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Research article

How the 2008 financial crisis affected the Spanish economy due to household income

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Abstract: Economic crises do not affect all households in the same way; therefore, it is crucial to analyze the differences in their impact based on household income. The last economic crisis, the financial crisis of 2008, lasted until 2013 in Spain; however, economic recovery was not considered to have been effectively achieved until 2016, when economic performance exceeded the pre-crisis level. Economic recovery was not reflected in households in the same way because of household income inequalities. This study identified the different effects of an economic crisis on households and economic sectors through a multisectoral model by analyzing the consumption behaviors of households according to monthly income after the crisis. A simulation was carried out based on consumption data for 2015, which identified the production sectors that suffered the greatest losses because of a crisis-induced decrease in household consumption spending. The results reveal that the decrease in low-income household consumption mainly affected accommodation and food services, manufactured products, wholesale and retail trade services, and activity generated by households as employers of domestic workers.

Keywords: households; income; economic crisis; input-output analysis

JEL Codes: C67, E21, O15

1. Introduction

Financial crises have a particularly strong effect on economic inequality in the long run, so the effects of the 2008 financial crisis must be considered today to protect the most affected households and prevent future crises from exacerbating these negative effects. In this study, we address the effects of the 2008 crisis on households and estimate the effects on economic activity from a macroeconomic perspective.

The world is currently facing an economic crisis due to the COVID-19 pandemic and the conflict in Ukraine, the full implications of which remain unknown, specifically their impact on households. Therefore, it is important to focus on the impact of the previous financial crisis on households to channel economic recovery in the most equitable manner. Bodea et al. (2021) found strong evidence that currency, banking, inflation, and debt crises increase inequality, particularly in the long run. They also found that the effects of crises manifest in the long term and the political consequences of a major financial crisis like that of 2008 have yet to be fully understood.

Many economic sectors suffer during an economic crisis, regardless of the origin. According to the Organization for Economic Co-operation and Development (OECD, 2020), COVID-19 containment measures shrank Europe's economic activity, causing a 50%–100% production loss in certain sectors. The pandemic led to an economic crisis that is expected to exacerbate poverty and wage inequality (Palomino et al., 2020). Low-income households were the most affected by the pandemic; therefore, introducing economic measures to mitigate this crisis and reducing the loss of income is necessary (Almeida et al., 2021). Therefore, decisions regarding economic policies should be based on the analysis of economic data from previous financial and economic crises.

Below, we cite some works analyzing the financial crisis at a global level. According to Almeida (2020), low- and middle-income U.S. households were the most severely affected; tax and transfer policies could stabilize income distribution after a crisis. Furthermore, De Stefani (2020) associated the consumption and savings rates of low- and middle-income U.S. households with house ownership and an increase in related prices.

In Canada, the financial crisis caused a decline in bank credit, which affected consumer spending in low-income households (Damar et al., 2020). Using evidence from China, Fan and Yavas (2020) revealed that mortgage debt affects household consumption behavior.

In Europe, Salcedo and Llanes (2020) measured the poverty risk rate based on two variables, namely household income and consumption. They found that consumption in low-income households is contingent upon higher household expenditure; thus, this expense should be considered while calculating available income.

Other studies have focused on comparing the effects of the financial crisis in different countries. Gokmen and Morin (2019) empirically examined income inequality after a financial crisis in 70 countries from 1973 to 2006. They found that in countries with more developed capital markets, stock market crises reduce wealth at the top of the wealth distribution pyramid, where most of the investments are in company stocks. Similarly, Woo (2023) analyzed the link between financial crises and inequality in 17 advanced economies from 1955 to 2016 and found that financial crises have significant and lasting adverse effects on income distribution. In Spain, the 2008 financial crisis lasted until 2013, the year in which GDP started showing signs of growth. However, economic recovery was not deemed to have been effectively achieved until 2016, when economic performance exceeded the pre-crisis level, according to the National Central Bank (2019). One factor that contributed to the

Spanish economy's rebound was household consumption behavior. However, there were disparities in the economic impact on household consumption spending based on income earned.

Compared with other economies, the inequality in household income in Spain decreased during the crisis partly because of pensions and the trend among young people to delay starting a family. However, consumption inequality increased because of a decrease in durable consumer goods spending, mainly by low-income households (Anghel et al., 2018).

Another important factor was international migration, which played a decisive role in the pre-crisis period (increasing from 0.51 million in 2000 to 4.11 million in 2008) to satisfy the increasing demand of the Spanish labor market. During the crisis, the decline in employment affected unskilled and low-skilled migrants and employees with temporary contracts and led to a decrease in spending on transportation, leisure, and food (Ballester et al., 2015).

According to Sánchez-Martínez et al. (2016), the crisis increased unemployment and lowered family income, which was worse in families with a mortgage. Furthermore, Martínez-Martín et al. (2018) examined labor market insecurity in Spain and found that there are material variations in annual personal income, an indicator of increasing poverty.

Spain was one of the hardest-hit countries by the 2008 financial crisis because of the austerity measures taken by the government. For this reason, during the subsequent crisis caused by the COVID-19 pandemic, the government implemented different types of social protection measures aimed at those who became unemployed or were in precarious employment. It has been shown that a combination of innovative income support policies and the existing progressive tax-benefit system was effective in mitigating the increase in income inequality during the COVID-19 pandemic (O'Donoghue et al., 2020). Stantcheva (2022) examined the inequalities caused by the COVID-19 pandemic, specifically how income inequalities affect consumption, and found that, unlike the government's response to the 2008 financial crisis, which involved austerity measures, the response to the pandemic involved substantial government support.

To conclude the literature review, we refer to studies that have used the methodology used in this study, the input-output methodology, to analyze household consumption during periods of economic crisis. Yuan et al. (2022) revealed that from 2005 to 2015, high-income regions, such as the U.S. and Europe, generated a larger greenhouse gas footprint in urban areas because of transport and utilities. Meanwhile, emerging economies, such as China and India, generated such a footprint in rural areas because of housing and food consumption spending. Liao et al. (2021) examined the water footprint in rural and urban areas during a similar timeframe (2002–2017) and found that the impact of consumption spending varies depending on household income and specific pollutants. Finally, Wahba (2021) related household income inequalities to water consumption, stating that the average blue water footprint per household in the richest Egyptian households is 8.3 times higher than that in the poorest households. Specifically, the richest households consume 5, 24.7, and 29.7 times more water for food, textile, and leisure-related products, respectively.

Finally, Bermejo et al. (2020) highlighted the significant role of Spanish pensioner households in consumption compared with other households during the 2008 crisis. Gül (2015) used a simulation to increase foreign demand in Turkey's tourism industry by 10%, demonstrating a positive impact on GDP, employment, and household income.

This study examined different household consumption behaviors depending on income after the 2008 economic crisis. The literature has shown that low-income households are the most affected in terms of consumption patterns by an economic crisis. Furthermore, considering lower consumption in certain sectors by certain household groups, it is possible to identify the production sectors that suffered

greater losses because of the crisis. In summary, we determine the post-crisis economic impact on household consumption and production sectors to better understand economic recovery, this will enable policymakers to shape future economic policies accordingly.

The 2008 global financial crisis led to a decrease in household savings and consumption in some sectors in Spain. Given this context, this study explored the effects of the financial crisis on Spanish households by analyzing different household consumption behaviors based on income and identifying how these variations affect different production sectors of the Spanish economy. For this purpose, we used multisectoral modeling, specifically a demand model, based on the input-output table (IOT) of the Spanish economy between 2005 and 2015 (i.e., the pre- and post-crisis years, respectively). Additionally, we used total household expenditure, disaggregated based on the monthly household income level. For modeling, we homogenized both databases by creating a conversion matrix linking activity sectors with consumption groups.

Although studies have focused on the fundamental question of whether financial crises affect income distribution, in this study, we broadened the focus. By examining variations in household consumption, we analyzed its effects on productive sectors.

The rest of this paper is divided into four sections. Section 2 presents the methodology and data sources used in this study. Section 3 presents the analysis of changes in household spending based on income and the variation in spending by production sectors. Section 4 presents the results, and Section 5 ends the paper with a discussion and conclusions.

2. Methodology and data sources

The model used in this study allows us to estimate the economic impact of an economic crisis through multisectoral modeling, specifically a demand model expressed in monetary terms. This modeling approach provides the direct effects on the production sectors that suffered due to changes in demand, as well as the indirect effects on the remaining sectors due to changes in intermediate demand. This methodological approach has been extensively developed by Miller and Blair (2022).

The primary database for these models was obtained from an IOT comprising an intermediate consumption matrix, a primary factor matrix, and a final demand matrix. In these matrices, a multisectoral model is used wherein factor demands are independent of their prices, primary factor prices are exogenous, final demand is exogenous, and product prices are independent of the demand structure.

This model defines sectoral production by assuming a straight-line (and constant) structure of intermediate transactions and a final exogenous sectoral demand. The gross production in sector *i* (x_i) is shown as follows:

$$x_i = x_{i1} + x_{i2} + \cdots + x_{in} + y_i, \tag{1}$$

where x_{ij} is the intermediate consumption of sector *i* products by sector *j*, and y_i is the final demand quantity of sector *i* (including private consumption, public consumption, gross capital formation, and exports). The input–output technical coefficient, namely, a_{ij}, is defined as the (constant) ratio between (monetary) intermediate consumption x_{ij} and the total sectoral output x_j ($\mathrm{a_{ij}} = \mathrm{x_{ij}}/\mathrm{x_j}$) in Equation (1), as follows:

$$x_i = a_{i1}x_1 + a_{i2}x_2 + \cdots + a_{in}x_n + y_i, \tag{2}$$

Considering all sectors, they are expressed in a matrix format as follows:

$$x_n = A_{nn} \cdot x_n + y_n, \tag{3}$$

Using matrix notation and discrete time differences, changes in sectoral production are expressed as follows:

$$\Delta x_n = (I - A_{nn})^{-1} \cdot \Delta y_n, \quad (4)$$

where Δy_n is a column vector with n × 1 dimensions (where n is the number of production sectors) containing changes in final demand; Δx_n is a column vector with n × 1 dimensions formed by changes in sectoral production; and $(I - A_{nn})^{-1}$ is the Leontief inverse matrix.

The resulting matrix Δx_n indicates the level at which an exogenous injection into the system affects total production. The term $(I - A_{nn})^{-1}$ includes the direct and indirect impacts on production when there is a change in final demand.

To apply this methodology, we obtained IOTs for 2005 and 2015 at basic prices from the National Statistics Institute (NSI, 2018); 2005 is the year of economic growth (pre-crisis level), and 2015 is considered the year of economic recovery (post-crisis level). The IOTs have data on 73 and 64 production sectors, respectively, according to the Classification of Products by Activity (CPA)[1].

Additionally, to disaggregate household private consumption, we used total household consumption expenditure broken down according to monthly household income level. These data, obtained from the Household Budget Survey (NSI, 2016), were grouped into 12 consumption categories by product according to the Classification of Individual Consumption According to Purpose (COICOP)[2].

The correspondence between household consumption groups (obtained from COICOP) and production groups (obtained from CPA) is not direct or unequivocal. Therefore, it became necessary to create a conversion matrix based on the matrix created by Cai and Vandyck (2020), which associates consumption groups with production sectors.

Using the conversion matrix, IOTs were added in 17 production sectors (Table 1), following the CPA.

Table 1. Production sectors in the IOTs.

Production sectors in the IOTs	
A	Agriculture, forestry, and fishing products
B	Mining and quarrying
C	Manufactured products
D	Electricity, gas, steam, and air conditioning
E	Water supply, sewerage, waste management, and remediation services
F	Construction and construction work
G	Wholesale and retail trade services, repair services of motor vehicles and motorcycles
H	Transportation and storage services
I	Accommodation and food services
J	Information and communication services
K	Financial and insurance services
L	Real-estate services
MN	Professional, scientific, and technical services; administrative and support services

Continued on next page

[1] Classification of Products by Activity, CPA Ver. 2.1 - CPA - Eurostat (europa.eu).

[2] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Classification_of_individual_consumption_by_purpose_(COICOP)/COICOP classification. https://www.ine.es/daco/daco42/daco4213/anexoecpf06.pdf.

Production sectors in the IOTs	
OP	Public administration and defense services, compulsory social security services, and education services
Q	Human health and social work services
RS	Arts, entertainment, and recreation services; other services
T	Activities of households as employers of domestic workers and producers of undifferentiated goods and services for own use

Source: Eurostat: European classification of economic activities NACE Rev.2 (adjusted to the CPA).

Next, we performed modeling to assess the economic impact of Spanish household consumption after the economic crisis. For this purpose, we assumed that consumption patterns (year 2005) did not vary during the crisis and that they were introduced in the 2015 database. To ensure that the results are consistent and comparable, the household expenditure for 2005 was adjusted using the cumulative inflation factor between 2005 and 2015 to reflect the demand at nominal prices of 2015. For this purpose, the producer price indices received by farmers from the Ministry of Agriculture, Fisheries and Food[3] and the industrial and services price indices provided by the NSI[4] were used for all the sectors.

The simulation results were compared with real consumption data for 2015, which allowed the estimation of the impact of the economic crisis on household consumption spending based on income level. These effects were obtained in relation to each production sector from Equation (4) and the difference between real production and estimated production in 2015 revealed the effects on each production sector.

The results show what the Spanish economy could have looked like in 2015 if there had been no financial crisis. Furthermore, when differentiating the impact according to household income, it is possible to identify the changes caused by the crisis in the consumption patterns of different types of households.

3. Household expenditure based on income and variation in spending by production sectors

The analysis of household consumption spending based on income for each year of reference is given below, which helps us to contextualize and understand pre- and post-crisis consumer behavior.

Table 2 shows that the consumption spending of all household income groups increased from 2005 to 2015, except households earning EUR 1,000–1,999. Specifically, there was a higher rate of increase in consumption spending of households earning over EUR 3,000, with an increase of 15%. Households earning less than EUR 999 showed an increase of 8%, and households earning EUR 2,000–2,999 showed an increase of 7%.

Meanwhile, households earning EUR 1,000–1,999 showed a fall in consumption spending (5%). This may be explained by the aftermath of the economic crisis, which increased uncertainty for

[3] Ministry of Agriculture, Fisheries and Food. Producer price indices. Available from: https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/economia/precios-percibidos-pagados-salarios/precios-percibidos-por-los-agricultores-y-ganaderos/default.aspx.

[4] Industrial and services price. Available from: https://ine.es/dyngs/INEbase/operacion.htm?c=Estadistica_C&cid=1254736147699&menu=resultados&idp=1254735576715#_tabs-1254736147604 and https://ine.es/dyngs/INEbase/categoria.htm?c=Estadistica_P&cid=1254735576778.

households and led to an increase in precautionary savings within this income group (Bande and Riveiro, 2013).

Table 2. Total household consumption expenditure by monthly household income (millions of EUR).

Income	2005	2015	Change
Under EUR 999	62,760.4	67,808.78	8%
EUR 1,000–1,999	200,229.8	190,086.15	−5%
EUR 2,000–2,999	155,302.4	166,386.73	7%
Over EUR 3,000	130,641.5	150,543.46	15%

Source: National Statistics Institute survey (undated).

We believe that it is important to look at the production sectors that were the most affected because of the differences in household consumption spending shown in Table 2, mainly in the EUR 1,000–1,999 household income group. Next, we analyzed each income group.

Table 3 presents the variation in household consumption expenditure by income for each production sector analyzed. There is a greater increase in household consumption spending in electricity, gas, steam, and air conditioning (D), public services (OP), real-estate services (L), arts, entertainment, and recreation services; other services (RS), and water supply, sewerage, waste management, and remediation services (E) sectors.

Conversely, household consumption expenditure decreased in mining and quarrying (B), household activities (T), accommodation and food services (I), and financial and insurance services (K).

Table 3. Variation in the total consumption expenditure on production sectors (2005–2015).

	Up to EUR 999	EUR 1,000–1,999	EUR 2,000–2,999	Over EUR 3,000
A	−6%	−11%	5%	8%
B	−71%	−76%	−72%	−69%
C	−8%	−16%	−3%	1%
D	81%	86%	114%	121%
E	27%	30%	49%	54%
F	2%	1%	16%	26%
G	10%	−18%	−6%	−1%
H	35%	1%	16%	23%
I	−16%	−24%	−11%	7%
J	26%	7%	21%	18%
K	−20%	−12%	−5%	−1%
L	35%	39%	59%	65%
MN	−1%	−19%	−5%	2%
OP	87%	15%	26%	49%
Q	12%	14%	27%	32%
RS	73%	30%	43%	53%
T	−45%	−49%	−42%	−32%
Total	8%	−5%	7%	15%

We also found differences between consumption spending by low- and high-income households. In the agriculture (A) sector, only the consumption spending of households with income under EUR 2,000 decreased; in the commercial services sector (G), only the consumption spending of households with income under EUR 999 increased. Finally, in the accommodation and food services (I) and professional services (MN) sectors, only the consumption spending of households with income above EUR 3,000 increased.

These results show that although consumption spending increased across all production sectors, the 2008 economic crisis reduced consumption spending in the EUR 1,000–1,999 income group.

3.1. Modeling results: Impact on production based on monthly household income level

In the methodology described in Section 2, we assumed that consumption patterns (for 2005) did not vary during the crisis and that they were introduced in the 2015 data. After performing the modeling, the simulated results were compared with the real consumption data for 2015, which allowed us to estimate the impact of the economic crisis on household consumption spending based on household income level (Figure 1). We analyzed the direct and indirect economic effects (expressed as the difference between real and estimated production) of the 2008 economic crisis, measured during the economic recovery period (2015).

Figure 1 shows that there was a positive impact on total production across all household income groups, except the EUR 1,000–1,999 income group. Specifically, there is an increase of EUR 7,668.2 million in production fueled by the increased consumption spending of households earning under EUR 999; a decrease of EUR 20,958.0 million in households earning EUR 1,000–1,999; an increase of EUR 16,536.7 million in households earning EUR 2,000–2,999; and an increase of EUR 31,623.2 million in households earning over EUR 3,000.

In the aftermath of the financial crisis, households with income between EUR 1,000–1,999 showed the worst recovery. Limitations in savings ability can also lead to lower consumption spending in certain production sectors, which we will specify in the following section.

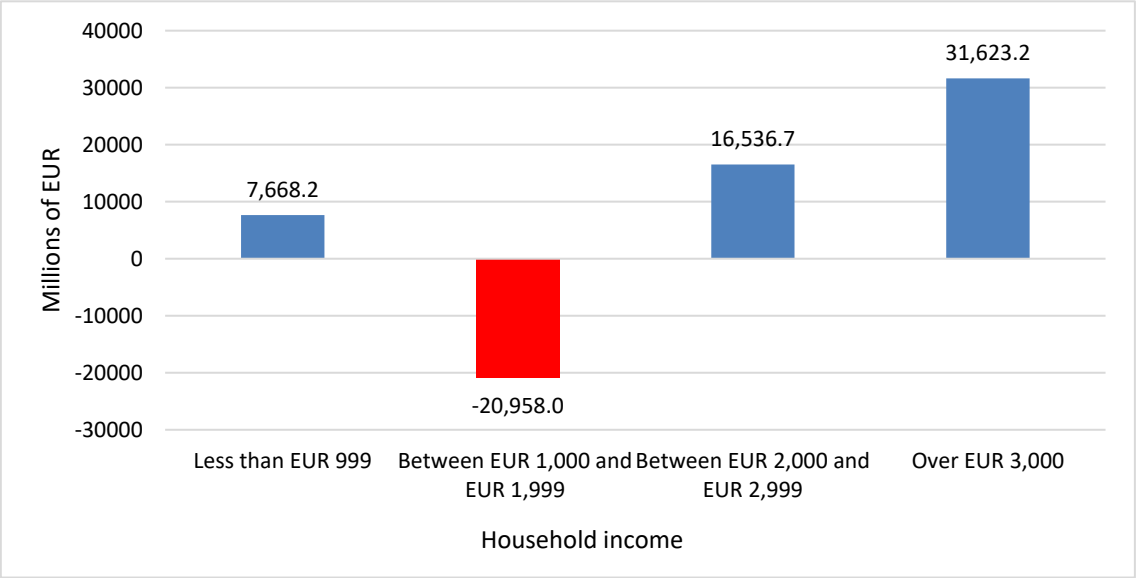

Figure 1. Impact on total production based on monthly household income level in millions of EUR (nominal prices, base year 2015).

3.2. Modeling results: Effects on production sectors based on household income

Figure 2 shows that the consumption spending of households earning a monthly income under EUR 999 had a positive effect on most production sectors. The biggest impact was on real-estate services (L) with an increase of EUR 4,781.2 million in production, followed by electricity, gas, steam, and air conditioning (D) with an increase of EUR 2,130.5 million, and arts, entertainment, and recreation and other services (RS) with an increase of EUR 1,142.9 million.

However, production decreased in some production sectors because of reduced consumption spending by households earning less than EUR 999. The sectors that recorded losses of over 1,000 million were accommodation and food services (I), with an economic loss of EUR 1,503.0 million, and manufactured products (C), with a loss of EUR 1,329.6 million. In contrast, activities of households (T), financial and insurance services (K), and agriculture (A) suffered losses of EUR 825.9, EUR 453.7, and EUR 185.0 million, respectively.

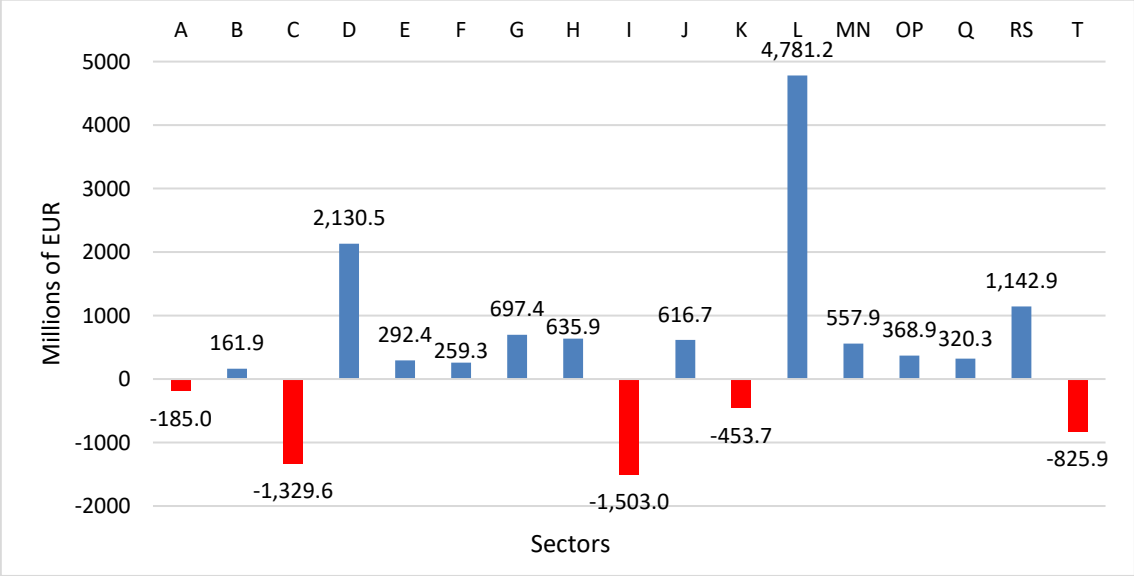

Figure 2. Impact on production sectors due to household consumption spending of households earning less than EUR 999 monthly in millions of EUR (nominal prices, base year 2015).

Figure 3 shows that the consumption spending of households earning a monthly income of EUR 1,000–1,999 had both positive and negative effects on production sectors. The biggest positive impact was on real-estate services (L), with a production increase of EUR 9,448.9 million, followed by electricity, gas, steam, and air conditioning (D) and arts, entertainment, and recreation and other services (RS), with an increase of EUR 3,577.2 million and EUR 1,613.0 million, respectively.

However, the biggest negative impact was on manufactured products (C), with production losses of EUR 12,974.1 million, followed by accommodation and food services (I) and wholesale and retail trade services (G), with losses of EUR 9,330.8 million and EUR 7,237.6 million, respectively. Activities of households (T), professional services (MN), financial and insurance services (K), transportation (H), and agriculture (A) were also affected negatively, though to a lesser extent.

Hence, we can conclude that these household groups were primarily responsible for the decline in production in important sectors, such as manufacturing, accommodation, and trade.

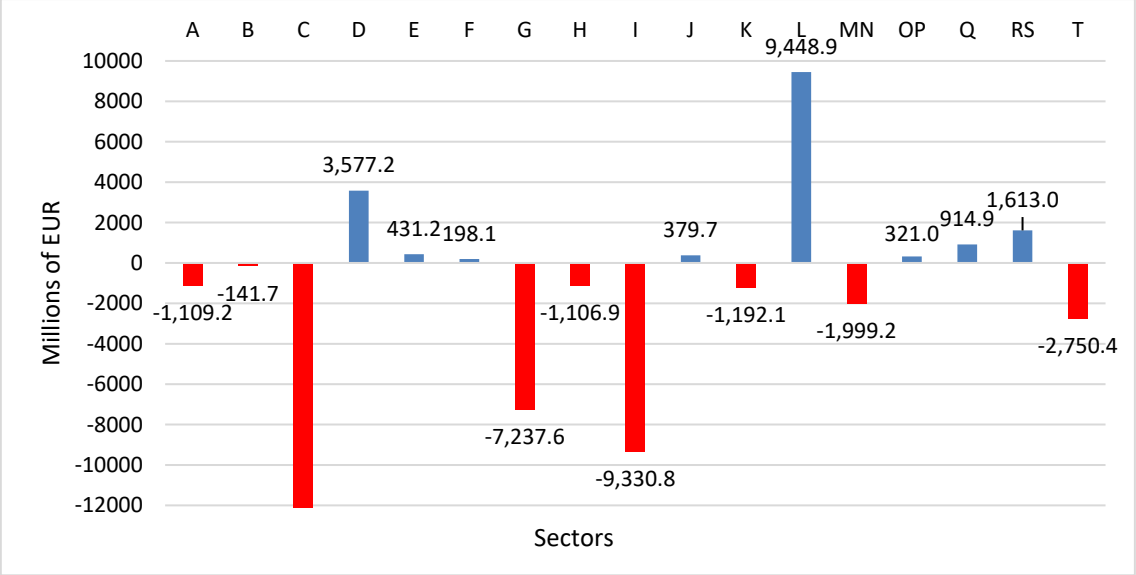

Figure 3. Impact of households earning EUR 1,000–1,999 on production sectors in millions of EUR (nominal prices, base year 2015).

Figure 4 shows that households earning a monthly income of EUR 2,000–2,999 had a positive impact on most production sectors. The highest increase in production was seen in real-estate services (L), an increase of EUR 10,271.0 million, followed by electricity, gas, steam, and air conditioning (D) and arts, entertainment and recreation services and other services (RS), an increase of EUR 3,805.0 million and EUR 2,453.9 million, respectively.

The accommodation and food services (I) sector was the most negatively affected, with a loss of EUR 3,490.7 million, followed by activity generated by households as employers of domestic workers and producers of goods and services for own use (T) with a loss of EUR 1,834.8 million, and wholesale and retail trade services (G) and manufactured products (C) with a loss of EUR 1,466.5 million and EUR 666.2 million, respectively.

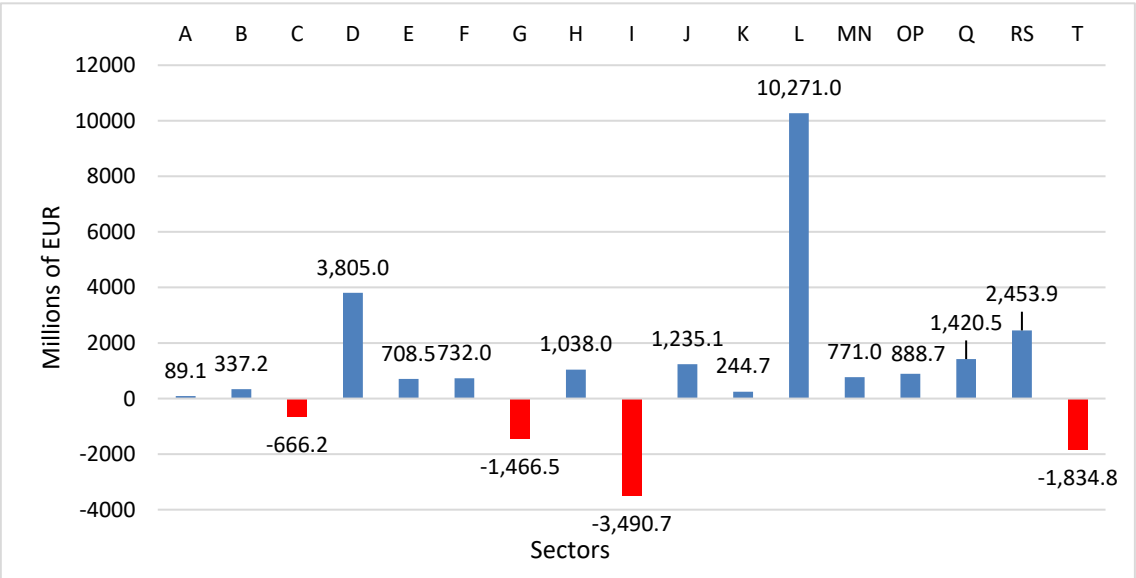

Figure 4. Impact on production sectors due to consumption spending of households earning EUR 2,000–2,999 in millions of EUR (nominal prices, base year 2015).

Finally, Figure 5 shows that households with income over EUR 3,000 had a positive effect on all production sectors except household activities (T). The higher impact was on real-estate services (L), with a production increase of EUR 9,487.4 million, followed by electricity, gas, steam, and air conditioning (D), with an increase of EUR 3,588.0 million, and manufactured products (C) and arts, entertainment and recreation services and other services (RS), with an increase of EUR 3,266.6 million and EUR 2,900.0 million, respectively.

This household group had a negative impact on only one sector, namely activities generated by households as employers of domestic workers and producers of goods and services for own use (T), with an economic loss of EUR 1,329.0 million.

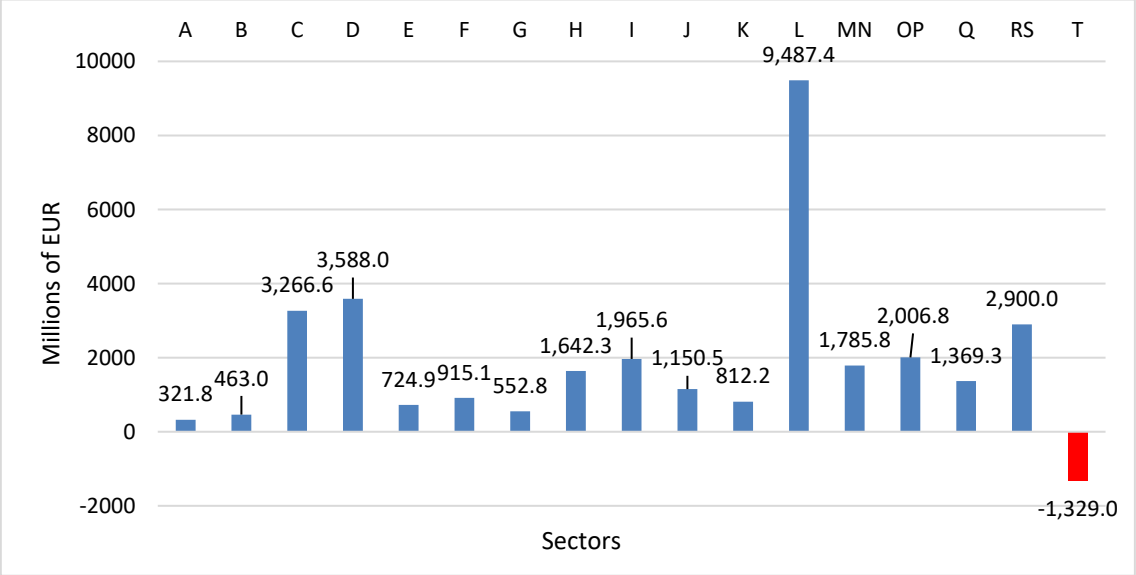

Figure 5. Impact on production sectors due to consumption spending of households earning over EUR 3,000 in millions of EUR (nominal prices, base year 2015).

4. Discussion and conclusions

In this study, we provide a macroeconomic perspective on the link between inequality and crises, distinguishing how the economic crisis affected the Spanish economy based on monthly household income level.

Consumption spending of high-income households grew more than that of low-income households. Notwithstanding the decreasing household income, during a crisis, consumers change their behavior to maintain their purchasing power (Arnal et al., 2020).

The real-estate services (L) sector recorded the highest increase in production, as a result of consumption spending by all household income groups. This may be because of an increase in the demand for private rental accommodation, mainly in the case of low-income households, as they could not purchase houses (Pareja-Eastaway & Sánchez-Martínez, 2017; López-Rodríguez & De los llanos, 2019). More people aged 26–35 years and working full-time put off starting a family during the crisis (Ahn & Sánchez-Marcos, 2017).

The electricity, gas, steam, and air conditioning (D) sector recorded an increase in production due to consumption spending by all income groups. Romero-Jordán et al. (2016) found that during the economic crisis, electricity consumption by middle- and low-income households was more sensitive

to a change in income. However, as it is an essential sector, it continued to see an improvement after the crisis. This increase may also be because of its relationship with real-estate services for purchase or lease purposes, as shown in the previous sector.

Production of manufactured products (C), in which food and beverages is the most representative subsector, decreased mainly because of the consumption spending of households with a monthly income of under EUR 1,999. The negative impact of households in this income group could be attributed to an increase in the unemployment rate, as unemployment hinders food consumption (Antelo et al., 2017). This effect worsened during the 2008 crisis, broadening the food consumption gap between households with unemployed and employed people.

Production in the accommodation and food services (I) sector decreased because of the consumption spending of households earning less than EUR 2.999, mainly in low-income households with less qualified and a higher number of unemployed members. According to Alegre et al. (2018), an increase in unemployment affects tourism, especially the population directly engaged in the sector, through a fall in income.

The sectors in which production decreased during the 2008 financial crisis are more vulnerable to future crises because of the lingering effects of the previous crisis. The activities of household (T) sector was the hardest hit due to the consumption spending of all income groups. Therefore, it can be concluded that the financial crisis did not affect all households equally; it mainly affected households with an income of EUR 1,000–1,999.

Analyzing consumption inequalities, identifying weaker or more vulnerable households, and determining the consequences on the entire production framework allow us to understand the economic effects of an economic crisis and help shape future targeted economic policies.

Studies, such as the one presented here, are of interest because it has been shown that inequality harms democracy; it decreases support for democracy and increases political violence, political inequality, corruption, and political polarization. At times like the present, these effects need to be taken into account to protect our democracy.

We must not forget that, just as they were recovering from the effects of the financial crisis, Spanish households were affected by the COVID-19 pandemic (Furceri et al., 2022). Economically vulnerable households have a higher financial exposure, which can exacerbate inequalities by combining the effects of one crisis with those of a subsequent crisis.

This study focused on the 2008 financial crisis as the economic data required for the analysis of the recovery period were readily available, namely, the pre-crisis year (2005) and the post-crisis year (2015). However, the methodology used in this study could be applied in future studies to analyze other economic crises, such as the current economic crisis due to the COVID-19 pandemic and the Russia-Ukraine conflict, as it allows for a comparison of the consumption patterns of different types of households, classified by income, age, and rural-urban type.

The literature has shown that low-income households suffer the most because of changes in consumption patterns after an economic crisis. Hence, it is important to analyze the economic impact on production sectors as well, by classifying households by income and identifying the most affected ones.

Hence, knowing the impact of the 2008 economic crisis on each production sector because of variations in consumption spending of households classified by income contributes to the understanding of economic recovery and shapes future economic policies. Although these models are static models in terms of the year of reference of the IOT, they are used by different international institutions. Furthermore, refinements made in the last few years have made these models more applicable and reliable. As this study performed a medium-term analysis (10 years), it is deemed valid to assume structural permanence.

This study opens up different lines of research, mainly in the use of this type of modeling to analyze the effects of subsequent economic crises, such as the COVID-19 pandemic, once data are available. The modeling used in this study allows a comparison of different crises through segmentation, such as by age of the main household earner or employed–unemployed and rural–urban households. It also allows a gender-based analysis of the effects of the crisis on men and women. Furthermore, examining the consequences of the continuous reduction in household size because of the relationship between household size and household income/expenditure is essential for designing economic policies for low-income households.

It is a subject of scientific debate whether increasing levels or high levels of inequality are associated with the occurrence of banking crises (Morelli and Atkinson, 2015). Therefore, we must consider the effects of the previous financial crisis in Spain, as currently, income inequality among households is increasing because of a high level of inflation and an increase in housing prices. The methodology used in this study, namely the classification of households by income but not taking into account the number of household members, did not allow us to obtain an inequality proxy, which we obtained using per capita income. Therefore, the main contribution of this study is the analysis of differences in the impact on productive sectors according to household income.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Author contributions

Miguel Á. Martínez-García: Conceptualization; Resources; Data curation; Formal analysis; Investigation; Methodology; Roles/Writing original draft; and Writing, review and editing; Supervision and validation. Ángeles Cámara: Conceptualization; Methodology; Writing, review and editing; Supervision and validation. All authors have read and agreed to the published version of the manuscript.

Availability of data and materials

Input-output tables 2005–2015: INEbase / Economía /Cuentas económicas /Contabilidad nacional anual de España: tablas Input-Output / Enlaces relacionados. Total expenditure according to level of regular net monthly household income: https://www.ine.es/jaxiT3/Tabla.htm?t=10679. Matrix created by Cai and Vandyck (2020): 1-s2.0-S2352340920302894-mmc1.xlsx (live.com)

Conflict of interest

All authors declare no conflicts of interest in this paper.

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