Riunione del 12 settembre 2023

Alberto Balestreri

Materiale riservato ai membri della Commissione Banche, Intermediari Finanziari ed Assicurazione dell'ODCEC di Milano

Commissione Banche, Intermediari finanziari e Assicurazioni

Ordine del giorno

1. approvazione del verbale della precedente riunione;
2. «The Road to Paris: stress testing the transition towards a net-zero economy”. *The energy transition through the lens of the second ECB economy-wide climate stress test*
3. Corso Formazione in materia di Imprese di Assicurazione
4. Attività formative;
5. Varie ed eventuali.

2. «The Road to Paris: stress testing the transition towards a net-zero economy”.

The energy transition through the lens of the second ECB economy-wide climate stress test

EUROPEAN CENTRAL BANK

EUROSYSTEM

Occasional Paper Series

Tina Emambakhsh, Maximilian Fuchs, Simon Kördel, Charalampos Kouratzoglou, Chiara Lelli, Riccardo Pizzeghello, Carmelo Salleo, Martina Spaggiari

The Road to Paris: stress testing the transition towards a net-zero economy

The energy transition through the lens of the second ECB economy-wide climate stress test

No 328

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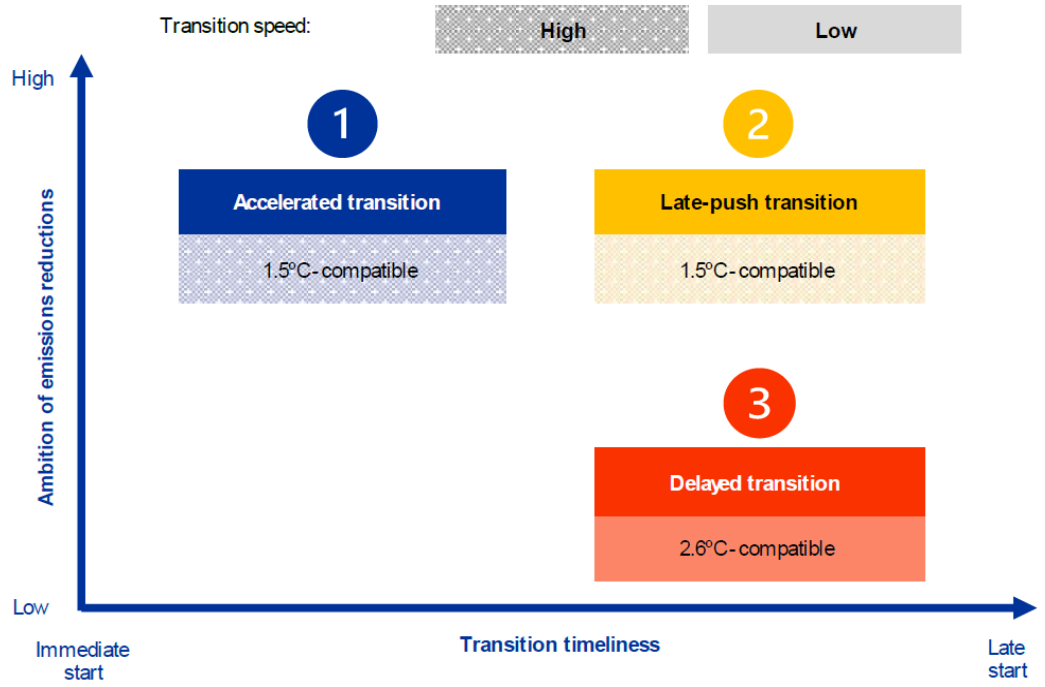
1. Timely and accurate scenario design is essential to be able to provide insight into the different plausible future pathways to a carbon-neutral economy.
2. The climate stress test exercise assesses three potential transition pathways based on scenarios spanning the period until 2030.
3. The first scenario is that of an accelerated transition (S1).
4. The second scenario is a late-push transition (S2).
5. The third scenario is a delayed (and milder) transition (S3).

Figure 1

The three potential transition pathways assessed in this exercise

Scenarios by transition timeliness and implied emissions reductions



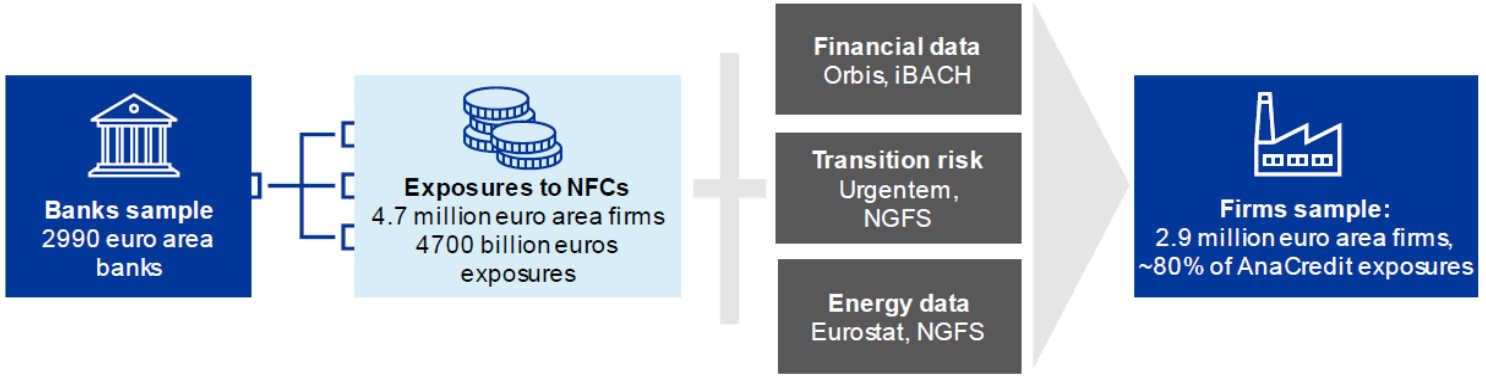
Source: ECB.

Gli scenari

1. **The NGFS scenarios are a key building block for analysis of climate risk; they require enhancements, however, to account for the current macroeconomic challenges and opportunities.**
2. **At the current stage, the NGFS climate scenarios lack the granularity and representation of sectoral dynamics required to assess transition risk.**
3. **In the process of scenario calibration, substantial effort went into capturing granular energy dynamics.**

Figure 2

Size and scope of the exercise



Source: ECB.
Notes: The final sample of companies was drawn from the sample of AnaCredit debtors and depended on the availability of financial, transition risk and energy data. Where possible, proxies were calculated to fill data gaps.

1. **The climate stress test presented in this paper studies the potential vulnerabilities of the euro area economy and financial system to a set of transition pathways towards a net-zero emissions economy.**
2. **The scenarios designed for this exercise differ in the timing and ambition of emissions reductions until 2030, combining, for the first time, NGFS transition paths with the latest macroeconomic projections and energy developments.**
3. **The results of this exercise reveal that an accelerated transition would provide significant benefits for firms, households, and the financial system, compared with a late-push transition scenario.**
4. **The accelerated and delayed transition scenarios would lead to similar risk levels in 2030. They would, however, entail substantially different long-term implications for both transition and physical risks.**
5. **The transition impact would be highly heterogeneous across economic sectors, with the largest tail risk for expected losses being experienced if the transition were to happen late and abruptly.**
6. **Both the accelerated and the delayed transition scenarios would increase banks' expected losses and provisioning needs in the short to medium term, but would not seem to generate financial stability concerns for the euro area.**
7. **Even though the field of climate stress testing is still in its early stages, the findings of other jurisdictions' climate stress tests align with the results of this current exercise.**

The climate stress test presented in this paper studies the potential vulnerabilities of the euro area economy and financial system to a set of transition pathways towards a net-zero emissions economy. Leveraging the framework developed for the first ECB economy-wide climate stress test, the current exercise is an important step forward in the field of climate stress testing. The original framework was enhanced by i) incorporating current and future euro area macroeconomic and energy-related developments into three plausible short-term transition scenarios, ii) capturing sector-level dynamics as well as more refined and granular modelling of investment needs for the green transition, and iii) assessing the impact of different timings and degrees of transition risk on the euro area real economy and financial institutions by extending the entities covered to include households and non-bank financial institutions. Feedback loops between the financial system and the real economy, as well as the amplification of risks inside the financial system and across financial sectors, were not covered in this work and should be further explored in future exercises.

The scenarios designed for this exercise differ in the timing and ambition of emissions reductions until 2030, combining, for the first time, NGFS transition paths with the latest macroeconomic projections and energy developments. The accelerated transition scenario assumes an immediate start of the transition that is compatible with the NGFS "net-zero by 2050" optimal path. Under the late-push transition scenario, current macroeconomic and geopolitical conditions would lead to a forward-push of the transition, which would start only after 2025 but would be sufficiently intense to reach emissions reductions comparable with the accelerated transition scenario. The delayed transition scenario assumes a late transition timing and milder policy action, which would not be sufficiently ambitious to achieve emission reductions similar to the other scenarios by 2030.

The results of this exercise reveal that an accelerated transition would provide significant benefits for firms, households, and the financial system, compared with a late-push transition scenario. Credit risk would increase during the transition under all scenarios, and particularly in the event of late and abrupt actions as envisaged under the late-push transition scenario. While the accelerated transition would lead to greater costs for households and firms in the short term, due to rapid and severe increases in energy prices, it would lower the financial risks in the medium term thanks to more rapidly reducing energy expenses and to large investments in renewable energy capacity. At the same time, an early start of the transition would allow banks to benefit from both lower credit risk and larger investment needs, thereby improving their income positions.

The accelerated and delayed transition scenarios would lead to similar risk levels in 2030. They would, however, entail substantially different long-term implications for both transition and physical risks. Under the accelerated transition scenario, corporate and households' risk exposure would start to decrease in the second half of the decade, after significant transition progress, while under the delayed transition scenario it would keep increasing until 2030 and potentially further, due to a continuous increase in energy prices and less renewable energy capacity. Moreover, given that the emission reductions by 2030 would not be compatible with the maximum +1.5° temperature target by the end of the century, stronger increases in temperature would be expected to lead to more frequent and severe natural hazards in the long term.[52] Given that temperature increases and physical risk levels would depend on the action taken at global level, these considerations would hold true only on the assumption that all global economies reduced their emissions as envisaged under their respective (front-loaded) NGFS scenario; the risks could be very different otherwise. Thus, assuming global efforts were in line with the assumptions underlying the NGFS framework, in the event of a delayed transition, firms and households might be more vulnerable to physical risk, as well as potentially to the compounding effects of transition and physical risks combined.

The transition impact would be highly heterogeneous across economic sectors, with the largest tail risk for expected losses being experienced if the transition were to happen late and abruptly.[53] Firms in the mining, manufacturing and utility industries would be among those most severely affected by transition risk, and therefore experience the largest impact on their balance sheets and consequently on their financial risk. Due to their strong reliance on brown energy sources, such energy-sensitive sectors would bear the largest costs in the form of higher energy expenditure and the need for major investment in carbon mitigation activities and renewable energy. Transition risk would affect vulnerable firms within sectors disproportionately, especially under the late-push transition scenario. This further illustrates the benefits of an early start to transition in order to mitigate the costs and financial risks.

Both the accelerated and the delayed transition scenarios would increase banks' expected losses and provisioning needs in the short to medium term, but would not seem to generate financial stability concerns for the euro area. Higher corporate credit risk due to green transition would cause higher expected losses for banks' corporate loan and households' portfolios. In 2030, the annual expected losses for the median bank would be 48% higher under both the accelerated and delayed transition scenarios compared with 2022 (also due to a more uncertain macroeconomic environment). In addition, under the accelerated transition scenario, expected losses would reach their peak in 2026 and decline thereafter. At the end of the horizon, annual expected losses relative to portfolio size for the median bank would be below 1% under all scenarios, and more than double the median only in the tail (i.e. the worst 10% of bank-level distribution). The heterogeneous results across exposures and banks would therefore suggest that a more careful monitoring would be required for some subsets of entities and exposures during the transition process.

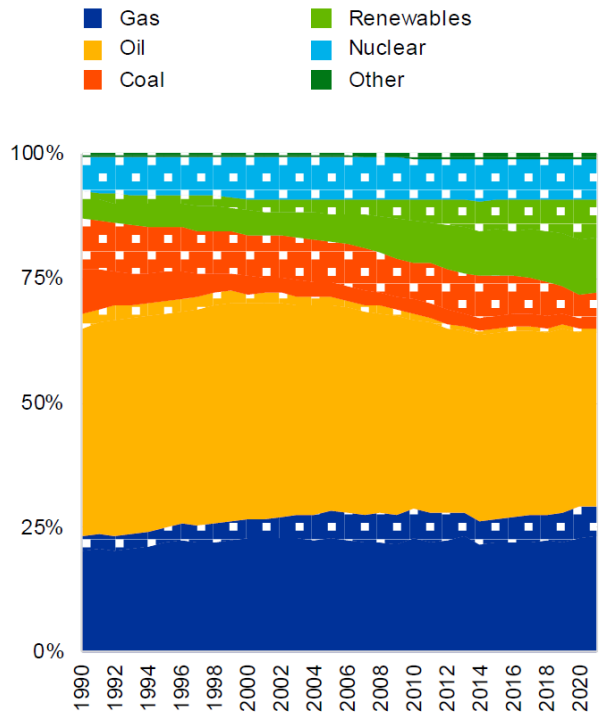
Even though the field of climate stress testing is still in its early stages, the findings of other jurisdictions' climate stress tests align with the results of this current exercise. The FSB and NGFS member institutions have already completed 35 exercises on climate scenario analysis; these vary widely in terms of methodology, level of granularity, jurisdictions in scope, horizon and climate risks covered. For abrupt transition scenarios in particular, other exercises have similarly found that climate-related risks would be concentrated within sectors, giving rise to large tail risk (Financial Stability Board, 2022). Other exercises focusing on the impact of transition risks on Italian (Faeilla et al., 2022), Dutch (Caloia et al., 2022), French (Clerc et al., 2021), and Canadian (BoC, OSFI, 2022) financial institutions find effects for credit risks that are of a similar order of magnitude to this current exercise and more pronounced in energy-intensive sectors, such as the petroleum/oil sector.

Chart 1

The EU energy mix is dominated by oil and natural gas, but the share of renewable sources has more than tripled over the last 30 years

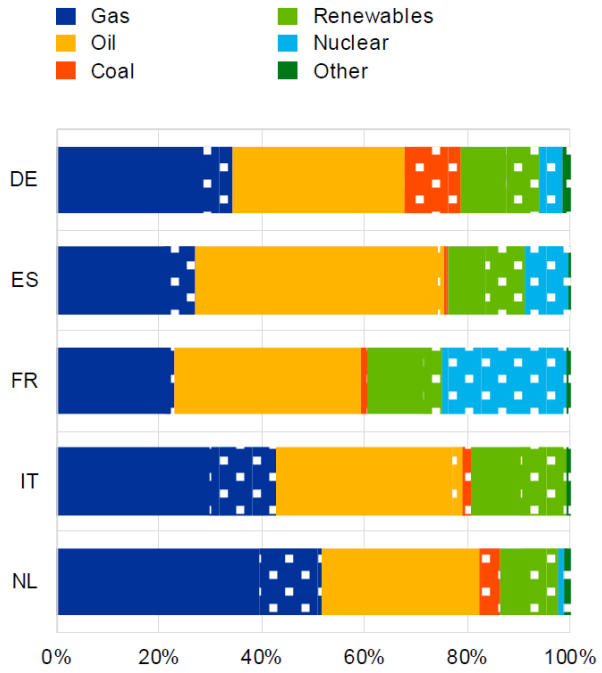
a) EU aggregate final energy consumption by source

(percentages)



b) Energy mix by country

(2021; percentages)



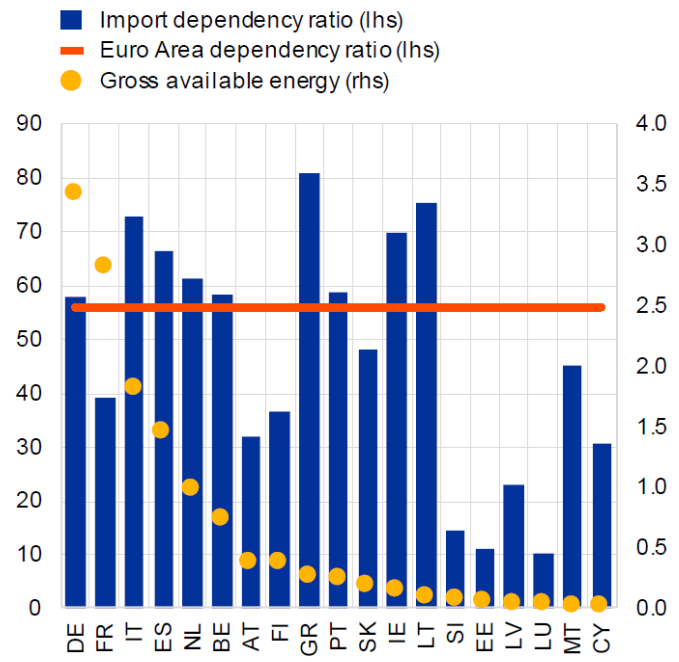
Source: ECB calculation based on Eurostat data.
Notes: Primary energy is represented by the filled areas and corresponds to energy consumed directly without transformation. Secondary energy is represented by dotted areas and is the transformation of primary sources into heat or electricity. Final energy consumption comprises both household and corporate energy consumption.

Chart 2

Until 2021, the EU strongly relied on energy imports from Russia and other non-EU countries

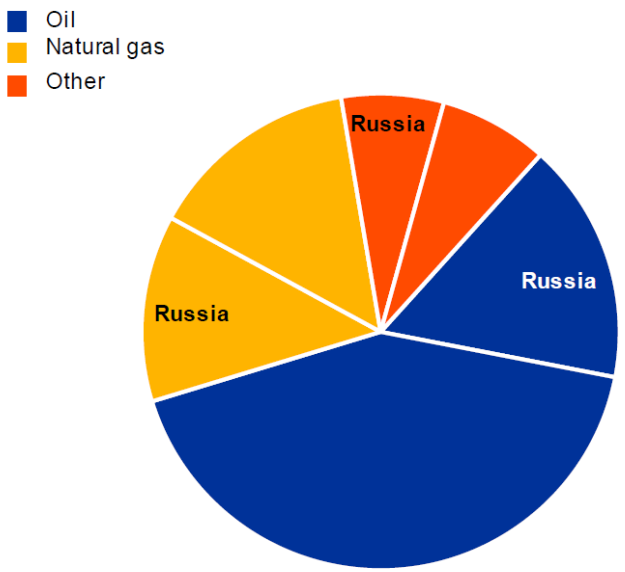
a) Energy import dependency ratio by country

(2021; LHS: percentage share; RHS: million GWh)



b) Extra-EU energy imports by energy source and by supplier country (Russia vs other extra-EU)

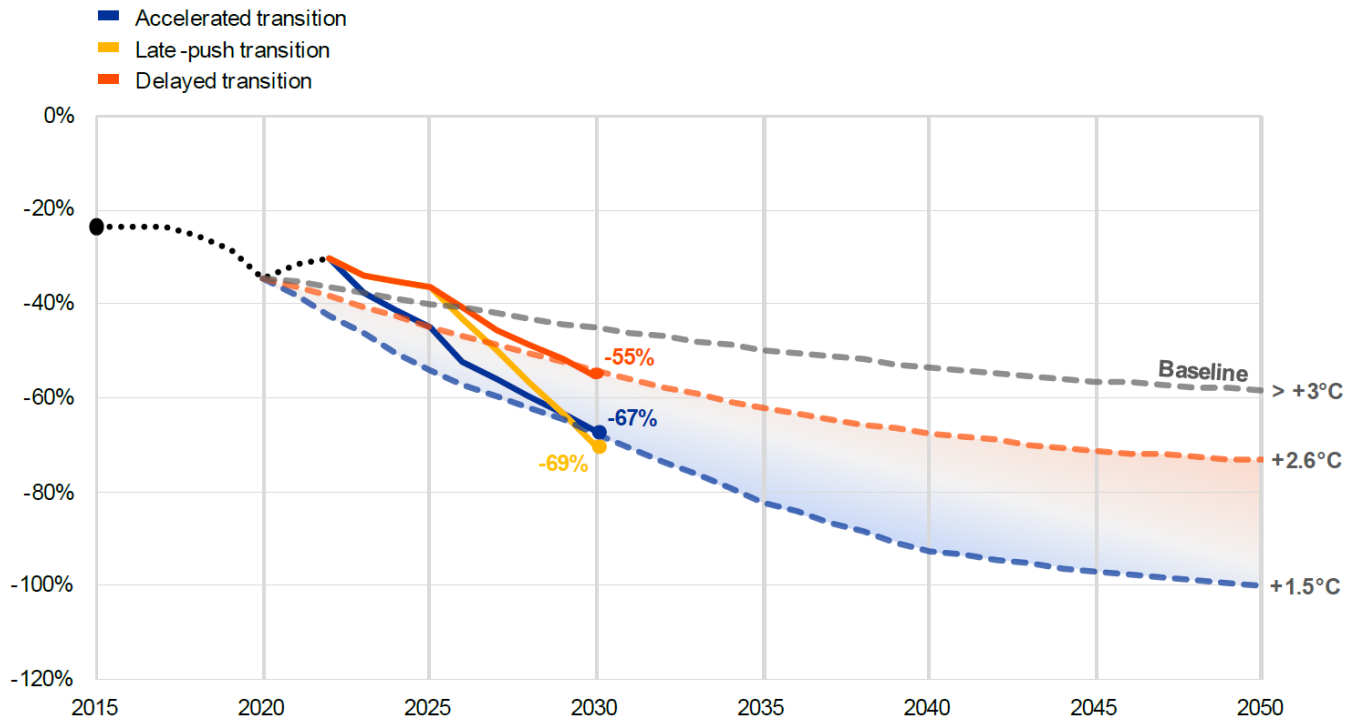
(2018-2021; annual average)



Source: ECB calculations based on Eurostat data.
Notes: LHS stands for left-hand scale. RHS stands for right-hand scale. The import dependency ratios in panel a are calculated as extra-EU energy imports minus exports divided by the sum of available energy per country. Extra-EU energy import shares are based on averages of imported energy in the net mass.

Chart 5

GHG emissions' pathways were calibrated to assess the impact of transition policies on the real economy

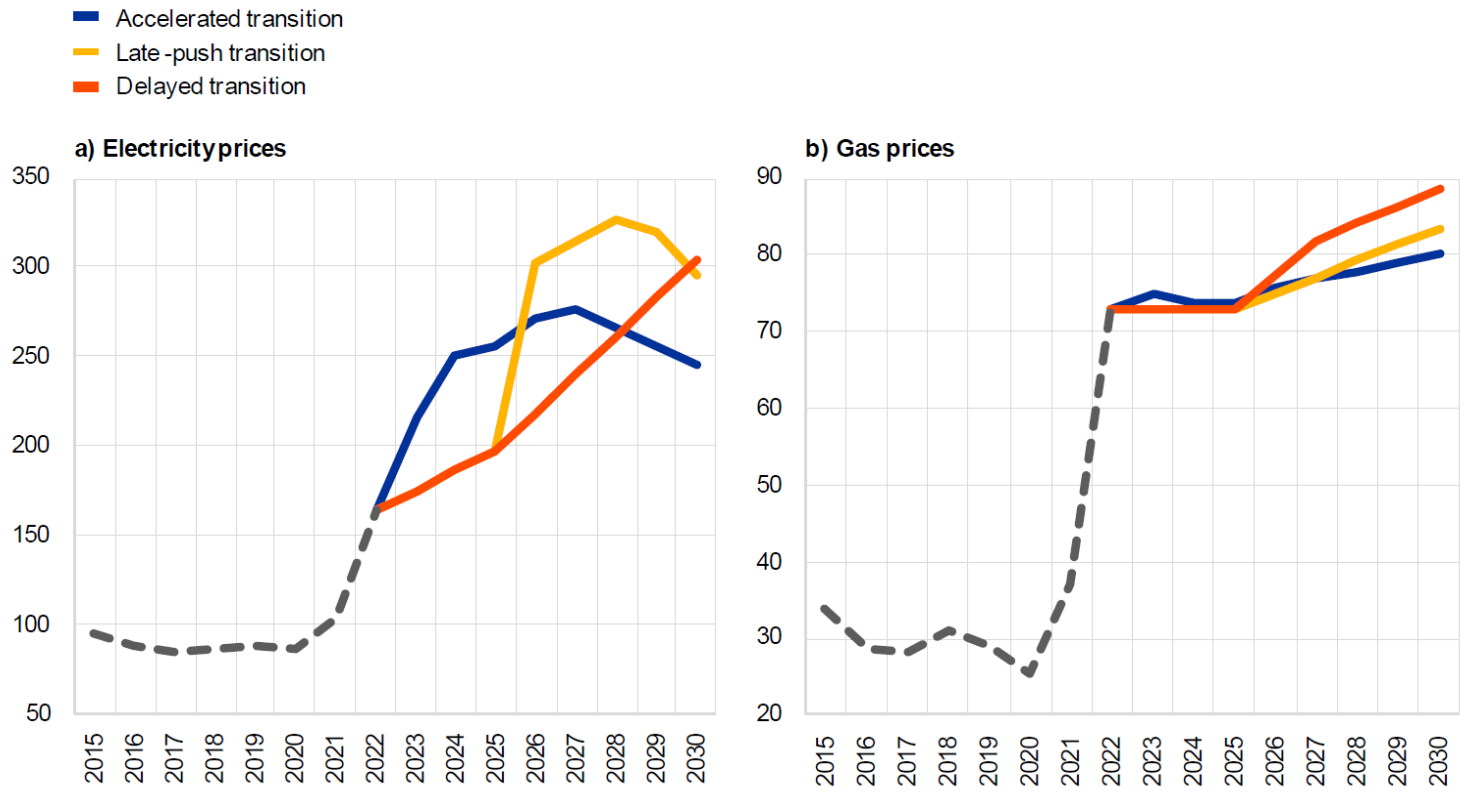


Source: ECB calculations based on European Environmental Agency (EEA), Eurostat and NGFS climate scenarios data.
Notes: Historical aggregated data on emissions were provided by the EEA and available until 2020. Quarterly emissions data for 2021 and 2022 were taken from Eurostat and aggregated at yearly frequency to complete the time series. The temperature increase refers to the year 2100. The emissions pathways until 2050 correspond to the NGFS net zero 2050 (+1.5°C), nationally determined contributions (+2.6°C) and current policies (>+3°C) scenarios.

Chart 10

Electricity and gas prices have been deeply affected by the energy crisis, with further rises expected due to green transition

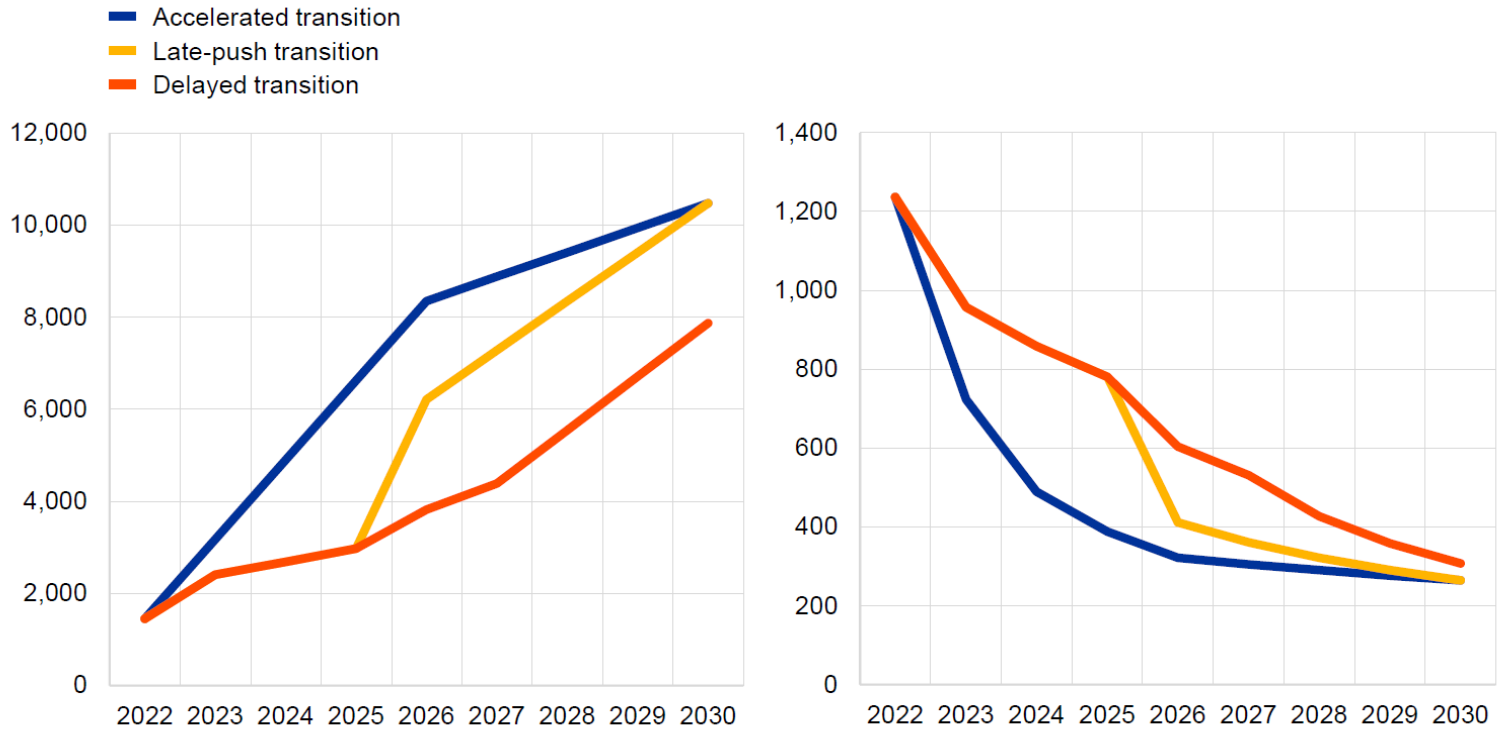
(EUR/MWh)



Source ECB calculations based on Eurostat and NGFS climate scenarios data.
Notes: The black dotted line represents historical data. For each country, Eurostat reports electricity and gas prices separately for different consumption buckets. An average for the euro area has been calculated.

b) Cumulative capacity in renewables-based electricity (LHS) and investment costs of renewable energy (RHS)

(left-hand scale: GWh; right-hand scale: USD (2021) / KWh)

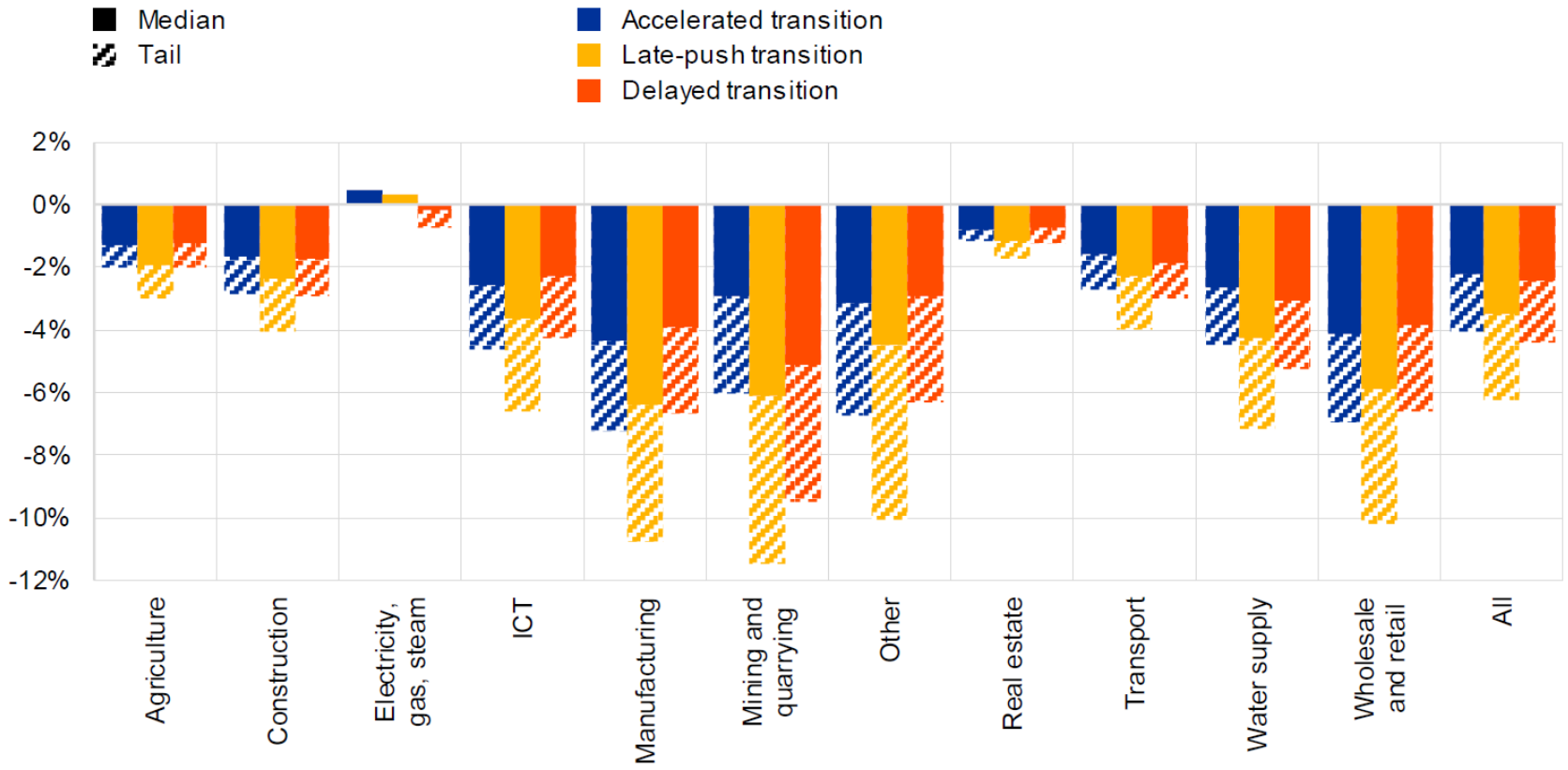


Source: ECB and ECB calculations based on Orbis, Urgentem, Eurostat, NGFS, BMPE macroeconomic projections, IRENA (2021) and IPCC (2022) data.
Notes: The costs for renewable energy capacity investment were calculated as the average costs for investment in global electricity capacity sourced from solar and onshore and offshore wind energy, weighted by the cumulative capacity of each renewable energy source in each year and scenario, and were based on global prices and capacities, on the assumption that regional prices are driven by movements in global markets. More details can be found in Annex A2.

Chart 15

By 2030 energy-intensive sectors would experience the largest deterioration in profitability due to higher energy expenses

Change in sector-level profitability due to energy expenses between 2022 and 2030
(absolute difference in percentage points)

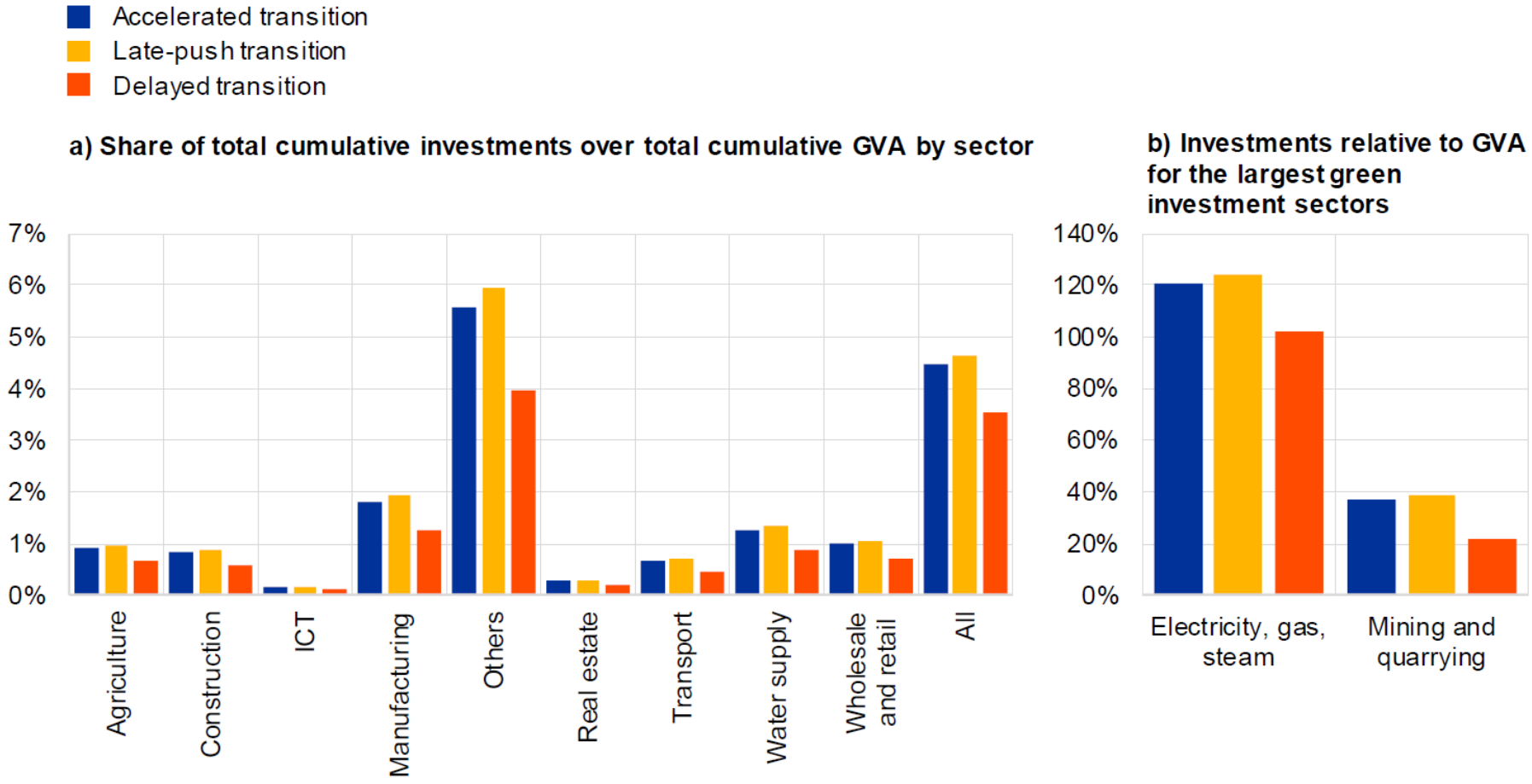


Source: ECB calculations based on Orbis, Urgentem, Eurostat and NGFS data.
Notes: Tails are defined as the 25th percentile firm in terms of profitability changes between 2022 and 2030 in each sector and scenario. Profitability is defined as the net profit (operating revenues minus operating and financial expenses) before tax over total assets. ICT stands for the Information and Communication Technology sector.

Chart 17

Green investments relative to gross value added by sector

(percentages)



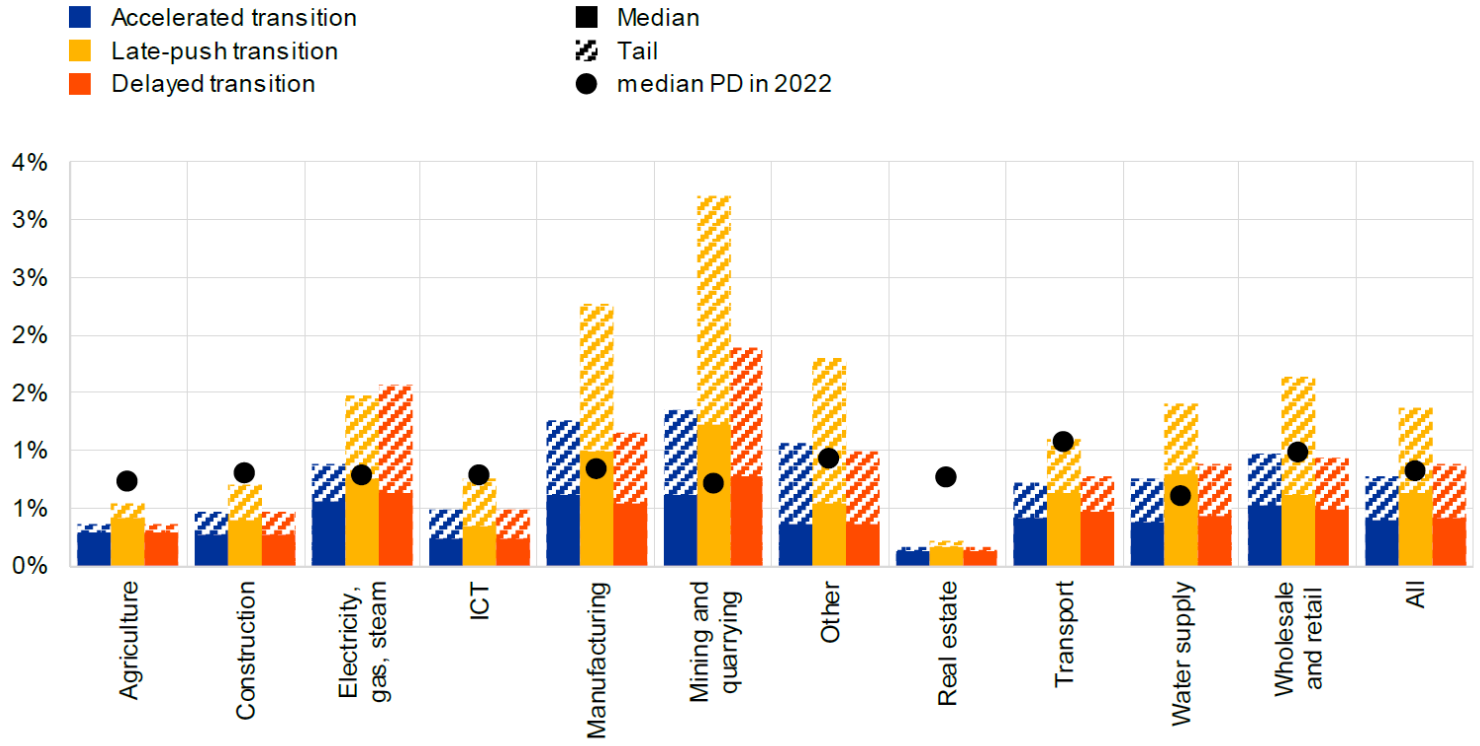
Source: ECB calculations based on Orbis, Urgentem, Eurostat, NGFS, BMPE macroeconomic projections, IRENA (2021) and IPCC (2022) data. ICT stands for the Information and Communication Technology sector.

Chart 21

By 2030 the strongest rise in probability of default would be in energy-intensive sectors

Change in sector-level probabilities of default between 2022 and 2030

(absolute difference in percentage points)



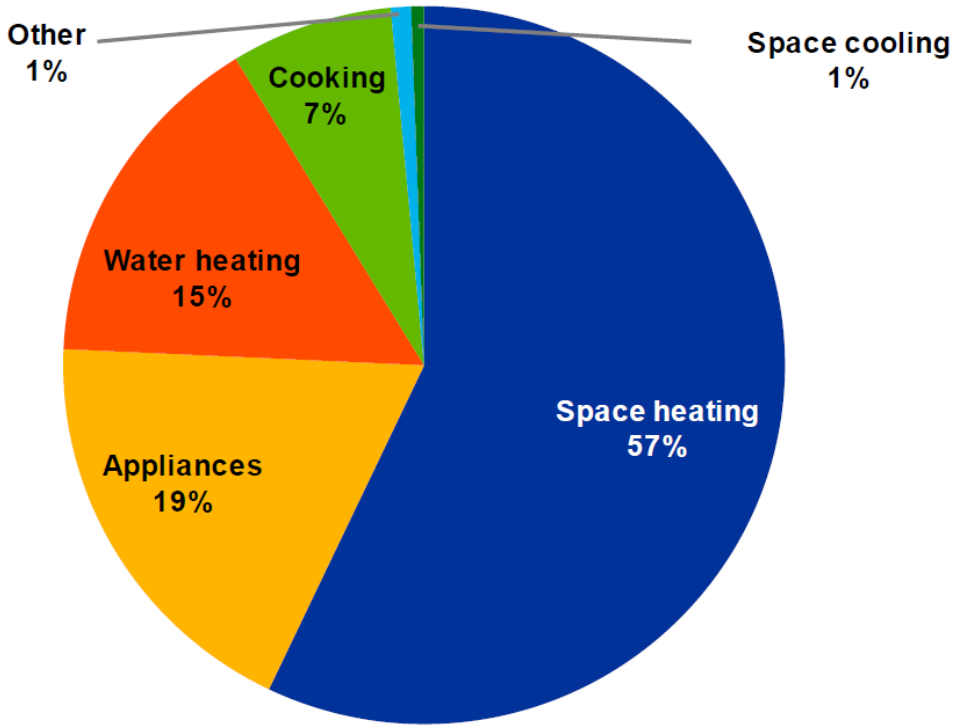
Source: ECB calculations based on Orbis, Urgentem, Eurostat, NGFS, BMPE macroeconomic projections, IRENA (2021) and IPCC (2022) data.
Note: Tails were defined as the 75th percentile of firms in terms of PD changes between 2022 and 2030 in each sector and scenario. ICT stands for the Information and Communication Technology sector.

Chart 23

Space and water heating account for most household GHG emissions

Household GHG emissions by usage

(percentages, 2020)

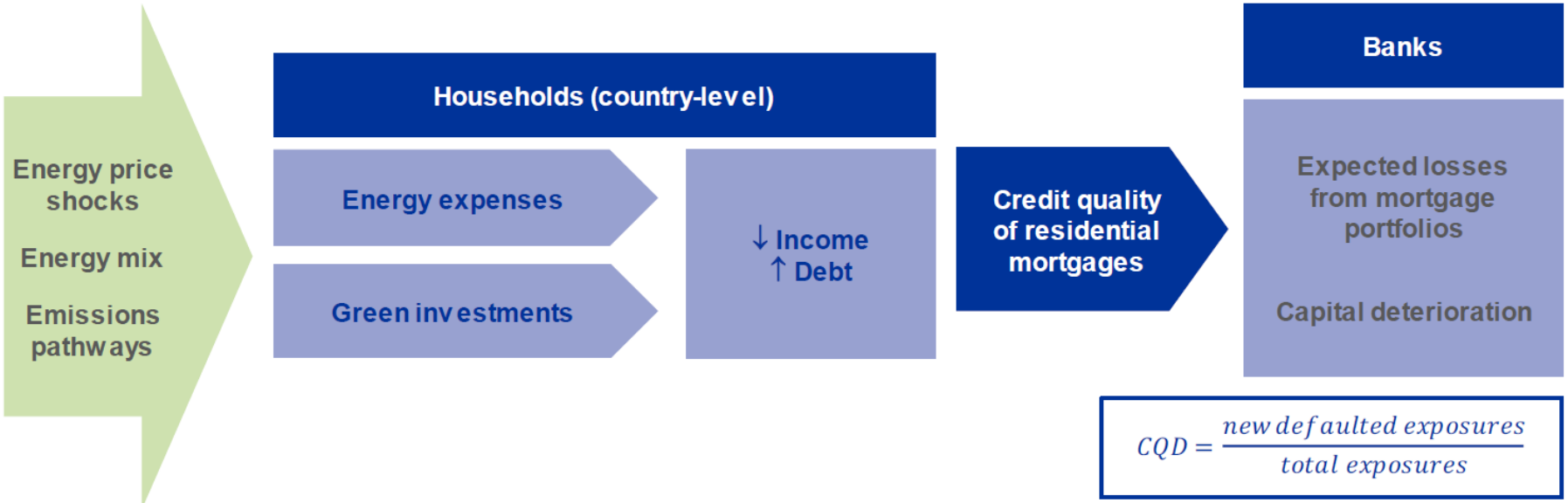


Source: ECB calculations based on Eurostat and Greenhouse Gas Protocol data.

Figure 5

Climate risk transmission to households

- **Green investment modelling** in the form of 1) increase in buildings **energy efficiency** and 2) investments into **renewable energy**
- **Energy-based modelling** based on **country level energy mix** and **households' emission pathways & models**
- **Deterioration of disposable income** due to higher energy expenses



$$CQD = \frac{new\ defaulted\ exposures}{total\ exposures}$$

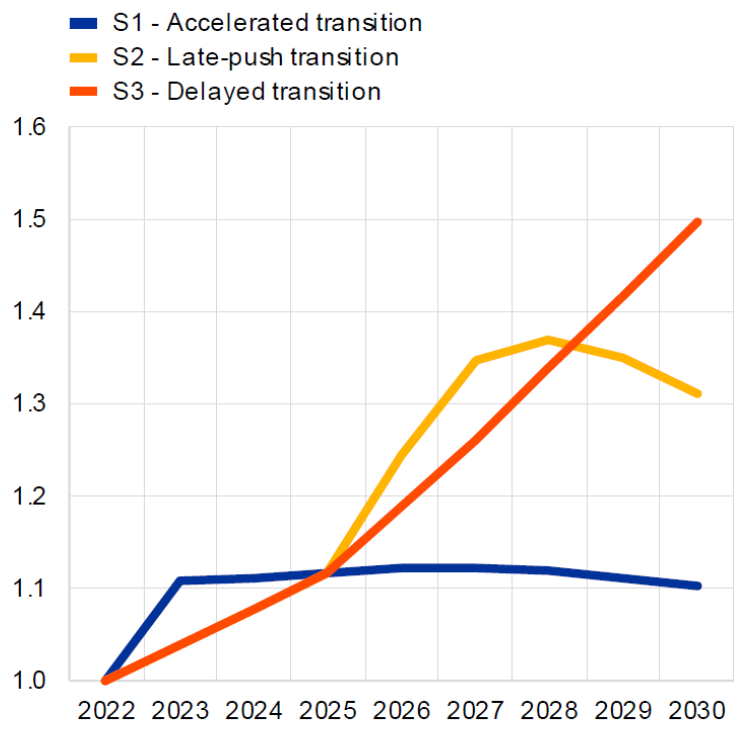
Source: ECB.

Chart 24

More ambitious emission reductions driven by timely and intense investments would lead to a greater reduction in energy expenses

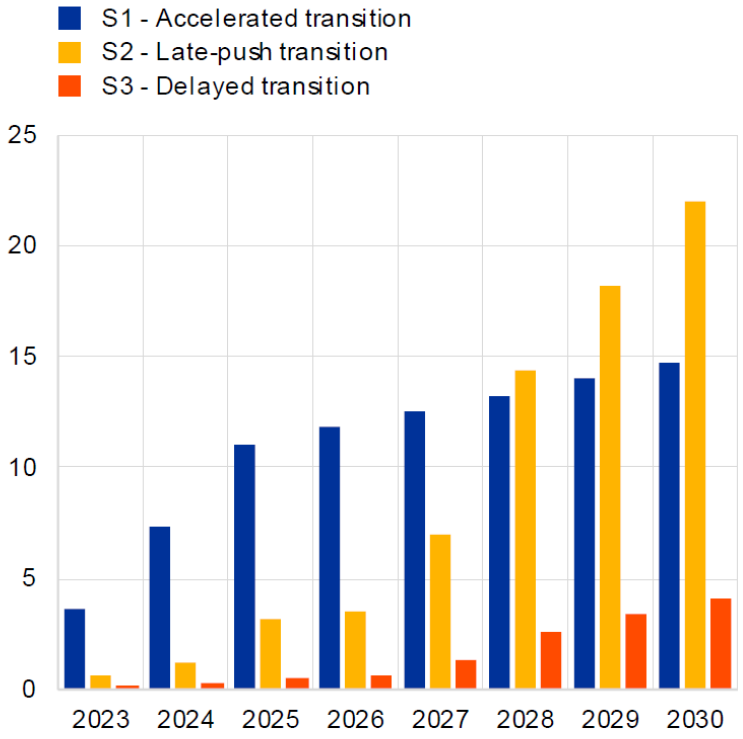
a) Euro area aggregate of households' energy expenses over the eight-year horizon

(index; 2022=1)



b) Euro area households' green investments over the eight-year horizon

(EUR billions)

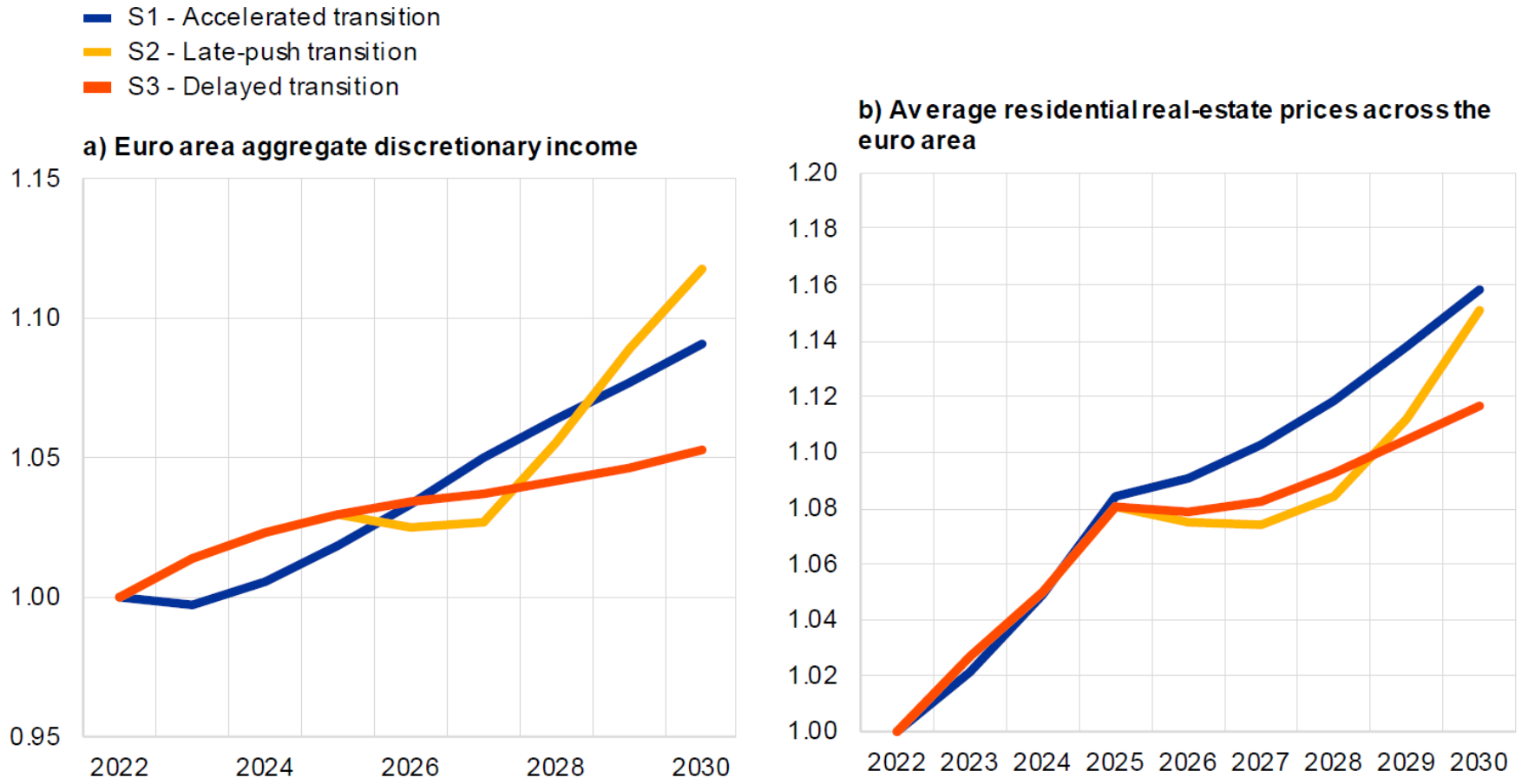


Source: ECB calculations based on ECB, Eurostat, NGFS, BMPE macroeconomic projections, Greenhouse Gas Protocol and IPCC (2022) data.
Notes: Panel b displays the euro area cumulative investments across time. They represent the debt taken on by euro area households under all three scenarios between 2023 and 2030, net of the repayments.

Chart 25

Green investments would affect income and residential real-estate prices

(index; 2022=1)



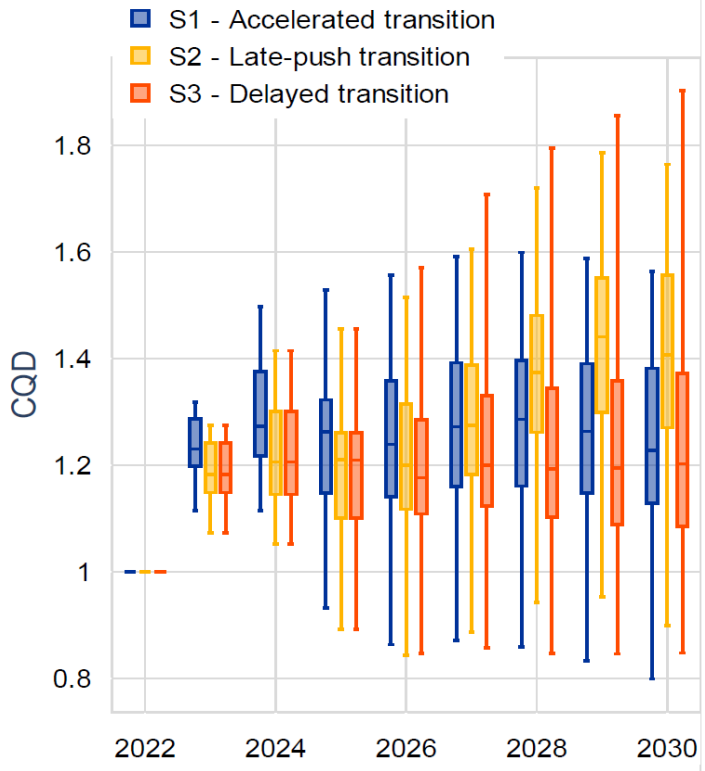
Source: ECB calculations based on ECB, Eurostat and NGFS data.

Chart 26

Household portfolio credit quality deterioration would be almost double under a late-push transition than under the other transition scenarios

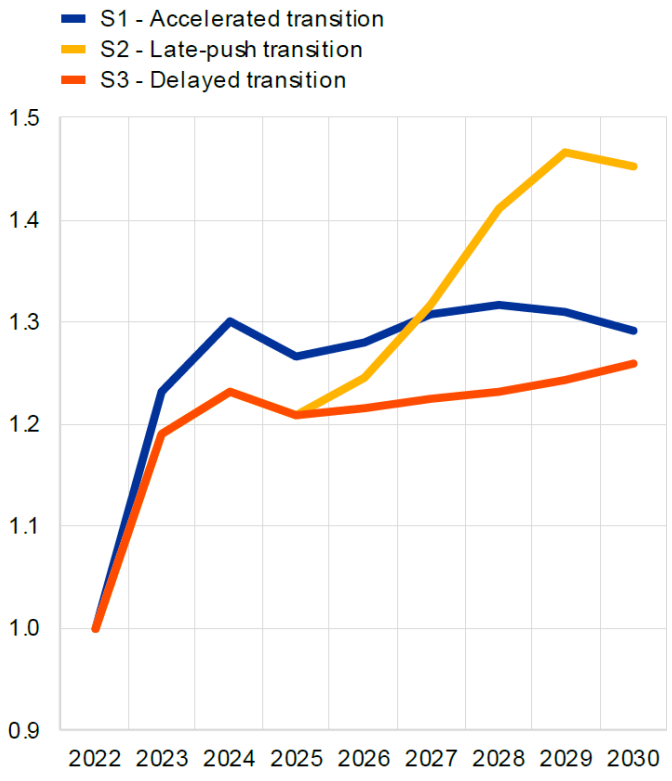
a) Distribution across countries

(index; 2022=1)



b) Euro area average credit quality deterioration index

(index; 2022=1)



Source: ECB calculations based on ECB, Eurostat, NGFS, BMPE macroeconomic projections, Greenhouse Gas Protocol and IPCC (2022) data.
Notes: CQD stands for credit quality deterioration. The chart excludes outliers with an indexed CQD above the 95% percentile and below the 5% percentile of the distributions.

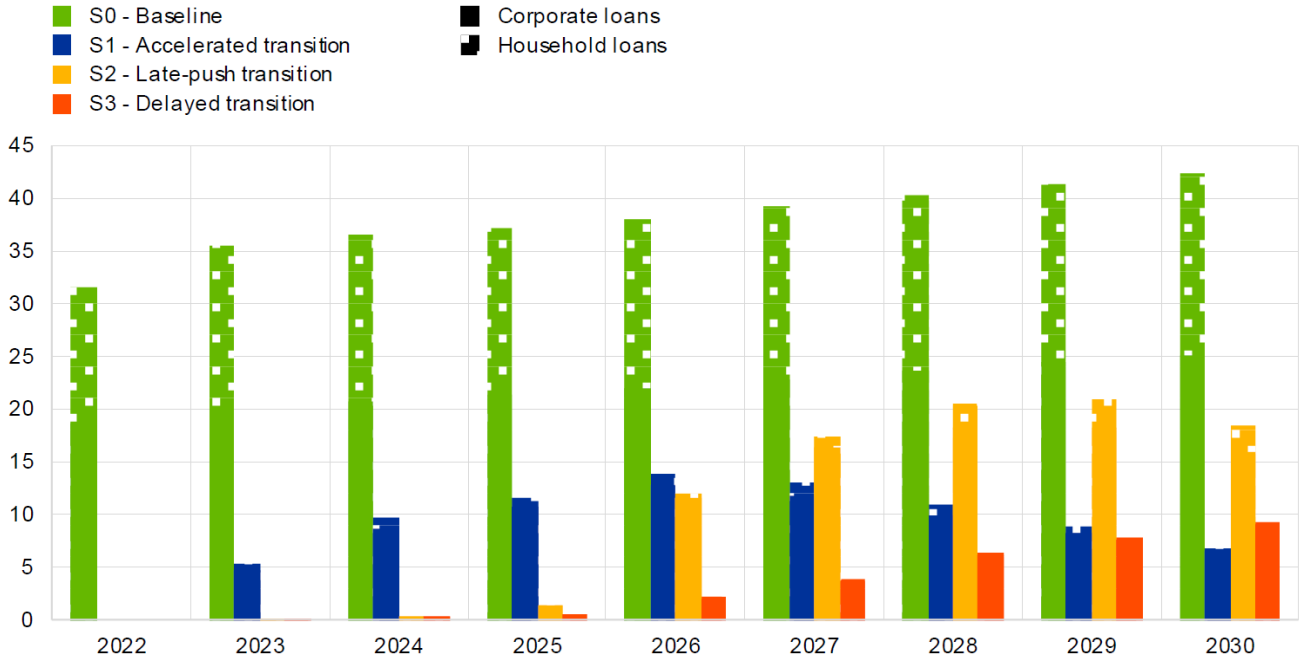
Transition risk would be of varying magnitudes across scenarios and time, and banks most exposed to transition risk would face large increases in expected losses until 2030. The late-push transition scenario would generate the highest annual expected losses from transition risk across scenarios and time, peaking at €21 billion in 2029 (**Chart 32**), exacerbated by baseline losses due to macroeconomic developments and current climate policies (green bars in Chart 31)[49]. Under the accelerated transition scenario, annual expected losses would rise sharply in 2023 and peak at €13 billion in 2026, before declining to €6.6 billion by 2030. Under the delayed transition scenario, expected losses would increase by €9 billion until the end of the projection period, due to milder transition efforts, but would be expected to increase further after 2030, due to greater long-term transition and physical risks than under the accelerated and late-push transition scenarios.

Chart 32

Expected losses would vary substantially across time and scenarios

Annual expected losses on corporate and household loans by scenario and year

(EUR billions)



Source: ECB calculation based on ECB, AnaCredit, Orbis, Urgentem, Eurostat, NGFS, BMPE macroeconomic projections and IRENA (2021) data.
Notes: The shaded areas show the share of expected losses stemming from household exposures. The green bars show the baseline losses stemming from the current policies and macroeconomic effects. The blue, yellow and orange bars show the expected losses due solely to transitional efforts under transition scenarios S1, S2 and S3. Thus, the total sum of expected losses under S1, S2 and S3 is the sum of the green bars and the corresponding blue/yellow/orange bars. Losses from corporate loans represent 80% of total AnaCredit exposures.

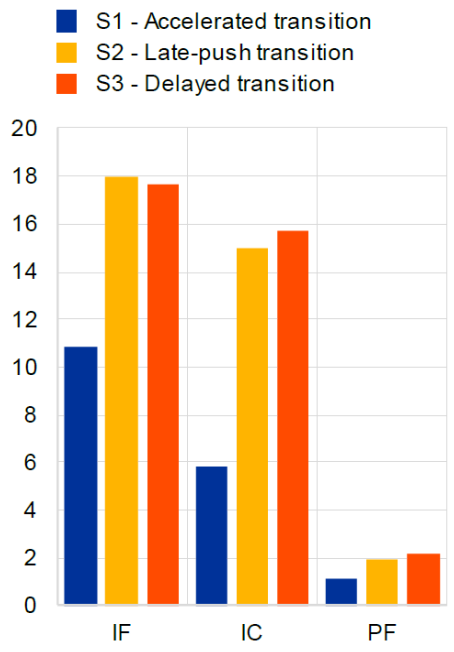
The estimates suggested a substantial market risk impact for non-bank financial institutions, with variation between sectors and countries. Across all three scenarios, the absolute losses of investment funds would range from around 10 to 18 € billion, while the estimates for losses for insurance corporations would amount to around 6 to 16 € billion. The losses of pension funds are estimated to be between 1 and 2 € billion in each scenario (**Chart 37**, panel a). Relative to the size of

Chart 37

Absolute and relative losses by type of non-bank financial institution in 2030

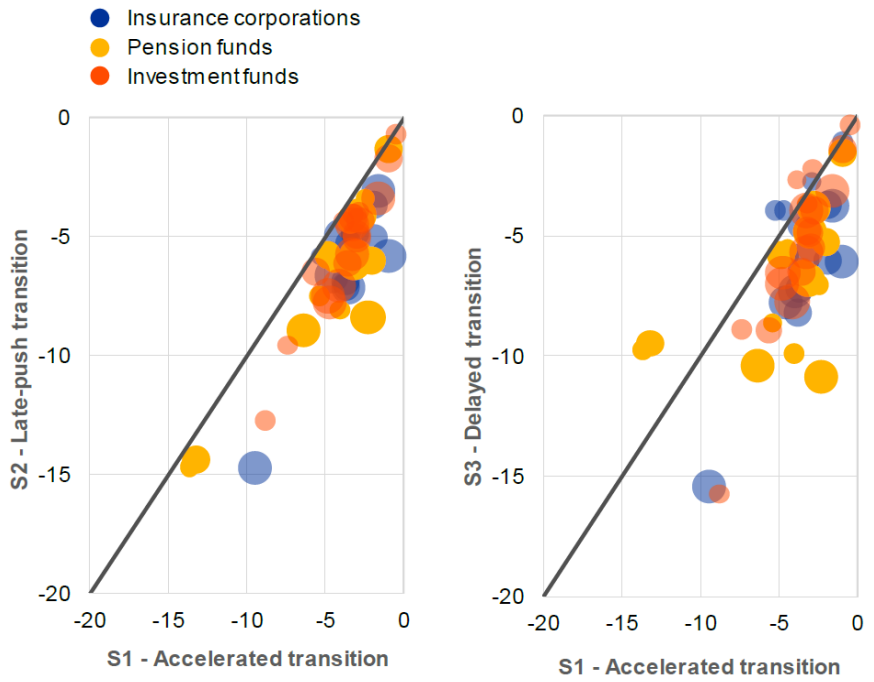
a) Absolute losses by non-bank financial institution

(EUR billions)



b) Relative losses by country, sector and scenario

(percentages)



Source: ECB calculations based on SHSS and CSDB data.
Notes: In panels b.1 and b.2 the size of the bubbles represents the size of the corporate bond portfolio relative to the sector. determine the size of an individual bubble, countries within individual non-bank sectors are separated into three groups based on the size of the corporate bond their portfolios using terciles. The size of the bubble corresponds to the group.

3. Corso Formazione in materia di Imprese di Assicurazione

Agenda per Corso Formazione in materia di Imprese di Assicurazione (in presenza)

Introduzione al Corso e presentazione (1g) 2h

Il Sistema di Governo e la regolamentazione del settore: (3gg da 3h)

- Introduzione e presentazione del mercato assicurativo e le sue peculiarità 1h
- Il Codice delle Assicurazioni Private: Cenni 1h
- I Principali regolamenti in materia di Governo Societario:
    - Il Regolamento IVASS nr. 38 in materia di governo Societario 2h
    - Il Regolamento IVASS nr. 24 in materia di investimenti 1h
    - Il Regolamento IVASS nr. 40 in materia di distribuzione assicurativa 1h
    - Il regolamento IVASS nr. 45 in materia di prodotti assicurativi (POG) 1h
    - L'impatto ESG sul comparto assicurativo 1h
    - Il ruolo dell' Autorità di vigilanza e gli strumenti di intervento 1h

Le specificità contabili: gli schemi di bilancio assicurativi (con cenno agli aspetti fiscali relativi alle imposte dirette) e IFRS 17 (3gg da 2,5h)

- Illustrazione sui principali comparti di attività del comparto assicurativo 1h
- Gli schemi di bilancio dell'impresa di assicurazioni
    - Il comparto Vita 1h
        - Schema di Conto Economico
        - Schema di Stato Patrimoniale
        - Le riserve tecniche Vita
        - Gli investimenti
    - Il comparto Danni 1h
        - Schema di Conto Economico
        - Schema di Stato Patrimoniale
        - Le riserve tecniche Vita
        - Gli investimenti

Il sistema di gestione di rischi e le regole di determinazione della solvibilità dell'impresa (3gg da 2h)

- Il framework di Solvency II 1h
  - Fonti normative
  - L'assetto complessivo
  - Il raffronto tra metriche Solvency e contabili
- Il Pillar I, il calcolo del Solvency Ratio 2h
  - I principali moduli di calcolo (market, sottoscrizione vita e danni, la diversificazione)
  - Le LAC DT e le LAC TP e volatility adjustment
  - Gli Own Funds
- Il Pillar II 2h
  - Il risk Appetite Framework, il sistema di escalation ed il Contingency Plan, l'ORSA report
  - Rischi ESG e cenni sul Cyber Risk
- Il Pillar III 1h
  - I QRT e la reportistica obbligatoria

Conclusioni e dibattito con tavola rotonda (da valutare la possibilità di ampliare la platea) (1g) 2h

4. Attività formative

In progettazione

1. ELTIF2 e impatti su economia ed industria finanziaria;
2. Macro – Micro: da definire

Riunioni programmate per il 2023

1. ~~Martedì 17 gennaio, ore 18,00 – MS Teams~~
2. ~~Giovedì 16 febbraio, ore 18,00 – MS Teams~~
3. ~~Martedì 21 marzo, ore 18,00 – In presenza~~
4. ~~Martedì 18 aprile, ore 18,00 – MS Teams~~
5. ~~Martedì 16 maggio, ore 18,00 – MS Teams~~
6. ~~Martedì 4 luglio, ore 18,00 – In presenza~~
7. ~~Martedì 12 settembre, ore 18,00 – MS Teams~~
8. **Martedì 17 ottobre, ore 18,00 – MS Teams**
9. Martedì 14 novembre, ore 18,00 – MS Teams
10. Martedì 12 dicembre, ore 18,00 – In presenza

5. Varie ed eventuali