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The chocolate market in Italy

Whit a focus on the cioccolato modicano

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0. Abstract

This thesis explores the current state and future prospects of the Italian chocolate market, a rapidly expanding industry that has become a significant source of revenue for Italy. After providing a brief history of chocolate, including its discovery in Latin America and subsequent processing and distribution, the research examines various aspects of the market such as production, consumption, pricing, and trends. The major players in the market and their strategies are analyzed, with a special focus on the unique and highly regarded "Cioccolato Modicano". This includes an investigation into its history, characteristics, and flavor profiles, as well as the socio-economic implications of its production. The thesis concludes by offering insights into the future of the Italian chocolate market, with a particular emphasis on the potential for “Cioccolato Modicano” to become a more widely available and appreciated product.

1. From plants to cocoa

1.1 Historical facts

Cocoa and chocolate products are enjoyed by many people worldwide, but not everyone knows their history. Cocoa was first cultivated as a crop in ancient South American cultures, with the Aztecs and Mayans being the most well-known. The word "chocolate" comes from two Nahuatl words, xocoatl and cacahuatl, which referred to a bitter beverage made with cocoa that was shared during religious ceremonies. When the Spanish arrived in the New World, they discovered the value of the cacao crop and added sugar and spices to sweeten the bitter cocoa. The Spanish kept the production method a secret for almost 100 years before chocolate spread across western Europe. Chocolate was popular amongst the social elite and gained the reputation of being an aphrodisiac. However, the desire for chocolate led to the thriving slave market between the 17th and 19th centuries. With the depletion of Mesoamerican workers, poor wage laborers and enslaved Africans produced cocoa beans. The first mechanical cocoa grinder was invented in Bristol in 1729, and Joseph Fry bought a patent for chocolate refining process in 1761. Chocolate production spread throughout Italy, giving rise to many chocolate companies such as Caffarel, Majani, Peringotti, Venchi, and Talmone. Industrialization in the last century introduced large chocolate companies such as Perugina, Novi, Peyrano, Streglio, Unica, and Ferrero.

1.2. Different species of cocoa

Around 10,000 B.C. the cocoa plants in central and South America suffered a clear geographical distinction: one part was cultivated from the Venezuelan Andes, the order in the Brazilian Amazon. In these two areas the plants developed separately and without suffering any influence, preserving a unique genetic heritage and giving rise respectively to cocoa Criollo and cocoa Forastero.

1.2.1 Criollo (“noble”)

Criollo is the most valuable variety of cocoa. It is born from a very fragile plant and sensitive to the attacks of parasites, because it is never hybridized and therefore less resistant: for this reason Criollo is a rare product and with very low yields, which, not by a chance, has a cost from 2 to 4 times higher than that of Forastero. The conquistadores came across this superb variety of cocoa, also discovering its beneficial properties, they fell in love with it and imported in into Europe, where it spread widely before the arrival of Forastero. Today, however, only 0,001% of the market consist of pure cocoa Criollo. Who has tasted it, knows its uniqueness: round and slightly bitter, can give sweet notes of honey, red fruits and dried fruit. And it also different in appearance: the inside of the beans is white, and not purple as in other varieties. The cultivations of Criollo cocoa are limited in Venezuela, Colombia and Perù and to some islands of the Indian Ocean. [1]

1.2.2. Forestero (“consume”)

Forestero cocoa is widely used: more than 90% of the cocoa of the chocolate marketed is produced with this variety. Its quality is certain lower than that of Criollo: it is more acid, bitter and astringent and less aromatic and refined. However, among the sub-varieties of Forastero cocoa there are also some higher quality exceptions, such as the Ecuadorian Arriba Nacional and the Peruvian Nacional. Compared to Criollo, the Forestero plant guarantees a much higher yield and is strong and resistant. For this reason the cultivation of Forestero has always represented a better investment for the majority of growers, who ended up preferring it to Criollo. Today this variety is widespread mostly in Africa, with Ghana and Ivory Coast above all. [1]

1.2.3. Trinitario ("Hybrid")

The hybridization between the two varieties mentioned before has given rise to a third: Trinitario cocoa, named like the name of the island of Trinidad, where the species was found, off the Venezuelan coast. Here in 1700 a natural catastrophe occurred that destroyed all the criollo cocoa plants cultivated, but they did not completely disappear from the territory, but traces remained in the land. In fact, when after a few decades some seeds of Forastero were planted, a new strain developed that was the result of hybridization between the two varieties. Trinitario cocoa today covers about 8% of the market and is considered a high-quality product. [1]

Having explained these differences between the cocoa varieties, it is important to underline that the distinction is not always so clear, from a genetic point of view, it is easy to vary the plant genetic patrimony, which, by reproducing, have given life to thousands of subvarieties present today in nature.

Figure 1 - Farmers, preparing the beans after the harvest source: National Geographic

1.3 From beans to cocoa

Cocoa butter is the fat obtained from cocoa beans or from parts of cocoa beans having the following characteristics:

a. Free fatty acid content (expressed as oleic acid): not more than 1.75%;

b. Unsaponifiable (determined using light petroleum): not more than 0.5%, with the exception of pressure which may not exceed 0.35%.

(D.leg.vo 12/6/2003, n.178, annex I, previewed from art. 1, paragraph 1).

The production of cocoa begins in the tropical regions near the equator, where the warm and humid climate is ideal for growing cocoa trees. The majority of cocoa beans, around 70%, are produced in four West African countries: Ivory Coast, Ghana, Nigeria, and Cameroon. Ghana and Ivory Coast are the two largest cocoa producers, accounting for over half of the world's cocoa production. Other countries that also produce cocoa include Indonesia, Nigeria, Cameroon, Brazil, Ecuador, and Venezuela.

Most cocoa is grown on small family farms of 1-5 hectares, which account for 90% of global cocoa production. In contrast, only 5% comes from large plantations of 40 hectares or more. The livelihoods of 40-50 million farmers, rural workers, and their families in the global south depend on cocoa production. In some West African countries, such as Ivory Coast and Ghana, up to 90% of farmers depend on cocoa cultivation as their primary source of income.

Growing cocoa is labor-intensive and requires continuous attention to properly care for and harvest the beans. Cocoa trees bloom and produce fruit throughout the year, with each pod containing around 20-30 seeds enclosed in a sweet white pulp. It takes a year's worth of harvest from a single tree to produce half a kilo of cocoa. Since the pods do not ripen at the same time, the trees must be monitored continuously. Furthermore, cocoa is a delicate plant that is easily affected by climate change and vulnerable to pests and diseases.

Once mature pods are harvested, they are opened with machetes, and the beans are removed. The beans are then fermented, dried, cleaned, and

packaged. Farmers then sell their product to intermediaries in cocoa bags.

The intermediaries buy with the raw grains and sell them to exporters. Only when the beans reach the milling companies in the North of the world, cocoa processing proceeds. The beans are crushed and after the shells have been removed, they are roasted and finally ground. The result – cocoa liqueur – is used to produce chocolate or is further processed for cocoa butter and cocoa powder. [2]

1.4 From cocoa to chocolate

Cocoa or cocoa powder means the product obtained by the processing into powder of cleaned, dehulled and roasted cocoa beans with a minimum cocoa butter content 20% (percentage calculated o the weight of the dry matter) and maximum water content of 9%.

(D.leg.vo 12/6/2003, n. 178, annex I, previewed from art. 1, paragraph 1)

The inventions that followed at the beginning of the 800 were fundamental, brought cocoa in the form of chocolate that we most commonly know, the tablet.

In fact, in 1828 the Dutch chemist Conrad Van Houten invented a hydraulic press capable of separating cocoa butter from pasta, this will be called the "Dutch method", allowing cocoa to improve its solubility in water, Van Houten will then treat cocoa with chemical bases with sodium or potassium carbonate, thus altering the natural ph of cocoa and making it darker.

As can be deduced from the mass production of cocoa powder, it lays the foundation for a mass production of chocolate.

If until then the commonly known chocolate had liquid form, now takes solid form, as mentioned above, the first to produce chocolate in solid format was the Englishman Joseph Fry, who added to the mixture of cocoa powder and sugar, cocoa butter. From this experiment Fry obtained a thin and malleable paste, which could take different shapes depending on the mold used.

Later, in 1878, the first milk chocolate bar was born in Switzerland, Daniel

Peters had the idea of adding milk to chocolate, however the water contained in the milk prevented a perfect solubility of cocoa. The problem was solved by another Swiss friend of Peters, Henry Nestlé, who had recently invented a method for producing condensed milk with reduced water content.

The last stage of the evolutionary process of chocolate occurred in 1879 with Rodolphe Lindt, it was he who developed the so-called "conching" method, which allowed the production of the first dark chocolate. The "conching", is a procedure that consists in the constant mixing of chocolate for a period ranging from thirty-six to sixty-two hours, at a constant temperature that fluctuates between 45 to 50 °C. This procedure allows you to reduce the level of acidity of the chocolate improving its flavour. Before Lindt's invention, the chocolate bar had to be chewed, but now it melts in the mouth. [3]

The 1900s is characterized by the emergence of big names in the industry. Each country has its main producers. In Italy stands out among these Caffarel that in 1865 began the production of the then famous *gianduiotto.* This product was born, during a serious period of economic crisis, from the need to meet the needs of the social classes that now accustomed to the product, therefore, to reduce the percentage of cocoa used in the production processes of chocolate, Caffarel introduces a raw material that was very common in Piedmont, and therefore easily available, hazelnuts. Another company worthy of note is the Majani that in 1832 introduced into the market the first Italian chocolate bar, called "chocolate peel". These were followed by other companies that brought similar products, emerging among these names such as Ferrero, who in 1946, revised the cream spreadable gianduia paste, Nutella. Other companies worth mentioning are: Perugina, Venchi, Domori, Amedei.

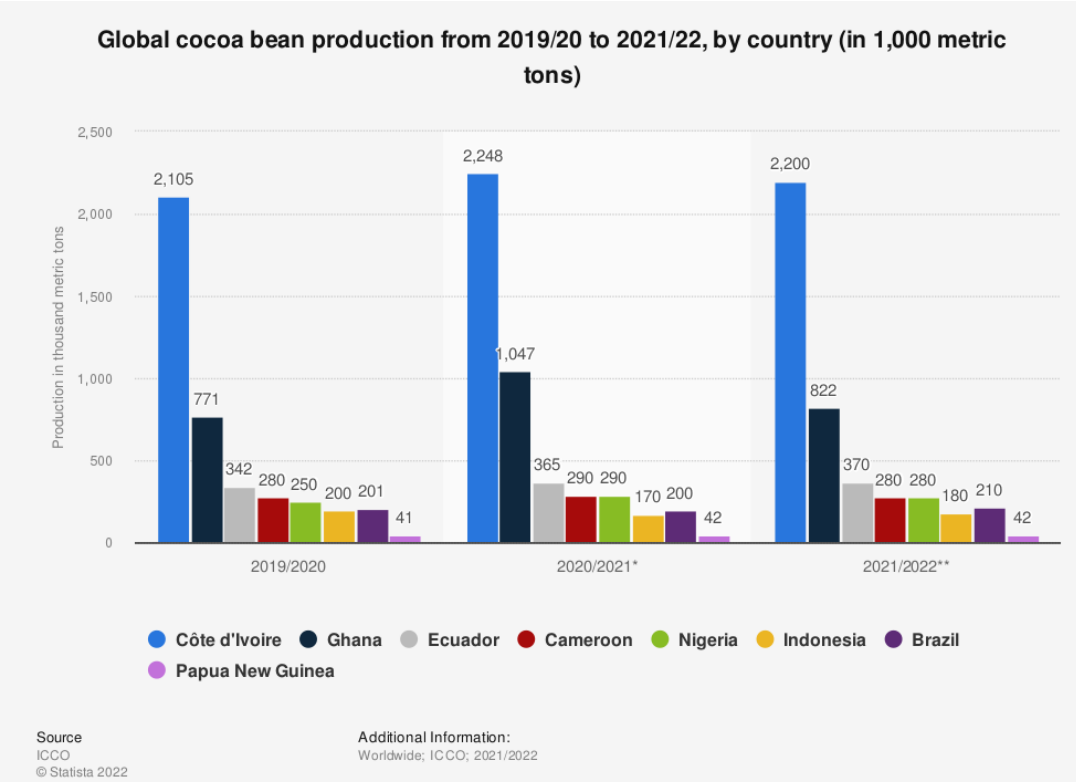
In the European context, in addition to Italy, there were two very strong poles to produce chocolate, Switzerland (Lindt, Nestlè) and the Netherlands (Wittamer, Godiva, Leonidas). Many of these enterprises over time were bought by large multinationals, while maintaining the characteristics that have distinguished them over time.

2. The production of cocoa

The cocoa tree, as mentioned before, originates in America, precisely from Central America. Today, about 80% of the world's cocoa production is in Africa.

In 2020/2021, cocoa production in Africa was estimated at about 4 million metric tons, almost half of which (2.2 million tons) produced in Ivory Coast

As the graph shows, Ivory Coast beats any other country in terms of cocoa



bean production.

Most of the proceeds are used for the production of cocoa butter paste (2/3), the rest is destined for the production of cocoa powder.

Cocoa plantations occupy 1 to 4 hectares, with about 800 plants per hectare, with a very variable yield per hectare depending on the type of technology used.

The average is 500 kg per hectare, but there are plantations with yields above 2 tons and plantations with yields below 100 kg.

2.1 The structure of crops

One of the biggest problems is meeting the growing demand for high chocolate from consumer markets such as Asia, Europe and North America.

The production of cocoa, because of its particular characteristics, is found in a few developing countries located between Africa, Asia and South America.

Production is also fragmented among many small, medium-sized family farms where owners generally live below the poverty line.

Many concerns arise if the status of cocoa growers is assessed, the disparities in distribution along the supply chain and the imbalance between supply and demand.

From this state, it is clear that one of the first factors from which we must start is to relieve farmers of this state of extreme poverty.

In fact, many families live with limited access to basic services such as health, education or clean water.

This is also due to the remote location of some agricultural communities means that only a lucky few can attempt the school, the remaining men must work to ensure the survival of the family.

This also affects the yield of crops, as farmers face challenges every day including pests, sick trees, poor nutrition and climate change. Many of these do not have the slightest formation related to the techniques of cultivation and management of the cocoa crop, one of the most complex plants to cultivate.

2.2 The condition of the farmers

In this scheme the farmer is forced to sell off his seeds, and the efforts to obtain a minimum wage do not guarantee an adequate lifestyle

Often cocoa farmers are excluded from the real gain generated by the supply chain.

This imbalance, shows in the figure above, is so strong that the average price of a single chocolate bar sold in a developed country is very often higher than a cocoa grower can earn in a week.

Moreover, many farmers do not even have access to modern techniques and environmental practices that could help them increase the harvest in a productive way.

Consequently, an increase in demand may not be guaranteed by sufficient cocoa intake.

2.3 The Cacao Trace: Ivory Coast

In the Ivory Coast, cocoa companies, especially in the San Pedro region, are all part of the Cacao-Trace program, dedicated to the sustainable supply of cocoa focused on the production of a product that creates value for all, from producer to consumer.

All these crops tend not to exceed three hectares, so as to allow farmers to give space to other crops, such as rice or vegetables, to be able to meet some primary needs. [4]

2.4 Cacao-Trace: the lifestyle of Viet Namita farmer

Figure 2 - Viet Namita farmer, preparing the beans for the drying process. (source: National Geographic)

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2.5 Barry Callebaut's ambitious project

Barry Callebaut, the world's largest producer of chocolate and cocoa products, has launched a global cocoa sustainability strategy since 2016.

The goal for 2025 of "Forever Chocolate" is to make sustainable cocoa the norm and no longer a niche product, with the aim of improving the supply

chain and ensuring better living standards for farmers.

This goal has as its main focus to establish a new method of cocoa cultivation, professionalizing agro-growers and creating cohesive communities of farmers.

The "Forever Chocolate" sustainability strategy has four objectives:

1. To lift more than 500,000 cocoa farmers out of poverty;

2. eliminate child labor in the supply chain;

3. A positive balance in terms of CO2 emissions and deforestation;

4. Use 100% of the necessary ingredients in all products.

To achieve this goal in time, Barry Callebaut contributes €15 million to the Cocoa Horizons Foundation.

The priority is to create positive impacts for cocoa producing communities.

In 2017/2018, 12,395 growers from Ivory Coast, Ghana, Cameroon, Tanzania, Brazil and Indonesia benefited from advice or services, tools, plants and funding.

In addition, 281 hectares of young cocoa plants and other trees were planted to diversify their incomes.

These initiatives show how a community approach can deal with problems not only from an economic point of view, in order to satisfy a constantly growing demand, but also by having a concrete impact on the environment. [5]

3. The Industry process

We have seen where it comes from, but it is right to clarify how chocolate is produced.

The key steps are:

-Cleaning of cocoa beans;

-roasting;

-Peel removal and fratumation;

-Milling of broad beans;

-Alkalinization;

-Mixing;

-Concage and birth of dark chocolate;

- Tempering of the chocolate;

-Stamping;

-packaging.

Below is shows the flow chart referred to the production of the chocolate from the roasting of beans to the production of the chocolate in the various shapes(source: NIH) [6].

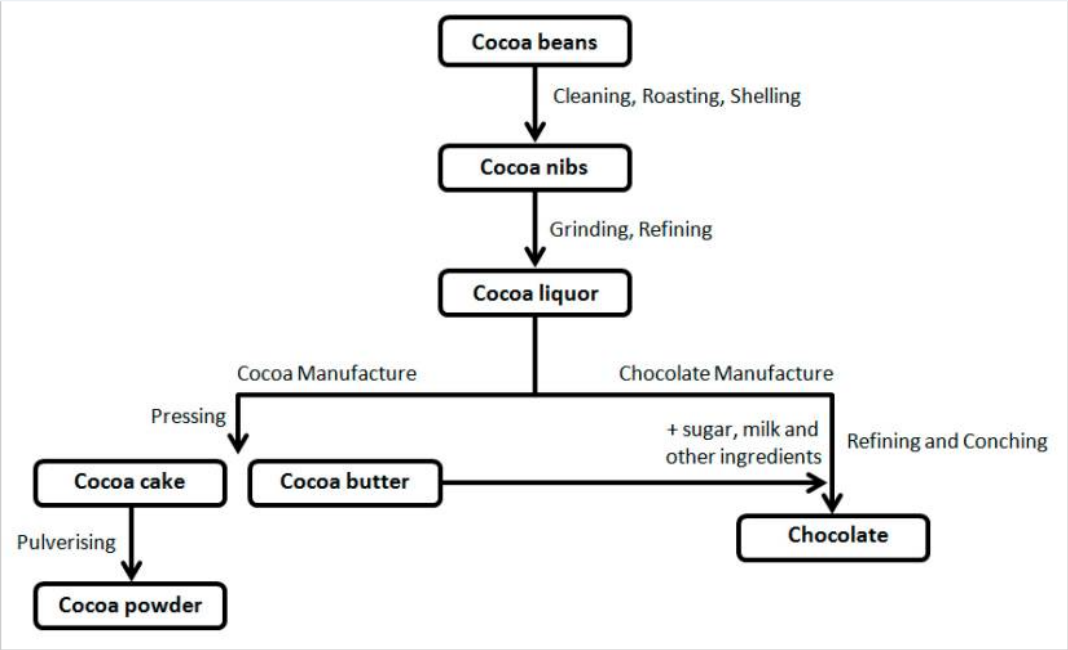


Figure 3 - Flow chart representing the industrial process of the chocolate production. (source: NIH)

3.1 Cleaning of cocoa beans

Three different machines are used in this specific process:

-dust collectors;

-remover;

-deferrer;

It is very important to underline that this process is the only one that takes place in a separate location from that of processing, since cocoa beans are a vehicle of salmonella that could contaminate the adjacent departments, precisely in order to avoid cross contamination problems in this department the personal must wear appropriate clothes that must be removed on leaving the ward.

Everyone starts on a hopper, where the cocoa beans are discharged, and transported via a bucket elevator that moves the beans from one machine to another during the process.

The cleaning allows to remove from the cocoa beans all the debris and impurities that compromise the product quality but could also damage the machines that perform the work.

As mentioned before the cleaning of the cocoa beans takes place through three different machines:

1. Dust collector: used to separate dust and soil from broad beans, operating on the basis of the specific weight as the separation key;

2. Remover: eliminates stones, stones and other similar bodies, also in this machine the separation key is the specific weight;

3. De-aerator: is a machine that allows the removal of ferrous parts from broad beans, with the help of a powerful electromagnet. [7]

Now the beans are almost free of impurities and ready for further processing.

3.2 Roasting

After being cleaned the cocoa beans arrive in the roasting department.

Here the cocoa beans undergo a further skimming, eliminating the defective ones and the remaining impurities, then they can be roasted.

This is one of the most important processes, because through a careful roasting you can release all the fragrances that cocoa naturally contains enhancing smells and scents.

In this process specific machines are used with large heat-heated tanks.

Each chocolatier treats the beans to your liking by choosing a lighter or less roasting, depending on the result sought and the type of cocoa.

The time varies between 15 min and 1 hour at a temperature between 110

The so-called roasting curve is one of the fundamental aspects of this process, each chocolate maker has its own, with which it determines the final aroma of the product.

But what does it do and what does it give to cocoa beans in detail?

1. Lowers humidity from 7/8% to about 1%;

2. reduces the bacterial load;

3. Develop the flavorings;

4. Makes the waste (cocoa peel) more crumbly and facilitates subsequent dehulling;

5. Partially remove the acid component.

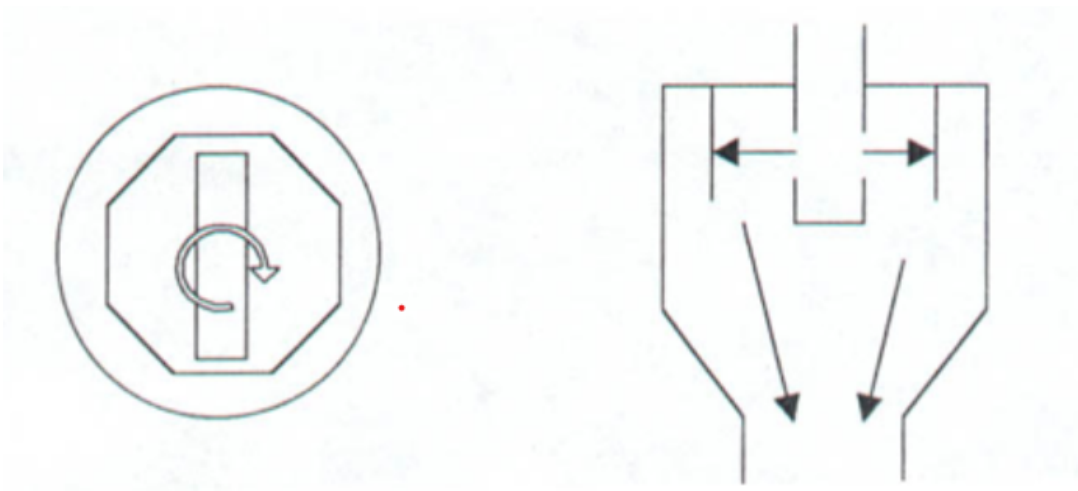
Roasting is a very simple process on paper, but like everything, in its simplicity, it shows many pitfalls.

Among the many chocolate masters, emerges an Italian, Claudio Corallo, who with his production process has removed, one of the fundamental parts of the process, producing a chocolate with raw cocoa, which will be analyzed in the following chapters as an example of virtuous use of raw materials.

3.3 Peel removal and frantumation

In this process a cocoa breaker (Concasseur Lehmann) and a classifier are used.

By means of an automatic transport the beans are stored in silos that feed the machines described above, below is the diagram of how a cocoa breaker works.



4- Figure shows how the cocoa-breaker works. (source: Foundation World Cocoa)

The crushing allows to eliminate the peel, so the so-called grue is generated, which is the valuable part of the bean.

The beans enter the cocoa breaker via a distributor, this through a rotating parallelepiped that pushes the beans through centrifugal force towards the walls of the machine.

On the walls are pre-placed the plates defined rebound, through which the real crushing of the beans takes place.

After the beans are collected on the bottom of the cocoa breaker and go to feed the classifier machine.

This machine consists of a series of vibrating sieves superimposed on increasingly fine meshes, in order to differentiate the product according to size.

At each sieve there is a vacuum cleaner that allows the separation of the peel from the lump.

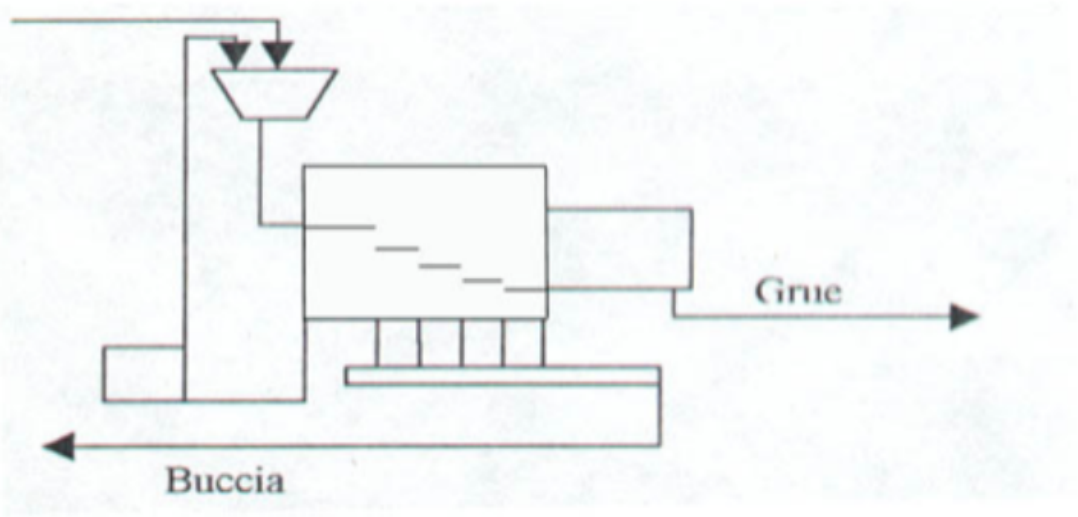
The suction is regulated according to the specific weight of the beans, to avoid too intense aspirations that could remove parts of the lump, or slightly intense, thus not removing the peel from its entirety.

The product that is rejected in the first sieves passes through the cocoa breaker again to avoid loss of the lump.

The grue, which passes through the sieves, is sent to the roasting plant.

The skins are sent, by automatic transport, in a tank, where they are collected and then disposed of or recycled. [8]

Below is the scheme of the classifier:



5- Figure showing the process of the classification of the material remove. (source: Foundation World Cocoa)

3.4 Milling of broad beans

In this phase, the cocoa beans are ground through machines with finer filters to obtain a product ground with granular precision, and then be better worked in the subsequent stages.

Here the roasted grain is then ground by complex cylindrical millstones: under the double effect of heat and kinetic energy, the grain is transformed

into a liquid mass of cocoa, called cocoa liqueur.

This mass has two components, on the one hand the solid part of the dry residue of beans, on the other the natural fat matter, cocoa butter.

3.5 The alkalinization

Alkalinization consists in treating the cocoa beans with an alkaline solution containing potassium or sodium carbonate.

This process allows you to change the color and flavor of cocoa mass and cocoa powder.

This process can be carried out in several parts of the chocolate production process, depending on the stage you will have different results on the color and flavor.

This process is also called "dutching" in appeal to its inventor, the Dutch Van Houten.

Dutching consist in wetting the cocoa beans before roasting in a solution of potassium carbonate.

One of the effects of dutching is to return the cocoa a more intense color, more red, another fundamental point, the solubility point.

3.6 Mixing

Before explaining in detail this production process it is right to specify that the cocoa mass takes different names depending on the state and temperature:

cold mass = cocoa paste

hot liquid mass = cocoa liqueur

Two products are extracted from the liquid mass:

- cocoa butter

-the panel or cake

At this stage the cocoa butter is extracted from the liqueur and then mixed with emulsifiers to obtain a malleable product.

Cocoa butter has a yellowish color and a characteristic chocolate scent.

The butter melts at a temperature of about 37 °C and solidifies rapidly below this temperature.

The melting point changes according to the composition of the butter and the fatty acids and emulsifiers present inside.

On the other hand, cocoa powder is obtained by re-grinding the panel, here it was fundamental the previously described process of alkalinization, which serves precisely to change the color and saponify the fat residue.

3.7 Concage and the birth of the dark chocolate

In 1879, as mentioned before, Rudolph Lindt invented the process called concage, which consists in keeping the molten cocoa mass for a long time to ensure that the mixing is homogeneous.

Through some machines, called "conche", the grains of sugar, previously mixed with cocoa grains that are further ground and made very fine, creating a hot dough kept in motion for a long time and at controlled temperatures, The basins are equipped with oscillating arms of mixing that perfectly mix the ingredients, eliminate the last traces of acidity and humidity, enhancing the aromas.

The chocolate is then poured into large containers and kept at a temperature of 50 °C, ready to be processed.

The concage phase can vary according to the food habits of the various countries: the Swiss one is subject to a 72-hour lock, while the American one, for example, suffers an 18-hour lock.

3.8 Tempering

By definition tempering is the process according to which chocolate is made to melt slowly following, a thermal curve, called precisely tempering curve.

This technique is widely used in pastry, because it gives chocolate very special properties:

- Retains the shiny and smooth appearance of chocolate;

- Facilitates the removal of pieces;

-Ensures a clear division.

To ensure a perfect tempering you must have thermometers to properly monitor the temperature of chocolate throughout the process, following a precise thermal curve, according to the type of cocoa used and the result you want to achieve.

The maximum temperature not to be exceeded depends, as mentioned before, on the type of chocolate and the phase in progress. As an example, dark chocolate needs to be melted between 50 and 55°C, while milk chocolate as well as white chocolate need to be melted around 40-45°.

The following table shows the temperature ranges to be respected, according to the phase and type of chocolate to be tempered. [9]

Temperature	Dark chocolate	Milk chocolate	White chocolate
T°1	50°C-55°C	45°C-50°C	45°C-50°C
T°2	28°C-29°C	27°C-28°C	26°C-27°C
T°3	31°C-32°C	29°C-30°C	28°C-29°C

3.9 Stamping and packaging

After tempering the chocolate, it is kept in temperature and made to slide through watertight pipes to the appropriate molds, which will then give the classic "bar" shape to chocolate.

In ancient times these molds were made of aluminum, over time thanks to the advent of plastic, have been replaced by silicone, which allows you to minimize any fractures of the tablet during extraction from the mold.

After the tablets have been removed from the appropriate molds, they are made to rest on conveyor belts, which lead the chocolate to the last step of processing, packaging.

In this phase, the bars are first wrapped in a layer of aluminum paper, to protect the high chocolate from external temperature drops and to better preserve all the organoleptic properties of chocolate. Finally, it is wrapped in a sheet of paper after which all the mandatory and non-mandatory information, described in the previous chapter, is reported.

Now the chocolate is ready to be discarded and enjoyed.

3.10 Quality Regulation, attention on the label

During this expansion in Italy, was formulated the first legislation for quality tracking in 1931, Law 916/1931, which regulated the production and marketing, clearly departing the "chocolate" from imitation products, defined by the expression "chocolate substitute".

Subsequently, chocolate was reserved, at European level, a specific regulation that specifies the denominations and their composition. With the advent of the European Common Market came, in fact, the harmonization of the existing regulations in the six countries that at the time constituted the European community. This harmonization was achieved by Directive 241/1973, transposed into Italian law by Law 351/1976. The new Community rules represented in detail the production of chocolate and defined precisely all the reserved names, which must still

be used in trade to designate the products in circulation. The essential condition for the composition of chocolate, in this legislation, was that it was produced exclusively with cocoa butter.

As a result of the enlargement of the European Union to include the United Kingdom, Denmark and Ireland, and subsequently other countries, the European chocolate market was uneven and not well regulated, protecting neither consumers nor consumers.

In the light of the freedom of movement based on the principle of mutual recognition, the risk could not be excluded that product lawfully manufactured in one of the countries whose legislation allowed the use of vegetable fats other than cocoa butter, were also marketed in countries where this practice was prohibited, such as in Italy.

Thus, at the beginning of the Nineties, a complete and definitive harmonization of the market was achieved at Community level, through a new directive.

On 23 June 2000, after a long legislative process started in 1992, the European Parliament finally approved a new harmonised legislation (Directive 2000/36/EC) In order to balance the need to preserve the principle of the free movement of goods within the 15 countries of the European Union, it introduces important innovations, which achieve the objective of more precise and complete information to the consumer.

The innovations introduced by the directive, transposed in Italy with the Legislative Decree 178/2003, are: Extension to all Member States of the European Union of the option to use, on an optional basis, up to a maximum of 5%, without changing the minimum compositional requirements defined by the previous 1973 Law, six vegetable fats of tropical origin other than cocoa butter. These are selected according to the criterion of chemical-physical compatibility with cocoa butter, and are precisely: *illpè butter, shorea robusta stearin, shea butter, kokum butter, mango kernel, palm oil* (the latter only for ice cream and the like).

- Obligation to indicate on the label the ingredients of the chocolate and the date of durability of the product.

- Obligation for products containing other fats in addition to cocoa butter to be indicated on the label, alongside the sales description, in a clearly visible and clearly legible manner, in the same field of vision as the list of ingredients and in characters at least equal in size and bold, the words “contains vegetable fats in addition to cocoa butter”.
- For producers who do not use vegetable fats other than cocoa butter, it may be stated explicitly on the label.

For chocolate produced or marketed in Italy, in applying the Directive, the Italian Parliament expressly provided for the possibility of using the term “pure chocolate” for the product containing only cocoa butter. [10]

Source: Elaborazione ministero italiano dello sviluppo economico

Mandatory information on the label:

A – The sales name indicates the exact type of chocolate you are buying (tablet, praline, etc.)

D – The expression ***cocoa... % minimum*** indicates the dry matter content of cocoa

E – The list of ingredients indicates the listed product components in descending order of weight

F – Name and address of the manufacturer or packager or seller of the product

H – This expression indicates the minimum storage term, i.e. the date until which the product retains tis specific properties under appropriate storage conditions

J – Indicates the quantity of the product net of packaging for products exceeding 30 g.

Non mandatory information on the label:

B – The term ***pure*** may be used to indicate that, the product is not containing vegetable fats other than cocoa butter

C – The higher term is one of the expressions relating to quality criteria (there are others such as: fine, extra fine, ecc..) which may be used when the content of the ingredients main (in this case cocoa and milk) is increased compared to the basic recipe

G – This indication stands for the most suitable storage methods for product

I – The nutritional table provides information about the energy value and the main nutrients of the product

K – Barcode, provides legible indications for electronic detectors, referred to the producer and the item sold at the distribution.

4. The chocolate market in Europe

Chocolate is often referred to as recession-proof, because it has been noted that during periods of economic turbulence, this product, like others in the blinding luxury sector, enjoys an effect that economists call "lipstick"; Consumers, in times of crisis are willing to give up the big luxuries, but not the small indulgences such as cosmetics and chocolate, which therefore suffer an increase in sales.

4.1 Definition of the micro sector

ATECO code 10.82.00 represents a sector dedicated to the production of cocoa-based food products, such as chocolate, cocoa powder, candy, and confectionery. Companies operating in this sector can produce chocolate in various forms, such as bars, blocks, tablets, and other formats, as well as cocoa-based spreads. This sector is an important part of the food industry and plays a significant role in the global economy. The production of chocolate and cocoa-based products is a widespread activity worldwide, with the presence of large multinational companies and numerous small and medium-sized enterprises.

The chocolate sector is subject to various factors that influence its growth, such as consumer demand, dietary trends, raw material prices, government policies, competition, and international regulation. The sector has also attracted attention regarding issues related to sustainability and corporate social responsibility, particularly concerning the working conditions of cocoa plantation workers and the environmental consequences of chocolate production.

In Italy, the micro-industry of chocolate production is characterized by a long tradition of artisanal excellence and high quality, despite the strong competition among domestic and foreign companies. Italian companies that produce chocolate are known for their pursuit of quality and authenticity of raw materials, creativity and innovation in product preparation, and the promotion of artisanal techniques and traditional

recipes. While the micro-sector of chocolate production in Italy continues to face competition, it is appreciated both nationally and internationally for its quality products and commitment to sustainability and social responsibility.

4.2 Structure of the offer

The chocolate sector is made up of a wide range of companies that produce cocoa-based food products, including chocolate bars and blocks, spreads, cocoa powder, candy, and confectionery. These companies range from large multinational corporations to small and medium-sized enterprises.

In Italy, there are numerous companies that operate in this sector, including both domestic and foreign companies. Some of the largest Italian chocolate producers include Ferrero, Perugina, and Venchi, while other well-known Italian companies specialize in the production of chocolate spreads, such as Nutella by Ferrero and Crema Novi by Novi.

In addition to these established companies, there are also many artisanal chocolatiers and small-scale producers who specialize in high-quality, niche products. These producers often use traditional techniques and locally sourced raw materials to create unique and distinctive flavors and textures.

The supply structure of the chocolate sector is also influenced by the type of products being produced. For example, companies that produce high-end, premium chocolate products may focus on using high-quality raw materials and innovative production techniques, while companies that produce more affordable products may prioritize efficiency and cost-effectiveness in their production processes.

Overall, the supply structure of the chocolate sector is diverse and varied, with a wide range of companies producing a variety of cocoa-based food products for different market segments and consumer preferences.

This diversity is also reflected in the production processes used by companies in the chocolate sector. While larger companies may rely on

industrial-scale production methods to meet high demand, smaller companies may focus on more artisanal production techniques to create unique and high-quality products.

Another factor that influences the supply structure of the chocolate sector is the distribution channel used by the companies. Some companies choose to distribute their products through traditional retail channels such as supermarkets and convenience stores, while others may focus on direct-to-consumer sales through online channels.

Overall, the supply structure of the chocolate sector is complex and multifaceted, with a range of companies operating at different scales and using different production methods to meet consumer demand and market trends.

The table, shows below, highlights the diversity and variety of companies operating in the chocolate industry in Italy, each with their own distinctive features.

TYPE OF COMPANY	EXAMPLES OF COMPANIES	CHARACTERISTICS
MULTINATIONALS	Nestlé, Mars, Mondelēz International	Large companies with a global presence that produce a wide range of cocoa-based products
ESTABLISHED ITALIAN COMPANIES	Ferrero, Perugina, Venchi	Large and medium-sized Italian companies that produce a wide range of cocoa-based products
SPREADS PRODUCERS	Ferrero (Nutella), Novi (Crema Novi)	Companies specialized in the production of chocolate and hazelnut spreads
ARTISAN CHOCOLATIERS	Slitti, Amedei, Guido Gobino	High-quality artisanal chocolate producers who use traditional techniques and local raw materials
PREMIUM CHOCOLATE PRODUCERS	Lindt & Sprüngli, Valrhona, Domori	Companies specialized in the production of high-end chocolate with a particular focus on the quality of raw materials and innovative production techniques
ORGANIC-FAIR TRADE CHOCOLATE PRODUCERS	Alter Eco, Divine Chocolate, Equal Exchange	Companies that produce chocolate using organic raw materials and are committed to promoting fair and sustainable working conditions throughout the supply chain

4.3 Competitive Strategy

VALUE CHAIN STAGE	DIFFERENTIATION STRATEGIES	COST REDUCTION STRATEGIES
Input Acquisition	Input Quality Differentiation 8/10	Offshoring 0/0 Supplier Relations 8/10
PRODUCTION	Product Quality Differentiation 8/10	Economies of Scale 8/10
	Product Innovation 3/10	Outsourcing 5/10
	Variety Economies 7/10	Process Innovation 4/10
Distribution and Sales	Customer Services 5/10	Downstream Integration 3/10
TRANSVERSAL	Communication 10/10	Geographic Diversification 4/10
	Market Presence/Reputation 9/10	Human Resource Management 2/10

The analysis starts from a distinction between differentiation strategy and cost reduction strategy.

The table above shows four levels of the value chain:

- input acquisition
- production
- distribution and sale
- transverse

The purpose of this is to identify the company's most significant competitive strategies during specific phases of its operations. In the food sector, companies can leverage various key factors to compete, starting with the procurement of high-quality raw materials that are closely monitored. Additionally, they must adhere to strict quality standards during production, especially larger companies that strive to maintain market share by focusing on product excellence. Creating an artisanal product using different production processes or acquiring unique inputs are potential differentiators. Over time, effective brand policies have emerged as a significant differentiator, as companies increasingly integrate quality control upstream, reduce transportation costs, and invest in production process innovation. Managing relations with distributors can be challenging, with different marketing strategies depending on the target market, whether it is large-scale distribution, traditional trade, or

restaurant and hotel channels. Brand policies can be effective strategies for companies looking to market their products through large-scale organized distribution, but smaller businesses may need to align with commercial brands to gain volume advantages, potentially sacrificing brand visibility.

4.4 Distribution channels

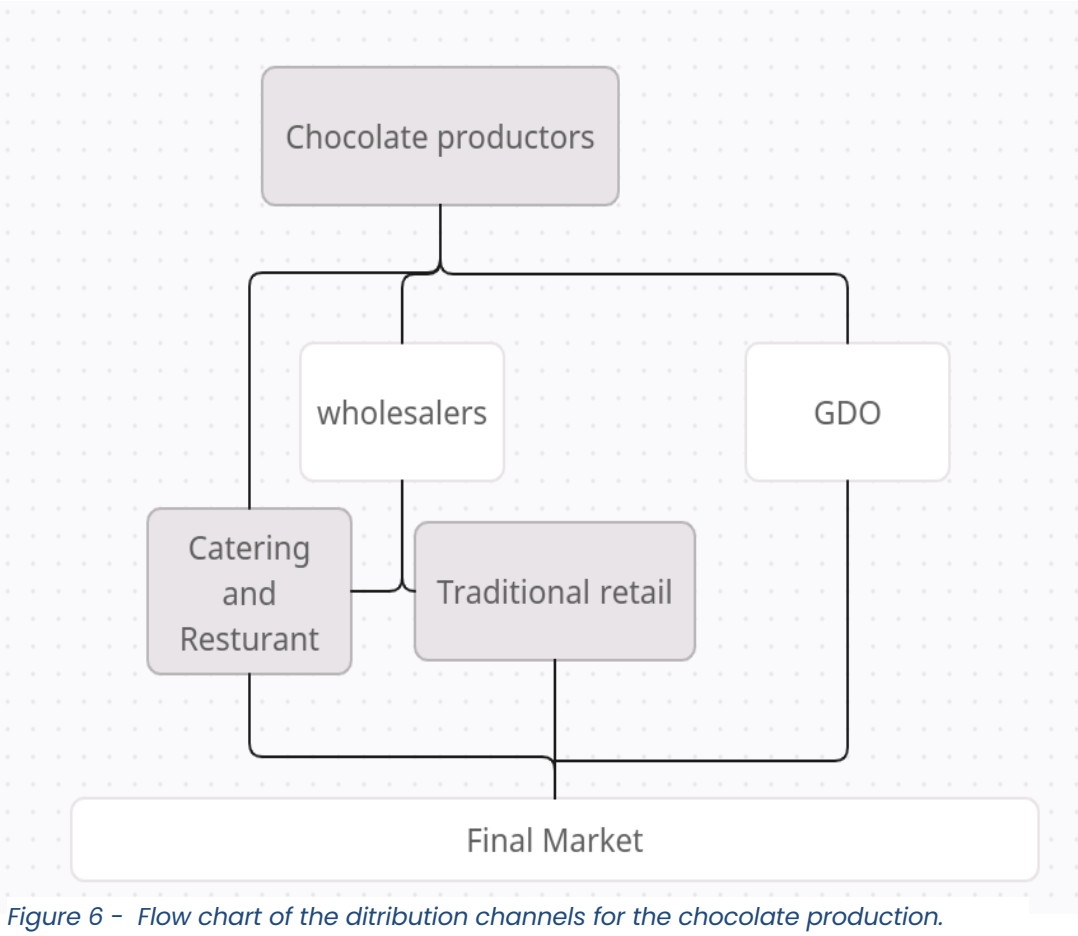


Figure 6 - Flow chart of the ditribution channels for the chocolate production. (source: Research Gate)

The chocolate sector presents a diverse structure of the offer, varying according to the type of product (homemade chocolate, milk, dark, cold worked). The market is highly fragmented, with a significant territorial inhomogeneity. While some market leaders exist, several industries excel in specific regions due to their roots in the territory. The artisanal chocolate segment is dominated by a few active operators who maintain high quality standards, conduct continuous research on raw materials, and

provide strong advertising support.

Distribution channels in the chocolate sector are relatively short, with chocolate producers directly supplying large retailers and wholesalers or selling directly to retailers. In the domestic consumption channel, the GDO dominates sales as large manufacturers leverage its ability to provide cost-effective conveyance of their products compared to traditional sales and distribution. High promotional pressures exerted by distributors have forced manufacturers to invest heavily in communication to support brand differentiation. GDO also offers manufacturers the ability to implement dual branding strategies by producing both branded products and commercial brands (private label).

As private labels have a significant presence in the market, large distributors have started implementing strategies to differentiate commercial brand products, including creating typical product lines and opening spaces for small and medium producers to access the channel. However, these producers must maintain high quality standards.

In the extra-domestic consumption channel, chocolate sales occur both directly and through the intermediation of wholesalers, offering excellent opportunities to manufacturers. A strategy in this field could involve opening shop points in trade centers, stands and displays in restaurants and hotels.

4.5 Foreign trade: historical analysis

The micro chocolate sector shows a propensity to export, but nevertheless also at import levels there is a positive evolution.

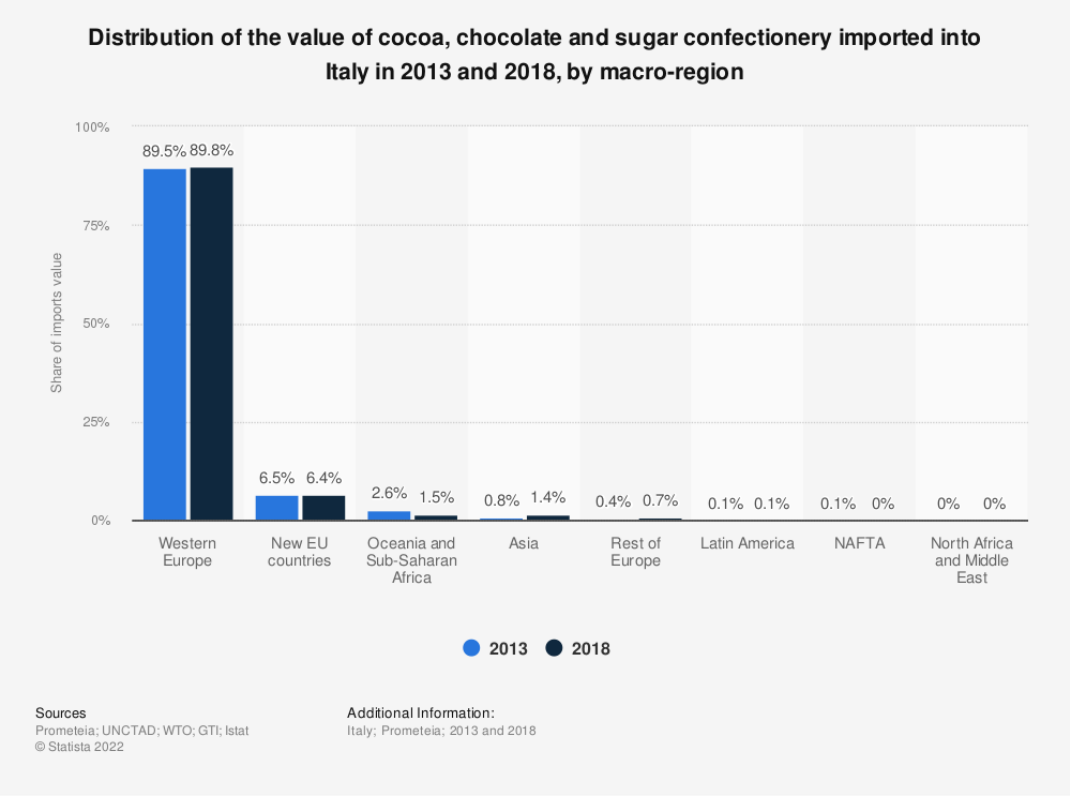
In the period 2013-18, the sector has experienced an almost constant evolution of imports and exports, also due to the fact that chocolate, as mentioned in the previous chapters, is a recession-proof product, which does not accuse of general market movements.

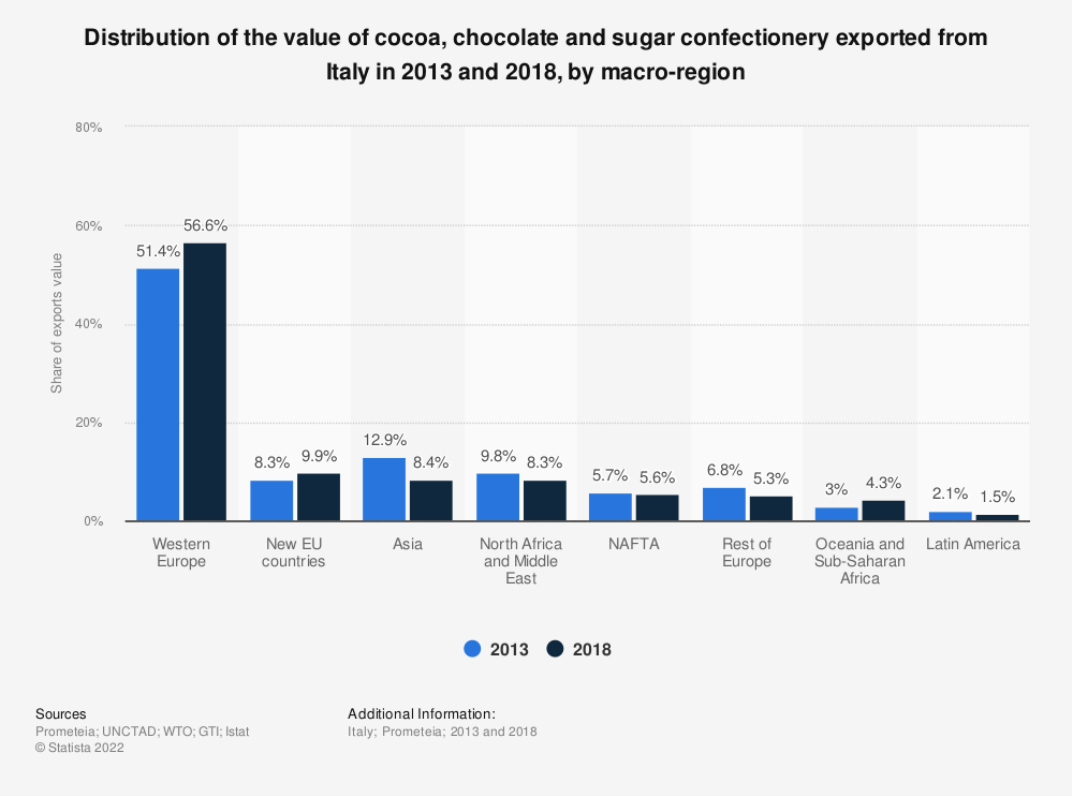
Consistent with what has been verified for the manufacturing industry as a whole, the destination of exports by geographical area shows the

primacy of Western Europe as the largest Italian export market, but also of import, with respectively a weight in export of 1.147 mln of euro and a weight in import of 898 mln of euro (according with data provided by Prometeia, in 2018).

The substantial resilience of exports to Western European markets confirms for this sector the presence of strong obstacles to overcome in terms of penetration and promotion of typical products in foreign markets, whose burdens borne by the enterprises are aggravated by the structural absence of international projection of the Italian GDO.

Below we can see the weight's charts (in %) of the imports and exports of the chocolate products of Italy.





The analysis of the ranking of the top ten countries of destination confirms the centrality of the advanced countries as major markets, among which emerges the significant weight held by France, Germany, United Kingdom.

This is also due to multiple cultural and historical factors that have led to the development of communities where this product is highly consumed in all social classes.

The causes can also be reduced to a geographical proximity of the countries, and to a migratory and tourist flow that has affected the relations in continuous modality.

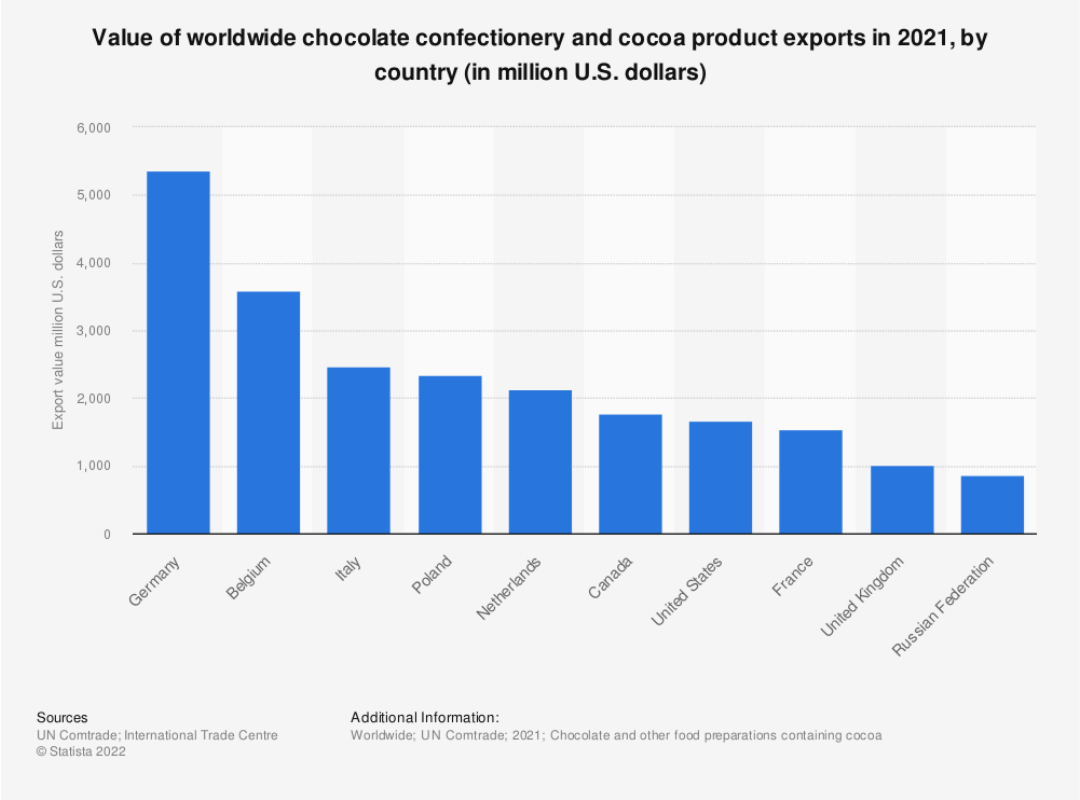
Leading destination countries of Italy's exports of cocoa, chocolate and sugar confectionery from 2016 to 2018, by export value (in million euros, Source: Statista). [11]

Italy leading destination countries of exported cocoa confectionery 2016-2018	2016	2017	2018
France	293,90	373,30	358,20
Germany	160	171,20	177,30
United Kingdom	116,10	133	135,50

Figure 7 - Italy leading destination countries of exported confectionery from 2016 to 2018. (source: Statista)

Similarly, the distribution of imports by geographical area shows a strong concentration in Western European countries, with a weight of 89.5% in 2018 (source processing Pometeia 2018).

Italy is a major player in the global chocolate market, holding a significant share of the international scene and ranking highly among the world's top exporters. This is largely due to the high levels of production specialization of Italian companies and the competitive advantage provided by the Made in Italy brand, which is difficult to replicate. Specific products such as *Cioccolato di Modica IGP and Gianduiotto*, as well as processes from protected geographical areas, further strengthen Italy's position in the market. Despite the highly specialized nature of the industry, the competitive arena is relatively stable. The United States is the largest world import market for chocolate, with a consistently large market share.

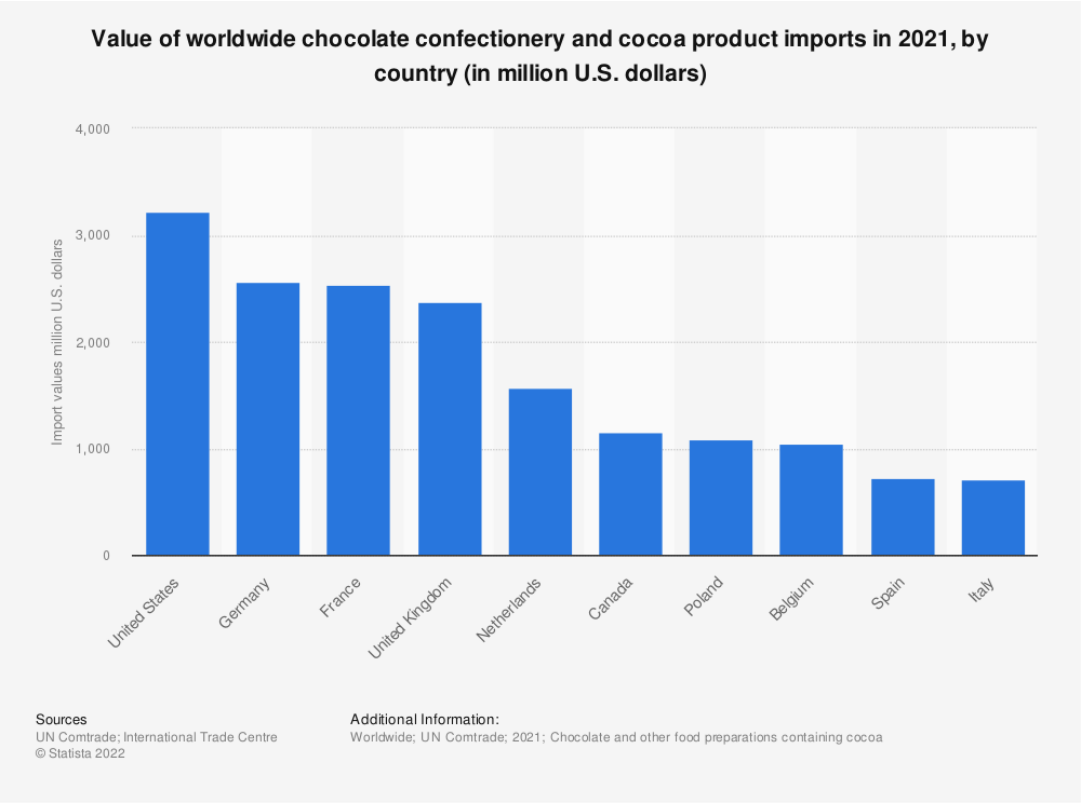


We can see from the above graph, as even if Italy is one of the world's first exporters of chocolate and chocolate products, Germany holds the record, with exports double the world average, also here due to cultural and historical factors.

It is noted that in this case the value generated by exports, is an inflated value, from a mainly GDO-shaped export, which allows to significantly increase production volumes, but compromising quality, that can never be compared to an artisanal chocolate "Made in Italy" or Belgian (second exporter for weight importance). (Source by International Trade Center).

Looking at the list of the top ten importers of chocolate and chocolate products, as mentioned before, the United States are the first importers in the world in terms of weight.

Here, too, causal factors derive from specific historical, cultural and geographical reasons.



Interestingly, Germany, although top export leader is second in world imports, this is because historically the chocolate produced in Germany has no deep historical and cultural roots, but the industrial confectionary and is very well structured by encouraging the migration of European production plants in Germany.

Hence the need also to import raw materials and finished products, to meet the domestic demand for trade and use, and the demand for materials to supply the production chains.

4.6 Foreign trade: economic trends and forecasts

The revenues of the sector support this hypothesis.

For the market segment of cocoa (source:Statista):

Revenue in the Cocoa segment amounts to US$3.25bn in 2022. The market is expected to grow annually by 6.17% (CAGR 2022-2025).

In global comparison, most revenue is generated in the United States (US$3,721.00m in 2022).

In relation to total population figures, per person revenues of US$3.83 are generated in 2022.

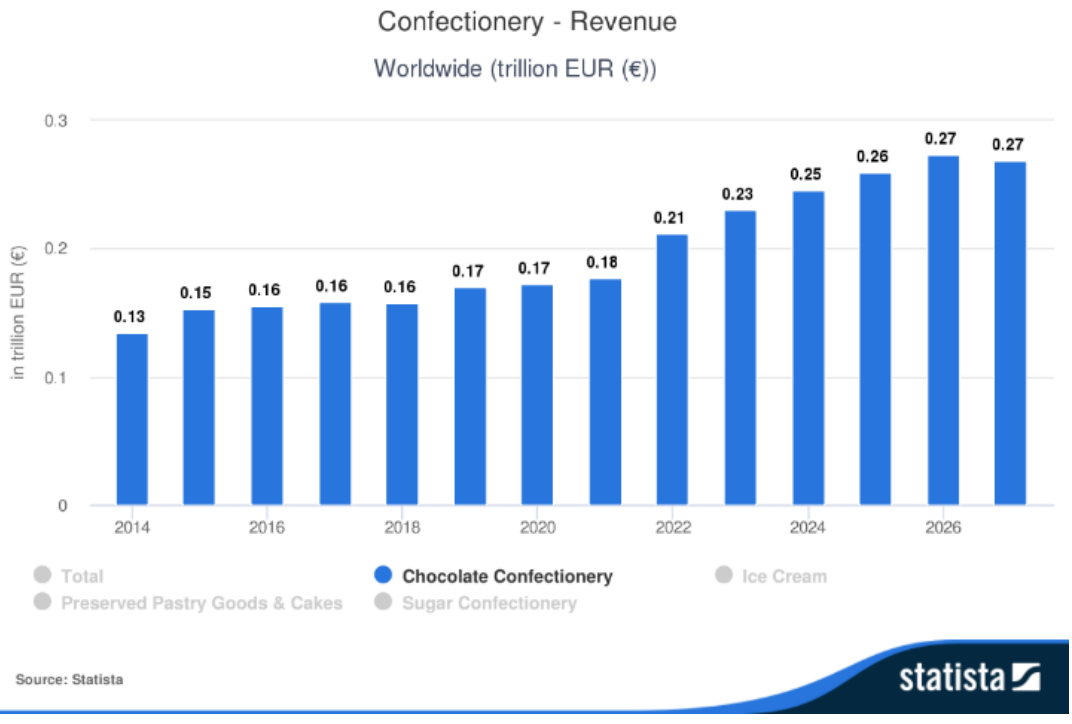
By 2025, 34% of spending and 3% of volume consumption in the Cocoa segment will be attributable to out-of-home consumption (e.g., in bars and restaurants).

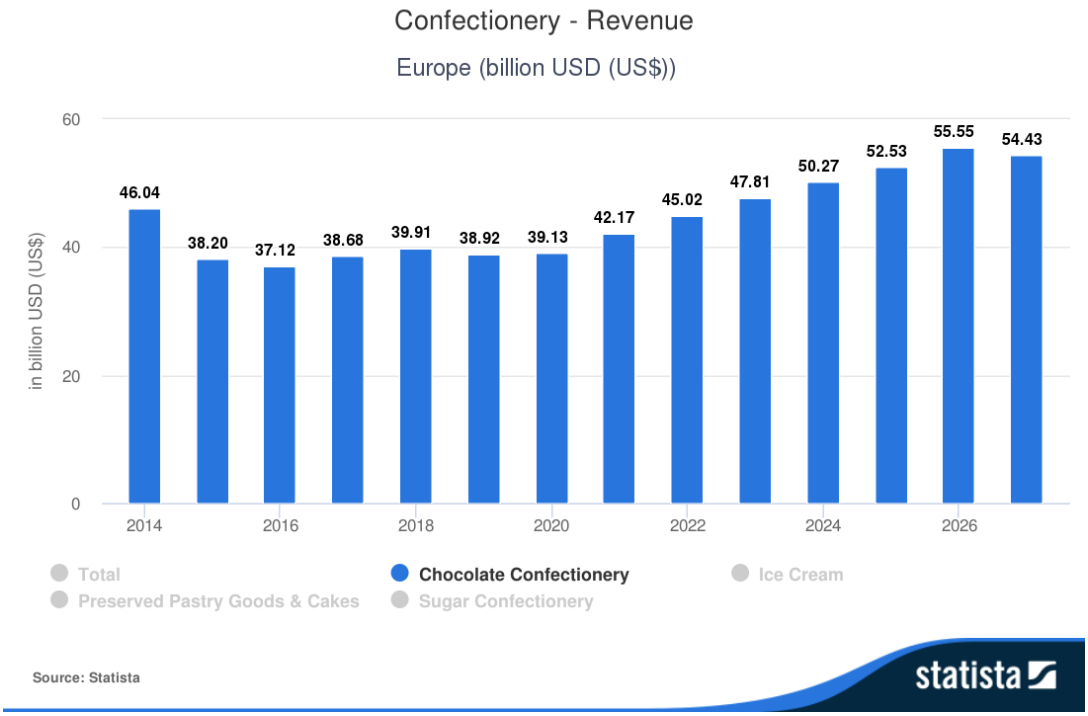
In the Cocoa segment, volume is expected to amount to 324.7mkg by 2025. The market for Cocoa segment is expected to show a volume growth of 10.7% in 2023.

The average volume per person in the Cocoa segment is expected to amount to 0.3kg in 2022.

As can be seen from the chart above, the revenues over the years have grown with a constant trend, a symptom that chocolate is a good recession proof.

Moreover, it can be seen that the forecast is increasing until 2026, after it is previewed a decrease of the revenues, probably due to the decrease of



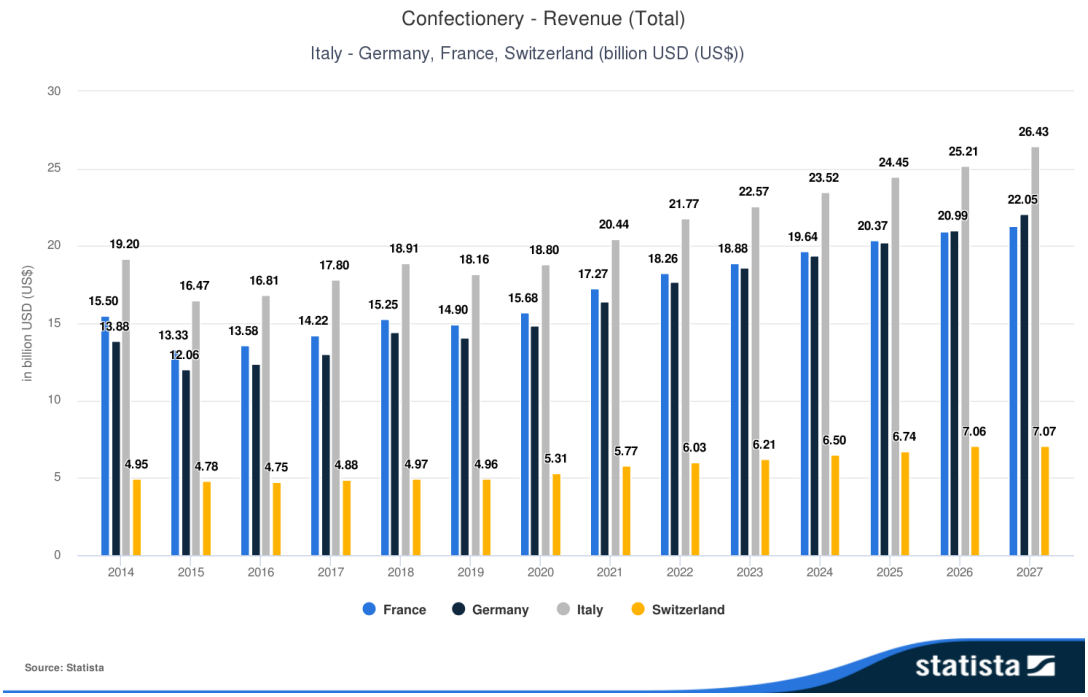


production to which inevitably it will be met in the time.

The worldwide chocolate's revenue reflects the before mentioned revenue for the worldwide confectionery. With an expectations to growths until the 2017.

This growth in Revenue, is supported by a Revenue change, forecast to decrease from the 2023, if we look at the chart below we can see how the quota's of Revenue Changes decreasing from a 19.1% (2022) to a -1.8% (2027).

This drastic decrease is due to factors not directly associated with the production of chocolate or cocoa, such as climate change wars and pandemics, that for almost three years have been changing rapidly and randomly the assets and settings of the current global market.



Going into the details of the major consumers of chocolate between France, Germany, Italy and Switzerland, we find Italy in first place.

A surprising data comparing the same regions for chocolate consumption, Italy is one of the last countries in the world, each inhabitant eats only 4 kg per year, almost 11 grams per day.

At the top of this ranking we find Switzerland with 8.8 kg per inhabitant per year, followed by Austria and Germany with 8.1kg and 7.9kg respectively.

Comparing the average price per unit of product, between Western Europe and Italy, we do not notice big differences, but both follow the same trend from 2021 onwards, particular year, as mentioned before, since the events outside the market in analysis (war, pandemic, and adverse climatic factors), have brought an increase on the average price per unit, destined to grow incessantly over the years.

The chocolate sector has demonstrated a strong international competitiveness in recent years, as evidenced by the growth of exports at almost constant prices that are in line with market demand. This indicates that companies in the sector are able to respond quickly and effectively to opportunities offered by foreign markets, which are still largely untapped and present significant growth margins compared to the already saturated domestic market.

Italy, with its strong specialization in the sector, is largely unaffected by imports at the level of finished products on domestic demand. However, there has been an increase in import penetration due to the rising demand for cheaper foreign supplies to meet cost-effective demand.

Export values have shown a sustained variation, driven by a greater contribution from Western Europe and North America, which are large markets with a high affinity for chocolate in their diets. Foreign demand is expected to continue increasing, with export volumes predicted to remain above historical averages in 2023/2024, and then potentially decrease due to factors external to the market, such as climate change.

Climate change is a particularly problematic factor, as it annually compromises the total production of cocoa. After reaching its peak in recent years, cocoa production is likely to decrease dramatically unless sustainable farming policies are implemented. This presents a major challenge for the industry, which will need to find ways to adapt and innovate in order to maintain its competitiveness in the global market.

4.7 Internal Demand

In 2020, the *Unione Italiana Food*, the largest association in Europe that groups productors food companies, defines the overall trend of the Italian chocolate market very profitable.

In 2020, total sales amounted to over 4.5 billion euros (+0.3%), with a total of 344 tons of chocolate produced (+2.2%).

The two main product segments that affect turnover are bars and chocolate blocks, recording an increase of 6% in terms of volume and +7.4% in terms of turnover (552 million euros).

Spreadable creams, another important product segment of chocolate, recorded an increase in volumes of 6%, but the most surprising thing is recorded in turnover, with an increase of 15.2% compared to 2019, with 366 million euros.

The effects of the pandemic also emerge in this market, if you think only of the demand deriving from the professional world of the confectionery industry, such as catering and resturant, with a decrease of next 3%, passing in a year from 715 million to 695 million of euro.

At the global level, Europe is one of the main players in the market.

The top five players in the European market, holding more than half of total global consumption (according to a survey carried out by the Indian market company Mordor Intelligence) are the Swiss company Neslté, whose follower Mondelez and Mars (US), Ferrero (Italy), Lindt and Sprungli (Switzerland).

Nestlè and Ferrero are leaders, not only in the global market of the chocolate but also in the entire confectionery industry, with turnover of 20 billion and 13 respectively, representing the first and second position of the 2021 *Top global Companies* prepared by *Candy Industry.*

5. Statistical analysis on a sample of Italian firms

In this chapter, we will perform a statistical analysis of the chocolate industry using STATA software. The chocolate industry is a very dynamic and competitive industry, with many companies seeking to distinguish themselves through marketing, production, and distribution strategies. The objective of statistical analysis is to provide an overview of industry trends, as well as to identify any factors that influence the demand and supply of chocolate.

Using STATA, we will be able to analyze available data on the chocolate industry, including prices, sales volumes, revenues, and other key variables. Additionally, we can use data analysis techniques, such as linear regression and cluster analysis, to identify any patterns or trends that may not be evident at first glance.

Moreover through statistical analysis, we will be able to gain a deeper understanding of the chocolate market and the dynamics that influence it. This will allow us to better understand the industry and make informed decisions regarding business management, marketing strategies, and investment opportunities.

5.1 Sample definition

To create a sample for analysis of the chocolate industry through the definition of the data set, we use the AIDA database.

AIDA provides information about all the companies operating in the Italian market, registered at least in one of the categories of the ATECO list.

Once we have defined the inclusion criteria, we can use the tools provided by the AIDA database to select the companies that meet these criteria. We can use the software to filter the data based on the variables that interest us and create a list of companies that make up our sample.

It is important to remember that creating a sample requires careful attention to defining inclusion criteria and selecting the most appropriate analysis tools. This way, we will be able to obtain accurate and useful results to understand the chocolate industry and make informed decisions based on these results.

The initial data set imported from AIDA contained 431 companies operating in the relevant sector with the ATECO code 2007 10.82.

After a careful analysis of individual companies and excluding those that were not strictly relevant to chocolate production, a cut-off threshold was set to downsize the sample and analyze a more consistent sample with the current Italian market trend.

Before analyzing the values present in the data set, in order to define cut-off thresholds, all economic variables were converted into real terms using deflators.

Deflators are tools used to adjust monetary values from one period to another, in order to account for inflation and currency devaluation. ISTAT, the Italian National Institute of Statistics, provides deflators for various economic variables such as GDP, consumer prices, and the harmonized index of consumer prices (HICP).

After converting the economic variables into real terms using deflators, the final step in preparing the dataset for descriptive analysis is to convert the displayed format from wide to long. This can be achieved using the "reshape" command, which groups the variables by year for each company present in the dataset.

Now the dataset is ready, below the STATA output showing the essential information on the composition of the dataset, after all the operations described above:

```
  obs:           648
 vars:           119
 size:       851,472
Sorted by: numero  year
```

The dataset contains 648 observations, which is calculated based on the number of observed years and the number of companies. At the end , our sample is composed of 72 companies observed for 9 years (2013-2021).

5.2. Geographic Distribution of Companies

Mapping the geographic distribution of companies in a specific industry has become an important tool for understanding regional economic development. In this subchapter, we explore the use of the STATA shapefile function to develop a map of Italy, showcasing the geographic distribution of companies within the chocolate production industry. Chocolate production is a significant industry in Italy, with a long history of artisanal production, as well as larger-scale production in certain regions. By analyzing the spatial distribution of chocolate production companies, we aim to gain insights into the regional dynamics of this sector and identify any spatial patterns or trends. We also examine how the distribution of these companies is related to various economic and demographic factors at the regional level, including the availability of raw materials, labor force characteristics, and transportation infrastructure. Through this analysis, we hope to contribute to the broader understanding of the spatial dynamics of the chocolate production industry in Italy.

Below is shown the map of the distribution of companies in the dataset:

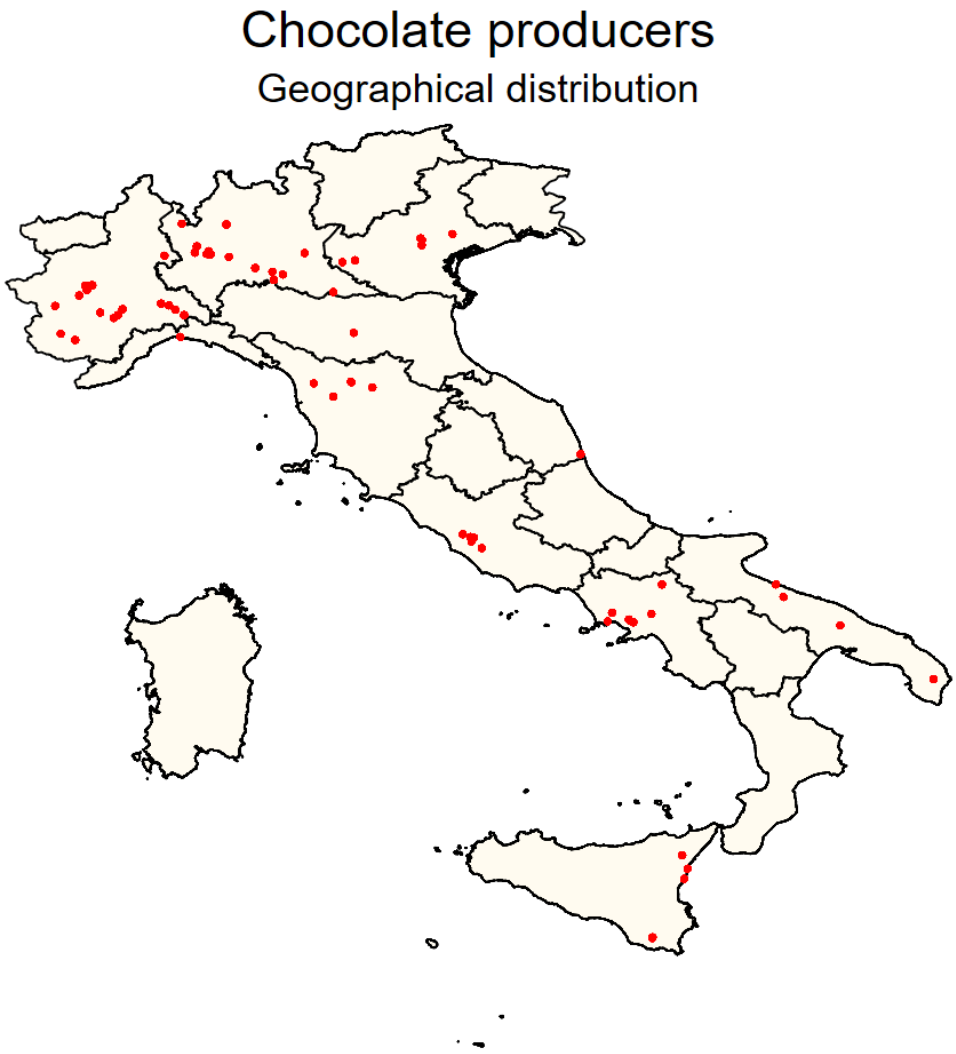


Figure 8- Distribution map of the chocoalte producers operating in Italy. (source: STATA)

The distribution of chocolate-producing companies in Italy is largely concentrated in the northern regions, particularly in the Piedmont, Lombardy, and Veneto. This can be attributed to several historical and territorial factors.

Firstly, these regions have a long history of chocolate production, dating back to the Renaissance period when the first chocolate factories were established in the city of Turin in Piedmont. Over time, the industry expanded to other northern regions, with Milan becoming a hub for large-scale chocolate production and distribution in the late 19th century.

Secondly, the northern regions have historically been more economically

developed than the southern regions, with greater access to capital, technology, and markets. This has created a more favorable environment for the development and growth of the chocolate industry, which requires significant investments in infrastructure, research and development, and marketing.

Furthermore, the northern regions have a more favorable climate for the production of chocolate, as the cooler temperatures and lower humidity levels are conducive to maintaining the quality and texture of chocolate products. Additionally, the availability of raw materials such as cocoa beans, sugar, and dairy products is higher in the northern regions due to the presence of agricultural land and a well-developed transportation infrastructure.

In summary, the concentration of chocolate-producing companies in the northern regions of Italy can be attributed to a combination of historical, economic, and environmental factors. The development of the industry in these regions has been facilitated by favorable conditions for production, access to resources, and a long-standing tradition of artisanal and large-scale chocolate production.

5.1.1 Specialization Index

The specialization index is considered as a tool to analyze the concentration of economic activity highlighting the comparative advantages of a particular geographic area or industry.

Throughout this chapter, we will explore the key concepts underlying the specialization index, how it is calculated, and how it can be used to interpret economic data.

In particular, we will focus on the application of the specialization index in the chocolate production sector in Italy.

For the calculation of this index, only manufacturing industries were considered as the denominator. This careful selection effectively excluded all other economic activities, such as agriculture, retail trade, and other

non-manufacturing sectors, thus allowing for a more targeted analysis of the concentration of manufacturing activities in the chocolate industry.

By employing this refined method, the resulting specialization index provided a more precise evaluation of the level of specialization of the country in this particular manufacturing sector. Furthermore, the exclusive focus on relevant manufacturing activities eliminated any potential confounding effects that could arise from the inclusion of non-pertinent economic activities.

The formula employed to calculate the specialization index, which is illustrated in the subsequent table.

$$Specialization\ Index = \frac{\frac{chocolate\ industry\ producers\ operating\ in\ the\ region}{chocolate\ industry\ producers\ operating\ in\ Italy}}{\frac{manufacturing\ industries\ operating\ in\ the\ region}{industries\ operating\ in\ Italy\ manufacturing}}$$

Registered office address	Freq.	Percent.	Cum.	Total Manufacturing Industries	Perc. Tot. Manufacturing Enterprises.	Specialization Index
Piemonte	19	26,39		16.188	6,35	4,16
Lombardia	16	22,22	48,61	55.717	21,84	1,02
Campania	7	9,72	58,33	22.124	8,67	1,12
Sicilia	6	8,33	66,66	10.395	4,08	2,04
Veneto	6	8,33	74,99	29.200	11,45	0,73
Lazio	5	6,94	81,93	18.524	7,26	0,96
Toscana	5	6,94	88,87	21785	8,54	0,81
Puglia	4	5,56	94,43	13.600	5,33	1,04
Emilia-Romagna	2	2,78	97,21	25.221	9,89	0,28
Liguria	1	1,39	98,6	3665	1,44	0,97
Marche	1	1,39	100,0	10338,0	4,05	0,34
Valle D'Aosta	0	0	100,0	234,0	0,09	0,00
Trentino	0	0	100,0	3017,0	1,18	0,00
Friuli	0	0	100,0	5112,0	2,00	0,00
Umbria	0	0	100,0	3654,0	1,43	0,00
Abruzzo	0	0	100,0	6112,0	2,40	0,00
Molise	0	0	100,0	973,0	0,38	0,00
Basilicata	0	0	100,0	1705,0	0,67	0,00
Calabria	0	0	100,0	3777,0	1,48	0,00
Sardegna	0	0	100,0	3727,0	1,46	0,00
Total	72	100,0		255.068	100,0	1,00

Figure 6- Specialization index of the Italy's regions. (source: STATA)

Subsequently, after calculating the specialization index, it was imported the excel file into STATA and the spmap function was employed to develop

a map on the analysis of the specialization index by region. This map effectively and clearly highlights the data calculated using the formula mentioned before.

Hereafter, we present the output map obtained from STATA

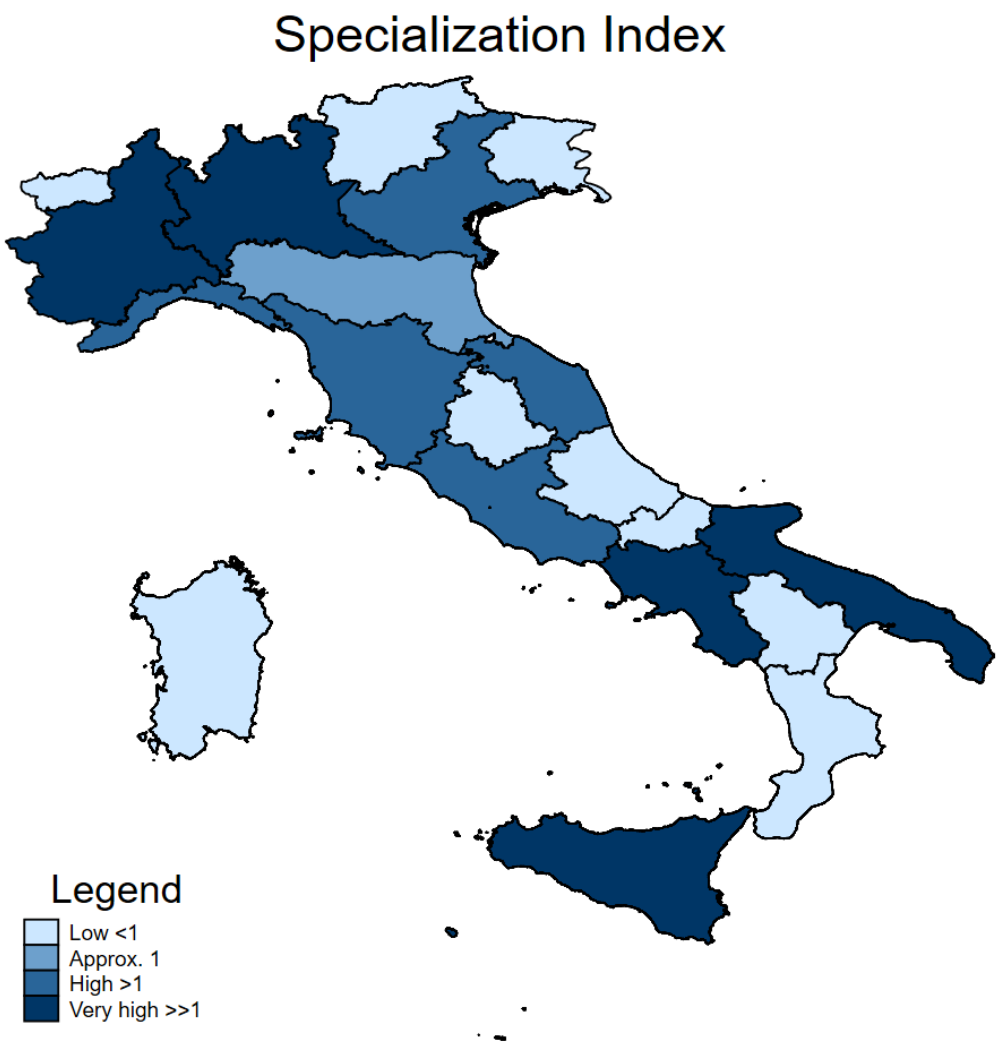


Figure 9 - Specialization index map of Italy. (source: STATA)

The table shows that the Piedmont region has the highest specialization index in chocolate production, with 26.39% of companies specialized in this sector. However, Lombardy has the highest gross production value, with 21.84% of companies in the manufacturing sector. Sicily has the highest specialization index among regions with fewer companies, which could suggest that there are local factors that favor the development of this sector in this region.

Moreover, we can note that many regions have low specialization in the sector, which could indicate that there is room for further growth. From an economic point of view, chocolate production seems to be concentrated in some regions, but this sector could have a positive economic impact even in regions with low specialization.

To summarize, the specialization index indicates that chocolate production in Italy is primarily concentrated in certain regions, but there is potential for growth in other regions as well.

5.2 Graphical analysis

For a comprehensive analysis of the chocolate market trend in Italy from 2013 to 2021, our investigation encompasses an overview of the key financial ratios that are instrumental in measuring the performance of the industry.

In order to perform the analysis, we used the graph twoway STATA function, which allows you to generate graphs in two dimensions, below will be shown graphs generated and used for analysis.

The values considered were deflated using appropriate deflators (source: ISTAT), after creating the real variables then thresholds were set to define a subset on which to analyze the following financial indices, the definition of the subset is possible on STATE via the macro command, which defines a subset, with certain values according to which to filter the data set in question.

Here is the code fragment related to macro generation:

```
. macro def prendi "vendite_real!=0 & lavoro!=0 & capital>0.1 & value_add_real>0 & rapp_Vend_Lav>-60"
```

the values that have been used to define the threshold are:

1. deflated sales other than zero;

2. deflated labor costs other than zero;

3. share capital greater than zero

4. value added greater than zero

5. the ratio of sales to labor deflated which was set up to exclude the values of the analyzed years of all the companies that had values that were too small or anomalies resulting from unclear financial statements and which could affect the analysis by distorting the real market trend.

This is a summary statistics table for deflated value added. The table shows various percentiles ranging from the smallest (1%) to the largest (99%). The smallest value for the variable is 132.137, while the largest is 414,087.6, means that the companies in the sector are not big enterprises do to the minimum and maximum level, even if the maximum value is approx. 414 million of euros, compare to the other sector in not enough big to compete.

The same reasoning has been applied to the other variables, as shown in the following descriptive tables.

Deflated Revenue and Sales

	Percentiles	Smallest		
1%	132.1372	62.60361		
5%	264.1892	102.3224		
10%	342.0041	104.7317	Obs	628
25%	705.9882	107.49	Sum of Wgt.	628
50%	2932.357		Mean	45055.89
		Largest	Std. Dev.	223325.3
75%	19714.62	2607117		
90%	100631.2	2644906	Variance	4.99e+10
95%	133996.3	2683976	Skewness	10.78862
99%	414087.6	2792969	Kurtosis	125.9057

Deflated Value added

	Percentiles	Smallest		
1%	32.88845	5.520525		
5%	61.47811	12.80262		
10%	94.41405	13.68648	Obs	628
25%	197.9053	14.88332	Sum of Wgt.	628
50%	876.6371		Mean	11115.36
		Largest	Std. Dev.	60999.63
75%	4712.951	691918.9		
90%	19879.42	736258.9	Variance	3.72e+09
95%	34830.93	755441.8	Skewness	11.17297
99%	78865.38	779347.9	Kurtosis	133.0729

Deflated Capital

	Percentiles	Smallest		
1%	4.992269	.6168542		
5%	13.126	1.718497		
10%	31.46539	2.096433	Obs	628
25%	145.162	2.445797	Sum of Wgt.	628
50%	1100.36		Mean	9555.67
		Largest	Std. Dev.	51225.2
75%	6359.007	126935.6		
90%	16416.43	681716.8	Variance	2.62e+09
95%	26661.07	730459.8	Skewness	12.78914
99%	94978.27	740764	Kurtosis	176.5052

Deflated Labor

	Percentiles	Smallest		
1%	4.826628	.2012133		
5%	37.85272	.3430291		
10%	63.82347	.6079208	Obs	628
25%	126.3882	2.181551	Sum of Wgt.	628
50%	666.2997		Mean	6111.656
		Largest	Std. Dev.	30900.95
75%	2619.61	323352.5		
90%	10200.21	386460.1	Variance	9.55e+08
95%	19055.1	396370.1	Skewness	11.29701
99%	58229.47	400632.9	Kurtosis	137.5784

Deflated average Revenues

	Percentiles	Smallest		
1%	204.2188	204.2188		
5%	249.8057	204.2188		
10%	382.7633	204.2188	Obs	641
25%	770.2206	204.2188	Sum of Wgt.	641
50%	2646.056		Mean	36229.53
		Largest	Std. Dev.	126517.9
75%	18644.79	1323164		
90%	97538.13	1323164	Variance	1.60e+10
95%	135027.7	1323164	Skewness	8.487677
99%	361102.3	1323164	Kurtosis	84.41029

Value added to labor cost

	Percentiles	Smallest		
1%	.5206659	.1191856		
5%	1.029115	.2022079		
10%	1.13739	.2090798	Obs	628
25%	1.296466	.3743931	Sum of Wgt.	628
50%	1.512006		Mean	2.339995
		Largest	Std. Dev.	8.904854
75%	1.827018	36.61014		
90%	2.280395	73.96783	Variance	79.29642
95%	2.665792	83.11744	Skewness	17.03644
99%	16.21288	189.7344	Kurtosis	331.2426

After setting the macro with the threshold values it was possible to generate graphs through the twoway function, below the code snippet:

egen fatt_annuo_med=median(sales_real) if $prendi, by (year)

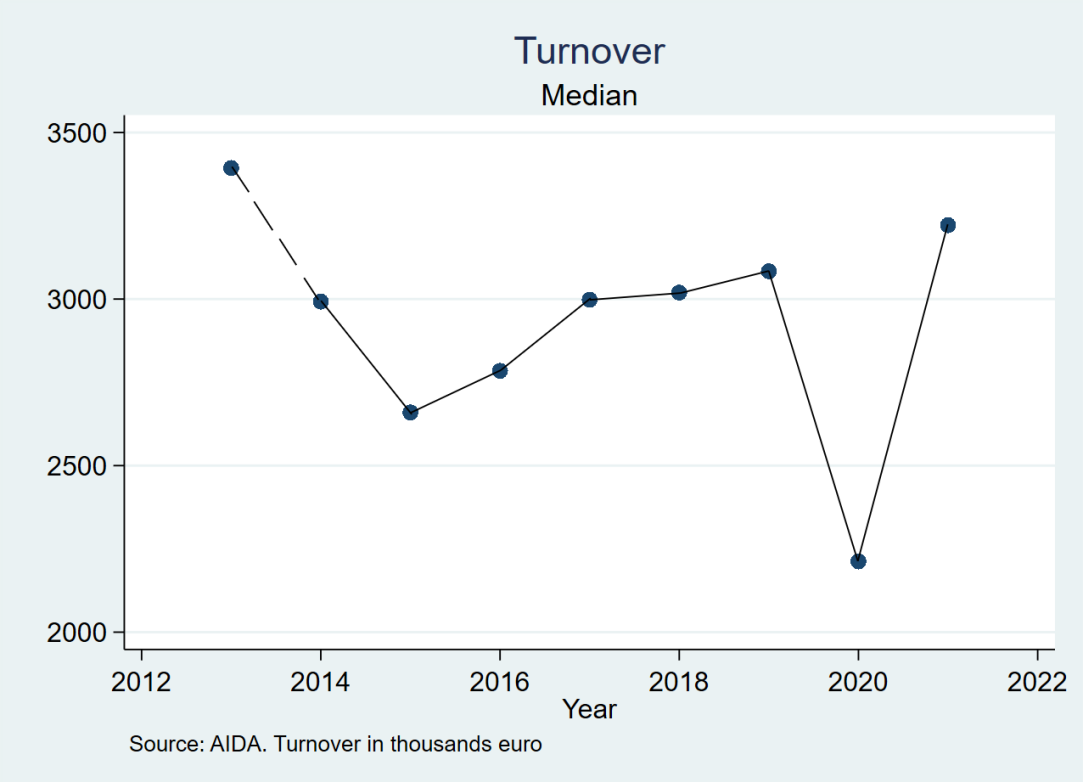
twoway (scatter fatt_annuo_med year), ylabel(, angle(horizontal)) title("Turnover") subtitle("Median") xtitle(Year) ytitle(") note("Source: AIDA. Turnover in thousands euro")

To obtain a more reliable analysis, the median of the values was

considered, to avoid small values that can be distorting the analysis. In this case the deflated annual turnover has been used, in which the use of the macro is recalled first described through the appropriate tag *"$"*, the result ordered by year. In the second line there is the call of the twoway function, in which the type of graph is chosen and then the value of the variable Y and X are inserted, then after setting of the graphic design parameters, it is possible to generate the output.

5.2.1 The turnover

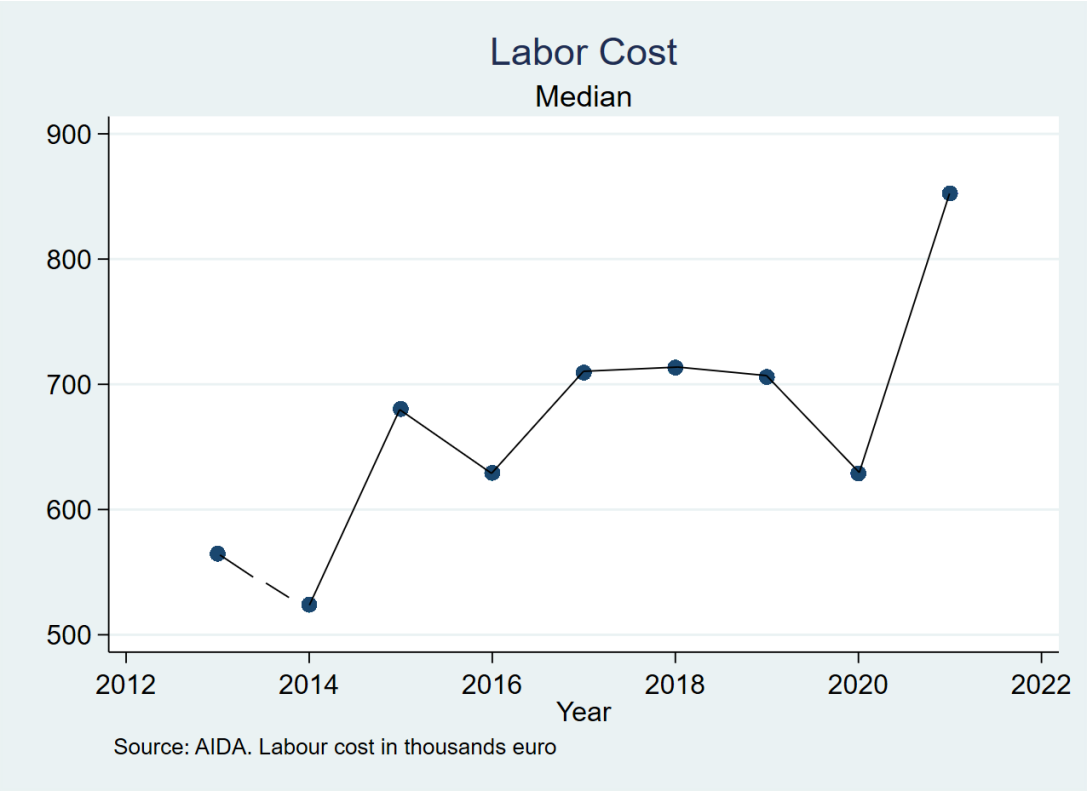
The first graph focuses on the turnover, presented in thousands of euros, which exhibits a non-linear trend. We observe that from 2014 to 2019, the chocolate market experienced a positive growth trend, ultimately reaching its peak in 2019. However, the sector was not immune to the effects of the pandemic, which resulted in a contraction of the turnover from 3000 to 2100 thousand euros in 2020. Despite this setback, the industry rebounded in 2021 and is currently in a phase of sustained growth. Overall, the turnover



provides valuable insights into the financial health of the chocolate market in Italy, and our analysis sheds light on its performance over an extended period.

5.2.2 The labor cost

The second graph in our analysis focuses on the labor cost in the Italian chocolate market, which is presented in thousand euros. We observe a trend similar to that of the turnover, with a contraction in labor costs during the year 2020, followed by a significant rebound in 2021.



The high labor cost in the industry indicates that companies have been expanding their operations after the pandemic's effects. The improvement in revenue has allowed them to invest in hiring more employees and potentially increasing salaries. However, it is worth noting that the high labor costs may also place pressure on the companies' profit margins, as labor expenses are a significant component of their total costs.

Furthermore, the market's trend towards growth indicates that the demand for chocolate products in Italy is increasing. This trend may be

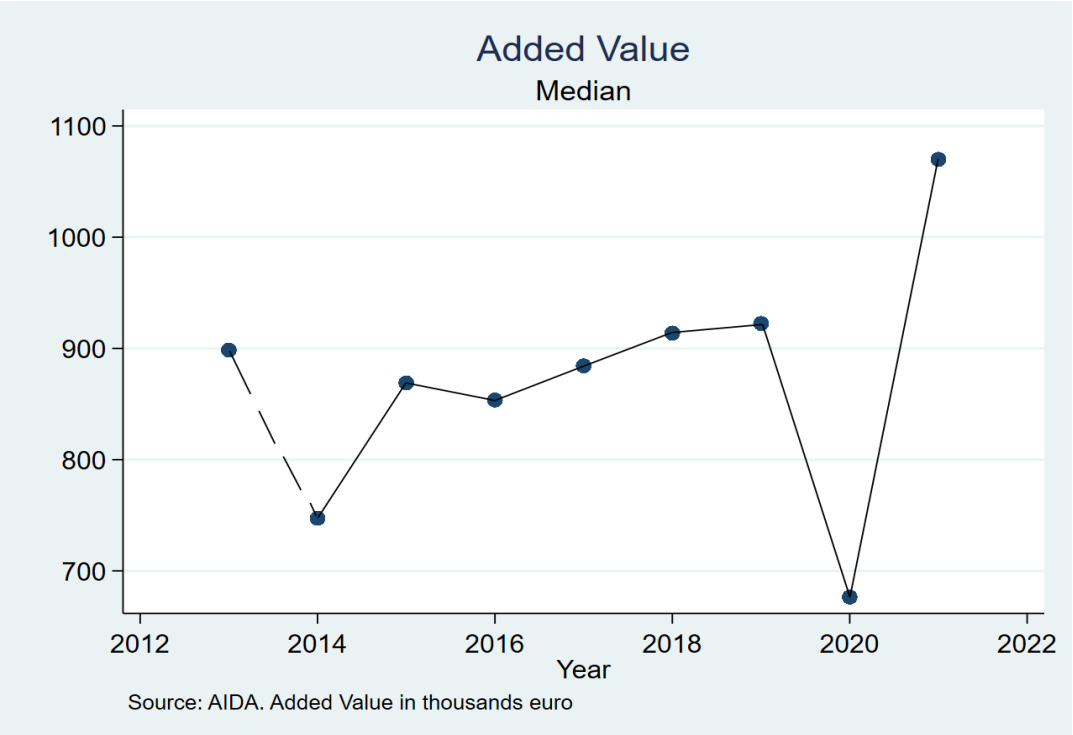
attributed to several factors, such as changing consumer preferences and the industry's innovation in creating new products.

In conclusion, the high labor cost in the Italian chocolate market, coupled with the market's growth trend, suggests that the industry is currently in a phase of expansion. However, companies may face challenges in maintaining profitability due to the high labor expenses.

5.2.3 The value added

The third graph in our analysis focuses on the value added in the Italian chocolate market, which is presented in thousands of euros. We observe a trend similar to that of the turnover, with a contraction during the year 2020, followed by a significant rebound in 2021.

A high value added typically indicates that the company has added significant value to the raw materials used in the production process. This can be achieved through various means such as the use of high-quality ingredients, innovative production techniques, and effective marketing strategies. Additionally, a high value added can also suggest that the company has a strong brand image and customer loyalty, which can translate into higher profit margins. Furthermore, the market's trend



towards

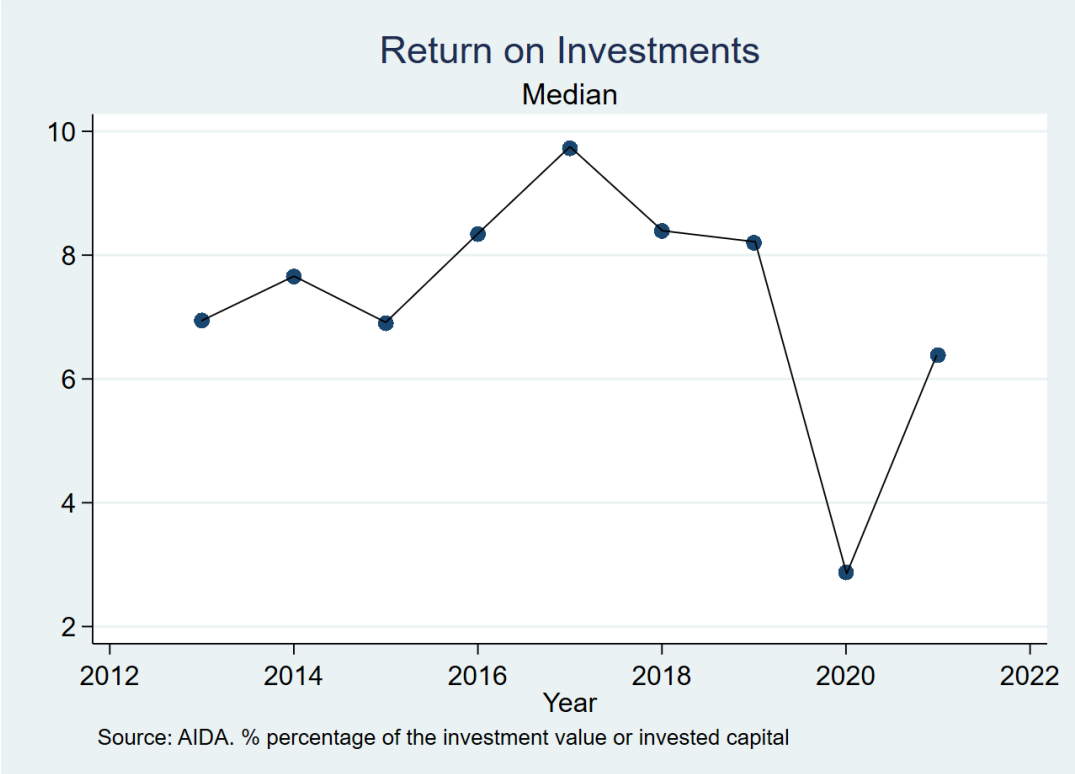
growth indicates that the demand for chocolate products in Italy is increasing. This trend may be attributed to several factors, such as changing consumer preferences and the industry's innovation in creating new products.

In conclusion, the value added in the Italian chocolate market, coupled with the market's growth trend, suggests that the industry is currently in a phase of expansion. However, companies may face challenges in maintaining profitability due to the high labor expenses.

5.2.4 ROI

The fourth graph in our analysis focuses on the Return on Investment (ROI) in the Italian chocolate market, presented as a percentage. ROI is a measure of the profitability of an investment, which represents the ratio of the net profit generated by an investment to the investment's cost.

We observe that the ROI in the Italian chocolate market has been fluctuating between 2013 and 2021, with a slight increase in 2019, followed



by a decline in 2020 due to the pandemic's impact. However, in 2021, the ROI rebounded and reached a new high.

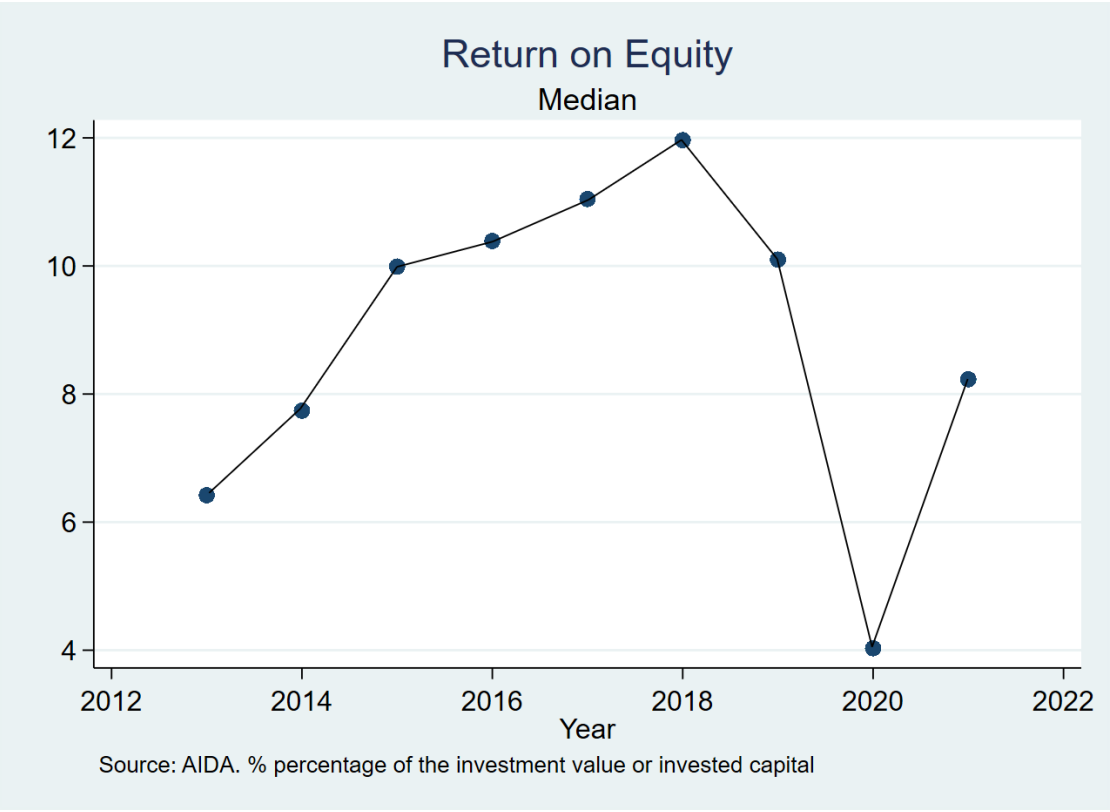
The fluctuation of the ROI suggests that the profitability of the industry has been influenced by various factors over time, such as changes in input costs, market competition, and consumer demand. The slight increase in 2019 may indicate that the industry was able to generate more profit from its investments, potentially due to improved efficiency and cost management. The decline in 2020 due to the pandemic's impact on the industry's revenue and cost structure.

The rebound of the ROI in 2021 is a positive sign for the industry's profitability and may indicate that the industry has been able to recover from the pandemic's effects. However, it is important to note that the ROI may be influenced by external factors such as changes in tax policies, market competition, and economic conditions.

Overall, the fluctuation of the ROI in the Italian chocolate market suggests that the industry's profitability has been influenced by various factors over time. While the rebound in 2021 is a positive sign for the sector.

5.2.5 ROE

The fifth graph in our analysis focuses on the Return on Equity (ROE) in the Italian chocolate market, presented as a percentage. ROE is a measure of the



profitability of an investment in relation to the shareholder equity invested in the company.

We observe that the ROE in the Italian chocolate market has been fluctuating between 2013 and 2021, with a high increase in 2018, followed by a decline in 2020 due to the pandemic's impact. However, in 2021, the ROE rebounded and reached a new high.

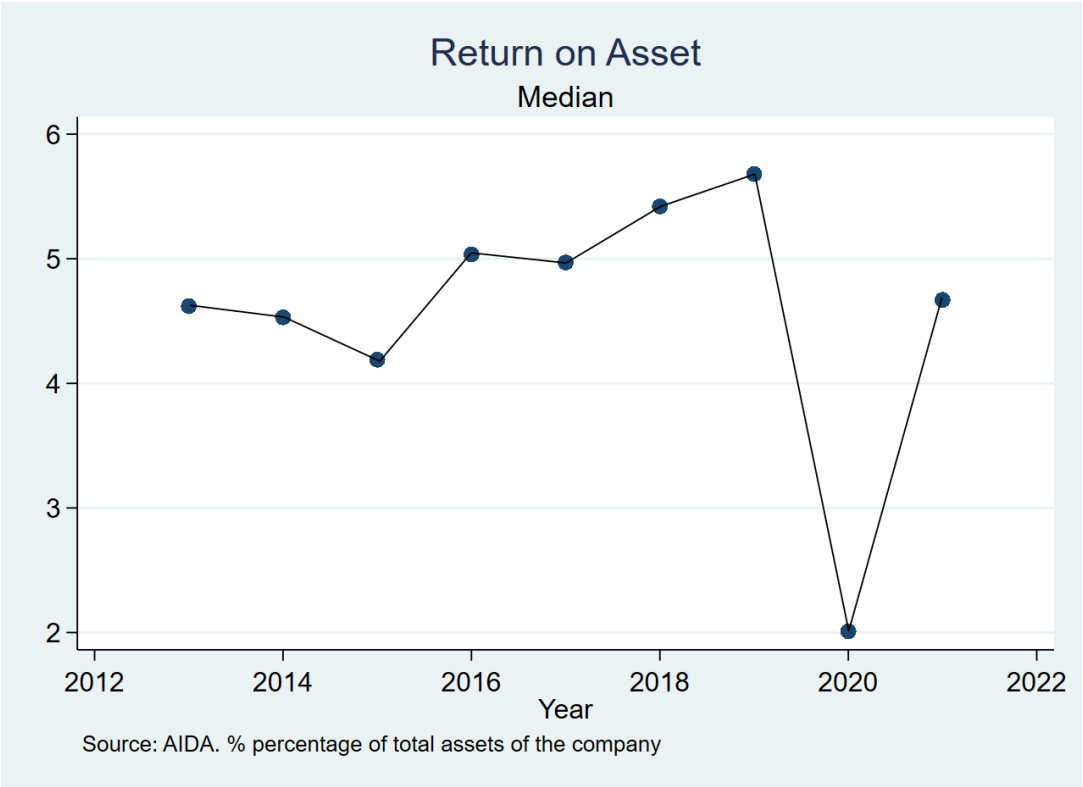
The fluctuation of the ROE suggests that the industry's profitability in relation to shareholder equity has been influenced by various factors over time, such as changes in input costs, market competition, and consumer demand. The slight increase in 2019 may indicate that the industry was able to generate more profit from shareholder equity, potentially due to improved efficiency and cost management. The decline in 2020 due to the pandemic's impact on the industry's revenue and cost structure.

The rebound of the ROE in 2021 is a positive sign for the industry's profitability in relation to shareholder equity and may indicate that the

industry has been able to recover from the pandemic's effects. However, it is important to note that the ROE may be influenced by external factors such as changes in tax policies, market competition, and economic conditions.

Overall, the fluctuation of the ROE in the Italian chocolate market suggests that the industry's profitability in relation to shareholder equity has been influenced by various factors over time. While the rebound in 2021 is a positive sign, the industry may face challenges in maintaining its profitability in relation to shareholder equity due to external factors beyond its control.

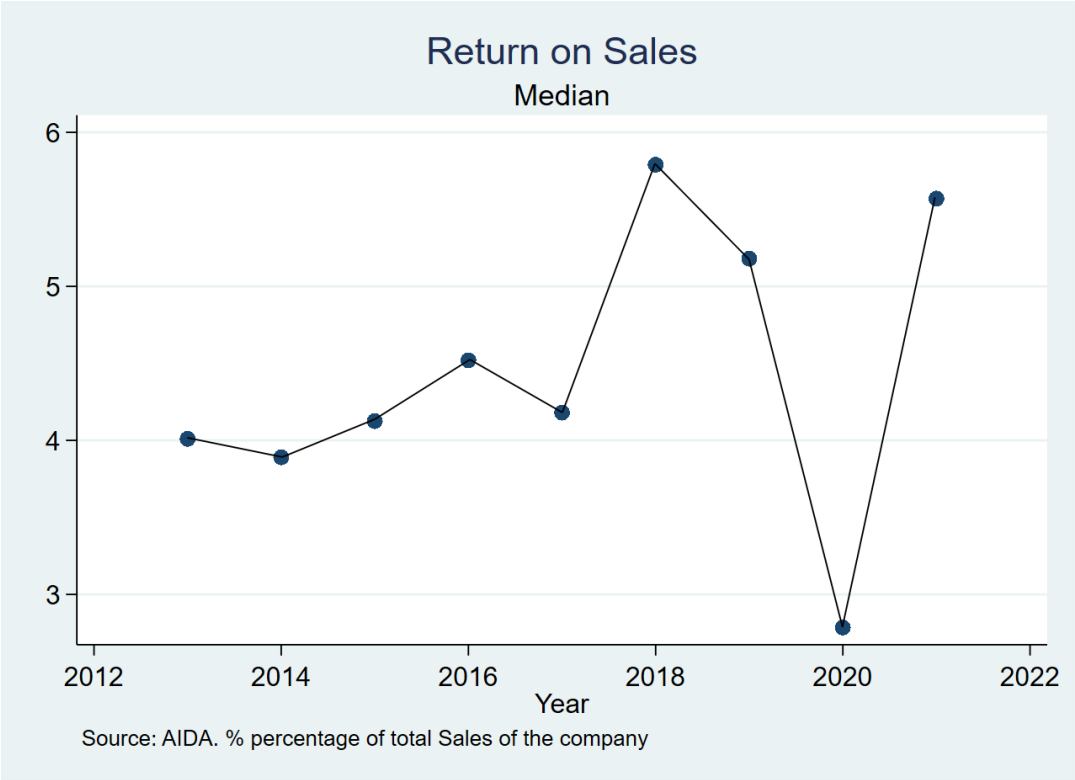
5.2.6 ROA



The graph shows the Return on Assets (ROA) in the chocolate production sector in Italy from 2013 to 2021. The trend of the ROA was steadily increasing from 2013 to 2019, with a peak of 5.9%. However, the ROA experienced a significant contraction in 2020 due to the pandemic, dropping to 2%. After that, there was a rapid recovery, and the ROA almost covered the gap taken in 2020, reaching a peak of 4.8% in 2021. This

suggests that the chocolate production sector in Italy has been facing challenges due to the pandemic but has been able to recover quickly, indicating its resilience and adaptability.

5.2.7 ROS



The graph shows the Return on Sales (ROS) in the chocolate production sector in Italy from 2013 to 2021. The ROS grew steadily until 2017 when it suddenly dropped to 6% due to a significant improve in sales, then experienced significant fluctuations, with a decline of 1% in 2019, followed by a decline to 2.8% in 2020. However, the sector was able to recover quickly, and the ROS rebounded to 5.8% in 2021, registering a peak.

5.3 Regression analysis

Linear regression is a widely used statistical technique that examines the relationship between a dependent variable and one or more independent variables.

In this chapter, we will analyze the chocolate production sector in Italy using linear regression. Our analysis will focus on the relationship between deflated value added, deflated capital, deflated labor cost, and the number of employees. We will use the STATA 15 software and the "reg" command to obtain the linear regression, and the "xtreg" command to run a panel regression with fixed effects.

The aim of this chapter is to provide an accurate analysis of the results of the obtained linear regression, identifying significant relationships between the variables analyzed and evaluating the fixed effects of the regression. In particular, we will examine the estimated coefficients of the regression and explain their significance in relation to the variables analyzed. Additionally, we will analyze the fixed effects of the regression and how these may influence the results.

Overall, this chapter will provide an in-depth understanding of the chocolate production sector in Italy through the analysis of linear regression, offering valuable insights for better understanding the dynamics of the chocolate market and identifying critical factors for its growth and future development.

- Linear regression with the dependent variable ly (value added) and the two independent variables ll (labor) lc (capital)

```
Linear regression                               Number of obs     =        628
                                                F(2, 625)         =    4620.45
                                                Prob > F          =     0.0000
                                                R-squared         =     0.9481
                                                Root MSE          =     .46886

------------------------------------------------------------------------------
             |               Robust
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lc |   .1489645   .0354597     4.20   0.000       .07933     .218599
          ll |   .8021482   .0523057    15.34   0.000     .6994319    .9048644
       _cons |   .7547398   .1285942     5.87   0.000     .5022107    1.007269
------------------------------------------------------------------------------
```

```
. test lc+ll=1

 ( 1)  lc + ll = 1

       F(  1,   625) =    6.63
            Prob > F =    0.0103
```

The linear regression model shows that both variables, capital (lc) and labor cost (ll), have a statistically significant effect on the value added (ly) with p-values of 0.000 for both variables. This means that as capital and labor cost increase, the value added also increases. Specifically, for a one percentage increase in capital and labor cost, the value-added increases by 0.15% and 0.80%, respectively. The R-squared value of 0.9481 indicates that the model explains 94.81% of the variance in the value added, which is a high proportion of the total variation. The root mean squared error (RMSE) of 0.46886 indicates that the model's predictions have an average error of approximately 0.47.

The t-test *"lc+ll=1"* tests the hypothesis that lc and ll coefficients add up to 1. The F-statistic of 6.63 and a p-value of 0.0103 suggest that the null hypothesis (lc + ll = 1) is rejected at the 5% significance level, indicating that lc and ll together do not add up to 1.

Overall, the results suggest that both capital and labor cost have a significant positive impact on the value added.

- Linear regression with the dependent variable ly (value added), and the two independent variables lc (capital) llav (number of workers)

```
Linear regression                               Number of obs     =        628
                                                F(2, 625)         =    4241.64
                                                Prob > F          =     0.0000
                                                R-squared         =     0.9239
                                                Root MSE          =     .56745

------------------------------------------------------------------------------
             |               Robust
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lc |   .1860781    .020485     9.08   0.000     .1458504    .2263058
        llav |    1.00587   .0304141    33.07   0.000     .9461441    1.065597
       _cons |   2.501344   .0776192    32.23   0.000     2.348918     2.65377
------------------------------------------------------------------------------
```

```
. test lc+ll=1

 ( 1)  lc + llav = 1

       F(  1,   625) =  159.16
            Prob > F =    0.0000
```

The regression model is statistically significant with an F-statistic of 4241.64 and a p-value of 0.0000. The R-squared value of 0.9239 suggests that the model explains a high proportion of the variance in the dependent variable.

The coefficients for lc and llav suggest that lc has a positive effect on ly with a coefficient of 0.1861 and a p-value of 0.000, while llav has a larger positive effect on ly with a coefficient of 1.006 and a p-value of 0.000. The intercept (represented by _cons) has a coefficient of 2.501344 and a p-value of 0.000.

The t-test *"lc+llav=1"* tests the hypothesis that coefficients lc and llav add up to 1. The F-statistic of 159.16 and a p-value of 0.0000 suggest that the null hypothesis (lc + llav = 1) is rejected at the 0.05 significance level, indicating that lc and llav together do not add up to 1.

- Fixed-effect panel data regression dependent variable is ly, and the independent variables are lc and ll

```
Fixed-effects (within) regression               Number of obs      =       628
Group variable: numero                          Number of groups   =        72

R-sq:                                           Obs per group:
     within  = 0.5271                                         min =         5
     between = 0.9594                                         avg =       8.7
     overall = 0.9445                                         max =         9

                                                F(2,71)            =     30.10
corr(u_i, Xb)  = 0.7766                         Prob > F           =     0.0000

                                  (Std. Err. adjusted for 72 clusters in numero)
------------------------------------------------------------------------------
             |               Robust
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lc |   .0342355    .049118     0.70   0.488     -.063703     .132174
          ll |   .6751599   .0972568     6.94   0.000     .4812353    .8690844
       _cons |   2.364433   .6019634     3.93   0.000     1.164152    3.564714
-------------+----------------------------------------------------------------
     sigma_u |   .6839974
     sigma_e |  .26874408
         rho |  .86627178   (fraction of variance due to u_i)
------------------------------------------------------------------------------

. test lc+ll=1

 ( 1)  lc + ll = 1

       F(  1,    71) =   10.06
            Prob > F =    0.0022
```

The model has an overall R-squared of 0.9445, which suggests that the independent variables explain a large proportion of the variation in the dependent variable. The within R-squared is 0.5271, indicating that the independent variables explain about 52.7% of the within-group variation in the dependent variable, after controlling for the individual fixed effects. The between R-squared is 0.9594, meaning that the independent variables explain about 95.94% of the between-group variation in the dependent variable.

The coefficients for the dependent variables are as follows: "lc" has a coefficient of 0.0342 with a standard error of 0.049 and a t-value of 0.70. This coefficient is not statistically significant at the 5% level since the p-value is 0.488. "ll" has a coefficient of 0.675 with a standard error of 0.09726 and a t-value of 6.94. This coefficient is statistically significant at the 5% level since the p-value is less than 0.05. This indicates that for every

percentage unit increase in "ll", "ly" increases by about 0.68%, holding "lc" and individual fixed effects constant.

The constant term "cons" has a coefficient of 2.3644, meaning that when "lc" and "ll" are both zero, "ly" is expected to be 2.36.

The t-test "*lc+ll=1*" tests whether the sum of the coefficients of "lc" and "ll" equals 1. The null hypothesis is that the sum is equal to 1, while the alternative hypothesis is that the sum is not equal to 1. The F-statistic for this test is 10.06, and the p-value is 0.0022. Since the p-value is less than 0.05, we can reject the null hypothesis and conclude that the sum of the coefficients of "lc" and "ll" is not equal to 1.

- . Fixed-effect panel data regression dependent variable is ly, and the independent variables are lc and llav.

```
Fixed-effects (within) regression               Number of obs      =       628
Group variable: numero                          Number of groups   =        72

R-sq:                                           Obs per group:
     within  = 0.2093                                         min =         5
     between = 0.9578                                         avg =       8.7
     overall = 0.9194                                         max =         9

                                                F(2,71)            =      9.32
corr(u_i, Xb)  = 0.9215                         Prob > F           =    0.0003

                                    (Std. Err. adjusted for 72 clusters in numero)
------------------------------------------------------------------------------
             |               Robust
          ly |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          lc |   .1259174   .0490768     2.57   0.012      .028061    .2237738
        llav |   .3494168   .1138052     3.07   0.003     .1224956     .576338
       _cons |   5.035185   .4599235    10.95   0.000     4.118123    5.952246
-------------+----------------------------------------------------------------
     sigma_u |  1.2924859
     sigma_e |  .34748533
         rho |  .93259178   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
. test lc+ll=1

 ( 1)  lc + llav = 1

       F(  1,    71) =   20.00
            Prob > F =    0.0000
```

This output shows the results of a fixed-effects panel data regression. The regression is estimated using the within-group estimator, which means

that all time-invariant factors are eliminated by taking the deviations of the variables from their group means. This helps to control for unobserved time-invariant heterogeneity across the groups.

The R-squared values indicate that about 20.93% of the variation in the dependent variable is explained by the independent variables within the groups, while about 95.78% of the variation is explained between the groups. The overall R-squared is 91.94%.

The coefficients for lc and llav are 0.1259 and 0.3494, respectively. Both coefficients are statistically significant at the 5% level, as their p-values are less than 0.05. This suggests that lc and llav have a positive effect on ly.

The constant term is 5.035185, which represents the average value of ly when lc and llav are both zero. This coefficient is also statistically significant at the 5% level.

The test lc+ll=1 checks whether the sum of lc and llav equals one. The F-statistic for this test is 20.00, with a p-value of 0.0000. This suggests that lc and llav are not perfectly collinear, and they jointly have a significant effect on ly.

The sigma_u and sigma_e values indicate the standard deviations of the error terms for the individual-specific and time-specific effects, respectively. The rho value is the correlation coefficient between these two error terms, and it shows the proportion of the total variation in ly that is due to the individual-specific effects. In this case, about 93.26% of the total variation in ly is due to the individual-specific effects.

6. Conclusion

Based on the analysis of the entire supply chain of the chocolate production sector in Italy, it can be concluded that the sector has a complex and interconnected system, with many different actors involved in the production, processing, and distribution of cocoa beans and chocolate products.

One key finding is that the sustainability of the cocoa supply chain is a critical issue for the sector, given the potential negative impacts of climate change and the risk of exploitation of cocoa farmers in developing countries. It is therefore important for companies in the sector to prioritize sustainable sourcing practices and work towards ensuring fair and equitable treatment of cocoa farmers.

Another important consideration is the need to invest in digital technologies and supply chain traceability systems to increase transparency and efficiency in the sector. This can help to improve the quality and safety of chocolate products, as well as enhance consumer trust and confidence.

In conclusion, the analysis of the entire supply chain of the chocolate production sector in Italy highlights the importance of sustainability, innovation, and collaboration among all actors involved in the sector. By working together to address common challenges and opportunities, the sector can continue to grow and thrive in the years to come.

Moreover, focusing on the analyses carried out, it can be stated that the chocolate production sector in Italy has demonstrated a remarkable resilience and adaptability to external events, as evidenced by the recovery from the strong contraction in 2020 in the following year. This resilience can be attributed to the sector's ability to innovate and diversify its offer, as well as to its ability to maintain a strong presence in national and international markets.

However, it is important to consider that the sector could be influenced by unpredictable external factors, such as climate change and geopolitical events, which could lead to slowdowns in production and distribution of

the product. It is therefore necessary for companies in the sector to develop effective risk management strategies to mitigate such potential negative impacts.

In any case, the forecasts for the chocolate production sector in Italy are positive, thanks to its innovation capacity and the increasing demand from consumers for high-quality products. In order to best exploit the growth opportunities of the sector, companies should continue to invest in innovation and develop strategies to diversify their offer, with particular attention to environmental and social sustainability, to meet the needs of consumers who are increasingly attentive to the quality and social responsibility of companies.

From the conducted analysis, it can be concluded that the sector of the production of chocolate has a high-income elasticity and a low-price elasticity. This means that consumer demand is highly influenced by disposable income and less by product prices. This provides an opportunity for small businesses in the sector to increase their value, as prices are not a decisive factor in consumer choice.

However, the analysis has also revealed decreasing returns to scale, which means that investing in expanding production facilities or increasing production may not necessarily lead to an increase in revenue. This may be due to the fact that the sector's market is already saturated or that existing businesses are already able to meet consumer demand.

In general, it can be concluded that the sector offers opportunities for small businesses, but expansion in terms of production volume or production centers may not be the most effective strategy for increasing revenue. Businesses should consider other growth strategies, such as product innovation or diversification of activities.

6.2 Focus on the *cioccolato modicano*

In conclusion, the analyses conducted on the specialization index and financial variables demonstrate that Modican chocolate is a luxury product that has reached a broad range of consumers from all social classes. This is possible thanks to its sensory properties and high quality,

making it a versatile and prestigious product suitable for both tasting and culinary preparation. Moreover, its historical fame and compositional characteristics make it an easily recognizable and appreciated product on the market, without the need for strong marketing campaigns. In fact, the growing demand for artisanal chocolate products such as Modican chocolate, both in retail and restaurant sectors, shows the increasing consumer appreciation for quality and craftsmanship. In summary, Modican chocolate represents an excellence of Made in Italy, capable of competing with chocolate producers worldwide and a symbol of the gastronomic and cultural heritage of Sicily and Italy as a whole.

7. Sitography

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