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Transformations in agriculture, stockbreeding, forestry and fishing within the Spanish agri-food system (1980-2016)

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KEYWORDS: **agri-food system, supply and use tables, input-output, Spain.**

JEL CODES: **E01, Q10, Q17, N54.**

This paper examines the evolution of agriculture, stockbreeding, forestry and fishing (ASFF) *within the Spanish* agri-food system *for 1980-2016. It adopts a socio-economic approach based on data from the input-output framework of Spanish National Accounting of the* Instituto Nacional de Estadística *[National Statistics Institute]. I examine the series on value added, labour and supply for the activities and products involved in the* agri-food system*, and calculate their intermediate input and use structures in 1980 and 2015. The results show the continuous reductions in the share of* ASFF*'s value added and labour within the Spanish* agri-food system*. Moreover, Spanish* ASFF *increasingly became decoupled from the land, reducing their 're-use' rate and becoming more dependent on external intermediate inputs.* Trade services *emerged as a major player in the system, a development associated with the country's growing integration in the global agri-food system and higher rates of salaried labour.*

Las transformaciones de la agricultura, ganadería, silvicultura y pesca en el sistema agroalimentario español (1980-2016)

PALABRAS CLAVE: **sistema agroalimentario, tablas de origen y destino, input-output, España.**

CÓDIGOS JEL: **E01, Q10, Q17, N54.**

Este artículo examina la evolución de la agricultura, ganadería, silvicultura *y* pesca (AGSP) *en el marco del* sistema agroalimentario *español del 1980 al 2016 adoptando un enfoque socio-económico basado en datos del marco input-output de la Contabilidad Nacional Española del Instituto Nacional de Estadística. En él examino series sobre el valor añadido, empleo y origen de los productos y actividades involucradas en sistema agroalimentario. Además, calculo su estructura de inputs intermedios y de usos en el 1980 y 2015. Los resultados muestran la continua caída de la* AGSP *en el valor añadido y empleo del* sistema agroalimentario *español. Además, la* AGSP *se desvinculó de la tierra, reduciendo su tasa de «reempleo» y volviéndose más dependiente de los inputs intermedios externos. Asimismo, los* servicios comerciales *emergieron como un actor clave. Esta transformación se dio simultáneamente a la creciente integración en el sistema agroalimentario global y el aumento de la asalarización.*

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1. INTRODUCTION

There is no doubt that agriculture has multiple vital functions, from its potential as a net provider of renewable materials and carriers of energy to the rest of the economy (Georgescu-Roegen, 1971) to its capacity to supply ecosystem services (*e. g.* carbon sequestration, water supply, disease control) that are essential for the sustainability of human life (Daily, 1997; MEA, 2005). Agroecosystems are the kind of human intervention into natural systems with the widest territorial scope on earth by far, as they take up roughly 40% of the total land area (IAASTD, 2009). This is why agriculture is considered a key dimension in tackling many of the environmental problems we currently face (Shukla *et al.*, 2019). Furthermore, agricultural activities have a major social role in that they are a source of employment and a way of maintaining cultural heritage all over the world (Koohafkan & Altieri, 2011). Despite this, the importance of agriculture in terms of value added and labour has sharply declined in most countries (World Bank, s. d.-a, -b). This is also the case for Spain. What is behind this fact?

Agriculture has undergone important transformations over the last three centuries. However, they are minor compared with the changes that it has experienced since the second half of the twentieth century (Clar, Martín-Retortillo & Pinilla, 2018). Historically agriculture has had the function of feeding and fuelling the world, being the core sector of food production. However, since industrialization, new economic processes have gradually developed between the agricultural production of food and food consumption, including transportation, packaging, processing and distribution, resulting in the value chains of the so-called *agri-food system* (Malassis, 1973; Infante-Amate & González de Molina, 2013). This makes essential the distinction between *agricultural product*, understood as the output derived from the production of the agricultural sector (Rodríguez Zúñiga & Soria, 1986), and *food product*, defined as the final production of goods resulting from the transformation of agricultural products and the addition of diverse uses (Lancaster, 1966). Thus, ongoing debates on agriculture and food should be framed in terms of the entire agri-food system.

In addition, the current agri-food system has become increasingly globalized, thanks to the industrialization of the agri-food chain, as well as being increasingly ruled by agribusiness and more recently by big distribution. This new stage of agricultural transformation has been called the "internationalized agri-business model" (Clar, Martín-Retortillo & Pinilla, 2018) and framed as the "third food regime" (McMichael, 2009; Friedmann, 2018; Krausmann & Langthaler, 2019). At the same time, the current agri-food system has become highly unsustainable, both from an environmental perspective (Cardinale *et al.*, 2012; Tscharntke *et al.*, 2012; Infante-Amate & González de Molina,

2013; Laso *et al.*, 2018) and socially (Camarero *et al.*, 2006; Tello & González de Molina, 2017; FAO *et al.*, 2018).

These transformations have been studied with reference to Spain from various perspectives. In political economy, Spanish agricultural dynamics were analysed by Etxezarreta (2006) from the mid-1970s to the beginning of the twentieth century. Agrarian change in Spain from 1900 to 2008 has been examined by González de Molina *et al.* (2017, 2020) using a socio-metabolic approach, and from 1950 to 2015 by Clar, Martín-Retortillo and Pinilla (2018) using a more conventional economic standpoint. These contributions are undoubtedly highly significant, though they focus primarily on agriculture.

The first contribution in broadening out this study to the agro-industrial complex was made by Titos and Haro, who examined the mutual dependence between food as a primary production activity and the food industry in Spain based on input-output data and techniques between 1962 and 1975 (Haro & Titos, 1982), which they also compared with other European countries (Titos & Haro, 1983). Subsequently, Naredo (1991) and Abad and Naredo (1997) analysed the Spanish transition from "traditional agriculture" towards an "agro-industrial system" in the second half of the twentieth century. They also used an input-output framework, for the first time linking the decline in agriculture's socio-economic aggregates to the development of the food industry. Taking a further step forward, Titos *et al.* (1995) included trade and food services by creating and analyzing an input-output table of the agri-food system in Spain for the year 1988. This work was further enlarged by applying a structural decomposition analysis of the period between 1970 and 1988 (Titos *et al.*, 1996).

Apart from these major contributions using input-output data and/or techniques for Spain as a whole, there are many other such works at the regional level, most of them focusing on the agro-industrial complex. These regions include Córdoba (Titos, 1974), Aragón (Arnal, 1980; Pérez & Feijoó, 1993); Catalonia (Artís, Suriñach & Pons, 1994; Enciso & Sabaté, 1995); Andalucía (Titos, 1995; Pablo & Céspedes, 1996), Navarra (Iraizoz & Rapún, 2001; Iráizoz, 2004) and Galicia (Valdês & López Iglesias, 2008).

This paper contributes to this literature by providing new evidence on the dynamics followed by the Spanish agri-food system in recent decades, highlighting the links between economic activities. It goes further in disaggregating the activities and products involved in the agri-food system and thus brings new features of their dependencies to light. In addition, it includes food services, an aspect that few researchers have explored. It also extends the period of time being examined up to 2016, therefore continuing the work of the authors mentioned above. In this regard, this paper covers a key historical moment: Spain's

entry into the European Economic Community (EEC) (1986). This had major consequences for the development of the Spanish agri-food system since it opened the country up to international trade agreements and launched rule by the later European Union (EU)'s Common Agrarian Policy (CAP).

To this end, I adopt a socio-economic approach based on data from the input-output framework. I examine value added, labour, supply and use data from the supply and use tables (SUTs) and input-output tables (IOTs) of the Spanish Instituto Nacional de Estadística (INE, s. d.-d) for *agriculture*, *stockbreeding*, *forestry* and *fishing (ASFF)*, as well as the *food industry* and *food and accommodation services*[1] between 1980 and 2016.

The paper is structured as follows. After this introduction, section 2 briefly presents the database and the methodological approach. Results of the analysis are set out in section 3, divided into the outcomes from value added and changes to labour (section 3.1.), as well the findings regarding supply (section 3.2.) and uses (section 3.3.). The results are discussed in section 4 and concluding remarks made in section 5.

2. DATA AND METHODOLOGY

This study adopts a socio-economic approach based on data from the input-output framework. Thus, I use data from SUTs and IOTs from the Spanish National System of Accounts provided by INE (INE, s. d.-a). In Annex I, I offer a brief but detailed description of the input-output framework. INE published SUTs from 1995 to 2017 on an annual basis and IOTs for 1980, from 1985 to 1994 on an annual basis, from 1995 to 2015 once every five years, and for 2016.

Data from SUTs are preferred for the purposes of this paper, which is fundamentally descriptive in nature. As explained in Annex I, the compilation of IOTs relies on certain assumptions that require the application of adjustments. Under the product technology assumption, secondary production –that is, production that is not characteristic of an activity– is reassigned so that symmetric IOTs can be constructed. This adjustment entails a distancing from primary data that SUTs show. However, data from Spanish IOTs can be considered a good proxy since secondary production is relatively low. According to my own calculations[2], from 1995 to 2016, secondary production averaged 6.4% for *agri-*

1. When using italics, I am referring to the categories of economic activities and products of the National System of Accounts from INE.

2. Calculations are based on Supply Tables at basic prices 1995-2016 (INE, s. d.-a).

culture, stockbreeding, forestry and *fishing (ASFF)*, 4.8% for the *food industry*, and 3.4% for *food and accommodation services*. These results are consistent with those published by Eurostat (2008), according to which secondary output of Spanish economic activities averaged 4.7% between 1995 and 2000. In addition, I use data from the Spanish *encuesta de población activa* (INE, s. d.-b) and the *anuarios* (INE, 1990, 1994, 1996, 1997) for those years without labour data from the input-output framework (from 1980 to 1995).

From these sources, I construct series on value added, labour and supply from 1980 to 2016 for all the categories of activities and products related to *ASFF, food industry* and *food and accommodation services*. These three groups are assumed to constitute the *agri-food system* in the framework of this study. Value added and supply series are calculated in current monetary units (pesetas from 1980 to 1996 and euros from 1997 to 2016), while the labour series are calculated in terms of the number of people employed. In addition, the labour series include data on salaried and non-salaried labour, while the supply series include data on domestic and imported supply.

As for uses, on the one hand I calculate the intermediate input structure for *ASFF*, the *food industry* and *food and accommodation services* in 1980 and 2015 in order to compare the situation at the beginning and end of the period. The intermediate input structure, also known as the *specific demand connection*[3], gives the weight of intermediate inputs used by a given activity in producing its output. On the other hand, I also calculate the use structures of *ASFF products*, *food products* and *food and accommodation services*, *i. e.* the weight of uses by category of use, for 1980 and 2015. In this case, my calculations draw on the methodology known as *specific use connection*[4]. However, I include not only intermediate uses, but also final uses (*i. e.* exports, household consumption and fixed capital formation), which enables me to depict a wider picture of product uses in the economy. In both cases, I base my calculations on data from the IOTs of years 1980 and 2015. I use year 2015 and not 2016 since 2015 is the latest year for which the INE published the IOT of domestic production and the IOT of imported production.

It is important to note that the INE used different systems of accounts and accounting base years, particularly affecting the classification of products and activities. Table 1 summarizes the system of accounts, accounting base years and classifications of products and activities used from 1980 to 2016. It also shows the availability of SUTs and IOTs

3. A detailed explanation of the calculation of the specific demand connection (*ligazón específica de demanda* in Spanish) can be found in Haro and Titos (1982).

4. A detailed explanation of the calculation of the specific use connection (*ligazón específica de oferta* in Spanish) can be found in Titos *et al.* (1995).

and the level of the disaggregation of products and activities related to the agri-food system they include. The largest disaggregation is shown by SUTs from 1995 to 2009, based on the Clasificación Nacional de Actividades Económicas (CNAE-93) (INE, s. d.-c) and the Clasificación Nacional de Productos por Actividades 1996 (CNPA-96)[5] (INE, s. d.-d). Figures AII.1 and AII.2 in Annex II[6] display the main categories of products and activities that make up *ASFF*, the *food industry* and *food and accommodation services* for the period of study (1980-2016).

TABLE 1

Database description by system of accounts, accounting base year, products and activities classifications, availability of SUTs and IOTs and categories of products and activities related to the *agri-food system* they show

Period	System of accounts	Base	Products classification	Activities classification	Tables	Agri-food system products class.*	Agri-food system activities class.**
2016	ESA 2010	2010	CPA 2008	CNAE 2009	SUTs	A (5), I (8), S (2)	A (5), I (8), S (1)
					IOT	A (3), I (1), S (1)	A (3), I (1), S (1)
2015-2010	ESA 2010	2010	CPA 2008	NACE Rev. 2.	SUTs (all years)	A (3), I (1), S (1)	A (3), I (1), S (1)
					IOT (2010, 2015)	A (3), I (1), S (1)	A (3), I (1), S (1)
2009-2008	ESA 1995	2008	CPA 2008	NACE Rev. 2.	SUTs (all years)	A (5), I (8), S (2)	A (5), I (8), S (2)
2007-2000	ESA 1995	2000	CNPA 96	CNAE 93	SUTs (all years)	A (5), I (8), S (2)	A (5), I (8), S (2)
					IOT (2000, 2005)	A (3), I (5), S (2)	A (3), I (5), S (2)
1999-1995	ESA 1995	1995	CNPA 96	CNAE 93	SUTs (all years)	A (5), I (8), S (2)	A (5), I (8), S (2)
					IOT (1995)	A (3), I (8), S (1)	A (3), I (8), S (1)
		1986 (from	R56	R56			
1994 -1985	ESA 1979	1986 to 1994)			IOT	A (1), I (5), S (1)	A (1), I (5), S (1)
		1985 (year 1985)					
1980	ESA 1979	1980	R43	R43			

Notes: European System of Accounts (ESA); *Clasificación de Productos por Actividades (CPA) 2008 Clasificación Nacional de Productos por Actividades (CNPA) 1996; Nomenclatura de Actividades Económicas de la Comunidad Europea (Nace Rev. 2); Clasificación Nacional de Actividades Económicas (CNAE) 93*; supply and use tables (SUTs); input-output table (IOT); * "A" refers to *agricultural, stockbreeding, forestry and fishing (ASFF)* products; "I" refers to *food products* and "S" refers to *food and accommodation services*. The number in parentheses refers to level of disaggregation of products' categories for A, I and S; ** "A" refers to *agriculture, stockbreeding, forestry and fishing (ASFF)*; "I" refers to *food industry* and "S" refers to *food and accommodation services*. The number in parentheses refers to level of disaggregation of activities' categories for A, I and S.

Source: based on the input-output framework (INE, a)

5. CNAE-93 is structured into five hierarchical levels, including 17 sections, 60 divisions, 222 groups, 512 classes and 7,666 subclasses of activities. CNPA-96 is structured into seven hierarchical levels, including 17 sections, 31 subsections, 60 divisions, 222 groups, 492 classes, 947 categories, 2,305 subcategories and 6,188 elements.

6. The figures in Annex 2, as well as others to be mentioned in the text, are available in an online appendix. See DOI 10.26882/histagrar.088x04p.

Due to these differences in accounting, it was not possible to construct homogeneous series for the entire period of study. As Table 1 shows, *food services* are particularly affected, being aggregated along with *accommodation services* for 1980, from 1985 to 1994, from 2010 to 2015 and for 2016. However, the examination of data from the years in which *food services* and *accommodation services* were accounted separately confirms the major share of *food services* in the aggregated value (83.3% on average in 1995-2009 and 2016).

A final concern has to do with distribution between the links of the value chain that makes up the *agri-food system*. SUTs and IOTs do not directly show the share of *transport* and *trade services* that are involved in the agri-food system (Titos *et al.*, 1995; Titos & Haro, 1983). Disentangling this requires further research. For this reason, distribution is excluded as going beyond the scope of this paper. However, *transport* and *trade services* are taken into account in examining the intermediate input structures and use structures related to *ASFF, food industry* and *food and accommodation services*.

3. RESULTS

3.1. Value added and labour in the agri-food system: the fall in *ASFF* and the rise in *food and accommodation services*

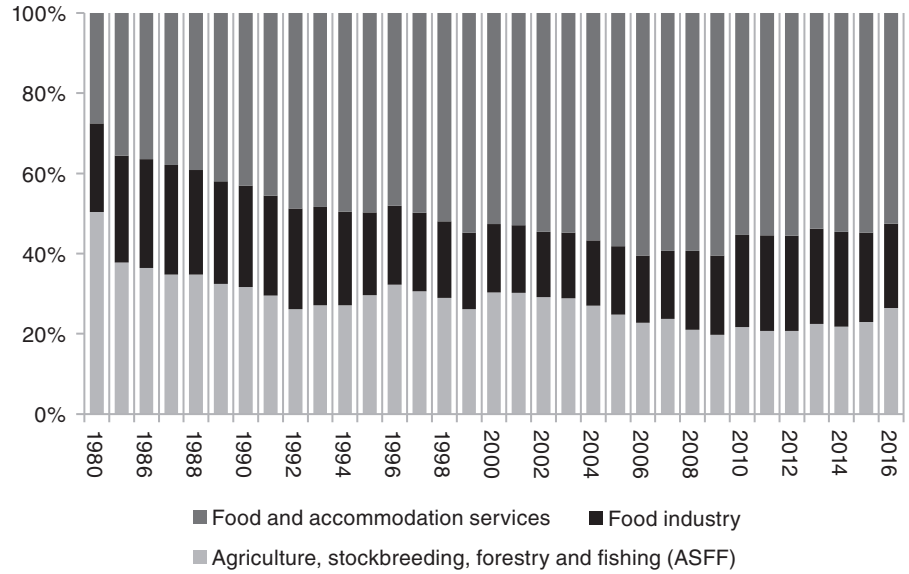
Figure 1 shows the evolution of the shares of value added of *ASFF, food industry* and *food and accommodation services* in the Spanish *agri-food system* from 1980 to 2016. Note that the weight of *ASFF* almost halved from 50.4% to 26.4% throughout the period, compared to a nearly twofold increase from 27.6% to 52.5% in the case of *food and accommodation services*. The share of *food industry* remained quite stable (average share of 21.5% throughout the period). As a result, *food and accommodation services* became the major contributor to the Spanish *agri-food system* in terms of value added, replacing the position *ASFF* occupied at the beginning of the period.

Figure AIII.1 (annex III, online version) shows the evolution of the same three aggregate activities in the total value added of the Spanish economy, also from 1980 to 2016. Again, the declining weight of *ASFF* is notable, falling 59%, from 7.6% to 3.1% of the Spanish total value added between 1980 and 2016. The share of *food and accommodation services* increased 78%, from 4.6% to 8.2% up to 1999, although in the twenty-first century it slightly contracted at an average rate of 1.2%. The weight of the *food industry* fell 24%, from 3.3% in 1980 to 2.5% in 2016. The joint result of these trends was a reduction in the *agri-food system* in the total value added of the Spanish economy, from 15.1% in 1980 to 11.8% in 2016. This downward trend was only interrupted between

1980 and 1987, when it expanded at an average rate of 1.7%. This evolution was the result of changes not only to the agri-food system, but also to the Spanish economy as a whole. The output of the *agri-food system* in absolute terms did not decrease, but other economic activities have emerged that have gained great relative weight in recent decades.

FIGURE 1

Value added by group of activity (% of *agri-food system*), Spain 1980-2016



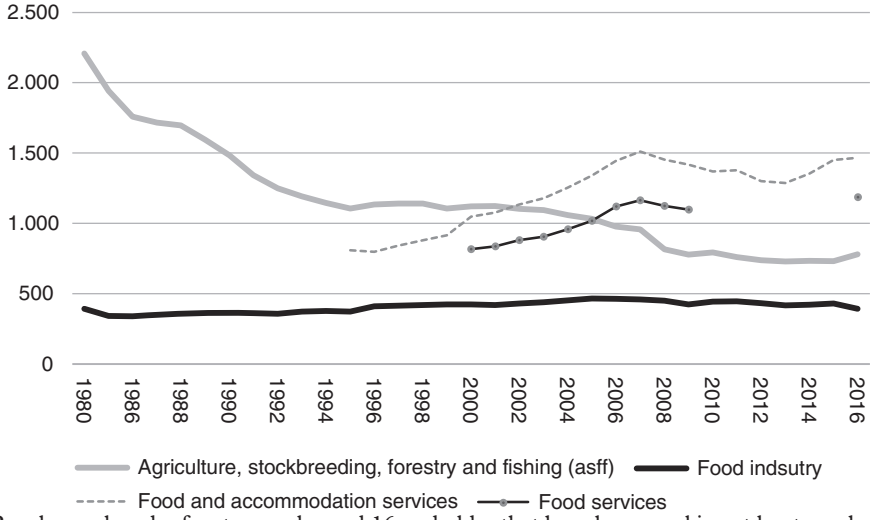
Source: based on data from the input-output framework (INE, a)

The reduction of the share of *ASFF* in the value added of Spain's *agri-food system* and economy went hand in hand with a drastic fall in the agricultural labour force (Fig. 2). This was particularly pronounced in between 1980 and 1994, when the number of people employed halved from 2,209,100 to 1,106,500. In 2016, only 779,700 people worked in *ASFF*.

Due to the lack of available data, it was not possible to calculate the share of agricultural labour in the total labour of the *agri-food system* in 1980. However, it must have been substantial. In 2000, the first year with available labour data for *ASFF*, the *food industry* and *food services*, the share of people employed in *ASFF* was 47.4% of the figure for the total *agri-food system* –excluding *accommodation services*–. In 2016, this share fell to 32.7%, thus declining by about 45%. Its corresponding share of the total labour of the Spanish economy fell by 78%, from 18.6% in 1980 to only 4.1% in 2016.

FIGURE 2

Number of people employed by activity (in thousands of people), Spain 1980-2016



Notes: People employed refers to people aged 16 and older that have been working at least one hour in exchange for a remuneration in cash or in kind during the references' week. It also includes those with work but temporarily absent through illness, holidays, etc. They are subdivided into freelance workers (employers, businesspersons without employees and independent workers) and employees (public or private)

Source: From 1996 to 2016 data were sourced from supply tables (INE, a) showing "positions" from 1996 to 2007 and "people employed in the activity" from 2008 to 2016. For the period 1996-2007 "positions" is used as a proxy since there are no data on "employees in the activity". Data on *food and accommodation services* in year 1995 also shows "positions". The lack of labour data before 1995 from supply tables was complemented with data from the *Encuesta de Población Activa (EPA)* (INE, b) for *ASFF* and from *Anuarios* (INE, 1990, 1994, 1996, 1997) for *food industry*.

In line with the evolution of value added flows, the number of people employed in *food services* increased. Data are only available from 1995 onwards, aggregated along with *accommodation services* from 1995 to 2000 and 2010 to 2015. Nevertheless, labour in *food services* seems to have followed an upward trend since the 1980s (Fig. 2). In 2000, 771,100 people were employed in *food services*, accounting for 34.6% of all labour in the *agri-food system* –excluding *accommodation services*– and for 4.8% of Spain's total labour. This figure increased to 1,244,500 in 2016, accounting for 51.1% of labour in the Spanish *agri-food system* –excluding *accommodation services*– and for 6.3% of the total labour in the Spanish economy.

The figure for those employed in the *food industry* remained stable in absolute terms, being 393,850 in 1980 and 393,400 in 2016. However, in relative terms, its weight fell 9%, from 17.9% in 2000 to 16.2% in 2016, of the total labour of the Spanish *agri-food system*, and 36%, from 3.3% in 1980 to 2.1% in 2016, of the total labour in the Spanish economy.

Labour data also reveal an increase in the rate of salaried labour. In the case of *ASFF*, the share of non-salaried labour nearly halved, from 71.7% in 1980 to 37.7% in 2016. These data also show that 1996 was a turning point in the inversion of salaried and non-salaried shares. As a result, *ASFF* labour substantially declined at the same time as it became predominantly employee-based.

Data on the types of labour employed in the *food industry* and *food services* have been only published from 1995 onwards. These data show that salaried labour was prevalent in both the *food industry* and *food and accommodation services* between 1995 and 2016 and that its weight increased relatively during this period. The share of salaried labour increased 7% in the *food industry*, from 89.7% in 1995 to 95.9% in 2016, and 18% in *food and accommodation services*, from 64.3% in 1995 to 75.7% in 2016.

3.2. Increasing internationalization of the agri-food supply

Supply data show that the share of imported products in total supply increased in all categories from 1980 to 2016. In the case of *ASFF products* this trend was only interrupted from 1980 to 1986, just before Spain joined the EEC, when it fell from 12.7% to 8.6% (Fig. AIII.2, online). Since then, the share of *ASFF* imports in the total supply more than doubled, reaching 19.9% in 2016. In the last decade, *ASFF products* were by far those with the highest share of imports, with an average of 18.3%, in contrast to *food products* (14.3%) and *food and accommodation services* (1.6%). In the available data (1995-2016) the shares of *ASFF* imports for the EU and non-EU categories are quite similar, on average 44.8% for the former and 55.2% for the latter.

Looking at the paths followed by *ASFF* imports at a greater level of disaggregation (available from 1995 onwards), Figure AIII.2 (online) shows that the behaviour described above refers mostly to *agricultural* and *stockbreeding products*. This is due to the fact that these products account for most of the output of *ASFF products*. *Fishing products* showed the highest rate of imports, with an average rate of 32.5% between 1995 and 2016. Moreover, this increased from 28.2% to 35.2% during the period. In constrast, the share of imports of *forestry products* decreased from 18.5% in 1995 to 5.4% in 2016.

The share of imported *food products* increased fourfold, from 4.1% to 17.2% between 1980 and 2016 (Fig. AIII.3, online). This growth was only interrupted by the 2008 financial crisis. *Food products* were mainly imported from the EU (65.9% on average between 1995-2016), while the non-EU share was 34.2% on average in the same period. Within *food products*, the highest rate of imports corresponds to *other food products* (*an-*

imal feed being the sub-category that accounts for the most of its aggregated value). Conversely, *meat products* had the lowest rates of imported supply. Moreover, the rates remained fairly stable throughout the period, with an average share of 6.8% in 1995-2016. *Food and accommodation services* were supplied domestically for most of the period. Only in 2015 and 2016 do imports show upward shares of 1.4% and 2.4% respectively.

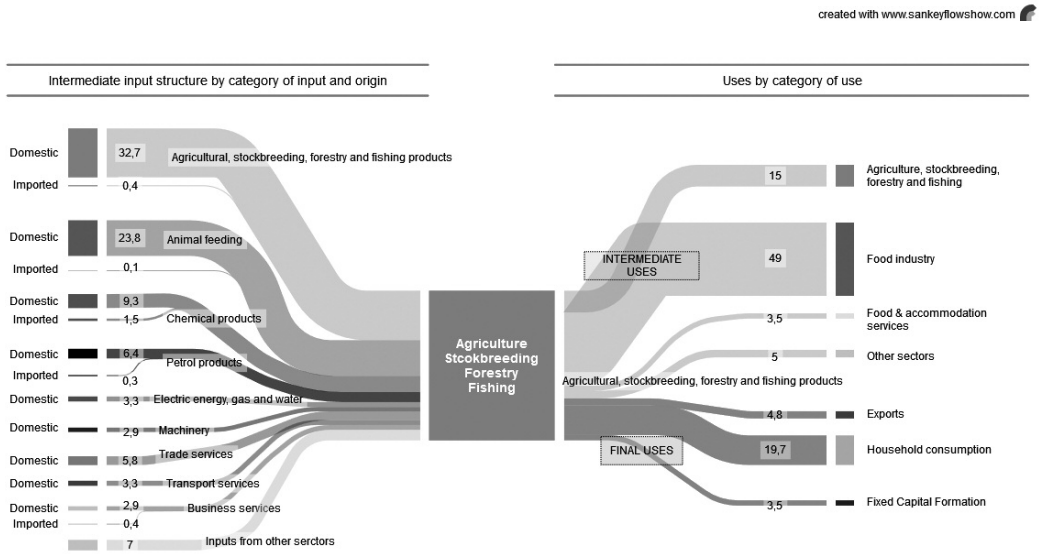
3.3. Changes in the links between economic activities

Figures 3 and 4 show the structural changes of the intermediate inputs structure of *ASFF* (left side of the diagram) and the structure of intermediate and final uses of *ASFF products* (right side of the diagram) from 1980 to 2015. One of the major changes is the fall in the share of reused inputs coming from the *ASFF* itself, from 33.1% to only 11.1%. This involves a 67% contraction of the "re-use" rate (Abad & Naredo, 1997) in agri-food primary production. In 1980, this internal circularity still was the first intermediate input category of *ASFF*, but it lost this leading role at the beginning of the 1990s, falling to the third position by 2015. In addition, the relative weight of imported intermediate inputs by *ASFF* grew from 1.2% to 22.0% between 1980 and 2015. This result is consistent with the increase in imported supply (see Figure AIII.2, online).

There have been other structural shifts within *ASFF* that changed the links both between and within these activities. Use tables from 1995-2016 provide disaggregated data for *agriculture and stockbreeding (1)* –differentiating between *agriculture (1.1)*, *stockbreeding (1.2)*, *services related to agriculture and stockbreeding (1.3.)*–, *forestry (2)* and *fishing (3)*. Interdependencies between *agriculture and stockbreeding (1)* and *forestry (2)* are of special interest. Historically, these activities were followed in the same agroecological landscape, and their mutual disconnection has been identified as the main driver of the loss of bioeconomic circularity and the reduction in the energy efficiency of industrial agriculture (Tello *et al.*, 2016; Padró *et al.*, 2017; Cattaneo, Marull & Tello, 2018; González de Molina *et al.*, 2020).

The examination of these data reveals that flows from *forestry (2)* to *agriculture and stockbreeding (1)* are notably weak, representing only 0.1% on average (1995-2016) of the total of the intermediate inputs of *agriculture and stockbreeding (1)*. As expected, the weight of the "re-use" rate in *agricultural and stockbreeding (1)* fell significantly, between 1995 and 2016, from 20.7% to 6.2%. These trends are consistent with the fact that *agriculture and stockbreeding (1)* account for most of the aggregated value of *ASFF*.

FIGURE 3
Structure of intermediate inputs of *ASFF* (in%) and of the subsequent intermediate or final uses of *ASFF products* (in %), Spain 1980



Notes: Data were collected from the input-output table at basic prices (million pesetas) 1980. The intermediate input structure shows the nine main categories of inputs in terms of weight. Data on *other food products* (6) –which includes *animal and vegetal fats and oils* (6.1.), *animal feeding* (6.2.) and *other food products* (6.3.)– are used as a proxy of *animal feeding*. *Animal feeding* accounted for 98.7% of the aggregated value made up of 6.1, 6.2 ad 6.3 1995 (this year is the first one for which the INE published these disaggregated data). Calculations are based on the use table at basic prices, 1995. Thus, it can be considered a good estimation.

Source: based on data from the input-output framework (INE, a)

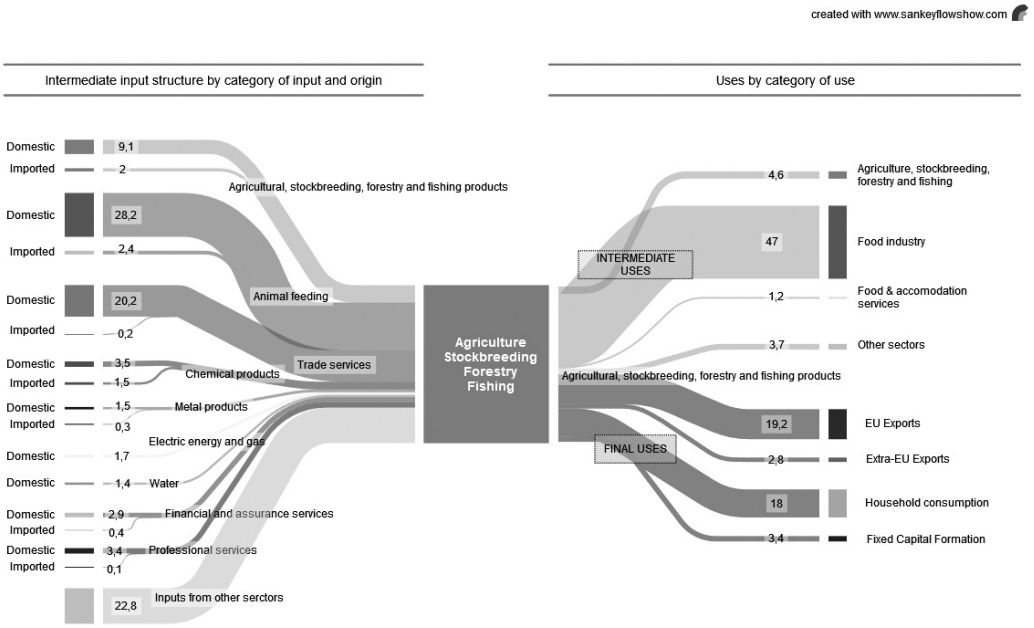
An even more exhaustive analysis of the inward flows between these three activities from 1995 to 2009, made possible by INE's disaggregated data on *agriculture (1.1)*, *stockbreeding (1.2.)* and *services related to agriculture and stockbreeding (1.3)*, shows two main features: firstly, *agricultural products (1.1)* were the intermediate input that was sourced internally the most by *agriculture and stockbreeding (1)*, with a share of 47.9% on average in the period 1995-2009; secondly, *services related to cropping and livestock breeding (1.3)* doubled their weight in the intermediate input structure of *agriculture and stockbreeding (1)* from 11.9% to 20.5%.

As for *forestry (2)*, the flow from *agricultural and stockbreeding* significantly weakened. The share of *agricultural and stockbreeding products (1)* in the intermediate input structure of *forestry (2)* fell from 12.4% in 1995 to 1.9% in 2015 (85% decrease). At the same time, the "re-use" rate within *forestry* (2) skyrocketed, from 0.3% in 1995 to 48.1% in 2015.

Both features point to a lack of connection with other agricultural and stock-raising activities. However, the *forestry (2)* figures need to be taken with caution due to the changes in the accounting criteria adopted by the INE. This specific issue needs further research.

FIGURE 4

Structure of intermediate inputs of *ASFF* (in%) and structure of the subsequent intermediate or final uses *ASFF products* (in %), Spain 2015



Notes: Data on the intermediate input structure (left side of the diagram) were collected from the input-output table of domestic production at basic prices (million euros) and the input-output table of imports at basic prices (million euros) of Spain, 2015. Data on the uses (right side of the diagram) were collected from the input-output table at basic prices (million euros) of Spain, 2015. The intermediate input structure shows the nine main categories of inputs in terms of weight. Data on *food products* is used as a proxy of *animal feeding*. Neither the input-output table nor the supply table of 2015 show disaggregated data of the sub-categories that make up *food products*. However, the supply table at purchasers' prices of 2016 shows it. *Animal feeding* accounts for 98.7% of the aggregate value. Thus, it can be considered a good estimation. *Professional services* is made up of categories *Other professional, scientific and technical services*; *veterinary services* and *security and research services; building and landscaping services; administrative and office services and other business services*. *Trade services* include categories *wholesale services, except from repair of motor vehicles and motorcycles* and *retail services, except from repair of motor vehicles and motorcycles*.

Source: based on data from the input-output framework (INE, a)

Going back to figures 3 and 4, we observe how the share of *animal feed* in the intermediate input structure of *ASFF* increased from 23.9% in 1980 to 30.6% in 2015. Following the opposite path of the internal re-uses of *ASFF, animal feed* became the major inter-

mediate input of *ASFF* by 1990s. In addition, the rate of imports of *animal feed* grew from 0.4% in 1980 to 8.5% in 2015.

Chemical products, which include pesticides and other agrochemicals, synthetic fertilizers and pharmaceutics, were others main intermediate inputs of *ASFF* throughout the period. Nevertheless, their weight halved between 1980 and 2015, from 10.8% to 5.0%. At the same time, the share of imports of *chemical products* also increased substantially, from 13.9% to 42.9%, thus reinforcing the trend towards greater dependence on industrial inputs from abroad.

However, one of the most important structural changes has to do with *trade services*. Their share was 5.8% in 1980, a figure that remained quite stable until the beginning of the twenty-first century. Since then, it tripled to 20.4% in 2015, becoming the second major intermediate input of *ASFF*. *Trade services* are by far the new big player in the intermediate input structure of primary agri-food production. The rapid increase in the trade costs for *ASFF* producers from 1980 to 2015 deserves special attention. Within the input-output framework, *trade* is considered a service whose output is measured by trade margins, calculated as the difference between the value of goods sold by agents and their purchase value, without these goods having suffered any transformation in a year (Titos *et al.*, 1995). Thus, the above results mean that a significant share of the increase in the production costs of agri-food primary producers would have come from a prominent rise in trade margins.

Apart from that, figures 3 and 4 show that the weight of *electricity, gas and water* in the *ASFF* intermediate input structure remained nearly steady: 3.3% in 1980 and 3.1% in 2015. We know that within these aggregated figures there have been changes in the energy and water uses of Spanish agriculture and stockbreeding due to the increase in the consumption of electricity for heating, lighting and the aeration of livestock production in industrial feedlots (González de Molina *et al.*, 2017; Infante-Amate, Aguilera & González de Molina, 2018). The abandonment of farms and tilled cropland has also meant a more than proportional reduction of tractors, with those into operation being more energy-efficient in Spain, as everywhere in the world (Aguilera *et al.*, 2015; Pellegrini & Fernández, 2018). Water and energy expenditure has also increased in physical units along with irrigation (Vila-Traver *et al.*, 2021), but their conversion in terms of added value depends on the evolution of prices. This issue deserves a more detailed specific study.

On the right side of the diagrams, which portray the changes in product uses, figures 3 and 4 shows that *ASFF products* were mainly used as intermediate inputs by other activities throughout the period. However, the share of these intermediate uses in total uses

fell 27%, from 72.0% in 1980 to 56.5% in 2015. In addition, note the change in the composition of intermediate uses. Those diverted again as inward flows towards *ASFF* halved, from 20.1% in 1980 to only 8.1% in 2015, denoting once more the reduction in economic circularity. The share of intermediate uses by *food and accommodation services* also declined by about 57%, from 4.9% in 1980 to 2.1% in 2015. Conversely, the share of intermediate uses by the *food industry* increased 22%, from 68.1% to 83.2%. Indeed, the *food industry* was by far the main destination of *ASFF products* in relation not only to intermediate uses, but also total uses, with shares of 49.0% in 1980 and 47.0% in 2015.

This relative decline in intermediate uses in Spanish economic activities is the consequence of the increase in exports of total uses of *ASFF products*, which multiplied by 3.5, from 4.8% in 1980 to 21.9% in 2015. 87% of these exports went to the EU in 2015. Of course, a relevant share of them might be used as intermediate inputs by foreign industries, signalling a greater integration of Spanish *ASFF* in the value chains of the global agri-food system. The input-output framework does not provide information on the uses of exports, and further research is needed to determine this. Moreover, the data show that the share of exports exceeded that of final consumption by households in 2015, which declined slightly from 19.7% in 1980 to 18% in 2015. Finally, the weight of fixed capital formation in *ASFF* total uses remained quite stable throughout the period, with shares of 3.5% in 1980 and 3.4% in 2015.

If we move our focus to the intermediate input structure of the Spanish *food industry*, we can see that *ASFF products* were its main intermediate input in 1980, with a share of 61.6%, whereas in 2015 their share more than halved, accounting only for 25.5% (Figures AIII.4 and AIII.5, online).

Conversely, the share of *food products* grew more than threefold, from 13.3% in 1980 to 44.7% in 2015. This increase entails a greater "re-use" rate within the *food industry*, a trend that contrasts with that experienced by *ASFF*. In addition, the share of *ASFF* imported inputs slightly fell from 19.3% in 1980 to 18.9% in 2015, again differing from the path followed by *ASFF*. However, this was not the case for the share of *food products* as imported inputs, which increased 15.7%, from 6.8% in 1980 to 7.8% in 2015.

The share of *oil products*, related to the use of fossil fuels as energy sources, was 1.4% in the intermediate input structure of the *food industry* in 1980. In 2015 it was not even listed among the nine primary categories of intermediate inputs in the *food industry*. Conversely, *electric energy and gas* was not among the nine primary intermediate inputs of the *food industry* in 1980, though by 2015 their share was already 2.0%.

On the uses side (right side of the diagram), note that the share of intermediate uses in the total uses of *food products* increased 49%, from 34.5% in 1980 to 51.4% in 2015. The share of uses by *food and accommodation services* fell from 40% in 1980, when it was the major destination of *food products*, to 23.0% in 2015. Similarly, the share of uses by *ASFF* fell 65% from 26.3% in 1980 to 9.2% in 2015. Conversely, the share of uses of *food products* by the *food industry* more than doubled, from 26.2% to 61.2%, a feature consistent with the increase of its "re-use" rate. As expected, the share of exports in total uses of *food products* grew, from 5.9% in 1980 to 31.9% in 2015. 68.7% of total exports of Spanish *food products* went to the EU in 2015 (Fig. AIII.5, online). As in the case of *ASFF products*, the question of the uses of these exports needs to be explored further with additional data from other sources. Apart from that, the data show that final household consumption in Spain lost 45.2% of its relative weight in total of uses of *food products*, falling from 58.8% in 1980 to 23.3% in 2015. Finally, use as fixed capital formation remained stable throughout the period, with a share of 0.8% in both 1980 and 2015.

As for *food and accommodation services*, figures AIII.6 and AIII.7 (online) show an 84% decline in *ASFF products* in respect of their intermediate input structure, from 10.1% to only 1.6% between 1980 and 2015. This indicates that the backward structural linkages between *ASFF* and *food and accommodation services* were severely weakened throughout the period. In contrast, the share of *food products* remained the main intermediate input of *food and accommodation services*, being 45.5% in 1980 and 41.3% in 2015. In addition, note that the ratio of imported intermediate inputs increased for both *ASFF products* and *food products*. In the first case, it increased almost six-fold, from 2.0% in 1980 to 14.3% in 2015. In the case of *food products* inputs, it increased about 8% from 5.3% to 14.3%.

Moreover, the share of *trade services* increased 88%, from 8.5% in 1980 to 16.0% in 2015. This suggests that a driver behind the weakening of the links between *food and accommodation services* and *ASFF* could have been the rise of commercial intermediation services between these two groups of economic activities.

Along with these major transformations, figures AIII.6 and AIII.7 (online) also show a 78% decline in the share of *electric energy and gas* intermediate inputs, from 9.8% in 1980 to 2.2% in 2015. Oil energy sources were not significant in the intermediate input structure of food and accommodation services. Furthermore, the share of *construction and civil engineering* was 5.9% in 1980, and it was not listed among the nine primary intermediate inputs of these services in 2015. Conversely, *real estate services* were not listed among the nine primary intermediate inputs in 1980, but their share was 11.5% in 2015. This suggests a shift in the preference for renting facilities rather than building them.

In regard to uses, the right sides of figures AIII.6 and AIII.7 (online) show that *food and accommodation services* were mostly used as household consumption in both 1980 and 2015. However, this share in total uses declined 7%, from 1980 89.6% in 1980 to 83.0% in 2015. This seem to be related to the rise in exports, which were non-existent in 1980 but grew by up to 5.5% in 2015, 75% going to the EU. Public consumption also rose by up to 0.2% of their total uses in 2015. The share of intermediate uses of *food and accommodation services* as intermediate inputs of other economic activities increased 9%, from 10.4% in 1980 to 11.3% in 2015. Additionally, they changed in composition. In 1980, *construction services* were their main destination, with a share of 17.3% of their total intermediate uses, while in 2015, *tourism* used accounted for most of them, with a share of 41.6%.

4. DISCUSSION

The foregoing results make apparent that primary production in the Spanish agri-food system continued to deepen its integration with the global agri-food system from 1980 to 2016, while reducing its "re-use" rate and decoupling livestock feeding from other agricultural activities (González de Molina *et al.*, 2017).

Supply and use data show the increasing involvement of Spanish agriculture in international markets. The share of imports in the total supply of *ASFF* increased by 42% between 1980 and 2016. Likewise, exports were the category that increased the most in *ASFF product* uses, multiplying its share by 3.5 in the same period. As a result, these trends, which could already be observed in the 1960s, were maintained and intensified until the second decade of the twenty-first century (Titos & Haro, 1983). In addition, these results are consistent with the structural changes that were made in the use of land and work and in the pattern of biophysical flows in Spanish agriculture (González de Molina *et al.*, 2020) and also when considering the growth of Spanish agri-food trade, which was higher than the world and European averages during the second globalization and increased further after Spain joined the EEC (Clar, Serrano & Pinilla, 2015).

Use data confirm that *ASFF products* were used mainly as intermediate inputs of other industries –fundamentally, the *food industry*– since the transition from "traditional agriculture" to the "agro-industrial system" up to 2016 (Abad & Naredo, 1997; Clar, Martín-Retortillo & Pinilla, 2018). At the same time, use by foreign industries increased more than use by domestic ones. These trends reveal a growing dependence on exports as purchasing markets, but also a decoupling from the end consumers in the domestic market. Moreover, the flows from *ASFF* to Spanish *food and accommodation services* more

than halved between 1980 and 2015, which seems to be explained by a rise in the degree of intermediation by traders.

The examination of the intermediate input structure of Spanish *ASFF* suggests that the links with the global food industry continued to tighten (Titos & Haro, 1983). A major issue has been the consolidation of *animal feed* as the primary *ASFF* input since the 1990s, which reached up to 30.6% of the value of its total intermediate inputs in 2015. This evidences the shift from food to feed in the globalized agri-food system (Soto *et al.*, 2016), and it is linked to the abandonment of the healthy Mediterranean diet (González de Molina *et al.*, 2020). The Spanish specialization in stock-raising towards an intensive model of animal fattening has been the main driver of this shift (Clar, Martín-Retortillo & Pinilla, 2018) at the expense not only of animal well-being but also of the risks to public health (Wallace, 2016).

Livestock numbers had already started to increase in Spain before the 1980s. Indeed, they more than doubled from 1960 to 2008, led mainly by pigs and poultry. The fact that these are monogastric animals explains the high demand for domestic and imported grains used as industrial compound feed, which replaced the extensive grazing of pastures by the traditional Spanish livestock landraces of ruminants like sheep, goats and cattle (González de Molina *et al.*, 2017). This also locked Spanish producers into close dependence on the agro-industrial provision of animal feed. The shift away from a Mediterranean diet towards one that was more based on animals mostly explains this change, which can also be linked to the "westernization" of diets globally (Kearney, 2010), in which the Spanish meat industry has also played a significant role (Clar, Martín-Retortillo & Pinilla, 2016, 2018).

In addition, the decoupling of stock-raising from Iberian cropland, pastureland and forests is behind the drastic shrinkage in the "re-use" rate of Spanish *ASFF* (from 33.1% in 1980 to only 11.1% in 2015), thus strengthening the trend followed in the previous two decades (Abad & Naredo, 1997; Titos & Haro, 1983). Data on SUTs and IOTs show to what extent the links among cropping, stock-raising and forestry became increasingly weaker. The disintegration of formerly complex agro-silvo-pastoral systems and their landscape mosaics, which began in the middle of the twentieth century (Garrabou & Naredo, 2008; Naredo, 1991), continued and intensified until recently (Marull *et al.*, 2010, 2015, 2016; Parcerisas *et al.*, 2012; Marull & Font, 2017; Tello *et al.*, 2020).

This shift is an important driving force of the current ecological crisis. Firstly, this is due to the lesser biological complexity of agroecosystems it entails (Cardinale *et al.*, 2012; Marull *et al.*, 2019). Secondly, it is due to the harmful impacts of agrosystems' high dependence on external fossil-fuel inputs in terms of water use and pollution, greenhouse

gas emissions, and low energy efficiency (Duarte, Pinilla & Serrano, 2014, 2016; Aguilera *et al.*, 2019a, 2019b), thus undermining the capacity of Spanish agriculture to provide ecosystem services. In this sense, the Spanish agri-food system is evolving in the opposite direction to the circular bioeconomy being advocated by the EU (European Commission, 2018), as well as the agroecology transition being pushed by the Food and Agriculture Organization of the United Nations (FAO, 2018) and many scientists and social movements (Altieri & Nicholls, 2012; IPES-Food, 2016).

Along with these major transformations, the results reveal a growing predominance of distribution in Spanish *ASFF*. The share of *trade services* reached 20.4% of the total of the intermediate inputs of *ASFF* in 2015. Data suggest that the rise in trade margins on animal feed is largely responsible for this. Historically animal feed had been led by a small number of international corporations in Spain (Titos, 1978), which are part of the agribusiness complex that exerts major market power on the agri-food chain (Davis & Goldberg, 1957; Etxezarreta, 2006). This phenomena was favoured by Spain's entry to the EEC since it opened up the path to large international food distributors (Cruz, Rebollo & Yagüe, 2003), which fostered international investment in the country and its integration within the dynamics of the global agri-food system (Sanz Cañada, 1997; Marsden, Moragues Faus & Sonnino, 2019).

The results also demonstrate the increasing weight of *trade services* in the intermediate input structure of *food and accommodation services*, given that their weight almost doubled between 1980 and 2015 (from 8.5% to 16.0%). Surprisingly, *trade services* were of minor importance in the case of the Spanish *food industry*, with shares of 4.8% in 1980 and 5.6% in 2015. The increase in the "re-use" rate within the *food industry*, more than three-fold over the period, from 13.3% in 1980 to 44.7% in 2015, explains this fact. This implies a strengthening of the integration of activities within the *food industry* that took place at the same time as the inputs from *ASFF products* halved (Titos & Haro, 1983).

All these trends favoured the change in the composition of the value added of the agri-food system. Under the assumption that the *agri-food system* is made up of *ASFF*, together with the *food industry* and *food and accommodation services*, the data show that the share of *ASFF* almost halved, from 50.4% in 1980 to 26.4% in 2016. This fall was also reflected in the framework of the Spanish economy. Conversely, the share of *food and accommodation services* increased by about 90% in the Spanish *agri-food system*, from 27.6% in 1980 to 52.5% in 2016. The weight of the *food industry* remained stable, with an average share of 21.5% throughout the period. These results are consistent with other studies and confirm that the trends in them portrayed deepened up to 2016 (Naredo, 1991; Titos *et al.*, 1995; Titos & Haro, 1983).

While there is strong evidence for how the growing dependence of *ASFF* on external inputs reduced its value added (Abad & Naredo, 1997; González de Molina *et al.*, 2020), the role exerted by distribution needs to be examined further. Studying *trade services* is essential to complete the picture of the value added chain of the Spanish *agri-food system*. According to Titos *et al.* (1995), the share of agri-food trade in the total of the value added of the Spanish agri-food system was 19.1% in 1988, while Sanz Cañada (1997) stated that it had already overtaken those of the food industry and agriculture by 1991.

In this scenario, market power relations and their impact on prices appear to be determinant. Prices, and the monetary valorisation of all the processes and tasks behind them, shape the production relations that are reflected in the input-output framework. We know that the "terms of trade" between the prices paid and received by farmers have become unrelentingly worse since the mid-twentieth century (Abad & Naredo, 1997; Serrano & Pinilla, 2011; González de Molina *et al.*, 2020). A clear example is the fine imposed on milk companies by the Spanish National Commission on Markets and Competition, most of them subsidiaries of transnational companies, due to their collusion in fixing low prices for the milk they purchased from family farms (Marey, 2020). But also, there is a lot of evidence on the asymmetrical power relations between manufactures and retailers. Food product retailers have experienced processes of concentration and internationalization resulting in large distribution groups with dominant power over food manufacturers (Cruz, Rebollo & Yagüe, 2003; Mir, Fayos & Calderón, 2008), as well as having detrimental impacts on traditional retailers (Casares & Rebollo, 1997) and wholesalers (Mollá & Sánchez Pérez, 2000).

All in all, the decline in value added retained by *ASFF* –which is, in turn, the source of primary producers' incomes– went hand in hand with the reduction in the number of those employed in these activities in both absolute and relative terms. The results show that the share of people employed in *ASFF* in total figures in Spain fell from 18.6% to 4.1% between 1980 and 2016. Thus, the reduction in the agrarian population continued the downward trend that has been observed since the second half of the twentieth century (Naredo, 1991). This fall also took place in relation to the *agri-food system* (in 2016, its share was 32.7%). Conversely, the number of people employed in *food services* continued to grow, reaching 51.1% of the total labour in the *agri-food system* (excluding *accommodation services*) in 2016. This is consistent with the path followed by *food and accommodation services* in terms of value added.

Furthermore, there was an increase in the rate of salaried workers throughout the *agri-food system*, but very particularly in *ASFF*, with growth from 28% to 62% between 1980

and 2016. This illustrates the decline of family farms (Etxezarreta *et al.*, 1995; González de Molina *et al.*, 2020) and the strengthening of the divorce between the economies of rural households and the dynamics of agricultural production (Abad & Naredo, 1997) after being increasingly integrated into the global accumulation process (Etxezarreta, 2006). This reduction was suffered mainly by the smaller farms, many of which only worked part-time (Abad & Naredo, 1997; González de Molina *et al.*, 2020). Along with the increase in average household spending in Spain, rural families underwent a process of decline in their living standards that endangered the viability of the small family farms that used to be the main providers of agri-food products (González de Molina *et al.*, 2020).

The important body of knowledge that agrarian communities held and inherited generation after generation on the site-specific management of agroecosystems, known as *agricultural heritage* (IAASTD, 2009; Koohafkan & Altieri, 2011; Agnoletti & Emanueli, 2016), has thereby been put at risk. The fall in incomes retained by *ASFF* rendered these activities dependent on subsidies from the CAP (Etxezarreta, 2006) and on external financing (Abad & Naredo, 1997). Data on SUTs and IOTs show that the weight of *financial and assurance services* in the intermediate input structure of *ASFF* increased from close to 0% in 1980 to 5.2% in 2015.

A last question that is unavoidable concerns the role of economic policies. With a different CAP, how different would things have been? While the issue of the impacts of CAP on agrarian change in Spain have already been raised by some authors (Clar, Martín-Retortillo & Pinilla, 2018; Etxezarreta *et al.*, 1995), giving a response to this question here would go beyond the scope of the present research. Nevertheless, this is a key dimension in understanding both current trends and the debate on its future paths.

5. CONCLUSIONS

This paper has provided an overview of the transformations of agriculture, stockbreeding, forestry and fishing within the framework of the Spanish agri-food system. It has adopted a socio-economic approach based on data from the Spanish input-output framework. I created series on value added, labour and supply for the activities and products related to *ASFF, food industry* and *food and accommodation services* –assumed to make up the *agri-food system* in the framework of this study– between 1980 and 2016, and calculated input structures and use structures in 1980 and 2015. This allows us to shed light on how the evolution of the links between different economic activities might have influenced the path and fate of agri-food primary production in Spain.

The results show that the contribution of *ASFF* to the value added of the *agri-food system* and the economy of Spain continued to fall from 1980 to 2016. Conversely, the contribution of *food and accommodation services* significantly grew. In line with this, the number of people employed in *ASFF* experienced a pronounced reduction both relative and absolute terms. Those remaining in the activity did so mostly as employees instead of family farmers, thus reversing the composition of labour observed at the beginning of the period. Supply and use data show a growing integration of the Spanish *agri-food system* in international markets, a feature more pronounced in the case of *ASFF*.

The findings also reveal a shift in the intermediate input structure of *ASFF*, characterized by a reduction of the "re-use" rate. This is mainly the result of a decoupling of forest and livestock management from agricultural land and forests, together with the growing weight of animal feed produced in industrial feedlots. This transformation conceals detrimental environmental impacts. In addition, *trade services* emerged as the second major intermediate input of *ASFF* in the twenty-first century, resulting from an increase in trade margins. This points to the great power exerted by large corporations within the global agri-food system and the impact of pricing dynamics on the value added retained by each of the stages of the agri-food chain. The decline in the share of value added and in the related incomes of agri-food primary producers was seemingly determined by these globalization processes. Family farms are particularly affected, endangering the fundamental roles they fulfil as providers of ecosystem services.

Moreover, the results show a deterioration in the weight of *ASFF products* in the intermediate input structure of *food industry* and *food and accommodation services* throughout the period. Simultaneously, the *food industry* strengthened its "re-use" rate, indicating a greater integration of industrial processes that also explains why *trade services* did not increase so much in the input structure of the *food industry*. The reduction of flows from *ASFF* to *food and accommodation services* was particularly marked. The data suggest that this reduction is related to a greater intermediation by traders, since the weight of *trade services* in the intermediate input structure of *food and accommodation services* increased significantly between 1980 and 2015.

Therefore, this study documents the increasing weight of distribution in the Spanish agri-food system and its crucial importance in examining the role of prices and market power relations, which go hand in hand with trade services and trade margins. This is the main limitation of this study by far. The role of economic policies, mainly the CAP, and the evolution of the number, structure and productive characteristics of the units of production involved in the Spanish agri-food system are also issues that need to be explored further.

The portrait of the transformations to the Spanish agri-food system in recent decades presented in this paper is a first approximation of these changes from a macroeconomic perspective based on data from the input-output framework. For a more comprehensive picture of these transformations and the analysis of the driving forces behind them and their socioecological impacts, my findings need to be further integrated with the study of other dimensions –such as the biophysical and care dimensions– and alternative approaches and scales.

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