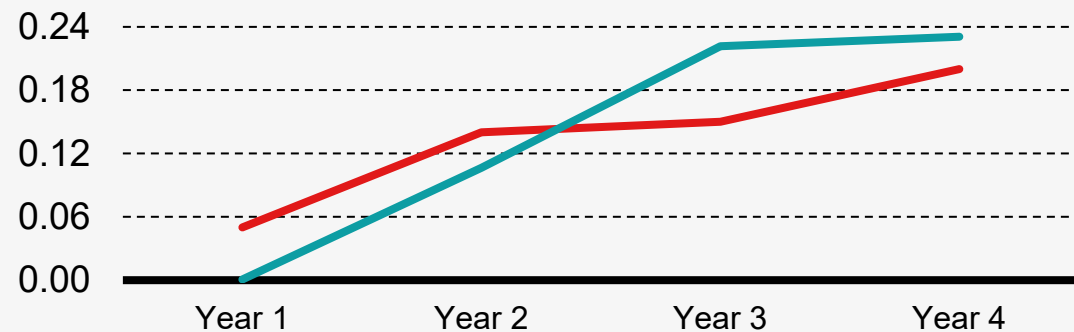
## PRICE DEVELOPMENTS: HICP

(percentage change from baseline level)



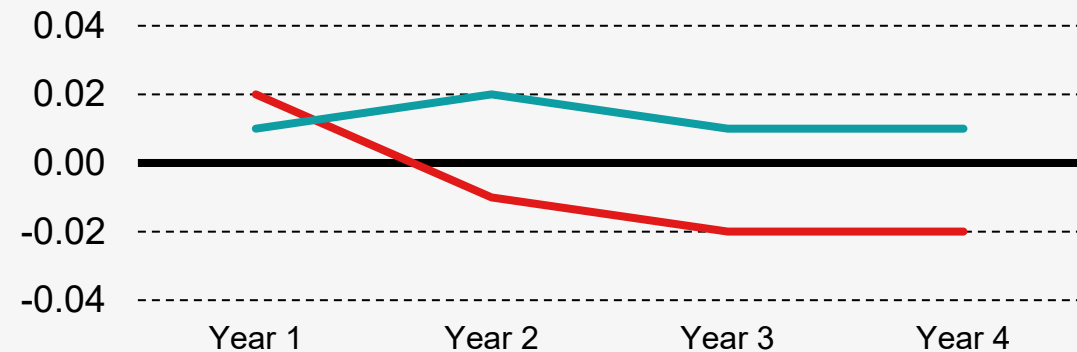
## LABOUR MARKET: COMPENSATION PER EMPLOYEE

(percentage change from baseline level)



## FISCAL SECTOR: BALANCE

(absolute change from baseline as per cent of GDP)



— Version 3.1

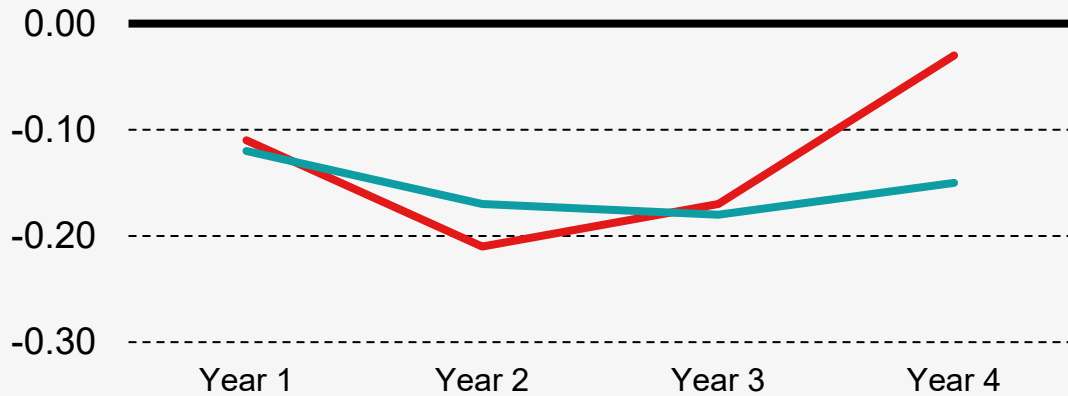
— Version 3.2

# EXCHANGE RATE SHOCK

permanent 10% appreciation of the euro against the US dollar

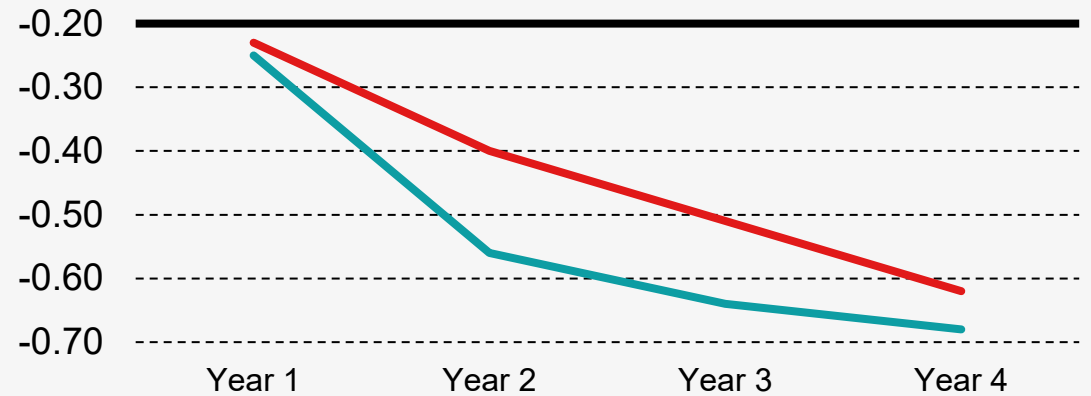
## ECONOMIC ACTIVITY: GDP

*(percentage change from baseline level)*



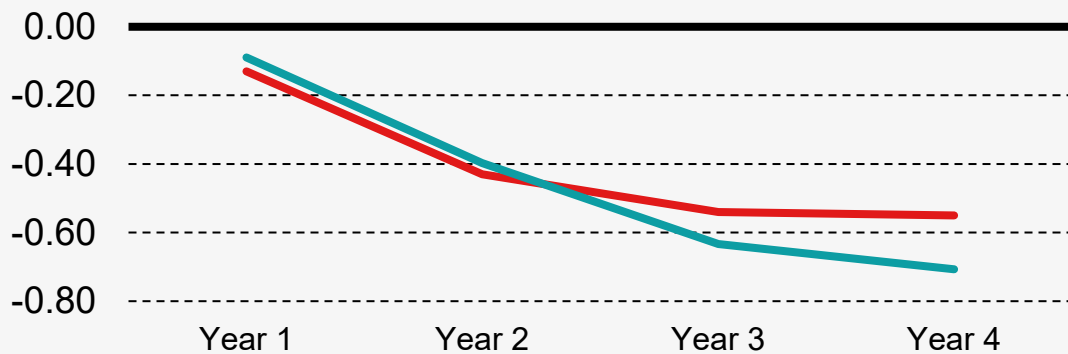
## PRICE DEVELOPMENTS: HICP

*(percentage change from baseline level)*



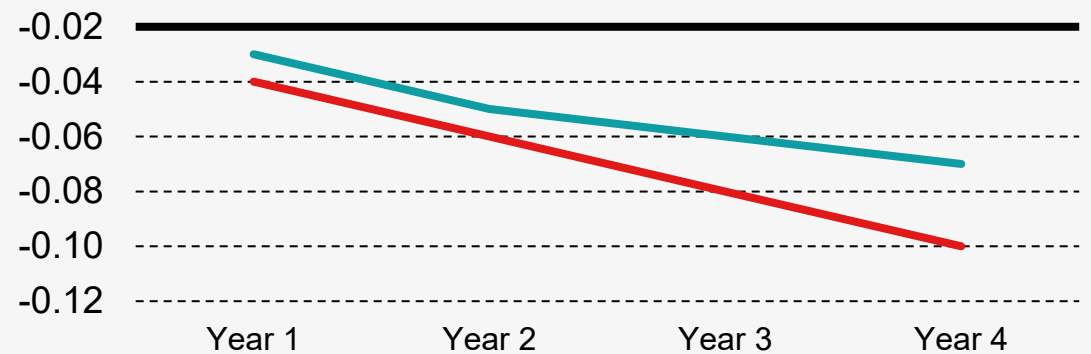
## LABOUR MARKET: COMPENSATION PER EMPLOYEE

*(percentage change from baseline level)*



## FISCAL SECTOR: BALANCE

*(absolute change from baseline as per cent of GDP)*



— Version 3.1

— Version 3.2

# CONCLUSIONS & FUTURE WORK

- **STREAM Version 3.2** is now **reflective** of the **more recent economic regime**
- **STREAM** continues to **be a central model** in the **Bank's modelling and research toolkit**
- **Further work on:**
  - **Supply-side** → channels for **population growth**
  - **Volatile data** during the **pandemic** years
  - Recent **benchmark revision in national accounts**