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Hedging and Speculative strategies with interest rate swaps: The Morgan Stanley and the Republic of Italy case study

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Table of Contents

Introduction

Financial markets are evolving, investors increasingly demand always different products to satisfy their continuously varying risk preferences and as a consequence, new solutions are needed. In such a context, derivatives are steadily gaining momentum because of their different nature and flexibility with respect to mainstream assets, and even though, similar instruments already existed in the XVIII century BC, during the last 30 years, not only derivatives' popularity exploded but also their use became widespread. With reference to the current global scenario, in fact, records report a striking value of $700 trillion of outstanding relative to OTC transactions while the overall gross market value is approximately $20 trillion. The rise in popularity of financial derivatives resides in the possibility they provide with of modifying the nature of already owned assets or liabilities as well as remodeling investors' consumption and spending preferences. Indeed, the whole work is intended to introduce such relatively new financial instruments, with a special focus on interest rate swaps and swaptions, to describe their historical evolution. Once the necessary preliminary knowledge is offered, then, the leading intention is to carry the reader along a path detailing corporations and Public Administrations' hedging or speculative strategies, investigating scientific evidence to grasp relevant inferences. In the end a practical case is tackled, in order to effectively validate previously discussed theories and apply the competencies acquired through the dissertation.

The whole work is developed through a gradually increasing degree of both accuracy and specificity, in an attempt to simplify the overall subjects' development process to consequently allow readers to grasp and realize all the implied details without sacrificing scientific relevance.

As it will be realized through the overall thesis, derivatives are extremely powerful instruments with the capability of both enlarging investors' possibilities and producing financial disasters. Accordingly, in the last chapter the most important inferences are draft as well as recommendations for future developments are offered.

Chapter 1:
Financial Derivatives: Brief History and definition

1.1 What is a Financial Derivative?

One of the most acknowledged dictionaries in US (the Merriam-Webster[1]) provides, as a first definition of a derivative, the following one : *"A substance that can be made from another substance"*. Clearly, the description refers to the field of chemistry; anyhow, its underlying rationale is not that different from the one pertaining to derivative products in finance. Indeed, in 1988, when "Options, Futures and Other Derivatives[2]" was, for the first time, published , its author , John Hull[3], specifically described a derivative as a *" financial instrument whose value depends on the value of another underlying asset "*.(Hull, Options, Futures & Other Derivatives, 2009, pp. 1)

Even though Hull is probably one of, if not the greatest authority in derivatives literature, at that time there was not 100% consensus over the definition he provided, and this was mainly due to the reference to the *"underlying asset"*. In fact, it is true that most of traded derivatives carry as an underlying, a financial instrument which usually is a measurable asset, but over time, always newer and different types of derivatives started to be traded on a wider spectrum of underlyings. For instance, derivatives exist not only with payoffs connected to different commodities or indicators but also to many variables such as the temperature at Kennedy Airport, the number of bankruptcies among a specific group of firms or to energy sources such as natural gas or electricity[4] (Hull, 2009).

[1] The dictionary by Merriam-Webster is America's most trusted online dictionary for English word definitions, meanings, and pronunciation

[2]Options, Futures and Other Derivatives ; John Hull; Pearson/Prentice Hall, 2009

[3] John C. Hull (born March 5, 1946) is a Professor of Derivatives and Risk Management at the Rotman School of Management at the University of Toronto.

[4] A derivative instrument in which the underlying asset is based on energy products including oil, natural gas and electricity, which trades either on an exchange or over-the-counter. Energy derivatives can be options, futures or swap agreements, among others.

As it might be easily realized, the ones just above mentioned can't be defined proper financial assets, just because of their different nature, but since derivative products related to the fluctuations of their values do exist, a different definition needs to be provided. This is why, a derivative requires rather to be defined as a financial instrument whose value depends on the value of any underlying which satisfies a fundamental criterion: its value must be observable and measurable, at least, over the entire life of the derivative contract.

As almost anything in life, depending on its usage, derivatives can produce both extremely beneficial or extremely destructive outcomes but, despite being associated to recent catastrophic events, when properly managed, they have proven to be remarkably valuable to newest economies. Still, they are a bit controversial. Warren Buffet [5], probably the greatest value investor[6] of all times, asserted that derivatives are *"financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal"*(Warren Buffet, Berkshire Hathaway[7] Annual Report, 2002).

However, derivatives can essentially be used for two main purposes: to reduce or completely eliminate (when it is possible) a specific risk source, which is called *"hedging"* or alternately, to augment the risk associated to a given position with the intention of improving the associated profit at the expense, though, of improved volatility. Before proceeding too far into details, it is reasonable to provide an overview of the derivatives market, trying to describe its recent evolution process, its boundaries and absolute relevance in the modern financial setting.

Nearly 25 years ago, indeed, derivatives markets didn't exist at all, or if they existed, they were very poorly developed.

[5] Warren Edward Buffett (born August 30, 1930)[2] is an American business magnate, investor, philanthropist and the Chief Executive Officer, President, and Chairman of Berkshire Hathaway

[6] Value investing is an investment strategy where stocks are selected that trade for less than their intrinsic values. Value investors actively seek stocks they believe the market has undervalued

[7] Berkshire Hathaway Inc. is an American multinational conglomerate holding company headquartered in Omaha, Nebraska, United States.

Nowadays, according to statistics provided by Global Finance[8], OTC[9] derivatives' transactions amount up to approximately $700 trillion of outstanding[10] with an overall gross market value[11] of more than $20 trillion. Note that this is a remarkable feature if compared to the worldwide equity market which accounted for approximately $65 trillion in 2016 (Business Insider[12], 2016), the global bond market reaching $90 trillion (Bank for International Settlements[13], 2017) in face value[14] and the world Gross Production reaching $77,4 trillion, in the same year (Statista[15],2017) . Furthermore, a striking $64 trillion in outstanding notional is reported for exchange-traded derivatives markets (Bank for International Settlements, Semi-annual statistics, 2017). It is important to underline that, even though it took different paths and developed according to different rationales, the recent and explosive growth of derivatives markets, engaged both industrialized and emerging economies with almost the same intensity, which reflects a solid and always steadily improving awareness of derivatives products and of both their associated benefits and potential.

The leading role in such a sudden growth in derivatives OTC transactions, has been played by interest rate derivatives (they will be specifically addressed in the next paragraphs), which have been, by far, representing the prevailing class of derivatives being traded, for more than 70% of the notional currently outstanding over the last 20 years. The second position, instead, is covered by currency derivatives amounting to $77 trillion at the end of 2016 (Bank for International Settlements, semi-annual release, 2017). In addition, it is worth mentioning the recent and rapid growth of a class of derivatives

[8] Global Finance is a monthly financial magazine. The magazine's primary target audience consists of Chairmen, Presidents, CEOs, CFOs, Treasurers and other financial officers. It is distributed in 158 countries, with 50,050 global subscribers and recipients, certified by BPA Worldwide.
[9] Over-the-counter (OTC) is a security traded in some context other than on a formal exchange such as the New York Stock Exchange (NYSE)
[10] Notional Outstanding Amount is defined as the monetary value of open interest (the notional value of all contracts outstanding at a given time).
[11] Absolute value given by the sum of the mark-to-market values of all outstanding contracts (the cash flows to pay or receive in case of an early termination of the derivative contracts)
[12] Business Insider is an American news website and in addition to providing and analyzing business news, the site aggregates top news stories on various subjects from around the web. It reported a profit for the first time ever in the 4th quarter of 2010. In June 2012, it had 5.4 million unique visitors. It now averages around 70 million unique visitors, monthly.
[13] An international organization fostering the cooperation of central banks and international monetary policy makers. Established in 1930, it is the oldest international financial organization, and was created to administer the transaction of monies according to the Treaty of Versailles. Among others, its main goals are to promote information sharing and to be a key center for economic research.
[14] Face value is the nominal value of a security stated by the issuer.
[15] Statista is a web portal for statistics, which displays data collected from different institutions dealing with market researches. The company claims that on the platform more than 80.000 topics coming from more than 18.000 sources are available.

which 20 years ago wasn't even existing: credit risk derivatives. Such type of derivatives, aims at manipulating and trading credit risk, which is the risk of default on a debt that may be arising from a single or more than one entity failing to perform due payments. Over time, therefore, always newer and more complicated scenarios incentivized investors to trade new instruments, especially after the financial crisis harshly hit the global economy in 2007. Nowadays, the credit derivatives market approaches nearly $30 trillion of outstanding notional which makes it the third largest class of derivatives being traded in OTC markets (Bank for International Settlements, 2016). Lastly, in order of importance even though they're probably the most renowned, derivatives on equities, only represent an outstanding notional of approximately $6 trillion (Bank for International Settlements, 2016).

The different patterns according to which derivatives markets developed in emerging and advanced economies are very interesting. In particular, in emerging countries such as Brazil, China, Singapore or South Africa, growth of derivatives markets has been relatively faster than in advanced countries such as the ones in western Europe, the US or Canada. This feature, probably reflects a superior marginal productivity and efficiency of derivatives products in emerging economies compared to advanced ones. In fact, being emerging economies less structured; more and bigger opportunities may arise by derivatives trading (higher marginal utility). In developed countries, instead, where complex and well delineated financial markets reduce profit possibilities to the smallest margin, the introduction of derivative products, represented of course a novelty to be exploited and benefit from, but to lower extents (law of diminishing marginal returns[16]). Furthermore, OTC markets seems to be relatively more important in emerging economies rather than in advanced ones. In fact, in industrialized countries, 62% of derivatives trading occurs in exchanges, the remaining being traded OTC. The statistic for emerging, instead, economies is a more equal 50%-50%(Surnam, 2012).

[16] Diminishing returns, also called law of diminishing returns or principle of diminishing marginal productivity , economic law stating that if one input in the production of a commodity is increased while all other inputs are held fixed, a point will eventually be reached at which additions of the input yield progressively smaller, or diminishing, increases in output

1.2 A brief history of derivatives: from Antiquity to Nowadays

Once provided with a brief introduction, a first definition of derivatives products and an overview of the global derivatives markets, it might make sense to analyze derivatives through history, to understand their intended use and evolution over time in an attempt to prepare the ground for all the technicalities that will be discerned in the following chapters.

Indeed, the very first objective of derivatives trading was to secure the supply of fundamental commodities or in certain cases to provide farmers with a sort of insurance in case of a crop failure. Nevertheless, as soon as investors became familiar with derivatives products, they started to exploit them for different purposes such as to rapidly raise funds or alternatively to capture potentially high profits. It is important to mention that over time, the political and jurisdictional focus on derivatives, changed depending on the geographic area and on the particular authority (and its beliefs) ruling at that particular time. Accordingly, the speed at which derivatives markets improved mostly depended on that. Anyhow, the very first derivatives transactions were purely OTC; the role of an intermediary such as an exchange, came later, but once recognized its relevance, though, up to the 1990s, trading mostly occurred there. Afterwards, the trend reversed again.

1.2.1 Derivatives trading in 1800BC: their development up to the end of the Middle Ages

"*if anyone owe a debt for a loan, and a storm prostrates the grain, or the harvest fail, or the grain does not grow for lack of water, in that year he need not give his creditor any grain, he washes his debt-tablet in water and pays no rent for the year."* (Hammurabi, The Code of Hammurabi, 1754 BC).

The one quoted above simply is the 48th (out of 280) law belonging to one of the most famous code of history: the code of Hammurabi, the king of Babylon, who ruled over his reign approximately from 1792 to 1750 BC. The rationale lying behind the 48th law is that in case of negative circumstances, any farmer had the option, but not the obligation to walk away from his duties. Hence, under the above described contingencies, the farmer

was no more required to pay annual interests (in the form of grain) while the creditor had only the option to forget about the interest payment he was supposed to receive. Even if not specifically described, it was probably the first example of a put option[17] which offered the farmer the opportunity of insuring himself against unforeseeable shortages. If, at the end of the year, the harvest was generous, then the farmer was forced to make the due payments and the option expired without being exercised; in case of negative events compromising the harvest, instead, the farmer would have had the possibility of exercising his right not to pay and walk away from his original obligation: no differences with respect to modern financial derivatives. Furthermore, despite being Mesopotamia one of the first recognized civilizations, written documents describing and formalizing such kind of transactions, already existed. This was simply to provide any participant, to a trading activity, with the maximum degree of legal certainty and to minimize the cost of eventual subsequent disputes (Kummer,2012). Such writings, were found in cuneiform script on tablets and their physical ownership awarded his owner the right of exercising what was specified in the contract. The most important implication was that those contracts could have been transferred to third parties. The same practice, was also diffused in Egypt were tablets written in Babylonian were found, testifying trades with Crete, Cyprus or the Augean Islands. At that time, most of the trades occurred in temples. Temples, in fact, not only had a religious, political or military role but also a commercial one. In a temple, actors participating to trading activities not only were provided with warehouse facilities but also specific standards both in terms of quality and quantity were specified in order to avoid misinterpretations. Temples in Mesopotamia, played the role of the modern clearing houses[18], guaranteeing trading activities to perform smoothly and regulating trade itself. An additional hint which indicated the familiarity of ancient Greeks with derivatives, can be found in one of the most important works of Aristotle[19]: "Politics" (IV century BC). In there, Aristotle narrated the story of Thales, who was a philosopher living in Miletus during the VII century BC (625). In particular, Thales during wintertime, was able to contract with local producers to acquire the option of employing all the olive presses in the region. At that time, since the harvest was very far in time, demand for olive presses was extremely low, and Thales managed to acquire the option to hire all the olive

[17] A put option is an option contract giving the owner the right, but not the obligation, to sell a specified amount of an underlying security at a specified price within a specified time

[18] A clearing house is an intermediary between buyers and sellers of financial instruments.

[19] was an ancient Greek philosopher and scientist born in the city of Stagira, Chalkidice, on the northern periphery of Classical Greece

presses for a very small amount of money. When summer came and the harvest appeared to be very abundant, the demand for olive presses, needed to produce oil, sharply rose and Thales could lease them at a substantial premium, hence realizing a considerable profit. Aristotle's principal aim was to prove just that, if they wanted, philosophers always have the possibility to become rich without devoting substantial effort, but at the same time, he also described the patterns of a call option[20].

Switching from Greek jurisdiction to the Roman one, it is possible to trace a completely different attitude towards the use of derivatives. During the Roman period, in fact, the use of derivatives was neither very common nor appreciated. Indeed, the possibility of transferring any right involved in a derivative contract to a third party was not legally recognized as long as the Empire was into force. Nevertheless, different emperors such as Pompey[21], understood the need of securing the supply of strategic goods and allowed private agreements to survive. Specifically, at that time two kind of forward contracts[22] existed : the first standing for a promise for future delivery of a certain good and the second involving the acquisition of *"expectancy"*. They were governed almost by the same principle ruling a forward contract, with the exception that the first one was not legally enforceable in case of failure to deliver the underlying, while the second was.

From the Roman Empire to Middle Ages many things changed. As it was before, the main purpose of derivatives was still facilitating trade, but during this period new kind of derivatives, along with new arrangements, started to be sold and bought by different actors. In the Early Middle Ages, for instance, *"commandae"* were traded in order to finance expeditions in different countries. They were essentially commercial partnership where one party agreed to put the necessary funds in advance, while the other was in charge of travelling to acquire and then give back to the sponsor, previously agreed commodities: a sort of a forward contract. During the XIII century, even local governments approached the derivatives market: *"monti"* shares started to be traded as a way for merchant cities to raise funds and they were intended as a sale of subsequent

[20] A call option is an agreement that gives an investor the right, but not the obligation, to buy a stock, bond, commodity or other instrument at a specified price within a specific time period
[21] Gnaeus Pompeius Magnus (29 September 106 BC – 28 September 48 BC), usually known in English as Pompey or Pompey the Great, was a military and political leader of the late Roman Republic.
[22] A forward contract is a customized contract between two parties to buy or sell an asset at a specified price on a future date

government revenues. By the way, even if legally recognized and authorized they were not traded in large volumes as it might be thought, not only because of their extremely volatile prices (connected to the current wealth of the cities) but also because foreigners couldn't access them easily (high transaction costs). Over time, however, since financial instruments in general and derivatives in particular started to be very frequently traded, the need for central markets soared. Indeed, matching buyers with sellers, transporting huge amounts of commodities and contracting on different qualities, were all elements dramatically augmenting transaction costs and reducing the benefits attached to derivatives trading. The establishment of central markets, indeed, allowed parties to trade on the basis of sample goods rather than the whole amounts to be sold or bought, to rely on the right to refuse the commodity in case the quality was not the same of the pre-agreed one and finally to rely on a sort of authority for every issue concerning trading activities.

This is mainly the reason why, over time, seasonal markets became always less and less important while permanent trading spots (usually located in between ports and main routes) became far more common and established.

1.2.2 The very first organized exchanges: Derivatives trading during the Renaissance

Overtime, Antwerp (in Belgium) became the reference city for derivatives trading, anticipating major locations such as Amsterdam and London. This was probably because of the strategic and central location of the city where tons of people from nearby countries could go easily and without dramatic efforts. During the XIV century, derivatives started to be so commonly traded that financial activities related to this kind of trades exceeded transactions related to the real commodities. In particular, "*bills of exchange*[23]*"* were the most common traded financial instrument. The rationale behind such a change in attitude was because, people and merchants in particular, understood that trading in derivatives could have been more beneficial because it didn't necessarily involve the delivery of the underlying, hence improved profits could have been realized without incurring in onerous

[23] Bills of exchange were a new type of derivative, a promise to repay a certain amount of money in a different location, in a different currency and at a future date.

transportation or storage costs. Such shift in the merchants' attitude was favored by the new regulatory framework enacted by Charles V[24] who in 1539 allowed the possibility of transferring bills of exchange to third parties (Kummer,2012). Anyhow, about 45 years later, once Antwerp got devastated by Spanish troops in what is remembered as probably the greatest massacre in Belgian history[25], financial activities moved to Amsterdam where the complexity of trading significantly improved. The main cause was the emergence of stock trading which allowed, in turn ,the flowering of new derivatives whose underlying were stocks[26]. Specifically, lot of companies went public in order to have their maritime trade financed by outside investors. With stock trading, forward contracts on shares (usually settled for difference[27]) bloomed as well, along with new speculative strategies. For this reason, short-selling[28] was banned in 1610, even if, at least unofficially, the practice continued to be perpetrated.

However, the first traces of organized and properly structured derivatives exchanges do not derive from western countries. In fact, the Osaka Derivatives market, was the biggest trading center for rice in Japan and its structure was very similar to modern exchanges. Most of the rice cultivated within the country was sent and stored there, where it could have been sold through auctions and where sellers basically acquired a future delivery of rice by anticipating money when the deal closed. As in Europe, merchants had the possibility to keep the certificates enabling them to acquire a specified amount of rice in the future or they could just trade those certificates attempting to realize quick profits. Rice exchanges were very useful to samurais[29] who could sell rice years in advance in exchange for an immediate cash-inflow enabling them, in most of the cases, to solve their credit issues with merchants.

Probably the most important step, towards modern markets, was the standardization of *"bills of exchange"*: such a practice certainly lowered transaction costs for investors and promoted trade. Nevertheless, trading activities became too speculative and in order to

[24] the Holy Roman Empire from 1519
[25] The Sack of Antwerp, often known as the Spanish Fury at Antwerp, was an episode of the Eighty Years' War. It is the greatest massacre in Belgian history.
[26] A stock is a type of security that signifies ownership in an organization and represents a claim on part of the organization's assets and earnings.
[27] A contract for differences (CFD) is an arrangement made in a futures contract whereby differences in settlement are made through cash payments, rather than by the delivery of physical goods or securities
[28] Short selling is the sale of a security that is not owned by the seller, or that the seller has borrowed.
[29] were the military nobility and officer caste of medieval and early-modern Japan

prevent the price of rice to rise too sharply, the Shogun [30] decided to ban the trading of *" prepayment bills [31]"*. After this decision was taken, such type of trades simply moved to the city center where the Dojima Rice exchange[32] arose. In 1715 the Shogun was forced to declare it official. Year by year, the Dojima Rice exchange became always more similar to modern exchanges. New elements such as the obligation to trade within specific and dedicated time-periods, the standardization of contracts, new rules about the quality of traded commodities, all contributed to the evolution of the derivatives market in Japan. Furthermore, the establishment of a clearing house[33] supervising and guaranteeing all trades was crucial under the risk mitigation point of view. In addition, a striking feature is that, in 1750, 110'00 barrels of rice were actually traded on the Dojima Exchange while only 30'000 barrels physically existed in reality. Accordingly, as previously mentioned, the Shogun was periodically forced to intervene by regulating trading activities to prevent speculative strategies going too far.

1.2.3 The eighteenth, nineteenth and twentieth centuries: the premises for modern markets

Even though, derivatives trading was spreading all over the world, across advanced economies, probably the main objectives were reached both in UK and in US during the XVIII and XIX centuries. In particular, in that period, England was leading the maritime trade and London became one of the major trading centers. As a matter of fact, lot of people dealing with derivatives in Amsterdam, which probably represented the most developed financial market of Europe, moved to London, attempting to transfer their knowledge and taking advantage of new possibilities. Because of the increasing trend, the English government was obliged to recognize both the transferability and negotiability of

[30] shogun was the military dictator of Japan during the period from 1185 to 1868.
[31] Prepayment bills were essentially bills to buyers on the basis of rice that had yet to be harvested
[32] The world's first commodity futures exchange. Established in 1697 in Osaka, Japan, by samurai who wanted to control the rice markets, the Dojima Rice Exchange was originally a market where rice was bartered
[33] A clearing house is an intermediary between buyers and sellers of financial instruments. Further, it is an agency or separate corporation of a futures exchange responsible for settling trading accounts, clearing trades, collecting and maintaining margin monies, regulating delivery, and reporting trading data. Clearing houses act as third parties to all futures and options contracts, as buyers to every clearing member seller, and as sellers to every clearing member buyer.

every bill of exchange. Anyways, along with new evolving scenarios, new troubles came. Company's shares started to be traded and new financial instruments were invented. Most of the investors, in fact, aimed at making profits by trading financial instruments carrying the company's shares as underlyings, rather than directly investing on that particular company by buying its shares. For this precise reason, a considerably high volume of businesses with ambiguous business plans soared and derivatives on their stocks started to be massively traded. Since trades were not motivated by the fundamental value of the company, the risk of incurring in huge losses once ascertained the real company value, was quite big. In particular, during that period, *"refusals"* were actively traded. They were essentially stocks which could have been purchased by paying a small amount upfront and completing the payment thanks to subsequent instalments. After scheduled time periods, the shareholder could decide whether to pay the next instalments or to give up the option on it. Companies tried to speculate by announcing false news and then issuing subscription receipts to trade them OTC at their favor while a lot of shareholders were defaulting on the option, causing, for the first time, financial bubbles[34]. For these reasons, the sector needed to be regulated and thanks to the Sir John Barnard[35]'s Act, the government decided to ban options linked to shares and every short-selling practice. Nevertheless, the most important achievements contributing to the recent and sudden improvement of financial markets, were made in US during the XIX century. Most of those ameliorations were mainly due to technological progress which enabled a wider range of investors to be informed and actively participate to a huge spectrum of trades. It all started in 1848 when the CBOT [36](Chicago Board of Trade) was established . There, mostly derivatives contracts, and in particular forwards, on agricultural commodities were exchanged. One of the biggest improvements was the introduction of an authority supervising, setting quality standards and accordingly augmenting investors' confidence as it was during the Roman Empire. Furthermore, the introduction of a clearing house,

[34] A bubble is an economic cycle characterized by rapid escalation of asset prices followed by a contraction. It is created by a surge in asset prices unwarranted by the fundamentals of the asset and driven by exuberant market behavior

[35] Sir John Barnard (c. 1685 – 28 August 1764) was a British Whig politician and Lord Mayor of London

[36] A commodity exchange established in 1848 that today trades in both agricultural and financial contracts.

sensibly reduced the counterparty risk[37] while the imposition of a margining system (it will be debated in the next pages), lowered default risk[38] even further.

As previously mentioned, the main innovations were caused by the advent of technology and in particular computers, which were able to perform complex calculations in a short amount of time and thanks to which more or less reliable models could have been built. In addition, new typologies of instrument were introduced. In 1972 the CME[39] (Chicago Mercantile Exchange) for the first time started to issue contracts on financial instruments and just 3 years later interest rate futures were actually traded.

Both the cultural and technological enhancement contributed to the globalization and OTC transactions got a foothold to the detriment of transactions regulated by physical exchanges. In 1991 the notional amount involved in OTC trades sensibly surpassed those related to exchanges and over time, the international financial markets took the shape of the one we know today.

1.3 Introducing Swaps: Preliminary Knowledge

As it will be abundantly disserted later on, SWAPS may be seen as compositions of Futures or Forward Rate Agreements. Accordingly, it sounds reasonable to introduce such instruments in order to allow a greater and more conscious understanding of subsequent chapters.

[37] counterparty risk is the risk to each party of a contract that the counterparty will not live up to its contractual obligations.
[38] Default risk is the chance that companies or individuals will be unable to the required payments on their debt obligations
[39] The Chicago Mercantile Exchange (CME) is the world's second-largest exchange for futures and options on futures and the largest in the U.S. Trading involves mostly futures on interest rates, currency, equities, stock indices and a small amount on agricultural products.

1.3.1 Forward Contracts

A Forward Contract is the simplest derivative being traded in financial markets. According to Hull (2009), it is simply an agreement between two parties (financial institutions, corporations or individuals) to buy or sell a specific asset at a predetermined date in the future. The price at which the transaction will take place is already known at the inception of the contract and it is said to be the forward rate ruling the future trade. The opposite of a forward contract is a sale or purchase of a certain asset in the spot market[40], which means the transaction takes place today at the equilibrium prices dictated by market demand and supply. Moreover, in a forward contract, the party agreeing to buy the asset in the future at a specified rate is said to have taken a *long position* in the asset, while, on the contrary, the party willing to sell the asset at a future specified date is said to have assumed a *short position*. Forward Contracts exist almost on everything and they allow different entities to manage different sources of risk. Nonetheless, the most famous type of forward agreements are the ones on foreign currencies, because of their usefulness and the extents to which they are traded. Corporations receiving revenues from wherever in the world have the possibility to hedge such cash flows by entering into forward contracts allowing them to exchange revenues inflows in a foreign currency for a predetermined amount of domestic currency, thus reducing variability in expected future revenue and completely eliminating risk related to exchange rate[41] fluctuations. The payoff at the expiration of the contract, basically depends on two variables: the delivery price (K), which is the price, already known at the inception of the contract, at which the future selling or purchase of the underlying asset will take place, and the future spot price (S_t), which is the equilibrium price for the underlying asset that will be in force at the expiration date of the contact.

As represented by the graph in figure n.1.1 below, the payoff associated to a long position increases with the future spot price of the underlying. This is because, the more, the asset will be expensive in the future spot market, the more the party with a long position can benefit from a predetermined fixed price at which he can purchase the asset, regardless the spot market. At the end of the contract, the payoff associated to a long position is St-

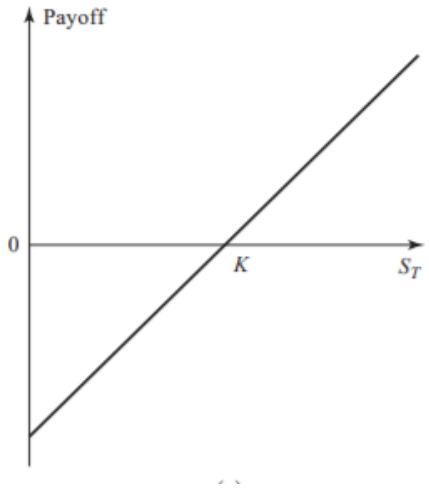
[40] The spot is a market for financial instruments such as commodities and securities which are traded immediately or on the spot

[41] The price of a nation's currency in terms of another currency.

K, and it measures how advantageous has been entering into a long position rather than waiting until the termination of the contract to buy spot. Of course if S_t-K was negative, it means that the future spot price is lower than the delivery one and that hence it would have been more convenient not to enter into a forward transaction. Alternatively, if S_t-K was positive, it means the forward rate has been cheaper than the future spot price and that consequently entering into a forward contract was the right choice. Since a long and short position mirror themselves, the opposite applies to a short forward contract.

Figure n.1.1

Payoff of a long position in Forward Contract as a function of the underlying Spot price at maturity

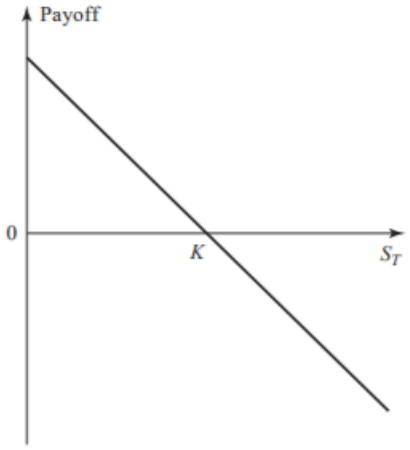


Source: Options Futures and Other Derivatives, John C. Hull, Pearson,2009

With reference to a short position, in fact, as represented by the graph below (figure n.1.2), the associated payoff is K-S_t and it is inversely proportional to the future spot rate. Indeed, the more the future spot price of any asset is high the less it has been convenient having fixed a price at which to sell the asset at a pre-determined future date. Accordingly, as long as the future spot price will remain below the delivery one, the forward agreement would maintain a positive value.

Figure n.1.2

Payoff of a short position in Forward Contract as a function of the underlying Spot price at maturity



Source: Options Futures and Other Derivatives, John C. Hull, Pearson,2009

It is essential to mention that entering into a forward contract doesn't costs anything. Indeed, such a transaction is said to be fair : at the beginning of the contract neither the long nor the short position is expected to be profitable and both the parties are expected to get involved in a transaction with a zero Net Present Value[42]. Furthermore, forward prices are set so that arbitrage[43] opportunities are not possible and in case they existed, investors identifying and exploiting them would also suddenly remove them from the market. Specifically, for any particular asset, forward prices are equal to spot prices grossed at the risk-free[44] interest rate. In fact, if forward rates were lower than the grossed spot price, investors could short sell the asset and invest the proceeds at the risk-free interest rate, gaining a risk-free profit given by the difference between the proceeds of the short-sale grossed at the risk-free rate and the asset forward price. In the opposite case, instead, investors would have the possibility to borrow money at the risk-free interest rate in order to acquire the asset and then enter in a short position so that to gain on the

[42] Net Present Value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows

[43] Arbitrage is the simultaneous purchase and sale of an asset to profit from a difference in the price. It is a trade that profits by exploiting the price differences of identical or similar financial instruments on different markets or in different forms.

[44] The risk-free rate of return is the theoretical rate of return of an investment with zero risk.

difference between the forward rate and the risk-free interest rate. Additionally, at the very end of the contract, forward and spot prices have to converge, otherwise even if with no time to maturity left, it would be beneficial buying forward and selling spot or vice versa, and it doesn't make sense since at maturity there's no difference between a spot and a forward transaction.

1.3.2 Futures

Once presented forward contracts, futures are easy to introduce and describe. Indeed, as well as forwards, futures are contracts implying a future transaction at a pre-specified delivery price which is binding for both parties. The main difference is that forward contracts are traded OTC between parties who have to know each other in order to let the trade work, while on the other hand, futures are traded in physical exchanges, such as the already mentioned CBOT and the CME. Accordingly, future contracts present some standardized features which contribute to lower transaction costs and hence to the tradability of future contracts. Particularly, the establishment of a margining system, which does not characterize forward contracts instead, works as an insurance against defaults of parties involved in the future transaction and incentivizes the use of futures rather than similar instruments.

The mechanics underpinning the margining system is straightforward: whoever take a position, is required to put in a sort of account a percentage of the value of the final trade so that to continuously protect both parties against fluctuations in spot prices. As previously discussed, the value of a forward and hence of a future contract, varies with variations of the spot price; consistently, with the passage of time, the margin account is day by day adjusted to reflect the investor's gains or losses. In order to always have a positive margin account, a maintenance margin (lower than the initial margin) is established and every time the account goes below this threshold the investor is forced by a "*margin call"* to restore the initial margin account. This mechanism, allows the exchange to perform the delivery or the purchase of determined assets, even if one of the parties defaults on its obligation.

1.4 Swaps

"*A swap is an OTC agreement between two companies to exchange cash flows in the future. The agreement defines the dates when the cash flows are to be paid and the way in which they are to be calculated."* (Hull, Options Futures & Other Derivatives, 2009, pp.148)

Accordingly, to compute cash flows to be exchanged in the future, the future value of a market variable such as an interest or exchange rate needs to be monitored; this is the reason why a forward agreement, due to the fact that it involves only one exchange of cash, may be seen as the simplest case of a swap contract. The most renowned types of swaps are: *plain vanilla* interest rate swaps and *fixed for fixed currency* swaps.

1.4.1 The Mechanics of Interest Rate Swaps

Plain vanilla swaps are probably the most popular type of swaps and they involve exchange of cash-flows based on the value of pre-determined interest rates. In particular, according to this type of swaps, one party agrees to receive interests at a floating rate and to conversely pay interests at a pre-determined fixed rate, while, on the other hand, the other party pays the floating rate in exchange for the fixed one. When dealing with floating rates in swaps, the reference rate is, in most of the cases, the London Interbank Offered Rate (LIBOR), which is the minimum acceptable rate at which a bank would be willing to deposit its money with other banks with a *"double A*[45]*"* credit rating[46]. Practically speaking, periodic payments are computed on a notional[47] , which is the same for both the parties. Generally, rather than exchanging the whole interests, only the

[45] is the highest possible rating assigned to an issuer's bonds by credit rating agencies.
[46] An assessment of the creditworthiness of a borrower in general terms or with respect to a particular debt or financial obligation
[47] Notional value is the total value of a leveraged position's assets. This term is commonly used in the options, futures and currency markets which employ the use of leverage, wherein a small amount of invested money can control a large position in the markets.

difference (if any) between interests computed with the different rates, is actually given to the party whose rate at which he pays is lower than the one he receives. Swaps are used for a wide range of purposes; for instance, to modify the nature of a liability.

Assuming that a company has a debt towards a specific lender and that this debt is structured so that the company has to pay interests at a floating rate equal to the LIBOR plus an additional 0,1%, by entering into a *plain vanilla* swap the corporation would be able to receive the LIBOR rate in exchange for payments at a fixed rate such as 4%. In this way, the periodical cash outflow to the lender and the inflows deriving from the swap partially offset each other, leaving outside the marginal 0,1% which added to the fixed rate implied by the swap, gives the final fixed rate at which the corporation is committed to pay interests, which is 4%+0,1%= 4,01%. Thanks to the swap agreement, indeed, a floating rate debt may be turned into a fixed rate one which reduces the uncertainty related to the variability of future expected cash outflows.

By applying the same reasoning, a swap agreement may allow a company or any other market participant to modify the nature of an asset. In the case of an asset periodically providing with a fixed rate, for instance, a swap which implies cash inflows computed at a floating rate and outflows at fixed one, permits the owner of the asset to receive a floating rate rather than a fixed one. In both cases, because of the negotiability of interest rate swaps, the inverse is also true: fixed rate debts may be turned into floating and floating rate assets may be turned into fixed.

Even if swap agreements are OTC transactions, usually banks cover the role of financial intermediaries so that both parties have to interface with the financial institution which will still honor the obligation even in the case of default of one of the parties. Of course in order to manage this risk, financial institutions need a remuneration and it is the swap rate. Banks act as market makers[48] in the swap markets, meaning that they're willing to enter into a swap agreement without being involved in another offsetting swap agreement.

[48] A market maker is a broker-dealer firm that assumes the risk of holding a certain number of shares of a particular security in order to facilitate the trading of that security

For doing so they gain on the bid-ask spread[49] which is usually near to 3 or 4 basis points[50].

1.4.2 How rates are determined and swaps evaluation

The swap rate is defined as the average of the maximum fixed rate that a swap market maker is willing to pay in exchange of a floating rate such as the LIBOR (the bid rate) and the minimum fixed rate it's willing to receive in return for paying the LIBOR (the ask rate). Analogously to the LIBOR, swap rates are not really risk-free rates, but very close to them (Hull,2009). Indeed, a bank or any other financial institution may earn the 4-year swap rate on a given principal by lending the principal for the first 6 months to a double A borrower to subsequently relend it, after 6 months, to another double A borrower and finally exchanging the LIBOR rate for the 4-year swap rate. This shows that the 4-year swap rate is almost identical to the average of 8 consecutive 6-months borrowing rates when the borrower is a double A credit rating. Anyhow, it is important to mention that, a 4-year swap rate, is slightly lower than the corresponding 4-year double A borrowing rate, because it is much less risky to continuously lend money to different institutions which in different periods of time have the same double A credit rating, rather than lending money over a period of 4 years to an entity which has a double A rating only at the beginning of the period.

One issue, related to the estimation of the swap rates, is that usually LIBOR curves are only observable for a period not exceeding twelve months. To this purpose, Eurodollar futures are observed to replicate a LIBOR zero curve, proceeding up to 2 or even 5 years. In a similar fashion to futures or forward contracts, when first initiated, an interest rate swap, has a zero value for both parties. Once some time to maturity passes, though, it starts modifying its value in favor of one party or the other, depending on the fluctuations of the floating rate. The value of an interest rate swap may be computed in two different

[49] A bid-ask spread is the amount by which the ask price exceeds the bid price for an asset in the market. The bid-ask spread is essentially the difference between the highest price that a buyer is willing to pay for an asset and the lowest price that a seller is willing to accept to sell it.
[50] Basis point (BPS) refer to a common unit of measure for interest rates and other percentages in finance. One basis point is equal to 1/100th of 1%, or 0.01% (0.0001).

but still intuitive ways. The first one, sees it as the difference between a fixed and a floating rate bond, while the second as a portfolio of Forward Rate Agreements, as it has been previously mentioned.

As already debated, notionals are not exchanged in interest rate swaps, but even if they were, since they're the same for both parties, the value of the swap wouldn't be affected. Accordingly, from the point of view of the party who pays the floating rate, the value of the swap may be represented by the difference between the value of a fixed rate bond and the value of a floating rate bond: $V_{swap} = B_{fix} - B_{flo}$. Obviously, the inverse holds for the party paying the fixed rate in exchange for the floating one.

On the other hand, a *plain vanilla* swap, may well be interpreted as a continuous exchange of cash flows or as subsequent forward transactions. For this reason, it may be valued on the assumption that forward interest rates are realized. Hence to accordingly value a *plain vanilla* swap, it is only necessary to use the LIBOR curve to compute forward rates for each of the LIBOR rates characterizing the cash-flows of the swap. Then, cash-flows may be calculated by assuming LIBOR rates will equal forward rates, and finally discounted and summed up to obtain the final swap value.

1.4.3 Currency Swaps

Another popular type of swaps is the *currency* swap. As usual, the rationale behind the mechanics of this derivative product is the same as the classic *plain vanilla* swaps but rather than involving the exchange of cash flows of the same currency, it implies the exchange of both the principal and the periodical payments in two different currencies, both paying a fixed interest rate rather than fixed for floating or vice versa as in the previous case. The principal amounts to be exchanged both at the contract initiation and termination are initially set so to reflect the exchange rate in force at that time. When the exchange takes place again at the end of the contract, instead, depending on the exchange rate fluctuations over the contract maturity, the two principals may have quite different values. The most common is the *fixed for fixed* currency swap, denominated in this way because, as previously mentioned, cash flows exchanges are fixed at the inception of the contract rather than depending on the interest rate fluctuations. *Currency* swaps are of

crucial importance and extremely beneficial for many different reasons. For instance, a company who needs to raise funds in a specific currency but has an easier access to the loan market of a country with a currency different from the one it needs, has still the possibility of exploiting the dynamics of a currency swap to transform the borrowing in the currency of the country in which it has an easy access with the currency it needs. Analogously, having funds and willingness to invest in a specific currency denominated asset but also the perception that other currencies will appreciate relative to the one in which the investment has been made; a *fixed for fixed currency* swap is the perfect instrument being able to transform a specific currency denominated asset into another currency denominated asset.

As it is for plain vanilla swaps, currency swaps may be valued both as the difference between two bonds, where, in order to compare them on an equal basis, one of them need to be converted at the current exchange rate, or as the value of a portfolio made up of forward agreements.

1.4.4 Default Risk

Being swaps OTC transactions and involving two different parties, credit risk obviously plays a role in the game and financial institutions which make the market, need to take it into account. Of course, in case none of the parties default on its obligation, the financial institution remains fully hedged, because of the fact that one party's gain reflects the other's loss and vice versa. Nevertheless, when one of the party is in extremely unfavorable conditions, the swap value to the financial institution is strictly positive but default risk increases. Swap spreads [51] are meant to compensate financial institution for this kind of risk bearing. Conversely, when the swap arrangement is positive to one of the counterparties, being in financial troubles and not able to perform the due payments, a favorable opportunity arises for the financial institution; in case of default, in fact, the financial institution would simply get rid of a liability, realizing a windfall gain. Anyhow,

[51] The difference between the swap rate and the lending rate offered through other investment vehicles with comparable characteristics

rather than giving up on a valuable swap agreement, counterparties usually sell the swap contract to a third party or rearrange its debts so that it can still perform the payments. Consequently, in case of default of one of the counterparties, the financial institution would realize a loss if the swap contract value was positive to it right before the default while there will be no significant effect in case the contract value was negative.

It is worth mentioning that potential losses from defaults on swap agreements are far less remarkable than losses arising from defaults on loans, simply because swaps imply the exchange of interest payments, which are only a small fraction of the principal, and at least at the contract inception, are zero NPV transactions.

Furthermore, default risk associated to a *currency* swap is much higher than the corresponding one associated to *plain vanilla* swaps. Indeed, in the first, both at the inception and at the termination of the contract, principals are exchanged, while the latter only implies the exchange of interests over the contract maturity. Finally, it is important to distinguish between credit and market risk. Indeed, the first simply refers to the possibility of default of a counterparty when the value of the contract to the financial institution is positive, while the second one refers to all the possible outcomes associated to the fluctuation of market variables such as interest and exchange rates. While credit risk cannot be hedged in almost any way, if not being remunerated for taking the risk, market risk can be easily hedged by entering into adequate forward, futures and others contracts.

1.4.5 Benefits from trading in Swaps

The main benefit arising from swaps trading is accurately represented by the *comparative-advantage*[52] argument. Financial markets are not 100% efficient; in fact, transaction costs do exist and prices are not homogenous all over the world, neither for consumer goods nor for financial instruments (Fama, 1970). Accordingly, different parties may access more easily certain markets than others. For example, a company may have a comparative advantage in fixed rate markets rather in floating, that is, a company

[52] Comparative advantage is an economic law referring to the ability of any given economic actor to produce goods and services at a lower opportunity cost than other economic actors.

may raise funds at a lower interest rate in fixed rate markets compared to floating than any other company having a comparative advantage in floating rates, instead (Ni,2005). Assume, for instance, Company A needs to borrow and has been offered a fixed rate of 4% while a floating rate equal to the LIBOR – 0,1%, while, on the other hand, Company B may get a fixed rate loan at a 5.2% interest rate, while a floating rate loan at a LIBOR+ 0,6% interest rate. Clearly, company A has an easier access to both markets and as a consequence it has an absolute advantage, but since the difference in fixed rates is higher than the one in floating, it can be asserted that Company A has a comparative advantage in fixed rates market compared to Company B. On the other hand, Company B has a comparative advantage in floating rates market compared to Company A. Therefore, they might enter into a swap agreement so that each company borrows from the market in which it has the comparative advantage to swap the proceedings thereafter. The rational justifying such a strategy, is represented by the fact that if they agree to exchange cash flows, somewhat in between their individual rates (i.e. at a fixed rate of 4.35% and a floating equal to LIBOR), each of them would end up paying less than if it they borrowed individually. Namely, Company A would end up paying a 4% fixed rate to outside lenders , receiving a fixed rate of 4.35% from Company B to be swapped with the LIBOR. The net outcome would be Company A paying a floating rate of LIBOR-0.35% (LIBOR +4%-4.35%); strictly lower than the floating rate (LIBOR -0,1%) that it would have been paying without the swap agreement. On the other hand, Company B would have to pay a LIBOR+0.6% to outside lenders and receive the LIBOR from Company A to pay it back the previously agreed 4.35% fixed rate. Netting out all the payments, Company B would end up paying a 4.95% (LIBOR+0.6% - LIBOR+4.35%) fixed rate, which is strictly lower than the fixed rate it would have had to pay if it didn't enter the swap contract (5.2%). It is important to underline, though, that the total gain, equal to the sum of the differences of the final rates compared to the ones each company could have accessed without the swap, is 0,5% (LIBOR - 0.1 – LIBOR + 0.35% + 5.2%-4.95%) which, in turn, is exactly equal to the difference between the differences in fixed (5.2% - 4%=1.2%) and floating interest rates (LIBOR+0.6% - LIBOR -0.1% = 0.7%), which again is: 1.2%-0.7%=0,5%. In order for the argument to hold, it's crucial that both parties have a comparative advantage in one market compared to the other, otherwise the logic behind the whole argument falls.

As a matter of fact, the comparative advantage argument is the fundamental rationale for swaps to exist. Anyhow, it is important to realize, that such an argument mainly holds because frictions and investors' irrationality prevent financial markets to be perfectly efficient and immediately respond to different stimuli. This is why, in financial markets, interest rate differentials persist without being arbitraged away (Pinnington and Shamloo, 2016).

Chapter 2:
How Corporations and Public Administrations hedge or speculate with interest rate swaps

2.1 Hedging and speculation: definition and preliminary knowledge

Just before proceeding too far into details, it is essential to properly define what exactly *hedging* and *speculation* mean, in order to correctly interpret derivatives usage intended to pursue such objectives and related investment strategies.

2.1.1 Hedging

Hedging is known as the practice of undertaking an investment whose fluctuations in price exactly offset the price movements of an already opened position, which might be represented by a security or a different asset; thus partially or completely eliminating that specific risk source (Wisner, 2002). Hence, hedges approximately work as a sort of insurance. Assume a person wants to protect himself against whoever could steal his car: as most of the people do, he may enter into a contract providing with coverage against such kind of events, but of course this is not for free. Insurers usually require a periodic instalment to guarantee the service, which has the property of chipping away all the upside potential, represented by the possibility of saving rather than paying for the policy. Nevertheless, lot of individuals aims at hedging, in the sense that they rather prefer incurring in pre-set periodic cash outflows instead of having to suffer the burden of big losses all at once (the car being stolen). Furthermore, a hedge which completely eliminates a specific source of risk, in a position or more, is said to be perfect; it may well be represented by the acquisition of a derivative which perfectly mirror, but in the opposite direction, the price movements of an already existing position; thus eliminating both upside and downside potential. Practically speaking, it is pretty unfeasible to find two assets or securities whose prices' movement exactly offset each other, and even if

they existed, basis risk would still exist. The basis, in fact, refers to the discrepancy between expected and actual price correlation[53] between the two securities composing the hedge (Hull, 2009), which in the case of a perfect one, is supposed to be -1. Therefore, derivatives' features probably render them the most appropriate instrument for hedging. The reason is that, both final payout and price over maturity, are strictly connected to the price movements of the underlying, as already mentioned in the previous chapter. Specifically speaking, referring again to the previous example, it shows how a car insurance almost works in the same way of an interest rate swap. Taking into consideration a fixed for floating interest rate swap, for example, in most of the cases, a floating rate is received in order to convert the nature an already existing asset or liability so that a fixed and previously known rate is paid instead of the floating one. Namely, the uncertainty related to the already established position is eliminated at the expense of a periodic fixed payment, represented by the instalments in the case of the insurance. In both contingencies, upside and downside potential is given up due to the nature of the agreement. In addition, the extents to which derivatives are able to conversely replicate fluctuations in the price of an already established position, is measured by Delta[54]. Delta in fact, is a measure of the sensibility of the value of the derivative to the variation in the price of the underlying and it is sometimes referred to as the *"hedge ratio"*[55] (Mwanga, 2005).

2.1.2 Speculation

With speculation, instead, is intended the act of undertaking a specific investment which carries a substantial amount of risk to be translated in superior expected losses. Nonetheless, the investment decision is also motivated by superior expected gains for which carrying the above mentioned risk is worth (Edward, 2011).

[53] Correlation, in the finance and investment industries, is a statistic that measures the degree to which two securities move in relation to each other. Correlations are used in advanced portfolio management. Correlation is computed into what is known as the correlation coefficient, which has value that must fall between -1 and 1.
[54] The delta is a ratio comparing the change in the price of an asset, usually a marketable security, to the corresponding change in the price of its derivative.
[55] The hedge ratio compares the value of a position protected through the use of a hedge with the size of the entire position itself

It is not that easy to differentiate between a pure investment decision and a speculative attempt; sometimes the two may coincide and whether a strategy is promoted by a speculative attitude, it depends on different factors such as the nature of the asset, the expected duration of the holding period and the amount of leverage[56]. Speculators are essential to a smooth functioning of financial markets. In fact, by performing rapid trades with the intention of getting profits at low expenses, not only they contribute to the liquidity[57] of the financial environment within which they operate but, most importantly, they allow other investors to hedge. Indeed, by reflecting different market expectations with respect to mainstream ones, they are fundamental to match the demand of hedgers who are willing to engage in opposite trades. With particular reference to the derivatives market, instead, a speculator is considered as an individual who invests in riskier than average derivative products, so that to receive higher than average returns. Their buying or selling decisions are influenced, most of the times, by the view and the expectations they have relative to the volatility of the variable affecting the final payoff. What they basically attempt to do, is to beat the market, relying on different factors, such as official or unofficial sources of information, overconfidence with respect to their own analyses, ideas or forecasts.

In order to take large positions without incurring in large investments, speculators usually trade highly levered instruments, so that relatively small upfront payments can entitle them to much more volatile payoffs. Both futures and options are optimal examples of highly levered instruments. For instance, futures cost zero and depending on the fluctuations of the spot price, all over the maturity of the contract may produce huge gains, while options despite costing a small percentage of the underlying, enable the buyer not to give up the upside potential and eliminate the downside one at the same time. Speculators essentially takes investment decisions which are poorly supported by market indicators or previous estimates and most of the risk they carry, is simply because of that. Anyhow, speculators might have a profound influence over financial markets; indeed, they may affect trends and market perceptions with respect to a given security or asset. If a speculator, in fact, had sufficient financial resources and believes a given security is going to considerably increase in value very soon, he would buy as much quantity as he

[56] he use of various financial instruments or borrowed capital to increase the potential return of an investment

[57] Liquidity describes the degree to which an asset or security can be quickly bought or sold in the market without affecting the asset's price.

can in order to realize quick profits thereafter. If the volume he is able to manipulate is important enough, many other investors may interpret the increase in demand as the signal that the market is currently undervaluing the asset. As a consequence, other investors would be incentivized to further invest in that security contributing to the increase in price and the consequent establishment of a financial bubble[58]. At that point, speculators might fully exploit the opportunity by selling all the previously acquired volume right before the bubble burst and then realize both quick and higher than average profits. However, the same reasoning applies to securities or assets which are believed to fall in value by speculators. They would (short) sell the asset, hence influencing market expectations and causing the opposite speculative bubble.

2.2 How and Why Corporations hedge or speculate with interest rate swaps

Once provided with the exact meaning of hedging and *speculation*, it is time to go further into details. More specifically, paragraph 2.2 addresses the dynamics and the reasons why *non-financial firms* engage in speculative or hedge trading by entering interest rate swaps. Due to the fact that empirical literature is not particularly supportive, an accurate and detailed study of the sources has been performed in order to provide the reader with the maximum degree of accuracy. In particular, rather than relying on previous literature, which seems not to be very accurate and detailed, it seems more beneficial to analyze and interpret probably the most comprehensive Panel Data[59] with respect to these issues, so that to produce relatively new and statistically significant information along with relevant inferences. The Panel Data under consideration has been constructed by Sergey Chernenko and Michael Faulkender (2011), respectively a Ph.D. student and a Professor of Finance at Harvard University[60]. Indeed, their study includes

[58] A bubble is an economic cycle characterized by rapid escalation of asset prices followed by a contraction. It is created by a surge in asset prices unwarranted by the fundamentals of the asset and driven by exuberant market behavior.
[59] In statistics and econometrics, panel data or longitudinal data are multi-dimensional data involving measurements over time. Panel data contain observations of multiple phenomena obtained over multiple time periods for the same firms or individuals.
[60] Harvard University is a private Ivy League research university in Cambridge, Massachusetts, established in 1636, whose history, influence, and wealth have made it one of the world's most prestigious universities.

data for approximately 1.854 firms over a ten-year period. This is why it can be considered one of the most comprehensive databases for interest rate swaps analysis.

The fundamental rationale to understand, in order to correctly interpret the different regressions[61] run on the above mentioned Data Set, is the following one: If a firm's exposure to risks which are hedgeable such as foreign exchange, commodities' prices and even interest rates' volatility, remains constant over time, implying the firm has not changed its business model, then hedging is supposed to be reflected by all those managerial practices which also remains stable over time. On the other hand, speculative activities pertain to all those actions management performs in an attempt to deviate from usual practices, which hence are influenced by a transitory component (Chernenko and Faulkender, 2012). Accordingly a *cross-sectional* analysis[62], underlying the differences in practices between non-financial firms, in a wide sample and scrutinized at a specific time period, provides with all the elements to interpret hedging patterns. In particular, relative to interest rate swaps, a non-financial firm may choose to hedge by comparing the sensitivity of its cash flows to interest rate fluctuations, but unless its operations are altered year by year, its sensitivity to interest rate fluctuations, should remain approximately constant over time. Consistently, the hedge ratio and the intensity according to which the firm engage in interest rate swap trading, to hedge, has to remain stable as well. On the other hand, the *time-series*[63] component of the Data Set is a far more adequate tool to verify for variations in management practices over time and hence individuating speculative strategies. Any trade in interest rate swaps or derivatives occurred because of speculative purposes, contributes to the modification of the value of the *observed hedge ratio* which then, may be decomposed as:

Observed Hedge Ration = Optimal Hedge Ratio + Speculative activities

[61] In statistical modeling, regression analysis is a set of statistical processes for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed.

[62] Cross-sectional analysis is a type of analysis that an investor, analyst or portfolio manager may conduct on a company in relation to that company's industry or industry peers. The analysis compares one company against the industry in which it operates, or directly against certain competitors within the same industry, in an attempt to assess performance and investment opportunities.

[63] A time series is a sequence of numerical data points in successive order. Time series analysis, instead, can be useful to see how a given asset, security or economic variable changes over time. It can also be used to examine how the changes associated with the chosen data point compare to shifts in other variables over the same time period.

The reasons why firms engage in speculative activities will be abundantly debated in the following pages but most of the times, it is because they present beliefs regarding future interest rate movements different from what implied by the term structure[64]. Furthermore, over time, variations in the *observed hedge ratio* due to speculation usually offset each other, thus evidencing just the *optimal hedge ratio*. Hence, having observations for a considerably long time period, a firm speculative activity may be simply caught by comparing its *observed edge ratio* at a given time with its historical average.

To the purpose of a more comprehensive picture, the Data Set on which regressions to interpret hedging and speculative patterns were run, was constructed by the two above mentioned scholars in the following manner. As a preliminary step, the CompuStat's ExecoComp Data Set[65] from 1993 to 2003 was taken as the base and implemented by adding hand-collected information pertaining to interest rate swaps usage over the same time span. More precisely, the 10-Ks[66] in EDGAR[67] were used to implement the Data Set with the amount of floating rate debt and both the notional and the directions of interest rate swaps outstanding at the end of each fiscal year. Furthermore, the choice of the sample period is governed by the full availability of data in the different databases. Then, the "*net floating swap amount"* for each company and time period, was computed as the difference between the floating-for-fixed and fixed-for-floating notional amounts and finally divided by each firm outstanding debt at the end of each fiscal year, in order to obtain the percentage of debt which is converted into floating through interest rate swaps.

Obviously, all obtained values range between -1 (all firm's debt being swapped to fixed) and 1 (all firm's debt being swapped to floating). Subsequently, multiplying the obtained variable by the overall outstanding notional value of fixed-for-floating swaps, produces the absolute value of floating debt each firm has (once accounted for the effect of interest rate swaps). As a last step, dividing the amount by the value of the total debt each firms

[64] The term structure of interest rates is the relationship between interest rates or bond yields and different terms or maturities. The term structure of interest rates is also known as a yield curve.
[65] ExecoComp data set is a dataset owned by Harward University including executive compensation for S&P 1000 firms from 1992 to present. Includes base salary, bonus and stock option data as well as company financial data.
[66] A 10-K is a comprehensive summary report of a company's performance that must be submitted annually to the Securities and Exchange Commission. Typically, the 10-K contains much more detail than the annual report. It includes information such as company history, organizational structure, equity, holdings, earnings per share, subsidiaries, etc.
[67] EDGAR, the Electronic Data Gathering, Analysis, and Retrieval system, performs automated collection, validation, indexing, acceptance, and forwarding of submissions by companies and others who are required by law to file forms with the U.S. Securities and Exchange Commission (the "SEC"). The database is freely available to the public via the Internet

has, furnishes the ratio of floating to total debt. At the end of its construction process, the Data Set comprehended 11.261 observations.

As summarized by Table n.2.1 below, a first analysis of the obtained Data Set provides with different insights: on average, almost 42% of a company outstanding debt is exposed to floating interest rate (Initial floating rate debt (%) in Panel A, Column: *Mean*), while the average swapped amount being approximately 7 % (Swapped to floating (%) in Panel A, Column: *Mean*). Anyhow, since not all the firms in the sample only swapped to fixed or vice versa, on average, only a 3.6% of the firms' debt out of the 7% being swapped, results to be swapped to floating. Accordingly, the remaining is swapped towards fixed. Considering that, the percentage of floating rate debt exposure to outstanding debt is netted down to 38.3% (Final floating rate debt (%) in Panel A, Column: *Mean*). Furthermore, the 17.8% volatility[68] (Standard Deviation[69]), in swap usage, is quite a remarkable feature. Such a value, in fact, indicates that firms differ quite a lot in the direction and the magnitude of swaps usage.

[68] Volatility is a statistical measure of the dispersion of returns for a given variable, security or market index.

[69] Standard deviation is a measure of the dispersion of a set of data from its mean. It is calculated as the square root of variance by determining the variation between each data point relative to the mean. If the data points are further from the mean, there is higher deviation within the data set.

Table n.2.1

Swap Usage and Floating Rate Debt Summary Statistics

This table reports summary statistics for swap usage and floating rate debt percentage for the sample of non-financial firms in the ExecuComp data set. The sample period is June 1993 - May 2003. Swap users are firms that use interest rate swaps at least once during the sample period. Initial floating rate debt is the percentage of outstanding debt that is floating before accounting for the effect of interest rate swaps. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Swapped to floating is the percentage of outstanding debt that is swapped to a floating interest rate. Long-term debt is the percentage of outstanding debt that has more than five years to maturity.

Panel A: Full Sample

	N	Mean	Median	SD	Min	Max
Initial floating rate debt (%)	11261	41.579	33.273	35.064	0.000	100.000
Swapped to floating (%)	11261	−3.404	0.000	17.804	−100.000	100.000
|Swapped to floating (%)|	11261	6.839	0.000	16.787	0.000	100.000
Final floating rate debt (%)	11261	38.323	30.783	33.275	0.000	100.000
Long-term debt (%)	11261	47.413	49.521	34.503	0.000	100.000

Panel B: Swap Users

	N	Mean	Median	SD	Min	Max
Initial floating rate debt (%)	6269	42.619	35.533	32.609	0.000	100.000
Swapped to floating (%)	6269	−6.114	0.000	23.513	−100.000	100.000
|Swapped to floating (%)|	6269	12.285	0.000	20.960	0.000	100.000
Final floating rate debt (%)	6269	36.770	31.579	28.995	0.000	100.000
Long-term debt (%)	6269	49.335	51.146	31.986	0.000	100.000

Panel C: Cross-Sectional and Time-Series Vatiation in Swap Usage and Floating Rate Debt

	Full Sample				Swap Users			
	Mean	Overall SD	Cross-Sectional SD	Time-Series SD	Mean	Overall SD	Cross-Sectional SD	Time-Series SD
Swap usage	-3.404	17.804	13.167	12.177	−6.114	23.513	18.261	16.321
Floating debt	38.323	33.275	29.138	20.607	36.770	28.995	21.688	20.069

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 32

One of the greatest evidences the Data Set provides with, is that the bigger a company is, the more it uses (pay) fixed for (receive) floating interest rate swaps, and it is understandable since, on average, the larger the size of a company, the bigger its outstanding debt and switching it towards a fixed rate debt reduces the uncertainty related to short-term fluctuations of the interest rate which may affect with a relatively higher intensity the firm's performance. Additionally, when a variable reflecting the behavior of the term structure is added to the econometric regression where the dependent variable is an indicator of the intensity of swap usage, a statistically significant[70]([71]) positive

[70] In statistical hypothesis testing a result has statistical significance when it is very unlikely to have occurred given the null hypothesis [69].

[71] A null hypothesis is a type of hypothesis used in statistics that proposes that no statistical significance exists in a set of given observations.

coefficient has been found. This indicates that when the term structure is volatile, firms are less willing to sustain a floating rate debt and accordingly try to switch to fixed rates by entering into swaps. Indeed, as already asserted by Faulkender (2005), a higher volatility of interest rates would translate into huge costs for non-financial companies with the majority of its debt being floating. Interests to be paid would not be certain and would fluctuate along with the interest rate fluctuations; both implied uncertainty and the improved volatility represent a cost for a firm. Swaps allow to modify the nature of the debt from floating to fixed, sensibly reducing volatility and associated financial distress costs. Additionally, according to the statistics provided by the Data Set, companies which own larger liabilities and engage in R&D activities more frequently than others, tend to have relatively more fixed debt than floating and they manage to do so by entering into different swap agreements. In accordance with what has already been described above, non-financial firms which undertakes R&D activities know the associated cash flows are far less certain and predictable with respect to an already established business on a *ceteris paribus conditions*[72] and the probability of missing the match between cash-inflows related to R&D activities and the cash-outflow implied by debt repayments is higher in case of a floating rate debt. This is because the entity of the cash-outflows is uncertain by nature and swapping them to fixed (rate) reduces costs associated to uncertainty. Accordingly, the bigger the debt of a company, the higher the related interest expenses; once again, swapping to fixed rate debts prove beneficial in that sense.

In addition, the Data Set shows that companies issuing rated bonds tend to swap more to fixed rates and it is simply because most of the securities they issue, pay a fixed rate. Swapping to fixed rate debts allows a better matching of cash-inflows and outflows.

Therefore, depending on the specific business in which they operate, companies may have their cash flows positively or negatively correlated to interest rates. Of course, those with a positive correlation are more willing to swap towards floating rates, so that they can finally reduce the variability of the after-interest expense cash flows; while those with a negative correlation have greater incentives to swap towards fixed rates. Anyways, it is important to mention some other important inferences derived from the analysis of the Data Set. On one hand, contrary to the results of Faulkender (2005), the spread between

[72] The Latin phrase ceteris paribus – literally, "holding other things constant" – is commonly translated as "all else being equal." A dominant assumption in mainstream economic thinking, it acts as a shorthand indication of the effect of one economic variable on another, provided all other variables remain the same.

long- and short-term Treasury yields does not seem to affect the amount of floating rate debt firms have. Similarly, compensation metrics do not seem to affect the percentage of floating rate debt as previously debated by Chava and Purnanandam (2007). On the other hand, though, the Dataset, reveals that the absolute interest rate level or the spread with the Treasury rates, instead, have a remarkable statistical relevance. Nevertheless, it Is also crucial to understand that the above mentioned results do not distinguish between *cross-sectional* and *time-series* variations, and this is the reason why, in order to more accurately identify whether swap usage refers to hedging or speculation, the analysis need to be separated into both its *cross sectional* and *time-series* components to the purpose of isolating hedging or speculative techniques as discussed at the beginning of the paragraph.

As already mentioned, in fact, unless a firm dramatically changes its business model, the activities it performs would more or less be affected by interest rate fluctuations in the same way over time, or at least in the short-run. Accordingly, the assumption that the *optimal hedge ratio* has to remain the same, seems likely. Hence, all deviations from the *optimal hedge ratio* may be interpreted as a speculative activity being performed. Once again, speculative activities do not have both a precise direction or magnitude. This is why they impact the hedge ratio, always in a different way and with a different intensity. Nevertheless, because of their unstable and unpredictable nature, it can be assumed that over time their influence over the *hedge ratio*, sums up to zero. Thanks to these assumptions, the *"between effects"*[73] and the Fama-MacBeth specifications[74] (to interpret regressions), companies hedging practices may be identified and consequently analyzed.

2.2.1 Cross-Sectional Analysis

The cross-sectional analysis, clearly shows that companies' decisions over their interest rate exposure are dictated by hedging purposes. In particular, as reported by Table

[73] The between effects analysis is equivalent to taking the mean of each variable across time for each case and running a regression on the collapsed dataset of means.
[74] The Fama-MacBeth regression is a method used to estimate parameters for asset pricing models. The method estimates the betas and risk premia for any risk factors that are expected to determine asset prices. The method works with multiple assets across time (panel data).

n.2.2, the sensitivity of companies' net operating[75] and investing[76] cash flows, result to positively affect the share of floating rate debt a company has, even once accounted for swaps effects (all coefficients are positive and statistically significant).

Table n.2.2

Cross-Sectional Variation in Floating Rate Debt

This table reports the results of regressions explaining the cross-sectional variation in final floating rate debt percentage. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Fama-MacBeth specification is reported in column 1, between specifications are reported in all other columns. The sample period is June 1993 - May 2003. Cash flow interest rate beta is the beta from regressing free cash flow to assets ratio on the average value of the 3-month LIBOR during the fiscal year. Cash flow interest rate beta is estimated using at least five observations. Long-term debt is the percentage of outstanding debt that has more than five years to maturity. Total number of firm-year observations is reported. Average R^2 is reported in the Fama-MacBeth specification in column 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	−0.005***	−0.011*	−0.011*	−0.011*	−0.011*	−0.011*	−0.011*
	(0.002)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Leverage	−0.122***	−0.281***	−0.286***	−0.278***	−0.280***	−0.281***	−0.234***
	(0.026)	(0.082)	(0.081)	(0.082)	(0.082)	(0.082)	(0.079)
Debt or CP rating	−0.143***	−0.148***	−0.148***	−0.147***	−0.148***	−0.148***	−0.142***
	(0.012)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Long-term debt	−0.229***	−0.208***	−0.207***	−0.209***	−0.208***	−0.208***	−0.207***
	(0.022)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Operating margin	0.046*	0.089	0.091	0.092	0.089	0.090	0.074
	(0.025)	(0.062)	(0.062)	(0.062)	(0.062)	(0.062)	(0.061)
Z-score	0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.002
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Capex/Assets	−0.092*	−0.240	−0.243	−0.243	−0.239	−0.240	−0.227
	(0.050)	(0.156)	(0.155)	(0.156)	(0.156)	(0.156)	(0.155)
R&D/Assets	−0.496***	−0.812***	−0.792***	−0.794***	−0.810***	−0.813***	−0.887***
	(0.120)	(0.183)	(0.183)	(0.187)	(0.183)	(0.184)	(0.184)
Advertising/Assets	0.159	0.126	0.142	0.124	0.126	0.125	0.087
	(0.105)	(0.260)	(0.259)	(0.260)	(0.260)	(0.260)	(0.259)
Cash flow beta	0.006***	0.004**	−0.003	0.005**	0.004**	0.005	0.001
	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.004)	(0.003)
Cash flow beta × Capex/Assets			0.097**				
			(0.038)				
Cash flow beta × R&D/Assets				−0.017			
				(0.034)			
Cash flow beta × Advertising/Assets					0.015		
					(0.072)		
Cash flow beta × Leverage						−0.002	
						(0.017)	
Cash flow beta × Z-score							0.001
							(0.001)
Constant	0.651***	0.719***	0.719***	0.717***	0.718***	0.719***	0.693***
	(0.031)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)
N	8594	8594	8594	8594	8594	8594	8594
R^2	0.164	0.203	0.207	0.203	0.203	0.203	0.205

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 35

[75] Operating cash flow is a measure of the amount of cash generated by a company's normal business operations.

[76] Cash flow from investing activities is an item on the cash flow statement that reports the aggregate change in a company's cash position resulting from any gains (or losses) from investments in the financial markets and operating subsidiaries and changes resulting from amounts spent on investments in capital assets such as plant and equipment.

Once again, companies benefit from floating rates only if their cash flows are positively correlated to such floating rates so that the volatility of residual cash flows (cash-inflows – cash-outflows) is reduced and the risk of producing significantly negative cash-outs is practically minimized. The inverse is also true but in the particular Data Set being analyzed, the statistical significance of the opposite scenario, is not very pronounced. However, it seems to be only a sample bias. In addition, the cross-sectional analysis proves that firms engaging in R&D activities and with larger rated debts tend to more intensively swap their cash flows in order to reduce their volatility and to match residual obligations. Moreover, even if such an inference has already been debated when initially presenting the main Data Set's statistics, thanks to the improved accuracy and to the specificity of the cross-sectional investigation, it can be reasonably asserted that, if firms swap to fixed rate debt when they find floating rates riskier and potentially costlier to them, hence, the practice of swapping can be ascribed as a hedging practice. Indeed, in order to get a better understandings of hedging practices, it is important to trace links between investment opportunities and financial distress costs and the sensitivity of the companies' cash flows to interest rates.

If companies hedged to the purpose of avoiding to finance their investment opportunities with external funds, then those investing the most are supposed to be the ones with the biggest incentives to match cash inflows, due to firm's investing and operating activities, and outflows connected to the interest rate exposure. Accordingly, results provided by the cross sectional-analysis confirm this hypothesis. As evidenced by Table n.2 above (columns 3 through 5), those companies, in the sample, investing twice than the average (and having a 7% share of floating rate debt), have their share of floating debt much more sensitive to fluctuations of interest rates affecting their operating cash flows; almost three times more (0.011 vs 0.04). In addition, even if not statistically significant, the coefficient for the variable indicating the intensity of R&D expenditures (*Cash flow Beta* R&D / Assets*) remains negative, supportive of the above debated rationale.

Another important reason which promotes the matching of cash outflows related to companies' debt obligations and the operating and financial income[77] companies earn, is represented by the firms' intention to avoid or at least lower financial distress costs.

[77] Revenue earned and reported on the monetary statements of an organization

Accordingly, highly levered companies should pursue the greatest possible matching and consequently, for doing so, they have to rely on interest rate swaps. Even if the Data Set under consideration doesn't fully confirm this hypothesis, even in this case, it seems to be simply a sample bias. Indeed, the underlying rationale is too clear and commonly accepted by the financial community. However, the analysis still confirms that the more a firm is levered, the less it has floating rate debt. This is not to suffer from financial distress in the future and to reduce volatility of cash-outflows. The coefficient accounting for the correlation between a firm leverage and its percentage of fixed rate debt (named Z-score in Table n.2) is positive and statistically significant.

Summarizing, all the regressions run to verify whether a firm hedge not to rely on expensive and external source of funding or alternatively not to incur in financial distress costs, are more supportive of the former rather than the latter hypothesis.

2.2.2 Time-series analysis

If a cross-sectional analysis only provides evidence of hedging strategies companies put in place, a time-series analysis, on the other hand, is a far more adequate tool to underline the gap between the intensity of trading activities justified by hedging and the intensity of trading activities justified by alternative reasons. Accordingly, with the assumption that companies do not change their business models and react in a similar fashion to external influences over time, any discrepancy between expected reactions and actual ones might be attributable to speculative practices. Moreover, this type of analysis contributes with new elements to complete the bigger picture. Indeed, even though the cross-sectional analysis evidenced a negative correlation between floating rate debt and a firm's leverage, the time-series analysis while confirming the negative correlation between leverage and share of floating rate debt, adds something more: when a given firm improves its leverage, in the short-run, it usually does so by adding more floating rate debt. Additionally, with reference to the different regression run over the Data Set, the coefficient accounting for a firm capital expenditures[78] results strictly positive indicating

[78] Capital expenditure, or CapEx, are funds used by a company to acquire or upgrade physical assets such as property, industrial buildings or equipment. It is often used to undertake new projects or investments by the firm.

that over time, the more a company is intentioned to invest, the more it will resort to floating rate debt. Results are shown in Table n.2.3.

Table n.2.3

Time-Series Variations in Floating Rated Debt

This table reports the results of regressions explaining the time-series variation in final floating rate debt percentage. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Delta and Vega are standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in Delta or Vega. Firm fixed effects are included in all specifications. Standard errors are adjusted for clustering by firm. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capex/Assets	0.482***	0.357***	0.596***	0.368***	0.420***	0.362***	0.412***
	(0.085)	(0.086)	(0.120)	(0.097)	(0.121)	(0.094)	(0.118)
R&D/Assets	−0.179	−0.168	−0.528*	−0.382*	−0.441	−0.347	−0.462*
	(0.192)	(0.192)	(0.284)	(0.216)	(0.284)	(0.215)	(0.270)
Advertising/Assets	−0.107	−0.058	0.238	0.198	0.253	0.205	0.268
	(0.283)	(0.284)	(0.436)	(0.307)	(0.422)	(0.303)	(0.414)
Log(Sales)	−0.000	0.015	−0.006	0.007	0.006	0.006	0.007
	(0.009)	(0.010)	(0.014)	(0.011)	(0.014)	(0.011)	(0.014)
Leverage	0.224***	0.231***	0.288***	0.228***	0.286***	0.237***	0.282***
	(0.045)	(0.045)	(0.063)	(0.050)	(0.064)	(0.049)	(0.061)
Debt or CP rating	−0.138***	−0.132***	−0.160***	−0.115***	−0.153***	−0.114***	−0.149***
	(0.017)	(0.017)	(0.023)	(0.019)	(0.022)	(0.019)	(0.023)
Long-term debt	−0.203***	−0.203***	−0.207***	−0.213***	−0.204***	−0.211***	−0.197***
	(0.015)	(0.015)	(0.020)	(0.017)	(0.020)	(0.017)	(0.020)
Operating margin	0.015	−0.022	0.020	−0.024	−0.030	−0.028	−0.024
	(0.036)	(0.036)	(0.054)	(0.037)	(0.057)	(0.037)	(0.054)
1-year Treasury yield		0.231		0.473	0.689	0.520	0.601
		(0.520)		(0.561)	(0.806)	(0.559)	(0.785)
Swap yield spread		1.231**		1.426**	2.071**	1.569***	2.111**
		(0.563)		(0.591)	(0.879)	(0.594)	(0.844)
Swap spread		3.871*		3.145	5.777*	3.211	6.060**
		(2.068)		(2.235)	(2.979)	(2.245)	(2.956)
Credit spread		3.407		2.997	4.187	2.600	5.156
		(2.345)		(2.413)	(3.387)	(2.431)	(3.303)
Economy-wide floating-rate debt		0.832***		0.732***	0.792**	0.778***	0.912***
		(0.215)		(0.235)	(0.323)	(0.235)	(0.314)
CEO Delta			−0.014**	−0.012			
			(0.006)	(0.008)			
CEO Vega			0.000			0.003	
			(0.006)			(0.006)	
CFO Delta			0.008		−0.014*		
			(0.010)		(0.008)		
CFO Vega			0.004				−0.001
			(0.007)				(0.008)
CEO Delta × Swap yield spread				1.428**			
				(0.617)			
CFO Delta × Swap yield spread					2.329**		
					(0.904)		
CEO Vega × Swap yield spread						0.542	
						(0.393)	
CFO Vega × Swap yield spread							1.175*
							(0.684)
N	11228	11228	5876	9759	5933	9939	6181
R^2	0.086	0.096	0.099	0.098	0.112	0.096	0.105

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 36

This is also indicative of the fact that when companies have to rely on external sources of funding they find more reliable or convenient floating rate bank debt with respect to other solutions. Moreover, it seems that an increase in the spread between the fixed swap rate and the LIBOR (*Swap Yield spread* in figure), positively affect the share of floating rate debt a company wants to have and consequently its swap usage. Specifically, assuming the spread increased by 100 basis points, the share of floating rate debt targeted by the company, would usually increase, instead, by approximately 120 basis points, in a way that is more than proportional.

In order to verify whether compensation patterns within a company affects the intensity according to which swaps are used, two specific variables are introduced: CEO[79]and CFO[80] *Delta* and *Vega*, respectively accounting for the magnitude of CEO and CFO compensations. Results are a bit contradictory. In fact, according to the obtained coefficients, it seems that the higher the magnitude of CFO and CEO compensations, the lower the use of floating rate debt and consequently of swaps. Nevertheless, being a within specification[81], it is probable that the principle of causality runs from the compensation amounts to the swaps usage and not the other way around.

More importantly, greater compensations, seems to correspond to an improved sensitiveness of companies towards floating rate debt usage with respect to volatility in the term structure. Specifically, an increase of 100 basis points in the spread between the LIBOR and the swap rate corresponds to a 140 basis points increase in the exploitation of floating rate debt. This is the proof that when the management of a specific company is incentivized with compensations based on equity performance, they engage in speculative activities in order to increase the volatility of cash-flows coming from operating and financing activities and consequently augmenting the probability of improving both the financial performance of the company as well as its equity value. Most of the times though, downside risks are not fully taken into account because of

[79] A chief executive officer (CEO) is the highest-ranking executive in a company, and their primary responsibilities include making major corporate decisions, managing the overall operations and resources of a company, and acting as the main point of communication between the board of directors and corporate operations.

[80] A chief financial officer (CFO) is the senior executive responsible for managing the financial actions of a company.

[81] In panel data where longitudinal observations exist for the same subject, fixed effects represent the subject-specific means. In panel data analysis the term fixed effects estimator (also known as the within estimator) is used to refer to an estimator for the coefficients in the regression model including those fixed effects (one time-invariant intercept for each subject).

psychological biases, typical of the human individual, which induce market participants to assign a greater relevance to possible positive outcomes rather than to negative ones, even if they have almost the same probability of occurrence.

Results, which are consistent with Geczy, Minton, and Schrand (2007) are summarized by Table n.2.4 below.

Table n.2.4

Firm-Specific Sensitivities of Swap Usage to Yield Spread

This table reports the results of regressing firm-specific sensivities of swap usage to swap yield spread on firm characteristics. Firm-specific sensitivities are estimated using at least five observations. All explanatory variables are standardized values of firm-level means and thus represent the effect of one standard deviation change in the firm-level mean. Robust standard errors are reported. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)
CFO Delta	1.568**			
	(0.645)			
CFO Vega		1.283**		
		(0.624)		
CEO Delta			1.182***	
			(0.454)	
CEO Vega				0.936*
				(0.534)
Log(Sales)	−1.058	−1.131	−0.888	−1.062
	(0.746)	(0.757)	(0.623)	(0.706)
Leverage	−0.507	−0.417	−0.661	−0.657
	(0.694)	(0.703)	(0.651)	(0.642)
Debt or CP rating	0.615	0.648	0.273	0.329
	(0.797)	(0.789)	(0.753)	(0.752)
Long-term debt	−0.099	−0.157	0.246	0.175
	(0.687)	(0.690)	(0.636)	(0.635)
Operating margin	0.412	0.563	0.670	0.638
	(0.588)	(0.587)	(0.506)	(0.539)
Capex/Assets	−0.814	−0.847	−1.046	−1.038
	(0.672)	(0.678)	(0.636)	(0.636)
R&D/Assets	−0.231	−0.139	0.045	−0.021
	(0.798)	(0.818)	(0.753)	(0.764)
Advertising/Assets	0.238	0.303	0.286	0.424
	(0.581)	(0.580)	(0.499)	(0.500)
Constant	3.913***	3.942***	4.058***	3.999***
	(0.566)	(0.568)	(0.536)	(0.538)
N	652	658	717	718
R^2	0.017	0.013	0.016	0.013

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 36

As evidenced by column 2 in the Table above, companies whose earnings are approximately equal or above the consensus forecast have their share of floating rate debt, less sensitive to fluctuations in the term structure if compared with those companies whose earnings are not that similar to the ones predicted by the consensus forecast. This

indicates how the management of a company tends to progressively swap more towards floating rates as long as the earnings per share are lower than expected in an attempt to profit from an improved interest rate volatility. Moreover it is important to notice that companies having the possibility to manage earnings in a better way thanks to *discretionary accruals*[82] have a lower need of recurring to floating rate debt in order to meet earnings forecast. As a consequence, the sensitivity of floating rate debt usage to the volatility of the term structure is strictly lower for companies which may benefit from more *discretionary accruals* than for companies which have not the same possibility.

As reported in the fifth column of Table n.2.5 below, companies which may benefit from an average amount of *discretionary accruals* have their share of floating rate debt 1.2% higher relative to a 1% movement in the term structure. On the other hand, companies which may benefit from a lower (reduced by one standard deviation) amount of *discretionary accruals*, have their share of floating rate debt with correlated to the fluctuations of the term structure by only a 0,06%.

[82] Non-obligatory expense (such as an anticipated bonus for management) that is yet to be realized but is recorded in the account books.

Table n.2.5

Floating-Rate Debt and Earnings Management

This table reports the results of earnings management hypotheses tests. EPS 1/2/5 cents is a binary variable equal to one when realized earnings per share are equal to are up to 1/2/5 cents above the final mean earnings forecast. EPS debt is a binary variable equal to one when a firm would have missed its earnings forecast using the lagged value of floating-rate debt percentage but would have met its earnings forecast if it increased its floating-rate debt percentage by one standard deviation from its lagged value. Discretionary accruals are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)). Discretionary accruals are first scaled by lagged total assets and then standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in discretionary accruals. Firm fixed effects are included in all specifications. Standard errors are adjusted for clustering by firm. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)
EPS 1 cent × Swap yield spread	1.129				
	(1.201)				
EPS 2 cents × Swap yield spread		0.954			
		(1.078)			
EPS 5 cents × Swap yield spread			1.921**		
			(0.979)		
EPS debt × Swap yield spread				2.780*	
				(1.584)	
Accruals × Swap yield spread					−1.162*
					(0.659)
Swap yield spread	1.419**	1.368*	0.845	0.877	1.215**
	(0.682)	(0.701)	(0.747)	(0.697)	(0.572)
1-year Treasury yield	0.515	0.513	0.494	0.816	0.064
	(0.593)	(0.593)	(0.593)	(0.834)	(0.533)
Swap spread	2.532	2.547	2.641	2.541	5.003**
	(2.302)	(2.305)	(2.303)	(2.539)	(2.114)
Credit spread	1.806	1.794	1.730	2.173	2.811
	(2.635)	(2.637)	(2.638)	(2.781)	(2.394)
Economy-wide floating-rate debt	0.713***	0.712***	0.725***	0.680**	0.881***
	(0.243)	(0.243)	(0.243)	(0.290)	(0.221)
Capex/Assets	0.396***	0.395***	0.393***	0.290***	0.356***
	(0.093)	(0.093)	(0.093)	(0.106)	(0.088)
R&D/Assets	−0.128	−0.126	−0.126	0.320	−0.214
	(0.213)	(0.213)	(0.213)	(0.231)	(0.197)
Advertising/Assets	0.249	0.250	0.244	0.517	−0.109
	(0.311)	(0.311)	(0.310)	(0.365)	(0.287)
Log(Sales)	0.012	0.012	0.012	0.031**	0.017*
	(0.012)	(0.012)	(0.012)	(0.016)	(0.010)
Leverage	0.305***	0.305***	0.303***	0.369***	0.236***
	(0.054)	(0.054)	(0.054)	(0.060)	(0.047)
Debt or CP rating	−0.133***	−0.133***	−0.133***	−0.147***	−0.127***
	(0.019)	(0.019)	(0.019)	(0.022)	(0.017)
Long-term debt	−0.220***	−0.220***	−0.220***	−0.236***	−0.202***
	(0.017)	(0.017)	(0.017)	(0.019)	(0.015)
Operating margin	−0.009	−0.008	−0.008	0.010	−0.033
	(0.047)	(0.047)	(0.047)	(0.052)	(0.038)
Constant	0.104	0.106	0.109	−0.048	0.027
	(0.124)	(0.124)	(0.124)	(0.147)	(0.106)
N	9280	9280	9280	7102	10734
R^2	0.108	0.108	0.108	0.126	0.105

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 38

All these findings, highlight the fact that companies plan and act also according to short-term earnings reasonings

2.2.3 Summary

The just disserted analysis evidenced how firms engage both in speculative and hedging activities for different reasons and rationales. In particular, the cross-sectional analysis, underlined that companies use interest rate swaps to modify the share of floating rate debt compounding their capital structure[83], and they do so mostly to avoid recurring to more costlier sources of funding rather than lowering financial distress costs (Froot, Scharfstein, and Stein (1993)). The time-series analysis, as previously debated is the right instrument to identify and evaluate speculative practices and the most remarkable obtained evidence is that when incentivized by compensation metrics, CEOs and CFOs tend to modify the capital structure at their favor by augmenting the share of the floating rate debt thanks to interest rate swaps. Finally, meeting earnings forecast may work as a substitute for compensation metrics: the reputational component involved in meeting analyst forecasts could work as an incentive to swap more towards floating debt and incurring the risk of bigger losses.

Even dough the analysis refers to a particular Data Set, it is probably the biggest and more complete one addressing similarities and differences in swap usage between non-financial firms. Consistently, due to the complex nature of the Panel Data, it sounds reasonable to generalize the results to all those financial markets belonging to industrialized countries and assume the just disserted patterns as mirroring the reality.

2.3 How and Why Public Administration hedge or speculate with interest rate swaps?

2.3.1 Preliminary Considerations

During the last 15 years, there has been a relevant growth in the use of derivatives in both emerging and developed economies. With reference to mature markets, though, public debt managers already use derivatives to certain extents and in particular products

[83] The capital structure is how a firm finances its overall operations and growth by using different sources of funds. Debt comes in the form of bond issues or long-term notes payable, while equity is classified as common stock, preferred stock or retained earnings.

such as interest rate derivatives, cross currency swaps, forwards and others are used in an attempt to ensure that the government financing needs and its payment obligations are met at the lowest possible cost, over the medium to the long-run, consistent with a prudent degree of risk (Piga, 2001). In emerging economies, public debt managers, instead, begun to use them recently.

It is extremely important to mention that the growth has been considerable in OTC transactions as well as the ones conducted through exchanges. Indeed, both markets offer their advantages. Exchanges, for instance almost completely eliminate counterparty risk thanks to clearing mechanisms, while on the other hand, OTC transactions are easy to personalize and fit specific needs. In particular, public debt managers use derivatives and swaps to pursue clear and well delineated strategies built upon a *costs-benefits*[84] analysis. Among the different goals to be achieved, one of the most important is to develop and maintain an efficient market for government securities. Consistently, derivatives are useful to modify decisions related to primary funding as well as the optimal composition of the overall portfolio (securities and derivatives together).

Whenever, evaluating whether achieving the desired risk and diversification profile by means of derivatives contracts or direct funding, the two different scenarios need to be *ex ante*[85] analyzed and compared. A direct issue of foreign debt, for instance, is comparable with a domestic currency debt issue along with the subscription of a currency swap which exchanges domestic currency cash flows for foreign currency ones. Anyhow, while having achieved a similar exposure towards the foreign currency, the two operations present very different features. First of all, by entering into a swap the exposure is increased towards a different range of risks with respect to a direct issue. In addition, issuing debt in foreign low-yield currencies, might be useful in sensibly reducing interest expenses, while issuing debt in the domestic currency, to subsequently swap cash flows, does not produce the same results. Further, issuing foreign currency debt might prove optimal in order to incentivize foreigners in investing in that specific country's securities and this adds liquidity to the market. Not less important, issuing foreign currency debt

[84] A cost-benefit analysis is a process by which business decisions are analyzed. The benefits of a given situation or business-related action are summed, and then the costs associated with taking that action are subtracted.

[85] Ex-ante, derived from the Latin for "before the event," is a term that refers to future events, such as future returns or prospects of a company. Ex-ante analysis helps to give an idea of future movements in price or the future impact of a newly implemented policy.

might be necessary to roll-over[86] an already issued foreign-currency debt. Lastly, deciding to issue debt in a different currency rather than in the domestic one, can be part of an optimal *"asset-liability management framework[87]"*, in a country where central banks and debt management offices closely cooperate (Piga, 2001). On the other hand, though, transaction costs related to a direct issue (setting up the auctions, declaring the issuance to the market), are much higher if compared to the opportunity of using derivatives; especially in the last years during which technology is contributing to a substantial market convergence and transaction costs reduction in OTC transactions. Furthermore, as abundantly debated by Missale (2000), the liquidity of fixed income[88] markets is quite different by reaching a certain level of market risk thanks to direct funding or via derivatives. However, probably the main rationale behind the use of derivatives in general, and swaps in particular, by public administration, pertains to cost savings. Suppose, for instance, that a certain European country issued a 5-year fixed-income bond and contemporarily decides to enter into a 5-year *plain vanilla* swap with a given counterparty agreeing to pay a variable rate (i.e. the 6-months Euribor) in exchange for a fixed rate set by current market conditions (i.e. 5,5%). Suppose further, the government pays a 10- year rate equal to 5,1% on its benchmark so that the swap spread is equal to 40 basis points (5,5%-5,1%). Assume further that, as an alternative solution to raise funds, the government could finance itself on the 6-months end of the curve (term structure) by issuing bonds at a 4.5% rate, while the Euribor stands at 4,7%. Netting out all the interest payments and taking into account the opportunity cost [89]of financing itself on the bond market rather than entering the swap, the government, is left with a surplus of 20 basis points ((4,5%- 4,7%)+(5,5%-5,1%)) to be projected on the outstanding notional. As a matter of fact, hence, a positive swap spread is not a sufficient condition to render the derivative transaction beneficial. Indeed, the spread has to be large enough to absorb the differential between the variable rate to pay (the Euribor in the example) and the rate at which the government could finance itself in shorter maturities debt

[86] A rollover occurs when reinvesting funds from a mature security into a new issue of the same or a similar security; transferring the holdings of one retirement plan to another without suffering tax consequences; or moving a forex position to the following delivery date.

[87] Initially pioneered by financial institutions during the 1970s as interest rates became increasingly volatile, asset and liability management (often abbreviated ALM) is the practice of managing risks that arise due to mismatches between the assets and liabilities

[88] Fixed income is a type of investing or budgeting style for which real return rates or periodic income is received at regular intervals and at reasonably predictable levels.

[89] Opportunity cost refers to a benefit that a person could have received, but gave up, to take another course of action. Stated differently, an opportunity cost represents an alternative given up when a decision is made. This cost is, therefore, most relevant for two mutually exclusive events.

markets (the opportunity cost). As long as the overall spread remains positive, the "*comparative advantage"* rationale (discussed in the first chapter) holds and entering the interest rate swap would be cheaper than financing itself in shorter maturities debt markets. Note, however, that such a transaction is extremely different from what is intended to be an arbitrage due to the fact that gains are uncertain until they are realized (the spread between the variable rate and the opportunity cost rate has to remain constant over the life of the contracts). As a consequence, the gain is not immediate and also a considerable amount of risk is involved. Nevertheless, rather than pure arbitrage opportunities, certain governments might benefit from *"accounting arbitrage"* which refers to the practice of swapping into foreign currencies paying a low yield[90] which according to Fisher (1896) are also the ones expected to appreciate[91] the most. Anyhow, such an appreciation would not affect that much interest payments, but the amount of domestic-denominated currency of public debt to be rolled over, instead. Indeed, such a strategy would not impact the budget deficit during the life of the bond, but on the contrary, it has an impact once the bonds expire to maturity, equivalent to gains which, in turn, are proportional to the intensity of the appreciation of the foreign currency versus the domestic one. However, as long as technology improves and globalization promotes both the integration and the alignment of financial markets, arbitrage opportunities arising from frictions, inefficiencies and considerable transaction costs would always decrease in number and magnitude, reducing the gap between perfect financial markets and current ones. The historical overview provided in the next paragraph will clear these aspects, describing their evolution over time.

Historical Panorama

Since 1970, European Public Administrations started dealing with financial derivatives because of their particular features that allowed them to manage crucial

[90] The yield is the income return on an investment, such as the interest or dividends received from holding a particular security. The yield is usually expressed as an annual percentage rate based on the investment's cost.

[91] Appreciation is an increase in the value of an asset over time. The increase can occur for a number of reasons, including increased demand or weakening supply, or as a result of changes in inflation or interest rates

transactions in a better way and have a better control on certain financial parameters including public debt. In particular, the way public debt has been addressed by Public Administrations through derivatives trading, will represent the main dissertation topic of this thesis from now to the end of it. As it will be debated in the next pages, the history of the use of derivatives widely varies across developed economies. Indeed, while having followed a common path, it has been influenced by each countries' idiosyncrasies. In particular, in the late 70s and during the 80s (the very first years in which derivatives started to be commonly traded in the Eurozone) many countries' financing needs exploded. Generally speaking, governments had no experience in borrowing, and used to borrow wherever they could such as in foreign exchange markets, for example, without thinking about risks. Strategies in the '80s in the foreign currency market, were mainly based on opportunistic behavior rather than on a properly delineated systematic planning. As a consequence, most of derivatives transactions carried an excessive amount of risk even if public debt managers were not completely aware. In some circumstances, the opportunistic behavior was replaced by a speculative one. Governments used to take positions in derivatives which were reflecting completely different market views with respect to the ones implied by the term-structure. Entering into a derivative transaction for public debt managers, at that time, was equivalent to express a clear market belief, reflecting a specific stance and expressing the willingness of a given country to position itself with respect to the financial community rather than attempting to hedge. An anonymous market maker of that time argued: *"The '80s were years of positioning more than hedging for all countries full of sins like A, B and C. It was very probable to us. They would come and ask: Can you do this? Can you do that? We realized a windfall with not very ethical business"* (Piga, 2001, Derivatives and Public Debt Management, pp.39).

Anyhow, such kind of trades, sensibly decreased as soon as governments started to suffer huge losses. Once again, Piga (2001) wrote that a non-specified European country in 1992 was playing convergence trades which resulted in big losses. In particular: *"It* (the country) *would receive 101, pay 100 in the budget and invest 1 in Italian liras. As the lira devalued the hit was hard."* (Piga, 2001, Derivatives and Public Debt, pp.39). Due to the many losses suffered by different European countries, at the beginning of the '90s, emphasis shifted to a greater attention to risk. In particular, the advent of the Euro, permitted derivatives' programs to have a much greater extension due to lowered financial barriers. Indeed, before the Euro, derivative programs faced two main obstacles.

The first was the possibility that a sovereign borrower entering a national OTC market would disrupt its functioning by causing large swings in prices (government borrowers being such large actors relative to the size of the market). The second obstacle, instead, was the aversion of debt managers of being perceived as playing against the market or signaling to the market when they actually were not. Thanks to the market expansion, though, countries which entered into derivatives transactions were not perceived as big players taking a view about the market anymore but rather as rational investors with an adequate level of knowledge attempting to hedge. With such a premises, governments started to use interest rate swaps to modify both the duration of their debt and impact the liquidity of secondary long-term bond markets. As depicted in the Table n.2.6 below, the countries which engaged the most in interest rate swaps transaction, on an absolute value, by the end of 1999 were Sweden, Belgium and Austria, while countries such as Italy, France and Netherlands started thereafter with different purposes and adopted strategies.

Table n.2.6

Notional Outstanding (EUR billions) and % notional over public debt at December 31, 1999

Country	Notional outstanding (EUR billions) December 31, 1999	% notional over public debt	Notes
Austria	18.16	15.4	
Belgium	22.95	9.4	
Canada	10.6	3.8	March 1999
Denmark	16.22	21.54	
Finland	8.66	12.75	
France	0	0	
Germany	0.71	0.23	
Netherlands	0	0	
Ireland	11.92	29.9	
Italy	10	0.91	
Portugal	7.04	11.25	
Spain	3.65	1.02	
Sweden	75.72	50.72	June 2000
United Kingdom	3.5	0.54	March 2000

Source: Piga, 2001, "Derivatives and Public Debt Management", pp.25

France and Germany, among others, announced a swap program, by the end of 2001.

At the very beginning of the 2000s, countries started to adopt a supervising system in order to monitor and evaluate derivative transactions according to specific and previously set criteria. In particular, Sweden was the first country to use a *"benchmark"*, suddenly followed by France, Greece, Italy and Spain. A *"benchmark"* portfolio, therefore, is basically an ideal portfolio, established by the public debt management department and approved by the Government, with a pre-determined risk-reward profile, from which

public debt managers have the possibility to deviate only in case of high expected gains and moderately risky positions. Hence, active management[92] decisions are permitted only in particular cases, while passive debt management[93] favored the increase in the number of derivative transactions over the last 20 years. In addition, some governments such as France, Germany and Netherlands, pursued interest rate swaps program on the pay-floating leg[94], while others, such as Italy and Spain, on the pay fixed-instead (Piga,2001).

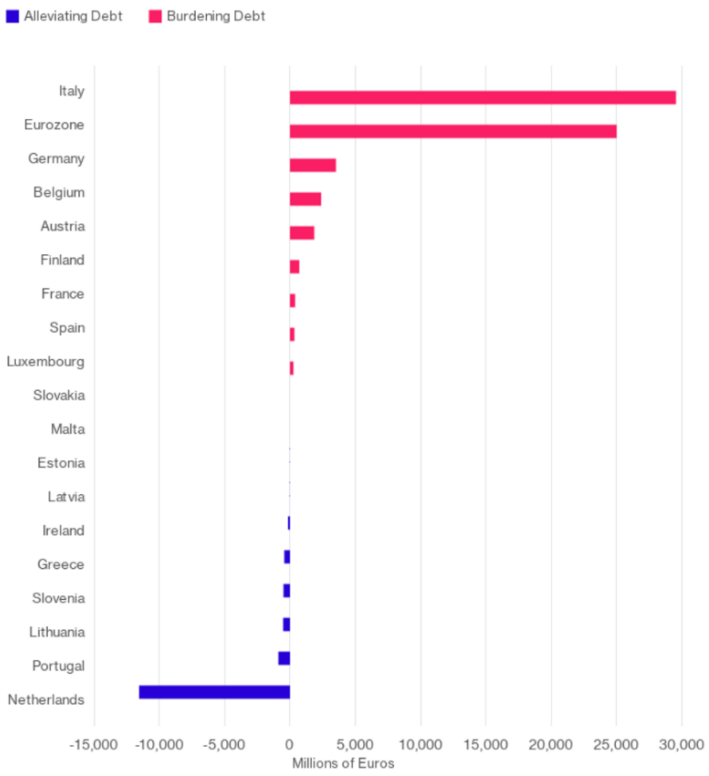
The main reason for converting long-term liabilities subject to a fixed rate into shorter-term ones subject to floating, is to reduce the debt duration to gain on the interest rate differential and consequently lower the burden of interest payments. In fact, by swapping into floating rate the weighted average of the interest payments to be performed is shifted more towards shorter maturities. Obviously, the inverse is also true: swapping into fixed rate allows public debt managers to dilute the payments to be performed and consequently extend the public debt duration and improve its sensitivity with respect to fixed rates. However, all over the Eurozone, results proved to be very heterogeneous. In fact, European countries achieved very different results depending both on the intensity of swap usage and on which one of the two legs they decided to invest in. With particular reference to the last 10 years, for instance, countries being exposed relatively more to floating rates had an enormous benefit from the steady deflation[95] the 2007 financial crisis have been causing, since then. On the contrary, countries (such as Italy) which believed interest rates to be increasing in a context of moderate economic growth, saw their Net Position [96] deteriorating as soon as interest rates started declining while realizing enormous losses. Figure n.2.1 clearly exemplifies the current situation in the Eurozone. The great majority of the most developed economies such as Germany, Italy, France and Spain, are the ones which have been hit the most by losses on interest rate swaps.

[92] Active management is the use of a human element, such as a single manager, co-managers or a team of managers, to actively manage a fund's portfolio. Active managers rely on analytical research, forecasts, and their own judgment and experience in making investment decisions on what securities to buy, hold and sell.
[93] Passive management is a style of management associated with mutual and exchange-traded funds (ETF) where a fund's portfolio mirrors a market index. Passive management is the opposite of active management in which a fund's manager(s) attempt to beat the market with various investing strategies and buying/selling decisions of a portfolio's securities.
[94] cash flows exchanged in a swap are referred to as legs
[95] Deflation is a contraction in the supply of circulated money within an economy, and therefore the opposite of inflation. In times of deflation, the purchasing power of currency and wages are higher than they otherwise would have been
[96] The value of the position subtracting the initial cost of setting up the position. For example, if 100 options where purchased for $1 each and the option is currently trading for $9, the value of the net position is $900 - $100 = $800.

Specifically, in the period between 2012 and 2016, Germany, France and Spain recorded moderate losses respectively for €3, €1 and €1.2 billion while Italy approximately lost €29.6 billion (€4.6 billion more than the whole Eurozone[97]) which further contributed to the deepening of the Italian Public debt. In 2016, only, they have been recorded losses for a record amount of approximately €9 billion (Bloomberg news calculations based on Eurostat data, 2017). Being, the Italian one, an extremely peculiar case, it seems worth discerning it to grasp all the details. The following chapter, therefore, will be completely devoted to its debate. With reference instead to countries which not only did not recorded a loss, but also gained from entering interest rate swaps, the winner is of course Netherlands, which in the same previously considered period saw his debt ameliorated by approximately €12 billion; a very striking feature. The gain earned by other countries, such as Ireland, Greece and Portugal was not that huge, but still remarkable. Respectively €0.2, €1.2 and €1.8 billion.

Figure n.2.1

Total Impact of Derivatives' losses: Net liabilities On Public Debt (from 2012 to 2016)



Source: Bloomberg New Calculations Based on Eurostat data, April 2017

[97] It is possible because come countries gained from positions in swaps and partially offset the losses recorded by the rest of the countries.

As it has previously mentioned, those countries which entered into interest rate swaps and recorded gains over the last 20 years, certainly invested on the pay-floating leg of the swap and took advantage from a much higher fixed rate to be received in exchange during the last ten years where the level of nominal interest rates was at its historical minimum, while real interest rates have sometimes been even negative (hard deflation). Accordingly, as already debated, the inverse also holds: those countries attempting to prevent an increase of interest rates tried to insure themselves and fix the rate to be paid in subsequent years through the subscription of swaps on the pay-fixed leg. Unfortunate, due to the financial crisis and the credit crunch[98], the fixed-floating interest rate differential was so high that previously mentioned countries had to record huge losses.

Focus on the Italian Panorama

Public Debt, defined as the difference between borrowings and repayments incurred or performed over time by a certain government, can be split between "internal" which includes borrowings and repayments within entities in the same country or "external", considering funds borrowed and repayments received from other countries. Furthermore, internal debt includes financial instruments such as government bonds[99], market stabilization schemes[100] and other securities against small savings.

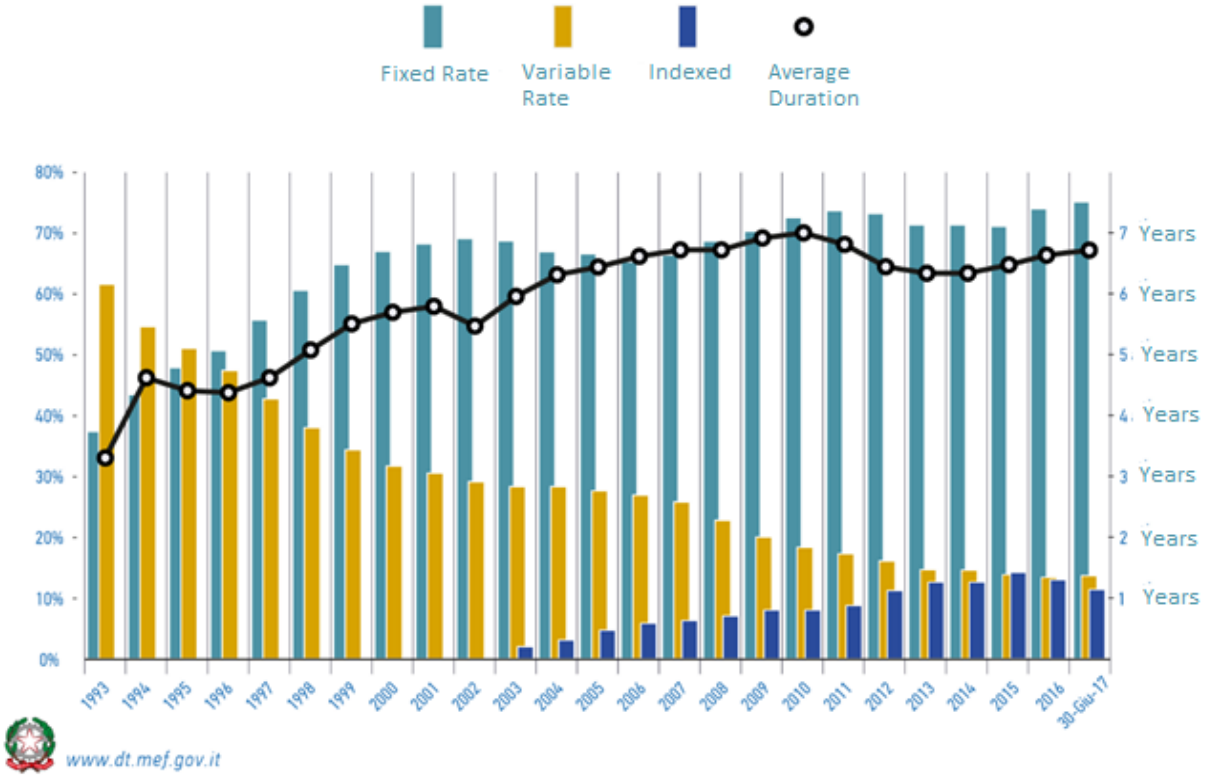
With a focus on the Italian landscape, as depicted in figure n.2.2 below, during the period ranging from 1993 to 2017, always an increasing percentage of the Italian public debt has been financed by the issuance of fixed rate securities (in 1993 pretty much 36% of the debt was composed by fixed rate obligations while at June 2017 the percentage increased up to 72%). During the 90s, though, when rates were easily predictable to be growing due to a steady economic growth, most of the issued securities were paying a floating rate. They were eventually swapped into fixed rate liabilities, in a context were interest rate

[98] A credit crunch is an economic condition in which investment capital is difficult to obtain. Banks and investors become wary of lending funds to corporations, which drives up the price of debt products for borrowers.
[99] A government bond is a debt security issued by a government to support government spending.
[100] Market Stabilization scheme (MSS) is a monetary policy intervention by the RBI to withdraw excess liquidity (or money supply) by selling government securities in the economy.

movements were predictable and being protected by their fluctuations was a relatively easy task. However as long as financial scenarios became unpredictable, the portion of the Italian Public Debt financed by variable rate bonds and securities, diminished down to a relatively moderate 13%. Indexed securities[101], instead, are quite a novelty and during the last 15 years acquired weight relative to the other components of the deficit[102]. Furthermore, the black-dotted line represents the average debt duration[103] and as it might be easily realized, it is continuously increasing as a result of a specific strategy that will be subsequently discussed in detail.

Figure n.2.2

Evolution of the Italian Public Debt Structure & Average Duration



Source: MEF[104] Treasury Department

[101] An index-linked bond is a bond in which payment of income on the principal is related to a specific price index
[102] When referring to accrued federal government deficits, the deficits are referred to as the national debt.
[103] An index-linked bond is a bond in which payment of income on the principal is related to a specific price index
[104] Ministry of Economics and Finance

The very first time transactions in derivative products were authorized was in 1985[105], when the financial decree enacted in the same year, authorized the Ministry of Treasury to enter into derivative contracts, while all the protocols to be followed and the extents to which derivatives trading was authorized were and actually are detailed in annual ministerial decrees. The *"cornice"* decrees of 2005, for instance, provided the guidelines for the issuance policies and the objectives to be pursued while attempting to restructure the public debt. In the various decrees, interest rate swaps, and generally derivatives, were categorized as a complementary tool to be coupled with the issuance of other securities, in order to reduce both exchange and interest rate risk. More specifically, derivative contracts are signed by the Director of the Treasury department of the economic and Finance Ministry, who is in charge of communicating it to the Cabinet of the Treasury Minister and to the General Director. Furthermore, all the details and directives related to the modalities according to which the Ministry and the counterparties have to interact between them, are regulated by the ISDA[106] setting (Commissione VI Finanze della Camera dei Deputati,2015).

It is important to mention that in the international landscape, those countries which actively manage their public debt, usually take advantage of separate entities, most of the times directly unrelated to the Ministry of Finance or the Treasury, in order to enjoy the benefits of specialization and more efficiently perform in financial markets. However, those separate bodies still have to follow specific guidelines dictated by their Ministry and periodically report both the achievements and the way they have been reached. It is the case of countries such as Spain, Belgium, France and Japan. More specifically, those dedicated bodies present the same structure of financial institutions; in fact, they usually have a back, a middle and a front office and each of them, contains a risk management unit, which in turn are supervised by internal audit mechanisms. The second direction of the Treasury Department, being entrusted to financial derivatives management, is pretty much organized as described above (Piga,2001).

Anyway, debating about the different scopes of trading in swaps, within the categories of hedging and speculation, it is possible to trace a lot more of purposes and rationales

[105] Law 22 December 1984 No.887 (Financial Law 1985)
[106] The ISDA (International Swap Dealers Association) Master Agreement is the most commonly used master service agreement for OTC derivatives transactions internationally. It is part of a framework of documents, designed to enable OTC derivatives to be documented fully and flexibly.

justifying their use. Specifically, with reference to Public Administrations, the main reasons are the following:

- *Modifying the Public Debt Duration*: by entering into interest rate swap contracts carrying a longer(or shorter) duration than the public debt one, it is possible to modify the public debt duration itself, to extend (or shorten it). This practice might reveal a powerful risk management[107] tool, since it allows to match the duration of cash-inflows and outflows, hence avoiding, or at least lowering both the risk of default on public debt or other liabilities and any related refinancing risk[108]. Additionally, it allows to reduce interest rate risk connected to the roll-over of the debt, without having to renounce to new security issues in the short-term. In fact, because of their particular nature, most of derivatives contracts have a moderate or null impact when initiated.
- *Constructing the necessary capital to face cash outflows implied by previous issuance of bullet bonds[109]*: by entering into bullet amortizing swaps[110], Public Administration might be able to allocate the necessary amount of money, in order to match cash disbursements implied by previously signed obligations.
- *Postponing cash disbursements or realizing immediate cash inflows (window dressing)*: derivatives, in fact, can be used to restructure certain stream of cash flows and in case of financial distress, realize immediate cash inflows, probably at the expense of one or more unfavorable transactions to be entered in the future. In this way, public accounts can be manipulated so that they might look better than they actually are. The practice may be seen as a sort of speculative activity; in fact, who receives the initial payment, suddenly realizes a windfall gain, without facing any cost, but the amount of volatility involved in the transaction is so high that future transactions may eliminate or turn the gain into an effective loss. Still, the desire (and probably the need) of realizing an immediate cash-in, is superior to any other consideration so that the risk of incurring into a loss and the possibility of earning a profit are not proportionally weighted. It is important to

[107] In the financial world, risk management is the process of identification, analysis and acceptance or mitigation of uncertainty in investment decisions.
[108] The risk that an early unscheduled repayment of principal on mortgage-backed securities(MBS) will occur when the underlying mortgages are refinanced by borrowers.
[109] A bullet bond is a debt instrument whose entire principal value is paid all at once on the maturity date, as opposed to amortizing the bond over its lifetime
[110] An exchange of cash flows, one of which pays a fixed rate of interest and one of which pays a floating rate of interest, and both of which are based on a notional principal amount that decreases.

mention that, if one of the parties involved in the transaction aims at receiving a premium[111] at the inception of a contract, the contract's Net Present Value[112] can't be zero; indeed, the contract is unbalanced towards one party with respect to the other, so that a reward is needed to compensate for the unfavorable conditions the disadvantaged party is going to accept, according to market expectations of that time. These contracts are denominated *"convex[113]"*.

With reference to practical applications, Public Administrations use to enter into derivatives contracts with almost the same aspirations of any other market participant. Specifically, interest rate swaps are the most exploited and common financial instrument Public Administrations benefit from.

In addition, the three above mentioned categories gather together many other objectives associated to derivatives trading. The most important and common ones are debated in the next four paragraphs.

2.3.2 Pure hedging

When issuing floating rate bonds, to the purpose of reducing the uncertainty and the associated volatility of cash disbursements, Public Administrations usually enter into pay (fixed)–receive (floating) interest rate swaps, so that cash flows dependent on the floating rate to be received, are actually matched with similar cash-outflows related to the issuance of floating rate bonds. In such a way, for the portion covered by interest rate swaps, the floating rate cash-out is turned into a fixed one and all the associated volatility reduces to zero. Of course, in order to properly reduce volatility, the duration of the swap has to be very similar to the one of the underlying bond, otherwise at a certain point of time, cash flow wouldn't be matching and the strategy would not be effective anymore. However, the reduction in volatility is obtained at the expense of a missed gain in the case

[111] it's the total cost to buy an option, which gives the holder the right but not the obligation to buy or sell the underlying financial instrument at a specified strike price

[112] Fair value is defined as a sale price agreed to by a willing buyer and seller, assuming both parties enter the transaction freely

[113] Convexity is a measure of the curvature in the relationship between securities prices and yields (rates) that demonstrates how the duration of a security changes as the interest rate changes. Convexity is used as a risk-management tool, and helps to measure and manage the amount of market risk to which a portfolio of securities is exposed.

interest rates decreased over the life of the bond; in that case, in fact, the swap would imply a stream of cash-outs due to the positive difference between the paying and receiving rate. Note that, as previously discussed, the practice of renouncing to a possible upside potential, with the purpose of reducing the uncertainty associated to a certain variable refers to hedging.

2.3.3 Extending or shortening the maturity of a portfolio

As already mentioned, financial derivatives might be used to modify the duration of a given portfolio. In the case of a Public Administration, when fixed rate bonds have to be rolled over, the risk of entering into contracts implying new less favorable conditions, represents a cost. Accordingly, to avoid or at least reduce costs related to the volatility of the term structure and modify the duration of the portfolio of bonds, two basic solutions arise: or bonds with greater maturities are issued or pay fixed-for-receive-floating interest rate agreements with a longer maturity with respect to the bonds in the portfolio are signed (Piga, 2001). In this way, any loss in the value of the portfolio of issued bonds is offset by the increase in value of the swaps. Anyhow, in the case of a lowering of interest rates, the opportunity cost of not having entered swap contracts, is the same as in the previous case. Indeed, the gain produced on floating rate bonds is entirely offset by losses incurred on the swap position.

On the other hand, interest rate swaps may be used by Public Administrations, to shorten the public debt duration. Indeed, by swapping payments to be performed (related to issuance of long-term fixed rate bonds) into cash flows subject to a variable rate, larger elements of the government liabilities are adjusted to the current levels of interest rate. Accordingly, the immediate interest rate burden increases at the expense of the future one, shifting the weighted average of due interest payments closer to the present with respect to how it was before. By definition, the overall portfolio's (public debt and derivatives) duration decreases, while refinancing gets riskier and interest rate volatility much higher. Hence, swapping into floating rates, of course, lowers the duration of the overall public deficit by anticipating the due payments and consistently reduces the nominal amount of the public debt. Nevertheless, relying on a floating rate pattern is extremely risky in the absence of a clear view of interest rate fluctuations. While

positioning on the pay-floating leg of the swap in a period of deflation (i.e. Netherlands) may prove extremely beneficial; doing so in a different context would bring to huge interest payments to be performed in always shorter time spans, with increasing refinancing and default risk.

2.3.4 Upfront[114] receipt

As detailed in the previous chapter, swap agreements are usually said to be fair contracts (zero Net Present Value[115]), because of their nature. At the inception of the agreement, in fact, none of the parties is supposed to be in a favorable or unfavorable condition, so that the upfront cost to be paid to enter such a contract is practically zero. What if, instead, one of the parties is offered a rate which is strictly lower than the one financial analysts expect for that certain period of time in exchange for a rate which, instead is consistent with market expectations? How can the party put in unfavorable conditions, be incentivized to enter such an inconvenient agreement? By the payment of a price called the *upfront.* At the inception of the contract, hence, the disadvantaged party is paid a certain amount of money, sufficient to provide him with all the necessary incentives to accept the unfavorable conditions. Anyhow, most of the times, disadvantaged parties accept those conditions simply because they need with extreme urgency the initial cash-in. It partially seems to be the case of the Italian Treasury Ministry, which, during the 80s and 90s has been exploiting this type of financial instruments to suddenly ameliorate the current public financial deficit and let accounts look better than they actually were. All this, at the expense of a stream of very probable subsequent payments the treasury has been and it is actually forced to periodically make (Piga, 2001). The argument will be the main dissertation topic of the following chapter. However, with reference to European countries, recent developments in the law system ruling the management of the public debt, have been modifying the accounting approach

[114] Cashflows exchange at the inception of a contract
[115] Fair value is defined as a sale price agreed to by a willing buyer and seller, assuming both parties enter the transaction freely.

which now considers the acceptance of these contracts as an actual deterioration of public finances (additional debt) rather than an improvement. (SEC 2010[116]).

However, as it might be easily realized, such a practice perfectly fits the category of *"window dressing"*, previously introduced.

2.3.5 Receipt of a premium.

While the aims are almost much the same of transacting in convex swaps, as disserted in the previous paragraph, the derivative instrument used to perpetrate them is not a pure swap agreement but a *swaption*, instead. *Swaptions* in fact, are options granting its owner the right but not the obligation to enter into the underlying swap. The rates at which the eventual swap will be entered in the future are called the Strike rates and even if the Strike rates were set so that the probability of entering into a fair transaction in the future is the highest, with the passage of time, interest rates fluctuate so that to render the option of entering the swap more or less valuable to one of the involved parties (Hull, 2009).

Obviously in order to acquire the option and not the obligation to enter into a swap agreement in the future, an upfront price needs to be paid and consequently, selling it, implies an upfront cash-in. It might happen that sellers, act motivated by the need of a cash-in rather than by hedging purposes. Selling a *swaption*, in fact, is equivalent to improve the volatility of future cash flows and to eventually commit itself to future disbursements. The counterparty, in fact, would be willing to exercise the option only in the case, rates in the future would be favorable to it or equivalently when the *swaption* would have a value greater or equal to zero to the counterparty. As mentioned earlier, the purpose of entering into transactions with these characteristics is simply to receive a premium at the inception of the contract and most of the times, such initial payment is diluted in installments so that to match them with the first eventual cash disbursements.

Such *"window dressing"* practice, assumes the characteristics of any other speculative activity. In fact, it bets on an unlikely term structure's pattern, while suddenly producing

[116] In 2014, European countries adopted a new system for public national and regional accounts management which substituted the previous one (SEC 95)

an immediate and considerable cash-in. Despite that, the amount of leverage, uncertainty and volatility associated to these kind of transactions is so elevated that most of the times they produce financial disasters.

2.3.6 Financial Derivatives and The Italian Public Administration: Historical Developments

The Treasury Ministry started to actively trade financial derivatives in the middle 80s' and over time, the way derivative instruments have been approached, their intended use and accounting treatment, have all been continuously modifying, so that it is possible to define five different phases pertaining to the history of the Italian public debt management which are predominantly characterized by different features (Commissione VI Finanze della Camera dei Deputati, 2015).

During the first ten years (1985-1995) of derivatives trading, therefore, the great majority of signed contracts were pertaining to *cross currency* swaps aiming at restructuring the foreign debt and hedging against fluctuations in the exchange rates.

In the second phase instead, which approximately started in the 1995 and lasted until the origins of the financial crisis of 2007, the legal environment allowed the recording of derivatives transactions so that the initial upfront could have been registered as an amelioration of the current deficit even if the upfront itself would have implied a long series of negative cash flows in the future *(window dressing).* Accordingly, a multitude of swaps and *swaptions* were initiated in order to let the public accounts look better in the present. At a first glance, the strategy seemed to work. In 1998, in fact, the Treasury cashed-in approximately 3 billion € thanks to swaps and *swaptions* agreed on disadvantaged conditions (Commissione VI Finanze della Camera dei Deputati, 2015). Starting from 2005, though, the sign of the cash flows associated to the same contracts became negative and remained the same as it is nowadays. Nevertheless, during the same time span, derivatives were bought and sold also to modify and in particular lengthen the duration of the Italian public debt. In fact, by extending the duration of the debt, also the burden of the due payments related to previously signed contracts could have been lowered and spread on a longer time period. Analogously, the liabilities associated to the issuance of bonds and other securities could have been diluted and softened over time.

The third phase, instead approximately started in March of 2008, when the European Commission enacted one of the most important document which become a pillar of derivatives transactions' regulation and its related accounting treatment : the *"Eurostat Guidance on accounting rules for EDP*[117]*"*. The biggest novelty, was that all those off-market[118] swaps (whose rates were not reflecting market equilibria) should have been treated exactly as loans and hence liabilities. In fact, there was no more the possibility to fully record the initial upfront against the market value of the outstanding debt. Particularly, the new directive mentioned: "*Lump sums exchanged at inception on off-market swaps should be classified as loans (AF.4) under ESA 1995, with an impact on the Maastricht debt when the lump sum is received by government. Off-market swaps are to be partitioned in the ESA 1995 balance sheet into a loan component and a regular (at-the-money) swap component. Similarly to swap cancellation, the EDP correction line does not include the lump sum at inception on off-market swaps, but includes streams of interest payments on off-market swaps corrected for the amortization of the lump sum over the life of the contract."*. (European Commission, Eurostat Guidance on accounting rules for EDP; March 2008). Namely, rather than considering the off-market swap as a unique transaction, once the above mentioned directive has been enacted, it had to be considered as the combination of *an at-the-money*[119] swap agreement, hence with a null fair value, and additional debt for the portion of interest rates provided by the agreement differing from the fair ones. Accordingly, hiding huge deficits became more difficult and *window dressing* practices found greater obstacles. Anyhow, when entering off-market swaps, all those stream of interest payments which were still positive even once accounted for the lump sum received at the inception of the contract, could have been recorded against the market value of the deficit, hence reducing it, over the contract maturity. Consistently, due to the new regulatory framework, all those contract initiated within that period aimed at reducing the impact of variations of the term structure in a period in which market expectations predicted low interest rates for long maturities, hence incentivizing actors in the financial markets to buy insurances against possible deviations from expected rates. Still, duration of the contracts remained relatively elevated in order to

[117] Excessive deficit procedure
[118] Non-competitive compared to current market conditions.
[119] At the money is a situation where an option's strike price is identical to the price of the underlying security

extend the overall duration of the resulting portfolio of derivatives and previously issued securities (bonds), for the same previously debated purposes.

The fourth phase, instead, was characterized by the global financial crisis that harshly hit all the most industrialized and financially developed countries approximately in 2007, exploded in the sub-prime mortgage market but suddenly spread in the majority of service and productive sectors of the economy. For the first time, the capability of countries, to meet obligations and perform due payments, was questioned and sovereign securities[120] such as bonds, were no more considered to be risk-free. As a consequence of the turmoil and instability caused by the crisis, the regulatory framework changed again to prevent similar scenarios to occur again in the future and to restore previous equilibria. Specifically, *"Basel III*[121] *"*(2010) and the "*European Markets Infrastructure and Regulation (EMIR)*[122]*"* (2012) frameworks, provided the major guidelines and the new compliance rules not to suffer financial distress anymore. Basically, banks and financial institutions were forced to build a stronger capital structure to absorb eventual losses without causing systemic reactions and in case of uncollateralized derivative contracts, thresholds were even tighter. In addition, capital requirements were set to be negatively correlated with credit ratings[123] of the corresponding financial institutions. As a consequence, banks and other financial institutions in general, started to reduce their derivatives exposure towards those sovereign counterparties with a low credit rating and it is for this exact reason that during that period, as it will be disserted in details in the following chapter, lot of financial institutions closed many positions leveraging on previously contracted *"early termination clauses",* agreed at the inception of the contract ,and rather than entering into new transactions, they renegotiated the old ones at the expense of those countries with a worsened credit rating (countries suffering financial distress such as Italy, Greece or Portugal). Furthermore, on December 30, 2015, Law No. 208 of 28 December 2015[124] (the Stability Law for 2016) was published in the *Official*

[120] Debt securities issued by a national government.
[121] Basel III is an international regulatory accord that introduced a set of reforms designed to improve the regulation, supervision and risk management within the banking sector
[122] The European market infrastructure regulation (EMIR) lays down rules on OTC derivatives, central counterparties and trade repositories.
[123] An assessment of the creditworthiness of a borrower in general terms or with respect to a particular debt or financial obligation.
[124] Law 28 dicembre 2015, n. 208 "*Disposizioni per la formazione del bilancio annuale e pluriennale dello Stato (legge di stabilita' 2016)*". (15G00222) (GU Serie Generale n.302 del 30-12-2015 - Suppl. Ordinario n. 70)

Gazette[125], following the Parliament's approval. Among the different guidelines that have been presented, one of the most important, authorized the Italian Treasury to sign insurance bilateral agreements (in Italian *"accordi di garanzia bilaterale"*) with counterparties in case of operations in derivatives. Those agreements, took the form of Credit Support Annexes (CSA) which basically are legal documents regulating the placement and the entity of a collateral[126] for derivative transactions and it represents one of the four parts which composes an ISDA Master Agreement. Essentially, a CSA defines the terms or rules under which collateral is posted or transferred between swap counterparties to mitigate the credit risk arising *from "in the money*[127]*"* derivative positions. Generally speaking, a CSA requires both parties to deposit to the party whose derivative value is positive, a sum equal to the market value of the derivative itself as a sort of insurance. In case of missed performance at the contract expiration, the party who has to be cashed-in, can still resort to the previously mentioned deposit. Among many others, such a complementary instrument, involved two important advantages: first of all, thanks to CSAs, which basically lowered transaction costs, Italian bonds and other securities could have been accessed more easily all over the world. Since 2015, indeed, the Italian bond market, became bigger and more liquid by further opening to investors with different risk preferences.

Currently, instead, the Italian Ministry of Economics, recently announced its intention to close the most expensive and disadvantaged positions opened during the first 30 years of derivatives transactions. However, while the strategy that will be adopted to pursue such objective has not been fully revealed yet; the process has been identified with the name of: "*Phasing out"*.

[125] A government gazette (official gazette, official journal, official newspaper or official diary) is a periodical publication that has been authorised to publish public or legal notices. It is usually established by statute or official action and publication of notices within it, whether by the government or a private party, is usually considered sufficient to comply with legal requirements for public notice

[126] Collateral is a property or other asset that a borrower offers as a way for a lender to secure the loan. If the borrower stops making the promised loan payments, the lender can seize the collateral to recoup its losses.

[127] An *in-the-money* derivative position is when the derivative fair value is positive and it would cost money to be bought

2.4 Risks and Benefits associated to derivatives trading

Being derivatives aleatory contracts, whose value is determined by fluctuations in the price of a specific asset, called the underlying, which cannot be known in advance; there are some risks that can't be neither eliminated nor reduced. These risks are denominated physiological and while evaluating the profitability of a derivative contract, they have to be taken into account.

2.4.1 Risks

Market risk

When entering into a derivative transaction, there is the risk that fluctuations in value of the variable against which the derivative itself is intended to work as a sort of insurance, are so that the stream of the payoffs associated to the derivative are lower than the one the investor could have earned without entering the contract. In the case of an interest rate swap, for instance, were a fixed rate has to be paid in exchange for a floating one, it might happen that in order to completely remove the uncertainty associated to the volatility of interest rates, the holder of the contract gives up the possibility to pay lower interest rates, only in the case of interest rates turning to be lower than the pre-agreed fixed ones all over the maturity of the contract. As a consequence, the net value of the derivative would be negative and it needs to be interpreted as the price to pay for completely removing both the upside and downside potential and hence eliminating volatility. (Chui,2012).

Counterparty Risk

Whenever entering into a derivative contract there is the possibility that one or both parties do not perform due payments because of their inability to do so. Of course

the smooth performance of due payments is directly related to the solvency capability of the counterparty and consequently to its credit rating. Eventual differences in the credit ratings of the two counterparties, is reflected by the spread, namely the difference of rates one party is going to pay and accept against the rates the other party is willing to pay and receive in return. It is important to mention that while directly transacting with the counterparty, *default risk* and *counterparty risk* are exactly the same. Hence, in OTC transactions, the two coincide. Indeed, when the counterparty is not able to fulfill its liabilities anymore, not only it is said to be insolvent but also it has to default on its liabilities. In this case, default and counterparty risks perfectly coincide. When the derivative instrument is acquired in a dedicated exchange, instead, usually a clearing house or any other intermediary is in charge of performing the due payments even if one of the counterparties fails to do so. In this case, for both agents entering into a derivative contract, the counterparty is not represented by the party taking the opposite position, but by the clearing house itself, which is responsible for the smooth functioning of the exchange it represents. Consistently when derivatives are not bought or sold OTC, counterparty and default risk do not coincide and of course, because of the role of the clearing house, default risk doesn't matter that much for investors. It is crucial to mention, though, that both market and counterparty risk may be increased by clauses involved in the contract which augment the leverage inherent in the derivative. With reference to market risk, the most common are those clauses providing for the possibility of an early termination of the contract in case the variable impacting the underlying value reaches a certain threshold. Obviously, the party with the possibility of exercising the clause would do so when he knows he can maximize its profits, that is when the variable has assumed particular values so that the counterparty is in the most disadvantaged position, and it is for this precise reason that, as it will be disserted in detail in the next chapter, early exercise clauses may have a disastrous impact (NAPF[128], 2013).However, the same early termination clauses may protect the holder of a financial derivative by providing him the chance of backing out from the contract in case the counterparty is subject to a credit downgrading. Other clauses, instead, may force one of the counterparties to enter into Credit Default Swaps (CDS[129]) so that just one of the parties bears the insolvency risk associated to sovereign assets.

[128] National Association of Pension Funds

[129] A credit default swap is a particular type of swap designed to transfer the credit exposure of fixed income products between two or more parties.

2.4.2 Benefits

With reference instead to the benefits associated to derivatives trading, the main ones are the following.

Insurance against rates fluctuation

As abundantly disserted in the chapter, both corporations and Public Institutions use derivatives with the aim of hedging as a first rationale. Entering into derivative contracts, in fact, protect investors against the fluctuations of the underlying they're willing to neutralize. Of course, this occurs at a cost, which in the case of fair contracts is represented by the opportunity cost of not exploiting market equilibrium rates when they turn favorable, or in the case of convex contracts instead, by the price paid to enter the favorable swap or the premium paid to buy a *swaption*. Anyways, benefits associated to the insurance provided by swaps or other derivatives must be weighted against the costs of entering into derivatives markets. In fact, aiming at accessing specific financial markets, corporations usually need to devote an entire department to the management and the (performance) analysis of derivatives while Public Administrations have the need of establishing well organized bodies such as the Treasury Ministry and its dedicated departments, all focused on the same tasks. Moreover, being, derivative products relatively new instruments which are traded in a relatively young market (not having reached full maturity), the uncertainty associated to the always changing regulatory framework represents a cost to be taken into account as well (Deloitte, 2014).

Risk Management Attitude

Actively trading in derivative instruments, may produce a development of those skills which are fundamental to the financial survival of a company or a Public Institution. In particular, risk management, and associated reporting and analysis protocols which represent a crucial aspect to be considered while trading in financial derivatives, might result positively influenced by new procedures being tested and consolidated over time

and which can be shared with other departments and structures within the same organization.

Payoffs associated to convex contracts

Trading in derivatives might prove beneficial due to different reasons, one of them is related to cash flows that despite the aleatory nature of financial derivatives, are in reality, certain. As already disserted, in specific conditions, one of the party may be willing to enter into contracts whose terms are far from being fair (zero NPV), simply to cash-in the upfront, which is supposed to compensate the disadvantaged party for having entered the contract. In these cases, being the initial sum received at the inception of the contract, at a hypothetical time zero, that amount of money is known with certainty and doesn't need to be discounted for evaluation purposes. Anyways, convex contracts are associated to *"window dressing"* and consequently to speculative purposes. As it was previously debated and will be practically addressed in the next chapter, the main objective of entering into convex contracts is to realize a sudden profit by receiving the upfront, in the hope of not having to subsequently pay cash flows whose discounted value is superior to the upfront itself. Nevertheless, it could only happen if the value of the underlying followed an opposite pattern with respect to market expectations; as a consequence, probabilities are very low while potential gains very high: the main characteristics of speculative transactions. On the other hand, though, entering convex contracts, may be seen as a way of exploiting derivatives nature to the purpose of modifying consumption preferences by anticipating cash-ins when needed or postponing them when surpluses arise. Without derivatives, in fact, consumption preferences could have not been met because of the rigidity of traditional financial markets. Derivatives furnish traders with the possibility of consuming when they couldn't, enlarging their possibilities' portfolio.

A certain premium

Even though the underlying of a *swaption* is a swap whose rates are set so that, at the inception of the contract none of the party is supposed to have a privileged position and the contract is said to be fair (zero NPV); having the opportunity and not the obligation to enter into such a transaction has a positive value. Indeed, the owner of the option would exercise it only if rates at the inception of the swap are convenient to him or would otherwise retire from it if, on the other hand, market rates are more advantageous than the ones agreed in the contract. The value of such an opportunity is known in advance with certainty and it is the price the buyer of the option has to pay to acquire it. Both in the case of the Upfront and in the case of the Premium, while having certain risks involved, such kind of transactions may allow different actors to match spending preferences, anticipating inflows of money and postponing cash outflows.

A new safer regulation

Since the birth of derivatives contracts, one of the biggest benefit associated to derivatives was the possibility of suddenly ameliorating public or private accounts by signing convex contracts providing an upfront, in a practice which is known as *"window dressing"*. Nevertheless, after the financial crisis hit the global economy in 2007, regulators decided to set tighter requisites and accounting standards so that to avoid financial distress in the future. With reference to the Italian panorama, in 2010 the Ministry of Economics and Finance enacted the SEC (Sistema Europeo dei Conti nazionali) where all the accounting procedures to be adopted by Italian Public Institutions (at a national, regional and municipal level) were detailed and summarized. The main purpose of the SEC was to produce statistics which were comparable and uniform to the other European Member States and useful in terms of performance indicators. Particularly, the SEC required that in case of convex derivative contracts, the value of the contract itself should have been ascribed as an additional component of the already existing debt, hence as an active component of an already existing liability.

The purpose of the new regulation was to reduce to the minimum extents *window dressing* practices and to make clear additional liabilities which since then were masked by the initial cash-ins. Accordingly, in the case of a convex swap, the price paid to the

disadvantaged party has to be recorded in its accounts as additional debt. The same reasoning applies to *swaptions*: the premium received for giving the buyer the possibility to exercise or not the option is equivalent to borrowing new funds. On the other hand, the party buying the option, acquires an asset (SEC, 2010). Analogously, over the maturity of *swaptions*, their eventual negative values, due to fluctuations in the underlying, are to be realized as additional debt.

Thanks to this new regulations, both for corporations and Public Administrations, speculating or entering into risky transactions has become harder. Indeed, financial statements more clearly reflect the nature and the impact of convex and unfair derivatives contracts and consistently, *window dressing* lost momentum since the SEC2010 addressed it.

Chapter 3:

The Morgan Stanley and The Republic of Italy case study

Once abundantly debated the rationales and the reasons why non-financial corporations and Public Administrations in particular, hedge or speculate with financial derivatives; it sounds reasonable to proceed with a practical application to verify whether all the before disserted theories, find a validation in reality. More specifically and with reference to Public Administrations only, a specific set of transactions entered both by the Republic of Italy and by one of the most influential financial institutions of the globe , namely Morgan Stanley[130], will be presented and analyzed. All the transactions, taken under consideration, obviously refer to financial derivatives and in particular both to interest rate swaps and *swaptions*.

Once the dynamics of the above mentioned transactions have been cleared and made explicit, the main objective of the chapter, hence, is to objectively evaluate and analyze whether the nature of these transactions was speculative or if they were entered with the intention of hedging. Anyhow, since, as already mentioned in the previous pages, Public Administrations trade in derivatives in order to manage specific financial parameters such as the public deficit; right before proceeding too far into details, it is necessary to provide with an overview of the Italian Public debt and how historically it has been addressed with financial derivatives.

3.1 Overview of the Italian public debt and how derivatives are used to manage it

A wide definition of the Italian public debt embraces all the liabilities incurred by local entities, other public institutions and central administrations. A tighter definition, instead, only refers to the sum of the mark-to-market values of bonds issued by the Republic of Italy, both on the domestic and the foreign markets. In particular, at the end

[130] is a leading global financial services firm providing investment banking, securities, wealth management and investment management services. It is headquartered at 1585 Broadway in the Morgan Stanley Building, Midtown Manhattan, New York City.

of 2016 the account was standing at approximately 2.455 billion € (132% of the Italian GDP) (Il Sole 24 Ore, June 20, 2017). Whenever analyzing the Italian public debt, considering the fact that outstanding bonds represent the great majority (84% at 31st December 2015) not only official documentation and reports released by the Ministry of Treasury and Finance, usually refer to them but also the TUDP (Testo Unico sul Debito Publico[131]), published by the President of the Republic, does not take into consideration other liabilities, except for the ones related to bonds' issuance. Hence, from now on, both as a matter of simplicity and to the purpose of the following dissertation, the second definition will be considered the reference one.

Italian bonds are of different types, basically differing between themselves because of their different maturities, the frequency according to which they perform payments and the different modalities according to which they can be bought. Table n.3.1 below, provides a clear and comprehensive picture.

Table n.3.1

Specific features of Italian bonds

TABELLA I.1: I TITOLI DI STATO DOMESTICI						
	BOT	CTZ	CCT/CCTeu	BTP	BTP€i	BTP Italia
	Buoni Ordinari del Tesoro	Certificati del Tesoro Zero Coupon	Certificati di Credito del Tesoro	Buoni del Tesoro Pluriennali	Buoni del Tesoro Pluriennali Indicizzati all'inflazione europea	Buoni del Tesoro Pluriennali Italia
Scadenza	3, 6, 12 mesi e inferiore a 12 mesi (BOT flessibili)	24 mesi	5, 7 anni	3,5,7,10,15,30 anni	5,10,15,30 anni	4,6,8 anni
Remunerazione	Emissione a sconto	Emissione a sconto	Cedole variabili semestrali indicizzate al tasso delle aste BOT 6 mesi o all'Euribor 6 mesi, eventuale scarto di emissione	Cedole fisse semestrali, eventuale scarto di emissione	Cedole semestrali indicizzate all'inflazione europea (indice HICP al netto dei tabacchi), eventuale scarto di emissione e rivalutazione del capitale a scadenza	Cedole semestrali indicizzate all'inflazione italiana (indice FOI al netto dei tabacchi), rivalutazione semestrale del capitale e premio fedeltà* a scadenza
Metodo di Emissione	Asta competitiva sul rendimento	Asta marginale con determinazione discrezionale di prezzo e quantità emessa	Asta marginale con determinazione discrezionale di prezzo e quantità emessa	Asta marginale** con determinazione discrezionale di prezzo e quantità emessa	Asta marginale** con determinazione discrezionale di prezzo e quantità emessa	Attraverso il MOT (Borsa Italiana), il mercato elettronico al dettaglio
Frequenza di Emissione	Mensile	Mensile	Mensile	Mensile e in base alle condizioni di mercato per i BTP 15 e 30 anni	Mensile	Una/due volte l'anno

Source: Rapporto sul Debito Pubblico 2015, 2016, Ministero dell'Economia e delle Finanze (MEF), pp.50

[131] DECRETO DEL PRESIDENTE DELLA REPUBBLICA 30 dicembre 2003, n. 398 (GU n. 57 del 9-3-2004-Suppl. Ordinario n. 37) Testo unico delle disposizioni legislative e regolamentari in materia di debito pubblico

Every year, the Treasury Ministry publishes a Report detailing the current debt situation, its composition and future targets. In the last Public Debt Report (released the 27/07/2016) the actual and target thresholds related to the debt composition have been communicated to the purpose of offering the right information intended to manage both the risks and the costs associated to the debt itself. According to the 2016 Report, therefore, the threshold for the percentage of BOTs (short-term bonds) to be maintained in the portfolio has to be ranging from 4% to 12%, slightly less than what has been fixed by previous reports (from 5% to 15%) in an attempt to increase the debt duration. Moreover, the target threshold for BTPs (fixed rate bonds) has been delineated to remain constant with respect to previous years (from 55% up to 75%) in order not to excessively suffer from unexpected and unfavorable interest rate fluctuations over time. Analogously, CCT/CCTs (variable rate bonds) have to maintain their relative weight with respect to other debt components, namely from 5 up to 10 % of the overall debt. The reason why such thresholds have been fixed has different cooperating grounds. The primary purpose, of course, is to improve the debt duration not only to lower the risk associated to the passage of time and more evenly spread liabilities and refinancing procedures but also to address eventually negative market variable fluctuations. The second purpose instead is to issue securities which still maintain a certain appeal to investors, so that buyers always exist and the Italian bond market does not lose liquidity[132].

However, it is important to mention, the specificity of the Italian case. Economies which have to sustain a relatively moderate public deficit may benefit from interest rate fluctuations because, most of the times, it coincides with the economic cycle the country is undergoing. Namely, in those countries, when interest rates increase it is because the whole economy is growing and consequently, the potential negative effects of an increase of interest rates over the public deficit are more than offset by the improved productive capability due to economic growth. Conversely, countries presenting a substantially deep public deficit are at a competitive disadvantage with respect to other countries and in order to render their financial products appealing to investors, they have to offer a lower price which corresponds to the commitment of a higher interest rate. The difference between the interest rate provided by bonds issued by countries with an high default risk and securities issued by countries with a lower default risk is known as risk premium[133]

[132] Liquidity describes the degree to which an asset or security can be quickly bought or sold in the market without affecting the asset's price.

.Indeed, for countries such as Italy, Spain, Portugal and Greece, it represents a relevant portion of the interest rate they have to offer investors in order to convince them to acquire the security (MEF,2016). Additionally, interest rate disbursements represent an elevated portion of the public expenses for countries offering high premia; accordingly rendering them foreseeable or at least evenly spread over a certain time period, is crucial not to worsen the public deficit and to affect the domestic and foreign financial market.

With regard to the management of both interest rate and refinancing risk, the main objectives have been delineated as follows (Commissione VI Finanze della Camera dei Deputati, 2015):

1. Postpone the overall maturity of incurred liabilities weighted for the notional value of the securities they represent. At the end of 2015, the duration of the portfolio representing the Italian public debt was approximately 6,38 years. The aim is to render it longer in accordance with market conditions, of course.
2. Reducing the amount of securities whose related cash outflows are practically impending and smooth the future expected outflows all over the average maturity of the obligations, avoiding peaks which cannot be managed or excessive bottoms.

As a matter of fact, both the objectives may be achieved thanks to derivatives. However, any kind of derivative in general and interest rate swaps in particular have the capability of modifying the sensitiveness of the portfolio of liabilities composing the public debt without actually modifying the characteristic of the debt already positioned towards investors. Eventual misalignments between the structure of the obtained portfolio, considering market possibilities, and pre-delineated objectives, can be levelled off by a correct use of financial derivatives. The already mentioned 2005 *"Cornice"* decree establishes that derivatives transactions need not to follow a pre specified calendar but they rather need to work as a complementary instrument to achieve the two main objectives, before explicated.

The portfolio of derivatives the Republic of Italy signed, comprehend cross currency swaps (aiming at neutralizing the risk associated to securities issued in a currency which was different from the domestic one), interest rate swaps (fundamental to modify the nature of an already existing liability and permit to modify the sensitiveness of the portfolio to fluctuations of interest rate over time) and finally but not less important, optional interest rate swaps or as they are properly denominated, *swaptions*. It is important

to specify that to the purpose of postponing the duration of the portfolio, *swaptions* are only sold and not bought. Specifically, when linked to an already signed interest rate swap, they are simply denominated *swpations*, when instead the option refers to a swap different from the ones in the portfolio, in that case, the option is denominated *"stand-alone"*.

With reference to the last available Report on the Italian public debt, published by the Ministry of Treasury at the end of 2015, the value of the portfolio of all derivatives signed by the Republic of Italy has remained substantially negative despite a slight amelioration with respect to the previous year. It is important to mention that the current negative value is the direct consequence of both the hedging function derivatives offer and of the market conditions within which the great majority of the contracts have been entered. As just debated, indeed, one of the main purposes of trading in interest rate swaps or *swaptions*, is the conversion of the nature of the interest rate affecting already incurred liabilities. Practically speaking, swaps and *swaptions* are signed or entered to increase the percentage of fixed rates over the overall debt portfolio at specific requirements which have to be coherent with limitations implied by market conditions at the time contracts were signed. According to these premises, the derivative portfolio, has to have both a duration and an average refixing period higher than the ones of the portfolio representing the entirety of all liabilities contracted by the Republic of Italy both in the domestic and foreign financial markets. Indeed, both portfolios put together produce as a result, a more comprehensive portfolio whose duration and average refixing period are still higher than the underlying debt portfolio. As a direct consequence, both interest rate risk and refinancing risk are lowered. However, at the light of what has just been asserted, price movements of the derivatives portfolio go in the opposite direction with respect to price movements of the underlying Italian debt. Decreasing interest rates, for instance, are beneficial to the underlying debt portfolio because they are associated to lower cash disbursements in the future. On the contrary, selling *swaptions* when rates are moderately low, produce a transaction which is not convenient for the party agreeing to receive the variable rate over the maturity of the contract. This is because, in case of low interest rates, the counterparty would obviously exercise the option to receive the pre-agreed fixed rate in exchange for the market variable rate which, in turn, is far less convenient in times of extremely low interest rates.

Accordingly, the extremely low level of interest rates during 2015, despite a slight increase between May and December, has caused a decrease in the value of the derivatives portfolio with respect to the previous year. In addition, as a consequence of the constraints established by banking regulators and the lack of collateralization[134] over the Italian public debt, and at the light of the directives set by the 2005 *"Cornice"* decree ; the main financial activity being performed during 2015 concerned the restructuring of an already existing position represented by a *swaption* with a €3.500 million of notional value. Indeed, due to persisting low interest rates in the Eurozone and to the market reaction followed by the BCE announcement of a bonds repurchasing program (APP[135]); the fact that the Italian counterparty would have exercised the option, not only would have been certain, but would have also produced a ten-years swap starting the 1st of February 2015 where the Treasury should have paid a fixed rate of 3.5325% in exchange for the 6 months Euribor[136] on the same €3.5 billion notional. Furthermore, at the light of the new legislations (SEC 2010), discussed at the end of the previous chapter, such a transaction would have caused the recording of an additional €960 million on the already existing Italian debt. In that situation, in order to avoid such a downgrading of the debt, four different options have been sold at the market value of €875 million each which postponed the possibility of exercising them by two years. Analogously, the maturities of underlying swaps have been extended to five years while the strike prices were reduced to a value ranging from 3.20% to 3.22% so that the probability of an exercise of the option was reduced (Rapporto sul Debito Pubblico 2015, Ministero dell'Economia e delle Finanze, 2016). Clearly, if in the future those new four options will be exercised, four new interest rate swaps would initiate and the rates at which they will take place, will be the market ones, lower than the respective strike prices, so that, in any case, the function of extending the duration of the underlying Italian debt will be preserved.

The above debated operations, have been disserted simply to the purpose of explicating the procedures according to which the Treasury engage in derivatives trading;

[134] Collateralization is the act where a borrower pledges an asset as recourse to the lender in the event that the borrower defaults on the initial loan.
[135] The expanded asset purchase programme (APP) includes all purchase programmes under which private sector securities and public sector securities are purchased to address the risks of a too prolonged period of low inflation and to boost demand.
[136] The rates offered to prime banks on euro interbank term deposits. The EURIBOR is based on average interest rates established by a panel of around 50 European banks (panel banks) that lend and borrow from each other. Loan maturities vary from a week to a year and their rates are considered among the most important in the European money market.

furthermore, it finely describes the reason why it does so and the timings according to which certain transactions are entered. Basically, a sudden worsening of €3.5 billion of the public deficit has been avoided by entering additional four equivalent positions, while, at the same time, maintaining and even improving the insurance against fluctuations of the interest rates. Nevertheless, as it will be abundantly debated, other similar transactions didn't produce similar results because of harsh market conditions and other factors affecting the final outcome.

From now on, in fact, probably one of the most onerous and ineffective derivative transaction, the Treasury entered, will be presented, detailed and objectively analyzed to understand all the hedging or eventually speculative underlying dynamics related to operations in *swaptions*, and which factors definitely contributed to the negative final outcome.

3.2 Where it all started

In US, the Securities and Exchange Commission[137] requires companies with more than $10 million in assets and a class of equity securities that is held by more than 2000 owners to file the *form10-K report* which provides with a summary of the firm yearly financial performance. In its report, presenting the year ended December 31, 2011, Morgan Stanley, announced its concerns with respect to those countries which, all over the document, have been denominated "*European Peripheral countries"*. According to the report, in fact, once the 2007 financial crisis[138] had originated in US and hit Europe few years later , *"during 2011, certain European countries, including Greece, Ireland, Italy, Portugal, Spain (the "European Peripherals") and France, experienced varying degrees of credit deterioration due to weaknesses in their economic and fiscal situations"* (Morgan Stanley 2011 Form 10-K Report, pp.120). What seemed clear, is that the leading

[137] The U.S. Securities and Exchange Commission (SEC) is an independent agency of the United States federal government. holding primary responsibility for enforcing the federal securities laws, proposing securities rules, and regulating the securities industry, the nation's stock and options exchanges, and other activities and organizations, including the electronic securities markets in the United States.
[138] The financial crisis of 2007–2008, also known as the global financial crisis and the 2008 financial crisis, is considered by many economists to have been the worst financial crisis since the Great Depression of the 1930s

intention, the financial institution had been perpetrating all over that specific and subsequent financial years, was to reduce as much as possible the risk exposure towards those countries whose debt was not considered risk-free anymore and to profit from contractual technicalities allowing them to do so. In particular, analyzing the Morgan Stanley *form 10-K report*, at page 120 there was a Table (Table n.3.2 below) summarizing the Net Exposure[139] and other related features the financial institution had towards certain European countries. Below the table, there was a note providing further information with respect to the variation of exposure towards Italy and it stated: *"On December 22, 2011, the Company executed certain derivative restructuring amendments which settled on January 3, 2012. Upon settlement of the amendments, the exposure before hedges and net exposure for Italy decreased to $2,887 million and $1,522 million, respectively, and the exposure before hedges and net exposure for European Peripherals decreased to $5,044 million and $3,056 million, respectively"* (Morgan Stanley 2011 Form 10-K Report, pp.120)

Table n.3.2:

Country Risk Exposure—Select European Countries

Country	Net Inventory(1)	Net Counterparty Exposure(2)	Funded Lending	Unfunded Commitments	CDS Adjustment(3)	Exposure Before Hedges	Hedges(4)	Net Exposure
				(dollars in millions)				
Greece:								
Sovereigns	$ (8)	$ 20	$—	$ —	$ 23	$ 35	$ 1	$ 36
Non-sovereigns	53	7	142	—	—	202	(78)	124
Total Greece	$ 45	$ 27	$142	$ —	$ 23	$ 237	$ (77)	$ 160
Ireland:								
Sovereigns	$ 78	$ 1	$—	$ —	$ 4	$ 83	$ (2)	$ 81
Non-sovereigns	102	41	—	—	15	158	(16)	142
Total Ireland	$ 180	$ 42	$—	$ —	$ 19	$ 241	$ (18)	$ 223
Italy(6):								
Sovereigns	$ (29)	$4,202	$—	$ —	$ 412	$ 4,585	$ (786)	$ 3,799
Non-sovereigns	197	689	255	363	179	1,683	(581)	1,102
Total Italy(6)	$ 168	$4,891	$255	$ 363	$ 591	$ 6,268	$(1,367)	$ 4,901
Spain:								
Sovereigns	$ (366)	$ 11	$—	$ —	$ 504	$ 149	$ (37)	$ 112
Non-sovereigns	225	397	311	424	218	1,575	(297)	1,278
Total Spain	$ (141)	$ 408	$311	$ 424	$ 722	$ 1,724	$ (334)	$ 1,390
Portugal:								
Sovereigns	$ (435)	$ 97	$—	$ —	$ 23	$ (315)	$ (96)	$ (411)
Non-sovereigns	7	90	126	—	47	270	(98)	172
Total Portugal	$ (428)	$ 187	$126	$ —	$ 70	$ (45)	$ (194)	$ (239)
Sovereigns	$ (760)	$4,331	$—	$ —	$ 966	$ 4,537	$ (920)	$ 3,617
Non-sovereigns	584	1,224	834	787	459	3,888	(1,070)	2,818
Total European Peripherals(5)(6)	$ (176)	$5,555	$834	$ 787	$1,425	$ 8,425	$(1,990)	$ 6,435
France(5):								
Sovereigns	$(1,796)	$ 234	$—	$ —	$ 100	$(1,462)	$ (228)	$(1,690)
Non-sovereigns	85	2,246	416	1,657	390	4,794	(1,390)	3,404
Total France(5)	$(1,711)	$2,480	$416	$1,657	$ 490	$ 3,332	$(1,618)	$ 1,714

Source: Morgan Stanley 2011 Form 10-K Report, pp.120

[139] Net exposure is the percentage difference between an investor's long and short exposure. Net exposure is a measure of the extent to which the investor's trading book is exposed to market fluctuations and other variables.

Despite not having been celebrated that much, the few lines above, were simply announcing the huge gain Morgan Stanley produced thanks to the closure and settlement of a portion of derivatives contracts signed in 1994 with the Republic of Italy (Piana, 2017). Unfortunately, not all the details concerning the multiple transactions conducted by Italy and the financial institution are available, due to the need of preventing markets to be influenced to extreme extents and accordingly not to excessively affect investors' preferences and expectations. Anyhow, the just presented transactions, *swaptions* to be precise, have been attracting a lot of attention because of their particular nature and over time, always additional details came out thanks to parliamentary investigations and similar. Indeed, mangers of the Ministry of Economics have always asserted that the 1994 agreement was coherent with the standards dictated by the International Swap Dealers Association (ISDA), an association born in 1985 ruling and setting the standards in derivatives transactions.

It is important to mention, though, that, generally speaking, even if the ISDA set the standards, parties may take advantage from the possibility of personalizing the contracts by filing an annex[140] which implements and in certain circumstances modifies the Master Agreement called *"Schedule"* . Clearly, both parties together have to agree upon the variations to implement to the contract, which, in turn, have to be detailed in the *schedule*. The Master Agreement, indeed, clearly specifies that in case of inconsistency between the rules set by the ISDA and the Schedule, it is the second one to prevail. But, while Master Agreements and ISDA principles are public and easily verifiable, Schedules are not; this is why the main points modifying the original nature of the contracts need to be inferred and grasped from available information.

3.2.1 Contractual technicalities

Specifically speaking, the 1994 signed contract, specified that all the subsequent derivative transactions between the two parties would have fallen within the same

[140] A Credit Support Annex, or CSA, is a legal document which regulates credit support (collateral) for derivative transactions. It is one of the four parts that make up an ISDA Master Agreement but is not mandatory. It is possible to have an ISDA agreement without a CSA but normally not a CSA without an ISDA.

standards and the same contract of the original one (a sort of an umbrella agreement regulating present and future transactions). Namely, all the subsequent derivatives would have been made part of a bigger and unique transaction subject in solid to the 1994 Master Agreement (Piana, 2017).

The Upfront Premium

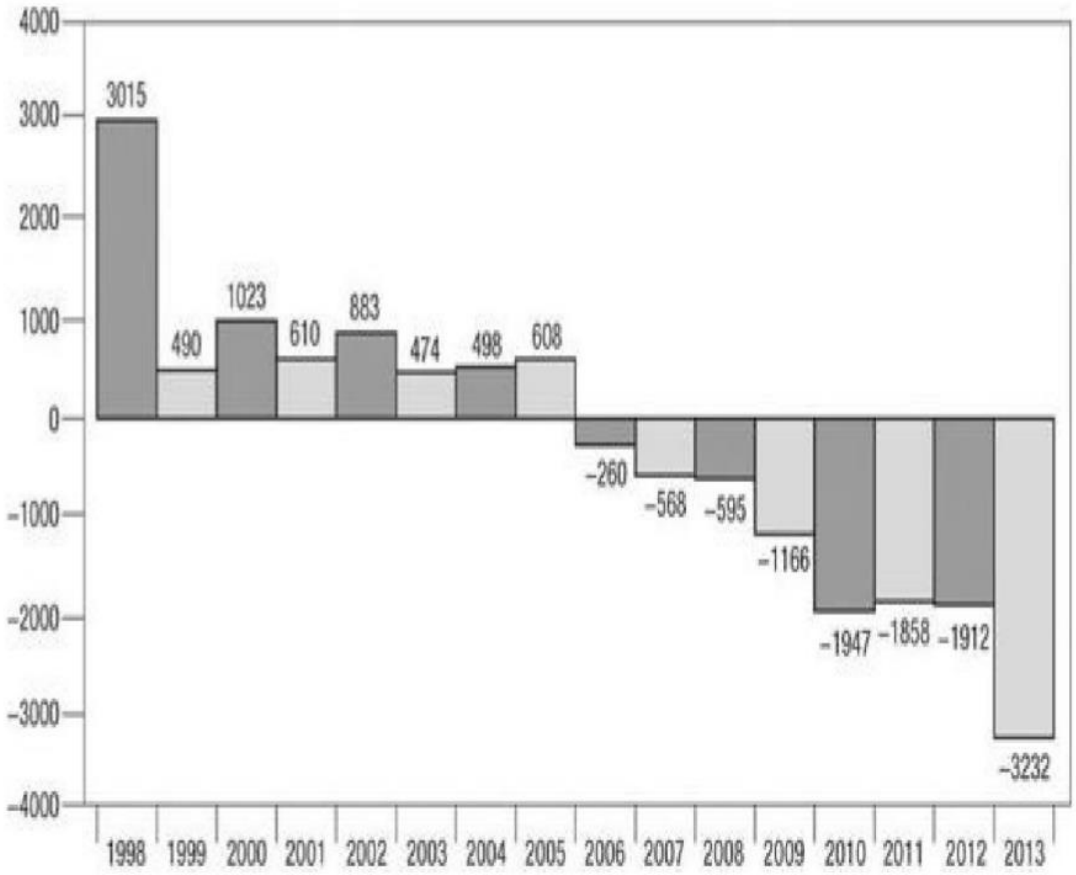
As already disserted in the second chapter, when selling a *swaption,* the seller receives a premium because it gives away the other party the possibility of choosing whether or not to enter an interest rate swap at a certain date in the future. Obviously the party that bought the option, would only exercise it if market conditions are so that entering the swap is profitable. Specifically, the underlying interest rate swap, expected the Republic of Italy to pay a fixed interest rate over the notional in exchange for a variable one (i.e. the 6 months Euribor). Indeed, in this specific case, the Republic of Italy played the role of the seller while Morgan Stanley bought the option. Generally speaking, the upfront premium, in fact, represents a sort of compensation for probable future losses and the more the terms of the contracts are unfavorable to the party selling the option, the bigger has to be the premium to compensate higher expected losses. Unfortunately, details concerning the initial upfront have not been explicitly disclosed. Nevertheless, the amount of risk involved in these transactions, instead, have been abundantly detailed and discussed. Certainly, market value is probably the best indicator for risk, especially in derivatives transaction. The *mark-to-market* which basically refers to the *"fair value"* of an asset, based on the current market price, provides synthetic and clear insights with reference to the probability of that certain asset to increase or decrease in value in financial markets by summarizing and validating both expectations and market analyses. Accordingly, the more a transaction is expected to produce negative cash-flows, the more its mark to market is expected to be negative and vice versa.

Therefore, at the inception of the contract, the *mark-to market* to the Republic of Italy was already negative, otherwise there would not have been a positive premium to be paid. Anyhow, the initial Interest payments were positive to Italy, because of the interest rate level prevailing at that time. In 1998, in fact, cash in associated to the *swaptions* signed

with Morgan Stanley in 1994 and all other derivative transactions, amounted to approximately €3 billion. Nonetheless, right after, in the following year, the Net Financial Income declined by approximately 90% and slightly fluctuated the thereafter. In 2006, Net Financial Income turned negative, as represented in the figure n.3.1, and started to deepen the public deficit so that to convince Morgan Stanley to exercise the early termination clause.

Figure n.3.1

Net Interest Payments relative to Derivatives operations (Values in million €)



Source: Piana,Luca, 2017, "La Voragine", Mondadori, pp.46

The Unilateral Clause

Early termination clauses have been previously discussed and usually, both parties can benefit from them. An early termination clause, indeed, provides that in case the market value to one of the two parties exceed a certain threshold, then that party can ask

for the settlement of the derivative transaction and for the early termination of the contract. Being derivative transactions a zero-sum game[141], a positive market value for one party , means a negative value for the other, and as a consequence a much higher risk exposure towards the party who is losing with the derivative.

The peculiarity related to the Morgan Stanley and the Republic of Italy's agreement, was that the early termination clause could have been exercised only by the financial institution rather than by both parties, which basically had an additional insurance against its risk exposure towards Italy. Specifically, in case the mark to market, exceeded the value of $50 million, then the American bank had the possibility of exercising the clause and terminate the contract. Maria Cannata, who was responsible for the Public Debt Department at the Treasury Ministry at that time, declared that there have been many attempts to modify the terms of the contract so that to render bilateral the clause the Republic of Italy could not have enjoyed. Nevertheless, she also declared the counterparty firmly denied such a query.

In 2014, then, Maria Cannata, during an interview related to the lawsuit pertaining to the role of financial intermediaries and their ratings over the Italian public deficit[142], also specified that Morgan Stanley could have exercised the clause at least 10 years before that January 2012 due to the fact that the exposure the financial intermediary had with respect to the Republic of Italy exceeded $50 million since then. According to her, the clause has not been previously exercised not only because expectations were favorable to the American bank and hence exercising it later would have been much more profitable but also because of technical factors. *"The financial Institution cared about institutional relationships with our country. Afterwards, at the end of 2011…when the exposure was too big and the Italian public debt was downgraded, the ones who were in charge of supervising over the American financial institution performance, wanted the clause to be respected. That doesn't mean it has been fully exercised; in fact, the contract has been renegotiated and not all the position comprehended in the portfolio have been closed."* (Maria Cannata during the interview held to the purpose of "*Proc Penali n. 3942/11*

[141] In game theory and economic theory, a zero-sum game is a mathematical representation of a situation in which each participant's gain or loss of utility is exactly balanced by the losses or gains of the utility of the other participants

[142] Proc Penali n. 3942/11 R.G.N.R. e n.742/13 R.G.N.R – Richiesta di informazioni e documenti della Procura di Trani

R.G.N.R. e n.742/13 R.G.N.R – Richiesta di informazioni e documenti della Procura di Trani").

Practically speaking, the cash outflows of $3,4 billion was related only to a considerable portion of derivative contracts but not to the entire portfolio.

3.2.2 Interest rates behavior

As mentioned in the previous chapter, Public Administrations operate in the derivatives markets, essentially for two reasons:

1) containing and modifying the public deficit through a reshaping of due interest payments,

2) modifying the public debt duration (improving or shortening it) so that to spread the burden of the due payments over a longer time span (or concentrate it in shorter maturities).

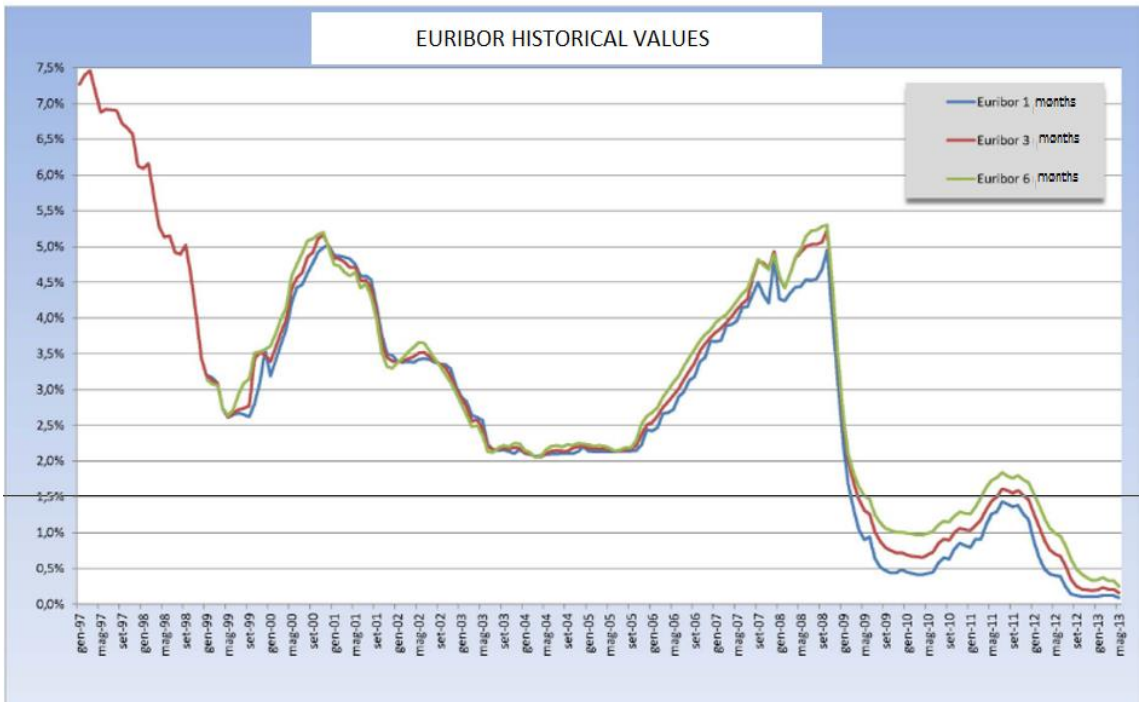
In particular, Maria Cannata, during the conference held at the Deputies Chamber to the purpose of detailing the above mentioned set of derivatives transactions, the 10th February 2005, explained that starting from 2005, postponing due payments and consequently extending the debt duration became the unique objective of transacting in derivatives, probably not to enter in unbalanced contracts anymore, which by providing some upfronts may well have ameliorated public accounts in the very short-run while significantly deteriorating them over the longer period due to additional liabilities. Accordingly, in order to reduce the impact of due interest payments in the short-run and postpone them, at least partially, over a longer time period, the key was to extend the duration of the portfolio representing the Italian Public Debt; namely to fix the rate at which interest payments would have been calculated so that to reduce volatility of cash outflows and produce a longer but certain stream of cash outflows. For this reason, every derivative contract (mainly swaps or *stations*) was signed so that a variable interest rate (i.e. 6-months Erabor) was received in exchange for a fixed interest rate payment over the same notional. According to Maria Cantata, at that time (in the early 2000s), entering in derivatives transactions at that conditions seemed beneficial because interest rates were

at their historical minimum. To understand the rationale behind the reasoning, it is crucial to understand that due to the nature of swaps (or *swaptions*) the party who is periodically committed to pay a fixed rate over a certain notional, benefits from an interest rates increase because of the opportunity of not having to pay a higher rate, while the party committed to pay at the variable rate incurs in a loss because he has to pay the increased rate. On the contrary, when interest rates fall, the party paying the fixed rate is disadvantaged with respect to the other paying the variable, because of the opportunity cost of having to pay the fixed rate regardless the interest rate level at that moment. Hence, being the Republic of Italy the fixed rate payer, any increase of the interest rate would have been beneficial to it, while any decrease would have implied bigger cash-outflows. At the light of that, Maria Cantata, still during the above mentioned conference asserted: *"Previous experience made us think that a sudden increase of interest rates would have been the main risk to be aware of and to be protected from." (*Maria Cannata during the interview held to the purpose of "*Proc Penali n. 3942/11 R.G.N.R. e n.742/13 R.G.N.R – Richiesta di informazioni e documenti della Procura di Trani").* The 2007 crisis, in fact, completely modified market expectations by creating scenarios that completely differed from the ones taken into consideration when entering into that kind of swaps or *swaptions*. Before the crisis, interest rates were expected to moderately increase in a context of moderate economic growth. Due to the bankruptcy of Lehman Brothers[143] though, reduced trust in financial institutions lead to improved financial instability which sensibly contributed to the depression of interest rates which completely frustrated the insurance the Republic of Italy built through swaps and *swaptions*.

[143] Lehman Brothers Holdings Inc was a global financial services firm. Before declaring bankruptcy in 2008, Lehman was the fourth-largest investment bank in the United States (behind Goldman Sachs, Morgan Stanley, and Merrill Lynch), doing business in investment banking, equity and fixed-income sales and trading (especially U.S. Treasury securities), research, investment management, private equity, and private banking. Lehman was operational for 158 years from its founding in 1850 until 2008.

Figure n.3.2

1-3-6 months Euribor Historical Values (from 1997 to 2013)



Source: ECB Statistical Data Warehouse

As depicted in the graph above (figure n.3.2), starting from the very first years of the 2000s the Euribor have been moderately increasing up to 2005, to boost its increase thereafter. Once the Real Estate bubble burst in US, though, and the consequences of the financial crisis hit Europe as well; investors' confidence in financial institutions significantly reduced as well as their propensity to consume[144] which together contributed to what has been called, the credit crunch (Catelani, 2015).

With respect to the European landscape, such market conditions favored, a deep fall of interest rates which was very unlikely to be predicted and as a consequence produced a very profound worsening of the many positions, the Republic of Italy had in derivatives contracts.

[144] The marginal propensity to consume (MPC) is the proportion of an aggregate raise in pay that a consumer spends on the consumption of goods and services, as opposed to saving it. Marginal propensity to consume is a component of Keynesian macroeconomic theory and is calculated as the change in consumption divided by the change in income.

3.3 Hedging or speculation?

At the very beginning of the second chapter, hedging has been defined as the practice of undertaking an investment whose fluctuations in price (at least) partially offset the price movements of an already opened position, which may be represented by a related security or asset; thus partially or completely eliminating the specific risk source. With reference to the case study under consideration, the already existing position is represented by the obligations the Republic of Italy has with its bond holders. In fact, increasing interest rates, are equivalent to larger cash disbursements towards investors owning BTP or other securities. On the contrary, the same interest rate fluctuation, is equivalent to a gain on derivatives position because of the opportunity of not having to pay the variable rate but the fixed pre-agreed one instead. This is basically why, in some sense, more than extending the debt duration, containing the public deficit or pursuing other objectives, all the transactions entered by the Ministry of Treasury have been presenting classical and well delineated hedging features and purposes.

On the other hand, though, what does not seem to be really convincing, are the rates at which both swaps and *swaptions* have been agreed upon. In fact, since the great majority of the transactions the Republic of Italy subscribed with Morgan Stanley provided with an upfront payment, it means that the fixed rate at which the Republic of Italy was committed to pay interests, on the notional, was not comparable with respect to competitive rates at the time the contracts were signed. Such a difference between the rates ruling the swaps and the ones regulating the issuance, the settlement and the interest repayments of Italian bonds was so that the derivative transactions did not constitute a perfect hedge; namely the variation of the derivative's values did not perfectly compensate for the variation in the value of the portfolio composed by Italian bonds. Such a discrepancy is what might be considered the speculative trait of the activity in derivatives performed by the Italian Republic. Moreover, referring again to the second chapter, speculation has been defined as the practice of undertaking a specific investment which carries a substantial amount of risk to be translated in superior expected losses. Nevertheless, the investment decision is also motivated by superior expected gains for which carrying the above mentioned risk is worth. Entering into a derivative transaction providing with an upfront, indeed, means accepting very probable unfavorable conditions

to be converted into likely losses. The speculative bet resides in the possibility of translating the upfront into profit, if not completely, at least partially. Anyways, for this, to occur, interest rates fluctuations should prove opposite with respect to analyst's expectations and accordingly, this is very improbable. Strive for a gain to be built over a very small portion of a given probability distribution[145], carries a very large amount of risk. Accordingly, the associated gain is large, as well as the possibility of incurring into losses which, in turn, is represented by the complementary portion of the above mentioned probability distribution.

It is important to underline that the upfront received at the inception of the contract represents a considerable incentive if public accounts need to be ameliorated quickly not to boost popular dissatisfaction and consequently affect people consumption habits and investors' preferences. An additional incentive to accept disadvantaged conditions along with an upfront is represented by the fact that derivative products do not usually need an initial investment to be acquired while benefits associated to the very short-run (i.e. the upfront) are clear and much higher. Furthermore, who is accountable for managing public debt and decides to use derivatives at a certain time period, will probably not be in charge, many years later, when the most impacting interest payments will have to be performed or contracts will be closed. This circumstance only provides incentives to Public Administrations to enter into unfavorable derivative contracts which by providing with an upfront, contribute to the amelioration of public finances, while deteriorating public deficit in the long run. Anyhow, as disserted in previous chapters, new regulation and accounting treatments, are continuously moving steps towards the prevention of similar practices, at least to certain extents.

[145] In probability theory and statistics, a probability distribution is a mathematical function that, stated in simple terms, can be thought of as providing the probabilities of occurrence of different possible outcomes in an experiment.

Chapter 4:
Summary, Conclusions & Final Recommendations

4.1 Summary

The main objective of the dissertation has been to delineate and accurately describe hedging and speculative practices with financial derivatives; the differences between them and the patterns followed by non-financial corporations and Public Administrations whenever operating in financial markets. The whole work is developed through a gradually increasing degree of accuracy in the debated issues, in an attempt to carry the reader along the overall subjects' development process and to consequently allow him to grasp and realize all the implied details without sacrificing scientific relevance.

Obviously, just before entering into the core dissertation, specific preliminary knowledge needed to be acquired and this is the rationale justifying the first chapter, where a brief prelude to the main issues is offered as well as an historical introduction to the financial derivative's classes which have been the main subject of the whole thesis. Indeed, the very first appearance of the term *"financial derivative"* as we currently interpret it, was provided in 1988, when *"Options, Futures and Other Derivatives "*was, for the first time, published and its author, John Hull, generally described a derivative as a *"financial instrument whose value depends on the value of another underlying asset".* At that time however, there was not a 100% consensus over Hull's definition and that was simply because always different types of derivatives, with always new features, started to be traded. In fact, derivatives existed and exist not only with payoffs connected to different commodities or indicators but also to many other variables such as temperature, number of bankruptcies among a specific group of firms or to energy sources such as natural gas or electricity (energy derivatives[146]). From such a criticality, the need of defining a derivative in an alternative and more specific way arose. Specifically, a higher quality

[146] A derivative instrument in which the underlying asset is based on energy products including oil, natural gas and electricity, which trades either on an exchange or over-the-counter. Energy derivatives can be options, futures or swap agreements, among others.

definition considers a derivative as an instrument whose value depends on the value of any underlying satisfying a fundamental criterion: its price variations must be observable and measurable, at least, over the entire life of the relative derivative contract. Differently, there would be no possibility of inferring the derivative's fair value and as a consequence, there would be little room for trading. With reference to the current global scenario, instead, records report a striking value of $700 trillion (Global Finance[147], 2016) of worldwide outstanding[148] relative to OTC derivative transactions while the overall gross market value[149] is approximately $20 trillion (Global Finance, 2016) . The feature acquires relevance if compared to the worldwide equity market which accounted for $65 trillion in 2016 (Business Insider[150], 2016), the 2016 global bond market, reaching $90 trillion in face value,[151] (Bank for International Settlements[152], 2017) and the world Gross Production amounting to $77,9 trillion (Statista[153], 2017). Furthermore, a striking $64 trillion in outstanding notional is recorded for exchange-traded derivatives markets (Bank for International Settlements, Semi-annual statistics, 2017). Therefore, as already debated, the recent and explosive growth of derivatives markets, engaged both industrialized and emerging economies by almost the same magnitude, reflecting a solid and always steadily improving awareness of derivative products and both of their associated benefits and potential. However, even thought, the volume of derivative transactions dramatically increased over the last 30 or 40 years, in reality, financial instruments, very similar to derivatives, already existed in 1800BC and the purposes for which they were used were pretty much the ones pursued nowadays. Indeed, as abundantly debated in paragraph 1.2.1, the very first objective of derivatives trading was

[147] Global Finance is a monthly financial magazine. The magazine's primary target audience consists of Chairmen, Presidents, CEOs, CFOs, Treasurers and other financial officers. It is distributed in 158 countries, with 50,050 global subscribers and recipients, certified by BPA Worldwide.
[148] Notional Outstanding Amount is defined as the monetary value of open interest (the notional value of all contracts outstanding at a given time).
[149] Absolute value given by the sum of the mark-to-market values of all outstanding contracts (the cashflows to pay or receive in case of an early termination of the derivative contracts)
[150] Business Insider is an American news website and in addition to providing and analyzing business news, the site aggregates top news stories on various subjects from around the web. It reported a profit for the first time ever in the 4th quarter of 2010. In June 2012, it had 5.4 million unique visitors. It now averages around 70 million unique visitors, monthly.
[151] Face value is the nominal value of a security stated by the issuer.
[152] An international organization fostering the cooperation of central banks and international monetary policy makers. Established in 1930, it is the oldest international financial organization, and was created to administer the transaction of monies according to the Treaty of Versailles. Among others, its main goals are to promote information sharing and to be a key center for economic research.
[153] Statista is a web portal for statistics, which displays data collected from different institutions dealing with market researches. The company claims that on the platform more than 80.000 topics coming from more than 18.000 sources are available.

to secure the supply of fundamental commodities or in certain cases to provide a sort of insurance to farmers in case of events such as a crop failure. Afterwards, once become commonly known and understood, derivatives started to be traded for other different reasons, such as to rapidly raise funds or alternatively to gain on market misalignments and capture easy and potentially high profits (i.e. arbitrage). Over time, the political and jurisdictional focus on derivatives, varied depending both on the geographic area and on the particular authority (and its beliefs) ruling at that particular time which, in turn, depending on the imposed legislation, contributed or not to the popularization of financial derivatives. However, the very first transactions in derivatives, were purely OTC; the role of an intermediary such as an exchange, in fact, came later but once recognized the advantages it involved, up to the 1990s trades mostly occurred there. Afterwards, due to improvements in technology, OTC transactions gained momentum again so that the trend reversed. Among the many types of derivative instruments that have been invented, interest rate derivatives are the leading ones. Not only they have been contributing in such a sudden growth in derivatives OTC transactions, but they have also been by far the prevailing class of derivatives being traded during the last 20 years. Within such a time-span, in fact, they have accounted for more than 70% of the outstanding notional. This is why the first chapter introduces interest rate swaps, defining them as OTC transactions between two parties to exchange cash flows in the future; basically a combination of currency forward contracts, which, in turn, have been described as an agreement between two parties (financial institutions, corporations or individuals) to buy or sell a specific asset at a predetermined date in the future where the price at which the transaction will take place is already known at the inception of the contract and it is said to be the forward rate ruling the future trade (Hull,2009). Therefore, as well as a forward contract may be signed over a wide variety of assets, the same can be done with swaps. Anyhow, swap agreements implying exchanges of cash flows depending on interest rates remain by far the most used derivative products.

All the technical knowledge related to the swap market and its features, which is provided in the first chapter, is critical to properly understand and interpret the second one where hedging and speculative strategies are explicated in relation to rationales justifying different market participants (non-financial firms and Public Administrations) to perpetrate them. Consistently, right before addressing swaps usage with related investment strategies, the second chapter furnish the reader, at first, with a clear and

complete definition of hedging and speculative practices, of their main features and differences. Subsequently, non-financial corporations and Public Administrations' hedging and speculative strategies with interest rate swaps, are analyzed and detailed. In particular, in order to investigate non-financial corporations risk preferences and investment strategies, a specific Panel Data[154] has been taken under consideration, namely the one constructed by Sergey Chernenko and Michael Faulkender (2011), respectively a Ph.D. student and a Professor of Finance at Harvard University. Despite being a Panel Data, hence not comprising the totality of observations related to every non-financial corporation of the globe, it is still the biggest and most comprehensive one so that inferences grasped on it, might well be considered a fair approximation of real contingencies. The key to properly interpret the Data Set and all the different statistical inferences (regressions) based on it, is that if a firm's exposure to risks which are hedgeable remains constant over time, implying the firm has not changed its business model, then hedging patterns are represented by all those managerial practices which also remains stable over time. On the other hand, hence, speculative activities pertain to the totality of actions management take into consideration when reacting to varying market conditions, which in turn are influenced by a transitory component. Accordingly, to the purpose of individuating hedging practices, a *cross-sectional* analysis[155] has been performed so that to underlie the differences in strategies adopted by non-financial firms in the sample, at a specific time period. On the other hand, the *time-series*[156] component of the Panel Data has been considered a more adequate tool to highlight variations in management practices over time and therefore to individuate speculative strategies. The results obtained by the *cross-sectional* analysis, indeed, seems to prove that companies use interest rate swaps to modify their share of floating rate debt which contributes to their capital structure[157], and they do so mostly to avoid recurring to costlier external

[154] In statistics and econometrics, panel data or longitudinal data are multi-dimensional data involving measurements over time. Panel data contain observations of multiple phenomena obtained over multiple time periods for the same firms or individuals.

[155] Cross-sectional analysis is a type of analysis that an investor, analyst or portfolio manager may conduct on a company in relation to that company's industry or industry peers. The analysis compares one company against the industry in which it operates, or directly against certain competitors within the same industry, in an attempt to assess performance and investment opportunities.

[156] A time series is a sequence of numerical data points in successive order. Time series analysis, instead, can be useful to see how a given asset, security or economic variable changes over time. It can also be used to examine how the changes associated with the chosen data point compare to shifts in other variables over the same time period.

[157] The capital structure is how a firm finances its overall operations and growth by using different sources of funds. Debt comes in the form of bond issues or long-term notes payable, while equity is classified as common stock, preferred stock or retained earnings.

sources of funding rather than lowering financial distress costs (Froot, Scharfstein, and Stein (1993)). On the other hand, the *time-series* analysis, investigating speculative techniques, indicated that when incentivized by compensation metrics, CEOs[158] and CFOs'[159] attempt to modify the capital structure at their favor by augmenting the share of floating rate debt through interest rate swaps. Moreover, even willingness to meet earnings forecasts might be influential to CFOs and CEOs. In fact, the reputational burden of not meeting analyst forecasts, seems to provide with incentives to swap more towards floating rate debt, to improve the volatility of interest expenses and gain on the interest rate differential. However, along with a higher probability of realizing gains, a higher probability of incurring in large losses comes. By definition, such a practice is associated to speculation. In addition to examine speculative or hedging practices relative to non-financial corporations, the second chapter is also dedicated to the investigation of interest rate swaps' usage by Public Administrations in general and by the Italian one in particular. The attempt is to prepare the ground for the third chapter where a case study, requiring a specific preliminary knowledge, is tackled. Therefore, due to their particular features which allowed Public Administrations to manage crucial transactions in a better way and to greater extents, while at the same time having an improved control on certain financial parameter, financial derivatives, started to be seriously traded during the 70s. In the first period, Eurozone countries such as Sweden, Germany, France and others started to engage in derivative transactions with the only purpose of taking a view about market trends. As a matter of fact, there were not consolidated practices or previous evidence to take into account whenever engaging in such kind of transactions and in addition, the market was not that structured as it is today. Almost the same occurred even in the 80s when strategies in the foreign currency market, were specifically based on opportunistic behavior more than on a properly delineated systematic planning and most of the times the opportunistic behavior translated into speculative trades. Accordingly, mostly speculative positions were taken as well as trades attempting to profit from arbitrage opportunities (arising from market structural deficiencies) were performed. Huge losses incurred by many European countries along with a better understandings of derivatives

[158] A chief executive officer (CEO) is the highest-ranking executive in a company, and their primary responsibilities include making major corporate decisions, managing the overall operations and resources of a company, and acting as the main point of communication between the board of directors and corporate operations.
[159] A chief financial officer (CFO) is the senior executive responsible for managing the financial actions of a company.

within financial markets, shifted the attention to the associated risks. In particular, during the 90s and with the advent of the euro, many things changed. Financial barriers lowered and markets consistently expanded. With this new scenario, countries taking positions were not seen anymore as betting against the market nor a single country was such a big player to produce price instability whenever trading. With the passage of time, anyhow, technology improved and financial markets enhanced their capability of immediately interpreting and incorporating information, so that arbitrage opportunities are rare but still existing nowadays. Additionally, across the Eurozone, whether a country gained or lost with interest rate swaps depended on which one of the two legs[160] they have been investing and on the pattern of the term structure in the period impacting the investment. Furthermore, the second chapter provides with a comprehensive picture of how Public Administrations engage in interest rate swaps for different reasons, many of them falling in the category of hedging investment strategies, many others in the category of speculative activities, instead. When issuing floating rate bonds to the purpose of reducing the uncertainty and the associated volatility of cash disbursements, for instance, Public Administrations usually enter into pay (fixed)–receive(floating) interest rate swaps, so that the cash flows dependent on the floating rate to be received, are actually matched with similar cash-outflows related to the issuance of floating rate bonds. Such a practice, may obviously be categorized as a hedging attempt. On the other hand, though**,** whenever a Public Administration signs an unbalanced contract, at its inception, the disadvantaged party is paid a certain amount of money, needed to provide it with all the incentives to accept the unfavorable conditions. Most of the times, disadvantaged parties accept those conditions even because they need with extreme urgency the initial cash-in. Interest rate swaps providing with an initial cash-in, usually, do so at the expense of a stream of very probable subsequent cash-outs in the future and the associated speculative payload is so clear as debated in the chapter. Furthermore, thanks to interest rate swaps, Public Administrations gain the faculty of modifying the duration of the portfolio composed by the debt securities governments issued and the derivatives supposed to back up them. At the end of the chapter, risks (i.e. *market and counterparty risks*) and benefits (insurance function) arising from derivatives trading are discerned and compared

Therefore, a wide and complete comprehension of the second chapter, is fundamental for introducing and understanding the third one, where the practical case has

[160] cash flows exchanged in a swap are referred to as legs

been debated and analyzed. The case under consideration sees as main actors Morgan Stanley, one of the most important and influential financial institution of the globe and the Republic of Italy. The dissertation's objective instead, is a bunch of interest rate swaps and *swaptions* both actors agreed on and its repercussions over a long-term perspective. More specifically, the transactions entered by the Republic of Italy presented both speculative and hedging traits. Synthetically, swapping a floating rate for a fixed one allows the Italian Republic to hedge its already existing position represented by obligations it has with its floating rate bond holders. In fact, an increase of the interest rate level, would represent a loss with respect to the debt position the Italian Government has towards its investors because of the increase of interest rate expenditures to be performed. On the other hand, the same interest rate fluctuation, is equivalent to a gain on swaps or *swaptions*' opened positions because of the chance of not having to pay the variable rate but the fixed pre-agreed one instead. As declared by Maria Cannata[161] in different circumstances, in fact, at the time interest rate swaps and *swaptions* where signed, interest rates were expected to increase as a consequence of a moderate economic growth. Accordingly, in some sense, other than having extended the debt duration and contained the public deficit, the transactions entered by the Ministry of Treasury have been presenting certain hedging features and purposes. On the other hand, instead, the speculative payload has been represented by the rates at which both the swaps and *swaptions* have been agreed on. The receipt of an upfront payment indicated that the fixed rate at which the Republic of Italy was committing itself was not comparable with respect to competitive rates at the time the contracts were signed. Such a difference, between rates ruling the swaps and the ones regulating the issuance, the settlement and the interest's repayment of Italian bonds, was so deep that the derivative transactions opposed to Italian debt securities did not constitute a perfect hedge; namely the variation of the derivative's values did not perfectly compensate for the variation in the value of the portfolio composed by Italian bonds. Such a discrepancy is what might be considered the speculative trait of the activity in derivatives performed by the Republic of Italy. Even if details have been provided in the previous chapter, it does not seem appropriate to assert whether the transactions taken under consideration had mainly a speculative or hedging nature, simply because both aspects where involved in the operation and evaluating which was the prevailing one, neither is feasible (due to the lack of information) nor the

[161] responsible for the Public Debt department at the Treasury Minstry

objective of this thesis. Anyway, the whole dissertation provided with a considerable amount of competencies, detailed knowledge and practical experience with respect to hedging or speculative strategies performed through the aid of financial derivatives in general and interest rate swaps (or *swaptions*) in particular. Therefore, important and different insights have been drawn as well as evaluating skills built, in order to critically analyze derivative transactions, correctly value them in such a way to identify the appropriate risk-reward profile, when needed, and finally take into account long-term perspectives as well as any other variable affecting both the final outcome of the trade, as well as its effects over time.

4.2 Derivatives Mishaps and what we can learn from them

At the light of what has just been discussed all over the dissertation, important insights need to be grasped and analyzed to effectively manage investment opportunities, deal with financial derivatives and most importantly allow investors to distinguish between hedging or speculative elements in transactions, whether they are non-financial corporations or Public Administrations. Therefore, right before getting involved in a derivative transaction, not only it is essential to define in the most possible clear way risk limits, but most importantly they have to be respected. In order, for this to happen, risk limits have to be set at the widest organizational level so that the organization's overall priorities and risk preferences are respected. Accordingly, risk limits, should then be converted and applied to inferior levels within the organization, in such a way to precisely define the thresholds each level has to respect and to render people working in it, accountable for having taken risk in excess of what has been previously set. It is essential, though, to take risk limits seriously and not to ignore them whenever a profit opportunity arises. This would contribute to a culture where pre-set risk limits are usually ignored. This is what paves the way to financial disasters. Furthermore, when entering into derivative contracts or swaps, it is fundamental to monitor risk so that to evaluate whether the department or the individual in charge of trading in derivatives has switched from being a hedger to a speculator or vice versa. Additionally, note that a transaction can't be defined a hedge or speculative *per se*[162]. Indeed, a transaction presents hedging or

[162] a Latin phrase meaning "by itself" or "in itself"

speculative traits in relation to the already opened positions the organization has. This is also why setting in advance risk preferences and coherent risk limits is crucial. Once risk limits have been set, and trades occurred, it is important to maintain an objective perspective all over the maturity of the entered transactions: having the impression of being able to outguess the markets is incredibly misleading. Reasoning by simple assumptions, in fact, a trader who performs well in 3 consecutive quarters by random trading, should not see his risk limits and resources augmented to increase his opportunity to leverage. This is because, in an ideal world where incurring into losses or gains have the same chance of occurrence, the probability of earning a positive return over 4 consecutive quarters, by random trading, is simply 0.5 raised to the power of 4 (1/16), meaning that a trader over 16, on average, would be able to beat the market, only by chance. Nonetheless, even if evidence proved the *random walk theory*[163] does not fit very well current financial markets, it might well be adopted as a fair approximation.

With reference to the Morgan Stanley and the Republic of Italy case study, the excessive confidence of the Italian Treasury with respect to the behavior of interest rates, was detrimental in the sense that interest rate swaps and *swaptions* have been signed so that a position which was too large and non-justified by market expectations of that time, was taken. Namely, even though, in 2007, a bubble burst, the expectation of interest rate to be increasing was not so realistic to justify such a massive recourse to swaps and *swaptions*. With special reference to Public Administrations instead, it is really essential to manage incentives in a different and more consistent way. As previously discussed, convex contracts provide one of the party with the possibility of receiving an upfront compensating for the unfavorable conditions the contract implies. Such an upfront, is usually misinterpreted and exploited in a wrong way by the ruling administrative body. Whenever possible, upfront cash-inflows are presented to the public opinion as an amelioration of public accounts so to gain in popularity. This is possible because the cash cost of such operations might fall on subsequent governments (Piga, 2001) that were not in power at the time these operations were initiated. As a consequence, subsequent governments might ask national accountants to revise past operations in order to eliminate their effects. Indeed, due to the fact that, if certain conditions subsist, derivative contracts' costs may be spread over a very long time period (10-20 or more years), political tensions

[163] The random walk theory suggests that stock price changes have the same distribution and are independent of each other, so the past movement or trend of a stock price or market cannot be used to predict its future movement. In short, this is the idea that stocks take a random and unpredictable path.

arise. Luckily, regulation has been modifying and thanks to SEC10 the "unbalanced" portion of the convex contract, has now to be recorded as additional debt, rather than being presented as a simple cash-inflow ameliorating public accounts. Anyhow, improvements still need to be done to disicentivize traders to enter in inappropriate transactions just because they would only enjoy their benefits while leaving costs to their successors and to align treasurer's perspective to the one of the whole organization (i.e. the State)

Due to the relatively new diffusion of derivatives in international financial markets, stimuli to stress the edges to verify the possibilities derivatives provide with, are high and once ascertained their hedging capability, this is what generally happens: leverage is increased up to an inappropriate level. At first, things might go well, but then a loss is made. As it was for the Republic of Italy which had to enter into other swaps and *swaptions* simply to perform due payments implied by previously signed swaps and *swpations*. Usually, to recover a loss the bet needs to be doubled; further losses are made and so on and so forth. In the end, a financial disaster is the most foreseeable final outcome. Indeed, for public debt managers, the use of derivatives is largely strategic, with clear objectives. Additionally, they have to consider as a first element whether the use of derivative is aligned with the risk-reward profile which has been *ex ante* set (the benchmark). Anyhow, the main difficulty debt managers encounter when trading derivatives to the purpose modifying the characteristic of the overall portfolio, arises from the fact that there are some inconsistencies between the accounting treatment reserved to derivatives (mark-to-market valuation) and underlying debt securities which most of the times are recorded at their book value[164]. Such inconsistency is what might lead public debt managers to opt for poor decisions. Also, their decisions should fluctuate within a well-specified debt strategy, which implies goals, such as developing and maintaining an efficient and liquid market for government securities. Moreover, even if not sufficiently debated, Public Administrations may benefit from properly developed derivatives markets, without directly interacting with it. In fact, derivative instruments, substantially contribute to overall market efficiency and liquidity by providing additional solutions and risk-reward combinations so that to facilitate matching of demand and supply.

[164] Book value of an asset is the value at which the asset is carried on a balance sheet and calculated by taking the cost of an asset minus the accumulated depreciation.

However, at the light of what has been debated, it seems a different degree of transparency is needed. The issue, though, is that fear of front running[165] or squeezes[166] may limit ex ante transparency, even if an improved transparency level may well reduce the incentives to debt managers to enter risky transactions which are not proportionally remunerated. Stakeholders, in fact, may gain the possibility of influencing the decision making process, preventing speculative transactions to be entered. On the other hand, the reasons for ex post transparency are much less articulated and solid.

In conclusion, as inferred by Piga (2010), during a Committee on Economic Affairs and Development held in Paris, derivatives and interest rate swaps in particular, are rather a different form of debt more than additional one. If properly managed, in fact, the main purpose for which swaps are intended to, is to convert the nature of a liability or an asset (i.e. from floating rate to fixed or vice versa), as widely disserted in the first chapter. Nevertheless, agreeing upon rates which render the swap Net Present Value different from zero at its inception, means entering into a riskier than average position. If the underlying debt securities do not present the features justifying such a decision, then the transaction acquires a speculative payload and the portion of the swap's fair value which makes it different from zero at its inception, requires to be considered as additional debt issued by the party receiving the upfront.

Therefore, if an organization hedging or speculative strategies are not built upon the organization's sensitiveness to different market variables, their fluctuations and current exposure, then their final outcome, as in the case of the Morgan Stanley and the Republic of Italy case study, would be catastrophic.

As exemplified in the thesis, the majority of poor financial decisions are taken because of the inability of individuals to interpret information and consequently value strategies and related outcomes. Accordingly, financial markets are far from being perfect as well as public debt managers far from being rational investors. Corrective actions need to be taken, in order to prevent financial disasters to occur again and to facilitate the smooth functioning of international financial markets and related economies. Regulation, in this sense, has to move steps forward as well as different and more complete monitoring

[165]Trading with the advantage of having received reserved information.
[166] In business, it is a period when borrowing is difficult or a time when profits decline due to increasing costs or decreasing revenues. In the financial world, it is used to describe situations where short sellers purchase stock to cover losses or when investors sell long positions to take capital gains off the table.

systems, need to be implemented. Nonetheless, to avoid free riding, the entirety of the issues debated in the whole work, have to be tackled at a collective level, otherwise extreme speculators, disrupting financial markets while attempting to earn superior profits, will always exist. In the end, however, the reality is that *"hedging is relatively dull, whereas speculation is exciting"* (Hull, 2009, Options, Futures & Other Derivatives, pp.789)

5. Summary

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Chapter 1. Financial Derivatives: Brief History and definition

In 1988, when "Options, Futures and Other Derivatives" was, for the first time, published, its author, John Hull, specifically described a derivative as a *"financial instrument whose value depends on the value of another underlying asset". (*Hull, Options, Futures & Other Derivatives, 2009, pp. 1). Anyhow, since always newer and different types of derivatives started to be traded on a wider spectrum of underlyings, different from purely financial assets (i.e. energy derivatives[167]), a derivative requires rather to be defined as a financial instrument whose value depends on any underlying which satisfies a fundamental criterion: its value must be observable and measurable, at least, over the entire life of the derivative contract.

With reference to the current global scenario, instead, records report a striking value of $700 trillion (Global Finance, 2016) of worldwide outstanding[168] relative to OTC[169] derivative transactions while the overall gross market value[170] is approximately $20 trillion (Global Finance, 2016) . The feature acquires relevance if compared to the worldwide equity market which accounted for $65 trillion in 2016 (Business Insider, 2016), the 2016 global bond market which reached $90 trillion in face value[171], (Bank for International Settlements, 2017) and the world Gross Production amounting to $77,9 trillion (Statista, 2017). However, even thought, the volume of derivative transactions dramatically increased over the last 30 or 40 years, in reality, financial instruments, very similar to derivatives, already existed in 1800BC and the purposes for which they were used were pretty much the ones pursued nowadays. Indeed, the very first objective of derivatives trading was to secure the supply of fundamental commodities or in certain cases to provide with a sort of insurance to farmers in case of events such as a crop failure.

[167] A derivative instrument in which the underlying asset is based on energy products including oil, natural gas and electricity, which trades either on an exchange or over-the-counter. Energy derivatives can be options, futures or swap agreements, among others.
[168] Notional Outstanding Amount is defined as the monetary value of open interest (the notional value of all contracts outstanding at a given time).
[169] Over-the-counter (OTC) is a security traded in some context other than on a formal exchange such as the New York Stock Exchange (NYSE)
[170] Absolute value given by the sum of the mark-to-market values of all outstanding contracts (the cash flows to pay or receive in case of an early termination of the derivative contracts)
[171] Face value is the nominal value of a security stated by the issuer.

Afterwards, once become commonly known and understood, derivatives started to be traded for other different reasons, such as to rapidly raise funds or alternatively to gain on market misalignments and capture easy and potentially high profits (i.e. arbitrage[172]). Over time, the political and jurisdictional focus on derivatives, varied depending both on the geographic area and on the particular authority (and its beliefs) ruling at that particular time which, in turn, depending on the imposed legislation, contributed or not to the popularization of financial derivatives. Additionally, the very first transactions in derivatives, were purely OTC; the role of an intermediary such as an exchange came later but once recognized the advantages it involved, up to the 1990s trades mostly occurred there. Due to improvements in technology, though, OTC transactions gained momentum again so that the trend recently reversed. Among the many types of derivative instruments that have been invented, interest rate derivatives are the leading ones. Not only they have been contributing in such a sudden growth in derivatives OTC transactions, but they have also been by far the prevailing class of derivatives being traded during the last 20 years. Within such a time-span, in fact, they have accounted for more than 70% of the outstanding notional. This is why it is important to introduce interest rate swaps, defining them as OTC transactions between two parties implying the exchange of cash flows in the future; basically a combination of currency forward contracts. Accordingly, right before entering into the core dissertation and dealing with interest rate swaps, it seems reasonable to offer preliminary knowledge relative to simpler financial instruments through which swaps are built: namely Forward Contracts and Futures.

1.1 Forward Contracts

A Forward Contract is the simplest derivative being traded in financial markets. According to Hull (2009), it is simply an agreement between two parties (financial institutions, corporations or individuals) to buy or sell a specific asset at a predetermined date in the future. The price at which the transaction will take place is already known at the inception of the contract and it is said to be the forward rate ruling the future trade (Strike Price). In a forward contract, the party agreeing to buy the asset in the future at a specified rate is said to have taken a long position in the asset, while, on the contrary, the party willing to sell the asset at a future specified date is said to have assumed a short position. Forward Contracts exist almost on everything and they allow different entities to manage different sources of risk. At the end of the contract, the payoff associated to a

[172] Arbitrage is the simultaneous purchase and sale of an asset to profit from a difference in the price. It is a trade that profits by exploiting the price differences of identical or similar financial instruments on different markets or in different forms.

long position is $\underline{St^{173}-K^{174}}$, and it measures how advantageous it has been entering into a long position rather than waiting until the termination of the contract to buy spot[175]. Of course if $\underline{St-K}$ was negative, it means that the future spot price is lower than the delivery one and hence it would have been more convenient not to enter into a forward transaction. It is important to mention that at the very end of the contract, forward and spot prices[176] have to converge, otherwise even if with no time to maturity left, it would be beneficial buying forward and selling spot or vice versa, and it doesn't make sense since at maturity there's no difference between a spot and a forward transaction.

1.2 Futures

As well as forwards, futures are contracts implying a future transaction at a pre-specified delivery price which is binding for both parties. The main difference is that forward contracts are traded OTC between parties who have to know each other in order to let the trade work, while on the other hand, futures are traded in physical exchanges. Therefore, future contracts present some standardized features which contribute to lower transaction costs and hence to the tradability of future contracts. Particularly, the establishment of a margining system[177], which does not characterize forward contracts instead, works as an insurance against defaults of parties involved in the future transaction and incentivizes the use of futures rather than comparable instruments.

1.3 Swaps

"*A swap is an OTC agreement between two companies to exchange cash flows in the future. The agreement defines the dates when the cash flows are to be paid and the way in which they are to be calculated."* (Hull, Options Futures & Other Derivatives, 2009, pp.148). Accordingly, to compute cash flows to be exchanged in the future, the future value of a market variable such as an interest or exchange rate[178] needs to be monitored; this is the reason why a Forward Agreement, due to the fact that it involves only one exchange of cash, may be seen as the simplest case of a swap contract. *Plain vanilla* swaps are probably the most common type of swaps and they involve exchange of cash-flows based on the value of pre-determined interest rates. In particular,

[173] Spot rate at time t (at maturity)
[174] Strike Price
[175] A spot trade is the purchase or sale of a foreign currency, financial instrument, or commodity for immediate delivery.
[176] A spot trade is the purchase or sale of a foreign currency, financial instrument, or commodity for immediate delivery.
[177] Both parties involved in the trade are required to commit a percentage of the final trade and adjust it depending on market fluctuations to reduce the mutual risk of default.
[178] The price of a nation's currency in terms of another currency

according to this type of swap, one party agrees to receive interests at a floating rate and to conversely pay interests at a pre-determined fixed rate, while, on the other hand, the other party pays the floating rate in exchange for the fixed one. When dealing with floating rates in swaps, the reference rate is, in most of the cases, the LIBOR[179]. Generally, rather than exchanging the whole interests, only the difference (if any) between interests computed with the different rates, is actually given to the party whose rate at which he pays is lower than the one he receives.

Among the many purposes, for which swaps are used, the most interesting ones refer to the modification of the nature of assets or liabilities. A swap agreement, indeed, may turn a floating rate debt into a fixed rate one, which reduces the uncertainty related to the variability of future expected cash outflows. Of course, the opposite is also possible, and fixed interest cash-ins generated by a given asset, may be converted into floating ones depending on investors' preferences.

With reference to rates and subsequent evaluation, the swap rate is defined as the average of the maximum fixed rate a swap market maker is willing to pay in exchange for a floating rate such as the LIBOR (the bid rate) and the minimum fixed rate it's willing to receive in return for paying the LIBOR (the ask rate). Accordingly, from the point of view of the party receiving the fixed rate, the value of the swap may be calculated as the difference between the value of a fixed rate bond, on which interests are equivalent to the swap rate, and the value of a floating rate one: $\underline{V_{swap}} = \underline{B_{fix}} - \underline{B_{flo}}$. The inverse holds for the counterparty. Alternatively, a *plain vanilla swap*, may be interpreted as a continuous exchange of cash flows or subsequent forward transactions. This is why, it may be also valued through the assumption that forward interest rates are realized. Hence to alternatively value a *plain vanilla swap*, it is only necessary to use the LIBOR curve to compute forward rates for each of the LIBOR rates characterizing the cash flows implied by the agreement. Then, cash flows may be calculated by assuming LIBOR rates will equal forward rates, and finally discounted and summed up to obtain the final swap value.

1.3.1 Benefits from trading in swaps

The main benefit arising from swaps trading is accurately represented by the comparative-advantage argument. Indeed, financial markets are not 100% efficient: transaction costs do exist and prices are not homogenous all over the world, neither for consumer goods nor for financial instruments (Fama, 1970). Accordingly, different parties may access

[179] The London Interbank Offered Rate (LIBOR) is the minimum acceptable rate at which a bank would be willing to deposit its money with other banks with a "double A" credit rating.

more easily certain markets than others. With reference to a *plain vanilla swap*, for instance, even if one of the two parties had an absolute advantage both in the fixed and floating rate markets, anyhow both of them might have a comparative advantage[180] with respect to the other one (Ni,2005). Accordingly, if each company borrowed from the market in which it has the comparative advantage to swap the proceedings thereafter, then each of them would obtain the possibility of accessing lower rates than if they borrowed individually.

Chapter 2. How Corporations and Public Administrations hedge or speculate with interest rate swaps

2.1 Hedging & Speculation: definition and preliminary knowledge

Hedging is known as the practice of undertaking an investment whose fluctuations in price exactly offset the price movements of an already opened position; thus partially or completely eliminating a specific risk source (Wisner, 2002). Hence, hedges approximately work as a sort of insurance: uncertainty related to an already established position is eliminated at the expense of a payment. A hedge which completely eliminates a specific source of risk, is said to be perfect. Indeed, it may well be represented by the acquisition of a derivative which perfectly mirror, but in the opposite direction, the price movements of an already existing position; consequently eliminating both upside and downside potential. The extents to which derivatives are able to conversely replicate fluctuations in the price of an already opened position, is measured by *Delta* which is a measure of the sensibility of the value of the derivative to the variation in the price of the underlying and it is sometimes referred to as the *"hedge ratio"* (Mwanga, 2005).

On the other hand, speculation, is intended as the act of undertaking a specific investment which carries a substantial amount of risk to be translated in superior expected losses. Nonetheless, the investment decision is also motivated by superior expected gains for which carrying the above mentioned risk is worth (Edward, 2011). In order to take large positions without incurring in large investments, speculators usually trade highly levered[181] instruments, so that relatively small upfront payments can entitle them to much more volatile payoffs. Both futures and options are optimal examples. Indeed, futures cost zero and depending on the fluctuations of the spot price, all over the maturity of the contract may produce huge gains, while options despite costing a small percentage of the

[180] Comparative advantage is an economic law referring to the ability of any given economic actor to produce goods and services at a lower opportunity cost than other economic actors.
[181] Leverage is the investment strategy of using borrowed money: specifically, the use of various financial instruments or borrowed capital to increase the potential return of an investment.

underlying, enable the buyer not to give up the upside potential and eliminate the downside one at the same time. Speculators essentially takes investment decisions which are poorly supported by market indicators or previous estimates and most of the risk they carry, is simply because of that.

2.2 How and Why Corporations hedge or speculate with interest rate swaps

In order to individuate and analyze non-financial firms' investment decisions, rather than relying on previous literature, which seems not to be very accurate and detailed, it seems more beneficial to analyze and interpret the most comprehensive Panel Data containing information related to interest rate swap transactions entered by corporations. In such a way, it is possible to produce relatively new and statistically significant information along with relevant inferences. The Panel Data under consideration has been constructed by Sergey Chernenko and Michael Faulkender (2011) and contains data for approximately 1.854 firms over a ten-year period (1993-2003). Therefore, the fundamental rationale to understand, in order to correctly interpret the different regressions, run on the Data Set, is the following one: If a firm's exposure to risks which are hedgeable such as exchange rate, commodities' prices and even interest rates' volatility, remains constant over time, implying the firm has not changed its business model, then hedging is supposed to be reflected by all those managerial practices which also remains stable over time. On the other hand, speculative activities pertain to all those actions management performs, in an attempt to deviate from usual practices, which hence are influenced by a transitory component (Chernenko and Faulkender, 2012). Accordingly, a *cross-sectional* [182] analysis, underlying the differences in practices between non-financial firms, in a wide sample and scrutinized at a specific time period, provides with all the elements to interpret hedging patterns. In particular, relative to interest rate swaps, a non-financial firm may choose to hedge by comparing the sensitivity of its cash flows to interest rate fluctuations, but unless its operations are altered year by year, its sensitivity to interest rate fluctuations, should remain approximately constant over time. Consistently, the *hedge ratio* and the intensity according to which firms engage in interest rate swap trading, to hedge, has to remain stable as well. On the other hand, the *time-series*[183] component of the Data Set is

[182] Cross-sectional analysis is a type of analysis that an investor, analyst or portfolio manager may conduct on a company in relation to that company's industry or industry peers. The analysis compares one company against the industry in which it operates, or directly against certain competitors within the same industry, in an attempt to assess performance and investment opportunities.

[183] A time series is a sequence of numerical data points in successive order. Time series analysis, instead, can be useful to see how a given asset, security or economic variable changes over time. It can also be used to examine how the changes associated with the chosen data point compare to shifts in other variables over the same time period.

a far more adequate tool to verify for variations in management practices over time and hence individuating speculative strategies. Any trade in interest rate swaps or derivatives occurred because of speculative purposes, contributes to the modification of the value of the observed hedge ratio which then, may be decomposed as:

Observed Hedge Ration = Optimal Hedge Ratio + Speculative activities

In particular, the *cross-sectional* analysis, underlined that companies use interest rate swaps to modify the share of floating rate debt which compounds their capital structure, and they do so mostly to avoid recurring to costlier external sources of funding rather than lowering financial distress costs (Froot, Scharfstein, and Stein (1993)). The most remarkable evidence, the *time-series* analysis underlined, is that when incentivized by compensation metrics, CEOs and CFOs tend to modify the capital structure at their favor by augmenting the share of floating rate debt thanks to interest rate swaps. Finally, meeting earnings forecast may work as a substitute for compensation metrics: the reputational component involved in meeting analyst forecasts could work as an incentive to swap more towards floating debt and incurring the risk of bigger losses. Even though the analysis refers to a particular Data Set, it is probably the biggest and more complete one addressing similarities and differences in swap usage between non-financial firms. Consistently, due to the complex nature of the Panel Data, it sounds reasonable to generalize the results to all those financial markets belonging to industrialized countries and assume the just disserted patterns as mirroring reality.

2.3 How and Why Public Administrations hedge or speculate with interest rate swaps

Since 1970, European Public Administrations started dealing with financial derivatives because of their particular features that allowed them to manage crucial transactions in a better way and have a better control on certain financial parameters including public debt. In particular, before the Euro, derivative programs faced two main obstacles. The first was the possibility that a sovereign borrower entering a national OTC market would disrupt its functioning by causing large swings in prices (government borrowers being such large actors relative to the size of the market). The second obstacle, instead, was the aversion of debt managers of being perceived as playing against the market or signaling to the market when they actually were not. Thanks to the market expansion, though, countries which entered into derivatives transactions were not perceived as big players taking a position within the market anymore, but rather as rational investors with an adequate level of knowledge attempting to hedge. With such a premises, governments

started to use interest rate swaps to modify both the duration of their debt and impact the liquidity of secondary long-term bond markets.

However, with reference to the different scopes of trading in swaps, within the categories of hedging and speculation, it is possible to trace a lot more of purposes and rationales justifying Public Administrations and public debt managers to use them:

• *Modifying the public debt duration*: by entering into interest rate swap contracts carrying a longer (or shorter) duration than the public debt one, it is possible to modify the public debt duration itself, to expand (or shorten) it. This practice might reveal a powerful risk management tool, since it allows to match the duration of cash inflows and outflows, hence avoiding, or at least lowering both the risk of default on public debt or other liabilities and any related refinancing risk. Additionally, it allows to reduce interest rate risk connected to the roll-over of the debt, without having to renounce to new security issues in the short-term. In fact, because of their particular nature, most of derivatives contracts have a moderate or null impact when initiated.

• *Constructing the necessary capital to face cash outflows implied by previous issuance of bullet bonds*: by entering into bullet amortizing swaps, Public Administration might be able to allocate the necessary amount of money, in order to match cash disbursements implied by previously signed obligations.

• *Postponing cash disbursements or realizing immediate cash inflows (window dressing)*: derivatives, in fact, can be used to restructure certain stream of cash flows and in case of financial distress, realize immediate cash inflows, probably at the expense of one or more unfavorable transactions to be entered in the future. In this way, public accounts can be manipulated so that they might look better than they actually are. The practice may be seen as a sort of speculative activity; in fact, who receives the initial payment, suddenly realizes a windfall gain, without facing any cost, but the amount of volatility involved in the transaction is so high that future transactions may eliminate or turn the gain into an effective loss. Still, the desire (and probably the need) of realizing an immediate cash-in, is superior to any other consideration so that the risk of incurring into a loss and the possibility of earning a profit are not proportionally weighted. It is important to mention that, if one of the parties involved in the transaction aims at receiving a premium at the inception of a contract, the contract's Net Present Value can't be zero. Indeed, the contract has to be unbalanced towards one party with respect to the other, so that a reward is needed to compensate for the unfavorable conditions the disadvantaged party is going to accept, at least theoretically. These contracts are denominated "convex".

Within the category of financial derivatives, interest rate swaps and *swaptions* are the most common and used by public debt managers to achieve the above mentioned objectives

Chapter 3. The Morgan Stanley & The Republic of Italy case study

3.1 Where it all started

In its *"Form 10-Ks Report*[184]*"*, presenting the year ended December 31, 2011, Morgan Stanley, announced its concerns with respect to those countries which, all over the document, have been denominated *"European Peripheral countries"*. According to the report, in fact, once the 2007 financial crisis originated in US and hit Europe few years later, *"during 2011, certain European countries, including Greece, Ireland, Italy, Portugal and Spain (the "European Peripherals") and France, experienced varying degrees of credit deterioration due to weaknesses in their economic and fiscal situations"* (Morgan Stanley 2011 Form 10-K Report, pp.120). What seemed clear, is that the leading intention the financial institution had been perpetrating all over that specific and subsequent years, was to reduce as much as possible the risk exposure towards those countries whose debt was not considered risk-free anymore and to profit from contractual technicalities allowing them to do so. In particular, analyzing the Morgan Stanley *form 10-K report*, at page 120 there was a Table (n.3.2 in Appendix) summarizing the Net Exposure with other related features the financial institution had towards certain European countries. Below the table, there was a note providing with further information with respect to the variation of exposure towards Italy and it stated: *"On December 22, 2011, the Company executed certain derivative restructuring amendments which settled on January 3, 2012. Upon settlement of the amendments, the exposure before hedges and net exposure for Italy decreased to $2,887 million and $1,522 million, respectively, and the exposure before hedges and net exposure for European Peripherals decreased to $5,044 million and $3,056 million, respectively"* (Morgan Stanley 2011 Form 10-K Report, pp.120). Despite not having been celebrated that much, the few lines above, were simply announcing the huge gain Morgan Stanley produced thanks to the closure and settlement of a portion of derivatives contracts (swaps and *swaptions*) signed in 1994 with the Republic of Italy (Piana, 2017).

[184] A 10-K is a comprehensive summary report of a company's performance that must be submitted annually to the Securities and Exchange Commission.

3.2 Contractual Technicalities

Specifically speaking, the 1994 signed contract, specified that all the subsequent derivative transactions between the two parties would have fallen within the same standards of the original contract (a sort of an umbrella agreement regulating present and future transactions). Namely, all the subsequent derivatives would have been made part of a bigger and unique transaction subject in solid to the 1994 Master Agreement (Piana, 2017).

3.2.1 The Upfront Premium

When selling a *swaption*, the seller receives a premium because it gives away the other party the possibility of choosing whether or not to enter an interest rate swap at a certain date in the future. Obviously the party buying the option, would only exercise it if market conditions are so that entering the swap is profitable. As a further information, the underlying interest rate swaps, expected the Republic of Italy to pay a fixed interest rate over the notional in exchange for a variable one (i.e. the 6 months Euribor). Indeed, the Republic of Italy played the role of the seller while Morgan Stanley bought the option. The Upfront premium, in fact, represented a sort of compensation for probable future losses and the more the terms of the contracts are unfavorable to the party selling the option, the bigger has to be the premium to compensate higher expected losses. Unfortunately, details concerning the initial upfront have not been explicitly disclosed. Nevertheless, the amount of risk involved in these kind of transactions, instead, have been abundantly detailed and discussed. Certainly, market value is probably the best indicator for risk, especially in derivatives transaction. The mark-to-market, which basically refers to the "fair value" of an asset based on the current market price, provides with synthetic and clear insights with respect to the probability of that specific asset to increase or decrease in value by summarizing and validating both expectations and market analysis. Accordingly, the more a transaction is expected to produce negative cash-flows, the more its mark-to-market is expected to be negative and vice versa.

At the inception of the contract, the mark-to-market for the Republic of Italy was already negative, otherwise there would not have been a positive premium to be paid. Anyhow, the initial interest payments were positive to Italy, because of the interest rate level prevailing at that time. In 1998, in fact, cash-ins associated to the *swaptions* signed with Morgan Stanley in 1994 and all other derivative transactions, amounted to approximately €3 billion. Nonetheless, right after, in the following year, the Net Financial Income declined by approximately 90% and slightly fluctuated the following years. In 2006, Net

Financial Income turned negative, as represented in figure n.3.1 (in Appendix), and started to deepen the public deficit so that to convince Morgan Stanley to exercise the early termination clause.

3.2.2 The Unilateral Clause

Usually, both parties involved in an interest rate swap are entitled to benefit from the *"early termination clause"*. An early termination clause, indeed, provides that in case the market value to one of the two parties exceed a certain threshold, then that party can ask for the settlement of the derivative transaction and for the early termination of the contract. Being derivative transactions a zero-sum game[185], a positive market value for one party, means a negative value for the other, and as a consequence a much higher risk exposure towards the party who is losing with the derivative. The peculiarity related to the Morgan Stanley and the Republic of Italy's agreement, was that the early termination clause could have been exercised only by the financial institution (rather than by both parties), which basically had an additional insurance against its risk exposure towards Italy. Specifically, in case the mark-to-market, exceeded the value of $50 million, then the American bank had the possibility of exercising the clause and terminate the contract. Maria Cannata, who was responsible for the Public Debt Department at the Treasury Ministry at that time, declared that there have been many attempts to modify the terms of the contract so that to render bilateral the clause the Republic of Italy could not have enjoyed. Nevertheless, she also declared the counterparty firmly denied such a query. In 2014, during an interview related to the lawsuit pertaining to the role of financial intermediaries and their ratings over the Italian public deficit, she also specified that Morgan Stanley could have exercised the clause at least 10 years before that January 2012 due to the fact that the exposure the financial intermediary had with respect to the Republic of Italy exceeded $50 million since then. According to her opinion, the clause has not been previously exercised not only because expectations were favorable to the American bank and hence exercising it later would have been much more profitable but also because of technical factors: "*The financial Institution cared about institutional relationships with our country. Afterwards, at the end of 2011…when the exposure was too big and the Italian public debt was downgraded, the ones who were in charge of supervising over the American financial institution performance, wanted the clause to be respected. That doesn't mean it has been fully exercised; in fact the contract has been*

[185] In game theory and economic theory, a zero-sum game is a mathematical representation of a situation in which each participant's gain or loss of utility is exactly balanced by the losses or gains of the utility of the other participants

renegotiated and not all the position comprehended in the portfolio have been closed."(Maria Cannata during the interview held to the purpose of "Proc Penali n. 3942/11 R.G.N.R. e n.742/13 R.G.N.R – Richiesta di informazioni e documenti della Procura di Trani").

Practically speaking, the cash outflows of $3,4 billion was related only to a considerable portion of derivative contracts but not to the entire portfolio.

3.3 Interest rate behavior

As mentioned in the previous chapter, Public Administrations operate in the derivatives markets, essentially for two reasons:

1) containing and modifying the public deficit through a reshaping of due interest payments,

2) modifying the public debt duration (improving or shortening it) so that to spread the burden of the due payments over a longer time span (or concentrate it in shorter maturities).

In particular, Maria Cannata, during the conference held at the Deputies Chamber to the purpose of detailing the above mentioned set of derivatives transactions, explained that starting from 2005, postponing due payments and consequently extending the debt duration became the unique objective of transacting in derivatives, probably not to enter in unbalanced contracts anymore, which by providing some upfronts may well have ameliorated public accounts in the very short-run while significantly deteriorating them over the longer period due to additional liabilities. For this reason, every derivative contract (mainly swaps or *swaptions*) was signed so that a variable interest rate (i.e. 6-months Euribor) was received in exchange for a fixed payment over the same notional. According to Maria Cannata, at that time (in the early 2000s), entering in derivatives transactions at that conditions seemed beneficial because interest rates were at their historical minimum. Anyhow, the 2007 crisis, in fact, completely modified market expectations by creating scenarios that completely differed from the ones taken into consideration when entering into that kind of swaps or *swaptions*. Before the crisis, interest rates were expected to moderately increase in a context of moderate economic growth. Due to the bankruptcy of Lehman Brothers[186] though, reduced trust in financial institutions lead to an improved financial instability which sensibly contributed to the

[186] Lehman Brothers Holdings Inc was a global financial services firm. Before declaring bankruptcy in 2008, Lehman was the fourth-largest investment bank in the United States.

depression of interest rates which, in turn, completely frustrated the insurance the Republic of Italy built through swaps and *swaptions*. The deep fall of interest rates (figure n.3.2 in Appendix) which was very unlikely to be predicted, produced a very profound worsening of the many positions, the Republic of Italy had in derivatives contracts, which, in turn lead to the Morgan Stanley's decision to exploit the early termination clause and close the positions it had towards the Republic of Italy.

Chapter 4. Conclusions & Final Recommendations

At the light of what has just been discussed all over the dissertation, important insights need to be grasped and analyzed to effectively manage investment opportunities, deal with financial derivatives and most importantly allow investors to distinguish between hedging or speculative elements in transactions, whether they are non-financial corporations or Public Administrations. Therefore, right before getting involved in a derivative transaction, not only it is essential to define in the most possible clear way risk limits, but most importantly they have to be respected. In order, for this to happen, risk limits have to be set at the widest organizational level so that the organization's overall priorities and risk preferences are respected. Accordingly, risk limits, should then be converted and applied to inferior levels within the organization, in such a way to precisely define the thresholds each level has to respect and to render people working in it, accountable for taking risk in excess of what has been previously set. It is essential, though, to take risk limits seriously and not to ignore them whenever a profit opportunity arises. This would contribute to a culture where pre-set risk limits are usually ignored, hence paving the way to financial disasters. Additionally, note that a transaction can't be defined a hedge or speculative *per se*[187]. Indeed, a transaction presents hedging or speculative traits in relation to the already opened positions the organization has. This is also why setting in advance risk preferences and coherent risk limits is crucial.

With reference to the Morgan Stanley and the Republic of Italy case study, the excessive confidence the Italian Treasury had with respect to interest rates behavior, was detrimental in the sense that interest rate swaps and *swaptions* have been signed so that a position which was too deep and non-justified by market expectations of that time, was taken. Namely, even though, in 2007, a bubble burst, previous interest rate expectations were not justifying such a massive recourse to swaps and *swaptions*. With reference to Public Administrations in general, it is really essential to manage incentives in a different and more consistent way. As previously discussed, convex contracts provide one of the

[187] a Latin phrase meaning "by itself" or "in itself"

party with the possibility of receiving an upfront compensating for the unfavorable conditions the contract implies. Such an upfront, is usually misinterpreted and exploited in a wrong way by the ruling administrative body. Indeed, whenever possible upfront cash inflows are presented to the public opinion as an amelioration of public accounts so to gain in popularity. This is possible because the cash cost of such operations might fall on subsequent governments (Piga, 2001), not in power at the time these operations were initiated. Indeed, due to the fact that, if certain conditions subsist, derivative contracts' costs may be spread over a very long time period (10-20 or more years), political tensions arise. Luckily, regulation has been modifying and thanks to SEC10[188] the "unbalanced" portion of the convex contract, has now to be recorded as additional debt, rather than being presented as a simple cash-inflow which ameliorates public accounts. Anyhow, improvements still need to be done to disicentivize traders to enter in inappropriate transactions simply because they would only enjoy benefits while leaving costs to new comers. Moreover, due to the relatively new diffusion of derivatives in international financial markets, stimuli to stress the edges to verify the possibilities derivatives provide with, are high and once ascertained their hedging capability, this is what generally happens: leverage is increased up to an inappropriate level. At first, things might go well, but then a loss is made. As it was for the Republic of Italy which had to enter into other swaps and *swaptions* simply to perform due payments implied by previously signed swaps and *swpations*, usually, to recover a loss the bet needs to be doubled; further losses are made and so on and so forth. In the end, a financial disaster is the most foreseeable final outcome. Indeed, for public debt managers, the use of derivatives is largely strategic, with clear objectives: they have to consider as a first element whether the use of derivative is aligned with the risk-reward profile which has been *ex ante*[189] set (the benchmark). Anyhow, the main difficulty debt managers encounter when trading derivatives, arises from the fact that there is inconsistency between the accounting treatment reserved to derivatives (mark-to-market valuation) and underlying debt securities which most of the times are recorded at their book value[190]. Such inconsistency is what might lead public debt managers to opt for poor decisions. Moreover, even if not sufficiently debated, Public Administrations may also benefit from properly developed derivatives markets, without directly interacting with it. In fact, derivative instruments, substantially contribute to overall market efficiency and liquidity by providing additional solutions and risk-reward combinations so that to facilitate matching of demand and supply. However,

[188] Sistema Europeo dei Conti Nazionali (2010)
[189] Ex-ante, derived from the Latin for "before the event"
[190] Book value of an asset is the value at which the asset is carried on a balance sheet and calculated by taking the cost of an asset minus the accumulated depreciation.

at the light of what has been debated, it seems a different degree of transparency is needed. The issue, though, is that fear of front running[191] or squeezes[192] may limit ex ante transparency, even if an improved transparency level may well reduce the incentives to debt managers to enter risky transactions which are not proportionally remunerated. Stakeholders, in fact, may gain the possibility of influencing the decision making process, preventing speculative transactions to be entered. On the other hand, the reasons for ex post transparency are much less articulated and solid. In conclusion, as inferred by Piga (2010), derivatives and interest rate swaps in particular, are rather a different form of debt more than additional one. If properly managed, in fact, the main purpose for which swaps are intended to, is to convert the nature of a liability or an asset (i.e. from floating rate to fixed or vice versa), as widely disserted in the first chapter. Nevertheless, agreeing upon rates which render the swap fair value different from zero at its inception, means entering into a riskier than average position. If the underlying debt securities do not present the features justifying such a decision, then the transaction acquires a speculative payload and the portion of the swap's fair value which makes it different from zero at its inception, requires to be considered as additional debt issued by the party receiving the upfront. Therefore, if an organization hedging or speculative strategies are not built upon the organization's sensitiveness to different market variables, their fluctuations and current exposure, then their final outcome, as in the case of the Morgan Stanley and the Republic of Italy case study, will be catastrophic. As exemplified in the thesis, the majority of poor financial decisions are taken because of the inability of individuals to interpret information and consequently value strategies and related outcomes. Accordingly, financial markets are far from being perfect as well as public debt managers far from being rational investors. Corrective actions need to be taken, in order to prevent financial disasters to occur again and to facilitate the smooth functioning of international financial markets and related economies. Regulation, in this sense, has to move steps forward as well as different and more complete monitoring systems, need to be implemented. Nonetheless, to avoid free riding, the entirety of the issues debated in the whole work, have to be tackled at a collective level, otherwise extreme speculators, disrupting financial markets while attempting to earn superior profits, will always exist. In the end, however, the reality is that *"hedging is relatively dull, whereas speculation is exciting"* (Hull, 2009, Options, Futures & Other Derivatives, pp.789)

[191] Trading with the advantage of having received reserved information.

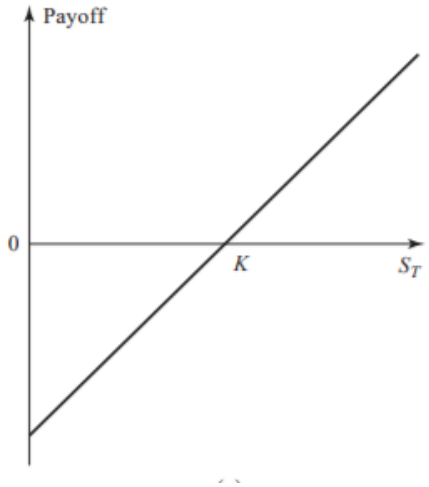
[192] In business, it is a period when borrowing is difficult or a time when profits decline due to increasing costs or decreasing revenues.

6. Appendix

Figures:

Figure n.1.1

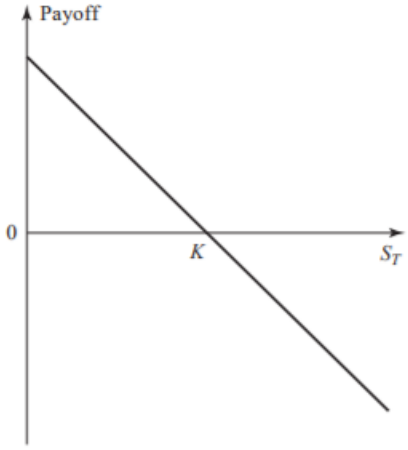
Payoff of a long position in Forward Contract as a function of the underlying Spot price at maturity



Source: Options Futures and Other Derivatives, John C. Hull, Pearson,2009

Figure n.1.2

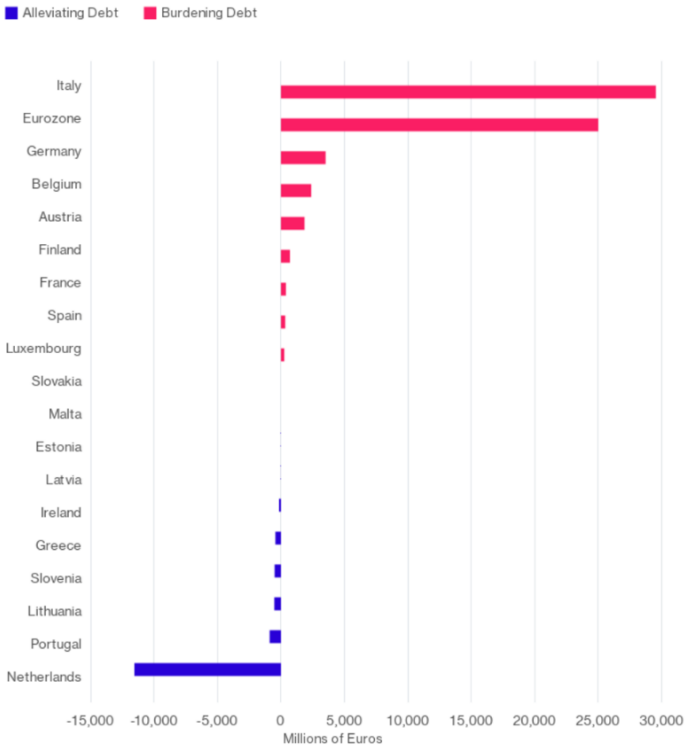
Payoff of a short position in Forward Contract as a function of the underlying Spot price at maturity



Source: Options Futures and Other Derivatives, John C. Hull, Pearson,2009

Figure n.2.1

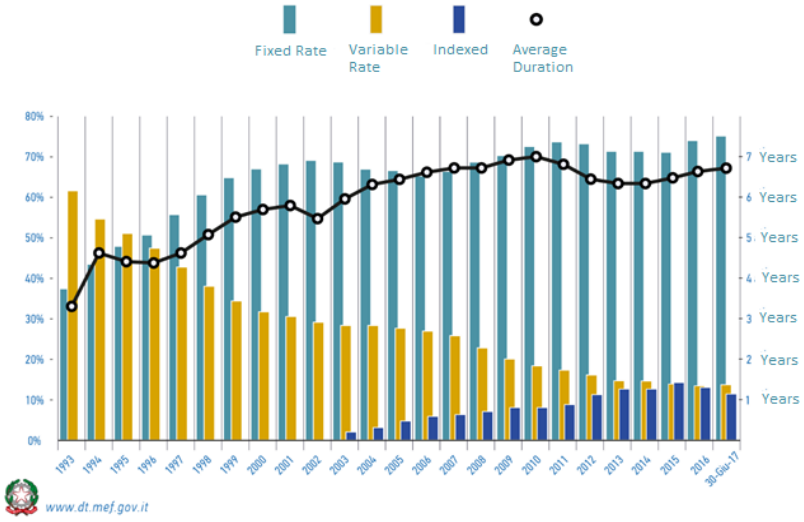
Total Impact of Derivatives' losses: Net liabilities On Public Debt (from 2012 to 2016)



Source: Bloomberg New Calculations Based on Eurostat data, April 2017

Figure n.2.2

Evolution of the Italian Public Debt Structure & Average Duration

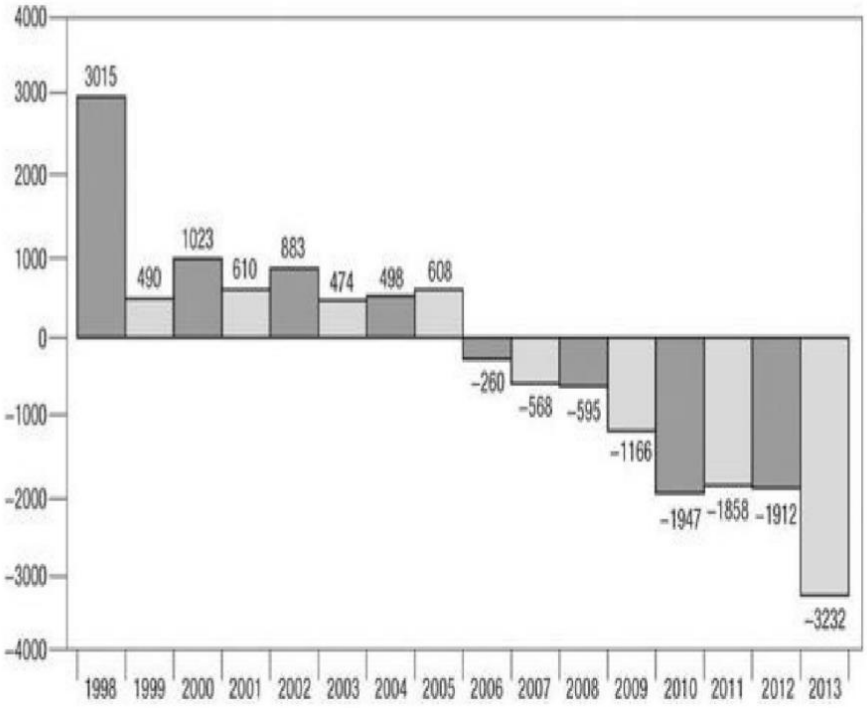


Source: MEF[193] Treasury Department

[193] Ministry of Economics and Finance

Figure n.3.1

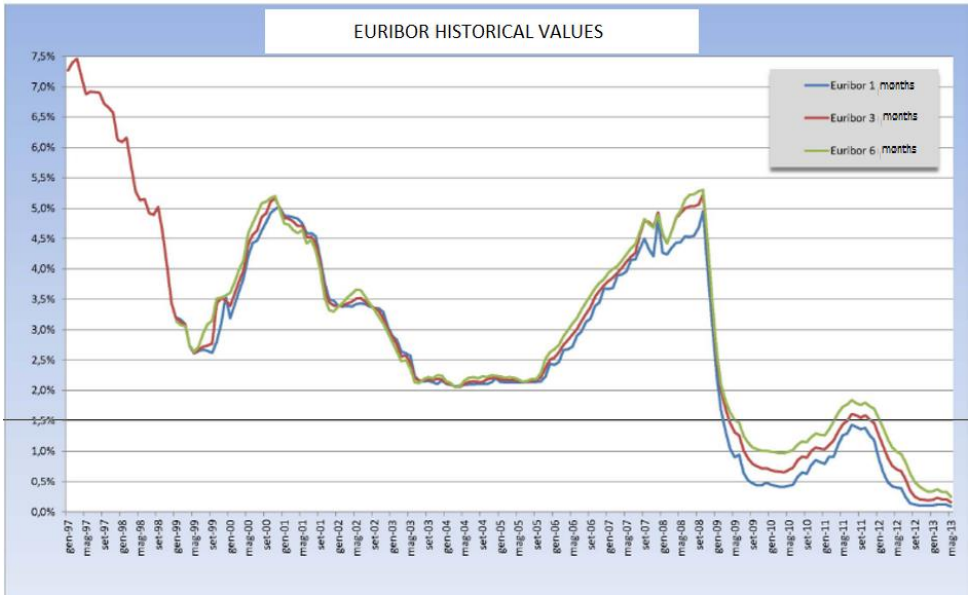
Net Interest Payments relative to Derivatives operations (Values in million €)



Source: Piana, Luca, 2017, "La Voragine", Mondadori, pp.46

Figure n.3.2

1-3-6 months Euribor Historical Values (from 1997 to 2013)



Source: ECB Statistical Data Warehouse

Tables:

Table n.2.1

Swap Usage and Floating Rate Debt Summary Statistics

This table reports summary statistics for swap usage and floating rate debt percentage for the sample of non-financial firms in the ExecuComp data set. The sample period is June 1993 - May 2003. Swap users are firms that use interest rate swaps at least once during the sample period. Initial floating rate debt is the percentage of outstanding debt that is floating before accounting for the effect of interest rate swaps. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Swapped to floating is the percentage of outstanding debt that is swapped to a floating interest rate. Long-term debt is the percentage of outstanding debt that has more than five years to maturity.

Panel A: Full Sample						
	N	Mean	Median	SD	Min	Max
Initial floating rate debt (%)	11261	41.579	33.273	35.064	0.000	100.000
Swapped to floating (%)	11261	−3.404	0.000	17.804	−100.000	100.000
|Swapped to floating (%)|	11261	6.839	0.000	16.787	0.000	100.000
Final floating rate debt (%)	11261	38.323	30.783	33.275	0.000	100.000
Long-term debt (%)	11261	47.413	49.521	34.503	0.000	100.000
Panel B: Swap Users						
	N	Mean	Median	SD	Min	Max
Initial floating rate debt (%)	6269	42.619	35.533	32.609	0.000	100.000
Swapped to floating (%)	6269	−6.114	0.000	23.513	−100.000	100.000
|Swapped to floating (%)|	6269	12.285	0.000	20.960	0.000	100.000
Final floating rate debt (%)	6269	36.770	31.579	28.995	0.000	100.000
Long-term debt (%)	6269	49.335	51.146	31.986	0.000	100.000

Panel C: Cross-Sectional and Time-Series Vatiation in Swap Usage and Floating Rate Debt								
	Full Sample				Swap Users			
	Mean	Overall SD	Cross-Sectional SD	Time-Series SD	Mean	Overall SD	Cross-Sectional SD	Time-Series SD
Swap usage	-3.404	17.804	13.167	12.177	−6.114	23.513	18.261	16.321
Floating debt	38.323	33.275	29.138	20.607	36.770	28.995	21.688	20.069

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 32

Table n.2.2

Cross-Sectional Variation in Floating Rate Debt

This table reports the results of regressions explaining the cross-sectional variation in final floating rate debt percentage. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Fama-MacBeth specification is reported in column 1, between specifications are reported in all other columns. The sample period is June 1993 - May 2003. Cash flow interest rate beta is the beta from regressing free cash flow to assets ratio on the average value of the 3-month LIBOR during the fiscal year. Cash flow interest rate beta is estimated using at least five observations. Long-term debt is the percentage of outstanding debt that has more than five years to maturity. Total number of firm-year observations is reported. Average R^2 is reported in the Fama-MacBeth specification in column 1. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(Sales)	−0.005***	−0.011*	−0.011*	−0.011*	−0.011*	−0.011*	−0.011*
	(0.002)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Leverage	−0.122***	−0.281***	−0.285***	−0.278***	−0.280***	−0.281***	−0.234***
	(0.026)	(0.082)	(0.081)	(0.082)	(0.082)	(0.082)	(0.079)
Debt or CP rating	−0.143***	−0.143***	−0.143***	−0.147***	−0.143***	−0.145***	−0.142***
	(0.012)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Long-term debt	−0.229***	−0.208***	−0.207***	−0.209***	−0.208***	−0.208***	−0.207***
	(0.022)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Operating margin	0.046*	0.089	0.091	0.092	0.089	0.090	0.074
	(0.025)	(0.062)	(0.062)	(0.062)	(0.062)	(0.062)	(0.061)
Z-score	0.001	−0.001	−0.001	−0.001	−0.001	−0.001	−0.002
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Capex/Assets	−0.092*	−0.240	−0.243	−0.243	−0.239	−0.240	−0.227
	(0.050)	(0.156)	(0.155)	(0.156)	(0.156)	(0.156)	(0.155)
R&D/Assets	−0.496***	−0.812***	−0.792***	−0.794***	−0.810***	−0.813***	−0.887***
	(0.120)	(0.193)	(0.193)	(0.187)	(0.193)	(0.194)	(0.194)
Advertising/Assets	0.159	0.126	0.143	0.124	0.126	0.125	0.037
	(0.105)	(0.260)	(0.259)	(0.260)	(0.260)	(0.260)	(0.259)
Cash flow beta	0.006***	0.004**	−0.003	0.005**	0.004**	0.005	0.001
	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.004)	(0.003)
Cash flow beta × Capex/Assets			0.097**				
			(0.038)				
Cash flow beta × R&D/Assets				−0.017			
				(0.034)			
Cash flow beta × Advertising/Assets					0.015		
					(0.072)		
Cash flow beta × Leverage						−0.002	
						(0.017)	
Cash flow beta × Z-score							0.001
							(0.001)
Constant	0.651***	0.719***	0.719***	0.717***	0.718***	0.719***	0.693***
	(0.031)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)	(0.055)
N	8594	8594	8594	8594	8594	8594	8594
R^2	0.164	0.203	0.207	0.203	0.203	0.203	0.205

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 35

Table n.2.3

Time-Series Variations in Floating Rated Debt

This table reports the results of regressions explaining the time-series variation in final floating rate debt percentage. Final floating rate debt is the percentage of outstanding debt that is floating after accounting for the effect of interest rate swaps. Delta and Vega are standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in Delta or Vega. Firm fixed effects are included in all specifications. Standard errors are adjusted for clustering by firm. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Capex/Assets	0.482***	0.357***	0.596***	0.368***	0.420***	0.362***	0.412***
	(0.085)	(0.086)	(0.120)	(0.097)	(0.121)	(0.094)	(0.118)
R&D/Assets	−0.179	−0.168	−0.528*	−0.382*	−0.441	−0.347	−0.462*
	(0.192)	(0.192)	(0.284)	(0.216)	(0.284)	(0.215)	(0.270)
Advertising/Assets	−0.107	−0.058	0.238	0.198	0.253	0.205	0.268
	(0.283)	(0.284)	(0.436)	(0.307)	(0.422)	(0.303)	(0.414)
Log(Sales)	−0.000	0.015	−0.006	0.007	0.006	0.006	0.007
	(0.009)	(0.010)	(0.014)	(0.011)	(0.014)	(0.011)	(0.014)
Leverage	0.224***	0.231***	0.288***	0.228***	0.286***	0.237***	0.282***
	(0.045)	(0.045)	(0.063)	(0.050)	(0.064)	(0.049)	(0.061)
Debt or CP rating	−0.138***	−0.132***	−0.160***	−0.115***	−0.153***	−0.114***	−0.149***
	(0.017)	(0.017)	(0.023)	(0.019)	(0.022)	(0.019)	(0.023)
Long-term debt	−0.203***	−0.203***	−0.207***	−0.213***	−0.204***	−0.211***	−0.197***
	(0.015)	(0.015)	(0.020)	(0.017)	(0.020)	(0.017)	(0.020)
Operating margin	0.015	−0.022	0.020	−0.024	−0.030	−0.028	−0.024
	(0.036)	(0.036)	(0.054)	(0.037)	(0.057)	(0.037)	(0.054)
1-year Treasury yield		0.281		0.473	0.689	0.520	0.601
		(0.520)		(0.561)	(0.806)	(0.559)	(0.785)
Swap yield spread		1.231**		1.426**	2.071**	1.569***	2.111**
		(0.563)		(0.591)	(0.879)	(0.594)	(0.844)
Swap spread		3.871*		3.145	5.777*	3.211	6.060**
		(2.068)		(2.235)	(2.979)	(2.245)	(2.956)
Credit spread		3.407		2.997	4.187	2.600	5.156
		(2.345)		(2.413)	(3.387)	(2.431)	(3.303)
Economy-wide floating-rate debt		0.832***		0.732***	0.792**	0.778***	0.912***
		(0.215)		(0.235)	(0.323)	(0.235)	(0.314)
CEO Delta			−0.014**	−0.012			
			(0.006)	(0.008)			
CEO Vega			0.000			0.003	
			(0.006)			(0.006)	
CFO Delta			0.008		−0.014*		
			(0.010)		(0.008)		
CFO Vega			0.004				−0.001
			(0.007)				(0.008)
CEO Delta × Swap yield spread				1.428**			
				(0.617)			
CFO Delta × Swap yield spread					2.329**		
					(0.904)		
CEO Vega × Swap yield spread						0.542	
						(0.393)	
CFO Vega × Swap yield spread							1.175*
							(0.684)
N	11228	11228	5876	9759	5933	9939	6181
R^2	0.086	0.096	0.099	0.098	0.112	0.096	0.105

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 36

Table n.2.4

Firm-Specific Sensitivities of Swap Usage to Yield Spread

This table reports the results of regressing firm-specific sensivities of swap usage to swap yield spread on firm characteristics. Firm-specific sensitivities are estimated using at least five observations. All explanatory variables are standardized values of firm-level means and thus represent the effect of one standard deviation change in the firm-level mean. Robust standard errors are reported. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)
CFO Delta	1.568**			
	(0.645)			
CFO Vega		1.283**		
		(0.624)		
CEO Delta			1.182***	
			(0.454)	
CEO Vega				0.936*
				(0.534)
Log(Sales)	−1.058	−1.131	−0.888	−1.062
	(0.746)	(0.757)	(0.623)	(0.706)
Leverage	−0.507	−0.417	−0.661	−0.657
	(0.694)	(0.703)	(0.651)	(0.642)
Debt or CP rating	0.615	0.648	0.273	0.329
	(0.797)	(0.789)	(0.753)	(0.752)
Long-term debt	−0.099	−0.157	0.246	0.175
	(0.687)	(0.690)	(0.636)	(0.635)
Operating margin	0.412	0.563	0.670	0.638
	(0.588)	(0.587)	(0.506)	(0.539)
Capex/Assets	−0.814	−0.847	−1.046	−1.038
	(0.672)	(0.678)	(0.636)	(0.636)
R&D/Assets	−0.231	−0.139	0.045	−0.021
	(0.798)	(0.818)	(0.753)	(0.764)
Advertising/Assets	0.238	0.303	0.286	0.424
	(0.581)	(0.580)	(0.499)	(0.500)
Constant	3.913***	3.942***	4.058***	3.999***
	(0.566)	(0.568)	(0.536)	(0.538)
N	652	658	717	718
R^2	0.017	0.013	0.016	0.013

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 36

Table n.2.5

Floating-Rate Debt and Earnings Management

This table reports the results of earnings management hypotheses tests. EPS 1/2/5 cents is a binary variable equal to one when realized earnings per share are equal to are up to 1/2/5 cents above the final mean earnings forecast. EPS debt is a binary variable equal to one when a firm would have missed its earnings forecast using the lagged value of floating-rate debt percentage but would have met its earnings forecast if it increased its floating-rate debt percentage by one standard deviation from its lagged value. Discretionary accruals are calculated using a modified version of the Jones (1991) model (see for instance Dechow et al (1995)). Discretionary accruals are first scaled by lagged total assets and then standardized so that the interaction term coefficient measures the change in the sensitivity of swap usage to yield spread due to one standard deviation change in discretionary accruals. Firm fixed effects are included in all specifications. Standard errors are adjusted for clustering by firm. *, **, and *** denote statistical significance at 10%, 5%, and 1%.

	(1)	(2)	(3)	(4)	(5)
EPS 1 cent × Swap yield spread	1.129				
	(1.201)				
EPS 2 cents × Swap yield spread		0.954			
		(1.078)			
EPS 5 cents × Swap yield spread			1.921**		
			(0.979)		
EPS debt × Swap yield spread				2.780*	
				(1.584)	
Accruals × Swap yield spread					−1.162*
					(0.659)
Swap yield spread	1.419**	1.368*	0.845	0.877	1.215**
	(0.682)	(0.701)	(0.747)	(0.697)	(0.572)
1-year Treasury yield	0.515	0.513	0.494	0.816	0.064
	(0.593)	(0.593)	(0.593)	(0.834)	(0.533)
Swap spread	2.532	2.547	2.641	2.541	5.003**
	(2.302)	(2.305)	(2.303)	(2.539)	(2.114)
Credit spread	1.806	1.794	1.730	2.173	2.811
	(2.635)	(2.637)	(2.638)	(2.781)	(2.394)
Economy-wide floating-rate debt	0.713***	0.712***	0.725***	0.630**	0.881***
	(0.243)	(0.243)	(0.243)	(0.290)	(0.221)
Capex/Assets	0.396***	0.395***	0.393***	0.290***	0.356***
	(0.093)	(0.093)	(0.093)	(0.106)	(0.088)
R&D/Assets	−0.128	−0.126	−0.126	0.320	−0.214
	(0.213)	(0.213)	(0.213)	(0.231)	(0.197)
Advertising/Assets	0.249	0.250	0.244	0.517	−0.109
	(0.311)	(0.311)	(0.310)	(0.365)	(0.287)
Log(Sales)	0.012	0.012	0.012	0.031**	0.017*
	(0.012)	(0.012)	(0.012)	(0.016)	(0.010)
Leverage	0.305***	0.305***	0.303***	0.369***	0.236***
	(0.054)	(0.054)	(0.054)	(0.060)	(0.047)
Debt or CP rating	−0.133***	−0.133***	−0.133***	−0.147***	−0.127***
	(0.019)	(0.019)	(0.019)	(0.022)	(0.017)
Long-term debt	−0.220***	−0.220***	−0.220***	−0.236***	−0.202***
	(0.017)	(0.017)	(0.017)	(0.019)	(0.015)
Operating margin	−0.009	−0.008	−0.008	0.010	−0.033
	(0.047)	(0.047)	(0.047)	(0.052)	(0.038)
Constant	0.104	0.106	0.109	−0.048	0.027
	(0.124)	(0.124)	(0.124)	(0.147)	(0.106)
N	9280	9280	9280	7102	10734
R^2	0.108	0.108	0.108	0.126	0.105

Source: The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps, Sergey Chernenko & Michael Faulkender,2011, pp. 38

Table n.2.6

Notional Outstanding (EUR billions) and % notional over public debt at December 31, 1999

Country	Notional outstanding (EUR billions) December 31, 1999	% notional over public debt	Notes
Austria	18.16	15.4	
Belgium	22.95	9.4	
Canada	10.6	3.8	March 1999
Denmark	16.22	21.54	
Finland	8.66	12.75	
France	0	0	
Germany	0.71	0.23	
Netherlands	0	0	
Ireland	11.92	29.9	
Italy	10	0.91	
Portugal	7.04	11.25	
Spain	3.65	1.02	
Sweden	75.72	50.72	June 2000
United Kingdom	3.5	0.54	March 2000

Source: Piga, 2001, "Derivatives and Public Debt Management", pp.25

Table n.3.1

Specific features of Italian bonds

TABELLA I.1: I TITOLI DI STATO DOMESTICI

	BOT	CTZ	CCT/CCTeu	BTP	BTP€i	BTP Italia
	Buoni Ordinari del Tesoro	Certificati del Tesoro Zero Coupon	Certificati di Credito del Tesoro	Buoni del Tesoro Pluriennali	Buoni del Tesoro Pluriennali Indicizzati all'inflazione europea	Buoni del Tesoro Pluriennali Italia
Scadenza	3, 6, 12 mesi e inferiore a 12 mesi (BOT flessibili)	24 mesi	5, 7 anni	3,5,7,10,15,30 anni	5,10,15,30 anni	4,6,8 anni
Remunerazione	Emissione a sconto	Emissione a sconto	Cedole variabili semestrali indicizzate al tasso delle aste BOT 6 mesi o all'Euribor 6 mesi, eventuale scarto di emissione	Cedole fisse semestrali, eventuale scarto di emissione	Cedole semestrali indicizzate all'inflazione europea (indice HICP al netto dei tabacchi), eventuale scarto di emissione e rivalutazione del capitale a scadenza	Cedole semestrali indicizzate all'inflazione italiana (indice FOI al netto dei tabacchi), rivalutazione semestrale del capitale e premio fedeltà* a scadenza
Metodo di Emissione	Asta competitiva sul rendimento	Asta marginale con determinazione discrezionale di prezzo e quantità emessa	Asta marginale con determinazione discrezionale di prezzo e quantità emessa	Asta marginale** con determinazione discrezionale di prezzo e quantità emessa	Asta marginale** con determinazione discrezionale di prezzo e quantità emessa	Attraverso il MOT (Borsa Italiana), il mercato elettronico al dettaglio
Frequenza di Emissione	Mensile	Mensile	Mensile	Mensile e in base alle condizioni di mercato per i BTP 15 e 30 anni	Mensile	Una/due volte l'anno

Source: Rapporto sul Debito Pubblico 2015, 2016, Ministero dell'Economia e delle Finanze (MEF), pp.50

Table n.3.2

Country Risk Exposure—Select European Countries

Country	Net Inventory(1)	Net Counterparty Exposure(2)	Funded Lending	Unfunded Commitments	CDS Adjustment(3)	Exposure Before Hedges	Hedges(4)	Net Exposure
				(dollars in millions)				
Greece:								
Sovereigns	$ (8)	$ 20	$—	$ —	$ 23	$ 35	$ 1	$ 36
Non-sovereigns	53	7	142	—	—	202	(78)	124
Total Greece	$ 45	$ 27	$142	$ —	$ 23	$ 237	$ (77)	$ 160
Ireland:								
Sovereigns	$ 78	$ 1	$—	$ —	$ 4	$ 83	$ (2)	$ 81
Non-sovereigns	102	41	—	—	15	158	(16)	142
Total Ireland	$ 180	$ 42	$—	$ —	$ 19	$ 241	$ (18)	$ 223
Italy(6):								
Sovereigns	$ (29)	$4,202	$—	$ —	$ 412	$ 4,585	$ (786)	$ 3,799
Non-sovereigns	197	689	255	363	179	1,683	(581)	1,102
Total Italy(6)	$ 168	$4,891	$255	$ 363	$ 591	$ 6,268	$(1,367)	$ 4,901
Spain:								
Sovereigns	$ (366)	$ 11	$—	$ —	$ 504	$ 149	$ (37)	$ 112
Non-sovereigns	225	397	311	424	218	1,575	(297)	1,278
Total Spain	$ (141)	$ 408	$311	$ 424	$ 722	$ 1,724	$ (334)	$ 1,390
Portugal:								
Sovereigns	$ (435)	$ 97	$—	$ —	$ 23	$ (315)	$ (96)	$ (411)
Non-sovereigns	7	90	126	—	47	270	(98)	172
Total Portugal	$ (428)	$ 187	$126	$ —	$ 70	$ (45)	$ (194)	$ (239)
Sovereigns	$ (760)	$4,331	$—	$ —	$ 966	$ 4,537	$ (920)	$ 3,617
Non-sovereigns	584	1,224	834	787	459	3,888	(1,070)	2,818
Total European Peripherals(5)(6)	$ (176)	$5,555	$834	$ 787	$1,425	$ 8,425	$(1,990)	$ 6,435
France(5):								
Sovereigns	$(1,796)	$ 234	$—	$ —	$ 100	$(1,462)	$ (228)	$(1,690)
Non-sovereigns	85	2,246	416	1,657	390	4,794	(1,390)	3,404
Total France(5)	$(1,711)	$2,480	$416	$1,657	$ 490	$ 3,332	$(1,618)	$ 1,714

Source: Morgan Stanley 2011 Form 10-K Report, pp.120

7. Bibliography

- Adu-Gyamfi, Mike, 2016, " The Bankruptcy of Lehman Brothers: Causes, Effects and Lessons Learnt", *Journal of Insurance and Financial Management*, Vol. 1, Issue 4 (2016) 132-149

- Aristotele, 1999, "Politics (translated by Benjamin Jowett), *Batoche Books, Kitchener*

- Baker, M. Colleen, 2010, "Regulating the invisible: the case of Over-The-Counter derivatives", *Notre Dame Law School*

- Banca d'Italia, 2017; "Statistiche: Finanza Pubblica, Fabbisogno e Debito", *Banca d' Italia*

- Bank for International Settlements (BIS) , 2010, "Basel III: A global regulatory framework for more resilient banks and banking systems"; *Bank for International Settlements*

- Bank for International Settlements (BIS), 2017, "Statistical release: OTC derivatives statistics at end-December 2016", *BIS Monetary and Economic Department*

- Berkshire Hathaway Inc, 2003, "2002 Annual Report", *Warren E. Buffet*

- Cannata, Maria, 2015, "Audizione: Indagine conoscitiva sugli strumenti finanziari derivati", *Minstero dell' Economia e delle Finanze (MEF) , Camera dei Deputati VI Commissione Finanze*

- Catelani, Edoardo, 2015, “Credit Crunch in Europe: Comparing Austria, Italy and Greece” , *University of Florence*

- Chava, Sudheer, and Amiyatosh Purnanandam, 2007, “Determinants of the Floating-to-Fixed Rate Debt Structure of Firms”, *Journal of Financial Economics* 85, 755-786.

- Chermenko, Sergey; Faulkender, Michael, 2011, “The Two Sides of Derivatives Usage: Hedging and Speculating with Interest Rate Swaps”, *Harward University Press*

- Chui, Michael, 2012, “Derivatives markets, products and participants: an overview”, *Bank for International Settlements,* Bullettin IFC no.35, Feb 2012

- Commissione VI Finanze della Camera dei Deputati, 2015, “Audizione del Presidente dell’Ufficio parlamentare di bilancio nell’ambito dell’indagine conoscitiva sugli strumenti finanziari derivati”; *Commissione VI Finanze della Camera dei Deputati,* March 2015

- Commissione VI Finanze della Camera dei Deputati, 2015, “Indagine conoscitiva sugli strumenti finanziari derivati. Testimonianza del Vice Direttore Generale della Banca d’Italia Luigi Federico Signorini “, *Commissione VI Finanze della Camera dei Deputati,* June 15, 2015

- Deloitte, 2014, “OTC Derivatives : The New Cost of Trading”, *Deloitte*

- Ellul, Andrew; Jotikasthira, Chotibhak; Lundblad, Christian T.; Wang, Yihui, 2013, “Mark-to-Market Accounting and Systemic Risk: Evidence from the Insurance

Industry", *The London School of Economics & Political Science*, SRC Discussion Paper No 4

- European Commision, 2008, "Eurostat Guidance on accounting rules for EDP" , EUROPEAN *Commission EUROSTAT* ;Directorate C: National and European Accounts, Unit C-3: Public Finance, March 2008

- Fama, Eugene F., 1970, "Efficient Capital Markets: A Review of Theory and Empirical Work", *The Journal of Finance*, Vol. 25, No. 2, Papers and Proceedings of the Twenty-Eighth Annual Meeting of the American Finance Association New York, N.Y. December, 28-30, 1969 (May, 1970), pp. 383-417

- Fama, Eugene F.; MacBeth, James D.; 1973," Risk, Return, and Equilibrium: Empirical Tests", *The Journal of Political Economy*, Vol. 81, No. 3. (May - Jun., 1973), pp. 607-636

- Faulkender, Michael, 2005, "Hedging or Market Timing? Selecting the Interest Rate Exposure of Corporate Debt", *Journal of Finance* 60, 931-962.

- Finance Division, Directorate for Financial and Enterprise Affairs, 2007, "Use of Derivatives for Debt Management and Domestic Debt Market Development: Key Conclusions", *Organisation for Economic Co-operation and Development (OECD)*

- Fisher, Irving, 1896, "Appreciation and Interest: A study of the Influence of Monetary Appreciation and Depreciation on the Rate of Interest, with applications to the bimetallic controversy and the theory of Interest", Publications of The American Economics Association, Vol XI, No.4 pp.331-442, August 1896

- Froot, Kenneth A.;Scharfsein, David S.;Stein, Jeremy C., 1993, "Risk Management: Coordinating Corporate Investment and Financing Policies", *The journal of Finance*, Vol. 48, No. 5 (Dec., 1993), pp. 1629-1658

- Geczy, Christopher C.; Minton, Bernadette A., 2007, "Taking a View:Corporate Speculation,Governance and Compensation.", *The Journal of Finance*, Vol.62,No.5, (October 2007)

- Harper, R. , 1904, " The Code of Hammurabi, King of Babylon, about 2250 B.C.", *Chicago: University of Chicago Press*

- Hauswald Kogod, Robert B.H.,2016, "Fixed Income Securities: Swap fundamentals, *Kogod School of Business*, American University of Washington DC

- Hull,John C. , 2009, "Options Futures and Other Derivatives", *Prentice Hall*

- Hurt, Chris; Wisner, Robert N., 2002, "Principles of Hedging with futures", *Purdue University*

- Kummer, Steve; Pauletto, Christian, 2012, "The History of Derivatives: A Few Milestones ", *EFTA Seminar on Regulation of Derivatives Markets*, Zurich, 3 May 2012

- Ministero dell'Economia e delle Finanze (MEF) , 2016, "Rapporto sul debito Pubblico (2015)", *Ministero dell'Economia e delle Finanze (MEF)*

- Missale, Alessandro, 1997, "Managing the Public Debt: The Optimal Taxation Approach", *Journal of Economic Surveys*, September 1997

- Missale, Alessandro, 2000, “Public Debt Management”, *Oxford University Press*

- Morgan Stanley, 2012, *“*FORM 10-K Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 For the year ended December 31, 2011 Commission, File Number 1-11758”, *Morgan Stanley*

- Mwanga, Gasper G., 2005, “Hedging of Financial Derivatives and Portfolio Insurance”, *African Institute for Mathematical Sciences* , University of Western Cape

- National Association of Pension Funds (NAPF); J.P. Morgan, 2013, “Derivatives and Risk Management Made Simple”; *National Association of Pension Funds,* Dec 2013

- Ni, Ying, 2005, “Swaps & Swaptions”, Mälardalen University, Seminar 2005-12-19

- Piana, Luca, 2017, “La voragine: La folle scommessa dei Derivati di Stato. I contratti segreti con le banche. Il buco nei conti pubblici di cui nessuno parla.”, *Casa Editrice Mondadori*

- *Piga, Gustavo, 2001, “Derivatives and Public Debt Management”, ISMA Zurich*

- Pinnington, James; Shamloo, Maral, 2016, *“*Limits to Arbitrage and Deviations from Covered Interest Rate Parity”, Financial Markets Department Bank of Canada

- Ruzickova, K.; Riederova, S., 2011, “Historical Development od Derivatives’ Underlying Assets”*, Acta Universitatis Agriculturae et Silviculturae Mendelliana e Brunensis,* Volume LIX, Number 7, 2011

- Statistics Department of the International Monetary Fund (IMF), 1998, “Financial Derivatives”, *Statistics Department IMF,* Eleventh Meeting of the IMF Committee on Balance of Payments Statistics

- Sundaram, Rangarajan K., 2012, “Derivatives in Financial Market Development”, *International Growth Center (ICG)*

- Turocy, Theodore L.; Von Stengel, Bernhard, 2201, “Game Theory”, *London School of Economics CDAM Research Report,* LSE-CDAM-2001-09 October 8, 2001

- Weber, Ernst J., 2008, “A Short History of Derivative Security Markets “, *Business School University of Western Australia,* DISCUSSION PAPER 08.10

- Wolswijk, Guido; de Haan, Jakob, 2005, “Government Debt Management in the Euro Area: Recent Theoretical Development and Changes in practices.”, *European Central Bank (ECB),* Occasional Series Paper, No. 25

7.1 Laws, regulations and other documents

- DECRETO DEL PRESIDENTE DELLA REPUBBLICA 30 dicembre 2003, n. 398 (GU n. 57 del 9-3-2004-Suppl. Ordinario n. 37) Testo unico delle disposizioni legislative e regolamentari in materia di debito pubblico

- DECRETO 22 dicembre 2016, Direttive per l'attuazione delle operazioni finanziarie, ai sensi dell'articolo 3 del decreto del Presidente della Repubblica 30 dicembre 2003, n. 398 (Testo Unico delle disposizioni in materia di debito pubblico). (16A09018) (GU Serie Generale n.304 del 30-12-2016)

- European Market Infrastructure Regulation (EMIR) Prepararsi al cambiamento del mercato dei derivati OTC

- Law 22 December 1984 No.887 (Financial Law 1985)

- Proc Penali n. 3942/11 R.G.N.R. e n.742/13 R.G.N.R – Richiesta di informazioni e documenti della Procura di Trani

- Procura della Repubblica Tribunale di Trani, REQUISITORIA DEL PUBBLICO MINISTERO proc. pen. n. 3942.11 R.G.N.R.-21 // 276/15 R.G. Trib.

- REGOLAMENTO (UE) N. 648/2012 DEL PARLAMENTO EUROPEO E DEL CONSIGLIO del 4 luglio 2012 sugli strumenti derivati OTC, le controparti centrali e i repertori di dati sulle negoziazioni (Testo rilevante ai fini del SEE)