Socioeconomic and environmental impact from changes to retirement age and population evolution: An application of MRIO footprints and HBS data for Spain

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EU countries have introduced policy changes to increase the average effective age of retirement in recent years, with the objective of providing sustainability to their pension schemes and public budget forecasts (Hinrichs, 2021). In the Spanish case, this has included, among other measures, progressively increasing the legal retirement age from 65 to 67 years old (SESS, 2023).
This takes place as population composition and age pyramids change. Spain is a striking example of relatively rapid changes resulting in an inverted pyramid with an increase in the population entering retirement that is expected to continue as a result of ageing in the generation of baby boomers. Not only does the number of people retiring matter, but also their pensions, as more workers with higher wages reach the retirement age, as opposed to decades ago, when a significant share of 65+ qualified for non-contributory pensions (AIReF, 2025).
The effects of those changes have been thoroughly studied in terms of their effects on public expenditure (RabatÃ© et al., 2024), but there are far fewer papers dealing with the impact on employment (Morgavi, 2025) and the environment from having a relevant part of the population spending more for longer (Huang et al., 2025). Employment studies have focused on increases from people retiring later, but they have not specifically considered the employment created by the increased consumption from those later retirees. On the other hand, that household expenditure also has environmental impacts that should be taken into account (Chai et al., 2024).
In this paper, we calculate the impact in socioeconomic and environmental terms from the changes taking place in the retirement age and population using data from the Spanish Household Budget Survey (HBS) and a multiregional input-output (MRIO) model to obtain carbon and employment household footprints. The microdata on consumption expenditure allows us to obtain the vectors of demand of households similar in age, but where their members are or are not retired. We would expect differences arising from changes to their level and pattern of spending that result in distinct effects on the related emissions and employment generated. To calculate those impacts, we use a MRIO model to include all direct and indirect effects, wherever they take place along global value chains.
As for input-output and factor coefficients data, we use the Exiobase database v.3.9.6 (https://zenodo.org/records/15689391), taking 2020 as the reference year for IO data and emissions, while employment coefficients can be updated up to 2022. This source provides data for 200 products and 44 countries, plus 5 rest-of-the-world categories. The main advantage of this database is that is very disaggregated for products in the household consumption basket and that we can use product by product matrices and coefficients. This is relevant considering that our data for the demand vector comes from HBS data, in COICOP classification. Despite this, we still need to apply the specific methodology to transform microdata into data that is compatible with IO data, which follows national accounts methodological principles.
To this aim, we follow (Cazcarro et al., 2020) to make the HBS microdata compatible with input-output data. First, we adjust the scaled population from HBS to population census data (INE, 2025). Second, we readjust the values in consumption categories to align with the information reported in the Spanish national accounts for household consumption. Then, we start from the bridge matrix in Cazcarro et al (2020), updating it to transform data from COICOP into CPA product categories. Finally, we convert the data, which is valued at purchasersâ€™ prices, into basic prices.
We repeat this procedure for all selected household consumption baskets to obtain the vector demands that we combine in the MRIO to calculate their footprints, using the standard formula (Miller & Blair, 2022):

Household footprint= f Ì‚âˆ™(I-A)^(-1)âˆ™(HD) Ì‚

The main novelty of our paper is our focus on specific households according to age and employment status to analyse the impact of predicted changes in the age of retirement, according to the AGING database (https://demog.iiasa.ac.at/apps/wpp2024/) and changes to the population from projections. We select, among households with all adult members close to the age of retirement on both ends (62-65 vs. 66-69), households with similar characteristics but that differ on whether their members are or are not retired. We calculate footprints for each household and differences due to retirement, so we can project the impacts on employment and carbon footprint from increasing the average age of retirement in Spain between 2020, 2030 and 2040. We then use decomposition analysis to isolate the different factors explaining their evolution (Owen & BÃ¼chs, 2024). Our results are relevant from the point of view of policy effects and future sustainable scenarios.