LUISS

Department
of Business and Management

Course of Advanced Corporate Finance

Real Estate Valuation: Building and Analyzing a Valuation Model for Trophy Assets

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Academic Year 2020/2021

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Introduction

The term “trophy asset” is used in the real estate industry to describe a property that is exceptionally rare and characterized by high demand from investors. Probably, the best example of these assets’ peculiarity (which will be used in the paper to explain the characteristics of heterogeneity of real estate assets) is the one of a vineyard which produces grapes that give an exceptional champagne. For this characteristic, that vineyard can be sold at a way higher price, if compared to the other vineyards in the same rural area, where prices are usually low. The rarity and the uniqueness of the champagne awards the vineyard a huge intrinsic value, which will influence the market and make its selling price skyrocket.

During the Covid-19 Pandemic, as will be seen in the analysis of the 2020 Italian Real Estate report, while the economic effects of the Pandemic were looming in the whole investments’ world, the Trophy Asset class in the field of Real Estate was one of the very few classes whose investments not only did not decrease, but actually increased, given their peculiarities of heterogeneity and ability to maintain a very high value over time. With the aim of explaining why this happened, first of all the field of real estate investments will be reviewed, making a distinction between direct and indirect investments, first in general and then specifically in Italy.

After giving a definition of what Trophy Assets actually are and what they represent in the world of real estate investment, Chapter 2 will focus on a review of the most widely used real estate valuation methods, distinguishing them into two specific classes: Traditional Valuation Methods and Advanced Valuation Methods. In general, the most commonly used method when dealing with the valuation of a property is the Comparables’ method, according to which the value of the property under valuation can be assimilated to that of properties that are similar both in terms of physical characteristics (square footage, number of bathrooms, etc.) and geographical characteristics (neighborhood, proximity to the center, etc.), which will therefore be called "Comparables". However, given the very high degree of heterogeneity of the class of assets analyzed, this valuation method cannot be applied to determine the value of a Trophy Asset, so other methods - even combined - must be used.

Finally, Chapter 3 will be entirely dedicated to the development of the valuation model, starting from the construction of the dataset, then proceeding to the construction of the model and the subsequent commentary of the results obtained. Finally, the last section will be a personal reflection on the impact that the investment in Trophy Asset in Italy could have, both from the point of view of the investor (which would gain in terms of returns), and from the point of view of the geographical area in which this investment is made, which would benefit in terms of local

economy. I strongly believe that the Pandemic can be turned into an opportunity for the Italian Economy recovery, which should be led by the tourism and hotel industry: new investments, new M&A transactions (carried out by both Italian and foreign investors) can be the key for the development of whole touristic areas.

1. Real Estate background

1.1 Introduction

The mainstream conception of a Real Estate Investment is that of the purchase of a property with the final aim of benefiting from constant cash flows through rents or realizing gains through capital appreciation. In an ever-changing world, in fact, direct investment in Real Estate seemed like a safe haven in which to allocate money was seen as a great way to avoid the effects of depreciation. The latter was the common belief until 2007, when high levels of indebtedness backed by unsecured collaterals led to the subprime mortgage crisis, which shed light on a sick system.

For this reason, alongside this system, another one has caught on, following the trend of an increased integration and globalization of capital markets: the Indirect Real Estate Investment system, which allows investors to buy shares in funds or publicly or privately held companies. In the United States, the most common practice in this sense is the Real Estate Investment Trust (REIT), whose system has recently been proposed, with some changes, in Italy as *Società di Investimento Immobiliare Quotata* (SIIQ).

The aim of this chapter is to give an overall analysis of the entire Real Estate Investments background, by first presenting the "theories" of the direct and indirect market, and then analyzing their application in Italy. The last section of the chapter will be focused on the Italian Real Estate Market Outlook for 2021, as a starting point for introducing the main topic of my essay: the Trophy Assets. I strongly believe that the peculiarity of this kind of assets deserves greater consideration, which is not yet the case in Italy, where these assets, if properly sponsored, could really lead to a boost in inbound investments, given the huge cultural heritage of the country, and as a consequence, to a redevelopment of certain areas and, most importantly, to the creation of new job opportunities.

1.2 Real Estate Investment: Main Reasons

The constant renewal of the financial system has led authors to frequently review a proper definition of a Real Estate Investment and the reasons behind such a kind of investment. Starting from the latter, Hudson-Wilson, Fabozzi and Gordon (2003) have stated five main reasons which lead investors to enter the Real Estate Market:

1. To reduce the overall risk of the portfolio by reaching a sufficient level of diversification, basically through the combination of assets which behave differently to expected or unexpected market changes.

2. To achieve an absolute return which can be considered competitive with other asset classes.
3. To be hedged in case of unexpected inflation levels.
4. To create a part of a portfolio which can be seen as a reflection of the overall investment universe: it is the case, for example, of an indexed or market-neutral portfolio.
5. To receive strong cash flows from the portfolio.

On this basis, the authors have given an expansion of the typical Real Estate definition for institutional investors so as to cover four financial structures:

1. Private commercial Real Estate equity, held as a single asset or in a miscellaneous vehicle.
2. Private commercial Real Estate Debt, as directly issued loans or as commercial mortgages held in funds or miscellaneous vehicles.
3. Public Real Estate equity textured as Real Estate Investment Trusts (REITs) or Real Estate Operating Companies (REOCs).
4. Public commercial Real Estate debt structured as Commercial Mortgage-Backed Securities (CMBS) or corporate bonds.

Table 1: The four Quadrants of the modern Real Estate

	Equity	Debt
Private	Individual properties	Senior/mezzanine Loans, Mortgage Trusts
Public	REITs & REOCs	CMBS & Corporate Bonds

Source: personal elaboration

These four structures are the so-called *quadrants of the modern Real Estate investment class*. In the past, as mentioned before, the approach of the literature was to assess the role of the Real Estate as strictly related just to the first quadrant (the Private Equity one, individual properties). However, the system has evolved and nowadays an institutional investor is concretely operating in at least two or three quadrants and nonetheless is influenced by - and influences him/herself - each quadrant.

1.3 Direct Real Estate Investment

In the next sections, following the studies of Hoesli and Morri (2010), the direct Real Estate investment will be analyzed, starting from the definition of the characteristics of the Real Estate goods to the analysis of the market in which such goods are traded.

The direct Real Estate investment represents the traditional approach to the Real Estate investments. We can refer to it as the purchase of a property in order to realize stable profits through rents or capital appreciation.

1.3.1 Direct Real Estate Assets: Characteristics

Italian Civil Code (Article 812) defines as Real Estate goods the "*Land, springs and streams, trees, buildings and other constructions, even if joined to the land for a transitory purpose, and generally anything naturally or artificially incorporated in the land*".

Hoesly and Morri (2010) gave a more in-depth definition of Real Estate goods, by both naming their characteristics and analyzing the implications of the latter on the market value of the goods. Such characteristics are defined as follows:

1. *Immobility*: it is probably the most predictable characteristic for something which is also called "immovable property". However, this has important implications on the financial value of the asset: because of this characteristic, the Real Estate asset value will heavily – if not entirely – rely on local economy trends: a drastic change in such trends should result in a reconversion of the asset.
2. *Soil Indestructibility*: by definition, lands are indestructible. However, they could become, as time goes by, unsuitable to be buildable due to external factors such as natural phenomena, for example. Moreover, even if lands are "strong", it does not prevent them from facing eventual price fluctuations.
3. *Heterogeneity*: two Real Estate goods, by definition, cannot be equal. As a matter of fact, the value of a Real Estate good is defined not only according to objective valuations, but also according to subjective ones, based on the intrinsic value of the

good. This is the reason why two very similar – in terms of positioning, size, etc. – goods can be traded at very different prices. A good example of this phenomenon is represented by a vineyard which produces grapes that give an exceptional champagne. For this characteristic, such vineyard can be sold at a way higher price, if compared to the other vineyards in the same rural area, where prices are usually low. The rarity and the uniqueness of the champagne produced awards the vineyard a huge intrinsic value, which will influence the market and make its selling price skyrocket.

4. *Location*: the immobility of lands and buildings leads to the fact that the value of a Real Estate good is heavily reliant on its position. To support this statement, Haider and Miller (2000) have applied an estimated model to a sampled housing unit ("*a detached, air-conditioned, single-family dwelling with four bedrooms, two washrooms, one parking space, and a fireplace*"), proving that such unit can lose up to the 11% of its value due to its distance from the central business district.
5. *Long-term investment*: be it an apartment to live in or to put on rent, or be it the place for a business activity, in any case the Real Estate good serves long-term-oriented purposes. The long-term view in this sense is also explained by the characteristic of the abovementioned indestructibility of the soil and, most importantly, by the statutory system: the Italian legislator, for example, disincentivizes short-term purposes (in terms of high turnover of Real Estate goods) by applying a series of taxes, such as a stamp duty (*imposta di registro*), a land registry (*imposta ipotecaria*), a cadastral tax (*imposta catastale*) and the Value-Added Tax (*IVA*).
6. *High unit value*: this is one of the peculiarities of the Real Estate market: unlike almost any other financial market, buying a Real estate good means using a substantial amount of money to support the investment. In order to gather such an amount, the bank lending channel system is widely used, and it represents another deterrent for a possible short-term investment strategy.
7. *Illiquidity*: this characteristic is mainly given by the fact that there is a consistent time interval between the decision to sell a Real Estate good and the proper sale of the asset. To support this statement, Crosby and McAllister (2004) have proved that on average such a time interval is almost ten months. Of course, that is not a rule: what is certain is that, as the authors highlight, there is a trade-off between the time needed to conclude the sale and the amount that the seller agrees to receive: generally, the less strict the seller's requests, the shorter the time interval needed to conclude the sale process.

   The illiquidity of the Real Estate market is another important deterrent for investors who would like to make use of short-term strategies mainly based on arbitrage.

8. *High level of debt*: as a consequence of the high unit value characteristic of a Real Estate good, the recourse to the bank landing system, as stated before, is widely spread. As proof of this, it is not rare that an investor decides to use debt even if they have enough capital, following a definite financial plan. A practice often used is the seller credit to buyer, through which the seller could finance a part of the deal, granted by the value of the collateral: if the buyer fails to repay its debt with the seller, the latter can recover the amount lent simply by selling the Real Estate good to another person.
   In this context, two different concepts have a strong importance, according to Bian, Li, & Liu (2018):
   - *Loan-to-Value (LTV*): it is the loan amount calculated as a percentage of the transaction price of the collateralized property. It is the most used indicator in the measurement of financial leverage.
   - *Credit Risk*: it is defined as the risk of losses resulting from the borrower's inability to repay a loan.

   The higher the value of the Loan-to-Value, the higher the credit risk, and so defaults become more likely. Moreover, in case of a default, higher loan-to-value levels means that it is less likely that the collateralized property will generate sufficient proceeds at a foreclosure sale to cover the outstanding loan balance, past due payments and other foreclosure costs sustained by the lender.
9. *Home as a fundamental need*: to feel part of the social environment, human beings need a house. This is the reason why the Constitution of the Italian Republic, with the article no. 47, "*encourages and safeguards savings in all its forms; it regulates, coordinates and controls the exercise of credit*" to favor "*the access of popular savings to home ownership, to direct cultivator ownership and to direct and indirect equity investment in the large productive complexes of the country*".
   Moreover, the Italian State directly intervenes in the housing sector with social welfare policies aimed at giving a house to the majority of the population.

1.3.2 Direct Real Estate Market

The same Hoesly and Morri (2010) provided a description of the market in which investors in the Direct Real Estate operate, listing six main characteristics:

1. *Absence of a centralized market*: unlike stock exchanges, Real Estate Markets are decentralized. As a matter of fact, there does not exist a proper centralized national market: Real Estate goods are traded in the context of micro-markets, mainly defined by the type of the goods exchanged and by the geographical area. Given such

characteristics, the knowledge of the geographical area in which to invest is fundamental to the success of the investment project.

2. *Low transparency*: much information about a Real Estate good is not widely available to the public, aside from general ones, such as dimensions and year of construction. For this reason, the preliminary phase of an investment project should be aimed at obtaining as much information as possible (about the maintenance status, for example) through a direct, in-depth inspection, to price the home in a fair way, not jeopardized by incorrect valuations based on the simple analysis of similar goods' prices in the same area.
3. *Frequently unbalanced markets*: Dipasquale and Wheaton (1996) defined the Real Estate market as divided into two different markets: a market for Real Estate space and one for Real Estate assets. Later studies summarized by Jones, Gatzlaff, and Sirmans (2016) have proved that an increase in the demand for Real Estate space is related to an economic growth for businesses, while the market for Real Estate assets is a function of demography factors and wages. Generally, a good economic situation for businesses (which results in an increase in office space demand) leads to an overall good economic outlook, from which also employees can benefit, through lower interest rates and higher wages, which consequently leads to an increase in the Real Estate assets demand. On the other hand, the offer is quite rigid, not able enough to quickly react to demand shifts, due to long production cycles.

   Such markets are basically made to be in disequilibrium: if the production cycles were flexible enough to let the suppliers react quickly to any change in demand, there would be an excess in the supply levels, while on the other hand – and that is usually the real scenario – a lack of adaptivity for the suppliers means an inevitable excess of demand. However, applying on the Real Estate market the same reasoning made by De Janvry, McIntosh, and Sadoulet (2015) about the fair trade and free entry, it is possible to conclude that a disequilibrium situation can be a good thing in the Real Estate market, if that leads to the entry of competitive players, able to meet the needs of the demand.
4. *Strong government presence*: besides owning Real Estate goods, such as buildings and infrastructures, in first person, the government presence in the Real Estate market is very wide, because it also serves as regulator and has a fundamental role in the taxation context.
5. *High transaction costs*: the Real Estate market is characterized by different kinds of transaction costs, such as:

- Brokerage: it is the most common cost in a Real Estate transaction, since it is the fee paid to the broker (i.e., the realtor) whose aim is to intermediate the overall transaction process.
- Search costs: for the seller, these are the costs sustained in order to advertise the property on sale – for example through newspapers or websites –, while for the buyer, the search costs are related to the time and money spent to visit the properties, in order to get as much information as possible.
- Legal and administrative costs: these are costs related to notaries and attorneys (in case the transaction is complicated), and to the transfer of title for utilities such as electricity and water.
- Financing costs: the recourse to the bank landing system leads to several charges which have to be paid periodically.

6. *Limited number of transactions*: the abovementioned imbalance between the demand and the supply as a result of the supplier inability to constantly meet the buyer's need, together with the high unit value of the Real Estate goods, determine a low number of transactions in the market.

1.3.3 Direct Real Estate Investment: final thoughts

The strategies leading to this kind of investment are several, from obtaining a good portfolio diversification level (both geographical and asset-type) to contrasting the effects of inflation. Such strategies, if implemented correctly, can mitigate several risks to which the investor is exposed:

- Market risk;
- Construction risk;
- Environmental risk;
- Liquidity risk;
- Financial risk;
- Legislative risk;
- Management risk.

To summarize what has been said so far, it is possible to conclude that, as any other investment, the direct Real Estate one has its benefits and its disadvantages, which are summarized below in Table 2.

Table 2: Direct Real Estate Benefits and Disadvantages

Direct Real Estate investment Benefits	Direct Real Estate investment disadvantages
Diversification, either asset-side (because of low correlation with stocks) and geographical	Very low liquidity
Direct control of the investment	High costs before and after the investment: transaction costs + taxes + management costs
Possibility to contrast the effect of inflaction	High invetsment costs: recourse to credit
Stable cash flows	Low market transparency: asymmetries of information
Possible value creation, through capital appreciation	

Source: personal elaboration

1.4 Indirect Real Estate Investment

In the next sections, the indirect Real Estate investment will be analyzed. It basically consists in acquiring shares of companies or funds which have a Real Estate portfolio, rather than directly acquiring physical properties. Two are the underlying ideas beneath such kind of instruments:

- To make the real estate market accessible to everybody, without necessarily investing high amounts of capital in a physical property. As a matter of fact, through these instruments a subject can invest in Real Estate companies that trade in a public exchange market.
- To eliminate – or at least mitigate – the disadvantages of a direct Real Estate investment. For example, the low market transparency, typical of direct Real Estate investment, does not exist anymore, since the investors are operating in the much more transparent stock market. Moreover, all the costs – acquisition, transaction cost, taxes, and management costs – are way lower.

However, such instruments also have some disadvantages, such as the dimension of the lower ability to counter the effects of the inflation and the higher correlations with stocks and bonds, which does not grant the asset diversification effects of the direct investment. A summary of the benefits and the disadvantages of the indirect Real Estate investment is shown in Table 3.

Table 3: Indirect Real Estate Benefits and Disadvantages

Indirect Real Estate Investment Benefits	Indirect Real Estate Investment Disadvantages
Higher transparency: low asymmetry of information	Lower ability to contain the inflation effects
Higher liquidity	Lower possibilities of asset-side diversification, because of the higher correlation with stocks
It is a cheaper investment	Potential debt and leverage risks
Lower taxes and management costs	
Similar exposure to the Real Estate market	
Higher possibility of a geographical diversification, through the investment in a portfolio of properties	

Source: personal elaboration

The overall indirect Real Estate background is very wide and diverse: for this reason, the instruments which will be analyzed in-depth will be the most common ones in the United States, such as the Real Estate Investment Trusts (REITs) and the Real Estate Operating Companies (REOCs). After having explained such instruments and their fundamental differences, the focus will be given to the Italian Indirect Real Estate main instrument, the Società di Investimento Immobiliare Quotata (SIIQ).

1.4.1 Real Estate Investment Trusts (REITs)

The one regarding the Real Estate Investment Trusts (REITs) is a concept which came to life in 1960, created by the US Congress to make large-scale, income-producing real estate investments accessible to the average investor, who should have been able to invest in Real Estate just as if it were any other kind of investment, that is, through the purchase of equity.

On the other hand, the concept of REITs in the European Union is more recent, and the field of European REITs is far more fragmented: this is because the REIT legislation is based on a country level. Therefore, there is no common REIT structure within the European Union. Despite that, the European Union accounts for a total of 220 REITs, representing 25.5% of the total, opposed to the 191 of the United States (22.26% of the total), according to the European Public Real Estate Association (EPRA) Global REIT Survey 2020. The real difference between the US and the European Union is the percentage of REITs belonging to the FTSE EPRA/Nareit

Global Real Estate Index[1]: 10.08% for the European Union (with a total sector market capitalization of €155,396 million); 66.41% for the United States (with a total sector market capitalization of €980,842 million). Such data are shown in Table 4 and Table 5. For these reasons, the analysis in the next sections will be focused on the American Real Estate Investment Trusts, taking into consideration the above mentioned EPRA report.

Table 4: Data about REITs in United States[2]

Listing Country	Number of REITs	Number in EPRA REIT Index	Sector Mkt Cap (EUR m)	% of Global REIT Index
United States	191	121	EUR 980,842	66.41%

Source: Personal elaboration based on EPRA Global REIT Survey 2020

Table 5: Data about REITs in Europe

Listing Country	Number of REITs	Number in EPRA REIT Index	Sector Mkt Cap (EUR m)	% of Global REIT Index
Belgium	17	11	EUR 17,814	1.38%
Bulgaria	24	0	EUR 506	0.00%
France	28	6	EUR 40,120	1.54%
Germany	6	2	EUR 4,442	0.31%
Greece	4	0	EUR 2,243	0.00%
Ireland	3	2	EUR 1,602	0.14%
Italy	3	1	EUR 641	0.02%
Netherlands	5	5	EUR 8,857	0.88%
Spain	77	3	EUR 20,634	0.54%
United Kingdom	53	33	EUR 58,537	5.27%
Total	**220**	**63**	**EUR 155,396**	**10.08%**

Source: Personal elaboration based on EPRA Global REIT Survey 2020

In a comparable way to shareholders who benefit from the ownership of stocks in other companies, the stockholders of a Real Estate Investment Trust receive economic benefits from the production of income through commercial Real Estate ownership. Moreover, REITs offer distinct advantages for investors:

[1] It is a free-float adjusted, market capitalization-weighted index which tracks the performance of listed real estate companies in both developed and emerging countries worldwide. Constituents of the Index are screened on liquidity, size and revenue.

[2] The data are presented in Euros, in order to have homogeneity which allows a better comparison between US data and European ones.

1. Geographical diversification, achieved by investing in a portfolio of different properties, rather than just in a single property.
2. Managerial activities are performed by experienced real estate professionals, which leads to lower management risks.
3. Shareholders benefit from a stream of cash distributions, due to the requirement for REITs to distribute at least 90% of the net income as dividends, in order not to be subject to a corporate-level tax.

The following pages are aimed at analyzing the requirements for a Real Estate Investment Trust in order to operate in the United States. Again, the entirety of the information is taken from the EPRA Global REIT Survey 2020:

- *Formalities/Procedures*

  To elect REIT status, a company must file a special tax return (the Form 1120) for the year in which the company aims at becoming a REIT. No prior approval is required, nor to submit a prior notification of regime election.

  The REIT must annually send letters of record to its shareholders who request the details of the beneficial share ownership. Otherwise, the REIT can face modest monetary penalties, unless it is possible to prove that the failure is due to reasonable cause and not willful neglect.

- *Legal form and minimum share capital*

  In the United States, a REIT can have the form of any legal entity (which can be also located or organized abroad) subject to taxation. Therefore, the REIT can be constituted as a corporation, a business trust, a limited liability company and so on: the entity will be treated as a corporation for tax purposes. However, this option does not apply in the case of a financial institution (i.e., banks or insurance companies).

  Another important requirement for the constitution of a REIT is the fact that the company must be managed by one or more trustees or directors and that the REIT's share must be transferable. Moreover, no minimum share capital is needed.

- *Shareholder requirements/listing requirements*

  To obtain the REIT status, listing the company is not mandatory: in fact, a private Real Estate Investment Trust is allowed. Still, REIT's shares must be transferable.

Moreover, starting from the REIT's second taxable year, the company must have a minimum of 100 shareholders, and it is not allowed that more than 50% of shares are held by five or less individuals in the last half of the taxable year.

It is possible for such kind of companies to issue different classes of shares, such as common or preferred stock, but all shareholders within the same share class must be treated equally.

- *Asset level*

Of all the assets owned by the REIT, at least 75% of them must be Real Estate (including mortgages), government securities or cash. Land, inherently permanent structures, and structural components that are Real Estate are included in the 75% asset test rule. By definition, are considered inherently permanent structures buildings like parking facilities, bridges, tunnels and railroad tracks, while for example wiring, plumbing systems, central heating and air conditioning systems are considered structural components that are Real Estate.

Moreover, at least the 75% of the gross income must derive from rentals of Real Estate property or from interest on mortgages and at least 95% of the gross income must be a combination of Real Estate sources and passive sources, like interests and dividends: it is stated that no more than 5% of REITs' income should come from "non-qualifying sources".

- *Activity test*

A REIT must own, operate and manage Real Estate for its own portfolio. If it develops Real Estate for third parties, the resulting income must fit under the 5% "non-qualifying sources" allowance. However, REITs are allowed to manage Real Estate for third parties through their taxable REIT subsidiaries (TRS).

A REIT is allowed to invest in non-US Real Estate assets: they fall under the 75% asset test category.

The ownership of one REIT by another REIT is considered a normal ownership of Real Estate. If the REIT owns shares of a company other than another REIT or a TRS, then the REIT is not allowed to own more than 10% of the shares. Furthermore, REIT's total assets cannot be composed by securities of any issuer other than another REIT or a TRS for more than 5%.

- *Leverage*

  About the balance between equity and debt used by the REITs, there are no limits. Typically, US REIT leverage is about 100%, which means an equal proportion between debt and equity (Baker and Chinloy. 2014).

- *Profit distribution obligations*

  REITs are required by law to distribute annually as dividends at least 90% of its taxable income. It is possible for REITs to declare a dividend in the last quarter of the year and pay it at the end of January: the dividend will still be considered as paid in December. However, if the REIT does not distribute at least the 85% of the due dividends within the year in which the income is created, the company will be subject to a 4% excise tax.

  On the other hand, REITs in the United States are not required to distribute capital gains.

- *Sanctions*

  A REIT can be exposed to several sanctions, depending on the kind of violations occurred. For example:

  - If the company does not distribute at least the 90% of its taxable income as dividends, it has to compensate with taxable deficiency dividends
  - If the asset levels are below the above mentioned thresholds by a *de minimis* amount, the REIT has to restore such levels within six months, without facing any other sanction. The situation, however, is different if the irregularity regards more than a *de minimis* amount: the company is required to pay corporate taxes on all income which derives from the "non-qualifying sources" and to prove a reasonable cause for the failure
  - For failures other than the asset test, a REIT will be subject to a $50,000 fine, together with a reasonable cause for the failure. If such a cause is not given by the REIT, the company may lose its REIT status.
  - In case the company loses its REIT status, a period of five years should pass before the company can re-apply. However, the government is entitled to forego this penalty, if there is a reasonable cause.

- *Taxation*

  The one regarding taxation is probably the most important feature for a REIT, which drives the choice of this kind of company. Indeed, at a corporate level, the distributed dividends are

deducted in the calculation of a REIT's taxable income. On the other hand, the tax treatment at the (domestic) shareholder's level is different, depending on the kind of shareholders:

- Corporate shareholder: US corporations pay a 21% tax both in REIT capital gains and REIT ordinary income distribution.
- Individual shareholder: capital gain dividends are taxed at a maximum of 23.8% rate and the return of capital is tax-deferred. Moreover, individual shareholders receive a 20% deduction on ordinary REIT dividends.

1.4.2 Real Estate Operating Companies (REOCs)

Evans and Evans (2007) define the Real Estate Operating Company as "*a publicly traded company that specializes in real estate investments but does not meet the strict requirements to be a REIT, particularly the requirement to pay at least 90 percent of net income out to investors*".

In the United States, the first REOC formed was Hilton Hotels, in 1949. However, globally, the most important REOCs are located in the Asia-Pacific region, in particular in Japan, where the first REOC – Mitsui Fudosan Co., Ltd, formed in 1941 after the separation of the separation of the Real Estate division from the main company – was listed in 1949, 52 years before the listing of the first Japanese REIT in 2001[3], as pointed out by Baker and Chinloy (2014), who showed in a table the top 10 REOCs in the world, ranking them by equity market capitalization:

Figure 1: List of the biggest REOCs in the world for market capitalization

Table 14.2 **Top 10 REOCs in the World**

Rank	*Name*	*Country*	*Equity Market Cap ($billion USD)*
1	Mitsubishi Estate Co Ltd	Japan	44.75
2	Sun Hung Kai Properties Ltd	Hong Kong	37.87
3	Mitsui Fudosan Co Ltd	Japan	30.63
4	Wharf Holdings Ltd	Hong Kong	26.59
5	Sumitomo Realty & Development Co	Japan	23.52
6	Hong Kong Land Holdings Ltd	Singapore	17.50
7	Hang Lung Properties Ltd	Hong Kong	17.41
8	Henderson Land Development Co Ltd	Hong Kong	17.40
9	CapitaLand Ltd	Singapore	12.08
10	Global Logistic Properties Ltd	Singapore	10.61

Note: This table presents the largest REOCs in the world, ranked by equity market capitalization. The table shows that these are very large global companies and that much of the global REOC exposure is in Asia.

Source: FTSE (2013) and Bloomberg (2013).

Source: Baker and Chinloy (2014)

[3] The REITs in Japan were introduced with the amendment to the Investment Trusts and Investment Corporations Law in November 2000 (Investment Trust Law)

The main characteristic of a Real Estate Operating Company regards the dividend policy: differently from REITs, in fact, REOCs are not obliged to distribute at least a certain percentage of taxable income as a dividend, so the management can freely decide whether to distribute part of the net income or reinvest it in new projects. This has important consequences on investment strategies, too: REOCs, because of the flexibility in the net profits' distribution policy, are able to quickly invest in new acquisitions, so one of the core profitable operations for the company is the sale of properties, while on the other hand, REITs must constantly issue new shares in order to raise capital for investment, and the sale of properties does not fall within the company's core operations. These peculiarities define the major advantages of using a REOC status, such as the following:

- *Debt benefits*

  As pointed out by Graham (2000), using debt for a firm has several advantages, such as the deductibility of interest and the reduction of the free cash flows, which bring to lower agency costs. REITs already benefit from interest deductibility – since they do not pay corporate income taxes – and from lower agency costs – given the low free cash flows due to the payout requirements – but they have to compete with REOCs in the debt capital markets, so the latter will benefit from a lower after-tax cost of debt than the REITs.

- *Growth potential*

  REOCs have a bigger growth potential, if compared to REITs. The reason is inside a formula which is one of the pillars of Corporate Finance:

$$g = retention\ rate * ROE$$

  Where g equals the earnings' growth rate.

  Keeping this in mind, a REIT, given the above mentioned dividend policy required in order to obtain the REIT status, will have a retention rate of maximum 10%, lowering the potential for good growth levels. On the other hand, the management of a REOC can freely decide not to distribute dividends for a given year, which will result in a 100% value of retention rate and, as a consequence, a higher growth rate.

- *Market timing strategy*

  The Real Estate market follow cycles and of course, the aim of the investor is to "*buy low, sell high*", riding the wave of such cycles. For this reason, the management of a company must be aware of this and try to take advantage of it: so, if a distress situation is forecasted, it should liquidate part of its portfolio when the cycle is still in a "high" phase. REITs, in this sense, have to face restrictions on capital gains as proportion of the income, while REOCs are more likely to apply the market timing strategy.

All the points made above lead to an overall ability for a REOC to be quite flexible when deciding to implement any strategy. This can be a fundamental factor in times of economic crisis.

1.4.3 REITs vs REOCs: a summary

The aim of this section is to summarize in a simple way the main similarities and differences between the Real Estate Operating Companies and the Real Estate Investment Trusts analyzed so far.

Table 6: Similarities and differences between REITs and REOCs

Characteristic	REITs	REOCs
Dividend policy	Distribution of at least 90% of its taxable income as dividends	No specific requirements: the management can freely decide whether to distribute part of the income as dividends or not
Business restrictions	At least the 75% of the assets owned by the REIT must be Real Estate (including mortgages), government securities or cash	No restrictions
Organization	Minimum number of shareholders (in US, 100) + restrictions on how few can own a determined amount of shares	No restrictions
Taxation	If certain conditions are met, the company is not taxed at the firm level	Double taxation: at firm and at shareholders level.
Management	Centralized, the directors protect the shareholders' interests	
Voting rights	Shareholders have the right to vote on certain decisions, including the election of the trustees or directors	
Investment strategy	Constantly issuing new shares is fundamental for raising capital for new investment. The sale of properties is not part of REIT's core business	The possibility of retaining income means investing in new constructions, acquisition and transformations, making the buying and selling of properties part of the core business for REOCS

Source: Personal elaboration, mainly based on EPRA Global REIT Survey 2020 and on "Public real estate markets and investments" (Baker & Chinloy, 2014)

1.5 Real Estate in Italy

In general, the REITs flow from the United States has caught on in Europe recently, starting from the beginning of the 21st century. Below there is a summary of the major European countries' attempts to approach the US Real Estate legislations:

Table 7: European REITs

Country	Year	Companies
France	2003	Sociétés d'Investissements Immobiliers Cotées, SIICs
Germany	2007	German Real Estate Investment Trusts, G-REITs
Italy	2007	Società di Investimento Immobiliare Quotata, SIIQ
Portugal	2019	Sociedades de Investimento e Gestão Imobiliária, SIGI
Spain	2009	Sociedades Anónimas Cotizadas de Inversión en el Mercado Inmobiliario, SOCIMI
United Kingdom	2007	UK-REIT

Source: Personal elaboration, based on EPRA Global REIT Survey 2020

The next sections will analyze the Real Estate market in Italy. First, the focus will be on the Italian indirect Real Estate market – to provide a sense of continuity – analyzing the Italian *Società di Investimento Immobiliare Quotate*, taking as a reference the 2007 Financial Law[4], and then the subsequent amendments made with the *Sblocca Italia* decree[5] in 2014, in order to make the Italian indirect Real Estate market more accessible.

Then, the focus will be on the analysis of the Italian 2020 direct Real Estate scenario, heavily affected by the Covid-19 Pandemic, with a particular attention to the forecasted outlook for 2021. Such analysis will be structured in this way: first, data on real estate investments in Italy will be presented, using different criteria (investments by asset class, domestic vs foreign component of investments, investments by geographic area and sector performance up to 2020), subsequently, an analysis will be given on the prospects for Italian real estate in the coming years, divided by sector. The entire content of the paragraph will be based on the "Italy Real Estate Market Outlook 2021" research made by CBRE. Later, the Italian direct Real Estate market will be analyzed, focusing on the CBRE report about the market outlook for 2021, which contains a key link for the main topic of the work: the trophy assets.

[4] Law of 27th December 2006 No. 296, Section 1, paras. 119-141, "*Legge Finanziaria 2007*"

[5] Law Decree 12th September 2014, No. 133, "*Decreto Sblocca Italia*"

1.5.1 Italian indirect Real Estate market: the SIIQ

The indirect Real Estate market in Italy was born in 1998, when the growing demand for new financial products was at the origin of the Real Estate mutual funds, which allowed the subscriber to invest in the Real Estate market through the acquisition of financial shares of the fund and, as a consequence, without a direct acquisition of the property. Leaving aside the differences between closed and open real estate funds, it is possible to summarize these funds by listing their two main characteristics: the minimum duration of the Real Estate fund is at least 10 years (with a maximum duration of 30) and the fund must invest at least two thirds of its capital in Real Estate. All this leads to problems of duration – they are long-term instruments – and of liquidity, if compared to financial instruments such as shares and bonds.

In order to overcome such problems and to follow the European trend of alignment with the US legislation on the indirect Real Estate market, Italy, with the abovementioned 2007 Financial Law, aimed at promoting the development of the overall Real Estate landscape through an increase in both the transparency and the competitiveness to attract capital for Real Estate investments.

The law stated four main kinds of requirements for a company to enter the SIIQ regime, which will be analyzed following the "*Circolare No. 8/E*" from the *Agenzia delle Entrate* (2008) on the topic of the SIIQ:

1. *Subjective requirements*

   The special regime of the SIIQ can be applied to companies which meet the following subjective requirements:

   - Being established as a joint-stock company.
   - Being resident, for tax purposes, within the Italian territory. The "*Testo Unico delle Imposte sui Redditi*[6] (TUIR) states that are considered as "resident" those companies which have their registered office of administration or main purpose in the territory of the Italian State for most of the tax period.
   - Having stocks traded in regulated markets, based in European countries, in countries belonging to the Agreement on the European Economic Area, and in foreign countries in which it is possible a proper exchange of information[7] (the so-called *White List*).

[6] Article No. 73, section 3.

[7] Article No. 168-bis, para. 1 of TUIR, as added by sec.1, para. 83, letter n) of law No 244 of 24 December 2007

2. *Statutory requirements*

It is required that SIIQ's bylaws must provide for the rules adopted by the company in the field with regard to investments, the limits set for the concentration of investment risks and counterparty risks, and the maximum level of leverage allowed, both at individual and group levels. The jurisprudence has not set benchmark parameters for the purposes of complying with the aforesaid limits, but has stated that the interim report and the management report must give an account of the choices made and of the current level of the individual parameters of potential criticality.

3. *Ownership requirements*

It is required that two conditions regarding the ownership of the SIIQ are met:

- *Control requirement*: limited concentration of the controlling shareholding. No shareholder must directly or indirectly hold more than 51% of the voting rights in the ordinary shareholders' meeting and more than 51% of the profits sharing of the SIIQ. It is important to note that for the purpose of calculating the percentage of voting rights and of profit sharing attributable to the holder of the shares, the pledged shares are also taken into account, if it is agreed that the right to vote at the Ordinary Shareholders' Meeting and the right to share in the profits belong to the holder of the shares.
- *Free float requirement*: at least 35 percent of the shares must be held by shareholders who do not possess, at the time of the option, directly or indirectly, more than 2% of the voting rights at the Ordinary Shareholders' Meeting and more than 2% of the rights to participate in profits.

4. *Objective requirements*

The application of the special regime is subject to the condition that the companies "*mainly carry out property rental activities*" (paragraph 119), specifying that such activities include the leasing of Real Estate properties held as property – even if abroad – , usufruct or other real estate rights, as well as on the basis of financial leasing contracts; leasing activities deriving from the development of the real estate complex; the holding of equity investments, constituting financial fixed assets in accordance with international accounting standards, in other SIIQs or SIINQs[8].

[8] *Società di Investimento Immobiliare Non Quotate*

It should be noted that the activity of property rental is considered to be "*mainly*" carried out if two parameters (*prevalence requirements*) are respected:

- *Asset test*: it is required that Real Estate owned by way of ownership or other right *in rem*, and Real Estate held under finance leases – intended for real estate leasing activities – represent at least 80% of the balance sheet assets.

$$Asset\ test: \frac{Leased\ properties}{Total\ Activities} \geq 80\%$$

- *Profit test*: it is required that revenues from rental activities and dividends – received from the participation in other SIIQs and SIINQs – represent at least the 80% of the positive components of the income statement.

$$Profit\ test: \frac{Profit\ from\ rents\ and\ dividends}{Positive\ components\ of\ the\ income\ statement} \geq 80\%$$

The compliance with such conditions allows companies to adopt the special scheme for the SIIQs, which provide exemption from IRES and IRAP taxes for the income deriving from rental activities, and exemption from IRES for the dividends received as a shareholder in other SIIQs. Moreover, the incomes, distributed as dividends, are taxed at shareholders' levels, as withholding taxes for entrepreneurs and as normal taxes for others.

On the other hand, any other kind of income – thus resulting from activities other than the "*property rental activities*" mentioned before – is normally taxed following the ordinary rules of IRES and IRAP, and the taxable income will be taxed at the company level, too.

However, if the above mentioned conditions are not met – with the exception of the *free float requirement*[9] –, the special regime is no longer applied. Below there is a table that summarizes the requirements, when they are verified, and when the special regime termination takes effect, according to Law No. 296/06.

[9] Such requirement must be met at the time of the access to the regime, but may subsequently be waived.

Table 8: Requirements for the access to the SIIQ special regime

Requirement	Requirement verification	Commencement of forfeiture
Residence in the territory of the Italian State	At the end of the tax period	From the same period in which the taxpayer is no longer considered a tax resident in Italy
Legal form of joint-stock company	Throughout the tax period	From the date on which the transformation into a non-IRES subject takes effect; from the beginning of the tax period in which the transformation into other companies or entities subject to IRES takes effect
Trading of shares on regulated markets	Throughout the tax period	From the same financial year in which the requirement ceases to apply
Maximum permitted ownership of 51% of voting rights and profit sharing	Throughout the tax period	From the same financial year in which the requirement ceases to apply
Free float requirement	At the time of access to the regime	It does not constitute cause for forfeiture
Performance of the activity of Real Estate rental on a prevalent basis	At the time of the meeting's resolution approving the financial statements	From the same financial year in which the prevalence requirement is no longer met; from the second consecutive financial year in which 1 of the 2 parameters is not met
Distribution of at least 85% of earnings for the year	At the time of the meeting's resolution approving the financial statements	From the same financial year to which the undistributed profits refer

Source: Personal elaboration, based on Law No. 296/06

The overall reform, in addition to conform to the contemporary European reforms on the subject, was aimed at driving several unlisted Real Estate companies towards the stock exchange through the above mentioned tax incentives. However, it did not yield the desired results: such instruments did not have a wide development in Italy. To try to overcome this problem, an amendment to the existing law was needed to make the SIIQ investment vehicle more flexible and accessible. In this sense, the Law Decree 12th September 2014, No. 133 – the so-called "*Sblocca Italia*"' decree – made several adjustments to the requirements for the adoption of the SIIQ special regime, mainly covering the following themes:

- *Control requirement*: the maximum percentage of direct or indirect control by a single shareholder (or group of shareholders) was raised from 51% to 60% of voting rights at Ordinary General Meetings and of profit participation rights. Should the 60% percentage be exceeded as a result of extraordinary transactions or capital market operations, the special regime is suspended until this shareholding requirement is re-established.
- *Free float requirement:* the percentage of shares that must be held by shareholders who individually do not possess, directly or indirectly, more than 2% of the rights to share in profits and to vote at the ordinary shareholders' meeting was reduced from 35% to 25%. However, the Decree specifies that the 25% percentage does not apply to companies that are

already listed. Therefore, the compliance with this minimum percentage of free float becomes a requirement for the admission to the listing of the capital for newly formed SIIQs.

- *Asset requirement:* the scope of the typical investment of SIIQs (i.e., that in Real Estate properties intended for rental, which must represent at least 80% of the assets and of the positive components of the income statement) was significantly broadened, allowing that the participation quotas in real estate funds – which, likewise, have as their main investment that in Real Estate properties for rental purposes – also contribute towards reaching this percentage, in addition to the Real Estate properties held directly and the participations constituting financial fixed assets held in other SIIQs. In the event of the sale of Real Estate properties or real rights on Real Estate properties intended for rental, only eventual capital gains realized will contribute to forming the positive income components deriving from the performance of Real Estate rental activities relevant for the purposes of verifying the income parameter.
- *Net income distribution*: the percentage of net income to distribute to shareholders dropped significantly, from the 85% to the 70% of the net profit, freeing up significant resources for the reinvestment and enhancement of existing assets.
- *Tax regime*: the income deriving from property rental activities was already exempt from IRES, but the scope of exemption is also extended to capital gains relating to property intended for rental and to equity investments in SIIQ and SIINQ, and to income deriving from investments in real estate investment funds that invest primarily in property intended for rental. The exemption also applies to the effects of IRAP. Moreover, it was introduced the obligation to distribute the income deriving from the above capital gains (net of capital losses) for at least 50% of their amount in the two years following their realization.

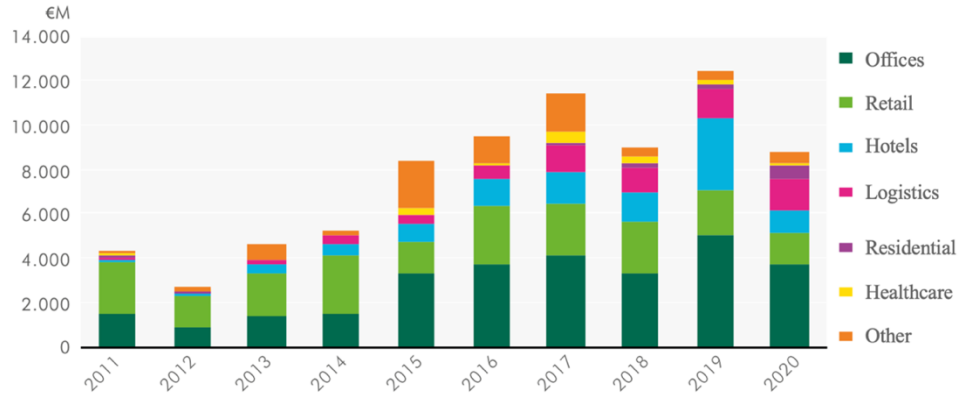
Moreover, the decree contains simplification and fiscal facilitation provisions aimed at favoring the transformation of Real Estate funds into SIIQs or their liquidation with transfer of the real estate properties to SIIQs: as a matter of fact, as said before, SIIQs are allowed to hold significant shareholdings in Real Estate funds, thus allowing the latter an indirect access route to listing. Moreover, a Real Estate fund undergoing total or partial liquidation may transfer all or part of its assets to a newly established SIIQ, receiving in exchange shares that must be distributed to the fund's participants within 30 days of purchase. This exchange transaction does not constitute a gain for the purposes of income tax for the former shareholder of the fund, who has become a shareholder of the SIIQ. Furthermore, the tax value of the shares of the SIIQ received will be the same as that of the shares in the real estate fund.

These are just two examples of a broader regulation, to show the ambitious direction of a more modern Italian Real Estate market, more able to compete with foreign countries.

1.5.2 Italian direct Real Estate market: an analysis

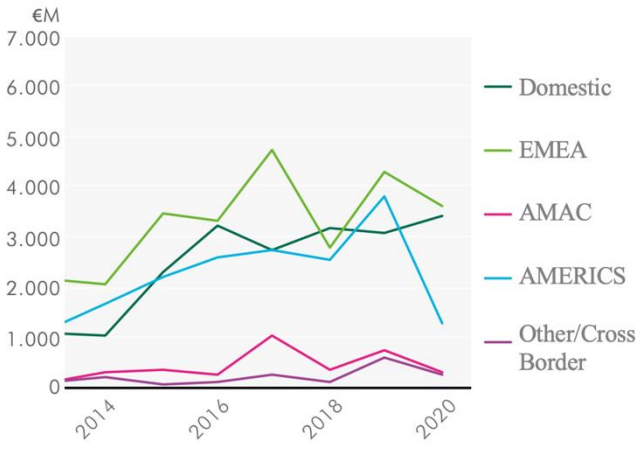
An analysis about the overall Italian direct Real Estate market shows a level of investments in the commercial Real Estate down 29% compared to 2019 – which, in all fairness, was a record-breaking year – and back to 2018 levels. In particular, as highlighted by Figure 10, offices are still the asset class in which the most is invested, but it is possible to notice a significant drop in investments compared to 2019, mainly due to the necessary adoption of the smart working system. The sector that has generally felt the effects of the pandemic the most is that related to hotels, also because of the closure of borders and the low predisposition of people to travel during that period, which led to a drastic drop in investments compared to 2019. On the other hand, the logistics sector is the one that has suffered the least, and indeed, investments in this sector have even increased compared to the previous year.

Figure 2: Investments by asset class



Source: CBRE Research

Figure 3: Foreign vs. domestic investments



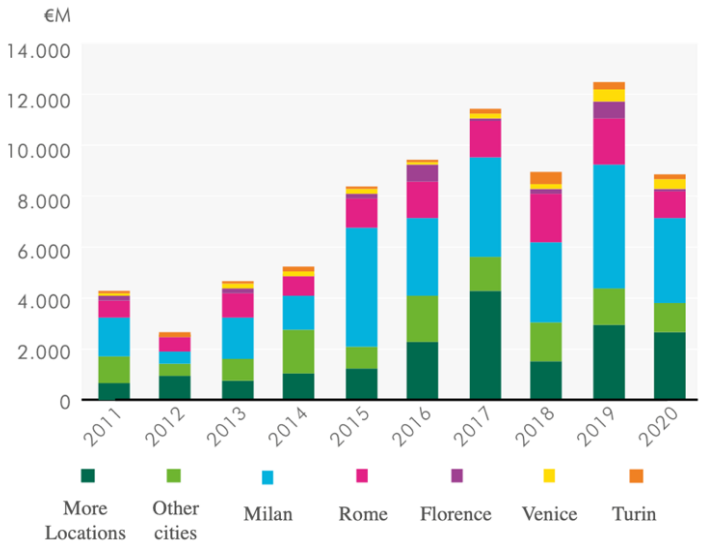
Source: CBRE Research

Making a comparison between the foreign component of investment in Real Estate and the domestic component, it is possible to note a decline in foreign investment – which falls to 59% from an average of 69% in the 2015-2019 period –, particularly from the AMERICAS area, as highlighted by Figure 3. This sharp decline, mainly due to a more wait-and-see attitude on the part of the investor, was

however well supported internally, with a 10% increase in absolute value of domestic investments, mainly thanks to large portfolio transactions.

Taking into consideration the investments in Real Estate made during 2020 in the major Italian areas, it is possible to note that Milan (Figure 4) remains the most coveted geographic area, despite a sustained decline compared to 2019, which brings the level of investments back to the same level as approximately 2018. The same trend can be noted for any other Italian cities, except for Rome, where the level of investments was not so low since 2014. This is mainly due to the fact that Rome has significantly suffered the almost total disappearance of tourism, whose value in 2019 accounted for 13% of regional GDP, with effects on the entire accommodation chain, on the activities of trade in the historic center and on the cultural offer, and with negative effects far greater than those of the global recession of 2008, as reported by the Bank of Italy in its "*Regional Economies – Lazio's Economy*" report.

Figure 4: Investments by geographical area



Source: CBRE Research

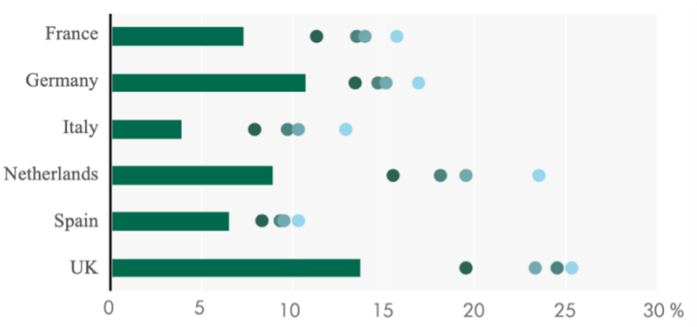
With these premises in mind, it is now possible to proceed to analyze the 2020 performance sector by sector, and the related trends for 2021. The main sectors taken into consideration will be the following: offices, retail, logistics, residential, hotels.

Offices. 2020 marked a decline in office space absorption in Milan and Rome markets of -41% and -56%, respectively. This slowdown can be attributed to the downturn in economic activity recorded during 2020 and uncertainty about the structural impacts of the Pandemic on future demand for space, which induced an increasing *wait-and-see* attitude amongst occupiers. However, it is important to remember that this result followed a year, 2019, that had marked an all-time record for absorption in Milan and Rome. The suspension of research by occupiers and the large amount of liquidity available to institutional investors polarize the office market in two directions: on one hand there is the above mentioned *wait-and-see* attitude towards value-added transactions, due to uncertainty about the future of take-up, and on the other hand there is a *flight-to-quality* trend that generates intense competition for *core* and *trophy assets* with excellent

covenants in primary markets, leading to further compression of prime yields. It is likely that office space absorption is headed toward a partial recovery from pre-Covid results due to better framing of the paradigms that will dictate post-emergency healthcare demand, both in terms of volume and quality of space. In conclusion, it is expected that these trends – *wait-and-see* and driven by *flight-to-quality* – will continue in 2021 and 2022.

Retail. Periods of closure due to the Covid-19 explosion, followed by the tightening of restrictive measures in the autumn, have had a heavy impact on retailers and on investments in physical stores. On the other hand, however, 2020 has seen the decisive emergence of e-commerce, whose low penetration in Italy – if compared to other European countries (highlighted in Figure 5) – will enable interesting margins of growth in demand in 2021. The complementary relationship between e-commerce and the physical store is becoming increasingly clear, thanks to better monitoring of the performance of online retail as a result of its increased popularity during the Pandemic.

Figure 5: E-Commerce penetration trend

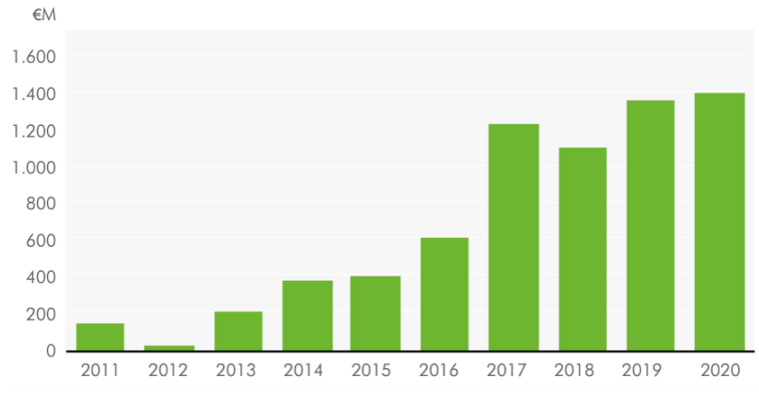


Source: CBRE Research

Underlying the overcoming of this dichotomy are three main elements: the uniqueness of the experience offered by physical retail, the complementary relationship between brick & mortar and e-commerce, and the future transition of stores to functions which are different from simply selling consumer goods. Overall, the complementary relationship between physical store and e-commerce is expected to normalize in 2021 and beyond.

Logistics. In contrast to what happened in virtually all other Real Estate sectors, investments in logistics in Italy even increased by 3% compared to 2019, reaching a volume of €1.4 billion and confirming a trend of high investment volumes in the sector that began in 2017, as can be seen in Figure 6. This confirms the strong interest by investors in the logistics sector in Italy, driven both by the intensity of demand for logistics space from occupiers and by maintaining competitive returns compared to what has been observed in major European markets. On the one hand, the search for core and super-core opportunities on standard logistics properties in primary markets, with excellent covenants and contractual terms of over 15 years, a trend that is set to grow in the coming months with new *trophy asset* transactions, is consolidating. On the other hand, the compression of prime yields pushes investors to look at new markets and new product

Figure 6: Investments in the logistics sector in Italy



Source: CBRE Research

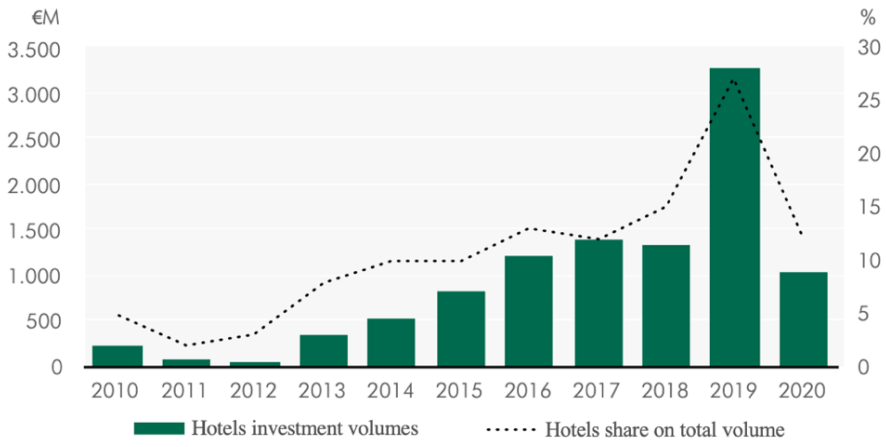
types. As mentioned above, 2020 saw the decisive emergence of e-commerce, which proved to be the main driver of growth in demand for logistics space, accounting for 46% of the final use of space absorbed in 2020. Moreover, the low penetration of e-commerce will allow interesting margins of growth in demand in 2021, which will contribute to the maintenance of a low vacancy and high rents. The increase in online sales and the growing omnichannel nature of retail, implying an increasing ubiquity and proximity to the end consumer of the logistics sector, have also begun to be reflected in the demand for *last mile spaces*, which at the moment is limited to large urban centers, and is destined to extend throughout the Italian territory, in particular to those smaller urban centers characterized by good spending capacity. The Pandemic has also highlighted the importance of logistics for the supply of goods in the food sector (particularly in the large-scale retail segment) and in the cold chain, segments where a strong supply chain reorganization is underway.

Residential. The crisis linked to the Covid-19 emergency has highlighted the resilience of the European residential Real Estate market. Despite an overall reduction in investment volumes compared to the previous year, the multifamily, co-living and PBSA[10] markets showed greater strength than the other sectors. Occupancy and rent collection remained robust, also thanks to the income and employment support measures promoted by governments in response to the emergency situation. Taking Multifamily into particular consideration, it is thought that this market can expand further in the coming years, thanks to the entry of new investors. The main attraction of the Italian Multifamily market is the fact that it is still at an early stage compared to other major European markets, and for this reason it has very high margins for growth, driven also by the strong interest of international investors, but slowed down by the lack of specialized operators. For this reason, the Real Estate services chain is implementing business lines aimed at supporting investment activities in Multifamily.

[10] Purpose Built Student Accommodation

Hotels. The tourism sector has been among the hardest hit by the Pandemic. Despite the reopening of international borders in June 2020, a large part of tourists preferred to spend their summer vacations within the national territory, rather than being restricted in their movements to air connections. This trend was also confirmed in Italy: almost all Italian vacationers spent the summer in the *Bel Paese*, and this led to the summer months (from July to September) registering a smaller drop in domestic stays (-14%), compared with -60% in international stays, which, however, led to a loss of around 20 billion, mainly due to the lack of American and Russian tourists, as reported by the Bank of Italy. It is estimated that these flows will return to 2019 levels no earlier than 2023, with differentiated speeds depending on the leisure/business/MICE[11] segmentation, as well as on the dependence on international demand. With regard to investments, in 2020, the volume of investments in the Hotels asset class in Italy slowed down sharply compared to 2019 results, reaching the amount of one billion euros, down 70% on the previous year (Figure 7), but still on average with the volume of investments in the last five years (except for the exceptional result of 2019). In this context, the transactions observed in 2020 nevertheless confirmed investor confidence in *trophy assets*, with transactions originated in the pre-Covid period ending almost without repricing. While waiting for a stabilization of hotel industry fundamentals, the hospitality Real Estate market is looking to the medium-to-long term: on one hand, a wait-and-see approach towards the purchase of existing properties prevails, while on the other hand a robust interest in development and conversion activities is observed. 2021 and 2022 may be characterized by investment opportunities arising from distressed situations and *flight-to-quality* and *value-add* investment policies driving hotel transactions.

Figure 7: Hotel and share investments in total volume in Italy



Source: CBRE Research

In conclusion, it can be said that the pandemic has certainly hit the Real Estate market hard in Italy, especially in those sectors that rely heavily on tourism. At the same time, however, the

[11] Meetings, Incentives, Conferences & Exhibitions

Pandemic can also be exploited as an opportunity to accelerate and create new essential growth processes – such as the penetration of e-commerce in the retail sector – to restart and boost the entire Italian economy as soon as possible. Furthermore, in this brief analysis of the Real Estate market in Italy in 2020, it is possible to note that there is an asset class that does not seem to be affected by the negative effects of the Pandemic and that, on the contrary, turns out to be one of the few "safe havens" in which investors can take refuge, given their peculiarity of maintaining a high value even in adverse market situations. Such an asset class is that of *trophy assets*, which will be the focus of the next chapter.

2. Real Estate Valuation Methods: Literature Review

2.1 Introduction

This chapter has the objective of laying the theoretical foundations for the analysis that will be carried out in the third chapter: after a definition of trophy assets, in fact, there will be a fairly in-depth literature review of the most important methods that are adopted in real estate valuation. More specifically, we will first review the more "traditional" valuation methods, more commonly used, and then we will analyze those methods that have more modern bases and that can make use of advanced techniques such as machine learning, which are in fact changing the entire landscape of real estate valuation.

2.2 Trophy Assets: a definition

Evans and Evans (2007) define a Trophy Asset as a "*status symbol, landmark building with distinctive design features and the very best construction and finishes"* which *"generally has widespread name recognition and is considered a prestigious address*".

According to Bill Mundi (2002), there are three main characteristics that distinguish a trophy asset: location, quality, and price.

Probably, a good example to explain the peculiarity of such assets is a vineyard which produces grapes that give an exceptional champagne. For this characteristic, the vineyard can be sold at a way higher price, if compared to the other vineyards in the same rural area, where prices are usually low. The rarity and the uniqueness of the champagne awards the vineyard a huge intrinsic value, which will influence the market and make its selling price skyrocket.

The main question is: "*Are they a good investment opportunity?*" To answer this question, it is necessary to consider a fundamental concept. When investing, in fact, there are two main goals:

1) In the short term, to obtain a return on investment (ROI). Trophy assets – rare and in high demand – offer this possibility: they can be used as shopping centers (a clear example can be considered the *Les Galeries Lafayette*, in Paris), luxury offices or Grand Hotels. Their uniqueness, together with a high and stable demand, will grant the best rental yield and the best profitability.
2) In the long term, to build up capital. A trophy asset can be a guarantee that the capital invested is very difficult to be eroded or depreciated. Of course, a necessary condition for this to happen is to maintain an elite-level constant maintenance, because of the reputation of the tenants occupying them: this leads to a high level of capitalization for the owner.

Moreover, in a possible crisis situation in the real estate market, trophy assets can be a safe place for investors, since their uniqueness will make their price evolve in the opposite direction compared to the traditional market, or at least they will not lose as much value as other kinds of assets. This is what happened during the Covid-19 Pandemic, as already seen in the EPRA Report discussed in chapter 1.

Of course, there is also skepticism of the real estate industry about this kind of assets: such an investment is very expensive, so on one hand, there are strong barriers to entry, while on the other hand, trophy assets show an important lack of liquidity, which leaves little room for maneuver. As a consequence, this specific market is mainly covered by large-sized real estate companies which usually invest on a single trophy asset, which acts as a great portfolio diversification strategy if combined with more traditional real estate investment. Furthermore, there is a certain lack of transparency: for example, the sale of the headquarters in Paris of Société Générale bank exceeded €100 million, but the exact amount of the transaction is not known. This lets the market be less susceptible to influence, but on the other hand it can lead to situations of mistrust by other players in the sector.

In conclusion, trophy assets are a solid investment opportunity, for those who can afford them, because of their unique, privileged position and their peculiarity to “go against” the adverse situations in the traditional real estate market.

The remainder of this chapter will be focused on reviewing the real estate valuation methods most commonly used in practice.

2.3 Real Estate Valuation Methods: Literature Review

Thanks to the work of Pagourtzi, Assimakopolous, Hatzichristos and French (2003), a linear review of the entire scenario of Real Estate valuation methods is available. As the authors themselves point out, "*what is often called a ‘valuation’ is the best estimate of the trading price of the building*". In this context, the following convention is adopted: when talking about price, we are referring to the actual exchange price of a property, thus the market value is an estimation of the price if such property were to be sold in the market. Moreover, the value calculation is used to assess the intrinsic value of the individual or group of individuals.

Estimates about the exchange price generally take into account several factors, such as the physical condition of the Real Estate good, the nature and size of the market, and assumptions about the possible entry of new buyers into the market. Because of the heterogeneity of such factors, it is required to ensure a proper consistency in the valuation process: his is the reason

why the International Valuation Standards Council (IVSC) has provided a standard definition of market value which is consistent across all countries, defining the market value as "*the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion*". The same Council provides an in-depth analysis of the definition:

- "The *estimated* amount" is referred to the price which will be likely to be paid for the Real Estate asset in the context of a market transaction. The estimation is made considering both the seller and the buyer, and in this regard the market value will be "*the best price reasonably obtained by the seller and the most advantageous price reasonably obtained by the buyer*". This definition intentionally excludes all price estimations that are inflated or deflated by special terms or circumstances, such as atypical financing or special concessions secured by anyone associated with the sale.
- "An asset or liabilities *should* exchange" basically means that the value of an asset or a liability is not a predetermined amount or an actual sale price, but it is an estimated amount which can be the final price if the transaction meets all the elements included in the market value definition.
- "On the *valuation date*" refers to the fact that the market value is time-specific to a given date. This means that on any date other than the valuation one, the value of the property may change because market conditions – or the markets themselves – might change.
- "Between a *willing buyer*" means that the buyer taken into consideration has the will to buy a property, but is neither compelled by it, nor on the other hand is overenthusiastic and willing to pay any amount to acquire it. In other words, this buyer is motivated to buy the property in accordance with current market conditions and according to fair market considerations.
- "And a *willing seller*": the same concept analyzed for the buyer is also valid for the seller: the latter is neither forced to sell, nor does he consider holding the property unjustifiably even in market conditions which are very favorable to him or her. For these reasons, the seller taken into consideration will be motivated to sell the property in accordance with current market conditions and according to fair market considerations.
- "In an *arm's length transaction*" refers to a deal in which the buyer and the seller act independently (i.e., they are not landlord and tenant, or parent and subsidiary companies), without influencing each other.
- "After *proper marketing*" means that, in order for the Real Estate asset to be properly valued, it must have been exposed to the market for a sufficient period of time – which is not fixed,

but may vary depending on market and asset conditions – to allow a sufficient number of participants to become aware of the asset for sale.

- "Where the parties had each acted *knowledgeably, prudently*" means that both the potential buyer and the seller are aware and informed about the market conditions and the Real Estate assets' nature and characteristics at the valuation date. Moreover, prudence refers to the fact that the buyer and the seller should act on the basis of the best market information available.
- "*Without compulsion*" means that neither party is forced to complete the transaction, but on the contrary are motivated to do so.

In this broad context, it is now possible to move on to analyze the various methods of Real Estate valuation, which are divided into two macro-categories (Pagourtzi et al., 2003): *traditional valuation methods* and *advanced valuation methods*.

2.3.1 Traditional Valuation Methods

Traditional valuation methods are characterized by a spectrum of observations that allow the evaluator to determine a regression model. The purpose of the next sections is to analyze the several methods that fall into the above category, which are the following:

- Comparable method
- Investment/income method
- Profit method
- Development/residual method
- Contractor's method/cost method
- Multiple regression method
- Stepwise regression method.

2.3.1.1 Comparable Method

The Comparable Sales Analysis (CSA) is probably the most widely used valuation method, as it is based on the simple assumption that the value of the property being valued is closely related to the sales prices of similar properties in the same market area. These properties will be considered the "Comparables" within the valuation. As asserted by Castle and Gilbert (1998), this approach strongly depends on the type of information available on the sale of real estate in the market area under consideration: the accuracy, completeness and recency of such information is a fundamental factor in order to carry out an adequate comparable analysis. Obviously, no two properties are absolutely identical, since the date of sale alone is a significant factor of

heterogeneity, as well as differences in the size of the property or the neighborhood. As a consequence, the value of the property subject to valuation will be calculated through a weighted average of the adjusted sales of the Comparables. For this reason, it is possible to divide this evaluation process into four phases:

First phase: search for a fairly significant number of transactions that are closest in characteristics to the one under evaluation (the *comparables*).
In practical terms, in order to find the comparables, it is necessary to calculate the distance (in terms of characteristics) between the property subject to valuation (the "*subject property*") and each sale of property that for its characteristics can be considered a comparable (the "*sale property*"). When calculating the distance, variables are assigned a factor weight (McCluskey and Borst, 1997), used to "*balance the effect of variables according to the magnitude of the variable itself, so that a variable with larger numerical size has a smaller weight*". According to McCluskey, Deddis, McBurney, and Borst (1997), such distance (*D*) is calculated as follows:

$$D = \sqrt[\lambda]{\sum_i [A_i(X_i - X_{si})]^\lambda + \sum_j \left[A_j \bar{\delta}(X_j, X_{sj})\right]^\lambda} \qquad (1)$$

Where:

λ = Minkowski exponent lambda
A_i = weight associated with *i*th continuous characteristic
X_i = value of the *i*th characteristic in the sale property
X_{si} = value of the *i*th characteristic in the subject property
Σ_i = summation of terms of *i* characteristics
A_j = weight associated with the *j*th categorical characteristic
X_j = value of the *j*th characteristic in the sale property
X_{sj} = value of the *j*th characteristic in the subject property
Σ_j = summation of terms of *j* characteristics
$\delta(a, b)$ = inverse delta function (0, if $a = b$; 1 $if\ a\ \neq \delta b$)

Second phase: adjust the selling price of all the comparables taken into consideration so that it reflects as closely as possible the characteristics of the property under valuation.
The adjusted sales price will be given by the following formula:

Adjusted sales price = sales price – (comparable MRA – subject MRA) (2)

Where MRA = Multi regression analysis.

Third phase: estimate the market value of the property subject to valuation through a system of weighted averages of the adjusted selling prices of the comparables.
The weighted estimate will be calculated as follows:

$$\text{Weighted estimate } = \sum_{i=1}^{n} \frac{W_i}{W} ASP_i \quad (3)$$

The weight for the *i*th comparable (W_i) will be calculated as a function of the sale price of the comparable (and its adjusted sale price calculated in phase 2) and of the distance *D* between the comparable and the property under evaluation:

$$W_i = \frac{1}{\left(\frac{D}{2}\right)^2 + D_i^2 + \left(2D \frac{|ASP_i - SP_i|}{SP_i}\right)^2} \quad (4)$$

$$W = \sum_{i=1}^{n} W_i$$

Where:

ASP_i = adjusted sale price for comparable *i*

SP_i = sale price of comparable *i*

D_i = distance for comparable *i*

D is Max of D_i

Fourth phase: to guarantee the transparency of the valuation method used, it is necessary to present the results of the valuation in a report.

In short, through the Distance calculation, it is possible to select the most appropriate comparables for the analysis under consideration. Once the comparables are selected, the price of those transactions must be adjusted to reflect what the selling price of the comparables would have been if their characteristics were identical to those of the property under evaluation: in this way, it is possible to value the *subject* (Fraser and Blackwell, 1988). In this context, through the

weighted average system, the CSA approach succeeds in placing more emphasis on past transactions that involved the most similar properties possible (i.e., with the least distance) from the property under evaluation.

However, the comparable model is only valid in sub-markets with a high degree of similarity, such as the residential market. Understandably, this type of model cannot be used to estimate the value of a trophy asset, given its unique characteristic of heterogeneity.

2.3.1.2 Investment/Income capitalization method

The simplest degree of an investment property involves the property being owned and occupied by the same party (owner-occupied). Alternatively, the landlord grants the right of occupancy to a third party (the tenant), who in return pays his landlord a rent, which reflects the (annual) value of the property. To estimate the market value of this type of investment project, the Real Estate appraiser often applies the discounted cash flow model (DCF). Usually, in this type of analysis it is not important to calculate the After-Tax Cash Flow, but it is sufficient to find the annual Before-Tax Cash Flows from Sale before tax reversion (Weaver and Michelson, 2003), which will then be discounted using a market-derived discount rate. In summary, the three key elements for an effective Discounted Cash Flow are projected cash flows, terminal value, and market-derived discount rate: once these three elements are in place, it is possible to calculate the present value (PV) of the investment in the real estate asset.

The pioneers in the field of real estate valuation are Downs (1966), Dilmore (1971) and Ratcliff (1972): they laid the groundwork, followed then by subsequent insights aimed at deepening certain concepts such as the uncertainty (French and Cooper, 2000), the importance of developing an analysis that is reliable (Willison, 1999), the influence of vacancy and market analysis (Rabianski, 2002) and the sensitivity of inputs on final output (Taylor and Rubin, 2002; Wheaton et al., 2001; Hendershott and Hendershott, 2002).

Following this method, referring to McDonald and Dermisi's (2008) studies, the present value of a real estate asset will be given by the following formula:

$$V_0 = \sum_{i=1}^{n} \frac{NOI_i}{(1+r)^i} \qquad (5)$$

Where the NOI_i is the Net Operating Income that the real estate asset generates at the end of each time period i, while r is the risk-adjusted cost of capital, used as the discount rate. In general, the

discount rate typically used in these cases is the Weighted Average Cost of Capital (WACC), following the formula:

$$WACC = K_e * w_e + K_d(1 - t)w_d \quad (6)$$

Where:

w_e = weight of equity on the total capital
w_d = weight of debt on the total capital
K_e = cost of equity
K_d = cost of debt
t = tax rate

However, it seems necessary to follow some guidance published in 2013 by the IVSC, which was then slightly modified in 2020, as follows:

"*The development of a yield or discount rate should be influenced by the objective of the valuation. For example:*
(a) if the objective of the valuation is to establish the value to a particular owner or potential owner based on their own investment criteria, the rate used may reflect their required rate of return or their weighted average cost of capital, and
(b) if the objective of the valuation is to establish the market value, the discount rate may be derived from observation of the returns implicit in the price paid for real property interests traded in the market between participants or from hypothetical participants' required rates or return".

The objective of the valuation is clearly the one stated in point (b), the establishment of the market value: for this reason, as stated by the International Valuation Standard Council itself, the discount rate will be given by the observation of several property trades and the returns implicit in them. It is therefore necessary to construct a model of analysis of a significant number of transactions carried out in the same area in a given period of time and which had as their object "similar" real estate assets. The data that can be taken into account are many and obviously vary depending on the ultimate purpose of the study: certainly, the most commonly used data are the sale price, the age and size of the asset and the date of sale, to which other quantitative and qualitative variables (such as the class of the building) can be added to the model.

In this context, the basic formula for calculating the risk-adjusted cost of capital is as follows:

$$r = \rho + \frac{\Delta V}{V_0} \quad (7)$$

where ρ is the capitalization rate and $\frac{\Delta V}{V_0}$ is the variation in the value of the property under consideration as certain variables change, such as those specified above.

Obviously, there is no absence of studies on the critical aspects of this method of valuation (Plattner, 1992; Martin, 1993), which highlight various problems in this regard, first and foremost the not always great availability of data relating to transactions that can be considered comparable.

2.3.1.3 Profit method

The profit method takes into account "*the specialized nature of the property and is based on the income and expenses related to the business*" (van Vuuren, D. J., 2016). This approach is similar to the income capitalization method in its ability to derive a hypothetical rent which is capitalized. What differentiates them is that the income method succeeds in arriving at the hypothetical value of the rent by calculating it as a fraction of the operating profit of the business, while the capitalization method arrives at the same result through the rents found in an established market. According to the aforementioned author, the entire evaluation process consists of several phases, as follows:

1. Gathering information and forecasting business performances: in this phase, key financial data from the three years prior to the time of the assessment is analyzed and a forecast of revenues and expenses for the next five years is made.
2. Separating business operating expenses from property expenses. In addition, all non-normal (e.g., gains/losses on sale of assets) and non-cash (e.g., depreciation) items will be excluded.
3. From the difference between the company's revenues and operating expenses it is possible to calculate the business net operating income, which will be referred to as NOI 1.
4. Applying a percentage split to NOI 1. The process leading to the determination of the appropriate split percentage to apply is the result of a market assessment and an assessment derived from the fact that the property under assessment is a specialized property. The author, in this context, gives the example of a poultry slaughterhouse in an industrial area: being in an area characterized by many different industries and real estate assets, it is relatively easy to find some properties that by physical characteristics can approach the characteristics required to build a poultry slaughterhouse. As a result, it is possible to immediately estimate how much the rents in the area are for land and buildings. However, since the property in

question is a specialized property with little compatibility with other industrial properties, it is necessary to make an adjustment and add premiums for utility differences, such as – as reported by the author – for cold storage and high-quality flooring. After determining the rent for land and buildings, it is necessary to determine the portion of the rent attributable to plant and machinery (P&M). The premise is that a hypothetical investor could simply occupy the property as a whole and pay the landlord a monthly rent, and that rent is calculated in square feet, which is not the unit of measure for P&M. For this reason, a conversion factor is assumed in several scenarios to also express P&M in the same unit of measure (m^2/month). Then the two types of rent (for land and buildings and for P&M) are added together and, through this, the impact they have on NOI 1 is observed, an impact that is determined through the hypothetical rental split.

The next Table shows a numerical representation of the above, assuming three scenarios in which the P&M factor represents 50%, 100% and 125% of the rent for lands and buildings, respectively.

Table 9: Hypothetical rental split calculation

Description	Steps	Unit of measure	Scenario 1	Scenario 2	Scenario 3
Market rental	(a)	€/m²/month	2.33	2.33	2.33
Subject rental – land and buildings	(b)	€/m²/month	3.00	3.00	3.00
Subject P&M factor	(c)	Factor	0.50	1.00	1.25
Subject rental – P&M	(d) = (b) x (c)	€/m²/month	1.50	3.00	3.75
Subject aggregate rental	(e) = (b) + (d)	€/m²/month	4.50	6.00	6.75
Subject building extent	(f)	m²	2,480.00	2,480.00	2,480.00
Net Operating Income 1 – NOI 1	(g)	€/annum	570,697.93	570,697.93	570,697.93
Net Operating Income 1 – NOI 1	(h) = (g)/12/(f)	€/m²/month	19.18	19.18	19.18
Hypothetical rental split	(i) = (e)/(h)	Percentage	23.47%	31.29%	35.20%

Source: personal elaboration based on van Vuuren's work

5. If this has not already been accomplished in steps 1 and 2, then the property operating expenses must be estimated.
6. Deducting property operating expenses from hypothetical rental income in order to calculate net operating income (NOI 2). As said in the previous point, the hypothetical rental income is given by the product between the NOI 1 and the hypothetical rental split. Depending on what assumptions are made explicit in the definition of the lease type, different property operating expenses can be calculated, as can be noted below:

a. if we assume a *gross lease*, we are assuming a situation in which the tenant does not pay property taxes, building insurance and maintenance, which will all be borne by the owner: this is the assumption that involves more property expenses for the person who is evaluating the investment opportunity and it is the scenario that actually defines the assumed minimum value that NOI 2 can take.
b. if we assume a *single net lease*, we consider the scenario where the tenant pays property tax.
c. if we consider a *double net lease*, we are assuming a situation in which the tenant pays property tax and building insurance.
d. finally, if we assume a *triple net lease*, we are analyzing the situation in which the tenant pays property tax, building insurance and maintenance, effectively making operating property expenses equal to 0 for the owner and thus matching the hypothetical rental income and NOI 2.

Below (Table 10) is a brief representation of the steps necessary to arrive at the calculation of NOI 2.

Table 10: Net Operating Income 2 calculation

Restated Income Statement	Steps
Turnover	(a)
Cost of sales	(b)
Gross profit	(c) = (a) – (b)
Other income	(d)
Business Expenses (BE)	(e)
Net Operating Income 1 – NOI 1	(f) = (c) + (d) – (e)
Hypothetical rental split	(g)
Entrepreneurial split	(h) = 1 – (g)
Hypothetical rental income	(i) = (f) x (g)
Property Expenses (PE)	(j)
Net Operating Income 2 – NOI 2	(k) = (i) – (j)

Source: personal elaboration based on van Vuuren's work

7. In order to calculate a plausible value at which to acquire the property in its entirety – that is, including the land, buildings, plant, machinery, movable property, and real rights associated with them – the NOI 2 calculated in the previous step must be capitalized at a rate that is

reasonable. In this calculation, intangible assets such as goodwill and tangible assets such as raw materials and inventory are excluded, as they are business-derived values, but they are not a business value. In this scenario, it is necessary to compute the discount rate and the capitalization rate.

The calculation of the **discount rate** is necessary at the time of discounting the financial data of the three historical financial years and the five forecasted years + the terminal value – after restating the income statement until the NOI 2 is calculated – to determine the final value of the property considered to make the investment. The most commonly used model for calculating the discount rate remains the Capital Asset Pricing Model, despite its limitations highlighted by various authors, such as Ball (1996) and Ansari (2000). This model leads to the definition of the Weighted Average Cost of Capital (WACC) as the rate needed to discount past and projected cash flows. WACC is calculated as follows (as already discussed in the Income Capitalization Method):

$$WACC = K_e * w_e + K_d(1 - t)w_d \quad (8)$$

Where:

w_e = weight of equity on the total capital
w_d = weight of debt on the total capital
K_e = cost of equity
K_d = cost of debt
t = tax rate

The cost of debt K_d will be calculated by adding to the risk-free rate (such as the 10-Year German Government Bond Yield) a spread that depends on the ratio between EBIT and net interest expense. The cost of equity K_e, on the other hand, will be calculated by adding to the risk-free rate a market risk premium multiplied by the beta (specific risk coefficient), which is obtained by applying a "releveraging" of the average industry beta.

The calculation of the **capitalization rate** makes it possible to understand the expected rate of return on the investment under analysis. The capitalization rate (k) will be calculated through the formula introduced by Hoesli and MacGregor (2000) as follows:

$$k = RF_R + RP + i_e - G + d \quad (9)$$

Where:

RF_R = risk-free real rate, being the average of high and low risk-free rate, without the long-term inflation effects

RP = property risk premium

i_e = expected long-term inflation

G = expected income growth rate

d = expected depreciation rate

Regarding the expected income growth rate, the author proposes two alternative formulas, depending on which is the main factor driving the property-business financial model: revenues or other income. In both cases, the hypothetical rental split calculated in point 4 will be used. The two alternative formulas are as follows:

$$G = \text{Hypothetical rental split (\%)} * \text{revenue growth rate (\%)} \quad (10)$$

$$G = \text{Hypothetical rental split (\%)} * \text{other income growth rate (\%)} \quad (11)$$

8. Estimate the capital expenditure (CAPEX) associated with the expansion projected in the investment plan.
9. Deducting the CAPEX from the NOI 2 and discount the cash flows using the WACC to calculate the present value of the possible investment being considered.

The principle behind this methodology lies in the assumption that rent is a derivative of supply and demand of the real estate asset under consideration, and this principle can be used for all properties whose value is intrinsically linked to the activity carried out within the asset itself.

As can be seen from these calculations, the profit method is very similar to the income capitalization method: the difference between them is that the former obtains the rents from an established market, while the latter arrives at the hypothetical rent as a fraction of the NOI.

2.3.1.4 Development/residual method

This section will mainly refer to studies published in three different publications on the subject: those of Wong (1998), Skarzyński (2006), and Kupec & Dlask (2020).

Underlying the residual method is a fairly basic economic concept: the value of the Real Estate asset is calculated as the difference between the estimated value of the revenues derived from the entire investment transaction in the property and all costs incurred in setting up and developing the project. The residual method is particularly effective when the property under valuation has characteristics that make it suitable to present a possibility of development in terms

of expansion and/or modernization that require additional investment but on the other hand can result in a high return on capital that turns into profit for the investor.

The residual value of the real estate asset is calculated by applying the following formula:

$$Residual\ Value = GDV - DC - DP \tag{12}$$

Starting with the **Gross Development Value (GDV)**, it is the estimated open market capital value or rental value when the property's development project is completed. While the valuation approach used is contingent upon the type of property under valuation, for most commercial properties, the GDV is calculated through the investment capitalization method. The GDV calculation involves estimating the Rental Value (ERV) per year multiplied by the Net Internal Area (NIA) - defined as the internal area bounded by the perimeter walls of the building at each floor - net of stranded costs, all in relation to the Equivalent Yield (EY), as follows:

$$GDV = \frac{ERV * NIA - Non\ recoverable\ costs}{EY} \tag{13}$$

The **Development Costs** (**DC**) are all those costs incurred in implementing the project. Primarily, these are the result of the influence of three different factors:

- *Construction Costs* (CC): in a very simplified way, construction costs are all those costs necessary to complete the construction process. The estimation of such costs is particularly easy to do, since they are stated in the construction contract: any unforeseen events generally do not create major deviations from the value expressed in the contract.
- *Soft Costs* (SC): Soft costs are all those incidental costs directly related to the investment project. These may be professional fees and project management costs - i.e., costs directly related to the construction/conversion of the real estate asset itself - but also marketing and legal fees.
- *Financial Costs* (FC): They represent the project financing costs incurred throughout the life of the project. The basic assumption in estimating financial costs is that the real estate asset purchase and development project is entirely financed by borrowed money: as a result of this, the factors that affect this value are the interest rate, the duration of the financing, and the amount of financing.

Therefore, as anticipated, the formula for development costs is as follows:

$$DC = CC + SC + FC \tag{14}$$

The **Development Profit (DP**) is the "premium" for the risk assumed in initiating, developing, and implementing the real estate investment project. While the level of development profit derives from the type of investment project undertaken and the risk involved, it is usually around 15-20% (assuming everything works out) of the total project costs, by which is meant the acquisition costs (AC) and the development costs seen above. Therefore:

$$DP = (AC + CC + SC + FC) * 15\% \quad (15)$$

Once this is calculated, it is possible to apply the Formula 12 to compute the residual value.

However, as Wong (1998) asserts in his analysis of the residual method as an appraisal method in Special Economic Zones (SEZs) and rural China, this method has an important limitation: having to determine a Gross Development Value that is plausible, it is necessary to rely on a large amount of sales data regarding properties that can be defined as comparables of the one under appraisal. For this reason, the use of this method in calculating the value of Trophy Assets, due to their almost unique nature, is highly discouraged.

2.3.1.5 Cost/Contractor's method

Also called the Depreciated Replacement Cost (DRC) valuation method, the cost method is defined by the Royal Institution of Chartered Surveyors (RICS) Valuation - Global Standards 2017 (RB Global) Glossary as "*the current cost of replacing an asset with its modern equivalent asset less deductions for physical deterioration and all relevant forms of obsolescence and optimization*". The following section will focus on the analysis of this method of real estate valuation primarily following the studies of Baxter et al. (2007), Wyatt (2009), Guo et al. (2014), Onyejiaka et al. (2015), and Fattinnanzi et al. (2020).

This approach is particularly used when dealing with properties whose purchase and sale in the marketplace is a rarity and only for technical purposes, such as accounting and statutory purposes. In other words, these are highly specialized properties. The final output of the model is the estimate of the market value (MV) of the property under evaluation going to add to the market value of the land in which the property lies all the restructuring costs necessary to – in fact – "replace" the real estate asset in question with a modern version of the same, finally deducting the estimated effects of depreciation that may have accumulated at the time of valuation. This can be summarized in a series of steps:

- Estimate the replacement cost of the building and any other modifications/improvements to the land.

- Adjust the value calculated in the previous step to reflect the weight of obsolescence on that building.
- Estimate the value of the land and adjust it if there are some adjustments to be made for any "disadvantages" in terms of the layout of buildings and other structures.
- Add up the estimated value of the land and the estimated building replacement cost and adjust if necessary because the cost may not necessarily equal the value.

The entire process leads to the definition of the Market Value of the real estate investment, using the following formula, which will then be analyzed in detail:

$$MV = MV_{land} + CV_{dep} \tag{16}$$

Starting from the **Market Value of the Buildable Land (**MV_{land}), this can be calculated using either a direct or an indirect approach. The direct method can only be used if sufficient information is available on similar properties – in terms of geographical area, surface area, purpose and legislative and administrative context – and consists of using the following formula:

$$MV_{land} = unit\ comparable\ price * size \tag{17}$$

The indirect approach, on the other hand, consists in discounting – using a given capitalization rate r' in a number *n* of years – the difference between the market value of all the properties that have been built on the land and that will be sold (MV_{bl}) and the sum of all the costs sustained (ΣK_p):

$$MV_{land} = \frac{MV_{bl} - \Sigma K_p}{(1 + r')^n} \tag{18}$$

About the **Cost of Rebuilding a past-built building (**CV_{dep}), this is calculated by estimating all costs that a hypothetical construction firm would incur to build an identical or equivalent property at the time the appraisal is made. These costs include all physical reconstruction costs (i.e., the sum of labor costs, rental costs, materials, and transportation + other general costs + the construction company's profit), bureaucratic fees, legal fees, any financial costs and finally the profit of the company that is considering making the entire real estate investment transaction. In addition to this, it may also be necessary to take into account the cost of demolition, recycling, and/or removal of rubble from the existing building. Regarding the

effects of the depreciation of the reconstruction cost, these are proportional to the age of the building in relation to its life expectancy.

The **first step** in doing so is to identify a benchmark for the value to be estimated. This requires considering a number of recently built properties that can be considered as comparables and, more importantly, whose construction costs are known. An average of the construction cost of these comparables must then be averaged, sometimes applying correction coefficients to optimize the estimate. The result of averaging the comparables is referred to as the **Overall Benchmark Estimate Value** and is referred to as $CVtu_{ref}$. Obviously, in the case of particularly specialized real estate assets such as trophy assets, it is very difficult to find comparables that can truly be defined as such, which is why it is necessary to create a value estimate that "unbundles" the various areas into which the real estate asset can be divided. Consequently, we can distinguish a primary area, in which the main purpose of the property is carried out, a secondary area, in which the support activities to the main ones are carried out, and the external areas.

Due to the very likely differences between the real estate asset under consideration and the set of comparable samples, the **second** required **step** is the application of **corrective coefficients** to the calculated $CVtu_{ref}$, which can guarantee that the overall value of the property subject to valuation is consistent with the distinctive characteristics that make it in fact a highly specialized asset. Therefore, by applying the necessary corrective coefficients, it is possible to compute the cost value of the asset being valued, indicated as $CVtu$. Fattinnanzi et al. (2020) identify several variables that may influence the correction coefficients k_x:

- *Infrastructural accessibility* (k_{site}). This is probably the variable that most influences costs: given the unique characteristics of the asset, the structural accessibility of the project and the way in which the site is managed are a factor that should not be underestimated in the evaluation of the investment project.
- *Morphology* (k_{morph}). Particularities in the building layout may require complex construction or reconstruction techniques, which can drive up costs.
- *Structure* (k_{stru}). The structure of the building, from the type of foundation to the number and height of floors, undoubtedly affects the total cost required to reconstruct the building.
- *Interior and exterior finishing* (k_{fin}). This is probably the most "controllable" factor, as there are now finishes, both exterior and interior, of all types, from the cheapest to those considered luxury. For this reason, the incidence of this factor on the total cost of construction depends on the investor's choice of the intended use of the property.
- *Systems* (k_{imp}): When we talk about this variable, we mean the expenses required for the construction of artificial lighting and heating systems. In this case, however, given the ever-

increasing minimum standards imposed by legislations, this variable will have less effect in adjusting the reference construction cost to the specific cost of the project under evaluation, since there will be no significant difference in cost.

- *Interior and exterior windows and doors* (k_{wind}): Although it depends on the conformation and type of building, even this variable is quite controllable, as there are now solutions for all budgets for the construction of interior and exterior windows and doors.
- *Ceiling height multiplier* (k_{hm}): As reported by Fattinnanzi et al. (2020), each meter of height that exceeds the 3.2 m standard increases the construction cost by 18%, so for example the value of a one-story building with a 4.2 m high ceiling is equal to the value of the same building with a standard height multiplied by 1.18.

In essence, these coefficients represent the deviation of the construction cost of the property being evaluated from the construction cost of the comparables. The calculation of the corrective coefficient k_x is done through an analysis regarding the relationship between the extraordinary and ordinary components used in the construction work concerning the various coefficients. The formula used is as follows:

$$k_n = \frac{CVeoc(x)_1 + CVeoc(x)_2 + \cdots + CVeoc(x)_n}{CVoc(x)_1 + CVoc(x)_2 + \cdots + CVoc(x)_n} \qquad (19)$$

Where *CVeoc(x)* is the Cost Value of the extraordinary "x" constructive component, while *CVoc(x)* is the Cost Value of the ordinary "x" constructive component. Finally, now it is possible to compute the value of the physical costs reconstructing a building with special features ($CVtu$), as follows:

$$CVtu = \left[CVtu_{ref} * \left(1 + k_{site} + k_{morph} + k_{stru} + k_{fin} + k_{imp} + k_{wind}\right)\right] * (1 + k_{hm}) \qquad (20)$$

Now, the **third step** is to apply the depreciation coefficient (k_{dep}) to the cost of reconstructing the building. Taking again into consideration Fattinnanzi's study, this is calculated as a weighted average of two ratios:

- The one between the lived life LCs_{buil} and the total expected life LEs_{buil} of the structural parts of the building
- The one between the lived life $LCop_{buil}$ and the total expected life $LEop_{buil}$ of all other parts of the building.

For what concerns the weights, it is assumed a 30% of structural parts and a 70% of other parts.

$$k_{dep} = \left[\left(\frac{LCs_{buil}}{LEs_{buil}}\right) * 0.3\right] + \left[\left(\frac{LCop_{buil}}{LEop_{buil}}\right) * 0.7\right] \quad (21)$$

After that, the **fourth step** is simply to multiply the construction cost of each area (primary, secondary, commercial, etc.) by the coefficient of amortization calculated in the previous point. the result will be the various $CVtu_{dep}(x)$.

$$CVtu_{dep}(x) = CVtu(x) * k_{dep} \quad (22)$$

The sum of all depreciated construction costs of the various areas of the building gives the total depreciated Cost of Rebuilding a past-built building CV_{dep}**.** Finally, applying Formula 15, by adding up the value of the land and the value of the building reconstruction project, it is possible to calculate the total value of the entire real estate investment project.

Below it is possible to find an exemplifying summary of all that has been said until now.

Table 11: A summary of the Cost Method

Step	Process	Result
1	**Estimation of the land value**	$\boldsymbol{MV_{land}}$
1.a	Direct or indirect method	MV_{land}
2	**Estimate of the value of the land**	$\boldsymbol{CV_{dep}}$
2.a	Benchmark identification	$CVtu_{ref}$
2.b	Application of corrective coefficient to the benchmark	$CVtu$
2.c	Calculation of the depreciation coefficient	k_{dep}
2.d	Application of the depreciation coefficient to each area	$CVtu_{dep}(x)$
2.e	Sum of each area's depreciated value	CV_{dep}

Source: personal elaboration

2.3.1.6 Multiple regression method

The author who can be considered the "progenitor" of Multiple Regression Analysis (MRA) is Court (1939) who, in his analysis of automobile prices, stated the notion that the value of a heterogeneous good in terms of characteristics can be modeled as a function of the characteristics of the good itself, in a model that is not derived from strict theory, but is referred to as "*hedonic*" by the same author, meaning that the relationship between the characteristics and

the value of the asset is derived from the data entered into the model. Given the definition given above, the Multiple Regression Approach therefore seems perfect for the Real Estate market, where the value of each individual asset is given by a multiplicity of different factors.

Trying to summarize as much as possible, the words of Nesticò and La Marca (2020) will be used, according to whom "*Regression analysis makes it possible to study a series of data with the aim of estimating a possible functional relationship between a dependent variable y and independent variables* $x_1, x_2, \ldots, x_n$".

The above independent and dependent variables are linked in the manner expressed by the following formula:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi} + \varepsilon_i \tag{23}$$

Where:

- $i = 1, \ldots, n$
- y_i is the dependent variable
- x_{pi} are the independent variables, also called regressors
- β_i are the regression coefficients
- ε_i is the error
- β_0 is the intercept: it is the point where the line crosses the ordinate axis.

The above relation can be rewritten in the following way:

$$Y = \beta X + \varepsilon \tag{24}$$

Which, in matrix form, will be written in the following way:

$$\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_i \\ \vdots \\ y_n \end{pmatrix} = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_i \\ \vdots \\ \beta_p \end{pmatrix} * \begin{pmatrix} 1 & x_{11} & \cdots & x_{p1} \\ 1 & x_{12} & \cdots & x_{p2} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{1n} & \cdots & x_{pn} \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_i \\ \vdots \\ \varepsilon_n \end{pmatrix} \tag{25}$$

Using the method of least squares, going for regression coefficients that make the estimated regression line as close as possible to the observable data will be assigned to the various β_0, β_1,

…, β_n those values $b_0, b_1, ..., b_n$ such as to make the quantity minimum. Omitting, for the sake of simplicity, the subsequent steps, it is possible to arrive at the following final formula:

$$y_i = b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_p x_{pi} \quad (26)$$

The independent variables taken into account to calculate the value of the Real Estate asset (dependent variable) can be really numerous: Chin et al. (2019) use for example the number of bedrooms, the number of bathrooms, the square meters of the house, the distance to the train station and the distance to the city center; Benjamin et al. (2004) consider square footage of living area, days the property was on the market, square footage of garage, fireplace, and age of property, while Pagourtzi et al. (2003) instead consider the quality of the view the property offers, the size of the property, and the developability of the property. These are just a few examples of the variables that can used within the MRA.

Six are the fundamental assumptions in the method just reported:

- Once assigned the various $x_{1i}, ..., x_{pi}$, the distribution of ε has mean 0
- $x_{i1}, ... x_{pi}$, and y_i – with $i = 1, ..., n$ – are independent and identically distributed (i.i.d.)
- $x_{i1}, ... x_{pi}$, y_i and ε_i have four moments
- no perfect collinearity, which means that no regressor is a linear combination of another regressor
- homoschedasticity, also known as homogeneity of variance
- each conditional distribution follows a normal probability distribution.

The effectiveness of the MRA used is measured by the R^2 coefficient, which, being a value between 0 and 1, represents the ratio between the variance expressed by the regression model and the total variance of the phenomenon studied:

$$R^2 = \frac{\frac{1}{n}\sum_i (\hat{y}_i - \bar{y}_i)^2}{\frac{1}{n}\sum_i (\bar{y}_i - y_i)^2} \quad (27)$$

In this context, particular importance is assumed by the collinearity between variables, which is calculated through the correlation matrix: the correlation coefficient will be defined by assigning two sets of statistical variables – A = {k1, k2, ..., kn} and B = {z1, z2, ..., zn} – and

applying the following formula, which is the ratio between the covariance between A and B and the product of the standard deviations of the two same A and B:

$$\rho_{AB} = \frac{cov(A,B)}{\sigma_A * \sigma_B} \tag{28}$$

These correlation indices of *n* variables will be represented by a *nxn* square correlation matrix that is symmetric ($p_{ij} = p_{ji}$) and has 1 on the diagonal.

However, as pointed out by Isakson (2001), the linear multiple regression method is far from being free from problems: in fact, according to the author, two very specific areas hide pitfalls in the application of MRA, the model specification and the robustness of regression results. Both areas hide three different pitfalls: starting from the model specification, the major issues are the following:

- **The choice of variables**, both independent and dependent. There is to say however that the literature is now rich of examples on the application of the MRA, therefore also the less expert appraisers are able to avoid the pitfall without too many problems.
- **The form of the model itself**. Usually, as also seen in part before, the variables most commonly used concern the location, the date of sale, the age of the property, the land-to-building area ratio, the log of building areas and so on as independent variables and the price per square meter of the building area as dependent variable. Doing so, however, uses building area three times in the model, the multiple use of which can potentially skew the final result.
- **Statistical significance**. Usually, it is used a 95% confidence level, which then provides a maximum of 5% error, used to distinguish significant results from those insignificant: in fact, with the adoption of this confidence interval is stating that there is no more than 5% chance to reject incorrectly the hypothesis that a given coefficient is zero. However, it may happen that the coefficients are suspect, and thus the standard errors so large and the t-statistic so low as to make the results totally unreliable.

Regression robustness, on the other hand, concerns how insensitive the results of the model used are to statistical interference. In this area, possible pitfalls are as follows:

- **Multivariate normality**. In order to have robustness it is necessary that the distribution of the data is at least close to being multivariate normal. In this area do not exist - or rather, are not yet well developed - tests on multivariate normality, but there are those on univariate

normality: if the data are multivariate normal are always univariate normal, but it is not said that the reverse is correct.

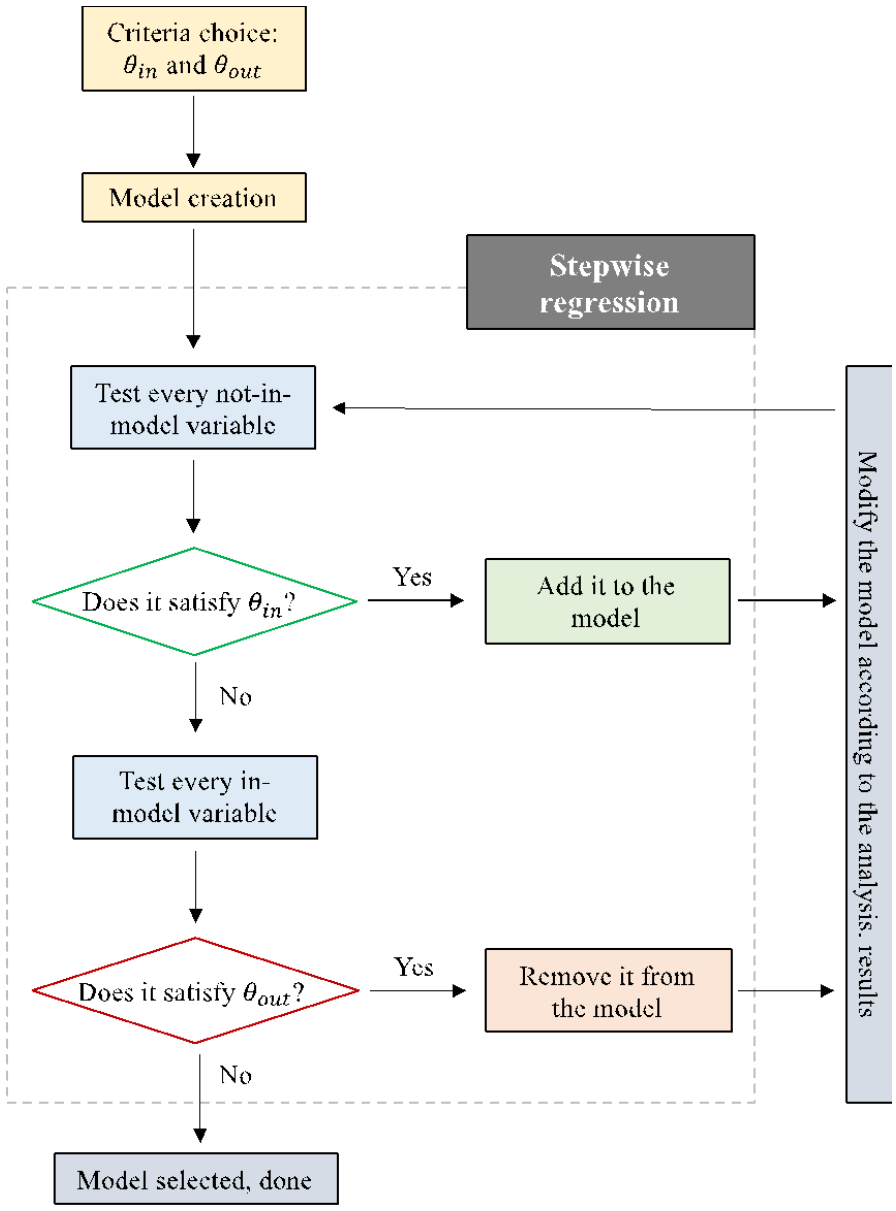
- **The use of ill-conditioned data**, i.e., parameters that have a very strong impact on the other estimated parameters and consequently on the overall property value.
- **Measurement errors**. It is absolutely necessary to carefully review all the evaluation criteria and all the data inserted in the model and try to use values that are as objective as possible, so for example the distance from the city center, rather than a more subjective parameter such as the more abstract location parameter.

Ultimately, it's not easy to avoid all of these pitfalls, but if you can, then Multiple Regression Analysis is one of the best approaches to evaluating Real Estate assets.

2.3.1.7 Stepwise regression method

Stepwise regression is a method of analysis whose purpose is to refine in an integrative way both the valuation models seen so far, and the more advanced ones that will be analyzed in the next paragraphs: indeed, this method is ideal for working with models that can predict a large number of independent variables, and for this reason, following for example the studies of Han (1998), Haider and Miller (2000) and Yeh and Hsu (2018), it is optimal for real estate valuation models. In short, usually this method is employed in the initial phases in order to verify if the variable inserted in a determined model of appraisal are those correct ones, and if therefore some more adapted one has not been mistakenly excluded or, vice versa, has been included in the model some unsuitable variable. The whole procedure aims at simplifying and at the same time making the most efficient possible the model of analysis set up, through an automatic procedure that for each step puts under evaluation a particular variable (first considering those initially excluded from the model, then those included) and its inherence with the explanatory variables, following some predetermined criteria, such as the lowest p-value or standard deviations, or the highest R-square. Usually, the process is carried out through the use of a t-test or an f-test (Pope and Webster, 1972), and it is structured in the following way (Johnsson, 1992):

Figure 8: A summary of the Stepwise Regression Process



Source: personal elaboration, based on Johnsson (1992)

2.3.2 Advanced Valuation Methods

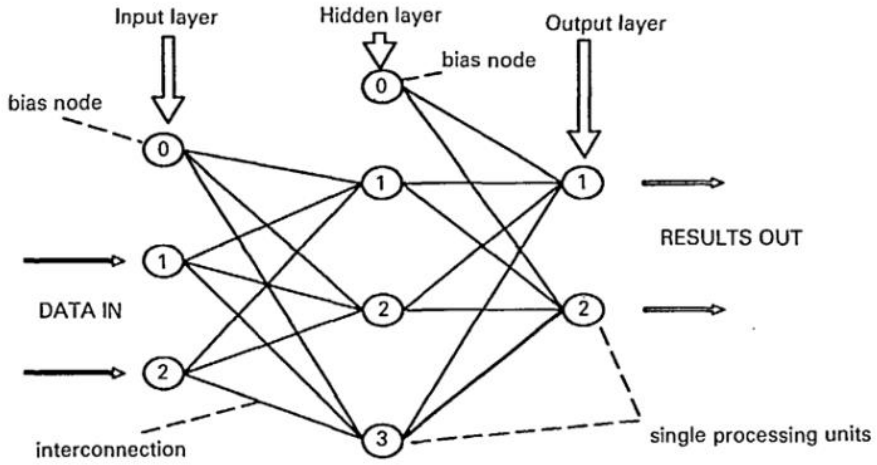
Advanced valuation methods are models that study the market through analysis, imitation and forecasting of the thought processes of the players present on the market. These models therefore have a more quantitative method of analysis and are as follows:

- Artificial Neural Networks (ANNs)
- Hedonic Pricing
- Spatial Analysis
- Fuzzy Logic
- Autoregressive Integrated Moving Average (ARIMA).

2.3.2.1 Artificial Neural Networks

In short, the Artificial Neural Networks (ANNs) method consists essentially in artificially recreating the cognitive and learning process of the human brain: in fact, just as the latter learns from the repetition of similar stimuli over time, the neural network "learns" by analyzing similar inputs and outputs from historical data. The – complex – structure of a neural network can be summarized as follows:

Figure 9: A neural network's structure



Source: Tay & Ho (1992)

The pioneers in the use of Artificial Neural Networks applied to the Real Estate valuation are mainly four: Borst (1991), Do and Grudnitski (1992), Evans, James and Collins (1992) and Tay and Ho (1992). In particular, Borst, who tested data regarding the American Real Estate using four different neural network models, asserted that the method deserves great consideration in the real estate appraisal, while Do and Grudnitski even affirmed with certainty the superiority of the Artificial Neural Networks method against the Multiple Regression Model, considering a mean absolute error of 6.9% deriving from the first against 11.3% of the second.

In addition to the four authors mentioned above, recently the topic of ANNs has been deepened by several studies, which have contributed to reinforce the importance of the method in real estate valuation (Ćetković et al., 2018; Zhou et al., 2018; Tabales et al, 2013) or have demonstrated the effectiveness of the method not only to estimate real estate prices, but even to identify and predict real estate cycles (Zhang et al., 2015).

The process that leads to the definition of an efficient neural network essentially consists of three steps:

1. Obtain the indicator data representative of the phenomenon being analyzed (i.e., real estate prices in a given area or real estate cycles) as inputs to the model and encode and translate

the inputs within the model. The coded inputs must fall within the range (-1; +1). For example, in the case of real estate prices, the following formula can be used to translate the inputs:

$$translated\ value = \frac{data\ field\ value - avg.data\ field\ value}{max.data\ field\ value - min.data\ field\ value} \quad (29)$$

2. Summarize the data derived from the research to create reference samples that are intended to train the neural network. Once trained, the model will be able to extract hidden relationships within the sample and make them its own.
   In the example above on real estate prices, the target output – which must fall in the range (0; 1) – will be the selling price, which will be calculated in this way:

$$translated\ price = \frac{selling\ price - min.selling\ price}{max.selling\ price - min.selling\ price} \quad (30)$$

3. Representative indicator data is processed, and model outputs are produced.

There are two fundamental criteria in establishing the efficiency and reliability of the data sets used: Mean Absolute Percentage Error (MAPE) and absolute percentage error.
The first is calculated in the following way:

$$MAPE = \frac{\left(\sum_{i=1}^{n} \left|\frac{P_i - A_i}{A_i} * 100\right|\right)}{n} \quad (31)$$

Where P_i and A_i are respectively the predicted and the actual prices of the i_{th} real estate property inside the data set of n properties. The MAPE represents the total error for the entirety of the properties in the data set, so, obviously, the lower the MAPE, the more accurate the model.
The absolute percentage error, also referred to as Forecasting Error (FE), is calculated in the following way:

$$FE = \left|\frac{P_i - A_i}{A_i} * 100\right| \quad (32)$$

It is possible to actually distinguish three cases based on the results obtained from the formula above: a range of FE less than or equal to 5% is considered acceptable by most investors, a range between 5% and 15% is a confusing indicator, which can be accepted in certain cases, an FE greater than 15% is instead considered unacceptable.

2.3.2.2 Hedonic Pricing

This model is based on a fundamental premise: the price is a function of two factors, the physical characteristics of the good placed under evaluation and other external factors that may have a direct or indirect influence on it (Malpezzi, 2003). In general, the model is structured in the following way:

$$Price = f(Physical\ Characteristics; Other\ External\ Factors) \quad (33)$$

The hedonic pricing model is suitable when dealing with a multitude of data and lends itself well to analyses of various types on the most disparate topics, which can range from the price index for automobiles (Court, 1939) to the analysis of fertilizer demand (Griliches, 1958), and of course to real estate pricing (Sirmans et al, 2005; Peterson et al., 2009; Monson, 2009; Ozalp et al., 2017), even in the connotation of cultural heritage (Lazrak et al., 2014) and Urban Green Space (Kolbe et al., 2014).

The process is – albeit in the complexity of the calculations – quite simple: it is necessary to simply derive a satisfactory number of significant data for the purposes of the research put in place (e.g., sales prices in a given time frame and in a given area), from these it is necessary to isolate what are the most significant variables for the real estate asset under evaluation (e.g., square footage, number of bathrooms, proximity from the city center) and determine how many times these had a positive, negative or neutral impact on the sales price. All of this is then transmitted to programming platforms such as Matlab or RStudio, on which the complex calculations leading to the final result are performed. It is therefore a totally automated process.

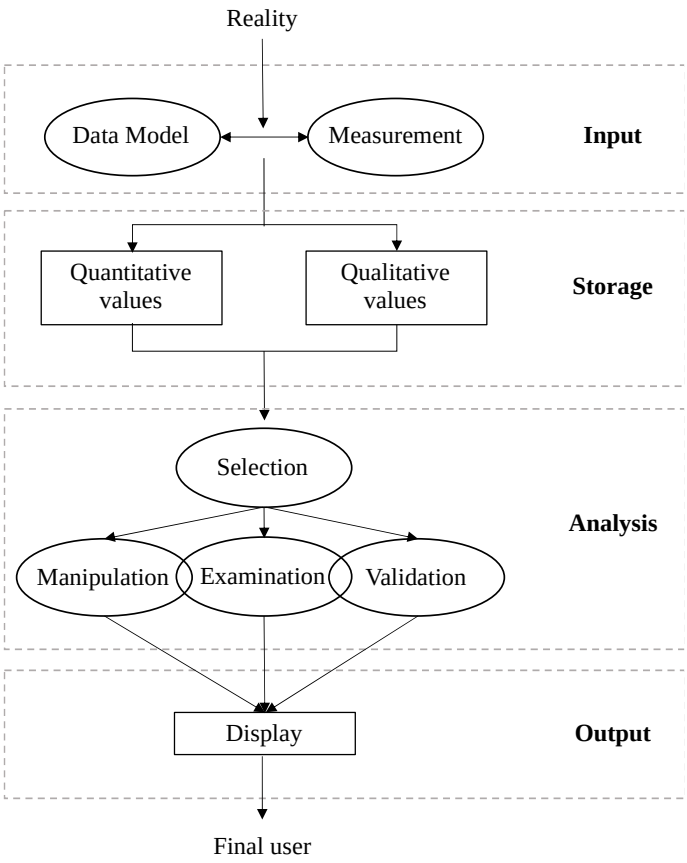
2.3.2.3 Spatial Analysis

Spatial analysis is supported by a tool that has evolved at a sensational rate in recent years, the Geographic Information System (GIS), which is a system capable of capturing, storing, controlling, and analyzing data regarding locations anywhere on the earth's surface. One of the progenitors in the field (Goodchild, 1987) defined this system as being able to perform four functions regarding spatial data, starting from the reality:

- Input, which involves the definition of the data model and related measurements
- Storage of both qualitative (e.g., location, topology) and quantitative (e.g., value) data
- Analysis, which concerns first of all the selection of the data that best suit the assessment made, and then proceed to the manipulation, examination and validation of such data
- Output, in which the results of the analysis are made available to the final user.

This can be represented graphically in the following way, as also reported by Anselin et al. (1992):

Figure 10: The spatial analysis



Source: Personal elaboration based on Anselin et al. (1992)

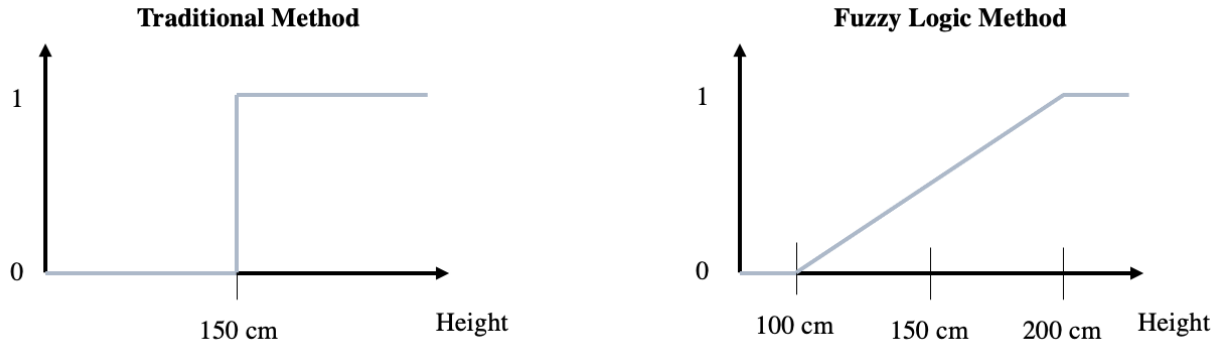
Spatial analysis in real estate is a theme that is constantly studied and deepened (Anselin, 1998; Pace et al., 1998; Dubin et al., 1999; Wilhelmsson, 2002; Páez, 2009; Zhang et al., 2015), as it is well combined with the valuation methods already seen in the previous paragraphs that require very detailed information to give reliable results: this can in fact be used both as a simple rich dataset of essential information, both as a real database in which to perform their own analysis. The goodness of this system is that it, for example, simultaneously helps both a possible seller and a possible buyer, giving almost complete access to all the information they need in order to – on the one hand – price the real estate asset in accordance with other similar assets in the same area and - on the other hand - have a large amount of information on which to base themselves before making wrong offers.

Another interesting use of spatial analysis is the in-depth analysis of bubbles in real estate to try to predict others in the future (Roehner, 1999).

2.3.2.4 Fuzzy Logic

Fuzzy logic is a theory that aims at subverting the scientific conception of a fact that can be exclusively true (1) or false (0), without instead considering what then is the real human decision-making process, for which degrees of truth or falsehood are attributed for a given observation, also considered a certain degree of relativity between the data under consideration and the entire dataset. To make the concept more understandable to everyone, two of the leaders in the field (Bagnoli and Smith, 1998) make a very effective example: consider that there is a dataset of heights, and the objective of the research is to distinguish tall people (1) from short people (0). According to the traditional method, it would be necessary to choose a reference height (e.g., 165 cm) and consider all values below this threshold as "not tall", assigning them the value 0, while all those above the same threshold will be considered "tall" and therefore they will be assigned the value 1. On the contrary, adopting a fuzzy logic in the resolution of the study, we will proceed by "intermediate" ways, going to answer the question "how high is this value?". For this reason, if, for example, the maximum height in the dataset is 200 cm and the minimum height is 100 cm, any height of 180 cm will be given a value of 0.8. The greater the slope of the curve, the greater the degree of fuzziness in the function.

Figure 11: A difference between a traditional method and the fuzzy logic



Source: Personal elaboration based on Bagnoli & Smith (1998)

Obviously, when applying fuzzy logic to real estate valuation, the degree of complexity of the method increases considerably. Several studies in the field have demonstrated the adaptability of the method in being able to both correct the most commonly used traditional real estate valuation methods, such as the DCF method (Byrne, 1995; Del Giudice et al., 2017), and to simplify or complement the most recent and advanced methods, such as ANNs (Guan et al., 2008) or GIS (Pagourtzi et al., 2006; Kuşan et al., 2010).

The method, of course, varies depending on the purpose of the analysis. If, for example, the purpose is to derive the decision making in real estate of different groups of people (López et

al., 2010), the first step is to consider different clusters of people, such as young couples, couples with 2-3 children, single men and single women, and speculative investors. The second step is then to isolate a significant number of characteristics of the real estate asset (e.g., number of bathrooms, size of the property, etc.) and submit them to the judgment of the members of the groups mentioned above: they will have to give a rating from 1 to 10 for each characteristic according to how important they consider it in defining a choice. Once proceeded to the collection of the data, these will come inserted in an appropriate tool (that one brought back from the abovementioned authors is XFuzzy) in which the model will be specified, and which will proceed to the definition of the fuzzy system, to the simulation and the debugging of the behavior of the system, to the machine learning and to the phase of synthesis of the data. At the end of this process of data analysis, the next step is the phase of analysis of the real estate assets under evaluation: if an asset presents a large part of the characteristics required by a specific client, it will be evaluated as "very good" for that specific profile; vice versa, it will be evaluated as "bad" or "very bad".

2.3.2.5 Autoregressive Integrated Moving Average

The ARIMA (Autoregressive Integrated Moving Average) model is increasingly used and is almost becoming a standard in financial modeling to predict future values of time series of data: the model has been used for example to predict future values of electricity demand (Ediger et al., 2007), but also to predict future values of electricity consumption (Erdoğdu, 2007) and future values of electricity production (Albayrak, 2010), all starting from a wide range of historical data (e.g. 1950-2004). In addition to the energy sector, the model has been used to predict stock prices, global temperature values, and of course real estate asset prices.

As pointed out by Stevenson (2007) "*The ARIMA model can be described as atheoretical, as it ignores all potential underlying theories, except those that hypothesize repeating patterns in the variable under study*".

An Autoregressive Integrated Moving Average model is defined as *ARIMA(p,d,q)* (Newbold, 1983), where *p* corresponds to the degree of the autoregressive (AR) model, *q* corresponds to the degree of the moving average (MA) model, and *d* is the degree of differentiation, which corresponds to a positive integer that can make stationary a series that is not stationary in principle. There are three basic steps in the method (Temur, 2019): diagnostic check, data identification and finally data re-processing leading to prediction. The most important part is the initial phase, in which the stationarity of the time series is verified: by stationarity we mean a fundamental characteristic for a series to be subjected to ARIMA, which sees statistical

properties such as mean, variance and covariance as a function of time. In case a time series is not stationary, one or more of the abovementioned differentiations (*d*) is performed[12].

Assume that the estimation model is as follows:

$$X_t = f(X_{t-1}, X_{t-2}, \dots, X_{t-L}) + \varepsilon_t + \theta_{\varepsilon_{t-1}} \tag{34}$$

for the given values of X = {X_1, X_2, ..., X_T). It is necessary to predict X_t, with t > T. It is assumed that the expected value of the residual term is zero: $E(\varepsilon_t + \theta_{\varepsilon_{t-1}}) = 0$, so it is possible to initially assume that $\hat{\varepsilon}_{T+1} = \theta_{\varepsilon_T}$. Continuing in this way it is possible to obtain the values of $\hat{\varepsilon}_{T+2}$, $\hat{\varepsilon}_{T+3}$ and so on. The predictions ($\hat{X}_t > T$) can be computed as follows (Tse, 1997):

$$\begin{aligned} \hat{X}_{T+1} &= f(X_T, X_{T-1}, \dots, X_{t-L}) \\ \hat{X}_{T+2} &= f(\hat{X}_{T+1}, X_T, \dots, X_{t-L}) + \hat{\varepsilon}_{T+2} - \theta_{\hat{\varepsilon}_{T+1}} \\ \hat{X}_{T+3} &= f(\hat{X}_{T+2}, \hat{X}_{T+1}, X_T \dots, X_{t-L}) + \hat{\varepsilon}_{T+3} - \theta_{\hat{\varepsilon}_{T+2}} \end{aligned} \tag{35}$$

The same author, in his study of real estate prices in Hong Kong, showed how the forecasts made using the ARIMA method turned out to be very close to the actual data.

For this reason, many studies have followed in the field of real estate, both concerning price forecasting or more generally real estate trends in various areas (Crawford et al., 2003; Hepşen, 2011; Vishwakarma et al., 2013), and in the demonstration of real estate as a tool to hedge against the effects of inflation (Hoesli, 1994).

2.4 Trophy Assets: Final Considerations

After a thorough analysis of the various Real Estate asset valuation models, it has already been possible to exclude several valuation models whose characteristics were not akin to the peculiarities of Trophy Assets. A first general impression unfortunately also leads me to exclude part of the Advanced Valuation methods as they do not have the necessary tools and skills to be able to fully exploit their great potential. For this reason, the general idea is to build a hybrid model that can, through the combination of Multiple Regression and Hedonic Pricing methods, be able in general to explain the characteristics that can influence positively or negatively the final price of a property with high characteristics - which will be decided later -, but also be able

[12] *d* then will correspond to the number of differentiations performed

to provide the necessary tools to be able to distinguish a normal real estate asset from a Trophy asset, even if with similar characteristics.

In the next chapter it will come therefore constructed a dataset containing prices and characteristics of real estate properties in sale and it will come applied the hybrid model mentioned above.

3. A Valuation Model for Trophy Assets

3.1 Introduction

After having analyzed in the last chapter the theoretical part related to the different models of valuation and analysis of real estate properties, the following chapter aims at building a valuation model that can also be a good reference point to recognize and distinguish a Trophy Asset from a "normal" Real Estate asset. To do this, the general idea is to extrapolate data from the *immobiliare.it* website, build a valuation model that can combine elements of linear regression to elements of hedonic pricing model, and finally move to the analysis of the results obtained from the dataset. To make a little more clarity on all the various variables that will be analyzed, we will first create micro-models that will have as dependent variable always the price of the property analyzed, and as independent variable one by one all the characteristics of the properties analyzed, with a focus which will be deep enough to discuss the statistics and the actual meaning of the above variable. The basic idea of the model is to analyze how much each independent variable can influence (both positively and negatively) the final price.

The last part of the chapter, then, will be a brief comment on the importance that this type of asset can assume in Italy, not only as an excellent investment opportunity, but also as a means of re-evaluation of a particular geographical area, or more generally, as a way to restart the local economy, usually generating jobs and more revenue.

3.2 The dataset: description

The dataset that will be used in this chapter has been created using the information available on *immobiliare.it*, the largest online hub for real estate services in Italy. The website is aimed at easing the virtual meeting between the seller and the buyer, by providing a well-stocked showcase of properties for sale or rent, in which the potential buyer can navigate by entering filters that can make his/her search as close as possible to his/her real needs. The decision of *immobiliare.it* as a provider of essential real estate information was made taking into consideration its characteristic of being a true virtual showcase, and not an agency per se: this meant that even ads from real estate agencies which deal with luxury goods such as Sothebys and Lionard could be fully accessible in a single virtual location, in fact considerably simplifying the search.

The functioning of *immobiliare.it* is very simple: on the one hand there are sellers (real estate agencies or private individuals), who upload on the site the announcement, visible to all, of their property for sale or rent; on the other hand, there are buyers (also in this case real estate agencies or private individuals), who can access all the available offers even without making any registration. On the contrary, sellers, in order to publish ads, must register on the platform: for

the private citizen, registration will be free, while for the real estate agency, it will be possible through the payment of a fee that depends on the number of ads that the agency plans to post.

The filters that a potential buyer can use to carry out his search are the most disparate: from the price range to the surface area, from the energy class to the position on the map. Once the right property has been found, the buyer only has to contact the seller and carry on the negotiation.

3.2.1 Data gathering

The data that will be included in the model represent weekly snapshots of the ads published on the site regarding real estate assets in each Italian province, in the period from the third week of May until the last week of August: the snapshot was made every Friday. This analysis – although in a relatively small period of time – has reported that the turnover rate of ads was around 1.5% average weekly: this means that, of the sample that falls within the parameters chosen (1165), on average every week 17 ads were removed and were replaced by as many ads. Regarding the parameters chosen for the model, all ads regarding real estate properties with a minimum starting price of €5,000,000 were included. The properties fell into the following categories: houses - apartments, buildings, offices - coworking, shops - commercial spaces. In addition, although the site showed both properties for sale and for rent, it was decided to only include data regarding buildings for sale. Among these, ads involving auctions were excluded.

Data collection was done through a technique called web scraping, a technique that allows you to extract data from a website, using a Python package called BeautifulSoup. In essence, starting from the display of a page like the one shown below, through the webscraping it has been possible to extract some information (those highlighted in red) and insert them directly into a .csv file. Unfortunately, my limited skills in Python end here, so the rest of the information, extrapolated by clicking on the ad, was then reported by hand on the actual file.

Figure 12: A screenshot of the website

Source: immobiliare.it

Clicking on the ad, it is possible to obtain many other important information for the construction of the model in being established, such as the number of floors, the energy class, the year of construction and the conditions of the building.

The most important problem encountered during data collection was the presence of duplicate ads. This can be due to multiple reasons:

- The property in question was placed in various real estate categories (e.g., Buildings and Commercial Spaces), given the great pliability that such kind of properties can have, due to their size.
- There is no law that forces the owner to commit to a single real estate agent for the sale of his property, so two or more agents could put the same property up for sale on the same website, which is likely given that, as mentioned, immobiliare.it is the number 1 website in Italy as a showcase for real estate listings.
- The owner could simply repost the ad created by the agency to give it more visibility.

Obviously, duplicate ads lead to a misrepresentation of the data and therefore lead to important bias in the analysis, both in terms of prices and in terms of time to market, which represents the amount of time the ad remains published and thanks to which it is also possible to understand if and when a property has actually been sold.

The problem has been bypassed manually, analyzing some data in the excel file that has been built as a result of scraping: first of all, the address of the property, then the square footage and the asking price. If there were still any doubts about the duplicity or not of the ads, they were compared both in the textual description and in the posted images.

3.2.2 The Dataset

As mentioned in the previous paragraph, the data collection in question was first carried out through the web scraping technique in order to obtain information such as location, price and square footage, and then through the analysis of each individual ad in order to obtain all the other information available about it. For each ad, the most varied information about the property for sale is provided: from the energy class to the number of floors, from the square footage to the year of construction of the property and its condition, all often enriched by a textual description that can add further details.

In the table below are listed all the variables taken into consideration:

Table 12: The Dataset's Variables

Type of data	**Variables**
Numerical	*Price* *Floor area* *Price per m²*
Related to the building	*Number of floors* *Property type*: Luxury property; classy property; average property class; economic property class *Intended use*: Business, Service; Residential; Productive *Maintenance status*: Excellent/renovated; Good/habitable; to be renovated; New/Under construction *Energy class*: A; B; C; D; E; F; G; Exempted; Unclassifiable *Year of construction*
Geographical	*Region* *Province* *Area* *Address*
Temporal	*Data of the ad* *Time on market*
Textual	*Description*

Source: Personal elaboration

However, several clarifications must be made in this regard:

- Any missing information (e.g., regarding energy class or date of construction) was indicated in the dataset as n/a.
- Sometimes it happened that the information contained in the summary tables of the announcement did not correspond with those provided by the real estate agency in charge in the description of the property: in that case it was decided to focus on the textual description of the announcement, as it is considered more reliable.
- Other information that the ad preview reports (as shown in Figure 12) are the number of rooms and the number of bathrooms. Unfortunately, the number of rooms and the number of bathrooms shown do not go beyond 5+ and 3+ respectively, and for this reason, since the

properties considered are all likely to have a high number of rooms and bathrooms, it was deemed unnecessary to add those two pieces of information to the model.

- I noticed a certain degree of approximation regarding the date of construction of the building: in fact, if, for example, we were considering a building from the 60s, the year of construction shown was 1960, while in the case of historic buildings, for example from the 14th century, the year of construction shown was 1300 or at most 1350. I have however considered it important to maintain this information within the dataset as it may still be able to insert the real estate asset in a specific historical context to justify its value.
- Regarding the variable "**Intended use**", the "*Productive*" category includes assets used in the primary (farms and lands) and secondary sectors (factories); the "*Service*" category includes hotels and nursing homes; the "*Business*" category includes the commercial sector – from offices to restaurants –; and finally the "*Residential*" category includes all properties acquired as dwellings, even if they are rented to third parties. In addition, when dealing with real estate assets of enormous value such as those analyzed, it is possible that they may fall into different categories depending on the discretion of the purchaser: for example, a castle could be used as a residence, be used as a hotel or become a museum, so it could in fact fall into two (or even three) different categories. For this reason, the castle is made to fall into the category of use of the previous owners, say in this case residential.
- In the case of land for sale, I could not help but insert as the actual size of the land (so several hectares), while in the case of historic houses with land, I decided to report the value of the building itself, not to compromise the variable "*Price per* m^2" of the real estate asset in question.
- Sometimes, in the case of particularly prestigious properties, the address of the asset is very vague (e.g. "Rome - center") and the photos are generic, and therefore not specific to the asset for sale. Despite this, for those ads that still contained some basic information such as price and province, along with other variables such as square footage and energy class, I still decided to include them in the model because they were often high-priced properties.
- Finally, some agencies prefer to deal in private and make the whole transaction confidential, for this reason an ad was published with totally generic information and with the words "price on request", so as to facilitate a negotiation outside the website. For obvious reasons, this type of asset has been excluded from the model.

The total number of observations in the dataset is 1165 properties sold for more than 5 million euros, excluding auctions and private negotiations. With this in mind, it is now possible to begin the preliminary comments on the dataset, in the next paragraph, which will address what

has emerged statistically from data collection alone, with no evaluation model implemented from those described in the previous chapter.

3.2.3 Preliminary comments

By just setting up the dataset it is possible to make some important statistical observations about the real estate that will be placed under evaluation. First of all, it is possible to make geographical observations, dividing Italy into the five areas defined by the Italian Institute of Statistics (ISTAT):

- *North-West*: Aosta Valley, Piedmont, Liguria, Lombardy.
- *North-East*: Emilia-Romagna, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia.
- *Center*: Tuscany, Umbria, Marche, Lazio.
- *South*: Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria.
- *Island*s: Sicily, Sardinia.

The first thing to highlight is that in not all Italian provinces there are currently real estate assets for sale that have the characteristics requested in this dataset. As a matter of fact, the search has given "*no results*" in the following provinces: Alessandria, Biella (Piedmont), Lodi, Mantova (Lombardy), Rovigo (Veneto), Fermo (Marche), Campobasso, Isernia (Molise), Benevento (Campania), Brindisi (Apulia), Potenza, Matera (Basilicata), Crotone, Catanzaro, Vibo Valentia, Reggio Calabria (Calabria), Messina, Enna, Ragusa (Sicily), Oristano, Nuoro, Sud Sardegna (Sardinia).

Already from this first information, it should come as no surprise that Southern Italy occupies the last position among the 5 Italian macro-areas for the number of real estate assets for sale for more than 5 million euros, with 38 observations out of 1165 total, 3.26%, as can be noticed in the table below.

Table 13: Geographical Area's Statistics

Variable	Levels	No.	%
Geographical area	*Center*	678	58,20%
	North-West	252	21,63%
	North-East	142	12,19%
	Islands	55	4,72%
	South	38	3,26%
	Total	**1165**	

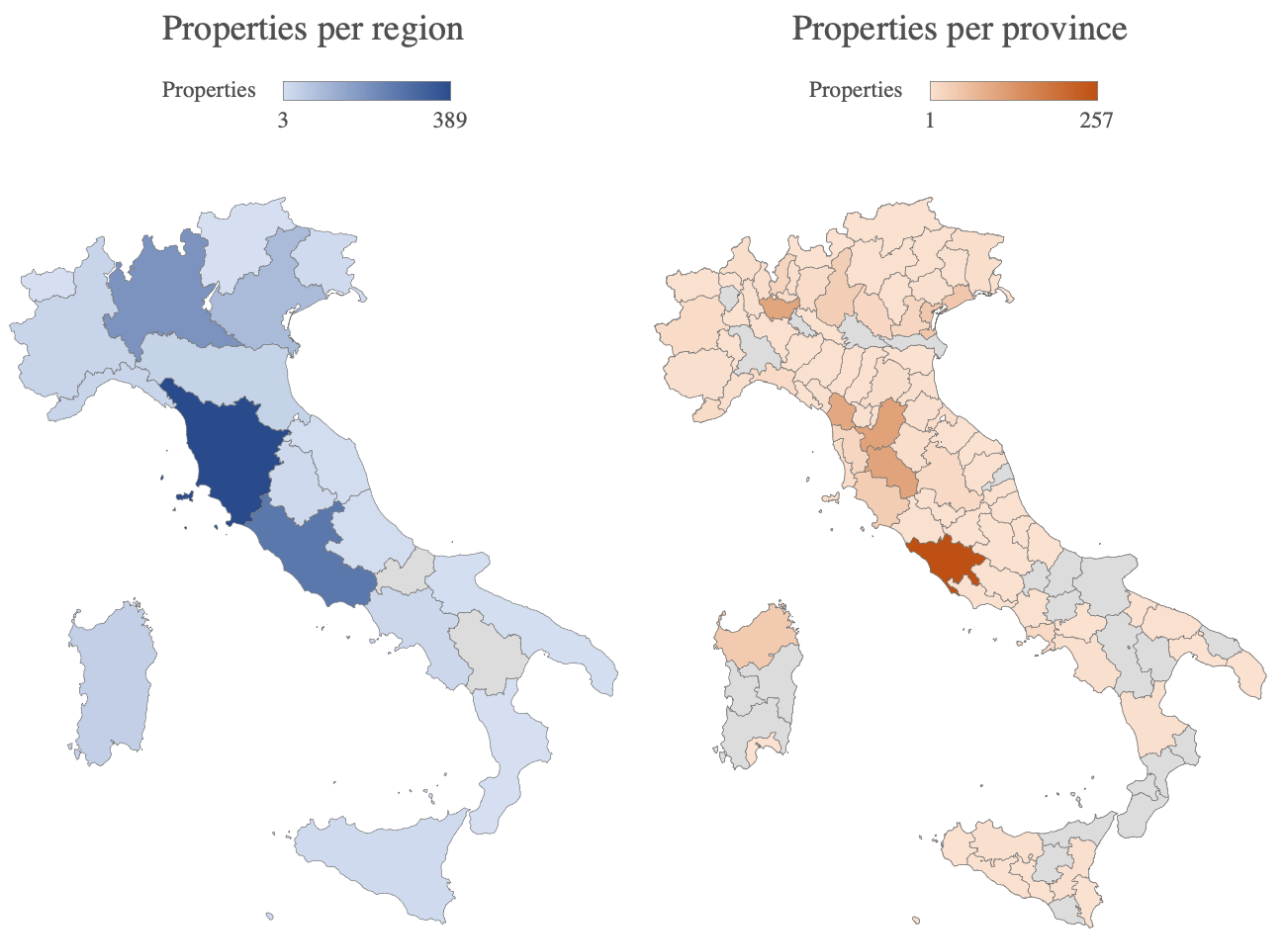
Source: Personal elaboration

As can be easily seen, central Italy is the macro-area where the largest number of real estate assets we are interested in are located, supported by Tuscany (first in the ranking, with 389 properties, 33.39% of the total) and Lazio (second, with 265 properties, 22.75% of the total). The North-West is understandably led by Lombardy, third in the regional ranking with 190 properties (16.31% of the total), while the North-East sees Veneto as the leader, with 91 properties (7.81% of the total) which puts it in fourth place. The fifth position is then occupied by Sardinia, with a total of 40 properties, equal to 3.43% of the total. The first southern region in the ranking is Campania which, with its 22 properties (1.89% of the total), occupies the ninth position. The only two regions not included in the ranking are Molise and Basilicata.

Tuscany occupies the first regional position thanks to three provinces in particular: Florence (106 properties, 9.10%), Siena (105 properties, 9.01%) and Lucca (97 properties, 8.33%), which rank second, third and fifth, respectively, among provinces. Ranking that is led by Rome, with 257 properties (22.06% of the total), which among other things represent 96.98% of properties in Lazio. The fourth place in the ranking is occupied by Milan, with 100 properties (8.58% of the total). As far as Veneto is concerned, the most representative province is, as expected, Venice (sixth, with 44 properties representing 3.78% of the total), which is then followed in the ranking by Sassari with 39 properties (3.35% of the total) in the beautiful Costa Smeralda. The leadership in the macro-area of Southern Italy belongs to Naples, with 14 properties, representing 1.20% of the total.

The two maps below summarize what has been said so far, through a graph that highlights with a more intense color the density of properties within a region (blue) or province (orange).

Table 14: A map's representations of the statistics



Source: Personal elaboration

Going beyond the geographical sphere, it is possible to distinguish the various real estate assets placed under evaluation according to several other variables related to the property: we are talking about price, floor area, property type, intended use, maintenance status, energy class, year of construction, number of floors, year of construction, time on market and number of floors (please refer to Table 12 for the criteria according to which some of these variables are classified). In this case, it is believed that the use of tables with a brief comment below is much more suitable to maintain a certain degree of clarity, compared to a long and sometimes scattered textual description.

3.2.3.1 Price

The price is certainly the other fundamental variable, in addition to the geographic variable mentioned so far: it is not by itself what distinguishes a "normal" real estate asset from a trophy asset, but it is certainly one of the factors that most influences its definition. In the case under

consideration, it appears that almost 70% of the assets included in the model fall within the price range between €5 and €10 million, with over 50% of the total whose value does not exceed €8 million. However, it must be said that, in addition to the fact that there is, in any case, a considerable number of properties whose valuation also exceeds €20 million, the price per se is not a factor that differentiates and characterizes an asset, making it comparable with others. In this context, a variable that instead succeeds in removing this great factor of heterogeneity between assets is the price per square meter, through which it is possible to make a decidedly more effective and less biased comparative analysis.

Table 15: Price levels' statistics

Variable	Levels	No.	%
Price per m^2 (€)	0 - 5000	626	53,73%
	0 - 1000	98	
	1000 - 2000	150	
	2000 - 3000	150	
	3000 - 4000	129	
	4000 - 5000	99	
	5000 - 10000	290	24,89%
	10000 - 15000	133	11,42%
	15000 - 20000	58	4,98%
	20000 - 25000	23	1,97%
	25000 - 30000	9	0,77%
	30000 - 35000	5	0,43%
	>= 35000	21	1,80%
	Total	**1165**	

Source: Personal elaboration

Now it is certainly easier to make comments about prices: as can be easily guessed, the intended use of a property that makes it more expensive per square meter (considering as sample all the properties with a price per square meter equal to or higher than €15000), is residential, with Tuscany being the absolute master in this ranking, especially thanks to the province of Lucca and its wonderful Forte dei Marmi.

Obviously, directly linked to the price per square meter is the square footage of the property itself, a fundamental factor to ensure homogeneity in the results. The statistics of the dataset in this regard show that from 0 to 3000 square meters there is a substantial balance between different

ranges of square footage: ranging substantially from 6.44% of properties belonging to the range 2500 - 3000 m^2 to 17.17% of properties belonging to the range 500 - 1000 m^2, which is the most populous class. However, also particularly populous is the class "≥ 10000" (7.55%) as it also encompasses farmhouses that benefit from hectares of land and therefore by necessity have a massively larger area. It is normal to assume, in fact, that the further the range advances, the more we move from a purely residential use to a use related to services, business and production.

More detailed analysis regarding the price of real estate assets in relation to the other variables within the model will be made in the next section.

3.2.3.2 Property type

The property type is nothing more than a sort of evaluation by the real estate agent aimed at making the property put up for sale fall under a certain category so as to make it easier for the potential buyer both to search for and compare two or more properties.

Table 16: Property type's statistics

Variable	Levels	No.	%
Property Type	*Classy Property*	497	42,66%
	Luxury Property	397	34,08%
	Average Property Class	145	12,45%
	n/a	124	10,64%
	Economic Property Class	2	0,17%
	Total	**1165**	

Source: Personal elaboration

On a scale that goes, starting from the bottom, from economic property class to luxury property, it is quite surprising – for this type of property – to notice that the most numerous class is the second highest level of the scale and not the first. However, this can be explained by the great heterogeneity of properties under valuation and by the level of prices and – above all – of prices per square meter, as seen above: we are dealing with a price range from 5 million up to figures much higher than 50 million euros, with the most varied characteristics, intended uses and locations. Consequently, it is normal that a real estate agency has to evaluate its properties in a relative way: if it has in the same real estate portfolio an apartment of 350 square meters in a non-central area of Rome and a penthouse of 120 square meters in front of the Colosseum, it is normal that the agency cannot put the two properties in the same class and the penthouse will

therefore fall into the "*luxury property*" class, while the apartment will fall into the "*classy property*" one. Then there is a consistent number of "*n/*a", which is justified by two different factors: on the one hand there are farms for which, except in very rare cases, real estate agencies prefer not to give a classification, and on the other hand we simply have incomplete ads (a small minority) in which only essential information such as price and location are provided.

3.2.3.3 Intended use

Intended use is that variable that categorizes the real estate asset based on what its function is. Unlike the Property Type seen above, the real estate agent made use of this categorization only for properties for real estate use: for this reason, I have created the other three macro-categories (Business, Service, Productive) starting from the description of the property. As mentioned earlier, here we are talking about properties that are endowed with unique characteristics such as to make them suitable for multiple functions, even simultaneously: this is the case of a building that can be divided into offices and apartments, for example, but also of a rustic that can be used as a holiday resort and as a farm. For this reason, the various properties have been categorized exclusively according to the last use that has been made of them.

Table 17: Intended use's statistics

Variable	Levels	No.	%
Intended Use	*Residential*	524	44,98%
	Service	274	23,52%
	Business	228	19,57%
	Productive	139	11,93%
	Total	**1165**	

Source: Personal elaboration

The most significant macro-category – *Residential* – includes apartments, penthouses, buildings used for residential purposes and, above all, villas which, appearing 310 times in the dataset, are the most popular residential category (among assets worth more than €5 million) and at the same time the most expensive, if the price per square meter is taken into account.

As far as the *Service* and *Business* macro-categories are concerned, the dividing line between them is rather blurred and it can be difficult to fully understand the choice of placing a restaurant and a hotel in two different categories: both offer a service for a monetary consideration. However, the hotel is part of the tourist-hotel sector and offers a range of services

that make it rightfully part of the *Service* category. On the contrary, the word "restaurant" also includes activities (even on an industrial scale) linked to banqueting, catering and vending, making it a commercial activity to all intents and purposes, and for this reason suitable for the *Business* macro-category.

With regard to the *Productive* macro-category, finally, it is simply the combination of the primary and secondary sectors, and therefore the real estate assets included within this category are mainly rustic buildings (with all the agricultural activities connected to them) and industrial plants such as factories or laboratories.

3.2.3.4 Maintenance Status

Maintenance status is a variable that allows the real estate agent to categorize properties for sale based on their actual condition at the time of sale. Moreover, it is a very important factor for the potential buyer, since on the one hand it allows him/her to filter the results based on his/her preferences and, on the other hand, it allows him/her to have a first estimate (completely hypothetical) of how much any renovation works can weigh on the budget he/she is considering.

Table 18: Maintenance Status' statistics

Variable	Levels	No.	%
Maintenance Status	*Excellent/Renovated*	551	47,30%
	Good/Habitable	373	32,02%
	n/a	102	8,76%
	To be Renovated	90	7,73%
	New/Under Construction	49	4,21%
	Total	**1165**	

Source: Personal elaboration

In this case, the results are not so surprising: for properties of this type a high state of maintenance is expected, which can contribute to maintaining a certain prestige and therefore justify such a high value of the property. Potentially the *Excellent/Renovated* and *New/Under construction* categories are indicative of a property that is ready to be lived in without having to do any kind of renovation, while the *Good/Habitable* category may suggest the need to do some minor work that will restore the prestige of the property. In my opinion, the work that is strictly necessary (i.e. not the work resulting from the whims of the new owners) should not exceed 10% of the budget in order for a property to be defined as *Good/habitable*. A different discussion

obviously has to be made for the "*To be renovated*" assets: these are usually properties that can also offer unique qualities and prestige, but which are obviously sold at a "discount" as a massive part of the budget must necessarily be allocated to the renovation of the property.

Personally, I don't agree with the website's choice to place in the same category (*New/Under construction*) both recently built properties and those whose work has yet to be completed: in this way there is a risk of misleading the potential buyer in his choice process. As a matter of fact, in the dataset there are 49 results in the category under examination, but in fact there were no more than 10 properties still under construction.

Another thing I noticed is that many of the newly built properties (2019, 2020, 2021) are placed in the *Excellent/Renovated* category, probably to avoid this misunderstanding.

3.2.3.5 Energy Classification

The energy classification is an evaluation procedure that aims at promoting the improvement of the energy performance of buildings. It is mainly a measure aimed at protecting the environment, but it also has the objective of improving the transparency of the real estate market, thanks to objective evaluations of what are the energy characteristics of the building and the costs (and sometimes tax benefits) that are associated with it. Without going into too much detail, we can limit ourselves to saying that the energy classes range from G (the lowest level) to A (the highest level), and to each of them are related minimum and maximum limits of consumption.

Table 19: Energy Classification's statistics

Variable	Levels	No.	%
Energy Classification	*A*	310	26,61%
	G	256	21,97%
	Exempted	204	17,51%
	B	82	7,04%
	C	71	6,09%
	n/a	69	5,92%
	F	53	4,55%
	D	59	5,06%
	E	44	3,78%
	Pending Certification	17	1,46%
	Total	**1165**	

Source: Personal elaboration

Usually, if not specially renovated recently, properties from about 50 years ago have obsolete energy systems, which inevitably make the property fall into classes F or G. Generally, the most common classes in Italy (for "common" real estate assets) are classes E and D, to which homes built in the 80s and 90s usually belong. The remaining classes are distinguished by the presence of condensing boilers (class C) as opposed to natural gas boilers, excellent thermal insulation (class B), photovoltaic and/or solar systems and compliance with anti-seismic standards (class A). Moreover, Agricultural, craft, industrial and non-residential structures are exempt from the obligation of energy certification if they have air-conditioned premises that are "*maintained at a specific temperature for needs related to the production process*"[13]. For this reason, it is not surprising that there is such a high number of properties which are *Exempted* from classifications, and in addition I am convinced that among the 69 *n/a* there is still some Exempted property, but since they all belong to the *Residential category*, it is not possible for me to verify it.

3.2.3.6 Year of Construction

The year of construction should be a key variable in the model, as it would be very interesting to see the relationship between the final price and this variable for a building dating back to the 11th century or even 75 BC. However, unfortunately the results that are provided by the real estate agencies, in this sense, are very approximate (e.g. 61 properties are dated 1500, most likely as approximate evidence that they date back to the 16th century) or are completely absent: more than half of the observations belonging to the dataset did not report a year of construction. For this reason, the variable Year of Construction will not be included in the final model, as it does not provide enough information to be considered a reliable variable to explain how the pricing of a Real Estate asset is derived.

[13] https://blog.leonardoimmobiliare.info/affitto-casa/certificazione-energetica-ecco-gli-immobili-esenti/

Table 20: Year of Construction's statistics

Variable	Levels	No.	%
Year of Construction	*1000 - 1100*	5	0,43%
	1100 - 1200	9	0,77%
	1200 - 1300	4	0,34%
	1300 - 1400	8	0,69%
	1400 - 1500	25	2,15%
	1500 - 1600	66	5,67%
	1600 - 1700	25	2,15%
	1700 - 1800	22	1,89%
	1800 - 1900	60	5,15%
	1900 - 1950	117	10,04%
	1950 - 2000	106	9,10%
	2000 - 2021	105	9,01%
	75 AC	1	0,09%
	n/a	612	52,53%
	Total	**1165**	

Source: Personal elaboration

3.2.3.7 Time on market

Measured in days, time on market is simply given by the difference between the day the data analysis ends (31/8/2021) and the day the ad was posted on the website. In this case, it is not possible for there to be any *n/a* among the results, as it is not data that is entered at the discretion of the real estate agent on duty, but is entered automatically by the platform, so there is 100% certainty of the veracity of this variable. What can be debated instead is the permanence of an ad for too long on the website: it is very unlikely that this happens without any changes being made to it, and therefore, when this phenomenon occurs, it is mainly due to three factors:

- The sale was made – or was cancelled – and the real estate agent forgot to remove the ad.
- The seller has changed real estate agency through which he or she will sell the property, relieving the other agency of the task, and the latter no longer has a voice in the transaction, again forgetting to remove the ad.
- We find ourselves in one of the cases described in the paragraph above: the seller has re-posted the real estate agency's ad and, when the sale was completed – or cancelled –, has forgotten to remove the ad, unlike the real estate agency in charge.

Obviously, it is not however to exclude the hypothesis, even if remote, of a seller that has not still found the right buyer for his property, admitted that someone has really shown interest for the latter.

Table 21: Time on Market's statistics

Variable	Levels	No.	%
Time on market (days)	*0 - 100*	556	47,73%
	0 - 25	53	
	25 - 50	219	
	50 - 75	148	
	75 - 100	136	
	100 - 200	249	21,37%
	200 - 300	75	6,44%
	300 - 400	43	3,69%
	400 - 500	56	4,81%
	500 - 600	59	5,06%
	600 - 700	29	2,49%
	700 - 800	14	1,20%
	800 - 900	14	1,20%
	900 - 1000	8	0,69%
	>= 1000	62	5,32%
	Total	**1165**	

Source: Personal elaboration

The fact that almost 70% of the listings in the dataset were published no more than 200 days ago is a significant indication of the high turnover rate for this type of real estate asset: while the real estate market may have suffered a sudden slowdown due to the Pandemic, the most prestigious assets have remained a coveted target for investors and in times of crisis even represent a high investment opportunity, as already seen in the Real Estate Market Outlook 2021 analyzed in Chapter 1. It is therefore no coincidence that the turnover rate is high. It is for this reason that I believe that the 62 ads whose time on market exceeds 1000 days have been left there by mistake (at least 75% of them): if they really had no appeal, the real estate agencies would have already modified the price, which is the fundamental factor in the choice of purchase.

3.2.3.8 Number of floors

This is also a rather important variable, as it is able to explain and justify the price per square meter in certain cases: for example, a property of 14500 square meters is strange that it costs "only" €414 per square meter, when such a high square footage makes you think of a whole building or a well-stocked resort. However, by analyzing the number of floors and observing that there are only 2 floors for 14500 square meters of surface area, it is easy to think, with good reason, that the property for sale is a huge farmhouse, or a laboratory, or even a factory: all characteristics that, as we will see, tend to lower the price per square meter, when compared to a property for residential use.

Table 22: Floors Number's statistics

Variable	Levels	No.	%
Floors Number	*1*	56	4,81%
	2	236	20,26%
	3	344	29,53%
	4	194	16,65%
	5	113	9,70%
	6	44	3,78%
	7	17	1,46%
	8	4	0,34%
	9	4	0,34%
	>= 10	6	0,52%
	n/a	147	12,62%
	Total	**1165**	

Source: Personal elaboration

It is possible to notice immediately that the greatest number of properties placed under analysis are characterized by 2 or 3 floors, which is the number of floors that can be found in penthouses and luxury villas, but also in boutique hotels and resorts developed in width, as well as in historic buildings. The 147 *n/a* are mainly justified by farms, commercial premises, properties still under construction and properties for which real estate agencies prefer to conduct private negotiations outside the website and for which they therefore do not provide all the information on immobiliare.it: the number of floors of the property is, together with the year in which the property was built, the most omitted piece of information.

After having analyzed all the variables that have been included within the dataset, in the next section it will be provided a description of the statistical model that will be built from the variables themselves.

3.3 The Model

With the data available, discussed in the previous section, I imagined the construction of a linear regression model combined with a method of hedonic pricing.

First of all, the linear regression model consists, as seen in the second chapter, in defining a set of independent variables (x_{pi}) and a dependent variable (y_i), on which the independent variables have a certain degree of influence, by referring to Formula (23) analyzed in Chapter 2, which is again reported below to make the fruition of the argument as fluid as possible:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi} + \varepsilon_i$$

With the data available, it was therefore decided to define the price per square meter of the property as the dependent variable y_i, while the following independent variables x_{pi} were defined: number of floors, type of property, intended use, state of maintenance, energy certification, time on market, floor area, regions. As expected, the model is therefore incorporating very heterogeneous data, ranging widely in category, but which in fact can be divided into two groups, following a hedonic reasoning: physical characteristics of the property and various external factors. The state of maintenance, for example, is a physical characteristic of the property, while the intended use is an external factor.

All the "numerical" variables, as the floor area or the time on market, are reported in the model as they are, therefore as an example an apartment of 500 meters that is in sale from 90 days will be defined in the model with the numbers 500 and 90 under the mentioned categories. On the contrary, for the not numerical variables like the energetic class, a different method is adopted: all the sub-categories of the variable are listed (in the case of the variable energetic class they will have as sub-categories A, B, C, D, E, F, G) and therefore if the previously mentioned apartment belongs to the energetic class B, it will be marked with 1 under the sub-category B and 0 under all the others: as a consequence, they are dummy variables. Once created the model, it is possible to carry out the regression through Excel or proper software and to comment the results.

3.3.1 A micro-model analysis

Before proceeding with the analysis of the final regression model, it is believed to be more appropriate to proceed through the creation of micro-models, whose narrower structure will help to simplify and make more understandable the commentary of the various elements arising from the regression, so as to streamline the subsequent process of commenting on the results when dealing with the final model. The first micro-model analyzed will be used to explain some theoretical concepts that are behind the results that are obtained through the regression function in Excel: it will be explained the process that led to its composition, the steps necessary to use the regression function and a brief explanation of the resulting summary output.

After that, all the remaining micro-models analyzed will be commented with a standardized and simplified procedure, which aims to report and comment the most important values of the analysis. Moreover, when deemed necessary, it is possible that two models that have particular affinities can be combined, using for example a particular independent variable as a filter that can explain more effectively the relationship between the dependent variable and another independent variable.

3.3.1.1 Price in relation to the Maintenance Status

A first linear regression can be performed to explain the relationship between the price per square meter of a property and the state of maintenance of the same, remembering that in the dataset it has been divided into four independent variables: New/Under Construction (NU), Excellent/Renovated (ER), Good/Habitable (GH), To be Renovated (TbR). The dependent variable, on the other hand, is the logarithm of the price per square foot in order to express our dependent variable as normally distributed. The model is expected to meet the following linear regression equation:

$$y_i = \beta_0 + \beta_1 * NU + \beta_2 * ER + \beta_3 * GH + \beta_4 * TbR + \varepsilon$$

The construction of the model therefore proceeds in this way: the column of the dependent variable is created, by simply calculating the logarithms of the prices for square meter, and then the four columns of the independent variables, which will be treated as dummy variables that will assume value 0 or 1. Everything is easily obtainable through the IF function of Excel, for example *IF(Q2 = "Good/Habitable";1;0)*: in this way we are basically telling Excel that if in the box Q2 of the dataset the value shown is "Good/Habitable", then in the corresponding box of the model it can write 1, otherwise 0. Once all the columns necessary to carry out the analysis have been filled in, click on *data - data analysis - regression*, and select as y the column of the logarithm of

the prices per square meter, and as x the columns relating to the various sub-categories of maintenance status. The result of the regression will be as follows:

Table 23: Summary Output from the Excel Regression function

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,243239
R Square	0,05916521
Adjusted R Square	0,05592095
Standard Error	1,17815805
Observations	1165

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	101,25539	25,3138476	18,2369014	1,5336E-14
Residual	1160	1610,14542	1,38805639		
Total	1164	1711,40081			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	8,17171645	0,11665503	70,0502709	0	7,94283798	8,40059492	7,94283798	8,40059492
NU	0,35645168	0,204783	1,74063117	0,08201341	-0,0453349	0,75823821	-0,0453349	0,75823821
ER	0,4259064	0,12699431	3,35374398	0,00082301	0,17674215	0,67507065	0,17674215	0,67507065
GH	-0,2061906	0,13164242	-1,5662929	0,11755279	-0,4644745	0,0520933	-0,4644745	0,0520933
TbR	-0,1431879	0,17038558	-0,840376	0,4008708	-0,4774863	0,19111046	-0,4774863	0,19111046

Source: Personal elaboration

Now it is necessary to examine what the tables resulting from the analysis performed are indicating:

- Multiple R: it represents the correlation coefficient, i.e. the strength of a linear relationship between two variables. This coefficient can take any value between - 1 and 1, keeping in mind that -1 indicates a strong negative relationship, 0 indicates no relationship and 1 indicates a strong positive relationship between the variables considered. In the case under consideration, Multiple R takes on an approximate value of 0.24, which therefore indicates a discrete positive relationship between the two variables. This means that as the property's maintenance status improves, the price per square meter tends to rise.
- R square: is the value that measures the proportion of the variation of the dependent variable that is explained by the regression line. It is a value between 0 and 1 and indicates the goodness of fit of a model, i.e. how many points fall on the regression line. The value of R square is calculated from the total sum of squares i.e. it is the sum of the square deviations of the source data from the mean. In the example under consideration, the value of R square is 0.059, in which means that 5.9% of the dependent variables y are explained by the independent variables x. Obviously in this case it is not a good result, but this can be explained

by the fact that this micro-model is part of a bigger "real" model, which includes many more independent variables that can influence the dependent one.

- Standard Error: shows the precision of the regression analysis, so the smaller this value, the more precise the regression equation. It should be considered another measure of goodness of fit. While R squared represents the percentage of the variance of the dependent variables explained by the model, Standard Error is an absolute measure that shows the mean distance around the regression line.
- Observation: it is simply the number of observations in the sample, in this case 1165.
- Regression F-Significance: This value gives an idea of how statistically significant (i.e., reliable) the results are. If the F-Significance value is less than 0.05 (5%), the model used is good. If it is greater than 0.05, it is probably better to choose another independent variable. In our case, the results are statistically significant.
- Coefficients: Through the coefficients it is possible to create the linear regression equation, which, based on the data we have, in our case would be as follows:

$$Y = 8.172 + 0.356 * NU + 0.426 * ER - 0.206 * GH - 0.143 * TbR$$

What the equation attempts to explain is the fact that the price per square meter of the properties analyzed is positively influenced by an excellent state of maintenance and, on the contrary, the property loses value if it is in a "habitable" state or is totally in need of renovation. The reason is clear: when pricing a property for which maintenance or renovation work is necessary, the property must be sold "at a discount", as after the purchase the buyer must provide for all necessary expenses out of his own pocket.

3.3.1.2 Price in relation to the Property Type

As in the previous case, here too we are dealing with a qualitative variable, which therefore also behaves like a dummy variable that can only assume the values 0 or 1. As previously reported, the property type variable has four categories: Luxury Property (LP), Classy Property (CP), Average Property Class (AP) and Economic Property (EP), and the equation that the model is expected to follow is as follows:

$$y_i = \beta_0 + \beta_1 * LP + \beta_2 * CP + \beta_3 * AP + \beta_4 * EP + \varepsilon$$

The summary output, in this case, reports a Multiple R of 0.391, which indicates a positive relationship between the dependent variable and the dependent variable more intense than in the

previous case. The R Square then, although a higher value compared to the previous case (0.153), is still a value too low but again, being the model much more complicated than the micro-model under consideration, the result is completely understandable. The low Standard Error, then, indicates a relatively precise analysis, while the very low Regression F-Significance is evidence of the fact that the results obtained from the regression are statistically significant.

The equation arising from the regression coefficients is as follows:

$$Y = 7.231 + 1.529 * LP + 1.133 * CP + 0.605 * AP - 0.232 * EP$$

Therefore, the equation indicates a strong influence that the type of property has on the final price of the property, when it is classified as a luxury or classy property, and a modest influence on the price of the Average Property category. As would be easily expected for properties of a certain importance, a classification defined as Economic has a negative impact on the final price.

3.3.1.3 Price in relation to the Number of Floors

With a multiple R equal to 0.042, it can be noticed that the relationship between the dependent variable price and the independent variable number of plans is very minimal, albeit positive. The R square of 0.001 indicates how the independent variable in this case is extremely irrelevant, as only 0.1% of the dependent variable y is explained by the independent variable x under examination. The statistical significance of the variable is on the other hand way higher, with a Significance F value of 0.15, which is sign of a probable unsuitable variable for the model.

The resulting equation is as follows:

$$Y = 8.396 - 0.029 * FN$$

It can be noticed that in this case, as the number of floors increases, the price of the property decreases, albeit very slightly. This is certainly due to the fact, as we will see later, that the luxury residential category is the one which sees a higher price per square meter (with rare exceptions) and whose ideal number of floors is usually between 2 and 3. Going up in number, you will inevitably go to change category and type of property.

3.3.1.4 Price in relation to the Intended Use

This is another case of qualitative independent variables, which will therefore be considered dummy variables within the model. Such variables are as follows: Residential (Re), Business (Bu), Service (Se) and Productive (Pr).

In this case, a Multiple R of 0.41 indicates a fairly intense positive relationship between the dependent variable and the independent variables, while the R Square of 0.167 indicates that 16.7% of the dependent variable y is explained by the independent variables x_i. The equation derived from the regression for the variables considered is as follows:

$$Y = 6.025 + 2.776 * Re + 2.073 * Bu + 2.010 * Se + 1.338 * Pr$$

It can be noticed that the "residential" component of a real estate asset is the one that contributes the most to its final value, followed then by the "Business" and "Service" components. Finally, as expected, the intended productive use of a property is the variable that contributes least of all to increasing the value of the property. Moreover, the value of the significance F is really small, so it is statistically significant.

Overall, with all certainty this variable will be considered in the final model, but I also personally believe that it can be a useful filtering factor in the final analysis: I would find it very interesting to see how the price of a residential property behaves as other independent variables change and compare it to the price of a business use property, for example. This will be done in a final section, after the actual model is implemented.

3.3.1.5 Price in relation to the Time on Market

This specific section is in my opinion one of the most interesting, because it shows a factor that is external to the property itself, but of fundamental importance when dealing with sales, both through a private party and a real estate agency: the time factor. In fact, an initial definition of the price could actually be wrong and therefore the seller could/should try to correct – obviously downwards – the initial asking price. And the micro-model under examination actually reports that: as the Time on Market of a given property increases, its expected price decreases. This is explained by the following relationship:

$$Y = 8.463 - 0.0005 * ToM$$

Also in this case the regression is characterized by a slightly positive relationship between the two variables (Multiple R = 0.190), a low Standard Error and a high statistical significance,

as well as a low R Square (0.036), which as always is explained by the fact that each independent variable has in itself a low effect on the dependent variable, which instead should not happen in the final model.

3.3.1.6 Price in relation to the Energy Class

Also in this case the variable involved – that of the energy class – is a qualitative one which can be easily transformed into a series of dummy variables that take on value 0 or 1. Regarding this micro-model, the regression shows a fairly strong positive relationship between the variables (Multiple R = 0.411), high statistical significance and also a fair percentage (R Square = 16.86%) of variation in the dependent variable that is explained by the regression line. The relationship between the dependent variable and the independent variables is explained by the following equation:

$$Y = 8.644 + 0.391 * A - 0.158 * B - 0.650 * C - 0.633 * D - 0.519 * E - 0.427 * F - 0.814 * G - 0.777 * Exempted$$

This is a very interesting result, which basically explains how an energy class A can be an effective plus to the value of a property, while all lower classifications represent a malus. It is very likely that the reason for this phenomenon lies in the type of property that is being analyzed: having set a filter that searched for properties whose value is above 5 million euros, it is normal to expect that the asset is in state-of-the-art condition. Each lower class represents a move away from the avant-garde, with consequent additional costs for the potential buyer to return to the standards he requires, additional costs that are therefore reflected in the "discount" that the buyer receives in the case of a lower energy classification.

3.3.1.7 Price in relation to the Regions

In this specific case things are slightly more complicated: the independent variable "Region" is qualitative, and not numeric, so even in this case it must be decomposed into several dummy variables that assume the values 0 and 1. However, the following error message appears on Excel: "*Regression - Input X Range cannot contain more than 16 variables (columns)*". This is a serious limitation of Excel: it is not possible to perform a regression with more than 16 variables. For this reason, the rest of the analysis will be done through RStudio, which is an Integrated Development Environment (IDE) for R, a programming language for statistical computing and graphics.

The "Region" variable is very interesting, as it allows to identify the relationship between the expected price per square meter of the property and the geographic factor, and thus observe how the valuation is actually influenced by location. The final micro-model is as follows (Molise and Basilicata regions have been excluded as they do not present data corresponding to the search filters):

$$Y = 7.234 + 1.159 * VDA + 0.536 * Pie + 1.536 * Lig + 1.071 * Lom + 0.866 * TAA + 0.908 * Ven - 1.196 * FVG + 0.112 * ER + 1.211 * Tos + 0.450 * Umb + 0.041 * Mar + 1.201 * Laz + 0.833 * Abr + 1.514 * Cam + 0.693 * Pug - 0.174 * Cal - 0.223 * Sic + 1.962 * Sar$$

What emerges from the equation obtained through linear regression is that, in order, Sardinia, Liguria, Campania, Tuscany and Lazio are the regions that most positively influence the final price per square meter of the property, while Friuli-Venezia Giulia, Calabria and Sicily even end up having a negative impact on the final price.

In the next section it will come defined for entirety and analyzed the final model, which in fact will put together all the variable analyzed until now. The process will be carried out on RStudio and Excel.

3.3.2 The macro-model

Summarizing everything that has been said so far, the idea behind the model that will be built in this section is that clearly the price of a property is derived from a multitude of factors, and the intent of this paper is to study what factors have more influence, but especially to verify the differences between a trophy asset and a non-trophy asset, even if these two assets have similar prices. In fact, clearly, not all the 1165 real estate assets over 5 million euros included in the model can be considered trophy assets, but only a small group of them, which will be discussed in the final part of the paper.

About the final model, it has been constructed entirely on Excel, starting from the dataset obtained through web scraping, and then it has been transposed on RStudio because of the above-mentioned problem of Excel that limits to 16 the number of possible independent variables. For this reason, it has been created a new Excel file, named 'Modeldef' and it has been applied the simple algorithm shown below:

```
> library(readxl)
> Modeldef <- read_excel("Desktop/Modeldef.xlsx")
> View(Modeldef)
> Modeldef <- lm(LnPrice ~ VDA + Pie + Lig + Lom + TAA + Ven + FVG +
  Erom + Tos + Umb + Mar + Laz + Abr + Cam + Pug + Cal + Sic + Sar +
  NU + ER + GH + TbR + LP + CP + AP + EP + FN + Re + Bu + Se + Pr +
  ToM + A + B + C + D + E + F + G + Exempted, data=Modeldef)
> sink("results.txt")
> summary(Modeldef)
> sink()
```

Basically, through these few lines of code, the RStudio terminal is being told to import the built model, create the linear regression model and print it in .txt version. What results is the following:

```
Call:
lm(formula = LnPrice ~ VDA + Pie + Lig + Lom + TAA + Ven + FVG +
    Erom + Tos + Umb + Mar + Laz + Abr + Cam + Pug + Cal + Sic +
    Sar + NU + ER + GH + TbR + LP + CP + AP + EP + FN + Re +
    Bu + Se + Pr + ToM + A + B + C + D + E + F + G + Exempted,
    data = Modeldef)

Residuals:
    Min      1Q  Median      3Q     Max
-5.7939 -0.4484  0.0673  0.5380  4.6597

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.380e+00  1.401e+00   4.554 5.83e-06 ***
VDA          3.090e-02  1.206e+00   0.026 0.979561
Pie          8.467e-02  9.995e-01   0.085 0.932508
Lig          7.475e-01  9.999e-01   0.748 0.454880
Lom          4.392e-01  9.857e-01   0.446 0.655958
TAA          4.201e-01  1.101e+00   0.382 0.702756
Ven          4.329e-01  9.904e-01   0.437 0.662114
FVG         -9.796e-01  1.024e+00  -0.957 0.338939
Erom        -1.270e-01  9.985e-01  -0.127 0.898797
Tos          7.133e-01  9.860e-01   0.723 0.469539
Umb          1.490e-01  1.016e+00   0.147 0.883362
Mar          3.591e-01  1.049e+00   0.342 0.732239
Laz          7.902e-01  9.848e-01   0.802 0.422462
Abr          6.427e-01  1.051e+00   0.611 0.541175
Cam          7.503e-01  1.007e+00   0.745 0.456358
Pug          4.951e-01  1.081e+00   0.458 0.646973
Cal         -7.754e-01  1.100e+00  -0.705 0.481129
Sic         -4.414e-01  1.015e+00  -0.435 0.663776
Sar          8.395e-01  9.979e-01   0.841 0.400368
NU          -2.341e-01  1.752e-01  -1.336 0.181702
ER          -7.455e-02  1.141e-01  -0.653 0.513674
GH          -1.167e-01  1.178e-01  -0.990 0.322181
```

```
TbR          -3.007e-01  1.493e-01  -2.014 0.044238 *
LP            9.969e-01  1.775e-01   5.618 2.44e-08 ***
CP            9.275e-01  1.687e-01   5.499 4.73e-08 ***
AP            6.668e-01  1.752e-01   3.806 0.000149 ***
EP           -1.555e-01  7.177e-01  -0.217 0.828562
FN           -1.281e-01  2.002e-02  -6.397 2.33e-10 ***
Re            1.396e+00  1.012e+00   1.380 0.167956
Bu            1.015e+00  1.011e+00   1.004 0.315643
Se            1.041e+00  1.009e+00   1.031 0.302655
Pr            7.845e-01  1.001e+00   0.784 0.433342
ToM          -3.265e-04  7.751e-05  -4.212 2.73e-05 ***
A             3.927e-01  1.282e-01   3.062 0.002248 **
B            -6.121e-02  1.588e-01  -0.386 0.699932
C            -4.045e-01  1.665e-01  -2.430 0.015253 *
D            -3.307e-01  1.761e-01  -1.878 0.060631 .
E            -3.890e-01  1.892e-01  -2.056 0.040049 *
F             2.194e-02  1.797e-01   0.122 0.902825
G            -3.983e-01  1.339e-01  -2.975 0.002996 **
Exempted     -1.047e-01  1.438e-01  -0.728 0.466797
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.9733 on 1124 degrees of freedom
Multiple R-squared:  0.3779,  Adjusted R-squared:  0.3557
F-statistic: 17.07 on 40 and 1124 DF,  p-value: < 2.2e-16
```

Without writing (for the sake of simplification) the equation that results from the regression performed, it is possible, however, to comment on the relationship that links the price per square meter of a property and the following independent variables: region, maintenance status, property type, intended use, time on market, energy class.

The macro-analysis confirms what has already been seen in the micro-analysis carried out in the previous paragraphs: in general, theoretically the highest price per square meter is obtained when dealing with a real estate asset located in *Sardinia*, catalogued as a *Luxury Property*, which is in an Excellent state of maintenance, has a *Residential* purpose of use, has been on the market for the shortest possible time, has an energy classification *A* and a low number of floors.

The variables (one per category) that best contribute to attributing a high value to a property have been highlighted in the table above, in green those that guarantee the greatest positive multiplicative coefficient, in red those that instead present the least negative coefficient. Indeed, what is interesting here is the correlation between the various independent variables: combining them in a single model, it turns out, for example, that the *Floors Number* is a component which is negatively correlated to the dependent variable, and therefore, as well as for the *Time on Market*, the lower the number of the variable, the less negative impact it will have on the final price. Another example of this particular phenomenon is the "Maintenance Status" variable: whatever value this variable takes on, it will still have a negative effect on the price per square

meter, so in this case the important thing is to select the variable that has the least negative effect, which, in this case, is *Excellent/Renovated*.

With regard to the statistical characteristics of the model, it is possible to note that the model is statistically significant (given the extremely low p-value), has a very low residual standard error and above all, 37.79% of the dependent variable y is explained by the independent variables x, values therefore much higher than the micro-models analyzed in the previous paragraphs. However, the F-Statistic value (17.07 on 40) is very high, and this is most likely explained by the Multicollinearity phenomenon, which happens when independent variables in the regression model are highly correlated to each other, so it makes it hard to interpret the model and also creates an overfitting problem. Through the R-Studio VIF function it has been possible to demonstrate it:

VDA	Pie	Lig	Lom
3,065146	30,82471	29,845652	163,101471
TAA	**Ven**	**FVG**	**Erom**
5,096744	86,878699	14,229478	34,7399
Tos	**Umb**	**Mar**	**Laz**
265,909813	17,17952	9,232164	209,58168
Abr	**Cam**	**Pug**	**Cal**
8,121312	23,107223	6,138143	5,095206
Sic	**Sar**	**NU**	**ER**
16,107476	40,608199	1,521238	3,991251
GH	**TbR**	**LP**	**CP**
3,717332	1,954327	8,700862	8,558847
AP	**EP**	**FN**	**Re**
4,113531	1,08574	1,555909	311,828731
Bu	**Se**	**Pr**	**ToM**
197,906376	225,417527	128,679742	1,164395
A	**B**	**C**	**D**
3,94981	2,028679	1,950386	1,833194
E	**F**	**G**	**Exempted**
1,600498	1,723888	3,780739	3,674573

As can be seen, the highest values of multicollinearity are related to Regional and Intended Use variables, while for the other variables are all acceptable values, falling within the threshold that should not be exceeded for these values, which is between 5 and 10.

For this reason, the two above mentioned variables will be isolated and used this time as filters, in the construction of sub-models that will highlight the differences in the characteristics that a real estate asset must have in order to be considered a trophy asset. In particular, the regional factor will be eliminated and will be replaced by the more general factor relating to the five Italian macro-areas (North-West, North-East, Center, South, Islands) as the first important filter,

together with the *Intended Use*. In addition, the *Floor Area* variable will be introduced, previously neglected because it was already included in the dependent variable, but now important because of the different characteristics for intended use. This is done because, in my opinion, the characteristics that a given asset must have in order to be considered a trophy asset can change considerably depending on whether it is, for example, a residential unit or a hotel, and with these also their participation in the definition of the final price. In this case, then, the dependent variable will no longer be the logarithm of the price per square meter, but the price of the property itself.

To briefly summarize, what has been done so far has been to build a dataset composed of 1165 different properties that were listed on the Immobiliare.it website at a price equal to or greater than 5 million euros. Among these, the main characteristics have been extracted, which then constitute the independent variables of the model, and it has been analyzed the behavior of the price (the dependent variable) of a property of this caliber in relation to these variables through a combination of hedonic pricing method and linear regression.

What I am personally interested to analyze now is related to the fact that clearly not all the properties included in the model are trophy assets, therefore the next section will be aimed at discovering whether indeed the analyzed model includes some trophy assets or not.

In the next section I will therefore analyze 15 different scenarios, relating to the various combinations of the two variables used as filters: *Geographic Area* and *Intended Use*. From the latter it was then excluded the variable of *Productive* intended use, whose price may not be fully explained by the variables included in the model, and the reason for this was given in the first chapter, when a pretty effective example was made about what is actually a trophy asset: in that example it was mentioned a vineyard producing precious wine. Indeed, it is just that variable which gives the asset an intrinsic value such as to define that vineyard a trophy asset and therefore justify the price difference compared to all the surrounding properties. Unfortunately, this information is not available through online research, but it would require at least a direct contact with the seller and a high level of competence in the field.

3.4 An Analysis through Geographic Areas and Intended Use

Basically, in this section, starting from the model analyzed in the previous paragraph, the various observations were filtered, as mentioned, by *Geographic Area* and *Intended Use*, with the latter subtracting the *Productive* variable: in this way, 15 sub-models were created, each with its own observations and from which 15 linear regression equations were extrapolated. Clearly, all the results will not be shown, but a summary table will be presented below, followed by a

brief comment: essentially, in addition to the intercept, it will be shown with a (+) or (-) the relationship that exists between the dependent variable and the independent variables. Note that, in the case of a negative influence on a quantitative variable such as *Floor Area*, the lower the area of the property, the higher the price will be; in the case instead of a negative relationship with a qualitative variable such as *Maintenance Status*, the price will be less negatively influenced in the case of a property with an *Excellent* status, rather than *To be Renovated*.

Table 24: The 15 Sub models' results

Intended Use / Area	Residential	Business	Service
North-West	Intercept: 15.5000 (-) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 15.8700 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (-) Energy Class	Intercept: 15.4800 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (+) Energy Class
North-East	Intercept: 16.5500 (+) Floor Area (-) Maintenance Status (-) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 15.2600 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 16.3700 (+) Floor Area (-) Maintenance Status (+) Property Type (-) Floors Number (+) Time on Market (+) Energy Class
Center	Intercept: 15.6000 (+) Floor Area (+) Maintenance Status (-) Property Type (+) Floors Number (-) Time on Market (-) Energy Class	Intercept: 15.2700 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (+) Energy Class	Intercept: 15.8200 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (-) Energy Class
South	Intercept: 14.8400 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (-) Energy Class	Intercept: 14.6300 (+) Floor Area (+) Maintenance Status (+) Property Type (-) Floors Number (NA) Time on Market (NA) Energy Class	Intercept: 17.3300 (-) Floor Area (-) Maintenance Status (-) Property Type (-) Floors Number (-) Time on Market (+) Energy Class
Islands	Intercept: 15.6200 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 14.4600 (+) Floor Area (-) Maintenance Status (+) Property Type (-) Floors Number (+) Time on Market (NA) Energy Class	Intercept: 15.9800 (+) Floor Area (-) Maintenance Status (-) Property Type (-) Floors Number (-) Time on Market (+) Energy Class

Source: Personal elaboration

Starting first of all from the intercept, which in fact represents the logarithm of the "base" price (that is, without analyzing all the other variables), it is possible to note that, on average, the Services sector is the one in which base prices are highest, with even a 17.33 recorded in the South, which corresponds to an absurd €33,598,769.42 base price, to which the other multiplier coefficients represented by the independent variables must then be added/subtracted. In addition to being a price that does not reflect the observations of the dataset at all (floor area, floors number and time on market are the factors that have the most influence, being represented in hundreds, if not thousands, unlike the dummy variables) that of the South - Service is also a result that does not find the same confirmation in the other two categories of Intended Use, in which, instead, the values in the South are much lower. On the other hand, the Business sector seems to be the most "economical" one (with the peak reached in the North-West Area), while the Residential sector is in the middle, with the peak represented by the North-East.

What I would like to point out with this table is that the judgment of a Trophy Asset cannot be based exclusively on price, as each area and each sector are characterized by different characteristics, which are analyzed below:

- As can be seen, there are no substantial differences, either in terms of classification by geographic area or by intended use, in the **Floor Area** variable, which has a positive influence practically always, except in the *Residential - North-West* and *Service - South* fields. This leads to the conclusion that in the vast majority of cases a larger floor area – whatever the intended use and the location of the property – contributes to raising the price of the property, which is quite normal.
- Regarding the **Maintenance Status**, in the *North-West* and *Islands* areas it has a negative effect on the final price, while in the *Center* it has a positive effect. What personally surprises me the most is that, in four out of five cases, Maintenance Status has a negative effect on the price, when dealing with a property that has a *Residential* Intended Use. In both cases, however, a property that is *Excellent/Renovated* always has a higher value than a property that, all other variables being equal, has a lower Maintenance Status: in the case of a positive relationship between the variables, in fact, the positive multiplication coefficient is higher, while in the case of a negative relationship, the negative multiplication coefficient will be lower and therefore will have a less negative impact on the final price.
- Equally surprising is the **Property Type** variable: the category in which the negative impact of the variable is most evident is *Residential*, in two areas (*Center* and *North-East*) in which there is a large number of observations, certainly greater than in the combinations *Service - South* and *Service - Islands*.

- Regarding the **Floors Number** variable, on the other hand, the *Residential* category shows in all five geographic areas a positive relationship between the price of the property and its number of floors. This is expected of all categories, and in fact it is mostly so, with the exception of *South* and *Islands*, where, however, a very low number of observations does not contribute to making their particular sub-models in the fields of *Business* and *Service* particularly reliable, as will be seen with other variables, too.
- With regard to the **Time on Market** variable, in most cases expectations are met: this is a variable that negatively affects the final price of a property. As can be seen from the table, 100% of this occurs in the *Residential* sector (whatever the geographic area), while there are some exceptions in the services and business sectors. In the latter, in particular, there is an *NA* for the *South* area, which shows a total absence of observations that fall within that specific filter.
- Finally, the **Energy Class** variable shows a slight prevalence of positive relations with regard to the final price, with a fairly balanced distribution for all three sectors taken into consideration. Also in this case, the scarcity of observations relative to the *Business* in *South* and *Islands* Area means that there are two *NA*s. In general, however, it is possible to state that as the energy class improves, the price of the real estate asset rises.

Following these criteria, it can be possible to venture an attempt to find possible Trophy Assets within the various sub-models highlighted, and not within the internal dataset as there are certainly substantial differences in the definition of a trophy asset with Intended Use Residential in Porto Cervo compared to an Office in Milan. In addition, for buildings belonging to the Business category, there are other fundamental differentiating factors that unfortunately are not in possession, due to lack of information, such as the tenor of the company that occupies a particular office, or the brand that rents a particular store in a particular shopping center.

With this in mind, it was possible to isolate fifteen potential Trophy Assets (one for each scenario), which therefore in theory could be purchased and transformed into something unique and particularly capable of ensuring a stable rate in terms of economic results, as seen in the Report analyzed in the first chapter. However, whether or not they are real trophy assets also depends on other "intangible" variables, such as, in the case of a shopping center, the prestige of the brands to which the various stores are rented.

In general, the peculiarities of each sector and each geographical area analyzed above are respected, with a preference for large sizes and number of floors in the Services and Business sector and for higher levels of quality in the case of residential housing; on the other hand, a substantially lower level of prices can be noted in Southern Italy.

3.5 An alternative model with Fuzzy Logic

In alternative to the sub-models, it is also possible to define a model that, instead of adopting the logic of the dummy variables, adopts instead the Fuzzy Logic already defined in the second chapter, according to which - instead of assigning to a qualitative variable only the values 0 or 1 - the same variable now can assume all the values between 0 and 1, so as to make possible the comparison between the variables.

In this model, in fact, all sub-variables that had been analyzed so far have been removed and in their place have been inserted the "original" variables, and so: Region, Intended Use, Maintenance Status, Property Type, Floor Number, Time on Market, Energy Class and Floor Area. The values between 0 and 1 that are assigned to these variables are taken from the micro-models: to give an example, the value assigned to each region depends on the value of the coefficients obtained in the regional micro-model (section 3.3.1.7). The criterion for assigning values to this variable is as follows:

- coefficient greater than or equal to 1.2 = 1
- coefficient between 0.8 and 1.2 = 0.75
- coefficient between 0.4 and 0.8 = 0.50
- coefficient between 0 and 0.4 = 0.25
- negative coefficient = 0.

The same reasoning was also carried out for the other qualitative variables, albeit with often different values. Having reduced the independent variables to 8 made it possible again to take advantage of Excel's regression function. The regression result is as follows:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.721257131
R Square	0.520211849
Adjusted R Square	0.516891516
Standard Error	0.84279453
Observations	1165

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	890.290978	111.2863722	156.6745908	2.0388E-178
Residual	1156	821.1098281	0.710302619		
Total	1164	1711.400806			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	6.290876156	0.165032837	38.11893606	1.4443E-206	5.96707872	6.614673591	5.96707872	6.614673591
Region	1.088126085	0.108378974	10.0400109	8.46222E-23	0.87548456	1.300767609	0.87548456	1.300767609
Intended_Use	1.204132174	0.195198622	6.168753465	9.5023E-10	0.821148919	1.587115429	0.821148919	1.587115429
Maintenance_Status	0.061667657	0.068142981	0.904974456	0.365667485	-0.072030114	0.195365427	-0.072030114	0.195365427
Property Type	0.544161547	0.109920485	4.950501703	8.50108E-07	0.328495551	0.759827543	0.328495551	0.759827543
Floor_Number	-0.126326139	0.014725616	-8.578665897	3.04488E-17	-0.155218066	-0.097434212	-0.155218066	-0.097434212
Time_on_Market	-5.57472E-05	6.54856E-05	-0.851289664	0.394784769	-0.000184231	7.27367E-05	-0.000184231	7.27367E-05
Energy_Class	0.576798502	0.060601743	9.517853277	9.91947E-21	0.457896776	0.695700227	0.457896776	0.695700227
Floor_Area	-7.12501E-06	3.48877E-07	-20.42269461	2.10973E-79	-7.80951E-06	-6.4405E-06	-7.80951E-06	-6.4405E-06

However, the P-value column shows that two variables are still not statistically significant, because their p-value is higher than 0.05: Maintenance Status and Time on Market. The only thing left to do in this case is to remove both variables and run the regression again. The result of it is as follows:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.720786681
R Square	0.519533439
Adjusted R Square	0.517043975
Standard Error	0.842661535
Observations	1165

ANOVA

	df	SS	MS	F	Significance F
Regression	6	889.1299468	148.1883245	208.6928873	2.1987E-180
Residual	1158	822.2708593	0.710078462		
Total	1164	1711.400806			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	6.280118486	0.161218828	38.95400166	8.331E-213	5.963804778	6.596432193	5.963804778	6.596432193
Region	1.110064369	0.106605636	10.41281126	2.47296E-24	0.900902545	1.319226192	0.900902545	1.319226192
Intended_Use	1.197422118	0.195030404	6.139668962	1.13437E-09	0.814769602	1.580074635	0.814769602	1.580074635
Property Type	0.565886616	0.107834944	5.247710949	1.83042E-07	0.354312873	0.77746036	0.354312873	0.77746036
Floor_Number	-0.125342109	0.014702496	-8.525226462	4.69795E-17	-0.154188623	-0.096495596	-0.154188623	-0.096495596
Energy_Class	0.590906642	0.058675536	10.07074979	6.32889E-23	0.475784379	0.706028905	0.475784379	0.706028905
Floor_Area	-7.19196E-06	3.39696E-07	-21.17174853	2.3374E-84	-7.85845E-06	-6.52547E-06	-7.85845E-06	-6.52547E-06

As done previously, the results can be commented on as follows:

- Multiple R = 0.72. It shows a strong positive relation between the dependent and the independent variables.
- R Square = 0.52. 52% of the dependent variables y are explained by the independent variables x. It is a good result.
- Standard Error = 0.84. The regression equation is precise, given the small Standard Error value.
- Regression F-Significance = 2.20E-178. It is way lower than 5%, so the results are statistically significant.

- Finally, most importantly, all the variables are now statistically significant.

As a consequence of the table analyzed, the resulting equation is as follows:

$$y = 6.280 + 1.110 * Region + 1.197 * Intended\ Use + 0.566 * Property\ Type - 0.125 * Floor\ Number + 0.591 * Energy\ Class - 0.000007 * Floor\ Area$$

To conclude, it is therefore possible to state that according to this model, the variables Region, Intended Use, Property Type and Energy Class have a positive effect on the price of a real estate asset, while the Floor Number and the Floor Area have a negative effect on it. This result is understandable, since usually the increase of these two variables leads from a Residential Intended Use (where the price per square meter and usually much more) to a different intended use such as the Productive one.

Personally, I think that both the combination of sub-models analyzed in the previous paragraph and the model which adopts the Fuzzy Logic are two valid alternatives to overcome the problem of statistical significance encountered in the model that would be the "final" one. I believe that the model analyzed in this last paragraph is the best solution, because it is simpler - with 8 variables in the regression against 41 in the previous model - and also more effective, since the logic adopted to determine the value of the variables is reasoned by taking as reference the relationships that the dependent variable has with each of the independent variables.

3.6 Just an investment opportunity? Final thoughts

To summarize in a final way, investments in Real Estate assets, if well analyzed and weighted, are still a good form of investment to generate liquidity in the short and medium term (through rent, or through payments for the use of services, for example) and as a means to maintain a stable value over the long run, or even raise it. In this category of investment, as seen, Trophy Assets represent the so-called *nonplus ultra* of real estate investment.

However, it is on the South of Italy discussed above that the last part of the paper wants to focus: an area so beautiful – from all points of view, from landscape to culture – as little exploited. This section has the sole purpose of offering a brief reflection in light of what has been said so far: Trophy Assets are indeed investment opportunities to be seized, but are they limited to this? Let's take as an example a historic building in disuse or in need of renovation: if someone decides to invest in it, what should it be transformed into? What Intended Use should it assume in that

context? In my humble opinion, a trophy asset is not limited to being a "simple" excellent investment opportunity: they are a real possibility to completely transform a given geographical reality, even having positive repercussions on the local economy. In this regard, it is possible to make a very elementary but equally effective example: a castle in some place in Southern Italy (e.g. Calabria) can be transformed into a hotel or in any case into a structure that can host events aimed at discovering the traditions and flavors of the area. Whatever the intentions, the result is unlikely to change: such an asset will be able to offer a revaluation of the entire surrounding territory, with a likely increase in the number of tourists as a consequence, which could be supported by an increase in the supply of work.

Italy is, more than others, a country that could almost exclusively live of tourism, given the heterogeneity of territories, landscapes, cultures, and specialties that each place has to offer, and a Trophy Asset, in this sense, could become a key factor for the economic growth. This is the message that this last chapter wants to get across: investing *on* Italy – and so not only *in* Italy – can really be the winning choice in this period of economic recovery, both for the investor himself, and for the regional economy, which then has obvious consequences on the national one.

Conclusion

Personally, before researching topics related to real estate investments, I had never heard of Trophy Assets. The main objective of this paper was first of all to bring to light the importance of this type of assets – too often ignored and treated as "normal" real estate assets unjustifiably too expensive – presenting them as a unique investment opportunity, both for the good of the investor and for Italy as a whole.

In attempting to do this, after laying the theoretical foundations of the whole by distinguishing direct and indirect investments and then through the literature review of the most commonly used valuation methods, we first created a dataset through a web scraping technique from the immobiliare.it website, after which we proceeded to the construction of the valuation model, built as a hybrid of linear regression and hedonic pricing methods. The web scraping procedure abstracted 1165 observations across Italy, of properties that reflected the following filters: price above €5 million, excluding auctions.

The objective of this model is to analyze the influence that the following independent variables have on the price per square meter (dependent variable): Maintenance Status, Property Type, number of floors, Intended Use, Time on Market, Energy Class, and the Region in which the asset is located. Some variables (Floors Number and Time on Market) are quantitative variables, therefore in the model have been expressed with their effective number, while the other variables are qualitative variables, and therefore not classifiable through numbers. For this reason, it was decided to subdivide these variables into sub-variables and to treat them as dummy variables, which therefore could assume as a value only 1 or 0, in case a particular property had that particular sub-variable or not: just to give an example, the Property Type variable was divided into the four sub-variables that are reported on the website by real estate agents: Luxury Property, Classy Property, Average Property and Economic Property. Following the reasoning of the dummy variables, therefore, a property listed as luxury on the website will have a 1 in the Luxury Property sub-variable and 0 in the other three.

In the first moment, with the objective of explaining every single variable and to analyze the influence that this has on the price, they have been constructed sub-models on Excel, in which the relative function of linear regression has been used. After that, the real model was built, which consisted of 41 variables, of which one dependent (the price) and 40 independents. The problem with having so many variables is the fact that Excel does not allow to carry out the regression for a model that has more than 16 variables, for this reason RStudio has been used in order to obviate this problem.

But that's not all: Italy is a very heterogeneous country, economically and geographically speaking, and therefore it is absolutely normal that the price standards in the 5 macro-areas defined by ISTAT (North-West, North-East, Centre, South, Islands) are not the same. In addition, I also considered it important to distinguish assets by their Intended Use, aware that an office and an apartment require different characteristics. Therefore, 15 sub-models (from the combination of the variables Geographic Area and Intended Use) have been created and analyzed very quickly, with the intent to verify what are the most important factors for a real estate asset of a certain type and to have the necessary tools to isolate within the model of potential trophy assets, which, if carefully treated, could really have the characteristics to ensure a constant flow of revenues maintain (or even raise) a high value over time and even in a crisis time.

Alternatively, another model has been created adopting the fuzzy logic, according to which each variable can be assigned every value which goes from 0 to 1, and is not therefore limited to the dummy variables' 0-or-1 idea. This model turns out to be the more statistically meaningful between those created and at the same time paradoxically the simpler one.

The paper concludes with a brief reflection on the opportunity that Trophy Assets in Italy can represent both for the investor, who can benefit from the advantages that a unique asset can offer, and for the geographical area, which can see an increase in the local economy (including tourism and job creation) following the enhancement of an asset that for its characteristics can be exploited in many different ways.

References

Agenzia delle Entrate (2008), "Oggetto – SIIQ (Società di Investimento Immobiliare Quotate) – articolo 1, commi da 119 a 141, della legge 27 dicembre 2006, n. 296". *Circolare No. 8/E.*

Albayrak, A. S. (2010). ARIMA forecasting of primary energy production and consumption in Turkey: 1923-2006. *Enerji, piyasa ve düzenleme*, *1*(1), 24-50.

Ansari, V. A. (2000). Capital asset pricing model: should we stop using it?. *Vikalpa*, *25*(1), 55-64.

Anselin, L. (1998). GIS research infrastructure for spatial analysis of real estate markets. *Journal of Housing Research*, *9*(1), 113-133.

Anselin, L., & Getis, A. (1992). Spatial statistical analysis and geographic information systems. *The Annals of Regional Science*, *26*(1), 19-33.

AT Court. (1939). *Hedonic price indexes with automotive examples*.

Bagnoli, C., & Smith, H. (1998). The theory of fuzz logic and its application to real estate valuation. *Journal of Real Estate Research*, *16*(2), 169-200.

Baker, H. K., & Chinloy, P. (Eds.). (2014). Public real estate markets and investments. Oxford University Press.

Ball, R. (1996). The theory of stock market efficiency: accomplishments and limitations. *Journal of Financial Education*, 1-13.

Banca d'Italia (2020), Economia del Lazio. *Economie Regionali*.

Baxter, J., French, N., & Gabrielli, L. (2007). Market value and depreciated replacement cost: contradictory or complementary?. *Journal of Property Investment & Finance*.

Benjamin, J., Guttery, R., & Sirmans, C. F. (2004). Mass appraisal: an introduction to multiple regression analysis for real estate valuation. *Journal of Real Estate Practice and Education*, *7*(1), 65-77.

Bian, X., Lin, Z., & Liu, Y. (2018). House price, loan-to-value ratio and credit risk. *Journal of Banking & Finance*, *92*, 1-12.

Borst, R. A. (1991). Artificial neural networks: the next modelling/calibration technology for the assessment community. *Property Tax Journal*, *10*(1), 69-94.

Byrne, P. (1995). Fuzzy analysis: a vague way of dealing with uncertainty in real estate analysis?. *Journal of Property Valuation and Investment*.

Castle, G. H., & Gilbert, H. (Ed.). (1998). *GIS in real estate: Integrating, analyzing, and presenting locational information*. The Appraisal Institute.

CBRE Group (2020), Italy Real Estate Market Outlook 2021.

Ćetković, J., Lakić, S., Lazarevska, M., Žarković, M., Vujošević, S., Cvijović, J., & Gogić, M. (2018). Assessment of the real estate market value in the European market by artificial neural networks application. *Complexity*, *2018*.

Chin, W. M., Kit, N. L. W., & Fei, J. L. W. (2019, July). Valuation of Real Estate: A Multiple Regression Approach. In *Proceedings of the 2019 2nd International Conference on Mathematics and Statistics* (pp. 96-100).

Constitution of the Italian Republic (1948). Art. 47. *Rapporti Economici*.

Crawford, G. W., & Fratantoni, M. C. (2003). Assessing the forecasting performance of regime-switching, ARIMA and GARCH models of house prices. *Real Estate Economics*, *31*(2), 223-243.

Crosby, N., & McAllister, P. (2004). Liquidity in commercial property markets: deconstructing the transaction process.

d'Amato, M., & Kauko, T. (2012). Sustainability and risk premium estimation in property valuation and assessment of worth. *Building Research & Information*, *40*(2), 174-185.

De Janvry, A., McIntosh, C., & Sadoulet, E. (2015). Fair trade and free entry: can a disequilibrium market serve as a development tool?. *Review of Economics and Statistics*, *97*(3), 567-573.

Del Giudice, V., De Paola, P., & Cantisani, G. B. (2017). Valuation of real estate investments through Fuzzy Logic. *Buildings*, *7*(1), 26.

Dilmore, G. (1971). *The new approach to real estate appraising*. Prentice Hall.

DiPasquale, D., & Wheaton, W. C. (1992). The markets for real estate assets and space: A conceptual framework. *Real Estate Economics*, *20*(2), 181-198.

Do, A. Q., & Grudnitski, G. (1992). A neural network approach to residential property appraisal. *The Real Estate Appraiser*, *58*(3), 38-45.

Downs, A. (1966). Characteristics of various economic studies. *The Appraisal Journal*, *3*, 329-338.

Dubin, R., Pace, R. K., & Thibodeau, T. G. (1999). Spatial autoregression techniques for real estate data. *Journal of Real Estate Literature*, *7*(1), 79-96.

Ediger, V. Ş., & Akar, S. (2007). ARIMA forecasting of primary energy demand by fuel in Turkey. *Energy policy*, *35*(3), 1701-1708.

Erdogdu, E. (2007). Electricity demand analysis using cointegration and ARIMA modelling: A case study of Turkey. *Energy policy*, *35*(2), 1129-1146.

European Public Real Estate Association (2020). EPRA Global REIT Survey 2020.

Evans, A., James, H., & Collins, A. (1992). *Artificial Neural Networks: An Application to Residential Valuation in the UK*. University of Portsmouth, Department of Economics.

Evans, D. L., & JD & O William Evans, J. D. (2007). *The Complete Real Estate Encyclopedia From AAA Tenant to Zoning Variance And Everything in Between*. McGraw-Hill, 2007.

Fattinnanzi, E., Acampa, G., Battisti, F., Campo, O., & Forte, F. (2020). Applying the Depreciated Replacement Cost Method When Assessing the Market Value of Public Property Lacking Comparables and Income Data. *Sustainability*, *12*(21), 8993.

Fraser, R.R., & Blackwell, F.M. (1988), "Comparable selection and multiple regression in estimating real estate value: an empirical study", *Journal of Valuation*, Vol. 7 No. 3.

French, N., & Cooper, R. (2000). Investment valuation models. *Journal of Property Investment & Finance*.

Gelman, A. (2008). Scaling regression inputs by dividing by two standard deviations. *Statistics in medicine*, *27*(15), 2865-2873.

Goodchild, M. F. (1987). A spatial analytical perspective on geographical information systems. *International journal of geographical information system*, *1*(4), 327-334.

Graham, J. R. (2000). How big are the tax benefits of debt?. *The Journal of Finance*, *55*(5), 1901-1941.

Guan, J., Zurada, J., & Levitan, A. (2008). An adaptive neuro-fuzzy inference system based approach to real estate property assessment. *Journal of Real Estate Research*, *30*(4), 395-422.

Guo, J., Xu, S., & Bi, Z. (2014). An integrated cost-based approach for real estate appraisals. *Information Technology and Management*, *15*(2), 131-139.

Haider, M., & Miller, E. J. (2000). Effects of transportation infrastructure and location on residential real estate values: application of spatial autoregressive techniques. *Transportation Research Record*, 1722(1), 1-8.

Han, S. (1998). Real estate development in China: a regional perspective. *Journal of Real Estate Literature*, *6*(2), 121-133.

Hendershott, P.H., & Hendershott, R.J. (2002). On Measuring Real Estate Risk, *Real Estate Finance*, 35-40.

Hepşen, A., & Vatansever, M. (2011). Forecasting future trends in Dubai housing market by using Box-Jenkins autoregressive integrated moving average. *International Journal of Housing Markets and Analysis*.

Hoesli, M. (1994). Real estate as a hedge against inflation: learning from the Swiss case. *Journal of Property Valuation and Investment*.

Hoesli, M., & MacGregor, B. D. (2000). *Property investment: principles and practice of portfolio management*. Pearson Education.

Hudson-Wilson, S., Fabozzi, F. J., & Gordon, J. N. (2003). Why real estate?. *The Journal of Portfolio Management*, 29(5), 12-25.

International Valuation Standards Council (IVSC) (2020). International Valuation Standards.

Isakson, H. R. (2001). Using multiple regression analysis in real estate appraisal. *The Appraisal Journal*, *69*(4), 424.

Italian Civil Code (1942). Art 812. *Distinzione dei Beni*.

Johnsson, T. (1992). A procedure for stepwise regression analysis. *Statistical Papers*, *33*(1), 21-29.

Jones, T., Gatzlaff, D., & Sirmans, G. S. (2016). Housing market dynamics: Disequilibrium, mortgage default, and reverse mortgages. *The Journal of Real Estate Finance and Economics*, *53*(3), 269-281.

Kaufman, R. L. (1996). Comparing effects in dichotomous logistic regression: A variety of standardized coefficients. *Social Science Quarterly*, 90-109.

Kolbe, J., & Wüstemann, H. (2014). *Estimating the value of urban green space: a hedonic pricing analysis of the housing market in Cologne, Germany* (No. 2015-002). SFB 649 Discussion Paper.

Kupec, J., & Dlask, P. (2020). Residual method used for commercial real estate valuation and its sensitivity. *Business & IT Scientific reviewed journal*

Kuşan, H., Aytekin, O., & Özdemir, İ. (2010). The use of fuzzy logic in predicting house selling price. *Expert systems with Applications*, *37*(3), 1808-1813.

Law Decree 12th September 2014, No. 133, "Decreto Sblocca Italia".

Law of 27th December 2006 No. 296, Section 1, paras. 119-141, "Legge Finanziaria 2007".

Lazrak, F., Nijkamp, P., Rietveld, P., & Rouwendal, J. (2014). The market value of cultural heritage in urban areas: an application of spatial hedonic pricing. *Journal of Geographical Systems*, *16*(1), 89-114.

López, V., Santos, M., & Montero, J. (2010). Fuzzy specification in real estate market decision making. *International Journal of Computational Intelligence Systems*, *3*(1), 8-20.

Makridakis, S., Wheelwright, S. C., & Hyndman, R. J. (2008). *Forecasting methods and applications*. John wiley & sons.

Malpezzi, S. (2003). *Hedonic Pricing Models: A Selective and Applied Review*. University of Wisconsin Center for Urban Land Economic Research.

Martin, W. B. (1993). Direct capitalization or discounted cash flow analysis?. *The Appraisal Journal*, *61*(3), 390.

McCluskey, W., & Borst, R. A. (1997). An evaluation of MRA, comparable sales analysis, and artificial neural networks (ANNs) for the mass appraisal of residential properties in Northern Ireland. *Assessment Journal*, *4*(1), 47-55.

McCluskey, W., Deddis, W., Mannis, A., McBurney, D., & Borst, R. (1997). Interactive application of computer assisted mass appraisal and geographic information systems. *Journal of Property Valuation and Investment*.

McDonald, J., & Dermisi, S. (2008). Capitalization rates, discount rates, and net operating income: The case of downtown Chicago office buildings. *Journal of Real Estate Portfolio Management*, *14*(4), 363-374.

Monson, M. (2009). Valuation using hedonic pricing models.

Morri, M. H. G., & Hoesli, M. (2010). Investimento immobiliare. *Milano: Hoepli.*

Mundy, B. (2002). Defining a trophy property. *The Appraisal Journal*, 70(4), 377.

Nesticò, A., & La Marca, M. (2020). Urban Real Estate Values and Ecosystem Disservices: An Estimate Model Based on Regression Analysis. *Sustainability*, *12*(16), 6304.

Newbold, P. (1983). ARIMA Model Building and the Time Series Analysis Approach to Forecasting. *Journal of Forecasting (pre-1986)*, *2*(1), 23.

Onyejiaka, J. C., Oladejo, E. I., & Emoh, F. I. (2015). Challenges of using the cost method of valuation in valuation practice: A case study of selected residential and commercial properties in Awka and Onitsha, Anambra State, Nigeria. *International Journal of Civil Engineering, Construction and Estate Management*, *3*(2), 16-35.

Ozalp, A. Y., & Akinci, H. (2017). The use of hedonic pricing method to determine the parameters affecting residential real estate prices. *Arabian Journal of Geosciences*, *10*(24), 1-13.

Pace, R. K., Barry, R., & Sirmans, C. F. (1998). Spatial statistics and real estate. *The Journal of Real Estate Finance and Economics*, *17*(1), 5-13.

Páez, A. (2009). Recent research in spatial real estate hedonic analysis.

Pagourtzi, E., Assimakopoulos, V., Hatzichristos, T., & French, N. (2003). Real estate appraisal: a review of valuation methods. *Journal of Property Investment & Finance*.

Pagourtzi, E., Nikolopoulos, K., & Assimakopoulos, V. (2006). Architecture for a real estate analysis information system using GIS techniques integrated with fuzzy theory. *Journal of Property Investment & Finance*.

Peterson, S., & Flanagan, A. (2009). Neural network hedonic pricing models in mass real estate appraisal. *Journal of real estate research*, *31*(2), 147-164.

Plattner, R. (1992). Income Capitalization Problems. *The Appraisal Journal*, *60*(4), 549.

Pope, P. T., & Webster, J. T. (1972). The use of an F-statistic in stepwise regression procedures. *Technometrics*, *14*(2), 327-340.

Rabianski, J. S. (2002). Vacancy in market analysis and valuation. *The Appraisal Journal*, *70*(2), 191.

Ratcliff, R. U. (1972). *Valuation for real estate decisions*. Democrat Press.

Raymond, Y. C. (1997). An application of the ARIMA model to real-estate prices in Hong Kong. *Journal of Property Finance*.

RICS professional standards and guidance, UK (2018). Depreciated replacement cost method

Roehner, B. M. (1999). Spatial analysis of real estate price bubbles: Paris, 1984–1993. *Regional science and urban economics*, *29*(1), 73-88.

Sirmans, S., Macpherson, D., & Zietz, E. (2005). The composition of hedonic pricing models. *Journal of real estate literature*, *13*(1), 1-44.

Skarzyński, A. (2006). Residual method of property valuation. *Technological and Economic Development of Economy*, *12*(3), 253-256.

Stevenson, S. (2007). A comparison of the forecasting ability of ARIMA models. *Journal of Property Investment & Finance*.

Tabales, J. M. N., Caridad, J. M., & Carmona, F. J. R. (2013). Artificial neural networks for predicting real estate price. *Revista de Métodos Cuantitativos para la Economía y la Empresa*, *15*, 29-44.

Tay, D. P., & Ho, D. K. (1992). Artificial intelligence and the mass appraisal of residential apartments. Journal of Property Valuation and Investment.

Taylor, M. A., & Rubin, G. (2002). Raising the Bar: Simulation as a Tool for Assessing Risk for Real Estate Properties and Portfolios. *Real Estate Finance*, *18*(4), 18-34.

Temur, A. S., Akgün, M., & Temur, G. (2019). Predicting housing sales in Turkey using ARIMA, LSTM and hybrid models.

van Vuuren, D. J. (2016). Valuing specialised property using the DCF profits method. *Journal of Property Investment & Finance*.

Vishwakarma, V. K. (2013). Forecasting real estate business: empirical evidence from the Canadian market. *Global Journal of Business Research*, *7*(3), 1-14.

Weaver, W., & Michelson, S. (2003). A practical tool to assist in analyzing risk associated with income capitalization approach valuation or investment analysis. *The Appraisal Journal*, *71*(4), 335.

Wheaton, W. C., Torto, R. G., Sivitanides, P. S., Southard, J. A., Hopkins, R. E., & Costello, J. M. (2001). Real estate risk: a forward-looking approach. *Real Estate Finance*, *18*(3), 20-28.

Wilhelmsson, M. (2002). Spatial models in real estate economics. *Housing, theory and society*, *19*(2), 92-101.

Wilkinson, L. (1979). Tests of significance in stepwise regression. *Psychological bulletin*, *86*(1), 168.

Willison Jr, D. L. (1999). Toward a more reliable cash flow analysis. *The Appraisal Journal*, *67*(1), 75.

Wong, K. C. (1998). The evolution of land valuation in China. *The Appraisal Journal*, *66*(1), 1.

Worzala, E., Lenk, M., & Silva, A. (1995). An exploration of neural networks and its application to real estate valuation. *Journal of Real Estate Research*, *10*(2), 185-201.

Wyatt, P. (2009). Replacement cost and market value. *Journal of Property Investment & Finance*.

Yeh, I. C., & Hsu, T. K. (2018). Building real estate valuation models with comparative approach through case-based reasoning. *Applied Soft Computing*, *65*, 260-271.

Zhang, H., Gao, S., Seiler, M. J., & Zhang, Y. (2015). Identification of real estate cycles in China based on artificial neural networks. *Journal of Real Estate Literature*, *23*(1), 65-83.

Zhang, R., Du, Q., Geng, J., Liu, B., & Huang, Y. (2015). An improved spatial error model for the mass appraisal of commercial real estate based on spatial analysis: Shenzhen as a case study. *Habitat International*, *46*, 196-205.

Zhou, G., Ji, Y., Chen, X., & Zhang, F. (2018). Artificial Neural Networks and the Mass Appraisal of Real Estate. *International Journal of Online Engineering*, *14*(3).

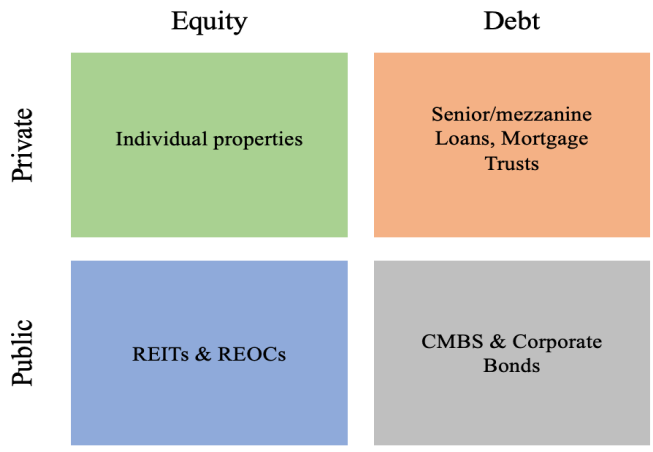
Summary

The mainstream conception of a Real Estate Investment is that of the purchase of a property with the final aim of benefiting from constant cash flows through rents or realizing gains through capital appreciation. In an ever-changing world, in fact, direct investment in Real Estate seemed like a safe haven in which allocating money was seen as a great way to avoid the effects of depreciation. The latter was the common belief until 2007, when high levels of indebtedness backed by unsecured collaterals led to the subprime mortgage crisis, which shed light on a sick system, and highlighted the problems of direct investment in Real Estate and consequently represented the territory of development of the other macro-category of investments in the field of Real Estate: the Indirect ones, which allow investors to buy shares in funds or publicly or privately held companies which finally invest in Real Estate.

Starting with general definitions, five are the main reasons which generally lead investors to enter the Real Estate Market:

1. To reduce the overall risk of the portfolio by reaching a sufficient level of diversification, basically through the combination of assets which behave differently to expected or unexpected market changes.
2. To achieve a competitive absolute return, compared with other asset classes.
3. To be hedged in case of unexpected inflation levels.
4. To create a portfolio which can be seen as a reflection of the overall investment universe: it is the case, for example, of an indexed or market-neutral portfolio.
5. To receive strong cash flows from the portfolio.

Over the years, therefore, the world of real estate investment has changed considerably, and now the typical definition of Real Estate actually covers four different financial structures, the so-called *quadrants of the modern Real Estate investment class*, shown below:



With that in mind, it is now possible to analyze in more detail the two macro-categories of real estate investment: direct and indirect.

Starting from the **Direct** investment in real estate, the assets that are exchanged are the "classic" real estate goods, of which the Italian Civil Code (Art. 812) gives a definition, defining them as "*Land, springs and streams, trees, buildings and other constructions, even if joined to the land for a transitory purpose, and generally anything naturally or artificially incorporated in the land*". Obviously, scholars have given much broader definitions on the subject, defining nine fundamental characteristics of the real estate good being the object of direct investment: immobility, soil indestructibility, location, long-term investment, high unit value, illiquidity, high level of debt, home as a fundamental need, heterogeneity, with the latter being an essential link to the pivotal topic of the paper. To invest in this kind of assets, investors operate in an environment characterized by an absence of a centralized market, low transparency, frequently unbalanced markets, strong government presence, high transaction costs and a limited number of transactions. However, on the other hand, by investing in real estate assets it is possible to reach a good level of portfolio diversification, useful to mitigate several risks. In general, Direct Real Estate Investments have their own advantages and disadvantages, summarized below:

Direct Real Estate investment Benefits	Direct Real Estate investment disadvantages
Diversification, either asset-side (because of low correlation with stocks) and geographical	Very low liquidity
Direct control of the investment	High costs before and after the investment: transaction costs + taxes + management costs
Possibility to contrast the effect of inflaction	High invetsment costs: recourse to credit
Stable cash flows	Low market transparency: asymmetries of information
Possible value creation, through capital appreciation	

About the **Indirect** Real Estate Investment, it basically consists in acquiring shares of companies or funds which have a Real Estate portfolio, rather than directly acquiring physical properties. Two are the underlying ideas beneath such instruments: to make the real estate market potentially accessible to everybody, and to mitigate the several disadvantages of a direct investment. Even this class of investment instruments has its own advantages and disadvantages, which can be summarized as follows:

Indirect Real Estate Investment Benefits	Indirect Real Estate Investment Disadvantages
Higher transparency: low asymmetry of information	Lower ability to contain the inflation effects
Higher liquidity	Lower possibilities of asset-side diversification, because of the higher correlation with stocks
It is a cheaper investment	Potential debt and leverage risks
Lower taxes and management costs	
Similar exposure to the Real Estate market	
Higher possibility of a geographical diversification, through the investment in a portfolio of properties	

In this paper, the two most common types of companies involved in indirect real estate investment have been analyzed. The first is defined as **REIT** (Real Estate Investment Trust): created in 1960 by the US Congress to make large-scale, income-producing real estate investments accessible to the average investor, who should have been able to invest in Real Estate just as if it were any other kind of investment, that is, through the purchase of equity. In a comparable way to shareholders who benefit from the ownership of stocks in other companies, the stockholders of a Real Estate Investment Trust receive economic benefits from the production of income through commercial Real Estate ownership: indeed, the peculiarity of REITs derives from profit distribution obligations, according to which the companies are required by law to distribute annually as dividends at least 90% of its taxable income.

The other major category of companies operating in the field of indirect investment is that of **REOCs** (Real Estate Operating Companies), which are defined as "*a publicly traded company that specializes in real estate investments but does not meet the strict requirements to be a REIT, particularly the requirement to pay at least 90 percent of net income out to investors*": REOCs are not obliged to distribute at least a certain percentage of taxable income as a dividend, so the management can freely decide whether to distribute part of the net income or reinvest it in new projects. As a consequence, REOCs are able to quickly invest in new acquisitions, so one of the core profitable operations for the company is the sale of properties, while on the other hand, REITs must constantly issue new shares in order to raise capital for investment, and the sale of properties does not fall within the company's core operations.

The similarities and differences between the two companies are the following:

Characteristic	REITs	REOCs
Dividend policy	Distribution of at least 90% of its taxable income as dividends	No specific requirements: the management can freely decide whether to distribute part of the income as dividends or not
Business restrictions	At least the 75% of the assets owned by the REIT must be Real Estate (including mortgages), government securities or cash	No restrictions
Organization	Minimum number of shareholders (in US, 100) + restrictions on how few can own a determined amount of shares	No restrictions
Taxation	If certain conditions are met, the company is not taxed at the firm level	Double taxation: at firm and at shareholders level.
Management	Centralized, the directors protect the shareholders' interests	
Voting rights	Shareholders have the right to vote on certain decisions, including the election of the trustees or directors	
Investment strategy	Constantly issuing new shares is fundamental for raising capital for new investment. The sale of properties is not part of REIT's core business	The possibility of retaining income means investing in new constructions, acquisition and transformations, making the buying and selling of properties part of the core business for REOCS

In Italy, the Indirect Real Estate market is a relatively recent concept: it was born in 1998, when the growing demand for new financial products was at the origin of the Real Estate mutual funds, which allowed the subscriber to invest in the Real Estate market through the acquisition of financial shares of the fund and, as a consequence, without a direct acquisition of the property. Companies operating in this field in Italy are called SIIQs (*Società di investimento immobiliare quotate*), and, to summarize, are shaped on the model of US REITs: SIIQs also have a legislative obligation to distribute a certain percentage of profits, which, following the 2014 "*Sblocca Italia*" law decree, decreased from 85% to 70%.

After a fairly detailed analysis on SIIQs, the next step was the analysis of the situation of the direct real estate market in Italy, reviewing the "Italy Real Estate Market Outlook 2021" report published by CBRE Group. As easily predictable, due to the Covid-19 Pandemic, the 2020 Italian Real Estate framework has recorded a 29% drop in the investment volume, going back to 2018 levels, where political uncertainty and the spread increase had a certain influence on the Real Estate Market in Italy. CBRE Group synthesizes the 2020 Italian Real Estate trends in this way, divided by sectors:

- **Offices**: given the uncertainty caused by the Pandemic and all its implications (smart working above all), the demand has dropped: investors are cautious and are waiting for a stabilization of the situation. The flexible spaces and trophy assets' demand is increasing.

- **Retail**: Covid-19 and the consequent increase of e-commerce has basically stopped investments and the demand for new spaces. Landlords and tenants are adopting a "wait and see" approach on the renegotiations and relying on temporary solutions.
- **Logistic**: as opposed to the retail sector, the logistic one has been heavily carried by the e-commerce growth. Moreover, the new "last mile" trend, made necessary by the Pandemic (we are talking about temporary spaces, basically) has been estimated to stay strong for all 2021 and to spread from large cities to all national territory, in particular to those smaller cities with good budgets. For these reasons, 2020 has been a record-year for Real Estate logistic investments.
- **Residential sector**: the Multifamily seems to be the new Real Estate residential sector's trend. The Italian market, however, does not still offer this kind of solution, so investors are cautious, waiting for new developments. The main volumes of investments in Italy are related to value-add operations.
- **Hotels**: The screeching halt of tourism has led to a slowdown for investments. However, the interest in this sector remains high for opportunistic operations and trophy assets.

A key concept within this report is related to the **Trophy Asset**, defined as a "*status symbol, landmark building with distinctive design features and the very best construction and finishes"* which *"generally has widespread name recognition and is considered a prestigious address*". In general, three are the main characteristics that distinguish a trophy asset: location, quality and price. A good practical example to explain the peculiarity of such assets is a vineyard which produces grapes that give an exceptional champagne. For this characteristic, the vineyard can be sold at a way higher price, if compared to the other vineyards in the same rural area, where prices are usually low. The rarity and the uniqueness of the champagne awards the vineyard a huge intrinsic value, which will influence the market and make its selling price skyrocket.

The question is: "*Are they a good investment opportunity?*" To answer this question, it is necessary to consider that, when investing, there are two main goals:

1) In the short term, to obtain a return on investment (ROI). Trophy assets – rare and in high demand – offer this possibility: their uniqueness, together with a high and stable demand, will grant the best rental yield and the best profitability.
2) In the long term, to build up capital. A trophy asset can be a guarantee that the capital invested is very difficult to be eroded or depreciated. Of course, a necessary condition for this to happen is to maintain an elite-level maintenance, because of the reputation of the tenants occupying them: this leads to a high level of capitalization for the owner.

Moreover, in a possible crisis situation in the real estate market, trophy assets can be a safe place for investors, since their uniqueness will make their price evolve in the opposite direction compared to the traditional market, or at least they will not lose as much value as other kinds of assets. This is what happened during the Pandemic, as seen in the EPRA Report. However, there is also skepticism of the real estate industry about this kind of assets: such an investment is very expensive, so on one hand, there are strong barriers to entry, while on the other hand, trophy assets show an important lack of liquidity, which leaves little room for maneuver. As a consequence, this specific market is mainly covered by large-sized real estate companies which usually invest on a single trophy asset, which acts as a great portfolio diversification strategy if combined with more traditional real estate investment. Furthermore, there is a certain lack of transparency: for example, the sale of the headquarters in Paris of Société Générale bank exceeded €100 million, but the exact amount of the transaction is not known. This lets the market be less susceptible to influence, but on the other hand it can lead to situations of mistrust by other players in the sector.

In conclusion, trophy assets are a solid investment opportunity, for those who can afford them, because of their unique, privileged position and their peculiarity to “go against” the adverse situations in the traditional real estate market.

Once the current real estate situation has been presented, the paper conducts a literature review of the most widely used valuation methods in current practice. In particular, a distinction is made between traditional and advanced valuation models. Starting from the **Traditional valuation methods**, they are characterized by a spectrum of observations that allow the evaluator to determine a regression model. These methods are the following: Comparable method, Investment/ income method, Profit method, Development/residual method, Contractor’s method/ cost method, Multiple regression method and Stepwise regression method. On the other hand, **Advanced valuation methods** are models that study the market through analysis, imitation and forecasting of the thought processes of the players present on the market. These models therefore have a more quantitative method of analysis and are as follows: Artificial Neural Networks (ANNs), Hedonic Pricing, Spatial Analysis, Fuzzy Logic and Autoregressive Integrated Moving Average (ARIMA).

In general, the most used method when dealing with the valuation of a property is the Comparable method, according to which the value of the property under valuation can be assimilated to that of properties that are similar both in terms of physical characteristics (square footage, number of bathrooms, etc.) and geographical characteristics (neighborhood, proximity to the center, etc.), which will therefore be called "Comparables". However, given the very high

degree of heterogeneity of the class of assets analyzed, this valuation method cannot be applied to determine the value of a Trophy Asset, so other methods - even combined - have been used.

In particular, the two valuation methods used are the Multiple Regression method and the Hedonic Pricing method. The first "*makes it possible to study a series of data with the aim of estimating a possible functional relationship between a dependent variable y and independent variables* $x_1, x_2, \ldots, x_n$". The above independent and dependent variables are linked in the manner expressed by the following formula:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi} + \varepsilon_i$$

On the other hand, the Hedonic Pricing method is based on a fundamental premise: the price is a function of two factors, the physical characteristics of the good placed under evaluation and other external factors that may have a direct or indirect influence on it. This method is particularly suitable when dealing with a multitude of data and lends itself well to analyses of various types.

The dataset used for the model has been built by using the information available on *immobiliare.it*, the largest online hub for real estate services in Italy. The data be included in the model represent weekly snapshots of the ads published on the site regarding real estate assets in each Italian province, in the period from the third week of May until the last week of August: the snapshot was made every Friday. This analysis – although in a relatively small period of time – has reported that the turnover rate of ads was around 1.5% average weekly: this means that, of the sample that falls within the parameters chosen (1165), on average every week 17 ads were removed and were replaced by as many ads. Regarding the parameters chosen for the model, all ads regarding real estate properties with a minimum starting price of €5,000,000 were included. The properties fell into the following categories: houses - apartments, buildings, offices - coworking, shops - commercial spaces. In addition, although the site showed both properties for sale and for rent, it was decided to only include data regarding buildings for sale. Among these, ads involving auctions were excluded.

The data was extracted through a web scraping technique performed using Python, which allows you to extract information from a web page. For example, in red are highlighted the information obtained through this technique:

The rest, on the other hand, was extracted manually. The data which were initially considered were the following:

Type of data	**Variables**
Numerical	*Price* *Floor area* *Price per m²*
Related to the building	*Number of floors* *Property type*: Luxury property; classy property; average property class; economic property class *Intended use*: Business, Service; Residential; Productive *Maintenance status*: Excellent/renovated; Good/habitable; to be renovated; New/Under construction *Energy class*: A; B; C; D; E; F; G; Exempted; Unclassifiable *Year of construction*
Geographical	*Region* *Province* *Area* *Address*
Temporal	*Data of the ad* *Time on market*
Textual	*Description*

However, some of these variables were then not considered in the final model: above all, the address and the year of construction of the property. The problems with these two variables in particular are different but such as not to allow the inclusion of these in the model:

- about the address, the real estate agencies - above all those in Rome – most likely prefer that the negotiation continues through them, therefore in fact on the site they insert some very generic information (ex. "*Roma Centro*").
- regarding the year of construction, there was a lot of approximation in the dates, or it was very often a missing data.

With the data available, I imagined a linear regression model combined with a method of hedonic pricing, defining a set of independent variables (x_i) and a dependent variable (y), on which the independent variables have a certain degree of influence.

The model has as dependent variable the price per square meter and as independent variables the following: Property Type, Intended Use, Maintenance Status, Region, Energy Classification, Time on Market, Number of Floors. Of these, however, it is necessary to distinguish the quantitative variables (which assume as values of numbers) and qualitative variables (which instead are not characterized by numbers). In the final model, therefore, these last ones have been considered of the dummy variables (that is variables that can assume like value only 1 or 0): it has been therefore necessary to divide these in sub-variables. As an example, the variable Property Type has been divided in the sub-variables Luxury Property, Classy Property, Average Property, Economic Property in base to as it comes brought back on the situated web.

Before analyzing the model itself, micro-models have been created (one for each independent variable) with the intention of analyzing in detail said independent variables and their "single" influence on the final price and to explain the functioning of the Excel Regression function, which is shown like this:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,243239
R Square	0,05916521
Adjusted R Square	0,05592095
Standard Error	1,17815805
Observations	1165

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	101,25539	25,3138476	18,2369014	1,5336E-14
Residual	1160	1610,14542	1,38805639		
Total	1164	1711,40081			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	8,17171645	0,11665503	70,0502709	0	7,94283798	8,40059492	7,94283798	8,40059492
NU	0,35645168	0,204783	1,74063117	0,08201341	-0,0453349	0,75823821	-0,0453349	0,75823821
ER	0,4259064	0,12699431	3,35374398	0,00082301	0,17674215	0,67507065	0,17674215	0,67507065
GH	-0,2061906	0,13164242	-1,5662929	0,11755279	-0,4644745	0,0520933	-0,4644745	0,0520933
TbR	-0,1431879	0,17038558	-0,840376	0,4008708	-0,4774863	0,19111046	-0,4774863	0,19111046

In particular, it was useful to explain what the most important outputs of the regression are:

- Multiple R: it represents the correlation coefficient, i.e. the strength of a linear relationship between two variables. This coefficient can take any value between - 1 and 1, keeping in mind that -1 indicates a strong negative relationship, 0 indicates no relationship and 1 indicates a strong positive relationship between the variables considered.
- R square: is the value that measures the proportion of the variation of the dependent variable that is explained by the regression line. It is a value between 0 and 1 and indicates the goodness of fit of a model, i.e. how many points fall on the regression line. The value of R square is calculated from the total sum of squares i.e. it is the sum of the square deviations of the source data from the mean.
- Standard Error: shows the precision of the regression analysis, so the smaller this value, the more precise the regression equation. It should be considered another measure of goodness of fit. While R squared represents the percentage of the variance of the dependent variables explained by the model, Standard Error is an absolute measure that shows the mean distance around the regression line.
- Observation: it is simply the number of observations in the sample, in this case 1165.
- Regression F-Significance: this value gives an idea of how statistically significant (i.e., reliable) the results are. If the F-Significance value is less than 0.05 (5%), the model used is good. If it is greater than 0.05, it is probably better to choose another independent variable.
- Coefficients: through them it is possible to create the linear regression equation since they are the betas of the equation.

Going instead to analyze the final model, it was no longer possible to use the regression function of Excel, since, with all the sub-variables derived from the qualitative variables, we ended up with a model with 41 variables, while Excel does not allow regressions with more than 16 variables. For this reason, the model was then analyzed using RStudio. The results are the following:

```
Call:
lm(formula = LnPrice ~ VDA + Pie + Lig + Lom + TAA + Ven + FVG +
    Erom + Tos + Umb + Mar + Laz + Abr + Cam + Pug + Cal + Sic +
    Sar + NU + ER + GH + TbR + LP + CP + AP + EP + FN + Re +
    Bu + Se + Pr + ToM + A + B + C + D + E + F + G + Exempted,
    data = Modeldef)
```

```
Residuals:
    Min      1Q  Median      3Q     Max
-5.7939 -0.4484  0.0673  0.5380  4.6597

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  6.380e+00  1.401e+00   4.554 5.83e-06 ***
VDA          3.090e-02  1.206e+00   0.026 0.979561
Pie          8.467e-02  9.995e-01   0.085 0.932508
Lig          7.475e-01  9.999e-01   0.748 0.454880
Lom          4.392e-01  9.857e-01   0.446 0.655958
TAA          4.201e-01  1.101e+00   0.382 0.702756
Ven          4.329e-01  9.904e-01   0.437 0.662114
FVG         -9.796e-01  1.024e+00  -0.957 0.338939
Erom        -1.270e-01  9.985e-01  -0.127 0.898797
Tos          7.133e-01  9.860e-01   0.723 0.469539
Umb          1.490e-01  1.016e+00   0.147 0.883362
Mar          3.591e-01  1.049e+00   0.342 0.732239
Laz          7.902e-01  9.848e-01   0.802 0.422462
Abr          6.427e-01  1.051e+00   0.611 0.541175
Cam          7.503e-01  1.007e+00   0.745 0.456358
Pug          4.951e-01  1.081e+00   0.458 0.646973
Cal         -7.754e-01  1.100e+00  -0.705 0.481129
Sic         -4.414e-01  1.015e+00  -0.435 0.663776
Sar          8.395e-01  9.979e-01   0.841 0.400368
NU          -2.341e-01  1.752e-01  -1.336 0.181702
ER          -7.455e-02  1.141e-01  -0.653 0.513674
GH          -1.167e-01  1.178e-01  -0.990 0.322181
TbR         -3.007e-01  1.493e-01  -2.014 0.044238 *
LP           9.969e-01  1.775e-01   5.618 2.44e-08 ***
CP           9.275e-01  1.687e-01   5.499 4.73e-08 ***
AP           6.668e-01  1.752e-01   3.806 0.000149 ***
EP          -1.555e-01  7.177e-01  -0.217 0.828562
FN          -1.281e-01  2.002e-02  -6.397 2.33e-10 ***
Re           1.396e+00  1.012e+00   1.380 0.167956
Bu           1.015e+00  1.011e+00   1.004 0.315643
Se           1.041e+00  1.009e+00   1.031 0.302655
Pr           7.845e-01  1.001e+00   0.784 0.433342
ToM         -3.265e-04  7.751e-05  -4.212 2.73e-05 ***
A            3.927e-01  1.282e-01   3.062 0.002248 **
B           -6.121e-02  1.588e-01  -0.386 0.699932
C           -4.045e-01  1.665e-01  -2.430 0.015253 *
D           -3.307e-01  1.761e-01  -1.878 0.060631 .
E           -3.890e-01  1.892e-01  -2.056 0.040049 *
F            2.194e-02  1.797e-01   0.122 0.902825
G           -3.983e-01  1.339e-01  -2.975 0.002996 **
Exempted    -1.047e-01  1.438e-01  -0.728 0.466797
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.9733 on 1124 degrees of freedom
Multiple R-squared:  0.3779,     Adjusted R-squared:  0.3557
F-statistic: 17.07 on 40 and 1124 DF,  p-value: < 2.2e-16
```

However, the F-Statistic value of this model was very high (17.07 on 40), and this is most likely explained by the Multicollinearity phenomenon, which happens when independent variables in the regression model are highly correlated to each other, so it makes it hard to

interpret the model and also creates an overfitting problem: in particular, the highest values of multicollinearity are related to Regional and Intended Use variables, while for the other variables are all acceptable values. For this reason, the two above mentioned variables have been isolated and used this time as filters, in the construction of fifteen sub-models that highlighted the differences in the characteristics that a real estate asset must have in order to be considered a trophy asset. In particular, the regional factor has been eliminated and replaced by the more general factor relating to the five Italian macro-areas (North-West, North-East, Center, South, Islands) as a filter, together with the *Intended Use*. The results of the sub-models can be summarized as follows:

Intended Use / **Area**	**Residential**	**Business**	**Service**
North-West	Intercept: 15.5000 (-) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 15.8700 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (-) Energy Class	Intercept: 15.4800 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (+) Energy Class
North-East	Intercept: 16.5500 (+) Floor Area (-) Maintenance Status (-) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 15.2600 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 16.3700 (+) Floor Area (-) Maintenance Status (+) Property Type (-) Floors Number (+) Time on Market (+) Energy Class
Center	Intercept: 15.6000 (+) Floor Area (+) Maintenance Status (-) Property Type (+) Floors Number (-) Time on Market (-) Energy Class	Intercept: 15.2700 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (+) Time on Market (+) Energy Class	Intercept: 15.8200 (+) Floor Area (+) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (-) Energy Class
South	Intercept: 14.8400 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (-) Energy Class	Intercept: 14.6300 (+) Floor Area (+) Maintenance Status (+) Property Type (-) Floors Number (NA) Time on Market (NA) Energy Class	Intercept: 17.3300 (-) Floor Area (-) Maintenance Status (-) Property Type (-) Floors Number (-) Time on Market (+) Energy Class
Islands	Intercept: 15.6200 (+) Floor Area (-) Maintenance Status (+) Property Type (+) Floors Number (-) Time on Market (+) Energy Class	Intercept: 14.4600 (+) Floor Area (-) Maintenance Status (+) Property Type (-) Floors Number (+) Time on Market (NA) Energy Class	Intercept: 15.9800 (+) Floor Area (-) Maintenance Status (-) Property Type (-) Floors Number (-) Time on Market (+) Energy Class

With this in mind, it has been possible to isolate fifteen potential Trophy Assets (one for each scenario), which therefore in theory could be purchased and transformed into something unique and particularly capable of ensuring a stable rate in terms of economic results. However, whether or not they are real trophy assets also depends on other "intangible" variables, such as, in the case of a shopping center, the prestige of the brands to which the various stores are rented.

In general, the peculiarities of each sector and each geographical area analyzed above are respected, with a preference for large sizes and number of floors in the Services and Business sector and for higher levels of quality in the case of residential housing; on the other hand, a substantially lower level of prices can be noted in Southern Italy.

In alternative to the sub-models, it was also possible to define a model that, instead of adopting the logic of the dummy variables, adopted instead the fuzzy logic, according to which - instead of assigning to a qualitative variable only the values 0 or 1 - the same variable now can assume the values comprised between 0 and 1, so as to make possible the comparison between the variables. This model turns out to be the more statistically significant with respect to those created before, and at the same time paradoxically the simpler one. These are the results:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.720786681
R Square	0.519533439
Adjusted R Square	0.517043975
Standard Error	0.842661535
Observations	1165

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	889.1299468	148.1883245	208.6928873	2.1987E-180
Residual	1158	822.2708593	0.710078462		
Total	1164	1711.400806			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	6.280118486	0.161218828	38.95400166	8.331E-213	5.963804778	6.596432193	5.963804778	6.596432193
Region	1.110064369	0.106605636	10.41281126	2.47296E-24	0.900902545	1.319226192	0.900902545	1.319226192
Intended_Use	1.197422118	0.195030404	6.139668962	1.13437E-09	0.814769602	1.580074635	0.814769602	1.580074635
Property Type	0.565886616	0.107834944	5.247710949	1.83042E-07	0.354312873	0.77746036	0.354312873	0.77746036
Floor_Number	-0.125342109	0.014702496	-8.525226462	4.69795E-17	-0.154188623	-0.096495596	-0.154188623	-0.096495596
Energy_Class	0.590906642	0.058675536	10.07074979	6.32889E-23	0.475784379	0.706028905	0.475784379	0.706028905
Floor_Area	-7.19196E-06	3.39696E-07	-21.17174853	2.3374E-84	-7.85845E-06	-6.52547E-06	-7.85845E-06	-6.52547E-06

In conclusion, a reflection that starts from the South of Italy mentioned and then reflects on the domestic country: what would the proper exploitation of trophy assets in the local economy entail? In the case, for example, of a castle in Calabria used as a hotel, this would certainly bring more tourism and the creation of new jobs, with the possibility of revaluation of the entire area.

But then, are the Trophy Asset just an opportunity for investment? Certainly, they are a unique opportunity, if properly renovated and maintained. But they can be much more in our country: Italy is, more than others, a country that could almost exclusively live of tourism, given the heterogeneity of territories, landscapes, cultures, and specialties that each place has to offer, and a Trophy Asset, in this sense, could become a key factor for the economic growth. This is the message that this paper wants to get across: investing *on* Italy – and so not only *in* Italy – can really be the winning choice in this period of economic recovery, both for the investor himself, and for the regional economy, which then has obvious consequences on the national one.