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Abstract

The modern nutritional transition is characterized by a significant increase in protein consumption derived from animal-based foods, particularly meat. Despite its importance, the underlying drivers of this process have not been extensively explored, especially from a quantitative perspective. Some authors attribute it to demand-side factors such as growth in income, population, and urbanization rates, while others focus on supply-side factors such as the decline in livestock product prices due to the intensification of the livestock industry. This study seeks to fill this gap by examining quantitatively the role of demand, supply, and consumer preferences in driving the increase in meat consumption in Spain, a Mediterranean country that completed its modern nutritional transition in the latter half of the 20th century.

JEL Codes: N34, N54, O13, E21

Keywords: nutritional transition, meat, Spain, consumption

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1. Introduction

Once societies reach a certain level of calories and macronutrients, consumers tend to increase their consumption of animal-derived products and decrease their consumption of plant-derived products (Grigg, 1995; Cussó Segura and Garrabou Segura, 2007; Medina-Albaladejo and Calatayud, 2020). This complex process, with significant exceptions and differences between countries (Deaton and Drèze, 2009; Langthaler, 2018; Presa and Román, 2022), has been referred to as the modern nutritional transition (Popkin, 1993). Historically, the nutritional transition first occurred in Europe and other high-income countries and subsequently in developing countries (Grigg, 1995; Delgado, 2003; Popkin, 2003; Cheng, Gao and Seale, 2015). Therefore, global diets have tended to homogenize around the Western diet, which is high in saturated fats and sugars and low in fiber. Consequently, the nutritional transition and the homogenization of diets have costs both in terms of health (mainly due to the increase in non-communicable diseases) (WHO, 2021; Cerrillo *et al.*, 2023) and the environment (Infante-Amate *et al.*, 2018; Winders and Ransom, 2019; González de Molina *et al.*, 2020).

However, the determinants of the nutritional transition and, therefore, the increase in consumption of animal products, have been less systematically studied (Collantes, 2019). Broadly speaking, there are two categories in the literature that attempt to analyze them: those that focus on supply factors and those that focus on demand factors.

On the supply side, the main argument would be that the increase in productivity due to livestock intensification and subsequently, the larger weight of large retailers, would have generated a fall in the relative prices of these products and therefore a strong increase in their consumption (Grigg, 1995; Clar, 2008, 2013; Rivera-Ferre, 2009; Magnan, 2012). Therefore, it would be the increase in productivity along the value chain that would induce greater consumption of products such as meat or milk. On the demand side, the increase in per capita income in the West after World War II (and subsequently in developing countries), as well as the increase in population and urbanization rates, would be behind the increase in consumption of animal products (Popkin, 1993; Delgado, 2003).

However, this literature, while important in understanding the main changes in global diets, often does not consider two issues in depth. Firstly, it does not quantify the variables that influence the nutritional transition. That is, it focuses on supply and demand variables as the main determinants of the increase in livestock products, but does not quantify each of these factors. Without a doubt, the decline in the prices of these products as well as the increase in

income, urbanization, and population were important in the nutritional transition, but how much weight did supply capacity and demand capacity have? Secondly, literature on the nutritional transition often does not deal with preferences and especially does not quantify them (Collantes, 2018). That is, although it is clear that consumers' preferences, in a broad sense, are very important in explaining changes in consumption patterns, literature (especially in economic history) does not usually focus on them. In fact, since the late 20th century, preferences tend to play a greater role than income and prices because food tends to lose weight in household expenditure (Engels' law) (Mili, Mahlau and Furtsch, 1998). Therefore, the increasing importance of large retailers along the value chain is associated with a diversification and sophistication of food products (Rodriguez Zuñiga and Soria, 1990; Germán, 2009; Collantes, 2016) that is influenced (and influenced by) consumer preferences. Understanding the factors behind the nutritional transition may help reduce its impact on both health and the environment.

In this context, the objective of this study is twofold. Firstly, I use Spain as a case study to quantify the weight of supply capacity and demand capacity in this process. Specifically, by analyzing the consumption of meat, a key product in the nutritional transition, I quantify the importance of relative prices (supply) and disposable household income per capita (demand) in the mass consumption of meat during the second half of the 20th century. Secondly, I aim to analyze from a quantitative and qualitative perspective the role of preferences in meat consumption trends. To gain a more comprehensive perspective, I do not focus solely on average consumption, but instead look at different groups of consumers (income quartiles, regions, and territories) and different types of meat (both by animal origin and degree of processing). In this way, I complement the aforementioned literature on determinants of livestock product consumption, attempting to provide a more causal and quantitative perspective.

The interest in Spain as a case study lies in its status as a Mediterranean country that experienced its nutritional transition later than Western Europe (Moreno, Sarría and Popkin, 2002; Pujol-Andreu and Cussó Segura, 2014). Prior to the 1970s, the consumption of livestock products in the diet was relatively low (Clar, 2008, p.136). However, there was a significant increase in the consumption of meat and other livestock products within a short period of time, leading to a shift away from Mediterranean dietary patterns (Moreno, Sarría and Popkin, 2002; Bach-Faig *et al.*, 2011). In 1958, the average meat consumption in Spain was approximately 20 kilograms per person, which is close to the current recommendations for nutritional discourse (Willett *et al.*, 2019, p. 551; Martínez *et al.*, 2020, p. 53). However, by 1980, meat consumption in Spain had surpassed 60 kilograms per capita, triple the recommended maximum

consumption. Additionally, in the latter decades of the 20th century, there was a relative increase in the consumption of processed meat, which is linked to an increased risk of colorectal cancer, coronary heart disease, and diabetes (Bonnet *et al.*, 2020, p. 3). Consequently, the prevalence of various diseases currently affecting Spanish society, such as high rates of obesity, diabetes, and other cardiovascular diseases (Cerrillo *et al.*, 2023), originated during the period under investigation in this paper.

In addition to various studies on the Spanish nutritional transition in the 20th century (see section 3), this paper is complemented by the works of Clar (2008) and Nicolau and Pujol-Andreu (2005). Clar claims that the implementation of a Fordist consumption model in Spain, characterized by the mass consumption of chicken, pork, milk, and sunflower oil, was highly influenced by supply. In turn, the supply was shaped by institutional variables, based on the ease with which the regime allowed foreign companies in these sectors to establish themselves in Spain. Nicolau and Pujol-Andreu emphasize that, in the long term, supply adaptations to demand are an important element for the restructuring of diets. Therefore, in this paper, I endeavor to quantify the data presented in both works for meat consumption in Spain in the second half of the 20th century.

The paper is structured as follows. After this introduction, in the next section, I describe how I constructed the database and the methodology used to understand the determinants of meat consumption capacity. In section 3, I present descriptive data on meat consumption in Spain, relating them to the existing literature on the subject. Then, based on the methodology presented in section 2, in section 4, I establish the role of supply capacity, demand, and preferences in the Spanish nutritional transition. Finally, I conclude the article with brief conclusions, limitations, and potential future research.

2. Data and methodology

In order to explain the determinants of meat consumption in Spain during the second half of the 20th century, I have primarily relied on three factors: net disposable household income (demand capacity), relative meat prices (supply capacity), and preferences. Much of this data has been obtained from the Household Budget Surveys, henceforth referred to as HBS. These surveys were first conducted by the National Institute of Statistics (INE) in 1958 with the aim of obtaining information about the expenditure (and physical consumption of food items) of Spanish households (Maluquer de Motes, 2005; Collantes, 2012), as well as the consumer price index. Specifically, in this study, I use the HBS from 1958, 1964/65, 1980/81 and 1990/91, also known as the structural (or basic) family budget surveys (Díaz-Méndez *et al.*, 2005, p. 120). Although

there is an HBS for the period 1973/74, it does not provide data on food intake, but only on food expenditure. I have attempted to use alternative databases such as the one provided by the FAO to cross-reference food intake data with the expenditure data from the HBS, but the data merging does not yield consistent and reliable results (Delgado, 2022; Cerrillo *et al.*, 2023). Therefore, while the changes in food intake between 1964/65 and 1980/81 are not quantitatively analyzed, qualitative information is provided. Furthermore, as will be analyzed throughout the study, I prioritize long-term dietary changes, as consumer preferences do not change from one year to another (Nicolau and Pujol-Andreu, 2005). In other words, I am interested in analyzing the structural changes in the Spanish diet, thereby avoiding biases provided by cyclical changes in income or the prices of certain products. Hence, the results of this study should not be understood in a dynamic sense, but rather in a transversal sense, that is, as a succession of snapshots of events throughout the second half of the 20th century (Collantes, 2015). Although the use of a single database as the foundation of the entire study may imply the existence of biases due to possible methodological errors of the source (Díaz-Méndez *et al.*, 2005), the trends (though not the exact values) in meat consumption presented in the surveys during the study period are similar to those of other sources such as the FAO and the Food Consumption Panel (from 1987 onwards), thus demonstrating the robustness and reliability of the surveys.

Starting from the 1964/65 survey, all of them have a considerable sample size (between 24,000 and 28,000 households (Maluquer de Motes, 2005, p.1271)) and a sufficiently broad disaggregation of products to gain a detailed understanding of household consumption. In addition to providing data on food consumption at the national level, they also offer data on consumer characteristics, such as income levels, regional scope, types of municipalities (rural and urban), etc., which allow for a much better understanding of what has happened at the average level.

Since the surveys provide physical consumption and nominal expenditure data, the implicit price of each food product can be obtained (Collantes, 2019). In order to calculate expenditure and prices in real terms, they have been deflated using the consumer price index offered in Maluquer de Motes (2005, p. 1292) and linked to the one provided by the National Institute of Statistics (INE)[1]. For data on net disposable household income at the national level, the data presented by Carreras, Prados de la Escosura and Rosés, (2005, p. 1372) have been used. For disposable income by different groups of consumers, the data provided by the HBS have been used, also

[1]https://www.ine.es/dyngs/INEbase/operacion.htm?c=Estadistica_C&cid=1254736176802&menu=resultados&idp=1254735976607

deflated by the general price index. Although the data provided by the HBS on disposable income may be somewhat underestimated (Torregrosa-Hetland, 2016), this does not seem to imply significant bias, as demonstrated in Collantes (2019) using alternative indicators such as GDP per capita. With regard to the types of meat analyzed, data has been aggregated both at the level of the source animal (beef, lamb, poultry (mainly chicken), and pork) and by degree of processing, i.e., fresh and processed meat.[2]

Once the database has been constructed, a methodology similar to that of (Collantes, 2019, p. 960-62) has been used to calculate the determinants of consumption capacity. This methodology consists of two parts. The first part involves analyzing the role played by supply capacity (relative prices) and demand capacity (net disposable income)[3] in the evolution of meat consumption capacity in Spain using the following formula:

$$T_{t,t-1}(Meat\ purchasing\ power) = T_{t,t-1}(Disposable\ income) - T_{t,t-1}(Real\ meat\ prices)$$

In other words, this is a breakdown of the cumulative annual growth rates (T) of purchasing power in the acquisition of meat, corresponding to the percentage of net disposable income per person and the prices of meat. The second methodological part is to determine the role of preferences or, in other words, households' predisposition to consume meat. Using Collantes' methodology (2019), the so-called consumer responsiveness factor (RP) is applied.

$$RP = \frac{T_{t,t-1}(Meat\ consumption)}{T_{t,t-1}(Meat\ purchasing\ power)}$$

Intuitively, the responsiveness factor measures how the increase in physical meat consumption varies over a period of time with variations in the purchasing power of meat acquisition in the same period. If the RF is greater than 1, the growth in meat consumption will be higher than the growth in purchasing power adjusted for meat prices, therefore there will be an increase in the predisposition to consume meat. In other words, consumer preferences will be favorable towards meat consumption. If the RF is less than 1, the opposite will occur.

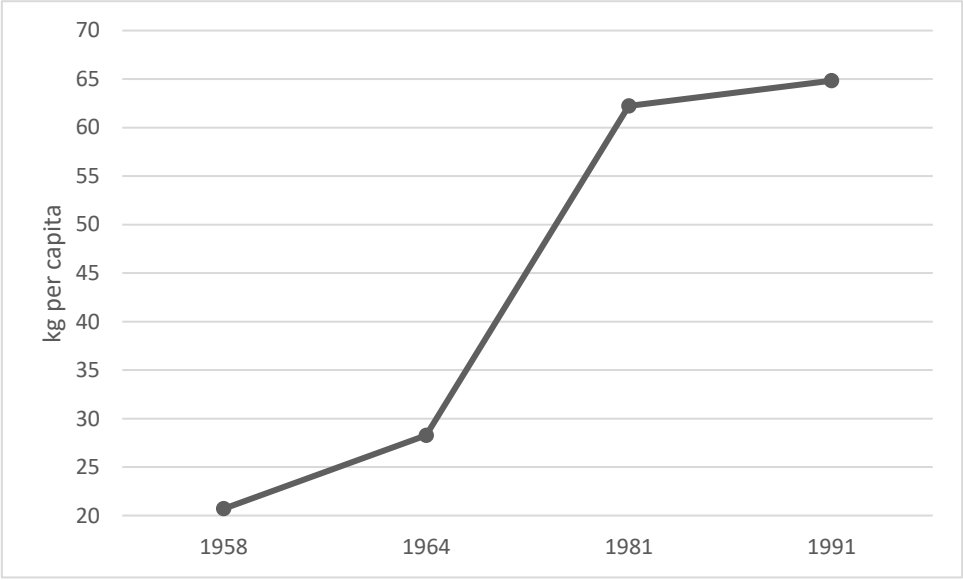
3. Nutritional transition and meat consumption in Spain

Historically, the Spanish diet has been characterized by the consumption of Mediterranean products (Moreno, Sarría and Popkin, 2002; Garrabou Segura and Cussó Segura, 2009; Pujol-Andreu and Cussó Segura, 2014). Therefore, the consumption of livestock products, such as meat, milk or eggs, was relatively low compared to Atlantic European countries (Gallego, 2016;

[2] I have included frozen meat in fresh meat due to its low weight contribution.
[3] The concepts of "supply capacity" and "demand capacity" are based on Malassis (1997).

Delgado, 2022). This meant that large groups of consumers had deficiencies in certain micronutrients, such as calcium (Cussó Segura, 2005; Collantes, 2014; Medina-Albaladejo and Calatayud, 2020). In the first third of the 20th century, there was a certain increase in the consumption of livestock products due to improvements in both supply and demand (Clar, 2008; Collantes, 2016; Langreo and Germán, 2018). However, these limited improvements were set back due to the civil war (1936-39) and the post-war period. That is, both the poverty caused by the war itself and the economic policies applied later, as well as international isolation, resulted in both economic and dietary deterioration (Barciela, 2003; Christiansen, 2013). The latter, accentuated in the case of livestock products (Clar, 2013; Martinez-Carrion, 2016). However, the final years of the 1950s and, especially the 1960s, witnessed significant changes in the Spanish diet. In other words, Spain completed its modern nutritional transition (Moreno, Sarría and Popkin, 2002). Therefore, there was a strong increase in meat consumption (see figure 1). Starting from very low levels (lower than in Greece or Turkey) (Delgado, 2022)), consumption first experienced a slight increase until the 1960s, and then took off and reached over 60 kilos per person just 15 years later. Thus, consumption reached levels higher than countries like France. From the 1980s, consumption would reach a certain level of saturation (Clar, 2022), causing its rate of increase to slow down and subsequently decline (Ríos-Núñez and Coq-Huelva, 2015; Delgado, 2022).

Figure 1: Meat consumption per capita in Spanish households



Source: Own elaboration based on household budget surveys.

However, the remarkable increase in meat consumption (and dairy products (Collantes, 2014)) since the 1960s masks significant changes among consumer groups (Collantes, 2015; Hernández-Adell, Muñoz Pradas and Pujol-Andreu, 2019; Delgado and Pinilla, 2022). In other words, the

growth in average meat consumption involved the massification of its consumption at the income, regional, and territorial levels (both in rural and urban areas). In fact, in 1960, the modern nutritional transition had been carried out only by certain social groups, usually high-income ones, while the vast majority of the population still based their diet on Mediterranean patterns (Cussó Segura, 2005). Therefore, meat consumption was not common among most of the population (Marrodan, Montero and Cherkaoui, 2012). As shown in Table 1, consumption was overwhelmingly higher in the highest income quartile (Q4), as well as in urban areas and in the Mediterranean and Interior regions (especially Madrid) (Cussó Segura and Andreu, 2016). In contrast, in the 1980s and 1990s, these inequalities in access to meat disappeared completely. In fact, consumption became higher among lower income quartiles and in rural areas (Lopez, 1993). In other words, it is the increase in meat consumption among less favored social groups or those with lower historical meat consumption that explains the strong increase in average terms up to the 1990s (see Table A1 in the appendix for consumption by disaggregated consumer groups by types of meat).

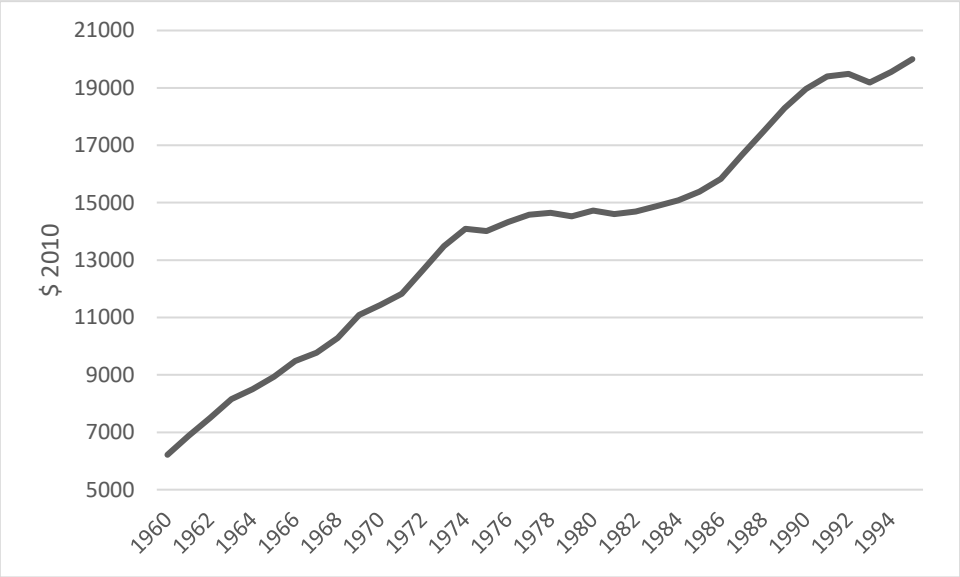
Table 1: Meat consumption in different consumer groups (kg per capita)

	1958	**1964**	**1980**	**1990**
Income				
Q1	n/d	19,9[a]	63,3	67,0
Q4	n/d	48,6[a]	64,8	61,3
Territory				
Urban	18,7	33,1	61,7	60,9
Rural	19,0	23,4	69,7	72,8
Regions				
North	n/d	24,5	65,4	66,7
Interior	n/d	30,9	69,7	69,0
Mediterranean	n/d	38,9	67,3	66,3
Andalucia	n/d	16.9	54,0	58,7

Source: Own elaboration based on household budget surveys. For the construction of the 4 regions (North, Interior, Mediterranean and Andalusia) see (Simpson, 1995; Collantes, 2015; Delgado and Pinilla, 2022).
Notes: Quartile 1 is the quartile with the lowest income. a) The 1964/65 family budget survey provides expenditure data by income brackets that do not correspond to quartiles, as the lowest income bracket (Q1) covers 50 percent of households. Therefore, the results should be interpreted with caution.

Undoubtedly, both supply and demand were important in explaining the sharp increase in meat consumption and its popularization among all consumer groups. On the demand side, after the Stabilization Plan of 1959, a series of economic policies favourable to economic growth were implemented, and per capita income in Spain grew (see figure 2) and tended to converge with Europe (Carreras, Prados de la Escosura and Rosés, 2005). In addition, income inequality tended to decrease (Prados de la Escosura, 2016). In other words, during this time, Spain became a developed country (Carreras and Tafunell, 2010).

Figure 2: GDP per capita in Spain



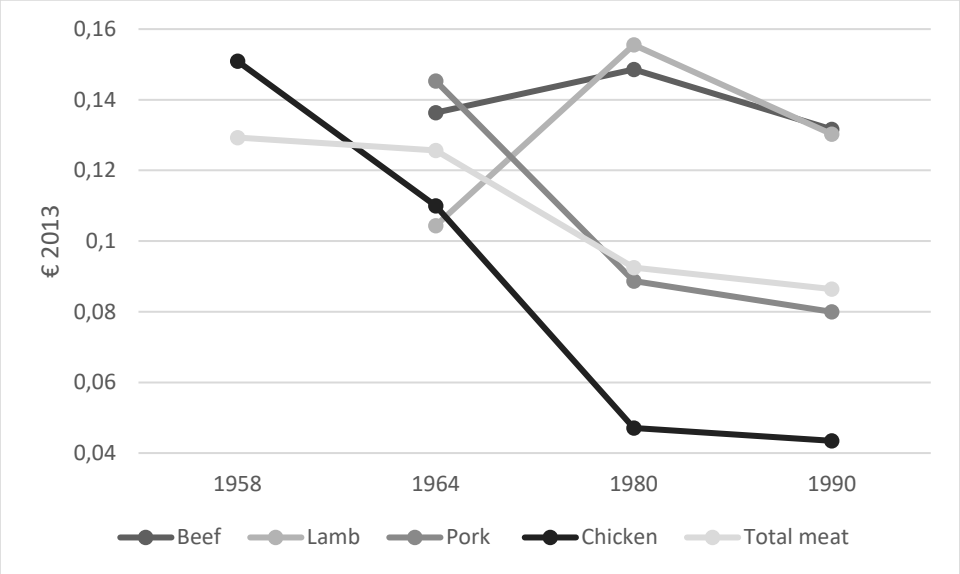
Source: World Bank

This entailed that food items with a higher relative price, such as meat and milk, became more accessible to the average consumer in the country. As affirmed by Igualador *et al.*, (1981, p.85), "*the strong increase caused by demand will bring about strong changes in [livestock] production*" (see also (Simpson, 1995)).

On the supply side, significant changes in livestock production were observed during these years, which have been described in the literature as the crisis of traditional livestock farming. (Domínguez Martín, 2001; Langreo, 2002, 2003, 2008; Ríos-Núñez and Coq-Huelva, 2015; Clar, Martín-Retortillo and Pinilla, 2018; Langreo and Germán, 2018). In other words, livestock production, historically based on being rooted to the land (extensive livestock farming), was industrialized, resulting in a notable increase in productivity in the meat sector. The intensification of livestock farming was based on the massive importation of animal feed, as well as the penetration of American capital with advanced technology, the importation of more productive foreign breeds, and improvements in the use of substances for animal fattening (Rodríguez-Zúñiga, 1980; Domínguez Martín, 2001; Clar, 2005, 2010; Estévez Reboredo and

Sánchez de Lollano Prieto, 2022). Similar to the West (Godley, 2014), the intensification of meat production occurred first in chicken and pork, so that meats whose production was still based on extensive livestock farming, such as beef and lamb, had relatively higher prices. Therefore, as shown in Figure 3, the relative prices of meat experienced a sharp decline during the second half of the 20th century. This decline is explained by pork and, especially, by chicken. In contrast, the price of lamb and beef tended to rise until the 1980s, and then fell due to their late intensification (Langreo, 2008). Additionally, throughout the entire study period, they remained above the average price of meat. Clar (2008, p. 159) considers the price decline as a more important factor than demand in explaining these patterns: "*the restructuring of the Spanish diet as a direct consequence of progress in income and urbanization (fundamentally) loses explanatory power the more we delve into the particular actors of change*."

Figure 3: Relative prices of meat



Own elaboration based on household budget surveys.

Due to the differing pricing patterns exhibited by each type of meat, their respective consumption patterns also varied. Tables 2 and 3 depict this process. In 1964, meat consumption was highly diversified, meaning that approximately the same amount of each type of meat was consumed. However, in the 1980s, in line with the strong increase in the average meat consumption, both the growth rates in chicken and pork consumption increased more than the growth rates in sheep and beef consumption (see Table 3). Consequently, the consumption of the former two meats stood at over 40 kilograms per person in the 1980s and 1990s, while the latter two were less than 15 kilograms. The early industrialization of chicken and pork had an influence on these consumption patterns due to the fall in their prices (see Figure 3). Therefore,

in the 1990s, the majority of meat consumption in Spain (over 70 percent) was based on these two meats. Regarding the degree of processing, although processed meat (mainly "*embutidos*", but also products such as sausages or hamburgers) have gained weight in the diet, in the 1990s, their consumption was around 25 percent. Therefore, the mass consumption of meat during the second half of the 20th century is mainly explained by the consumption of fresh meat, in turn derived from chicken and pork. In fact, as mentioned earlier, it is the massification of chicken and pork among consumers with limited meat intake (low incomes, Andalusia, some inland areas, etc.) contributed to the reduction of inequalities in meat consumption in the 1980s (see Table A1 in the appendix).

Table 2: Consumption of different types of meat per person

Kg por person	**1958**	**1964**	**1980**	**1990**
Beef	n/d	7,2	9,5	11,4
Lamb	n/d	5,4	4,1	4,2
Chicken	1,2	5,3	22,1	23,0
Pork	3,3	7,4	22,4	23,3
Other meats[a]	n/d	3,0	4,1	2,9
Total	**20,7**	**28,3**	**62,2**	**64,8**
Fresh meat	17,4	22,6	49,4	48,4
Processed meat	3,3	5,7	12,8	16,4
Total	**20,7**	**28,3**	**62,2**	**64,8**
Percentage	**1958**	**1964**	**1980**	**1990**
Beef	n/d	25,6	15,27	17,6
Lamb	n/d	18,9	6,6	6,4
Chicken	5,6[b]	18,7	35,5	35,9
Pork	15,6[c]	26,3	35,9	35,5
Other meats[a]	n/d	10,5	6,6	4,5
Total	**100**	**100**	**100**	**100**
Fresh meat	84,0	79,9	79,4	74,6
Processed meat	16,0	20,1	20,6	25,4
Total	**100**	**100**	**100**	**100**

Source: Own elaboration based on household surveys. a) The composition of the category "Other meats" varies during the study period. Broadly speaking, it includes pork and horse meat, as well as meats whose origin is not specified in the surveys.

Table 3: Cumulative annual growth rates in the consumption of different types of meat.

	1958-64	1964-80	1980-90	1958-90
Beef	-1,9	1,7	1,8	3,5
Lamb	-6,5	-1,7	0,2	-6,4
Chicken	28,1	9,3	0,4	34,4
Pork	14,4	7,2	0,4	21,6
Other meats	n/d	2,0	-3,4	n/d
Fresh meat	28,9	0,0	-0,6	15,7
Processed meat	36,2	-0,1	2,1	22,6
Total meat	**5,4**	**5,0**	**0,4**	**12,1**

Source: Own elaboration based on household surveys.

4. Determinants of the mass consumption of meat

4.1 Income and prices

As outlined in the previous section, significant changes occurred in the livestock supply and demand, resulting in the average consumption of meat in Spain growing and becoming widespread among all consumer groups in the second half of the 20th century. In this way, Spain completed the modern nutritional transition and westernized its consumption patterns. In line with the first objective of this work, the first question I ask is: what was the degree of importance of the supply and demand capacity in this process? Based on the methodology outlined in section 2, I proceed to quantify both variables. To do so, I use the relative prices of meat to quantify the supply capacity and the per capita net family income as demand capacity, as shown in the first equation of the methodological section.

Table 4 shows the main results. First, the growth of the purchasing power of all meats was particularly strong between 1958 and 1980, and then continued to grow, although less markedly. This growth was explained by the intense increase in household income and by the fall in relative meat prices (except for beef and lamb, whose relative prices increased during this period). What role do income and prices play in the increase of purchasing power in meat? Initially, income is the main determinant for the growth of aggregate meat (last two rows), especially between 1958 and 1964. These results are consistent since, during this time, most of the meat was produced on extensive livestock farming, so the drop in the relative prices of aggregate meat was low (0.3). In the following two periods, although price increases in importance as a driver of consumption capacity as the meat sector becomes more productive,

income remains more important than prices. Therefore, between 1965 and 1990, income explains around 60 percent of the increase in purchasing power. The same occurs with fresh and processed meat: income is more important in explaining its massification from the 50s onwards.

Table 4: Contribution to the growth of purchasing power of different types of meat at the national level

	1958-64	1964-80	1980-90	1964-1990
Growth of purchasing power of each type of meat				
Beef	n/d	2,7	2,2	2,5
Lamb	n/d	0,6	2,7	1,5
Pork	n/d	6,5	2,0	4,7
Chicken	9,8	8,8	1,8	6,0
Fresh meat	5,3	5,2	1,8	3,9
Processed meat	7,2	5,6	1,5	4,0
Total meat	5,7	5,3	1,7	3,8
Growth of net disposable family income per person	5,4	3,3	1,0	2,4
Growth of the relative price of each type of meat				
Beef		0,6	-1,2	-0,1
Lamb		2,7	-1,8	0,9
Pork		-3,2	-1,0	-2,4
Chicken	-4,4	-5,5	-0,8	-3,6
Fresh meat	0,12	-1,9	-0,9	-1,5
Processed meat	-1,8	-2,3	-0,6	-1,6
Total meat	-0,3	-2,0	-0,7	-1,5
Contribution to the growth of purchasing power				
Beef				
Income	n/d	121,1	44,7	94,3
Prices	n/d	21,1	55,3	5,7
Lamb				
Income	n/d	551,6	35,7	160,8
Prices	n/d	451,6	64,3	-60,8
Pork				
Income	n/d	50,4	48,5	50,0
Prices	n/d	49,6	51,5	50,0
Chicken				
Income	55,4	37,5	54,7	39,3
Prices	44,6	62,5	45,3	60,7
Fresh meat				
Income	102,4	63,1	53,3	61,2
Prices	-2,4	36,9	46,7	38,8

Processed meat				
Income	75,5	58,4	63,3	59,0
Prices	24,5	41,6	36,7	41,0
Total meat				
Income	94,9	62,0	59,0	61,3
Prices	5,1	38,0	41,0	38,7

Source: Own elaboration based on household surveys.

However, if we conduct a more disaggregated analysis by type of meat, the argument becomes nuanced. Especially in the case of poultry (mainly chicken), the type of meat whose production was intensified earlier and with greater intensity (Langreo, 2008), the fall in prices is more important to explain the increase in consumption capacity from 1964. Regarding pork, also highly industrialized after chicken, we observe a balance between income and prices to explain the increase in its purchasing power. However, for meats whose production became intensive later (beef and especially lamb), income is more important, at least in the period where meat consumption increased sharply (1964-1980). In the last period (1980-90), both the beef and lamb sectors tended to intensify, so prices played a more important role than income.

Therefore, if meat is analyzed in an aggregated manner, the modern nutritional transition in Spain would be explained more by demand capacity than supply capacity, in line with authors such as Popkin or Grigg (see introduction). However, if meat is analyzed in a disaggregated manner, the degree to which supply and demand influence consumption depends on the degree of industrialization of the production of each meat. Therefore, in this case, works such as Rivera-Ferre (2009) or Clar (2008) for the case of Spain would be more accurate in pointing to supply as the main determinant in the modern nutritional transition. That is, in products such as chicken, fully inserted into the agribusiness model early on, prices would play a more important role in explaining the increase in its consumption capacity.

Unlike the case of dairy products (Collantes, 2019), where in almost all periods and types of products (milk and derivatives), income plays a greater role in consumption, in the case of meat we find more heterogeneity in results. A priori, this heterogeneity would be highly influenced by the degree of industrialization of each type of meat.

Table 5: Contribution of income to the growth of purchasing power of aggregated meat

	1964-80	1980-90
Q1[a]	87,2	84,4
Q4[a]	132,3	70,5
Rural	65,5	78,0
Urban	67,4	68,0
Nortyh	73,6	75,6
Interior	70,3	96,6
Mediterranean	59,8	61,1
Andalucia	62,5	76,7

Source: Own elaboration from the Family Budget Surveys (EPF).
Notes: a) The 1964/65 family budget survey provides expenditure data by income brackets that do not correspond to quartiles, as the lowest income bracket (Q1) covers 50 percent of households. Therefore, the results should be interpreted with caution.

However, national results conceal differences among consumer groups. Table 5 shows the contribution of income to the growth of purchasing power for total meat consumption across different consumer groups. Consistent with the national-level findings, income plays a larger role than prices in explaining the growth in meat consumption across all consumer groups. However, there are notable differences among groups. First, income played a greater role during the mass consumption period of meat (1964-80) for high-income consumers (Q4) than for low-income (Q1) consumers. In other words, the fall in prices was important for enabling groups with lower purchasing power to consume meat regularly. During the same period, the contribution of demand capacity to meat consumption was relatively similar in rural and urban areas, but there were significant differences among regions. In order not to deviate too much from the argumentative line of the study, I will focus solely on the lesser role played by income in the Mediterranean region as a driver of consumption capacity. Appendix table A1 shows the per capita meat intake across different consumer groups, and table A2 shows the contribution of income to the increase in consumption capacity, also disaggregated by those groups. The first table (as well as table 1 in the main text) shows a paradox: in 1964/65, the Mediterranean region was the most carnivorous. Or, in other words, the Mediterranean region was the furthest away from the Mediterranean diet, at least in terms of meat consumption. Table A1 shows that what explains the higher total meat consumption in the Mediterranean in 1965 is the consumption of poultry (and, to a much lesser extent, pork). This was about 11 kilos per person, much higher than in the interior (4.5kg), north (2.3 kg), and Andalusia (2.5kg). In addition, the higher

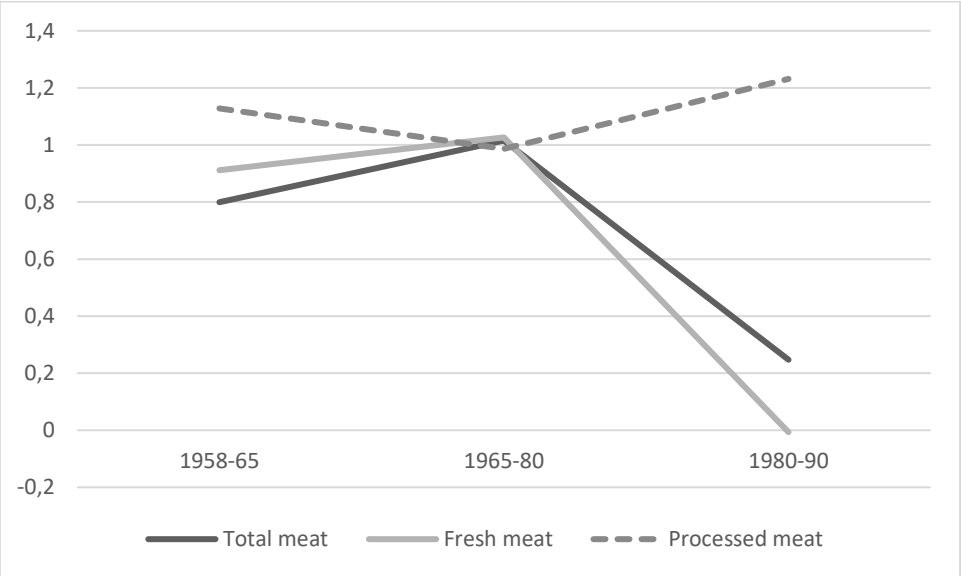
consumption of chicken is not only explained by higher consumption in Barcelona (11.4kg), but also by the rest of the provinces: Girona (9.0 kg), Tarragona (9.8 kg), Lleida (12.3kg), Valencia (13.7kg), Castellon (10.0 kg), Alicante (8.9kg), and Balearic Islands (11.2kg). Therefore, except for Murcia (3.8 kg), chicken consumption in the Mediterranean region was much higher than in the rest of the country. The poultry industry was the first meat industry to intensify, and its production was located in areas close to Madrid, Barcelona, and Valencia (Segrelles Serrano, 1993, p. 107). Therefore, once again, it seems to indicate that the role of supply was key to the early massification of products such as chicken.

4.2 The role of preferences

What role did preferences play in meat consumption? Although often overlooked, especially from a quantitative standpoint, preferences play an important role in explaining different consumption patterns. Preferences encompass a wide range of variables. In this article, without aiming to be exhaustive, I focus on some of them. For example, the dominant nutritional discourse, the percentage of women in the labor market, the role of advertising in consumption, consumers' perception of certain products, or regional historical tradition in the consumption of certain meats. As explained in the methodological section, I will combine the analysis of preferences from both a quantitative and qualitative perspective. To quantify preferences, I use the responsiveness factor (RF). This indicates consumers' predisposition to consume meat in growth rates (see methodological section). Figure 4 represents the national responsiveness factor for total, fresh, and processed meat. There are at least three points to highlight. Firstly, the high predisposition to consume meat in 1958-1965 (around 0.8). This was much higher than in the case of dairy products during the same years (almost 0), although lower than the RF of processed milk (because it was a new product) (Collantes, 2019). To put this fact into context, graph 5 shows the growth rates in meat consumption and the other macronutrients (except carbohydrates). In the 1960s, the Spanish population (on average) consumed a level of macronutrients more than sufficient with respect to the minimum necessary values (Cussó Segura, 2005, p. 349) (around 3000 kcal, 60 grams of proteins, and 140 grams of lipids). Despite this, the growth rates in meat consumption increased significantly more than those of other macronutrients, thus showing a substitution of foods as an energy, protein, and fat source. From the 1980s, when meat consumption tended to saturate, its growth rates converged with those of other macronutrients. Therefore, in the 1950s and 1960s, the predisposition to consume meat in Spain was very high due to its low historical consumption.

Secondly, the increase in the RF for total (and fresh) meat between 1958-64 and 1964-80 is remarkable. This result, a priori, would not be predictable. The responsiveness factor, in my opinion, should be interpreted as a product life cycle curve (Collantes, 2019). That is, when a product is new in the market, its predisposition to consume it is high. In other words, the increase in its consumption will be greater than the increase in adjusted purchasing power for that product. However, over time, as the product becomes more widely available, the predisposition to consume it tends to fall, as it ends up becoming a mass consumption product. Therefore, if there are no significant changes in the intrinsic characteristics of that product or a transitory change in consumers' perception of it (for example, a fad), the natural curve of the RF should be descending over time. So why is there an increase between 1958-65 and 1965-80?

Figure 4: National-level responsiveness factor

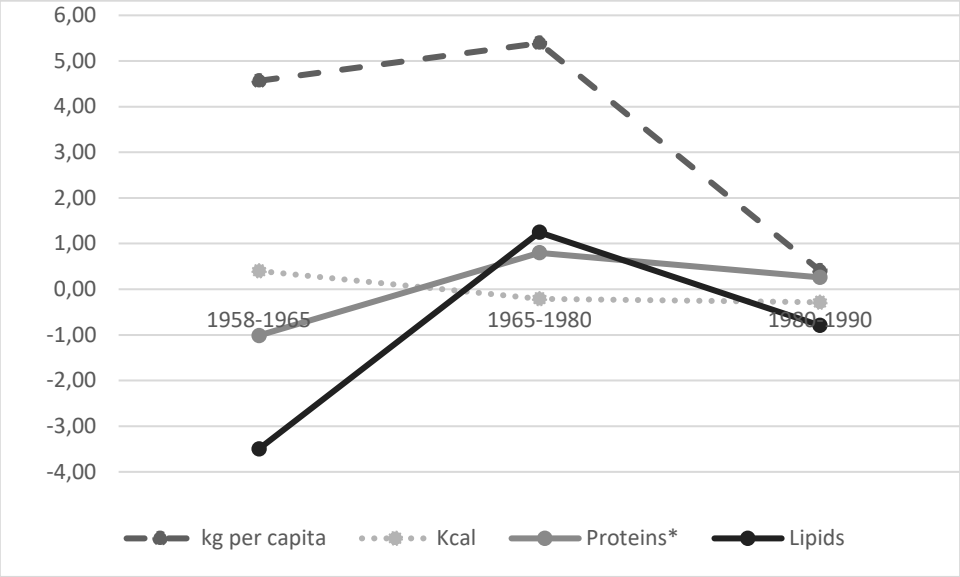


Source: Own elaboration from the Family Budget Surveys (EPF).

Collantes (2019) also observed an increase in RF during this period for dairy consumption (in fact, the increase was greater than that for meat consumption). His hypothesis for this increase is based on the fact that the type of milk consumed in 1958-64 was not the same as that consumed in the period 1964-80. In the first period, most of the milk consumed was raw milk, while in the second period it was processed milk. In other words, the mass production of processed (homogenized) milk increased confidence in this product, resulting in an increase in the RF. For meat, the argument could be similar. That is, the meat consumed in 1958-64 was produced in an extensive type of livestock farming, while in 1964-80 its production was intensive

(industrialized). Therefore, the appearance of a new type of meat (or produced in a different way) could have increased the predisposition to its consumption.

Figure 5: Cumulative annual growth rate in meat consumption and macronutrients per person in Spain



Source: Figure 1 for meat data and Cussó, Gamboa and Pujol-Andreu (2018, p. 15) for macronutrients. Notes: * high biological value proteins.

However, I consider that this argument does not apply to meat. To support this claim, I rely on the RF of poultry meat, for which there are data available since 1958 (see figure 6). What is observed is that the RF of this meat, being the paradigm of intensive livestock farming (Godley, 2014), follows a normal pattern since 1958, that is, decreasing. Therefore, the change in the production of chicken, from a production based on hunting and family poultry to a type of chicken produced industrially, would not explain the increase in the predisposition to the consumption of total meat between 1958-64 and 1964-80. Consequently, I consider that the explanation behind this change in preferences is based on beef.

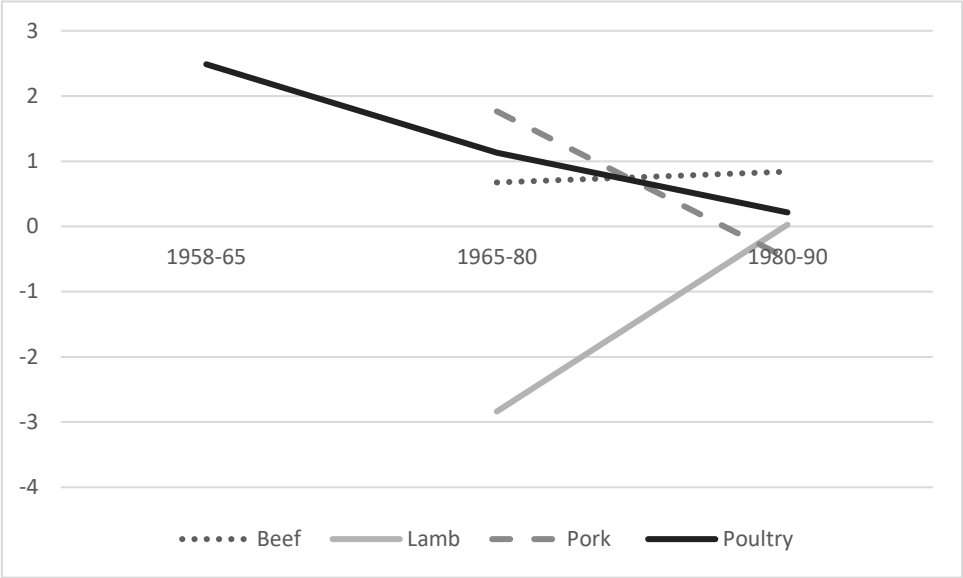
As shown in table 6 and table A1 in the appendix, beef consumption is historically linked to urban areas (Nicolau and Pujol-Andreu, 2005; Martinelli Lasheras, 2009, p. 35; Gil Roig, Angulo Garijo and Gracia Royo, 1998, p. 114). Along with chicken, the consumption of beef was almost 3 times higher in urban areas than in rural areas. Therefore, since between 1950 and 1975 there was a large migration from rural to urban areas (Pinilla and Sáez, 2017, p. 5), this led to the emergence of new consumers with a greater predisposition to the consumption of beef, causing the RF of

total meat to increase in this period. Because in 1964 beef consumption with respect to total meat was still high (around 25 percent), its consumption had a great influence on the consumption of total meat (and fresh meat). Clar (2013, p. 340), presents this idea clearly:

"*A new middle class emerged from the great exodus from the country to urban areas. It is calculated that in the 1960s alone more than two million Spaniards moved to the city from the countryside. However, until that time, any growth in the urban population had been reflected in greater consumption not of pork or chicken but of beef and, more particularly, veal. This partly explains why meat consumption in Spain was so low, given that veal tended to be seen as a luxury and its price was subject to large fluctuations. However, rural emigrants were generally unaccustomed to eating either beef or veal".*

Indeed, the RF of beef in 1964-80 in rural areas was 2.9, while in urban areas it was 0.52 (see Table A3 in the appendix). Therefore, this reinforces the hypothesis of the importance of rural-urban migration in changes in national preferences during this period (Clar, 2013). In the following years, both sheep and beef meat showed a positive RF (see figure 6). However, already in the 1980s, these two types of meat lost importance with respect to the total consumption of meat, so they had little effect on the RF of total meat (now dominated by chicken and pork). From the 1960s-80s onwards, figure 4 shows a significant decline in the predisposition to consume total (and fresh) meat. In addition to its own mass consumption, the dominant nutritional argument in Spain may have had some importance in this decline. In the first third of the 20th century, the low consumption of meat and milk by the Spanish population (on average) was a public health problem due to the importance given to the consumption of high biological value proteins (Bernabeu-Mestre *et al.*, 2008). However, in the early second half of the 20th century, the dominant nutritional discourse was different in the case of meat. For example, in the 1960s, a consumption of around 100 grams of meat per person was recommended (Vivanco and Palacios, 1964, p. 196). Therefore, unlike milk, where in the 1950s its consumption was promoted by the state in schools (Collantes, 2017, p. 126), the relatively low consumption of meat in Spain was not considered a danger to public health and the problems caused by excessive consumption of meat were already evident (Clar, 2013, p. 340). These concerns about excess consumption of meat had already permeated society in the 1980s, thus influencing its lower preference and stagnation in consumption during this period (Mili, Mahlau and Furtsch, 1998).

Figure 6: Responsiveness factor of different meats



Source: Own elaboration from the Family Budget Surveys (EPF).

Table 6: Meat consumption in rural and urban areas in 1964

	Urban	**Rural**
Beef	9,9	3,6
Lamb	5,0	5,7
Pork	8,0	8,6
Chicken	7,0	3,0

Source: Own elaboration from the Family Budget Surveys (EPF).

The third important feature of Figure 4 is related to processed meat. Specifically, the increase in its responsiveness factor between 1964-80 and 1980-90 is noteworthy. Processed meat has been gaining weight in total meat consumption, accounting for around 40 percent of total consumption in recent years (Delgado, 2022). As outlined in the introduction, this has both health and environmental implications.[4] What is behind this increase in the responsiveness factor of processed meat? Several factors could be at play. Firstly, the incorporation of women into the labor market. This fact, accelerated in the second half of the 20th century (Casares and Rebollo, 1991, p. 26), may have led to an increase in the consumption of processed and prepared food products due to less time spent preparing food. However, this does not appear to be a

[4] However, it should be noted that the FR for processed meat varies depending on the type of income used. If I use the net available family income provided in Carreras, Prados de la Escosura and Rosés (2005), the predisposition to consume processed meat increases more than if I use the income provided by the HBS. In any case, even with the income provided by the surveys, the slope remains slightly positive and far from the RF of total and fresh meat, with the latter two RF showing a sharp decline during this period.

determining factor in the case of meat. Consumption data for processed meat in 1994 shows that it is slightly higher in households where the woman is inactive in the labor market than in households where she is active (Rama, 1997, p. 129).

Therefore, I consider that the increase in the predisposition to consume processed meat is due to an intrinsic change in the characteristics of processed meat produced in Spain during this period. Historically, the consumption of processed meat in Spain was linked to rural areas, with a type of processed meat made artisanally ("*embutidos*") and a high level of self-consumption (Lopez, 1993, p. 27). Therefore, in the 1950s and 1960s, the processed meat market was still based on artisanal meat, consumed abundantly by high-income families and in rural areas. The increase in income and urbanization rates in the 1960s and 1970s demanded a type of mass-produced processed meat for this new segment of urban and middle-class consumers. The supply adapted to the demand by producing processed meats such as chopped, salami, mortadella, and sausages. This type of meat, in line with a higher total expenditure on processed foods (Abad, García Delgado and Muñoz Cidad, 1994, p. 85), gained weight in total meat consumption between the 1980s and 1990s, to the detriment of other types of meat more linked to rural areas such as chorizo (Moreno, 2009). In fact, in the 1970s and 1980s, various transnational companies became interested in the production of this type of processed meat, so companies such as Nestlé and Oscar Mayer invested in the Spanish market to meet this new demand (Moreno, 2009, p. 114). Additionally, during this period, quality standards and regulations for processed meat increased (Escribano, 1981), further differentiating industrially produced processed meat from artisanal meat. In fact, in 1988, the meat sector was one of the sectors that dedicated the most resources to advertising "new products" (industrially produced processed meat) (Rodriguez Zuñiga Manuel y Soria Rosa, 1990, p. 106).

Figure 7: Responsiveness factor of processed meat in rural and urban areas.

Source: Own elaboration from the Family Budget Surveys (EPF).

As shown in Figure 7 and as outlined previously, this new industrially produced processed meat was primarily traded in urban areas, resulting in a slight increase in its RF. In rural areas, the predominantly consumed processed meat was mainly artisanal, resulting in a decreasing trend in its responsiveness factor, as it was not considered a "new" product.

However, the general change in preferences for processed meat masks a great variability among regions. Regions in the Interior and Mediterranean such as Madrid, Extremadura, Navarra, La Rioja, Balearic Islands, or Valencia greatly increased their consumption of ham (especially cured ham). The consumption of sausages notably increased in some areas of the north such as Galicia and Asturias, as well as in Madrid or Aragón, while its consumption fell in Catalonia. This is probably due to the fact that in the latter, its consumption has historically been higher (especially "*butifarras*"), resulting in an earlier saturation of this type of meat than in other areas. Therefore, the new offer of industrially processed meat was also conditioned by historical regional consumption patterns and had to adapt to them. In fact, regional differences in meat preferences have existed throughout the second half of the 20th century and have also been modified by supply. For example, as shown in Table A3 of the appendix, the predisposition to consume poultry in the Mediterranean in 1964-80 was much lower than in the rest of the regions because its consumption was already high in the 1960s. As explained, this early high consumption is influenced, in turn, by the early location of the chicken industry in the Mediterranean. However, in the 1980s-90s, the variability in the responsiveness factor for all

types of meat, in addition to decreasing, tends to homogenize in all regions, showing a convergence in consumption patterns throughout the country.

5. Conclusions

The nutritional transition, along with other transitions such as the demographic and epidemiological ones, is a complex and multifactorial process that has significant importance in the historical evolution of societies. On one hand, the massification of products such as meat or milk among all consumer groups implied a nutritional improvement (especially in terms of micronutrients) in more disadvantaged consumer groups such as children, pregnant women or low-income segments (Cussó Segura, Gamboa and Pujol-Andreu, 2018). On the other hand, the nutritional transition and the westernization of consumption patterns also carry health costs. In recent decades, there has been an increase in non-communicable diseases such as obesity, diabetes and other cardiovascular diseases in middle-low and low-income countries (Popkin, Adair and Ng, 2017).

In this study, I have focused on Spain to delve into the determinants of the completion of the nutritional transition in the second half of the twentieth century. To do so, I have decomposed the growth in the capacity to consume meat into the role played by demand and supply. Then, I have tried to analyze preferences towards meat consumption using a quantitative indicator and qualitative reasoning supported by the literature. At the aggregate level of meat, demand capacity would play a greater role as a determinant of consumption. However, a more disaggregated approach by types of meat shows that the degree of industrialization of each type of meat is also a crucial factor, which would lead us to think that supply plays a more important role, as shown by Clar (2008). Regarding the role of preferences, I have tried to show the importance of regional and territorial patterns to explain the change in predisposition to consume meat, as well as the importance of changes in supply to adapt to a new type of urban middle-low class consumer (Nicolau and Pujol-Andreu, 2005).

The differences in the roles of supply, demand, and preferences across different types of meat demonstrate the complexity and the need for disaggregation by products and consumer groups in order to understand major changes in dietary composition. This is particularly evident when comparing the determinants of meat and dairy consumption during the second half of the 20th century in Spain (Collantes, 2017a, 2019). In the early 1960s, the milk responsiveness factor was much lower than that of meat, as the average consumer did not trust raw milk consumption. In the case of meat, this lack of confidence did not exist. It is likely that, for this reason, prices played a more important role in the capacity for chicken and pork consumption than in milk

consumption. In other words, the drop in milk prices did not increase milk consumption, but the mass production of processed milk did, as this "new" type of milk generated enough consumer confidence to become a mass-consumed product. In fact, the increase in the responsiveness factor of processed milk between 1958-64 was much greater than in the case of meat. In addition to being a new product, dominant nutritional discourse may have also conditioned milk consumption. State encouragement of milk consumption since the 1950s was something that did not happen (or at least not to the same extent) in the case of meat.

Analyzing and understanding the determinants of the nutritional transition of each product can help mitigate the negative effects, both environmentally and health-wise. On the one hand, the importance of supply (prices) in consumption supports the application of taxes (such as a Pigouvian tax) to reduce consumption (Katare *et al.*, 2020; Funke *et al.*, 2022). On the other hand, the importance of preferences also supports appealing to emotional and informational factors (such as how to cook vegetarian food or increasing the availability of it) as drivers in reducing meat consumption (Harguess, Crespo and Hong, 2020)[5].

However, this article has some limitations that must be taken into account. Firstly, not having annual data but rather different temporal points implies assuming linearity over time which may not necessarily be the case. Additionally, at the quantitative level, income is taken as a demand variable, but other factors such as urbanization or population growth may have also been important. Lastly, other consumer groups such as gender or age differences are not analyzed, which may help better understand national consumption patterns (Collantes, 2015).

[5] Despite the fact that most of these studies have a bias towards high-income countries

Appendix

Table A1: Per capita meat intake by different consumer groups.

Beef	**1964**	**1980**	**1990**	**Lamb**	**1964**	**1980**	**1990**
Q1	6,1	8,1	9,0	**Q1**	6,8	4,6	4,2
Q4	18,3	15,0	13,0	**Q4**	12,3	4,2	4,2
Rural	3,6	8,8	9,7	**Rural**	5,7	6,3	6,1
Urban	9,9	12,7	11,4	**Urban**	5,1	3,2	3,5
North	12,1	19,7	20,2	**North**	0,9	1,5	2,1
Interior	7,5	13,3	12,9	**Interior**	7,9	7,4	6,8
Mediterranean	6,1	8,8	8,0	**Mediterranean**	7,5	5,1	5,1
Andalucia	3,2	6,2	5,6	**Andalucia**	3,3	1,2	0,9
Pork	**1964**	**1980**	**1990**	**Chicken**	**1964**	**1980**	**1990**
Q1	5,4	22,0	23,7	**Q1**	1,6	24,2	27,5
Q4	9,4	21,7	21,6	**Q4**	8,5	20,3	20,0
Rural	2,7	12,1	13,4	**Rural**	3,1	22,9	24,5
Urban	1,5	9.6	8,2	**Urban**	6,9	21,4	21,4
North	8,6	19,8	23,0	**North**	2,3	17,5	17,8
Interior	7,9	25,1	24,4	**Interior**	4,5	20,9	21,9
Mediterranean	10,5	21,8	22,2	**Mediterranean**	11,0	26,7	27,1
Andalucia	6,3	22,8	25,7	**Andalucia**	2,5	21,9	23,8
Fresh meat	**1964**	**1980**	**1990**	**Processed meat**	**1964**	**1980**	**1990**
Q1	n/d	49,5	50,2	**Q1**	n/d	11,5	15,2
Q4	n/d	50,5	44,1	**Q4**	n/d	13,1	16,5
Rural	17,2	55,9	56,6	**Rural**	6,3	13,7	16,2
Urban	26,5	49,5	45,7	**Urban**	6,5	12,4	15,2
North	20,	53,1	50,4	**North**	5,4	11,4	14,9
Interior	23,90	52,3	51,3	**Interior**	7,0	13,1	17,1
Mediterranean	30,7	52,8	48,4	**Mediterranean**	8,1	14,2	17,6
Andalucia	11,9	39,4	43,3	**Andalucia**	5,0	11,8	14,3

Source: See table 1.

Table A2: Income contribution to purchasing power growth for different types of meat.

Beef	**1964-80**	**1980-90**	**Lamb**	**1964-80**	**1980-90**
Q1	n/d	77,1	**Q1**	n/d	75,2
Q4	n/d	65,8	**Q4**	n/d	54,5
Rural	155,9	71,2	**Rural**	661,7	68,2
Urban	117,7	60,2	**Urban**	328,8	49,6
North	134,3	69,4	**North**	419,6	51,7
Interior	94,0	75,7	**Interior**	123,9	602,4
Mediterranean	117,5	51,2	**Mediterranean**	214,8	45,7
Andalucia	98,3	74,9	**Andalucia**	-278,9	124,5
Pork	**1964-80**	**1980-90**	**Chicken**	**1964-80**	**1980-90**
Q1	n/d	88,9	**Q1**	n/d	79,5
Q4	n/d	65,4	**Q4**	n/d	87,3
Rural	52,8	72,0	**Rural**	34,4	74,8
Urban	49,2	66,1	**Urban**	21,1	75,2
North	62,7	55,5	**North**	42,0	117,7
Interior	57,7	96,0	**Interior**	45,7	76,8
Mediterranean	43,1	48,6	**Mediterranean**	34,1	73,8
Andalucia	77,8	72,0	**Andalucia**	37,6	68,3
Fresh meat	**1964-80**	**1980-90**	**Processed meat**	**1964-80**	**1980-90**
Q1	n/d	80,6	**Q1**	n/d	89,3
Q4	n/d	66,5	**Q4**	n/d	73,0
Rural	65,5	73,3	**Rural**	72,1	82,8
Urban	69,0	61,7	**Urban**	62,6	77,2
North	69,9	75,2	**North**	94,5	72,9
Interior	71,6	91,2	**Interior**	70,0	93,9
Mediterranean	58,5	53,2	**Mediterranean**	64,2	80,4
Andalucia	60,8	64,1	**Andalucia**	71,7	119,0

Source: See table 4.

Table A3: Responsiveness factor by types of meat and consumer groups

Beef	**1964-80**	**1980-90**	**Lamb**	**1964-80**	**1980-90**
Q1	n/d	0,2	**Q1**	n/d	-0,2

Q4	n/d	-0,3	**Q4**	n/d	0,0
Rural	2,9	0,2	**Rural**	1,2	-0,1
Urban	0,5	-0,3	**Urban**	-2,5	0,2
North	1,2	0,1	**North**	3,6	0,8
Interior	0,8	-0,1	**Interior**	-0,1	-2,2
Mediterranean	1,0	-0,2	**Mediterranean**	-1,8	0,0
Andalucia	1,1	-0,2	**Andalucia**	4,8	-1,0
Pork	**1964-80**	**1980-90**	**Chicken**	**1964-80**	**1980-90**
Q1	n/d	0,0	**Q1**	n/d	0,3
Q4	n/d	-0,5	**Q4**	n/d	-0,1
Rural	1,7	0,3	**Rural**	1,5	0,2
Urban	1,7	-0,5	**Urban**	0,9	0,0
North	0,9	0,4	**North**	1,6	0,1
Interior	2,3	-1,2	**Interior**	1,1	0,2
Mediterranean	1,3	-0,3	**Mediterranean**	0,7	0,0
Andalucia	2,9	0,1	**Andalucia**	1,5	0,2
Fresh meat	**1964-80**	**1980-90**	**Processed meat**	**1964-80**	**1980-90**
Q1	n/d	0,0	**Q1**	n/d	0,5
Q4	n/d	-0,3	**Q4**	n/d	0,5
Rural	1,6	0,0	**Rural**	1,2	0,5
Urban	0,8	-0,2	**Urban**	0,7	0,7
North	1,2	0,0	**North**	1,3	0,4
Interior	1,0	-0,2	**Interior**	0,7	0,7
Mediterranean	0,7	-0,2	**Mediterranean**	0,8	0,7
Andalucia	1,3	0,1	**Andalucia**	1,0	0,7

Source: see figure 4

6. References

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