

ECONOMIC AND FINANCIAL IMPLICATIONS OF CLIMATE CHANGE

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Governor

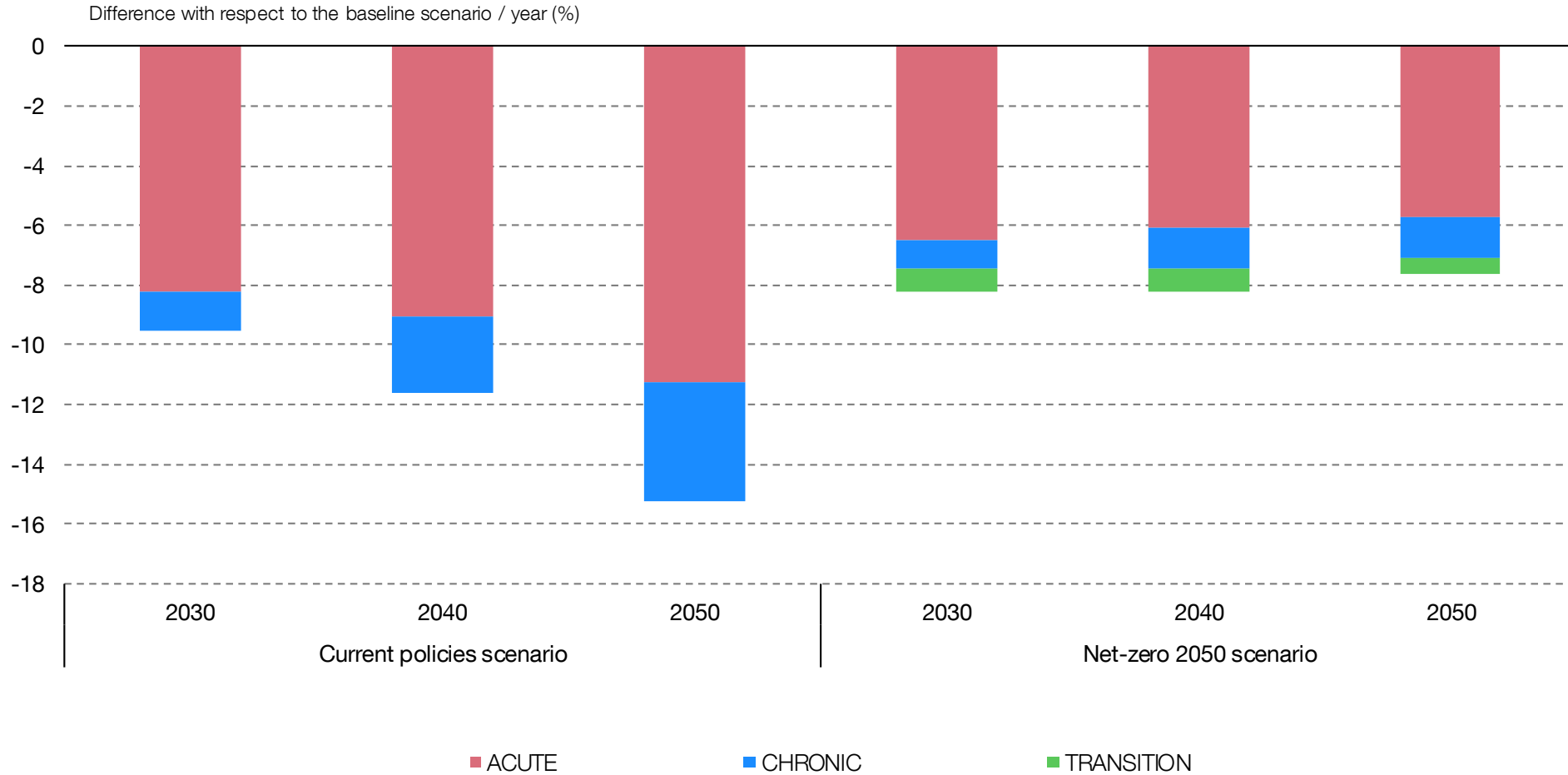
CLUB ÚLTIMA HORA - CERCLE D'ECONOMÍA DE MALLORCA

Palma de Mallorca

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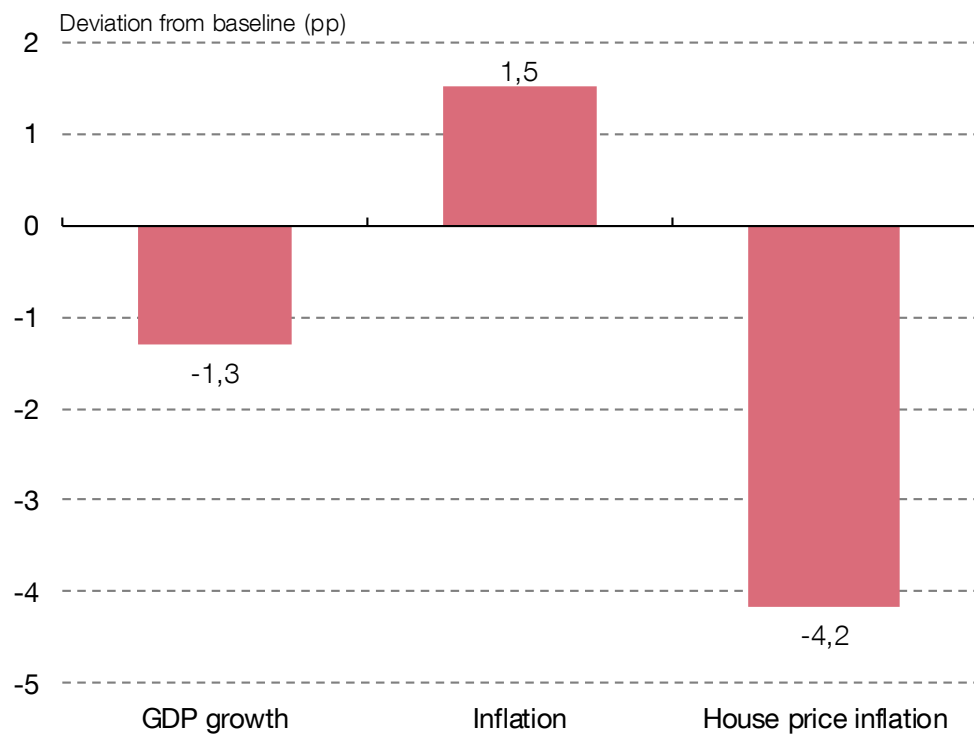
SPAIN: IMPACT OF CLIMATE CHANGE ON GDP (a)



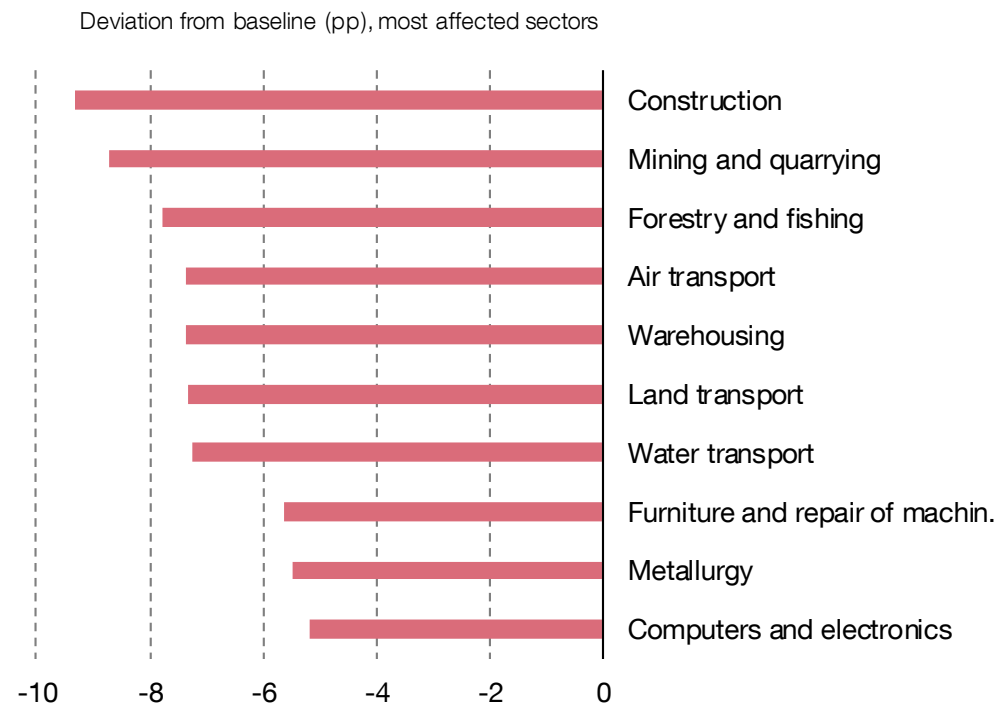
Sources: NGFS and Banco de España.

(a) The data refer to [Phase IV of the NGFS scenarios](#). The charts shows the impact on GDP under different scenarios, against a hypothetical (and impossible) baseline scenario in which physical and transition risks do not materialise. This baseline scenario assumes a world without climate change. Thus, climate change has a negative impact on GDP in every plausible scenario, but the extent of the losses differs from one scenario to another.

MACROECONOMIC IMPACT (a)



IMPACT ON SECTORAL REAL GROSS VALUE ADDED (a)

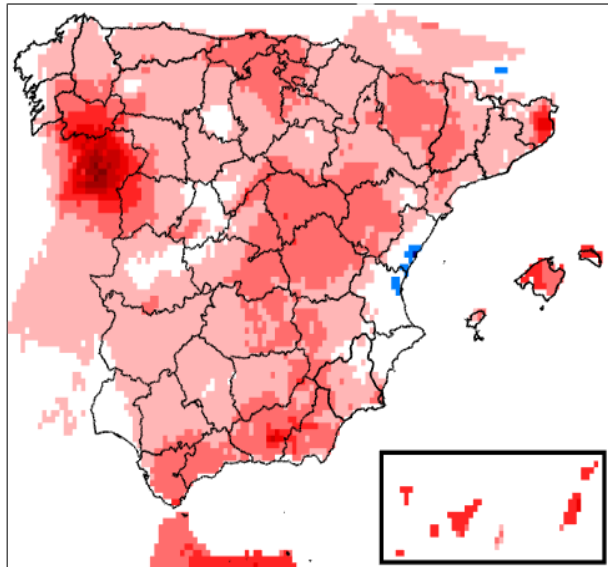


Sources: NGFS and Banco de España.

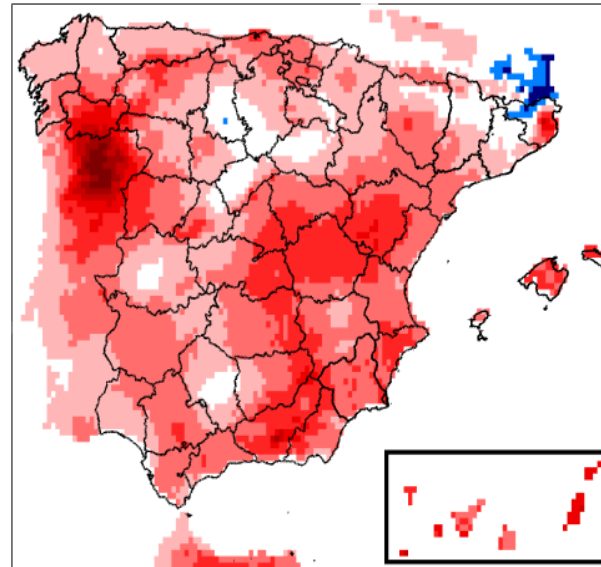
(a) Figures for the aggregate and sectors of the Spanish economy. Impacts are defined as the differences with respect to a trend baseline scenario in growth rates at the one-year horizon (t+1). The impacts have been estimated by the Banco de España in line with the ECB/ESRB narrative and sectoral shocks envisaged in the drought and heatwave scenario.

- Aridity is being driven by rising temperatures and declining precipitation. Research into its relationship with economic and financial decision-making is thin on the ground. One ongoing study combines central credit register data with data on the geographical location of arid regions.
- Spain's average aridity has been on the rise since the 1970s, albeit unevenly across the regions.

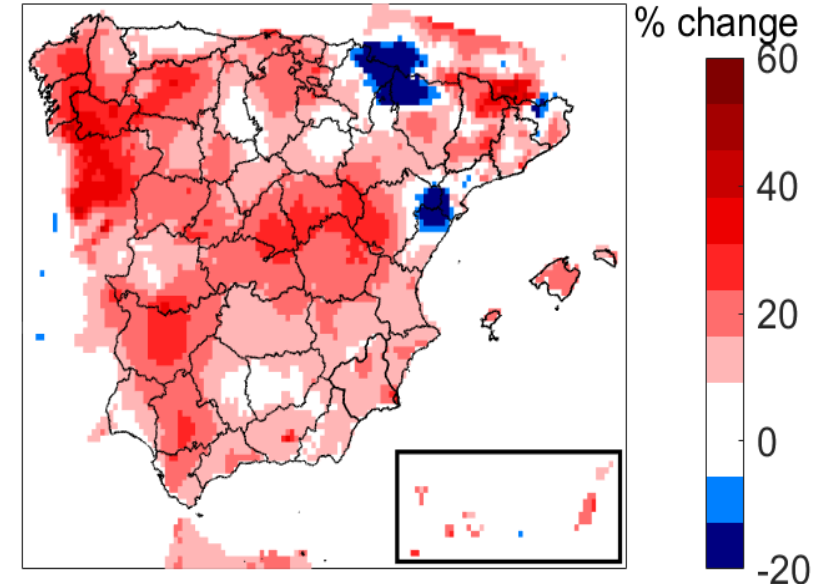
1970-1979 vs.1980-1989



1970-1979 vs.1990-1999



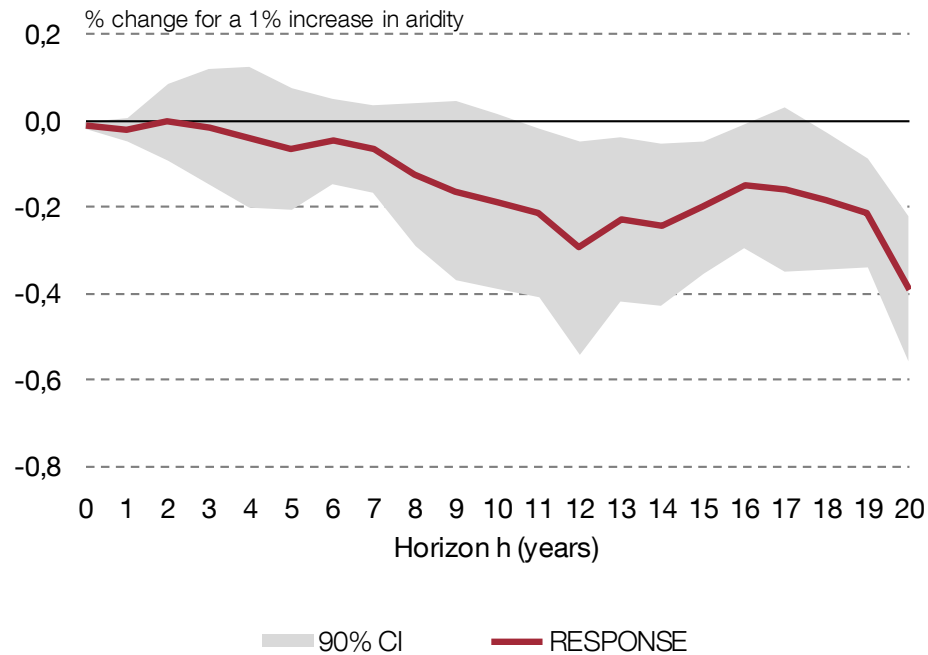
1970-1979 vs.2010-2019



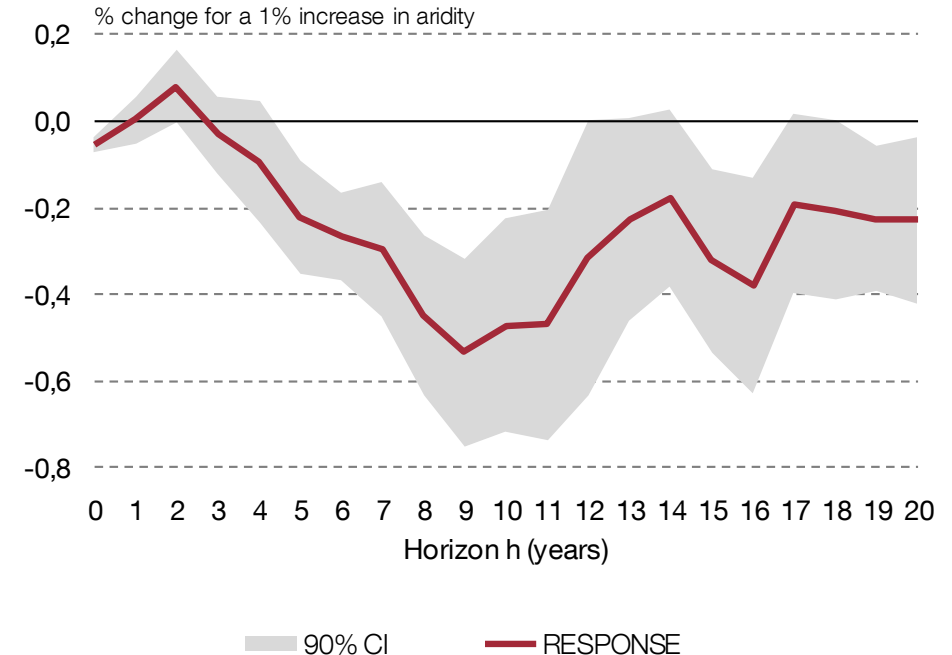
... WHICH IS ASSOCIATED WITH A LOWER VOLUME OF LENDING TO FIRMS WITH AN UNEVEN IMPACT ACROSS THE DIFFERENT SECTORS

- Aridity has a negative impact on lending volumes, although it typically takes a significant period of time before the full effect is observed.
- Overall lending declines -20 bp for each 1% increase in aridity. The agricultural and real estate sectors are particularly affected, whereas tourism has proved relatively impervious so far.

OVERALL LENDING



LENDING TO THE AGRICULTURE AND FISHERIES SECTOR

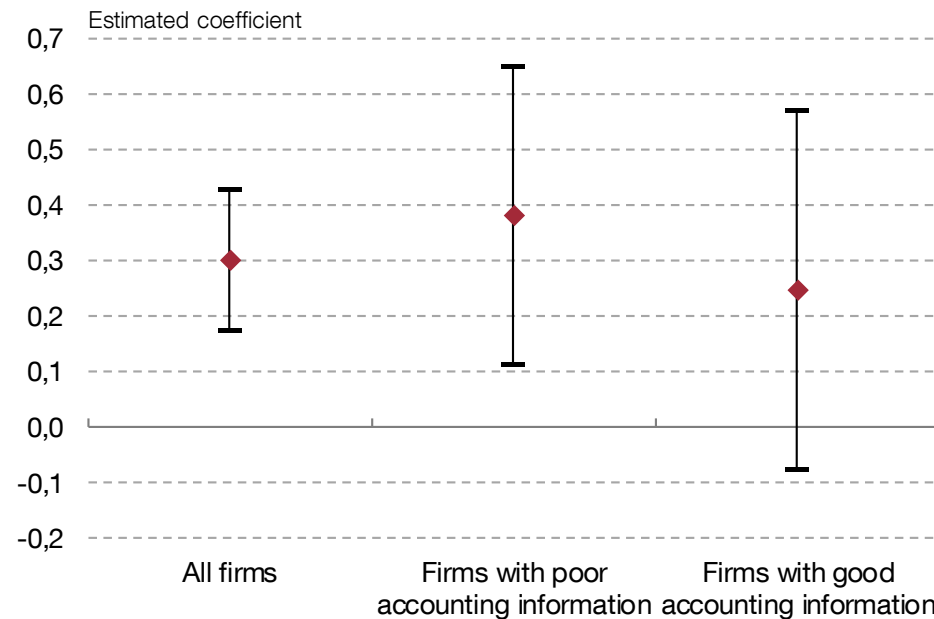


Source: Banco de España.

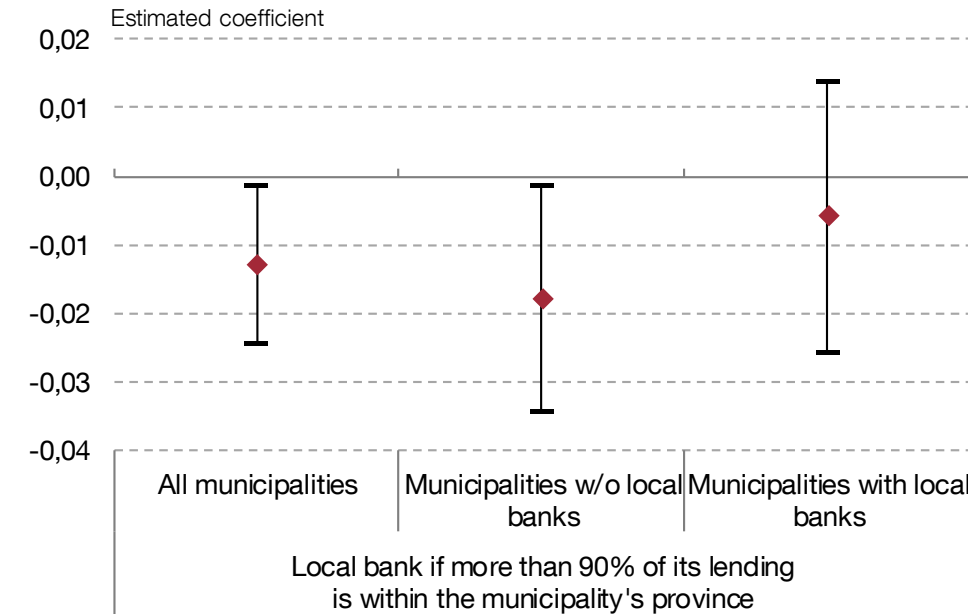
Note: The impulse-response figures depict the percentage response of lending per capita to NFCs after a shock of a 1% increase in the aridity index, estimated using local projections. The model is estimated as a municipality-year panel and includes province, year and province-year fixed effects. Standard errors are clustered at the provincial level and are heteroskedasticity-autocorrelation (HAC) robust.

- Local banks have greater access to qualitative information on firms and are therefore better placed to monitor the effect of wildfires on firms with scant accounting information.
- The effects of wildfires on employment are also mitigated for firms domiciled in municipalities with active local banks.

CHANGE IN CREDIT SUPPLY BY LOCAL BANKS AS COMPARED WITH OUTSIDER BANKS AFTER A WILDFIRE (a) (b)



CHANGE IN FIRM EMPLOYMENT (a)



Source: L. Álvarez-Román, S. Mayordomo, C. Vergara-Alert and X. Vives. (2024). Documento de Trabajo - Banco de España. Forthcoming.

(a) Including wildfires with a burned area of 500 hectares or more in Spain between 2004 and 2017. Includes firms located within 10 km and those between 20 km and 40 km from a wildfire. A firm is deemed to be affected if it is less than 10 km from a wildfire. The bands represent the 90% confidence interval.

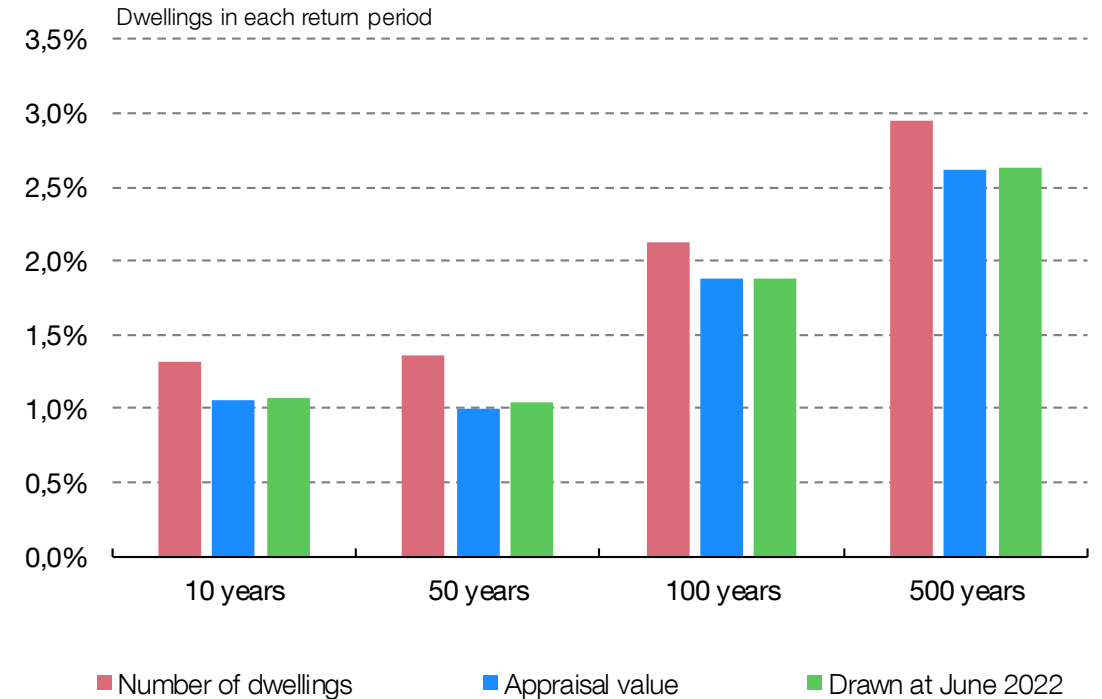
(b) The explanatory variable is the interaction between a dummy variable that is equal to one if the firm was affected by wildfire in year t and the proportion of credit from bank b in December of year $t-1$ in the province where the firm is located. Given that the quality of firms' accounting information has a bearing on lenders, that accounting quality is proxied using the predictability of firms' earnings. Thus, a distinction is drawn between firms with poor accounting information and those with good accounting information. Firms with poor (good) accounting information are those whose earnings predictability is in the bottom (top) quintile of the distribution of the sample firms.

- 1.3% of dwellings pledged as mortgage collateral are located in areas at risk of flooding over a ten-year horizon. This proportion rises to 2.7% over a 50-year horizon and 7.7% over a 500-year horizon.
- However, unless climate change is averted, these frequencies could increase. Furthermore, if current appraisals fail to take these risks fully into account, there is greater probability of abrupt appraisal changes when the risks materialise.

FLOOD-PRONE AREAS IN SPAIN



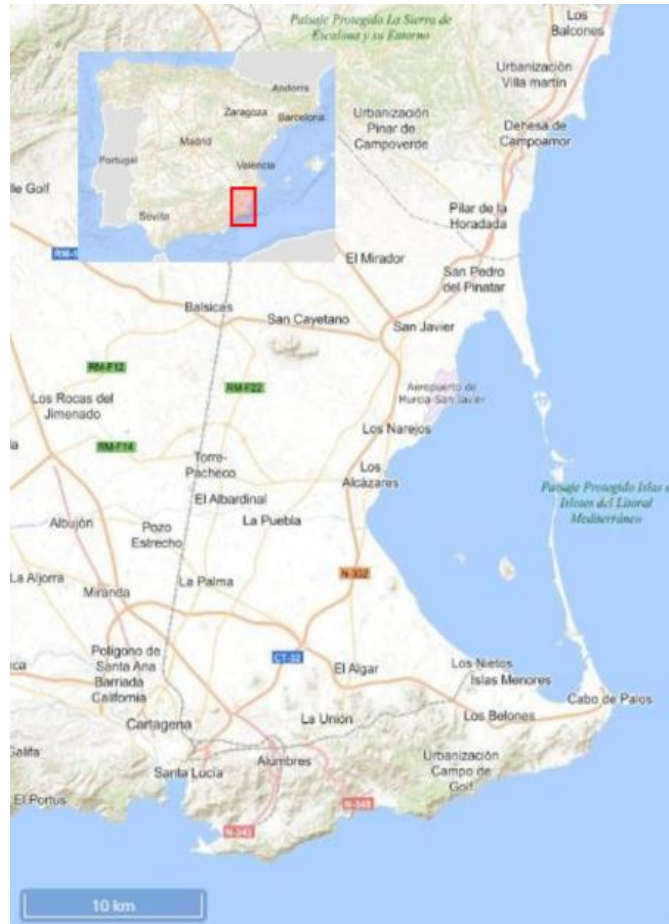
DISTRIBUTION OF DWELLINGS WITH ASSOCIATED BANK DEBT (IN THE CCR) IN FLOOD-PRONE AREAS (a)



Source: Banco de España.

(a) The sample comprises loans to households (i) registered in the CCR at June 2022, (ii) whose collateral is a dwelling and (iii) whose geographical location can be identified from the cadastral reference (approximately 60% of such loans). The Basque Country and Navarre are not included as their cadastral information is not available.

- The Mar Menor, located in Murcia (in the south-east of Spain), is Europe's largest salt-water lagoon with a surface area of 135 square km.
- It is a major tourist destination, with 7,500 hotel bed places in the surrounding area and annual visitor numbers of over 200,000.

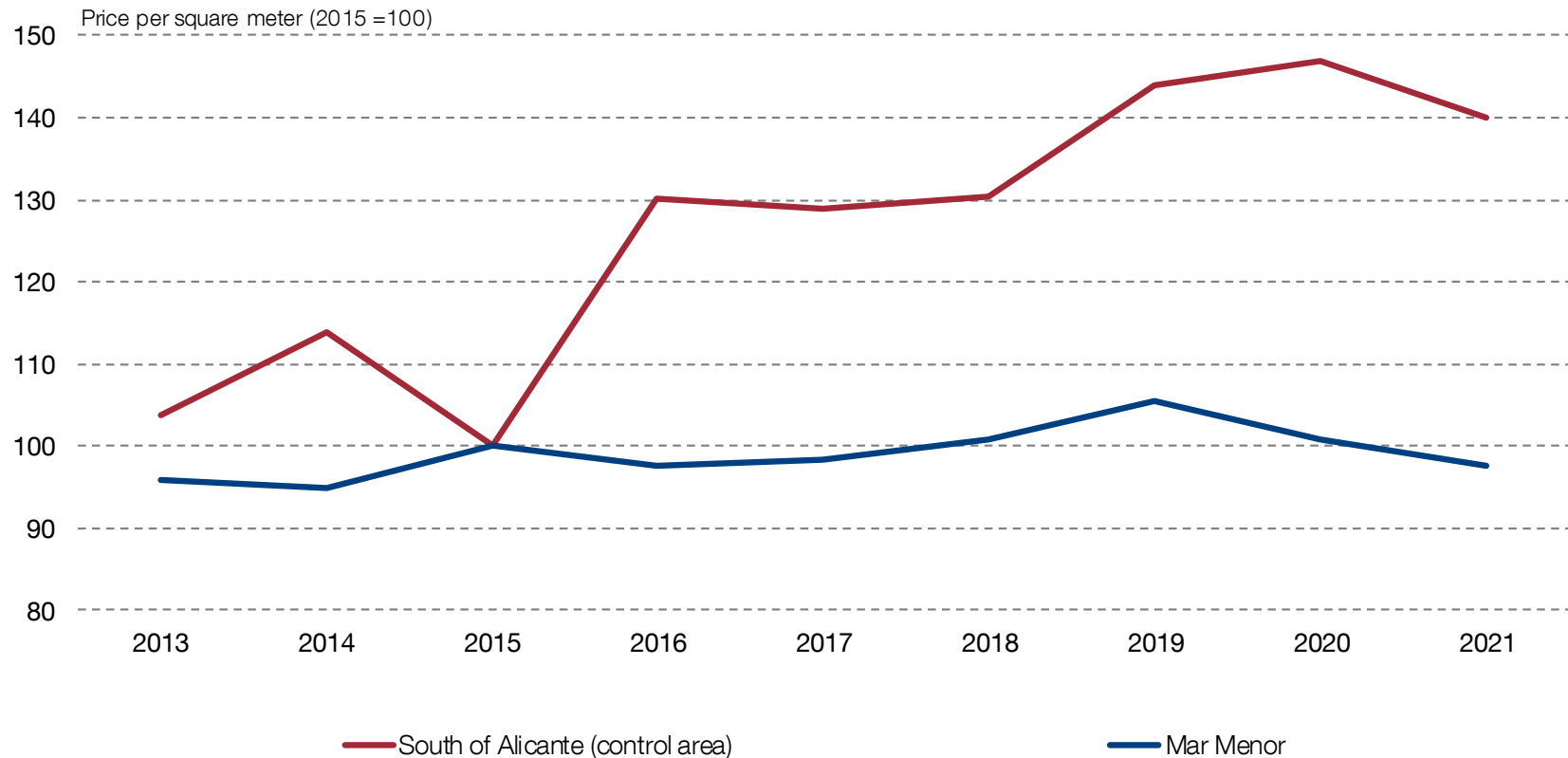


- Environmental degradation has been driven by urban development, tourism and, above all, a shift from dry-farming to irrigated crops in the surrounding areas.
- The area is prone to frequent flooding and extreme temperatures, which, in a deteriorated environment such as the Mar Menor, have also driven changes in the nitrogen and phosphorus cycles, fostering eutrophication, algal blooms (green soup) and fish die-off.

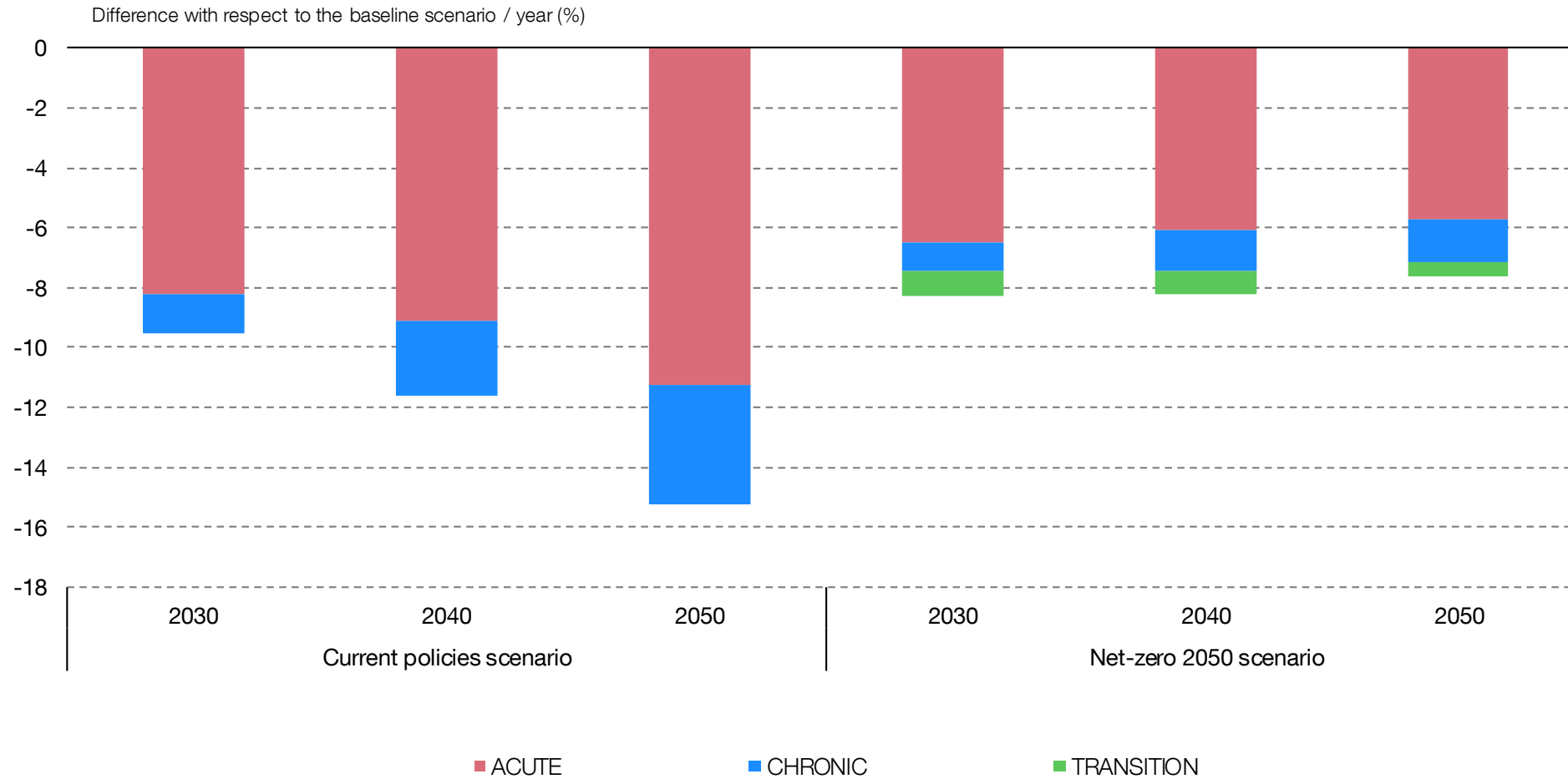


- Since 2015, the return on housing investment in the Mar Menor region has been 43% lower than in comparable surrounding areas.
- The loss in value of housing wealth amounted to more than €4 billion, around ten times the gains obtained by changing from dry-farming to irrigation crops.

IMPACT ON HOUSING PRICES OF SEVERE ENVIRONMENTAL DEGRADATION



SPAIN: EFFECT OF CLIMATE CHANGE ON GDP (a)



Sources: NGFS and Banco de España.

(a) The data refer to [Phase IV of the NGFS scenarios](#). The charts shows the impact on GDP under different scenarios, against a hypothetical (and impossible) baseline scenario in which physical and transition risks do not materialise. This baseline scenario assumes a world without climate change. Thus, climate change has a negative impact on GDP in every plausible scenario, but the extent of the losses differs from one scenario to another.

- Carbon pricing raises the cost of GHG-intensive goods and services and thus reduces the demand for these, but may also have an adverse impact on activity.
- Using the revenues generated by these measures to reduce distortionary taxes may largely mitigate transition costs.

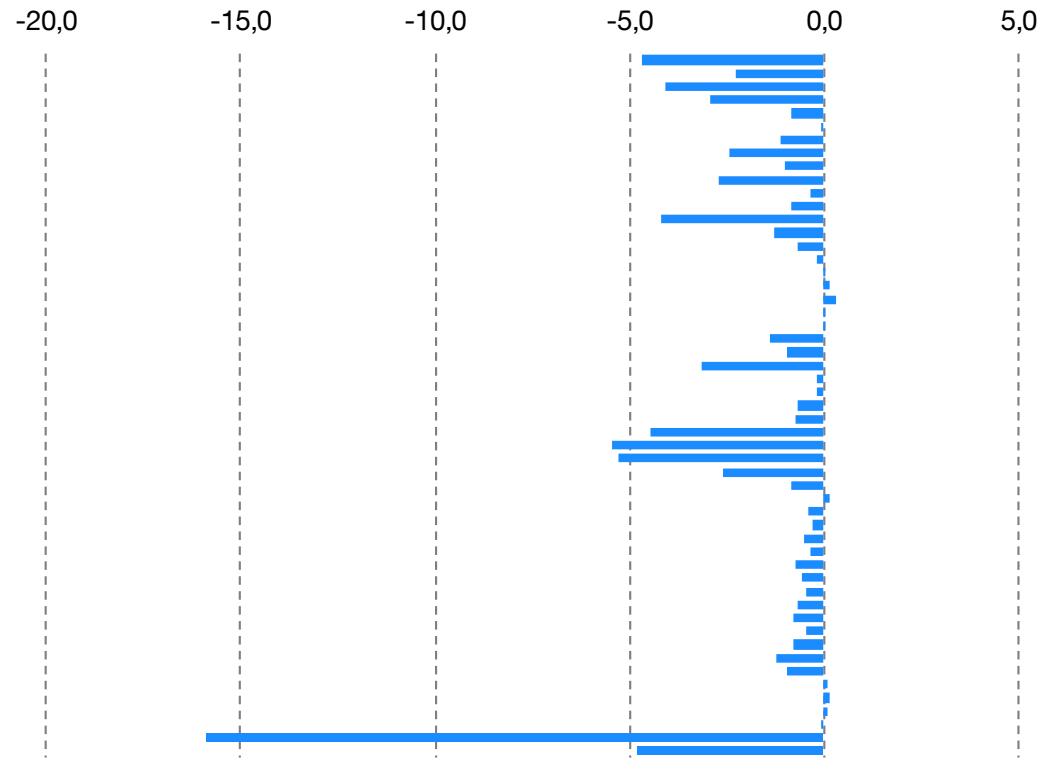
**SIMULATION OF AN INCREASE IN CARBON PRICES OF €25 TO €100 PER TONNE,
PLUS EXPANSION OF COVERAGE TO ALL SECTORS**

Change (%)	Earmarking the revenue for lump-sum tax reductions	Earmarking the revenue for labour income tax reductions
Real GDP	-0.90	2.47
Real consumption	-1.52	1.84
Employment	-1.27	2.09
Use of fuels	-15.9	-13.0
Use of electricity	-4.8	-1.6
Emissions	-31.1	-28.8

Source: Aguilar, González and Hurtado (2023): “[Economic Modelling: Green Policies and Transition Risk Propagation in Production Networks](#)”, *Economic Modelling*.

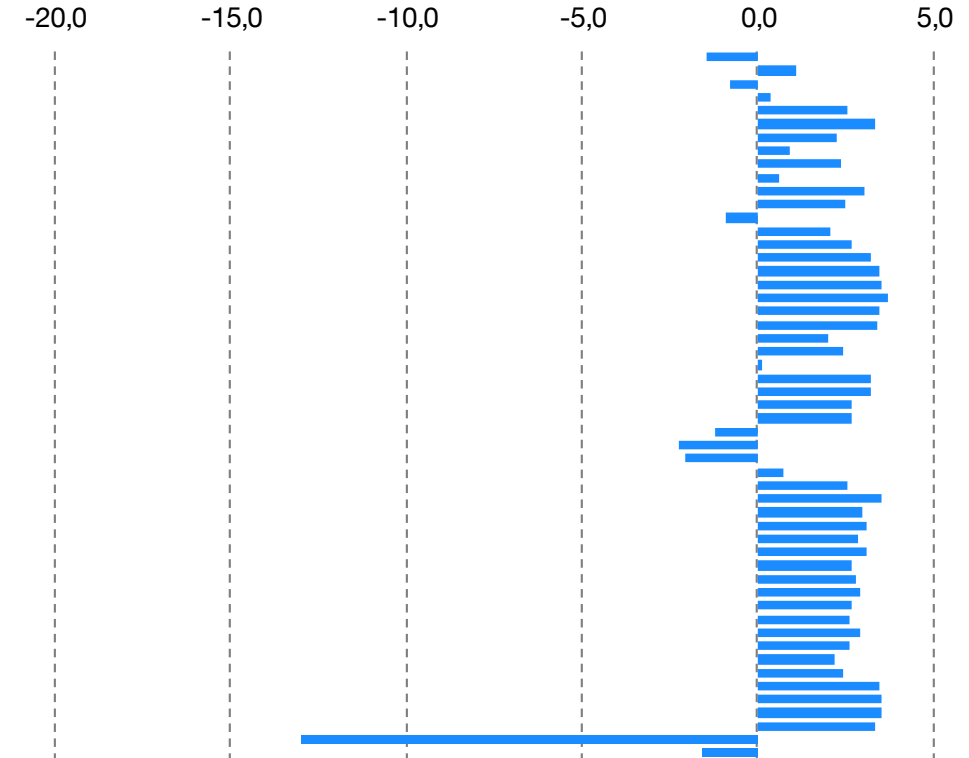
SECTORAL EFFECTS, WITH RECYCLING THROUGH LUMP-SUM TAXES

% change in sectoral value added



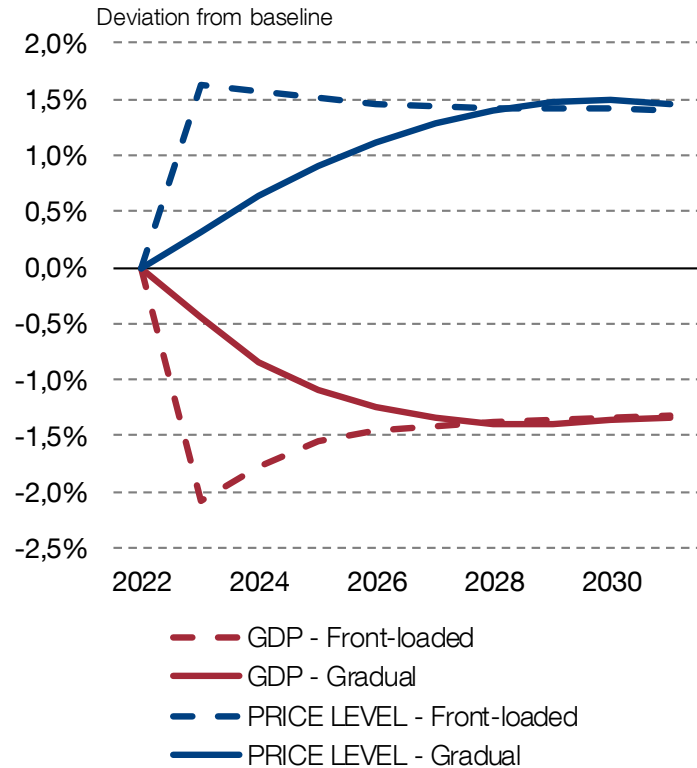
SECTORAL EFFECTS, WITH RECYCLING THROUGH LABOUR INCOME TAXES

% change in sectoral value added

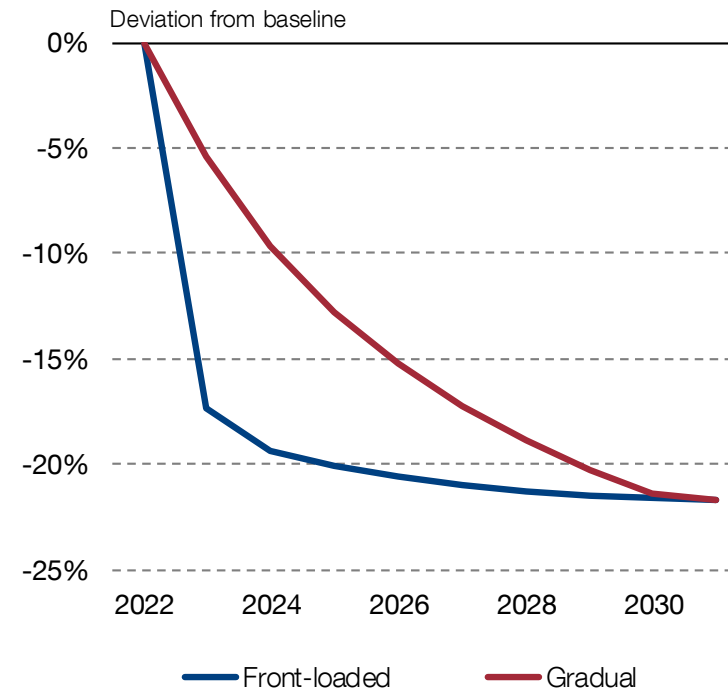


Source: Aguilar, González and Hurtado (2023): "[Economic Modelling: Green Policies and Transition Risk Propagation in Production Networks](#)", *Economic Modelling*.

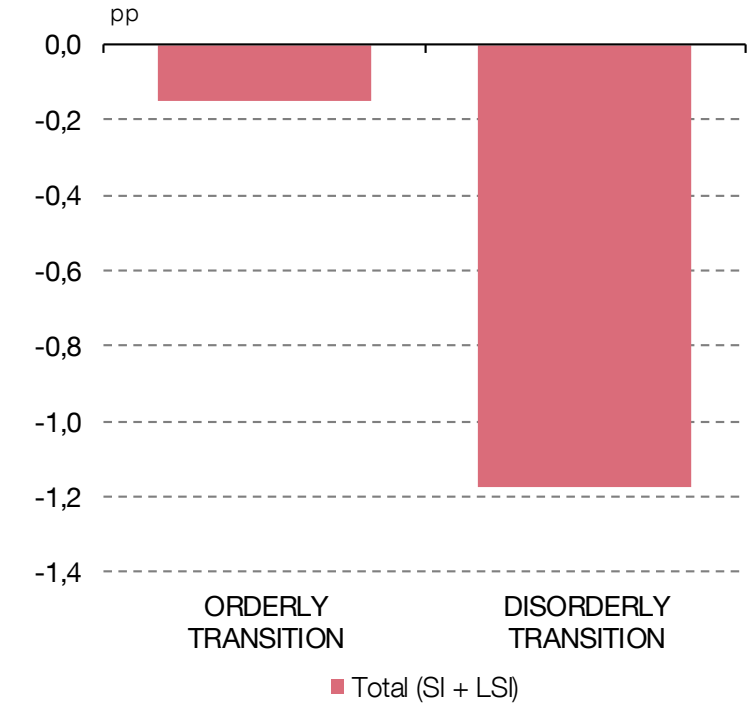
GRADUALISM: EFFECT ON GDP AND PRICE LEVEL (a)



EU CO₂ EMISSIONS (a)



IMPACT ON CET1 RATIO OF ORDERLY AND DISORDERLY TRANSITION SCENARIOS (b)



Sources: Delgado, Quintana and Santabárbara (2023): “Carbon Pricing, Border Adjustment and Renewable Energy Investment: a Network approach”, AMCESFI report.

(a) A gradual and permanent increase in carbon taxes of up to €150 per CO₂ tonne in 2030 in the EU is assumed.

(b) The transition scenarios impact businesses in Spain and the value of consolidated sovereign bond holdings. The impact is measured as the difference between the baseline and the adverse scenarios at the end of a three-year crisis horizon.

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