Profitability and financial performance of Italian real estate companies: quantitative profiles

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Abstract

Purpose – This study illustrates the economic and financial dynamics of the sector, analysing the evolution of the main ratios of profitability and financial structure of 1,559 Italian real estate companies divided into the three macro-regions: North, Centre and South, in the period 2011–2020. In this way, it is also possible to verify the responsiveness to the 2020 pandemic crisis.

Design/methodology/approach – The analysis uses descriptive statistics tools and the ANOVA method of analysis of variance, supplemented by the Tukey–Kramer test, to identify significant differences between the three Italian macro-regions.

Findings – The study shows the increase in profitability after the 2008 crisis, despite its reverberation in the years 2012–2013. The financial structure of companies improved almost everywhere. The pandemic had modest effects on performance.

Research limitations/implications – In the future, other indices should be considered to gain a more comprehensive view. This is a quantitative study based on financial statements data that neglects other important economic and social factors.

Practical implications – Public policies could use this study for better interventions to support the sector. In addition, internal management can compare their company's performance with the industry average to identify possible improvements.

Social implications – The research analyses an economic field that employs a large number of people, especially when considering the construction and real estate services covered by this analysis.

Originality/value – The study contributes to the literature by providing a quantitative analysis of industry dynamics, with comparative information that can be deduced from financial statements over the years.

Keywords ROE, ROI, Independence financial ratio, Current ratio, Fixed assets coverage ratio, ANOVA, Tukey–Kramer test

Paper type Research paper

This article is the result of collaborative work. However, it is possible to attribute the different paragraphs to the Authors in relation to the prevailing tasks that were carried out. Guido Migliaccio was responsible for the design and scientific approach of the work, outlining its theoretical aspects and the critical analysis of the results. The paragraphs "Introduction", "Literature and hypotheses", and "Discussion and Conclusions" can therefore be attributed to him.

Andrea De Palma, on the other hand, analysed the sector, selecting and processing budget data, and presenting initial comments on the results of the research. The following paragraphs can therefore be attributed to him: "Theoretical Framework", "Production in the Continental and National Context", "Results and First Evidence" and "The Tukey–Kramer Test".

The paragraph "Research design and methodology" is common to both authors.

1. Introduction

The broad scope of the real estate market includes constructing and selling real estate and assets of high economic and social value (Yi Man Li, 2016; Serrallegri, 2022). It thus includes construction, demolition, renovation, redevelopment and maintenance of buildings and infrastructure, as well as a complex variety of advisory and intermediary services that facilitate trade. The sector's production units can therefore be classified into two macrocategories.

Construction companies, also known as building contractors, are in charge of material works (Anderton, 2022; Abdul-Kareem, 2015; Panniello *et al.*, 2022), soliciting the supply of raw materials. They are often involved in multiple construction sites. Weather situations influence their activity. They can use smaller companies to coordinate their activities. They can produce for the market or even on commission, perhaps after winning a tender (Cianflone *et al.*, 2018). They can realise more or less large and complex buildings. A distinction is often made between residential (Vabischevich, 2021), non-residential and public works construction. Significant money, liquidity and specialised managerial skills often characterise developers and investors in managing urban construction projects. This is why special real estate investment funds have developed, which are in addition to the other financial operations typical of institutional investors and real estate management and leasing companies (Flynn, 2018). The sector also significantly impacts the household economy, considering the high costs of purchases and rents, especially in the most desirable areas, which can generate substantial profits for owners (Leonard, 2022).

Real estate companies facilitate the matching of supply and demand for real estate (Gardner, 2011; Castello, 2003; Waterson and Lee, 2001a, 2001b), also using real estate and financial advisors. The broad category thus includes real estate buying and selling activities carried out on one's property, rental and management of owned or leased real estate, and real estate activities for third parties (real estate agencies, which are widespread). Sometimes in franchising (Galli and Stella, 2021) or even "chain" (Bishop, 1993), they play a key role in making the real estate market efficient (Kunzel, 2009), even where a real estate exchange is active, providing up-to-date information and protecting the parties, reducing time and risk for the contracting parties.

In summary, they provide the following:

(1) technical, contractual and financial advice with customised services;

(2) facilitate access to credit, as they are often linked to specialised financial institutions;

(3) they facilitate collateral services (insurance, restructuring, etc.);

(4) they reduce the time of transaction conclusion (Bronchick and Cooper, 2016);

(5) they lower the risks in sale and purchase transactions due to their specialised expertise.

The real estate sector, as a whole, plays a central role in a nation's economic development, including in Italy, where it contributes to employment, production and the country's financial stability (Rossi, 2019; Nomisma, 2020; Scenari-immobiliari.it, 2021). According to a recent edition of the report on the real estate services sector in Europe and Italy (Lunghini, 2021), the sector in European countries produces an added value of about 20% of the total: in 2020, the turnover of the real estate services sector in the five main European countries was estimated at 350bn euro, with a 6.3% decrease compared to 2019 due to the lockdown.

While the Italian and international bibliography has devoted ample space to construction and related financial services, studies on the performance of Italian real estate companies are rarer, to which this study is dedicated. It presents the economic-financial dynamics of a large

sample of companies over the decade 2011–2020 and outlines possible post-pandemic recovery strategies.

Using exclusively financial statements data and indices derived from their analysis appropriately processed with suitable statistical algorithms, we present a study conducted in the nation and its three macro-regions (North, Centre and South) to answer a research question:

RQ. What has been the evolution in the economic-financial performance of companies in Italy and its three macro-areas, with particular attention to the pandemic period?

Italy can be a valuable reference for other states with similar socio-economic and urban contexts.

A historical analysis, up to recent times, of the results achieved by companies in the sector encourages its development, also by proposing management strategies based on data processing that is also useful for improving forecasts of future market trends. Therefore, it introduces a more intimate link between accounting systems and decision-making processes. Given the importance of the sector in Italy and the main advanced economies, the expected benefits are easy to see, especially regarding employment.

After the primary bibliographical references, the methodology, results, implications, limitations of the research and possible future developments are outlined.

2. Theoretical framework
2.1 Macroeconomic notes
The real estate market influences a nation's economic activity through various channels. If real estate prices rise, the expected return on the construction business increases, and as a direct consequence, capital accumulation in the sector also increases (Rossi, 2019). The economy benefits because construction activates the supply chain, amplifying cyclical stimuli: an owner household, sensing the increase in wealth, tends to spend more. The value of the collateral often required for bank loans also increases, with effects on the cost and quality of banks' assets and, consequently, on the availability of credit (Shafik, 2006), with intuitable influences on monetary policy and the economic cycle (Giannotti and Gibilaro, 2009).

The subprime mortgage crisis in the United States of America at the origin of the global crisis of 2008–09 was an example of an increase in impaired loans, with a consequent impact on the ability to make new loans, which had a considerable impact on households and businesses (Lopreite and Scarpino, 2010).

There are also effects on taxation, considering, for example, the deductibility of interest expenditure on mortgages and the frequent tax breaks for purchasing a first home (Milligan *et al.*, 2009; Ong *et al.*, 2013; Barrett *et al.*, 2015).

Facilitating or incentivising home purchases may reduce residential mobility instead of helping facilitate development. Some studies confirm the inverse correlation between home ownership and mobility (Troiano, 2022). However, high transaction costs in buying and selling houses and very stringent regulations of the rental market can hinder mobility.

A clear sign of the efficiency of the real estate market is the high flexibility of access to housing services, whether owned or rented: if, on the one hand, it contributes to the territorial redistribution of workers to job opportunities, on the other hand, it panders to the desire for independence of younger people, both when they are out of the country for study reasons and when they decide to start a family (Arbaci *et al.*, 2021). The labour market thus benefits, along with the growth potential of the economy and collective well-being.

Investments in real estate are largely financed through debt, and leverage is generally high (Herring and Wachter, 2002). If financing on favourable terms is available, the investment would be higher. Therefore, a significant share of bank income, rather than risk, depends on real estate.

The most significant and widespread risks are price bubbles, which "burst" and reduce the ability of borrowers to repay loans, collateral is devalued, and as a result, lenders suffer considerable losses. This happened in Northern European countries in the early 1990s, in Southeast Asian countries in 1997 and in Japan at various stages in the 1990s, undermining the soundness of financial intermediaries (Rossi, 2019).

Therefore, the real estate sector is experiencing rapid and marked changes stemming from new technologies and their impact on the different stages of the real estate life cycle (Janowski and Lepkova, 2021).

The challenge in the future lies above all in financial dynamics, as well as in production techniques, requiring more outstanding qualifications consultants and appraisers (Tsung, 2022) who will have to develop new skills capable of monitoring the entire technical and financial production process (Baiardi and Tronconi, 2010).

2.2 Operators
The real estate company performs services related to real estate (Cermignano and Fasano, 2011). This initial and simple definition excludes construction companies, which instead deal with physical-technical interventions, as already mentioned.

Real estate companies, therefore, carry out the following activities related to real estate:

(1) buying and selling their property or that of third parties;

(2) management, leasing or letting;

(3) mixed activities, combining the above;

(4) intermediation between supply and demand, typical of classic real estate agencies, compensated by a commission on the purchase price, which mainly remunerates the information, skills and protection offered, reducing the risks of contractors to whom personalised services such as technical, contractual and financial advice are offered;

(5) leasing, with the possibility of redeeming the asset used (Sirtoli, 2013).

(6) financial, management and valuation consultancy on real estate with appropriate valuation methodologies.

The Ateco 68 code, which is the subject of this research, uses this classification in Italy. It excludes construction companies to which the Ateco F code: Construction is instead dedicated.

To be competitive in the global market, companies must have available capital and adequate managerial skills, and to face the growing competition from real estate investment funds and other financial operators such as life insurance companies, provident societies and pension funds.

3. Literature and hypotheses
The scholarly focus on the sector, in general, is significant.

3.1 Construction companies (brief notes)
Several analyses, including some recent ones, refer to construction companies. For example, we refer to the writings of Haider *et al.* (2023) and Khalfan *et al.* (2022) on leadership and the effects of managerial culture, the research on sustainability by Bontempi *et al.* (2023), the publication of new communication strategies (Schnell, 2022), the analyses on the use of risk factor models (Escribano *et al.*, in press), etc.

3.2 Securities market and investments

There are also numerous publications on the real estate market and investment possibilities (Jayanthi and Saravanakumar, 2022) in a sector that could be very profitable. In this context, we note the study by Tang *et al.* (2022), who analysed stock market responses and the movement of returns. In China, Huang *et al.* (2022) assessed the systemic financial risks arising from the pandemic.

The analyses of regulated financial markets are complemented by those of classical bank financing methods (Abuamsha, 2022).

Specific studies have recently been devoted to changes in prices (De Stefani, 2021; Tuyet *et al.*, 2022) and brokerage costs, which have a significant impact on the dynamism of trading (Lee and Lee, 2007; You *et al.*, 2014).

3.1 Management and marketing, in particular

We then highlight the evolution of strategies (Rowley, 2005) due to changes in size and asymmetric information typical of the industry (Bishop and Megicks, 2002a, b).

More recently, the adoption of information and communication technologies (Li and Wang, 2006; Babatunde and Ajayi, 2018) and the use of "virtual reality" (Adegoke *et al.*, 2022) have changed long-term choices. New technologies have also changed customer relations, evolving traditional marketing (Driver, 1984; Pheng and Hoe, 1994) to digital marketing (Luís *et al.*, 2022), which has undoubtedly altered the more classical modes of relationship between supply and demand. This is also due to the observation that home buyers and tenants increasingly rely on the Internet to search for accommodations (Koch and Maier, 2015) and the frequent integration of big data into the real estate decision-making process (Cheryshenko and Pomernyuk, 2021).

Despite these developments due to new technologies, a special relationship with the customer due to the specificity of the intermediated property and it is often high-cost characterises real estate companies: customer identification, participation, satisfaction and loyalty are always relevant to the success of the economic initiatives (Yang *et al.*, 2019), which must carefully consider the decision-making process, even if irrational, in the purchase of agency services, and the key role played by the staff in "shaping" consumer behaviour: price and the physical appearance of the service provider are certainly not among the main evaluation criteria (Crozier and McLean, 1997).

3.2 Real estate companies and environmental and social sustainability

More recent developments give a prominent place to sustainability requirements for a sector that certainly needs specific knowledge (Filstad and Gottschalk, 2009), information (Grishkina *et al.*, 2022), and training to generate value always and, above all, to develop the processes of the circular economy (Gupta and Tiwari, 2022).

In this context, the quality of life of employees (Majumder and Biswas, 2022), who suffer from the described effects of the digitisation of their activities (Piazolo and Dogan, 2021), is important, even considering that they are often forced to note that ethnic discrimination is a persistent problem, predominantly in the private rental market: discrimination is lower in poorer, ethnically mixed neighbourhoods and higher in smaller, male-dominated real estate offices (Ghekiere and Verhaeghe, 2022).

Real estate companies, however, also sometimes behave unethically (Markoc and Cizmeci, 2021). Therefore, prevention, monitoring of activities and possible sanctions are necessary on the part of public authorities, which should propose a clear legislative framework (Curran and Schrag, 2000). The state must also intervene to support the activities of these companies, especially to improve the effectiveness of agency disclosure in real estate transactions (Wiley and Zumpano, 2009).

3.3 The effects of the pandemic

One of the main economic effects of the pandemic has been the spread of remote working. This has favoured living away from the workplace, thus decongesting the main urban centres and favouring suburban living. This, of course, has changed the value of real estate, which, in some cases, has relatively decreased in large cities and, conversely, increased in suburbs and smaller towns. This was an actual market revolution with effects that have been well analysed by Gupta et al. (2022). A similar study approach, with similar outcomes, characterised the research by Chmielewska et al. (2022), which shows a trend of increasing demand for residential properties away from cities in favour of urban suburbs and areas close to green spaces. Such situations can also be observed in Italy (Micelli and Righetto, 2022).

Trends in the real estate market were only marginally affected by public interventions (Pilinkiene et al., 2021). Panic has often led to irrational behaviour in purchasing durable goods such as real estate and cars (Karthiyaini et al., 2020).

In general, however, it seems that the processes of migration of values to and from the sector do not show any relevant changes when comparing the periods before and after the pandemic, at least in Poland (Kowalski et al., 2023). A more comprehensive analysis, however, must also consider the choices of tenants and not only those of investors, which are more widely studied (Munshifwa et al., 2021).

The nation that originated the pandemic and in which the most remarkable effects were felt was China. Therefore, the aforementioned study by Huang et al. (2022), in which the systemic financial risks in the real estate market resulting from the pandemic were assessed, is particularly interesting. The Chinese situation was also compared with that of the United States and Europe (Jovanović-Milenković et al., 2020), concluding that, even though the viral pandemic appeared at different times around the world and with different intensity, the indicators of changes in the real estate market point to similar trends.

Also interesting because of the spread of COVID-19 are the proposals of Min et al. (2022), who quantified the daily rate of return of three major stock indices of real estate-related industries.

The scholars' efforts have also analysed the volatility of "green metal" prices and its links to environmentally sustainable real estate development over the pandemic (Eje et al., 2023), considering the described sustainability drivers.

It should be mentioned, in conclusion, that COVID-19 had a considerable impact on the workflow of real estate brokers and the attitudes of their clients (Marona and Tomal, 2020).

Numerous contributions, therefore, on the relationship between the pandemic and the real estate market, but little is based on financial statements data, which justifies one of the research hypotheses of this paper later outlined.

3.4 Aspects specific to Italy

Concerning Italy, first of all, there are studies on the economic impact of monetary policy (Ahmed et al., 2021), unconventional (Ahmed et al., 2020), and analyses on equity crowdfunding (Battisti et al., 2020), as well as monographic writings in local languages (Baiardi and Tronconi, 2010; Cermignano and Fasano, 2011).

Italian real estate has also been the subject of specialised analyses of closed-end real estate funds as part of a broader analysis of real estate portfolio management (Mattarocci and Scimone, 2021), as well as applications of a subset of artificial intelligence, "machine learning", to detect market information transparency (Gabrielli et al., 2022) and to predict house prices (Rampini and Re Cecconi, 2022).

Italy has been plagued by the pandemic, and therefore its experience is significant for assessing the consequences of COVID-19 on real estate supply and demand. The study mentioned above by Micelli and Righetto (2022) compared the responsiveness of demand after

the financial crisis of 2008 and the pandemic crisis of 2022 in major metropolitan cities. The authors distinguished different clusters in which they sometimes recorded a significant increase in property values and other times a decrease in favour of more sustainable housing areas.

The Italian market, therefore, which was also investigated with the analyses of Avallone and Quagli (2015), can be a valuable laboratory for studies based on currently deficient company financial statements data, especially concerning the effects of the pandemic.

3.5 Performance

This topic has been the subject of numerous contributions addressing it from different perspectives.

The organisational dimension is prevalent in the recent contribution by Amos and Boakye-Agyeman (in press), who attempted to model the value added of corporate real estate precisely on organisational performance. The authors constructed statistical relationships between indicators of the value added by corporate real estate and the financial and non-financial performance of the organisation. They then highlighted the significant influence of three value-added indicators on organisational performance, highlighting the need for strategic management of corporate real estate risk to improve performance.

Gender, age and tenure of executives, however, are not a catalyst for differences in corporate performance. Ricciotti *et al.* (2022) came to this conclusion by drawing on the Upper Echelons theory and analysing the socio-demographic characteristics of key executives of a panel of listed European real estate service companies. Instead, financial statements outcomes are more directly related to intellectual capital (Zhang and Wang, 2010) and salesperson motivation, especially if transactions are online (Gautier *et al.*, 2023). The prior participation of employees in the setting of budget targets would also seem to be very helpful in improving their performance (Silva *et al.*, 2023).

Other contributions focus on corporate performance by correlating it with developments in the financial markets. The topic is well outlined in Ke *et al.* (2008), where they show that, in England and Wales, it is subject to the volatility and uncertainties of the market, its "liquidity" and thus to changes in house prices. Business factors such as size and fees are much less affected.

Finally, in other research, the outcomes of financial statements and the calculation of key ratios, which are also used in this article, take precedence.

Already in 2018, Rehkugler *et al.* examined whether and to what extent open real estate companies could use financial statements information to identify undervalued companies. More recently, in 2022, Khuntaweetep and Koowattanatianchai created an econometric model for strategic planning and ROE forecasting of real estate development companies in Thailand. Even more recently, in 2023, Gupta *et al.* examined the impact of mergers and acquisitions on the financial performance of the construction and real estate industry using numerous ratios. Coeval is the contribution of Jiang and Zhang (2023), who also used financial ratios to analyse the relationship between the debt ratio and the performance of numerous real estate companies, also distinguishing state-owned from private.

The use of the ANOVA method to develop ratios, also used in this article, characterised the research of Daryanto *et al.* (2018) to assess the impact of liquidity and leverage on the performance of Indonesian firms. Finally, it is worth mentioning one of the few Italian cases due to Avallone and Quagli (2015), who used profitability drivers and financial structure for industry studies.

3.6 Formulation of hypotheses

The conceptual framework and the articulate presentation of the main bibliography revealed a considerable interest of the scientific community in the field, also considering its economic

importance in all nations. Scholars also highlighted the importance of financial statements and their informative power to gather news for their research objectives. There are also relevant studies on the performance of companies that have used static and dynamic analyses of financial statements and statistical processing methods such as, for example, ANOVA. Italy has also been the subject of significant elaborations.

Although there has been a proliferation of studies on the real estate sector in recent months, especially to assess the effects of the pandemic, there is a lack of quantitative analyses using financial statements data of Italian companies in the decade 2011–2020. This prompted this research to implement the literature on real estate agencies and test the following hypotheses:

H1. Profitability is affected by the business cycle and decreased during the pandemic.

H2. Financial structure is correlated with economic dynamics.

H3. Location affects companies' economic and financial balances.

4. Production in the continental and national contexts

4.1 In Europe
Health and economic crises characterised the two years 2020–2021, which, however, did not radically affect the real estate services industry, which showed strong resilience. The construction and real estate sectors, within this general framework, continued to play a central role in the economic systems of the various countries, of which they contribute 17.4% to the formation of added value (up by one percentage point compared to the year before the pandemic) (Lunghini, 2021).

According to the seventh edition of the report on the real estate services sector in Europe and Italy produced by Scenari Immobiliari (Scenari-immobiliari.it, 2021), the sector under analysis, with the construction sector continues to play a crucial role in the economies of the main European countries, contributing an added value representing between 18 and 21% of the total (Table 1).

Real estate services in the core European countries recorded an estimated turnover of around EUR 350bn in 2020, down by about 6% compared to the previous year. This is the somewhat predictable result related to the pandemic, where there were periods of complete standstill of activity. The only European country with a better-performing market was Germany, recording a turnover of almost EUR 125bn and a moderate decline of 1.7%. France, on the other hand, kept its business volume unchanged, so 2020 ended with a turnover of EUR 85.2bn.

Italy recorded a turnover of almost EUR 37.1bn, with a drop of almost twelve percentage points compared to 2019.

The country, on the other hand, that recorded the most negative figure ever, with a loss in turnover of almost twenty percentage points, going from 91bn in 2019 to 73.3bn, was the

Nation	Construction	Development real estate	Activities real estate	Total
Italy	4.4	2.4	14.2	21
France	5.2	2.3	13.4	20.9
Germany	5.8	2.1	11.0	18.9
United Kingdom	5.4	2.3	12.8	20.5
Spain	6.2	2.3	12.8	21.3
Average	5.4	2.3	12.8	20.5
Source(s): Scenari-immobiliari.it (2021)				

Table 1.
The added value generated by construction and real estate companies

United Kingdom, for which 2020, in addition to being the year of the pandemic, was the year of its exit from the European Union. By contrast, the only country that did not record a negative trend was Spain, thanks to brisk activity, especially in the latter part of 2020. To this result, Spain is the only country with a growing turnover (+1.4%).

On the employment front, the construction sector is of key importance, recording remarkable figures. Also relevant is the presence of real estate services companies, the subject of this analysis (Table 2).

In Italy, the percentage of the total workforce respects the European average, while the average company size is lower, i.e. 1.9 employees per company. The United Kingdom and Germany are exceptions, with an average size of 7.4 and 4.7 direct employees, respectively, while a significant fragmentation of companies characterises France, Spain and Italy (Lunghini, 2021) (Table 3).

4.2 In Italy

The real estate sector is central to the Italian economy because of its contribution to employment, production and the country's financial stability. Despite the small size of the companies and the vast fragmentation of the production structure as well as under capitalisation, difficulties in accessing financing and the complex management of receivables from the public administration (Federcostruzioni.it, 2012).

In Italy, almost one-fifth of the GDP in one year corresponds to the total value of investments and expenditure on rents and brokerage services (Rossi, 2019). Sixty per cent of total household wealth is invested in real estate assets. Loans to households for real estate mortgages and loans to businesses in this sector account for about one-third of total bank loans.

Italy's construction tradition is significant, but optimal organisational and management activities are less widespread, even concerning all services for the real estate sector.

Nation	Number of enterprises	Employees direct	Indirect employees	% of the total workforce	Dimensions medium
Italy	223.200	298.900	134.700	1.7	1.9
France	218.600	311.400	130.900	1.5	2.0
Germany	180.000	593.600	253.300	1.9	4.7
United Kingdom	121.900	694.200	207.600	2.6	7.4
Spain	170.700	263.800	88.900	1.6	2.1
Total	914.400	2.161.900	815.400	1.9	3.3
Source(s): Scenari-immobiliari.it (2021)					

Table 2.
Real estate companies in major European countries

Nation	Small enterprises (%)	Medium-sized enterprises (%)	Large enterprises (%)
Italy	93.3	5.0	1.7
France	43.2	15.4	41.4
Germany	69.0	12.7	18.3
United Kingdom	40.0	7.4	52.6
Spain	84.7	11.7	3.6
Average	66.0	10.4	23.5
Source(s): Scenari-immobiliari.it (2021)			

Table 3.
Size of real estate companies in major European countries

The reasons behind this situation are (Caracciolo, 1963; Gnan and Montemerlo, 2008).

(1) the historical delay in the industrialisation process, which is responsible for the deficit of organisational and management culture;

(2) an entrepreneurial fabric made up of small and minute enterprises with solid craftsmanship.

The situation is slowly improving. This is mainly due to the process of financialisation of the Italian real estate market, which has had as a direct consequence the creation of new financial instruments (Baiardi and Tronconi, 2010).

However, the market has been surprised by its resilience to the problems of the pandemic crisis (Buonaccorsi, 2021). 2020 had a more modest impact than expected. Experts consider Italy to be ready for recovery that, albeit slightly, may even rise above the levels estimated for the German economy, which has always been a benchmark for European countries (Nomisma, 2020).

There are, however, two elements to be considered, namely, the 2% drop in employment in 2020 and lower disposable income for households (International Labour Organisation, 2020). Despite this, the forecasts are optimistic due to a typical feature of the Italian real estate market: as many as 8 of 10 households have recourse to credit for the purchase of a home (Marcatili, 2021) due to a lack of liquidity because in any case, the home is still a haven asset, due to the numerous concessions for the purchase of a first home, etc. (Nomisma, 2020).

Indeed, the 2020 lockdown has, however, substantially changed the modus operandi of agents who have reacted by digitising agencies and by using video appointment services, virtual tours, online cadastral maps, etc. (Bergamaschi, 2022).

The forecasts are optimistic, not least because of the expected benefits of the PNRR (Bergamaschi, 2022) and the increase in demand for properties located in small towns (Immobiliare.it, 2022) to buy larger premises.

Considering demographic trends and greater sensitivity to the logic of sustainability, efforts are also being made to recover the already built-up area without consuming new land. Efforts to improve energy efficiency, which reduces energy costs and promotes a healthier environment, are also on the increase.

More and more foreigners, both European and non-European, have decided to invest in the Italian residential property market, according to a recent survey conducted by Fimaa and REinsight-Opisas (Simplybiz.eu, 2021).

In Italy, a significant boost to the market is also due to the benefits of the 110% Superbonus, which supports energy efficiency interventions in residential buildings with public funds (Mecca *et al.*, 2020; Artese *et al.*, 2021; Rebaudengo *et al.*, 2022).

5. Research design and methodology

The investigated sample consists of 1,559 companies. It is derived from a selection of over 20,000 initial ones, removing those with unavailable or insignificant data. Thus, for all selected companies, initial data were available for all years, which were subsequently processed.

Financial statements for the decade 2011–2020, taken from Bureau van Dijk's AIDA database, were analysed. The companies were divided into the three Italian macro-regions: North, Centre and South (Figure 1).

The companies are, therefore, mainly concentrated in Northern Italy (as many as 1,040 out of 1,559), certainly the wealthiest area in the country.

The ATECO code 68 "Real Estate Activities" (Table 4) characterise all the company: companies that are therefore different but are united by the intention to produce various services in the articulated real estate market.

The sample size was assessed to turnover (Table 5) and the number of employees in 2020, the last of the survey.

Most companies have a turnover between EUR 500,000 and EUR 1,500,000. About one-third has a turnover of more than 2mn.

The size of number of employees is illustrated in Table 6.

The national average is thus 12 employees, considering the employment of 18,764 people in the 1,559 companies selected.

After obtaining the financial statements for the decade considered, the average annual value and ten-year trend of two-income ratios (ROE and ROI) and three capital structure ratios (Financial Independence Ratio, Current Ratio and Fixed Asset Coverage Ratio) were assessed.

The available data were also subjected to the following descriptive statistics to broaden the possibilities of evaluating the phenomenon: arithmetic mean, standard error, median,
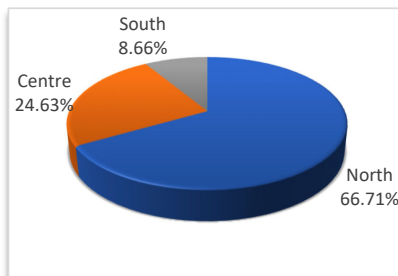
Figure 1.
Sample

Source(s): Authors own work

Code	Description
L	Real estate activities
68	Real estate activities
68.1	Buying and selling real estate on one's own property
68.10	Buying and selling real estate on one's own property
68.10.0	Buying and selling real estate on one's own property
68.10.00	Buying and selling real estate on one's own property
68.2	Rental and management of owned or leased real estate
68.20	Rental and management of owned or leased real estate
68.20.0	Rental and management of owned or leased real estate
68.20.01	Lease of own property
68.20.02	Renting out businesses
68.3	Real estate activities on behalf of third parties
68.31	Real estate brokerage activities
68.31.0	Real estate brokerage activities
68.31.00	Real estate brokerage activities
68.32	Management of real estate on behalf of third parties
68.32.0	Administration of condominiums and management of real estate on behalf of third parties
68.32.00	Administration of condominiums and management of real estate on behalf of third parties

Source(s): www.codiceateco.it (accessed on 17 September 2023)

Table 4.
The 2007 Ateco Code
for real estate
companies

fashion, standard deviation, sample variance, kurtosis, skewness, interval, minimum, maximum, sum and number of observations.

In particular, it was checked whether the values were close to the arithmetic mean, in which case the trends are stable and have a better descriptive value.

After representing the historical trend with a broken straight line, the interpolating function that best interprets the trend over the period was also determined. Several functions could be used: exponential, linear, logarithmic, polynomial, power, moving average, etc.

The choice fell on the one that maximises the coefficient of determination (R^2), with values close to 1: always the polynomial function of order 6.

The analysis was relative to the national average and its three macro-regions.

To ascertain the presence of statistically significant differences between the three areas, the one-way ANOVA test was used (Quirk, 2012; Liao and Li, 2018), using geographic locations as the independent variables, while the dependent is the value of the ratio. Indeed, the use of the ANOVA test has been effective in numerous studies (Kottala and Herbert, 2019; Fotopoulos and Psomas, 2009), etc.

The post-Anova test, known as the Tukey–Kramer test (Tukey, 1949, 1953, 1993; Kramer, 1956; Benjamini and Braun, 2002), has been used to identify which area differs from the others.

6. Results and the first evidence

6.1 The evolution of ROE (return on equity)

ROE indicates the percentage return on equity and is calculated by comparing net profit and equity. Its value should be as high as possible, far from the rate of return on government bonds often used as a benchmark.

Table 7 shows the main statistical calculations.

A very often positive ROE characterised the sector, albeit relatively low and with uncertain and fluctuating trends.

Table 8 shows the interpolation function equations for each group.

The R^2 value in the North and South is close to 1: the trend depicted in Figure 2 is therefore statistically valid. In the Centre, the R^2 value is slightly lower, so the trend deviates, albeit slightly, from optimal values.

The reverberation of the 2008 crisis is evident in the two years 2012–2014 after the "rebound" of the years following the global financial crisis, which in Italy had particularly severe characteristics (Istat, 2012; Borghi, 2013).

In particular, the South starts with very high values compared to the other geographical macro-areas and then records a more consistent drop in 2014 to a value of 1%. This is followed by a sharp recovery that brings the values of the South back above the other areas considered, up to values close to 4. The North and the Centre, on the other hand, show a less

Turnover (in thousands of €)	Number of companies
0–500	85
500–1,000	391
1,000–1,500	356
1,500–2,000	187
over 2,000	540
Total	1.559
Source(s): Authors own work–Elaboration on AIDA data	

Table 5.
Turnover and companies

North				Centre				South and the Islands			
Region	No of Companies	Total employees	Average employees	Region	No of Companies	Total employees	Average employees	Region	No of Companies	Total employees	Average employees
Lombardy	525	2,734	5.2	Tuscany	114	9.052	79.4	Campania	50	262	5.2
Liguria	29	96	3.3	Marche	31	401	12.9	Molise	1	6	6.0
Piedmont	108	521	4.8	Umbria	11	41	3.7	Calabria	1	0	0.0
Aosta Valley	1	0	0.0	Abruzzo	12	104	8.7	Apulia	23	146	6.3
Friuli-Venezia Giulia	22	96	4.4	Latium	216	2.124	9.8	Basilicata	2	7	3.5
Trentino-Alto Adige	34	120	3.5								
Veneto	166	1.146	6.9					Sicily	38	252	6.6
Emilia-Romagna	155	1.519	9.8					Sardinia	20	137	6.9
North	*1,040*	*6,232*	*6.0*	*Centre*	*384*	*11,722*	*30,5*	*South and the Islands*	*135*	*810*	*6.0*

Source(s): Authors own work

Table 6.
Number of employees, year 2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy										
Average	3.85	2.06	2.08	1.91	2.38	2.65	3.00	3.13	2.92	2.65
Standard error	0.41	0.43	0.36	0.38	0.34	0.33	0.32	0.33	0.33	0.33
Median	1.34	0.94	0.90	1.02	1.24	1.45	1.60	1.93	2.00	1.80
Fashion	0.00	0.69	0.06	0.01	0.13	0.01	0.07	0.08	0.05	0.37
Standard deviation	16.35	17.13	14.19	15.17	13.38	13.08	12.51	13.01	13.18	13.16
Sample variance	267.39	293.52	201.41	230.24	179.04	170.97	156.41	169.36	173.68	173.13
Kurtosis	17.98	21.73	16.77	15.86	34.19	18.47	20.46	26.32	32.64	33.45
Asymmetry	0.09	−2.01	−0.88	−1.29	−2.65	−0.42	−1.34	−1.25	−2.70	−2.52
Range	268.24	230.32	220.27	219.71	219.82	214.90	220.92	252.71	232.96	242.45
Minimum	−130.09	−135.77	−125.79	−138.53	−147.53	−114.35	−133.28	−119.67	−135.76	−148.28
Maximum	138.15	94.55	94.48	81.18	72.29	100.55	87.64	133.04	97.20	94.17
Sum	6007.61	3211.14	3243.95	2983.09	3711.33	4127.90	4677.40	4882.73	4549.42	4137.29
Count	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559
North										
Average	3.76	2.15	2.11	2.14	2.70	2.76	3.34	3.44	3.16	2.39
Standard error	0.51	0.53	0.47	0.49	0.39	0.42	0.38	0.38	0.35	0.44
Median	1.50	1.22	1.08	1.32	1.44	1.64	1.85	2.18	2.12	1.82
Fashion	0.83	0.17	0.06	0.10	0.13	0.01	0.07	0.08	0.32	0.37
Standard deviation	16.43	17.18	15.03	15.94	12.63	13.47	12.30	12.28	11.40	14.07
Sample variance	269.79	295.02	226.00	253.96	159.40	181.54	151.39	150.76	129.95	197.91
Kurtosis	16.32	20.29	17.88	16.18	30.34	19.43	14.13	18.34	23.78	34.27
Asymmetry	−0.68	−1.81	−1.30	−1.18	−1.94	−0.90	−1.15	−1.63	−1.77	−3.12
Range	217.39	230.32	220.27	219.71	211.81	214.90	155.57	186.94	183.30	231.03
Minimum	−130.09	−135.77	−125.79	−138.53	−141.05	−114.35	−87.42	−110.14	−112.57	−148.28
Maximum	87.30	94.55	94.48	81.18	70.76	100.55	68.15	76.80	70.73	82.75
Sum	3907.02	2232.06	2199.49	2221.51	2803.39	2868.64	3475.26	3575.41	3290.98	2486.40
Count	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
Centre										
Average	3.61	1.68	2.11	1.63	1.62	2.47	2.31	2.55	2.49	3.00
Standard error	0.82	0.91	0.64	0.68	0.84	0.67	0.62	0.82	0.83	0.57
Median	0.96	0.64	0.62	0.75	0.92	1.21	1.01	1.58	1.80	1.59
Fashion	0.28	0.69	0.06	0.78	0.53	0.81	0.33	−1.44	0.81	1.37
Standard deviation	16.15	17.91	12.56	13.37	16.54	13.07	12.08	16.07	16.18	11.14
Sample variance	260.81	320.84	157.67	178.74	273.59	170.85	145.93	258.14	261.66	124.17
Kurtosis	25.98	25.84	8.45	13.70	30.90	14.83	13.58	28.88	30.30	19.04
Asymmetry	1.32	−2.58	0.85	−1.67	−3.36	0.73	0.73	−0.67	−2.50	0.99
Range	248.34	221.86	131.56	153.96	219.82	149.36	155.62	252.71	232.96	162.08
Minimum	−110.19	−133.31	−61.37	−97.19	−147.53	−64.20	−67.98	−119.67	−135.76	−67.91
Maximum	138.15	88.55	70.19	56.77	72.29	85.16	87.64	133.04	97.20	94.17
Sum	1385.81	646.81	811.42	624.21	621.29	947.70	885.58	980.80	955.66	1150.25
Count	384	384	384	384	384	384	384	384	384	384
South										
Average	5.29	2.46	1.73	1.02	2.12	2.31	2.34	2.42	2.24	3.71
Standard error	1.41	1.24	1.01	1.20	0.67	0.82	1.29	0.67	1.39	0.95
Median	1.56	0.89	0.76	0.69	0.71	0.91	1.51	1.48	1.82	2.07
Fashion	0.00	0.89	0.16	−1.96	2.90	−1.84	0.48	0.15	1.82	0.70
Standard deviation	16.41	14.41	11.77	13.99	7.83	9.57	15.00	7.75	16.20	11.02
Sample variance	269.27	207.61	138.60	195.60	61.26	91.63	224.96	60.11	262.44	121.50
Kurtosis	10.18	12.98	11.57	11.73	7.30	11.42	50.88	4.57	34.23	23.43
Asymmetry	2.68	−1.30	−0.01	−1.62	1.34	1.60	−5.23	−0.75	−4.93	−2.15
Range	122.57	133.80	116.42	124.77	62.93	96.05	183.03	57.62	148.23	120.54
Minimum	−31.88	−74.93	−54.98	−75.80	−19.90	−35.99	−133.28	−34.57	−111.96	−77.04
Maximum	90.69	58.87	61.44	48.97	43.03	60.06	49.75	23.05	36.27	43.50
Sum	714.78	332.27	233.04	137.37	286.65	311.56	316.56	326.52	302.78	500.64
Count	135	135	135	135	135	135	135	135	135	135

Source(s): Authors own work

Table 7.
ROE – statistical data

fluctuating trend. The North is the only one to record a decline in ROE in the last year of the decade under review.

The data were subjected to the ANOVA test to better measure and evaluate the differences between the areas (Table 9).

The variance shows an F-value of 0.84, which is lower than F (3.35): No statistically significant differences exist between the areas examined. Therefore, there would be no need for the post-Anova test, which occurs later on, for appropriate verification.

6.2 The evolution of ROI (return on investment)
ROI [Operating income/(Shareholders' equity + Bonds + Long-term liabilities to banks + Long-term liabilities to shareholders + Long-term liabilities to shareholders] is a

		R^2
North	$y = 0.0003x^6 – 0,0097x^5 + 0.1409x^4 – 1.0459x^3 + 4.2668x^2 – 8.8955x + 9.3227$	0.9861
Centre	$y = 0.0008x^6 – 0.0266x^5 + 0.3491x^4 – 2.3075x^3 + 8.1052x^2 – 14.356x + 11.813$	0.8877
South	$y = 1E\text{-}04x^6 – 0.002x^5 + 0.0186x^4 – 0,188x^3 + 1.6301x^2 – 6.5222x + 10.344$	0.9726
Italy	$y = 0.0004x^6 – 0.0147x^5 + 0.2001x^4 – 1.3988x^3 + 5.3476x^2 – 10.546x + 10.251$	0.9812
Source(s): Authors own work		

Table 8.
ROE – interpolation equation

Figure 2.
ROE – Trend 2011–2020
Source(s): Authors own work
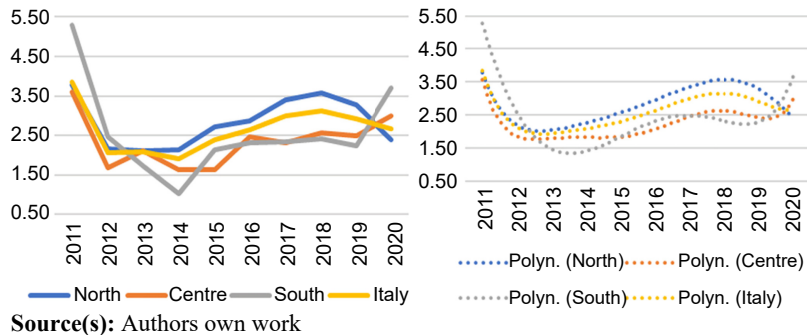
Riepilogo				
Groups	*Count*	*Sum*	*Average*	*Variance*
North	10	28.40,824	2.840824	0.403715318
Centre	10	23.46232	2.346232	0.404209632
South	10	25.6457	2.56457	1.366922036

ANOVA						
Source of variance	*SQ*	*dof*	*MQ*	*F*	*p-value*	*F-crit*
Between groups	1.228696	2	0.614348	0.847436198	0.439595052	3.35413083
Within groups	19.573623	27	0.724949			
Total	20.802319	29				
Source(s): Authors own work						

Table 9.
ROE – ANOVA test

summary percentage indicator of the effectiveness and efficiency of operations. It is often compared with the cost of capital: ROI should be higher than the prevailing interest in financial markets to have a positive effect from "leverage" (Tieghi and Gigli, 2009). Descriptive statistics are given in Table 10.

Also, for the ROI, the interpolating function used is the polynomial of degree 6. The R^2 coefficient varies from 0.79 to 0.96, so the constructed polynomial proxies are statistically quite significant (Table 11).

A graphical representation of the trend is shown in Figure 3.

The sector has a good operating return on invested capital everywhere. The North, the Centre and the South have equally satisfactory values with similar development trends. The presence of any statistically significant differences between the three macro-areas is then verified with the ANOVA test (Table 12).

Here again, the null hypothesis H0 is established, and thus the absence of statistically significant differences between the three geographical areas under consideration, as the F-value of 1.19 is lower than the critical F-value of 3.35. There would therefore be no need for the post-Anova test, which, in any case, occurs later on for appropriate verification.

6.3 Evolution of the financial independence ratio

The financial independence ratio shows the relationship between venture capital and investments and, thus, the percentage the company depends on or is independent of debt capital. Exactly the formula used is (Equity/Total Assets) * 100. The results of this study are given in Table 13.

Table 14 shows the equations needed to obtain the interpolating trend curves and, with R^2, their representative effectiveness.

The equations show that the R^2 value for the Centre is close to 1: the trend is statistically significant. For the North and South, however, it only approximates the broken line well. This trend is graphically expressed in Figure 4.

The index of financial independence shows an increasing trend for the Centre, while for the South and North, it is unstable. The measurement and evaluation of the difference between the groups are entrusted to the ANOVA test (Table 15).

The analysis of variance shows that the F-value (13.14) is higher than the critical F-value (3.35). The post-Anova test, later presented, is required.

6.4 Evolution of the current ratio

The current ratio assesses a company's working capital by measuring the ratio of its current assets to its current liabilities. It shows the company's ability to meet its short-term liabilities with its short-term liquid assets, which consist of inventory, receivables due within 12 months, and cash.

A desirable ratio greater than 1 indicates that short-term assets are greater than readily collectable liabilities. The results of the quantitative analysis are given in Table 16.

Table 17 shows the equations needed to obtain the interpolating trend curves and, with R^2, their representative effectiveness.

The chosen functions of the different geographical areas are effective, as the R^2 value is close to 1. Figure 5 shows the growth of the current index in the analysed decade.

The values in the different geographical areas started at around 1 in 2011, an increase over the years, and settled in the vicinity of 1.90 in 2020.

The measurement and evaluation of the difference between the groups are entrusted to the ANOVA test (Table 18).

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy										
Average	3.68	3.28	3.19	3.17	3.40	3.39	3.42	3.69	3.54	3.01
Standard error	0.13	0.13	0.14	0.14	0.13	0.14	0.14	0.14	0.14	0.14
Median	2.56	2.33	2.18	2.24	2.43	2.42	2.38	2.55	2.38	2.01
Fashion	0.76	0.37	2.23	−0.09	2.12	0.56	1.49	1.87	1.87	1.49
Standard deviation	5.33	5.11	5.40	5.35	5.28	5.35	5.50	5.35	5.44	5.50
Sample variance	28.38	26.08	29.12	28.65	27.91	28.63	30.20	28.68	29.62	30.27
Kurtosis	3.69	4.55	5.18	4.47	5.77	6.05	4.53	3.94	3.92	7.15
Asymmetry	1.21	0.83	0.98	0.83	1.07	0.64	0.65	1.12	0.94	0.59
Range	47.37	51.63	56.35	49.80	58.76	57.07	57.40	52.28	49.69	58.82
Minimum	−18.54	−23.09	−26.93	−21.39	−29.14	−27.22	−27.98	−23.88	−20.11	−28.98
Maximum	28.83	28.54	29.42	28.41	29.62	29.85	29.42	28.40	29.58	29.84
Sum	5737.72	5118.28	4976.47	4941.87	5306.18	5284.63	5330.51	5755.12	5512.38	4693.67
Count	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559
North										
Average	3.78	3.34	3.36	3.23	3.52	3.55	3.58	3.81	3.51	2.82
Standard error	0.17	0.16	0.17	0.17	0.16	0.16	0.17	0.17	0.17	0.17
Median	2.74	2.45	2.29	2.34	2.59	2.50	2.50	2.63	2.41	2.01
Fashion	0.96	1.26	1.32	−0.09	2.12	0.56	1.49	1.05	0.01	0.86
Standard deviation	5.52	5.15	5.62	5.42	5.28	5.23	5.64	5.38	5.36	5.60
Sample variance	30.46	26.51	31.60	29.41	27.87	27.31	31.80	28.95	28.68	31.32
Kurtosis	3.57	4.47	4.94	4.22	5.44	5.31	4.84	3.87	3.98	7.83
Asymmetry	1.18	0.78	0.85	0.64	1.09	0.94	0.61	1.23	0.91	0.17
Range	47.15	51.63	56.35	49.80	56.15	55.49	57.40	45.34	48.33	58.82
Minimum	−18.54	−23.09	−26.93	−21.39	−26.53	−25.64	−27.98	−16.94	−20.11	−28.98
Maximum	28.61	28.54	29.42	28.41	29.62	29.85	29.42	28.40	28.22	29.84
Sum	3935.92	3472.42	3496.87	3362.65	3658.09	3689.61	3722.55	3961.02	3646.66	2931.75
Count	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
Centre										
Average	3.58	3.05	2.87	3.11	3.25	3.14	3.02	3.46	3.33	3.16
Standard error	0.25	0.24	0.26	0.27	0.27	0.29	0.27	0.27	0.28	0.27
Median	2.28	2.14	1.80	2.11	2.19	2.23	2.13	2.40	2.13	1.99
Fashion	1.20	0.90	0.22	0.32	0.83	3.29	2.13	1.87	0.72	1.84
Standard deviation	4.91	4.64	5.02	5.33	5.34	5.77	5.30	5.29	5.51	5.25
Sample variance	24.09	21.50	25.20	28.43	28.47	33.33	28.08	28.03	30.35	27.61
Kurtosis	3.87	3.29	5.82	4.61	6.34	7.56	4.05	4.81	3.75	5.90
Asymmetry	1.27	0.79	1.32	0.96	0.65	−0.18	0.66	0.84	0.68	1.65
Range	44.29	39.82	44.44	43.18	57.04	56.97	47.12	51.18	48.24	42.63
Minimum	−15.46	−13.82	−15.83	−17.02	−29.14	−27.22	−19.80	−23.88	−19.56	−13.32
Maximum	28.83	26.00	28.61	26.16	27.90	29.75	27.32	27.30	28.68	29.31
Sum	1376.61	1170.93	1100.35	1194.97	1247.17	1205.84	1158.35	1327.30	1278.89	1215.02
Count	384	384	384	384	384	384	384	384	384	384
South										
Average	3.15	3.52	2.81	2.85	2.97	2.88	3.33	3.46	4.35	4.05
Standard error	0.43	0.52	0.39	0.42	0.44	0.43	0.42	0.46	0.50	0.46
Median	1.90	1.90	1.97	1.60	1.64	2.14	2.22	2.17	2.51	2.42
Fashion	−2.37	0.70	4.09	0.35	5.14	2.71	1.08	0.65	2.03	−0.12
Standard deviation	4.95	6.00	4.57	4.87	5.16	5.02	4.87	5.34	5.87	5.36
Sample variance	24.53	36.04	20.88	23.70	26.65	25.24	23.67	28.52	34.41	28.74
Kurtosis	3.78	5.46	4.85	7.58	7.72	4.50	1.60	2.24	3.67	3.49
Asymmetry	1.22	1.03	1.26	2.32	2.32	1.69	0.89	1.04	1.72	1.53
Range	33.57	49.21	36.81	32.34	35.92	31.56	26.65	31.89	34.51	36.03
Minimum	−12.20	−22.70	−13.57	−5.54	−8.26	−7.55	−8.69	−8.65	−4.93	−11.23
Maximum	21.37	26.51	23.24	26.80	27.66	24.01	17.96	23.24	29.58	24.80
Sum	425.19	474.93	379.25	384.25	400.92	389.18	449.61	466.80	586.83	546.90
Count	135	135	135	135	135	135	135	135	135	135

Table 10.
ROI – statistical data

Source(s): Authors own work

From the analysis of variance, the F-value of 0.63 is lower than the critical F-value of 3.35. Therefore, the post-Anova test would not be necessary because there are no statistically significant differences between the areas.

6.5 Evolution of the coverage ratio of fixed assets
This ratio is used to verify the existence of a structural balance between permanent or long-term sources of financing (equity capital and consolidated debt) and fixed assets. The formula is thus: (Equity + Medium- and long-term debt)/Net-fixed assets.

It indicates the share of the net value of fixed assets abstractly financed by consolidated equity and debt. In other words, the ratio indicates the extent to which long-term financing sources cover long-term investments. It is desirable that long-term sources fully cover permanent investments and tied stocks.

		R^2
North	$y = 4E\text{-}05x^6 - 0.0009x^5 + 0.0031x^4 + 0.0576x^3 - 0.6244x^2 + 2.1725x + 1.2059$	0.945
Centre	$y = -7E\text{-}05x^6 + 0.0034x^5 - 0.0563x^4 + 0.4456x^3 - 1.7549x^2 + 3.1615x + 1.3489$	0.7984
South	$y = -0.0008x^6 + 0.0276x^5 - 0.3591x^4 + 2.3248x^3 - 7.7243x^2 + 11.752x - 1.9667$	0.9628
Italy	$y = -6E\text{-}05x^6 + 0.0015x^5 - 0.0119x^4 + 0.0154x^3 + 0.2415x^2 - 1.102x + 4.538$	0.9371
Source(s): Authors own work		

Table 11.
ROI –interpolation equation
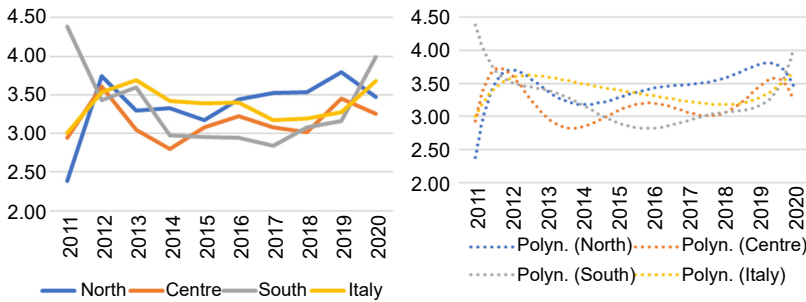
Source(s): Authors own work

Figure 3.
ROI – Trend
2011–2020

Riepilogo Groups	Count	Sum	Average	Variance
North	10	34.49763	3.449763	0.082191
Centre	10	31.96727	3.196727	0.046005
South	10	33.36193	3.33693	0.274754

ANOVA Source of variance	SQ	dof	MQ	F	p-value	F-crit
Between groups	0.321256	2	0.160628	1.195888	0.317952	3.354131
Within groups	3.626557	27	0.134317			
Total	3.947813	29				
Source(s): Authors own work						

Table 12.
ROI – ANOVA test

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy										
Average	43.03	43.84	44.87	45.76	46.54	47.36	48.51	49.26	50.04	54.72
Standard error	0.68	0.66	0.66	0.65	0.64	0.64	0.64	0.64	0.64	0.64
Median	40.63	42.14	43.61	44.46	45.58	46.64	48.17	48.83	49.94	56.06
Fashion	74.11	7.03	52.72	5.42	38.79	10.57	76.19	40.30	28.97	65.41
Standard deviation	26.67	26.22	25.92	25.55	25.17	25.33	25.39	25.33	25.28	25.19
Sample variance	711.42	687.33	671.85	652.82	633.71	641.65	644.50	641.50	639.15	634.76
Kurtosis	-0.94	-0.97	-0.95	-0.93	-0.92	-0.96	-0.99	-0.98	-0.96	-0.91
Asymmetry	0.27	0.24	0.22	0.17	0.13	0.10	0.06	0.03	0.00	-0.21
Range	131.70	98.80	99.30	99.00	99.00	98.81	98.80	98.78	99.55	98.56
Minimum	-32.49	0.34	0.38	0.36	0.26	0.18	0.17	0.18	0.18	0.66
Maximum	99.21	99.14	99.68	99.36	99.26	98.99	98.97	98.96	99.73	99.22
Sum	67082.14	68340.58	69957.28	71345.23	72558.86	73839.19	75633.53	76800.09	78019.43	85312.40
Count	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559
North										
Average	43.16	43.76	44.80	45.56	46.51	47.55	48.98	49.96	50.71	55.44
Standard error	0.82	0.81	0.80	0.79	0.77	0.78	0.79	0.79	0.79	0.78
Median	40.75	41.72	43.36	44.47	45.42	46.80	48.42	49.23	50.95	57.00
Fashion	74.11	54.79	45.75	70.00	26.59	62.60	75.68	59.33	28.97	95.95
Standard deviation	26.58	26.06	25.87	25.43	24.99	25.29	25.37	25.41	25.34	25.09
Sample variance	706.57	679.36	669.37	646.72	624.31	639.83	643.60	645.70	642.03	629.53
Kurtosis	-0.95	-0.94	-0.92	-0.91	-0.90	-0.95	-0.99	-0.98	-0.97	-0.85
Asymmetry	0.29	0.25	0.23	0.18	0.13	0.09	0.04	0.02	-0.01	-0.26
Range	98.97	98.80	99.30	98.75	99.00	98.81	98.80	98.48	98.67	98.15
Minimum	0.14	0.34	0.38	0.36	0.26	0.18	0.17	0.18	0.18	1.07
Maximum	99.11	99.14	99.68	99.11	99.26	98.99	98.97	98.66	98.85	99.22
Sum	44882.08	45510.55	46590.42	47382.80	48368.52	49448.19	50940.55	51961.46	52741.24	57653.04
Count	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
Centre										
Average	43.18	44.32	45.52	46.68	47.06	47.46	47.92	48.06	49.18	53.95

(*continued*)

Table 13.
Financial
independence ratio –
statistical data

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Standard error	1.41	1.38	1.36	1.33	1.32	1.32	1.31	1.30	1.30	1.30
Median	41.13	42.71	44.38	44.81	46.14	45.88	46.70	47.95	48.53	54.55
Fashion	44.95	19.78	27.49	45.12	38.43	37.03	27.89	85.48	45.16	78.26
Standard deviation	27.60	27.09	26.58	26.13	25.95	25.82	25.75	25.44	25.42	25.44
Sample variance	761.82	733.85	706.49	682.82	673.46	666.46	663.16	647.27	646.39	647.39
Kurtosis	-0.96	-1.07	-1.03	-0.98	-0.94	-0.98	-0.99	-0.94	-0.93	-0.99
Asymmetry	0.22	0.22	0.19	0.17	0.15	0.12	0.10	0.05	0.01	-0.14
Range	131.70	98.12	98.73	98.82	98.42	98.22	97.67	98.45	99.22	98.45
Minimum	-32.49	0.58	0.51	0.54	0.53	0.36	0.52	0.51	0.51	0.66
Maximum	99.21	98.70	99.24	99.36	98.95	98.58	98.19	98.96	99.73	99.11
Sum	16579.88	17017.03	17478.36	17923.79	18071.56	18224.93	18400.02	18454.31	18886.26	20718.68
Count	384	384	384	384	384	384	384	384	384	384
South										
Average	41.63	43.06	43.62	44.73	45.32	45.67	46.61	47.29	47.35	51.41
Standard error	2.13	2.15	2.11	2.14	2.11	2.09	2.11	2.09	2.10	2.16
Median	40.30	42.25	43.33	43.26	45.69	46.59	50.60	49.52	47.99	50.92
Fashion	21.08	#N/D	24.98	53.45	22.74	68.89	85.39	#N/D	54.48	30.85
Standard deviation	24.77	25.00	24.48	24.91	24.50	24.32	24.52	24.29	24.35	25.14
Sample variance	613.43	625.03	599.32	620.32	600.21	591.30	601.44	590.17	592.72	631.97
Kurtosis	-0.92	-0.99	-0.90	-0.98	-0.99	-0.96	-1.04	-1.08	-1.02	-1.07
Asymmetry	0.19	0.18	0.17	0.08	0.09	0.11	0.01	-0.01	0.00	-0.09
Range	91.61	89.09	90.41	92.08	93.71	90.76	90.52	92.05	92.63	96.27
Minimum	0.13	1.45	1.34	0.96	1.02	3.88	3.40	2.56	1.18	0.66
Maximum	91.74	90.54	91.75	93.04	94.73	94.64	93.92	94.61	93.81	96.93
Sum	5620.18	5813.00	5888.50	6038.64	6118.78	6166.07	6292.96	6384.32	6391.93	6940.68
Count	135	135	135	135	135	135	135	135	135	135

Source(s): Authors own work

Table 13.

The results of the calculations are given in Table 19.

Table 20 shows the equations needed to obtain the interpolating trend curves and, with R^2, their representative effectiveness.

The functions of the North and South are expressive, as the R^2 value is close to 1. On the other hand, that of the Centre is unrepresentative, as the R^2 value is only 0.5495.

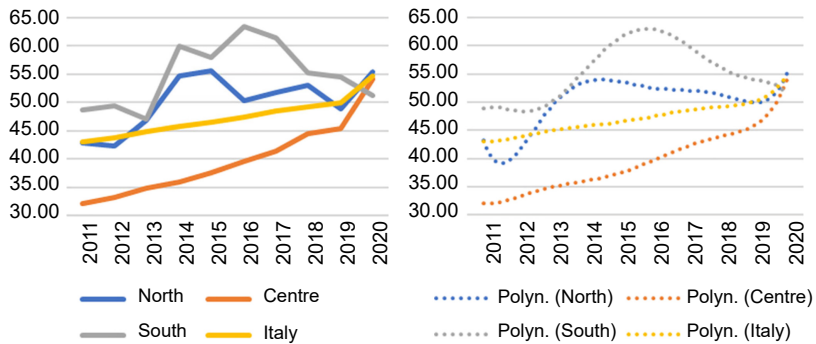The ten-year trend of the ratio is presented graphically in Figure 6.

The value of the index is fairly constant in the North and Centre. However, the South is graphically distant from the other geographical areas, with higher values that demonstrate a better structural balance than the rest of the nation.

		R^2
North	$y = 0.0058x^6 - 0.2002x^5 + 2.7474x^4 - 18.804x^3 + 65.525x^2 - 102.41x + 96.312$	0.8995
Centre	$y = 0.0023x^6 - 0.0695x^5 + 0.8226x^4 - 4.7519x^3 + 13,907x^2 - 17.778x + 39.98$	0.9973
South	$y = -0.0043x^6 + 0.1432x^5 - 1.795x^4 + 10.487x^3 - 28.6x^2 + 34.685x + 33.964$	0.8587
Italy	$y = 0.0011x^6 - 0.0345x^5 + 0.4097x^4 - 2.3891x^3 + 7.0718x^2 - 8.8898x + 46.869$	0.9997

Table 14.
Financial
independence ratio
–interpolation equation **Source(s):** Authors own work

Figure 4.
Financial
independence ratio –
trend 2011–2020

Source(s): Authors own work

Riepilogo					
Groups	Count	Sum	Average		Variance
North	10	494.08	49.408		20.92202
Centre	10	391.01	39,101		26.9233
South	10	532.55	53.255		74.37523

ANOVA						
Source of variance	SQ	dof	MQ	F	p-value	F crit
Between groups	1071.231	2	535.6156	13.14711	0.000103	3.354131
Within groups	1099.985	27	40.74018			
Total	2171.216	29				

Table 15.
Financial
independence
ratio –ANOVA

Source: Authors own work

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy										
Average	1.33	1.25	1.30	1.36	1.36	1.43	1.51	1.57	1.59	1.88
Standard error	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
Median	0.85	0.83	0.85	0.87	0.86	0.93	0.95	1.02	1.03	1.23
Fashion	0.10	0.23	0.07	0.20	0.06	0.09	0.30	0.33	0.09	0.10
Standard deviation	1.55	1.40	1.49	1.50	1.50	1.53	1.64	1.70	1.72	1.89
Sample variance	2.39	1.96	2.22	2.25	2.26	2.35	2.67	2.88	2.95	3.57
Kurtosis	5.85	7.35	7.60	4.84	4.68	4.78	4.55	4.54	4.50	2.90
Asymmetry	2.27	2.39	2.45	2.05	1.99	1.99	2.00	2.00	1.99	1.71
Range	9.86	9.99	9.74	9.24	9.78	9.87	9.94	9.78	9.78	9.77
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Maximum	9.86	9.99	9.74	9.24	9.78	9.87	9.95	9.78	9.78	9.78
Sum	2068.46	1953.37	2030.69	2114.47	2118.30	2223.91	2347.30	2445.14	2472.68	2923.33
Count	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559
North										
Average	1.29	1.25	1.32	1.32	1.33	1.39	1.50	1.61	1.60	1.90
Standard error	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
Median	0.86	0.84	0.87	0.86	0.85	0.91	0.96	1.06	1.03	1.24
Fashion	0.10	0.13	0.07	0.24	0.06	0.18	0.10	0.33	0.12	0.08
Standard deviation	1.47	1.38	1.53	1.47	1.47	1.52	1.62	1.76	1.72	1.93
Sample variance	2.16	1.89	2.34	2.15	2.15	2.30	2.62	3.09	2.96	3.74
Kurtosis	5.92	5.93	8.06	5.47	4.49	5.48	4.37	4.28	4.14	2.83
Asymmetry	2.23	2.21	2.52	2.12	1.97	2.10	1.97	1.97	1.92	1.69
Range	9.86	9.20	9.73	9.24	9.14	9.58	9.76	9.76	9.74	9.77
Minimum	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Maximum	9.86	9.20	9.74	9.24	9.14	9.58	9.77	9.76	9.74	9.78
Sum	1345.09	1302.60	1368.81	1373.48	1386.73	1445.03	1556.41	1670.99	1659.31	1972.72
Count	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040
Centre										
Average	1.44	1.28	1.30	1.47	1.46	1.53	1.55	1.50	1.56	1.82
Standard error	0.09	0.07	0.07	0.08	0.08	0.08	0.09	0.08	0.09	0.09
Median	0.85	0.84	0.85	0.94	0.91	1.05	1.01	0.99	1.07	1.26
Fashion	0.72	0.33	0.83	1.00	0.11	0.07	0.30	0.27	0.09	0.37
Standard deviation	1.71	1.46	1.41	1.59	1.61	1.56	1.67	1.60	1.70	1.76
Sample variance	2.92	2.12	2.00	2.54	2.60	2.43	2.79	2.56	2.88	3.08
Kurtosis	4.80	10.22	5.71	3.72	5.16	4.40	4.69	5.61	5.54	2.78
Asymmetry	2.18	2.73	2.18	1.88	2.05	1.90	2.07	2.13	2.18	1.66
Range	8.94	9.98	9.04	8.91	9.77	9.87	9.60	9.76	9.67	8.97
Minimum	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.02	0.00	0.01
Maximum	8.94	9.99	9.04	8.92	9.78	9.87	9.61	9.78	9.67	8.98
Sum	552.78	491.23	499.59	565.20	560.44	588.04	594.28	576.39	600.95	700.02
Count	384	384	384	384	384	384	384	384	384	384
South										
Average	1.26	1.18	1.20	1.30	1.27	1.41	1.46	1.46	1.57	1.86
Standard error	0.14	0.12	0.12	0.13	0.12	0.14	0.14	0.13	0.15	0.16
Median	0.75	0.70	0.82	0.82	0.83	0.73	0.78	1.01	0.93	1.20
Fashion	0.17	0.11	1.20	0.47	0.04	0.28	0.07	0.32	0.22	3.62
Standard deviation	1.63	1.44	1.38	1.48	1.44	1.59	1.66	1.48	1.76	1.91
Sample variance	2.66	2.08	1.90	2.18	2.07	2.53	2.75	2.20	3.09	3.66
Kurtosis	7.72	8.41	7.62	4.34	3.37	1.70	5.80	2.72	4.93	3.40
Asymmetry	2.67	2.69	2.51	2.08	1.93	1.57	2.14	1.68	2.09	1.87
Range	8.75	8.28	7.97	7.74	6.72	6.86	9.93	7.58	9.75	9.42
Minimum	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.03	0.02
Maximum	8.77	8.29	7.98	7.75	6.73	6.87	9.95	7.58	9.78	9.44
Sum	170.59	159.54	162.29	175.79	171.13	190.84	196.61	197.76	212.42	250.59
Count	135	135	135	135	135	135	135	135	135	135

Source(s): Authors own work

Table 16.
Current ratio –
statistical data

The measurement and evaluation of the difference between the groups are entrusted to the ANOVA test (Table 21).

The F-value of 17.7 is higher than the critical F-value of 3.35, so the H0 hypothesis is accepted. With the post-ANOVA test, it is necessary to determine which areas the most significant differences occur.

7. Tukey–Kramer test

The geographical location of companies affects some financial and asset balances but not profitability, as the previously proposed ANOVA tests showed. The post-ANOVA test would

		R^2
North	$y = 0.0002x^6 - 0.0061x^5 + 0.0814x^4 - 0.5358x^3 + 1.8143x^2 - 3.0262x + 3.5676$	0.9839
Centre	$y = 6E\text{-}05x^6 - 0.002x^5 + 0.0284x^4 - 0.2062x^3 + 0.8037x^2 - 1.6316x + 2.8662$	0.9978
South	$y = 5E\text{-}05x^6 - 0.0016x^5 + 0.0217x^4 - 0.1598x^3 + 0.657x^2 - 1.3977x + 2.7042$	0.9758
Italy	$y = 0.0001x^6 - 0.0046x^5 + 0.0621x^4 - 0.4147x^3 + 1.4417x^2 - 2.5043x + 3.2942$	0.9987

Table 17.
Current ratio
–interpolation equation **Source(s):** Authors own work
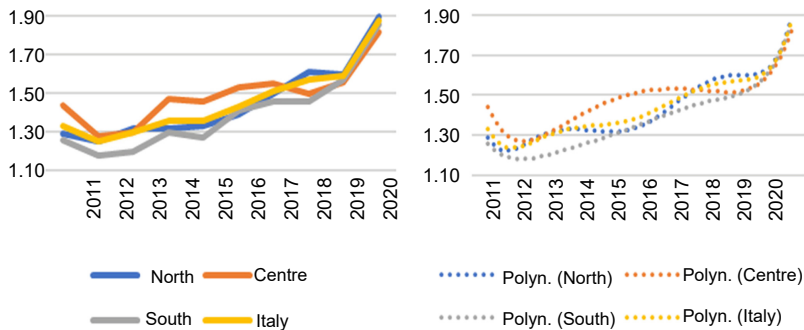
Figure 5.
Current ratio – trend
2011–2020

Source(s): Authors own work

Summary				
Groups	Count	Sum	Average	Variance
North	10	14.501125	14.5011125	0.040335149
Centre	10	13.98192593	1.398192593	0.042026211
South	10	14.9190625	1.49190625	0.022838076

ANOVA						
Source of variance	SQ	dof	MQ	F	p-value	F Crit
Between groups	0.044082	2	0.022041	0.628551	0.540988	3.354131
Within groups	0.946795	27	0.035066			
Total	0.990877	29				

Table 18.
Current ratio
– ANOVA **Source(s):** Authors own work

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Italy										
Average	3.92	3.56	4.24	3.77	3.23	3.03	2.70	2.37	2.41	3.09
Standard error	0.76	0.56	0.92	0.83	0.59	0.55	0.37	0.32	0.35	0.56
Median	0.97	0.97	0.97	0.97	0.97	0.98	0.98	0.99	0.99	1.01
Fashion	0.97	0.97	1.00	1.01	1.00	1.01	0.99	0.99	1.00	1.00
Standard deviation	29.90	22.05	36.42	32.76	23.32	21.55	14.42	12.58	13.89	22.19
Sample variance	893.86	486.41	1326.66	1073.44	543.97	464.58	207.88	158.19	192.91	492.51
Kurtosis	397.19	223.88	377.61	582.72	427.54	702.47	154.26	246.47	324.20	326.21
Asymmetry	17.82	13.68	18.32	22.09	18.97	23.51	11.95	14.86	16.81	17.16
Range	813.07	475.54	843.78	986.79	616.07	696.41	229.99	247.23	316.65	510.45
Minimum	0.00	0.02	0.03	0.04	0.04	0.03	0.03	0.02	0.02	0.01
Maximum	813.07	475.56	843.81	986.83	616.11	696.44	230.02	247.25	316.67	510.46
Sum	6103.41	5539.38	6613.64	5871.11	5029.52	4724.30	4202.77	3698.41	3750.63	4813.33
Count	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559	1,559
North										
Average	55.43562	4.957459	4.133295	5.593971	4.647981	4.053388	3.706121	3.045313	2.510885	2.530942
Standard error	0.778022	1.119595	0.795741	1.37662	1.213152	0.871262	0.799764	0.471269	0.361382	0.417357
Median	56.995	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.99	0.99
Fashion	95.95	1.01	0.97	1	0.99	0.99	1.01	0.99	0.99	1
Standard deviation	25.09045	36.0885	25.63719	44.39466	39.12298	28.08385	25.7792	15.19067	11.65422	13.45936
Sample variance	629.53	1302.38	657.27	1970.89	1530.61	788.70	664.57	230.76	135.82	181.15
Kurtosis	-0.85144	277.8972	179.8428	254.2312	426.4942	302.1564	511.9273	127.083	216.9937	332.6002
Asymmetry	-0.25723	15.02097	12.49135	15.0809	19.12933	16.07424	20.32959	10.71889	13.51971	16.57158
Range	98.15	813.04	475.52	843.78	986.79	616.07	696.4	229.99	224.2	316.59
Minimum	1.07	0.03	0.04	0.03	0.04	0.04	0.04	0.03	0.06	0.08
Maximum	99.22	813.07	475.56	843.81	986.83	616.11	696.44	230.02	224.26	316.67
Sum	57653.04	5150.8	4290.36	5817.73	4833.9	4211.47	3850.66	3164.08	2611.32	2632.18
Count	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,040

(continued)

Table 19.
Coverage ratio of fixed assets – statistical data

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Centre										
Average	1.92	2.57	1.44	1.98	1.36	1.52	1.77	1.78	1.73	1.81
Standard error	0.47	0.68	0.21	0.67	0.16	0.29	0.55	0.55	0.45	0.42
Median	0.97	0.97	0.97	0.97	0.98	1.00	0.99	0.99	0.99	1.01
Fashion	1.00	0.98	0.97	0.92	1.01	1.01	0.97	1.02	1.00	1.01
Standard deviation	9.21	13.36	4.14	13.07	3.19	5.72	10.71	10.82	8.80	8.22
Sample variance	84.86	178.37	17.16	170.76	10.16	32.70	114.78	117.13	77.46	67.54
Kurtosis	205.56	103.84	128.67	338.88	209.22	328.63	365.15	366.33	338.89	295.49
Asymmetry	13.57	9.93	11.04	18.03	13.45	17.59	18.90	18.95	17.97	16.43
Range	153.72	162.71	55.99	249.41	54.46	108.99	208.53	210.82	168.44	152.18
Minimum	0.00	0.02	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.01
Maximum	153.72	162.73	56.03	249.45	54.50	109.02	208.56	210.84	168.46	152.19
Sum	734.68	985.75	554.55	760.53	520.84	582.33	681.03	683.05	665.09	693.89
Count	384	384	384	384	384	384	384	384	384	384
South										
Average	1.614296	1.950148	1.787852	2.049481	2.201556	2.157852	2.649333	2.992889	3.358222	4.31563
Standard error	0.364026	0.570741	0.617181	0.888435	1.107962	1.039428	1.481905	1.825425	2.133625	3.030451
Median	0.94	0.94	0.95	0.95	0.93	0.94	0.95	0.96	0.95	0.98
Fashion	1	0.91	0.99	0.99	1	0.88	0.88	0.86	0.86	0.97
Standard deviation	4.229594	6.631416	7.170991	10.32268	12.87336	12.07706	17.21818	21.20953	24.79048	35.21066
Sample variance	17.88947	43.97568	51.42311	106.5577	165.7234	145.8555	296.4657	449.8441	614.568	1239.79
Kurtosis	56.98413	59.83946	123.6248	129.5338	133.4872	132.9457	133.9061	134.2118	134.3368	134.5978
Asymmetry	7.435333	7.692391	10.9349	11.28568	11.52394	11.49037	11.55004	11.56923	11.57702	11.59347
Range	36.51	54.77	82.65	119.81	150.19	140.69	200.54	247	288.6	409.87
Minimum	0.1	0.17	0.07	0.09	0.07	0.23	0.29	0.25	0.32	0.23
Maximum	36.61	54.94	82.72	119.9	150.26	140.92	200.83	247.25	288.92	410.1
Sum	217.93	263.27	241.36	276.68	297.21	291.31	357.66	404.04	453.36	582.61
Count	135	135	135	135	135	135	135	135	135	135

Source(s): Authors own work

Table 19.

only be necessary for the debt and fixed asset coverage ratios. However, it occurs for all five analysed ratios (Table 22).

The main statistically significant differences are evident in the debt ratio between the North and the Centre and between the Centre and the South. For the fixed asset coverage ratio, on the other hand, significant differences are noted between North and Centre and between North and South.

8. Discussion and Conclusions

8.1 Hypothesis testing

The economic importance of the real estate sector worldwide and in Italy prompted this research. In particular, it focused on the economic and financial performance of real estate companies whose activities are crucial for developing an efficient market.

		R^2
North	$y = 0.0012x^6 - 0.0375x^5 + 0.4666x^4 - 2.8872x^3 + 9.3818x^2 - 14.895x + 11.401$	0.9393
Centre	$y = 4E\text{-}05x^6 - 0.0017x^5 + 0.0298x^4 - 0.25x^3 + 1.1194x^2 - 2.9079x + 6.3166$	0.5495
South	$y = -0.0003x^6 + 0.0086x^5 - 0.0947x^4 + 0.5047x^3 - 1.3707x^2 + 1.7409x + 1.0061$	0.988
Italy	$y = 0.0001x^6 - 0.0044x^5 + 0.0555x^4 - 0.3465x^3 + 1.1197x^2 - 1.7176x + 2.2208$	0.9987

Source(s): Authors own work

Table 20.
Coverage ratio of fixed
assets –interpolation
equation
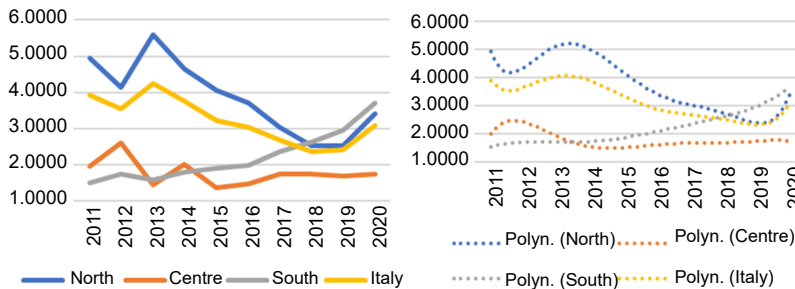
Source(s): Authors own work

Figure 6.
Coverage ratio of fixed
assets – trend
2011–2020

Summary Groups	Count	Sum	Average	Variance
North	10	38.58015	3.858015	1.047645
Centre	10	25.07726	2.507726	0.700085
South	10	17.87913	1.787913	0.116041

ANOVA Source of variance	SQ	dof	MQ	F	p-value	F Crit
Between groups	22.08912	2	11.04456	17.77777	1.18529E-05	3.354131
Within groups	16.77393	27	0.621257			
Total	38.86305	29				

Source(s): Authors own work

Table 21.
Coverage ratio of fixed
assets –ANOVA

	ROE	ROI	Financial index	Current ratio	Coverage ratio of fixed assets
Mean North	2.84	3.45	50,199	1.45	3.86
n North	10	10	10	10	10
Mean Centre	2.35	3.34	39,881	1.40	2.51
n Centre	10	10	10	10	10
Mean South	2.56	3.20	54.93	1.49	1.79
n south	10	10	10	10	10
MQ	0.72	0.13	40.74	0.04	0.62
Q statistic	3.51	3.51	3.51	3.51	3.51
Comparison of North to Centre					
Absolute difference	0.49	0.11	10.32	0.05	1.35
Critical Range	0.95	0.41	7.08	0.21	0.87
Means of North and Centre are	Not Different	Not Different	*Different*	Not different	*Different*
Comparison of North to South					
Absolute Difference	0.28	0.25	4.73	0.04	2.07
Critical Range	0.95	0.41	7.08	0.21	0.87
Means of North and South are	Not Different	Not Different	Not different	Not different	*Different*
Comparison of Centre to South					
Absolute Difference	0.22	0.14	15.05	0.09	0.72
Critical Range	0.95	0.41	7.08	0.21	0.87
Means of Centre and South are	Not different	Not Different	*Different*	Not different	Not different

Table 22.
Tukey–Kramer test

Source(s): Authors own work

Using the financial statements for the decade 2011–2020 of a sample of 1,559 companies characterised by the ATECO code 68-Real Estate Activities, the trends of two profitability ratios, ROE and ROI, and of three capital structure ratios were outlined: the financial independence ratio, the current ratio and the fixed asset coverage ratio.

Different assessments can be made concerning the economic and financial equilibrium.

The dynamics of profitability seem to be significantly affected by the general economic trend, considering that there was a sharp drop in the two-year period 2012–2014 in which Italy suffered the repercussions of the previous financial crisis that began in 2008. The 2008 crisis, whose genesis is debated (Leiser *et al.*, 2016; Barnett, 2015; Bakir and Campbell, 2015; Farmer, 2014), obviously also affected the real estate market with different effects in different countries (Chen and Leung, 2008; Newell *et al.*, 2010; Ryan, 2011) and the dynamics of real estate agencies (Lovsletten *et al.*, 2019). The subsequent two years, 2012–2014 reverberations affected some states, including Italy, due to the worsening sovereign debt crisis and the growing distrust towards it due to high public spending (Istat, 2012; Borghi, 2013). The course of the crisis had significant effects on the demand and supply of real estate, with substantial effects on the net profitability expressed by Roe. A steady recovery followed until the pandemic that accentuated a reduction that had already begun in the immediately preceding years, however, especially in northern Italy, which conditioned the national trend, despite the slight recovery recorded in the other two macro-regions.

The effects of COVID-19 also affected trading in Northern Italy, influencing the national trend, despite the positive and increasing results recorded in the Centre and South. However, zonal differences are very modest, as shown by ANOVA and post-ANOVA tests. However, values were always positive throughout the decade, albeit relatively low.

The trend in ROI only partially reflects that of ROE, with a rather articulated pattern in which the effects of the reverberations of the 2008 crisis seem to manifest themselves with relative delay. The consequences of the pandemic reduce the index in the Centre and North, while the South presents a rising national average figure, despite the restrictions. However, zonal differences are insignificant, as measured by statistical elaborations.

Overall, the first hypothesis (H1) can only be confirmed to a limited extent because profitability has fallen slightly over the last year and only in some areas of the country. Moreover, the decline was certainly less than in the years of the reverberation of the 2008 financial crisis. This also confirms the statistical evidence of the sector reported and commented on earlier.

Presumably, increases in agency fees may also have impacted the result, as they could have coped with the likely difficulties in negotiations considering the relationships established by previous studies between prices and market volumes (Lee and Lee, 2007; You *et al.*, 2014).

Quite different is the overall assessment of the company's financial structure.

The sector improves its capitalisation throughout the decade, reaching optimal values. Central Italy showed a steadily growing trend, recovering the considerable initial disadvantage and settling on values considered ideal. The North and South, on the other hand, have a fluctuating trend. However, by reducing even excessive values of equity compared to investments, they reach an area of values favourable to a correct relationship between internal and external sources. The differences between the macro-areas are statistically significant, but despite starting from even antithetical situations, they all converge toward an optimal balance between equity and debt.

This praiseworthy outcome is presumably due, for the real estate agencies alone, to the modest structural investments they require: their greatest cost is the rent of the premises, in addition to that of the employees. Generally, for all companies in the sample, the hypothesis that premises are acquired on rent rather than on property is supported by the trend of the fixed asset coverage index, which shows extremely high values: the sources of equity capital and medium to long-term debt appear excessive compared to durable investments and cover a large part of the gross working capital. It would therefore seem that there are sufficient resources to favour investments in fixed assets of various kinds. Paradoxically, it is precisely real estate companies, which are experts in the real estate market, that seem disinclined to make such investments, despite having adequate resources.

Even the evolution of the current ratio, although different in the macro-regions, shows a considerable imbalance because the values are extremely high. Short-term debt is small compared to gross current assets, which can only be partially justified considering the typical structure of a service company.

On the whole, therefore, the second hypothesis (H2) cannot be confirmed because, over time, the financial structure of the companies improves, approaching, even in the pandemic years, values considered optimal concerning the correct balance between internal and external sources.

The greatest criticalities, on the other hand, can be found in an anomalous relationship between medium-long term sources and their relative uses, and in the short term, showing excessive permanent sources compared to actual needs.

The financial structure analysis shows the most remarkable differences between the various geographical areas, especially concerning debt and fixed asset coverage ratios. On the whole, however, despite the considerable economic and social differences that characterise the Italian macro-regions, few differences were found between them. The third hypothesis (H3), therefore, cannot be considered confirmed.

8.2 Implications for science

This research implements the growing reflection of scholars on the effects of the pandemic crisis on the real estate market (Taşan-Kok *et al.*, 2021; Damianov and Escobari, 2021; Horno-Bueno *et al.*, 2022), highlighting the consequences of the spread of distance working on the real estate market (Gupta *et al.*, 2022; Chmielewska *et al.*, 2022; Micelli and Righetto, 2022), the effects of panic (Karthiyaini *et al.*, 2020) and the more modest impact of public interventions (Pilinkiene *et al.*, 2021).

This article favoured comparisons across continents (Jovanović-Milenković *et al.*, 2020) and countries, adding Italy to studies on China (Zhang and Wang, 2010; Huang *et al.*, 2022), Poland (Kowalski *et al.*, 2023; Marona and Tomal, 2020), Indonesia (Oey and Lim, 2020), Zambia (Munshifwa *et al.*, 2021), India (Karthiyaini *et al.*, 2020), Thailand (Khuntaweetep and Koowattanatianchai, 2022), etc. It was more difficult to compare with other studies related to Italy, although valuable (Avallone and Quagli, 2015; Mattarocci and Scimone, 2021; Gabrielli *et al.*, 2022) because the methodology used was different. This article also facilitated further comparisons between the two recent major economic crises, the financial crisis of 2008 and the pandemic of 2010 (Micelli and Righetto, 2022; Rai *et al.*, 2022; Taltavull, 2022).

Its most significant contribution, however, is in the confirmation of the importance of accounting outcomes also for scientific research related to economic-financial performance already highlighted by Rehkugler *et al.* (2018), Khuntaweetep and Koowattanatianchai (2022), Jiang and Zhang (2023), etc. as well as the necessary interdisciplinary approaches, especially with statistics (Daryanto *et al.*, 2018).

Analyses of this kind have been possible considering the valuable and irreplaceable contribution of financial statements databases, which are a key element for quantitative studies on economic and financial dynamics.

8.3 Implications for operational practice

This study is also useful for the management of companies operating in the sector: each can compare their values with the average values to identify any negative differences, presumably due to management inefficiencies that need to be remedied.

This would also have the effect of implementing adequate and modern management control systems linked to general accounting. The greater availability of timely information would lead to the replacement of the all too frequent strategies based mainly on experience with long-term, well-considered decisions correctly based on data and on a shrewd comparison with similar realities, suitably supplemented with assessments of future expectations.

Forecasting methods would also improve because they would use actual and comparative information obtained from scientifically validated statistical processing.

The lower costs of electronic data processing systems and the now widespread machine learning and artificial intelligence make such proposals possible, even in smaller company sizes.

With the results of this study, public authorities can better orientate policies to support and develop the housing market, which has as its object an essential asset, the home–home, that meets a necessary and primary need for a dignified life, a right recognised by all in many Constitutions, declarations and international treaties. Among others: the Universal Declaration of Human Rights of 1948, the International Covenant on Economic, Social and Cultural Rights of 1966 (in force since 1976 also in Italy), in numerous documents of the UN Committee on Economic, Social and Cultural Rights (1991, 2009, etc.).

Finally, academic teaching can make use of this article, continuing the positive proposal of Gattis (2023), who presented a case on the real estate market in an MBA and advanced degree course, which can also be used in real estate and personal finance courses. The outcome

was positive. Obviously, in the aforementioned experience, and the desired one using this article, students should have adequate knowledge of financial statements, their static and dynamic analysis, and descriptive and methodological statistics.

8.4 Research limitations and possible future developments
These are the conclusions of a quantitative study that does not analyse qualitative aspects that could further justify the trends established. Trends in other indices could also be assessed, possibly concerning the market prices of intermediated real estate, the level of commissions charged by intermediaries, the cost of money, and, above all, any state support policies that intervened during the most critical periods of the financial and pandemic crises.

In the future, it would also be appropriate to disaggregate the sample, analysing the trends in the indices of the different types of companies, although they share the same Ateco code. It would be necessary to distinguish at least three groups: companies buying and selling real estate carried out on their assets, companies renting and managing real estate owned or leased and companies performing real estate activities on behalf of third parties. The different management characteristics could certainly have significant effects on the economic-financial balances ascertained by the balance sheets.

Final note. This article derives from a broader project to analyse and study the effects of the two major international crises, the financial crisis of 2008–09 and the pandemic crisis of 2020, on the economic and financial performance of public and private companies in various sectors. The project has already yielded many relevant publications, summarised in Table 23.

Primary sector				
The sector in general			Wine	
Pavone and Migliaccio (2021), Migliaccio and Pavone (2022)			Migliaccio and Tucci (2020)	
Secondary sector				
Plastic	Energy	Tanning	Cosmetics	Jewellery
Migliaccio and De Blasio (in press, 2021)	Iovino and Migliaccio (2019)	Migliaccio and Arena (2021a, b)	De Blasio *et al.* (2022)	Migliaccio and Colantuoni D'Alelio (2022)
Tertiary sector				
Hotels		Bed and breakfast		Soccer
Pavone *et al.* (in press), Migliaccio (2018)		Migliaccio *et al.* (2021)		Migliaccio *et al.* (2022)
Particular social forms in different sectors				
Cooperative societies		Start up societies	Small- and medium-sized innovative companies	
Fusco and Migliaccio (2018, 2019)		Migliaccio and Pavone (2021a, b)	Migliaccio and Pavone (in press)	
Source(s): Authors own work				

Table 23.
Publications of the performance analysis project

References

Abdul-Kareem, H. (2015), *A Process Framework for Managing IT Benefits in Construction Companies*, LAP Lambert Academic Publishing, Saarbruecken.

Abuamsha, M.K. (2022), "The role of the banking sector in financing the real estate and contracting sector in the Palestinian territories", *International Journal of Housing Markets and Analysis*, Vol. 15 No. 2, pp. 357-374.

Adegoke, A.S., Oladokun, T.T., Ayodele, T.O., Agbato, S.E., Jinadu, A.D. and Olaleye, S.O. (2022), "Analyzing the criteria for measuring the determinants of virtual reality technology adoption in real estate agency practice in Lagos: a DEMATEL method", *Property Management*, Vol. 40 No. 3, pp. 285-301.

Ahmed, I., Socci, C., Severini, F., Pretaroli, R. and Al Mahdi, H.K. (2020), "Unconventional monetary policy and real estate sector: a financial dynamic computable general equilibrium model for Italy", *Economic Systems Research*, Vol. 32 No. 2, pp. 221-238.

Ahmed, I., Socci, C., Medabesh, A., Severini, F. and Zotti, J. (2021), "Economic impact of monetary policy: focus on real estate sector in Italy", *International Journal of Finance and Economics*, Vol. 26 No. 1, pp. 1256-1269.

Amos, D. and Boakye-Agyeman, N.A. (in press), "Modelling the added value of corporate real estate on organizational performance", *Journal of Corporate Real Estate*.

Anderton, E. (2022), *Construction Genius: Effective, Hands-On, Practical, Simple, No-BS Leadership, Strategy, Sales, and Marketing Advice for Construction Companies*, Caradog E. Anderton, Sacramento.

Arbaci, S., Massimo, B. and Salento, A. (2021), "The value of the city. Rent extraction, right to housing and conflicts for the use of urban space", *Partecipazione e conflitto*, Vol. 14 No. 2, pp. 774-787.

Artese, S., De Ruggiero, M., Salvo, F. and Zinno, R. (2021), "Economic convenience judgments among seismic risk mitigation measures and regulatory and fiscal provisions: the Italian case", *Sustainability (Switzerland)*, Vol. 13 No. 6, Art. no. 3269, pp. 1-25.

Avallone, F. and Quagli, A. (2015), "Performance disclosure in the real estate industry: a case research of analyst reports and corporate financial presentations in Italy", *International Journal of Globalisation and Small Business*, Vol. 6 Nos 3-4, pp. 208-228.

Babatunde, T.O. and Ajayi, C.A. (2018), "The impact of information and communication technology on real estate agency in Lagos Metropolis, Nigeria", *Property Management*, Vol. 36 No. 2, pp. 173-185.

Baiardi, L. and Tronconi, O. (2010), *Valutazione, valorizzazione e sviluppo immobiliare*, Maggioli, Sant'Arcangelo di Romagna.

Bakir, E. and Campbell, A. (2015), "Is over-investment the cause of the post-2007 U.S. Economic crisis?", *Review of Radical Political Economics*, Vol. 47 No. 4, pp. 550-557.

Barnett, J. (2015), *Global Financial Crisis: Causes, Consequences and Impact on Economic Growth*, Nova Science, Hauppauge, NY, USA.

Barrett, G., Cigdem, M., Whelan, S. and Wood, G. (2015), *The Relationship between Intergenerational Transfers, Housing and Economic Outcomes*, AHURI Positioning Paper, April, No 163, Melbourne, Australia, pp. 1-64.

Battisti, E., Creta, F. and Miglietta, N. (2020), "Equity crowdfunding and regulation: implications for the real estate sector in Italy", *Journal of Financial Regulation and Compliance*, Vol. 28 No. 3, pp. 353-368.

Benjamini, Y. and Braun, H. (2002), "John W. Tukey's contributions to multiple comparisons", *The Annals of Statistics*, Vol. 30 No. 6, pp. 1576-1594.

Bergamaschi, S. (2022), "Mercato immobiliare, così il PNRR lo spinge alla ripresa: digitale e green, from the site", available at: www.agendadigitale.eu (accessed 25 January 2023).

Bishop, P. (1993), "The changing structure of estate agency", *The Service Industries Journal*, Vol. 13 No. 4, pp. 307-316.

Bishop, P. and Megicks, P. (2002a), "Asymmetric information and strategic competition in estate agency", *Service Industries Journal*, Vol. 22 No. 2, pp. 89-108.

Bishop, P. and Megicks, P. (2002b), "Competitive strategy and firm size in the estate agency industry", *Journal of Small Business and Enterprise Development*, Vol. 9 No. 2, pp. 150-161.

Bontempi, A., Del Bene, D. and Di Felice, L.J. (2023), "Counter-reporting sustainability from the bottom up: the case of the construction company WeBuild and dam-related conflicts", *Journal of Business Ethics*, Vol. 182 No. 1, pp. 7-32.

Borghi, E. (2013), *L'impatto delle misure anti-crisi e la situazione sociale e occupazionale. Italia, Comitato economico e sociale europeo*, Unione Europea, Bruxelles, Belgique.

Bronchick, W. and Cooper, R. (2016), *How to Sell a House Fast in a Slow Real Estate Market*, Wiley, Hoboken.

Buonaccorsi, A. (2021), "Italian real estate market during COVID-19 an increasingly green future?", available at: https://drive.google.com/file/d/1PNLJVt5Eidi2hS-bQ8DW7n-8GlUN2bgj/view, (accessed 29 June 2023).

Caracciolo, A. (1963), *La Formazione dell'Italia Industriale*, Laterza, Bari.

Castello, G. (2003), *L'agenzia Immobiliare*, Sistemi Editoriali, Napoli.

Cermignano, M. and Fasano, N. (2011), *Imprese e società immobiliari*, Maggioli, Sant'Arcangelo di Romagna.

Chen, N.-K. and Leung, C.K.Y. (2008), "Asset price spillover, collateral and crises: with an application to property market policy", *Journal of Real Estate Finance and Economics*, Vol. 37 No. 4, pp. 351-385.

Cheryshenko, M.S. and Pomernyuk, Yu.Yu. (2021), "Integration of big data in the decision-making process in the real estate sector", *IOP Conference Series: Earth and Environmental Science*, Vol. 751 No 1, 012096.

Chmielewska, A., Ciski, M. and Renigier-Biłozor, M. (2022), "Residential real estate investors' motives under pandemic conditions", *Cities*, Vol. 128, 103801.

Cianflone, A., Giovannini, G. and Lopilato, V. (2018), *L'appalto di opere pubbliche*, Giuffrè, Milano, 2018.

Crozier, D.A. and McLean, F. (1997), "Consumer decision-making in the purchase of estate agency services", *Service Industries Journal*, Vol. 17 No. 2, pp. 278-293.

Curran, C. and Schrag, J. (2000), "Does it matter whom an agent serves? Evidence from recent changes in real estate agency law", *Journal of Law and Economics*, Vol. 43 No. 1, pp. 265-284.

Damianov, D.S. and Escobari, D. (2021), "Getting on and moving up the property ladder: real hedging in the U.S. Housing market before and after the crisis", *Real Estate Economics*, Vol. 49 No. 4, pp. 1201-1237.

Daryanto, W.M., Samidi, S. and Siregar, D.J. (2018), "The impact of financial liquidity and leverage on financial performance: evidence from property and real estate enterprises in Indonesia", *Management Science Letters*, Vol. 8 No. 12, pp. 1345-1352.

De Blasio, V. and Migliaccio, G. (2021), "Economic performance of Italian plastic manufacturers between the two international crises", *International Journal of Managerial and Financial Accounting*, Vol. 13 Nos 3/4, pp. 279-316.

De Blasio, V., Pavone, P. and Migliaccio, G. (2022), "Cosmetics companies: income developments in time of crisis", *Journal of Small Business and Enterprise Development*, Vol. 29 No. 7, pp. 1017-1048.

De Stefani, A. (2021), "House price history, biased expectations, and credit cycles: the role of housing investors", *Real Estate Economics*, Vol. 49 No. 4, pp. 1238-1266.

Driver, J. (1984), "Estate agency: a marketing challenge", *The Service Industries Journal*, Vol. 4 No. 3, pp. 91-107.

Eje, G.C., Abner, I.P. and Ezeaku, H.C. (2023), "Green metal price volatility and environmentally sustainable real estate development nexus: a global perspective from post COVID-19 pandemic", *Journal of Cleaner Production*, Vol. 405, 136855.

Escribano, A., Jareño, F. and Cano, J.Á. (2023), "Study of the leading European construction companies using risk factor models", *International Journal of Finance and Economics*, Vol. 28 No. 3, pp. 3386-3402.

Farmer, K. (2014), *Financial Crises: Causes, Management and Economic Impac*, Nova Science, Hauppauge, NY.

Federcostruzioni.it (2012), "Per un rilancio della qualità edilizia in Italia: definizioni, misurazioni, ritardi e potenzialità, from the site", available at: www.federcostruzioni.it (accessed 23 January 2023).

Filstad, C. and Gottschalk, P. (2009), "How knowledge organizations work: the case of real estate agencies", *International Real Estate Review*, Vol. 12 No. 1, pp. 88-97.

Flynn, M.J. (2018), *Real Estate Investing: the Ultimate Guide for Creating Wealth with Proven Real Estate Market Strategies*, Author's Republic, Buffalo.

Fotopoulos, C. and Psomas, E. (2009), "The use of quality management tools and techniques in ISO 9001:2000 certified companies: the Greek case", *International Journal of Productivity and Performance Management*, Vol. 58 No. 6, pp. 564-580.

Fusco, F. and Migliaccio, G. (2018), "Crisis, sectoral and geographical factors: financial dynamics of Italian cooperatives", *Euromed Journal of Business*, Vol. 13 No. 2, pp. 130-148.

Fusco, F. and Migliaccio, G. (2019), "Cooperatives and crisis: economic dynamics in Italian context", *International Journal of Business and Globalisation*, Vol. 22 No. 4, pp. 638-654.

Gabrielli, L., Ruggeri, A.G. and Scarpa, M. (2022), "Detecting information transparency in the Italian real estate market: a machine learning approach", *Valori e Valutazioni*, Vol. 31, pp. 33-48.

Galli, A. and Stella, M. (2021), *Imprenditore di pregio: il tuo business di successo nell'immobiliare di pregio con il giusto franchising*, Libri d'Impresa, Barlassina.

Gardner, N. (2011), *The Broker's Bible: the Way Back to Profit for Today's Real-Estate Company*, AuthorHouse, Bloomington.

Gattis, L. (2023), "Should I buy a Caribbean condo during a pandemic? Valuing a real estate investment using cash flows", *CASE Journal*, Vol. 19 No. 2, pp. 137-165.

Gautier, P., Siegmann, A. and van Vuuren, A. (2023), "Real-estate agent commission structure and sales performance", *Journal of Empirical Finance*, Vol. 72, pp. 163-187.

Ghekiere, A. and Verhaeghe, P.-P. (2022), "How does ethnic discrimination on the housing market differ across neighborhoods and real estate agencies?", *Journal of Housing Economics*, Vol. 55, 101820.

Giannotti, C. and Gibilaro, L. (2009), "Property market liquidity and real estate recovery procedures efficiency: evidences from the Italian economic cycle", *Journal of European Real Estate Research*, Vol. 2 No. 3, pp. 235-258.

Gnan, L. and Montemerlo, D. (2008), *Le piccole medie imprese familiari in Italia, tradizione e novità*, Egea, Milano.

Grishkina, S., Sidneva, V., Shcherbinina, Y., Berezyuk, V. and Pliev, K. (2022), "Information support for the sustainable development of small and medium-sized businesses in the real estate development sector", Lecture Notes in Networks and Systems, *International Conference on Digital Science*, 15-17 October 2021, pp. 277-286.

Gupta, A. and Tiwari, P. (2022), "Circular economy in the real estate sector", in Tiwari, P. and Miao, J.T. (Eds), *A Research Agenda for Real Estate*, Edward Elgar Publishing, Cheltenham, pp. 121-138.

Gupta, A., Mittal, V., Peeters, J. and Van Nieuwerburgh, S. (2022), "Flattening the curve: pandemic-Induced revaluation of urban real estate", *Journal of Financial Economics*, Vol. 146 No. 2, pp. 594-636.

Gupta, I., Raman, T.V. and Tripathy, N. (2023), "Impact of merger and acquisition on financial performance: evidence from construction and real estate industry of India", *FIIB Business Review*, Vol. 12 No. 1, pp. 74-84.

Haider, S.A., Zubair, M., Tehseen, S., Iqbal, S. and Sohail, M. (2023), "How does ambidextrous leadership promote innovation in project-based construction companies? Through mediating role of knowledge-sharing and moderating role of innovativeness", *European Journal of Innovation Management*, Vol. 26 No. 1, pp. 99-118.

Herring, R. and Wachter, S. (2002), "Bubbles in real estate markets", *Federal reserve bank of Chicago and World bank group's conference on: "Asset Price Bubbles: Implications for Monetary, Regulatory, and International Policies"*, Chicago on April 22-24, 2002, pp. 1-14.

Horno-Bueno, M.P., Licerán-Gutiérrez, A. and Bautista-Mesa, R. (2022), "Capital markets and valuation models of investment properties. A pre and post crisis analysis", *Revista de Contabilidad-Spanish Accounting Review*, Vol. 25 No. 2, pp. 233-243.

Huang, W., Lan, C., Xu, Y., Zhang, Z. and Zeng, H. (2022), "Does COVID-19 matter for systemic financial risks? Evidence from China's financial and real estate sectors", *Pacific Basin Finance Journal*, Vol. 74, 101819.

Immobiliare.it (2022), "Il mercato immobiliare nei piccoli centri urbani, from the site", available at: www.immobiliare.it (accessed 25 January 2023).

International Labour Organisation (2020), "COVID-19 e mondo del lavoro, from the site", available at: www.ilo.org (accessed 25 January 2023).

Iovino, F. and Migliaccio, G. (2019), "Financial dynamics of energy companies during global economic crisis", *International Journal of Business and Globalisation*, Vol. 22 No. 4, pp. 541-554.

ISTAT (2012), *Istituto nazionale di statistica, Rapporto annuale 2012*, La situazione del Paese, Roma, Italy.

Janowski, A. and Lepkova, N. (2021), "Genetic algorithm application for real estate market analysis in the uncertainty conditions", *Journal of Housing and the Built Environment*, Vol. 36 No. 4, pp. 1629-1670.

Jayanthi, M. and Saravanakumar, S. (2022), "Expediency of investments in real estate sector", *ECS Transactions*, Vol. 107 No. 1, pp. 3973-3982.

Jiang, Y. and Zhang, J. (2023), "The relationship between capital structure and performance of real estate companies in China", *International Symposia in Economic Theory and Econometrics*, Vol. 31, pp. 217-233.

Jovanović-Milenković, M., Đurković, A., Vučetić, D. and Drašković, B. (2020), "The impact of Covid-19 pandemic on the real estate market development projects", *European Project Management Journal*, Vol. 10 No. 1, pp. 36-49.

Karthiyaini, S., Sivakumar, R. and Shanmuga Sundaram, M. (2020), "Market response of real estate and automotive industry during pandemic-a transdisciplinary approach", *International Journal of Management*, Vol. 11 No. 5, pp. 764-769.

Ke, Q., Isaac, D. and Dalton, P. (2008), "The determinants of business performance of estate agency in England and Wales", *Property Management*, Vol. 26 No. 4, pp. 255-272.

Khalfan, I., Jamaluddin, Z. and Widyarto, S. (2022), "Effect of leadership and quality culture on quality management practices and operational performance of construction companies in Oman", *International Journal of Quality and Reliability Management*, Vol. 39 No. 7, pp. 1824-1843.

Khuntaweetep, W. and Koowattanatianchai, N. (2022), "Comparison of the performance of macroeconomic finance models for financial planning (MFM-FP) and ARIMA-common size in forecasting roe of real estate developers in the stock exchange of Thailand", *ABAC Journal*, Vol. 42 No. 4, pp. 14-29.

Koch, D. and Maier, G. (2015), "The influence of estate agencies' location and time on the Internet: an empirical application for flats in Vienna", *Review of Regional Research*, Vol. 35 No. 2, pp. 147-171.

Kottala, S.Y. and Herbert, K. (2019), "An empirical investigation of supply chain operations reference model practices and supply chain performance: evidence from manufacturing sector", *International Journal of Productivity and Performance Management*, Vol. 69 No. 9, pp. 1925-1954.

Kowalski, M.J., Wang, T. and Kazak, J.K. (2023), "The impact of covid-19 pandemic on value migration processes in the real estate sector", *Real Estate Management and Valuation*, Vol. 31 No. 1, pp. 10-24.

Kramer, C.Y. (1956), "Extension of multiple range tests to group means with unequal numbers of replications", *Biometrics*, Vol. 12 No. 3, pp. 307-310.

Kunzel, P. (2009), *Inefficiencies in the Real Estate Market*, VDM Verlag, Riga.

Lee, M.-L. and Lee, M.-T. (2007), "Corporate real estate sales and agency costs of managerial discretion", *Property Management*, Vol. 25 No. 5, pp. 502-512.

Leiser, D., Benita, R. and Bourgeois-Gironde, S. (2016), "Differing conceptions of the causes of the economic crisis: effects of culture, economic training, and personal impact", *Journal of Economic Psychology*, Vol. 53, pp. 154-163.

Leonard, R. (2022), *The Everything Guide to House Hacking: Your Step-by-step Guide to: Financing a House Hack, Finding Ideal Properties and Tenants, Maximizing the Profitability of Your Property, Navigating the Real Estate Market, Avoiding Unnecessary Risk*, Adams Media Corporation, Coon Rapids.

Li, L.H. and Wang, C. (2006), "Real estate agency in China in the information age", *Property Management*, Vol. 24 No. 1, pp. 47-61.

Liao, Q. and Li, J. (2018), "An adaptive reduced basis ANOVA method for high-dimensional Bayesian inverse problems", *arXiv:1811.05151* [math.NA].

Lopreite, M. and Scarpino, A. (2010), "Housing market and financial crisis", *WSEAS Transactions on Business and Economics*, Vol. 7 No. 4, pp. 424-433.

Lovsletten, P.A., Kionig, L. and Vold, T. (2019), Using AR in higher education-suggested use in the real estate agency study program, *18th International Conference on Information Technology Based Higher Education and Training*, ITHET 2019, 8937344.

Luís, J.F., Catulo, J.D.O., Rodrigues, J.D., Piedade, N.R. and Marcos, A.D.F. (2022), "The impact of the Digital Marketing in Real Estate the past, present and future of the sector", *17th Iberian Conference on Information Systems and Technologies, CISTI 2022*, 22-25 June 2022.

Lunghini, P. (2021), "Presentato il settimo 'Rapporto sulla filiera dei servizi immobiliari in Europa e in Italia' a cura di Scenari Immobiliari. In Italia il settore è raddoppiato in vent'anni", available at: https://www.internews.biz/presentato-il-settimo-rapporto-sulla-filiera-dei-servizi-immobiliari-in-europa-e-in-italia-a-cura-di-scenari-immobiliari-in-italia-il-settore-e-raddoppiato-in-ventanni/ (accessed 29 June 2023).

Majumder, S. and Biswas, D. (2022), "COVID-19: impact on quality of work life in real estate sector", *Quality and Quantity*, Vol. 56 No. 2, pp. 413-427.

Marcatili, M. (2021), "Indagine sulle famiglie italiane 2021", in *Rapporto Nomisma, La Casa e gli Italiani, XIV Rapporto sulla finanza immobiliare*, Nomisma, Bologna.

Markoc, I. and Cizmeci, F. (2021), "Ethics in real estate: agency practices in Istanbul", *International Journal of Housing Markets and Analysis*, Vol. 14 No. 5, pp. 1145-1165.

Marona, B. and Tomal, M. (2020), "The COVID-19 pandemic impact upon housing brokers' workflow and their clients' attitude: real estate market in Krakow", *Entrepreneurial Business and Economics Review*, Vol. 8 No. 4, pp. 221-232.

Mattarocci, G. and Scimone, X. (2021), "Closed end real estate funds and real estate portfolio management: evidence from the Italian retail market", *Journal of Real Estate Portfolio Management*, Vol. 26 No. 1, pp. 27-36.

Mecca, U., Moglia, G., Prizzon, F. and Rebaudengo, M. (2020), "Strategies for buildings energy efficiency in Italy: financial impact of superbonus 2020", *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM - 2020 20th International Multidisciplinary Scientific Geoconference:* Nano, Bio and Green - Technologies for a Sustainable Future*, SGEM 2020*, Vienna 8-11 December 2020, Vol. 20 No 6.2, pp. 325-332.

Micelli, E. and Righetto, E. (2022), "How do metropolitan cities evolve after the 2008/2012 crisis and the Covid-19 pandemic? An analysis from real estate market values", *Valori e Valutazioni*, No. 31, pp. 49-67.

Migliaccio, G. (2018), "The profitability of Italian hotels during and after the 2008 Economic Crisis", *African Journal of Hospitality, Tourism and Leisure*, Vol. 7 No. 6, pp. 1-21, 2.

Migliaccio, G. and Arena, M.F. (2021a), "Il *benchmarking* per il controllo della performance: esiti di una ricerca nei distretti conciari italiani", *Management Control*, No. 3, pp. 87-110, with an appendix of 11 pp.

Migliaccio, G. and Arena, M.F. (2021b), "Financial performance of Italian tanning manufacturers before, during and after the global crisis", *International Journal of Globalisation and Small Business*, Vol. 12 No. 3, pp. 213-246.

Migliaccio, G. and Colantuoni D'Alelio, C. (2022), "The profitability of Italian jewellery between the two international economic crisis", *International Journal of Globalisation and Small Business*, Vol. 13 No. 1, pp. 79-107, 2022.

Migliaccio, G. and De Blasio, V. (in press), "The Italian plastics industries toward a plastic-free society: what possible strategies?", *World Review of Entrepreneurship, Management and Sustainable Development*.

Migliaccio, G. and Pavone, P. (in press), "Innovativeness in the economic system: the Italian experience", *International Journal of Business Innovation and Research*.

Migliaccio, G. and Pavone, P. (2021a), "Innovative small start-ups in Italy: a successful business model?", *International Journal of Management and Enterprise Development*, Vol. 20 No. 4, pp. 405-455.

Migliaccio, G. and Pavone, P. (2021b), "Italian innovative start-up cohorts: an empirical survey on profitability", in Bevilacqua, C., Calabrò, F. and Della Spina, L. (Eds), *New Metropolitan Perspectives - Knowledge Dynamics and Innovation-Driven Policies towards Urban and Regional Transition*, Springer Nature Switzerland AG, Heidelberg, Berlin, Vol. 2, pp. 834-843.

Migliaccio, G. and Pavone, P. (2022), "Primary sector in Italy: profitability dynamics and relationship with the international economic crisis", *International Journal of Productivity and Performance Management*, Vol. 71 No. 7, pp. 2893-2912.

Migliaccio, G. and Tucci, L. (2020), "Economic assets and financial performance of Italian wine companies", *International Journal of Wine Business Research*, Vol. 32 No. 3, pp. 325-352.

Migliaccio, G., Tucci, L. and Simonetti, B. (2021), "The effects of the global crisis on the economic-financial performance of Italian bed and breakfasts: a ten-year quantitative analysis from the financial reports", *E-Review of Tourism Research*, Vol. 18 No. 4, pp. 611-646.

Migliaccio, G., Lucadamo, A., Napoli, G. and Gallo, M. (2022), "Economic and sporting performance and player registration rights in Italian soccer: connections?", *International Journal of Management and Enterprise Development*, Vol. 21 No. 4, pp. 392-415.

Milligan, V., Gurran, N., Lawson, J., Phibbs, P. and Phillips, R. (2009), *Innovation in Affordable Housing in Australia: Bringing Policy and Practice for Not-For-Profit Housing Organisations Together*, AHURI Final Report, No 134 Melbourne, Australia, pp. 1-197.

Min, H., Shin, S. and Taltavull de La Paz, P. (2022), "COVID-19 and the daily rate of return of three major industry sector stock price indices related to real estate", *Journal of Property Investment and Finance*, Vol. 40 No. 2, pp. 138-164.

Munshifwa, E.K., Jain, N., Mushinge, A. and Chileshe, R.A. (2021), "Principle of substitution in the face of COVID-19 pandemic: an application to tenants' choice in commercial real estate markets", in Veuger, J. (Ed.), *The Future of Real Estate*, Nova Science, Hauppauge, pp. 37-56.

Newell, G., Adair, A. and McGreal, S. (2010), "Robustness of capital flows into the European commercial property markets during the global financial crisis", *Journal of European Real Estate Research*, Vol. 3 No. 3, pp. 182-202.

Nomisma (2020), "Presentati i dati del 3° Rapporto sul mercato immobiliare 2020: analisi di scenario e prospettive, from the site", available at: www.nomisma.it (accessed 23 January 2023).

Oey, E. and Lim, J. (2020), "Challenges and action plans in construction sector owing to COVID-19 pandemic – a case in Indonesia real estates", *International Journal of Lean Six Sigma*, Vol. 12 No. 4, pp. 835-858.

Ong, R., Haffner, M., Wood, G., Jefferson, T. and Austen, S. (2013), *Assets, Debt and the Drawdown of Housing Equity by an Ageing Population*, AHURI Positioning Paper, Vol. 153 Melbourne, Australia, pp. 1-103.

Panniello, U., Messeni Petruzzelli, A. and Mancuso, I. (2022), *Trasformazione digitale e nuovi modelli di business per l'edilizia*, Franco Angeli, Milano.

Pavone, P. and Migliaccio, G. (2021), "Profitability of the Italian farming companies and the impact of financial crisis: a quantitative research using accounting data", *International Journal of Business Performance Management*, Vol. 22 No. 4, pp. 394-425.

Pavone, P., Migliaccio, G. and Simonetti, B. (in press), "Investigating financial statements in hospitality: a quantitative approach", *Quality and Quantity. International Journal of Methodology*.

Pheng, L.S. and Hoe, K.S. (1994), "A survey of the important attributes for marketing: real estate agency services in Singapore", *Property Management*, Vol. 12 No. 2, pp. 22-27.

Piazolo, D. and Dogan, U.C. (2021), "Impacts of digitization on real estate sector jobs", *Journal of Property Investment and Finance*, Vol. 39 No. 2, pp. 47-83.

Pilinkiene, V., Stundziene, A., Stankevicius, E. and Grybauskas, A. (2021), "Impact of the economic stimulus measures on Lithuanian real estate market under the conditions of the COVID-19 pandemic", *Engineering Economics*, Vol. 32 No. 5, pp. 459-468.

Quirk, T.J. (2012), "One-way analysis of variance (ANOVA)", in Quirk, T.J. (Ed.), *Excel 2010 for Social Science Statistics. A Guide to Solving Practical Problems*, Springer, New York, pp. 175-193.

Rai, A., Mahata, A., Nurujjaman, M. and Prakash, O. (2022), "Statistical properties of the aftershocks of stock market crashes revisited: analysis based on the 1987 crash, financial-crisis-2008 and COVID-19 pandemic", *International Journal of Modern Physics C*, Vol. 33 No. 2, 2250019.

Rampini, L. and Re Cecconi, F. (2022), "Artificial intelligence algorithms to predict Italian real estate market prices", *Journal of Property Investment and Finance*, Vol. 40 No. 6, pp. 588-611.

Rebaudengo, M., Mecca, U. and Gotta, A. (2022), "'Fit to 55': financial impacts of Italian incentive measures for the efficiency of the building stock and the revitalization of fragile areas, lecture notes in networks and systems", *LNNS - 5th International Symposium on New Metropolitan Perspectives*, Reggio Calabria, 25-27 May 2022, NMP 2022, Vol. 482, pp. 201-210.

Rehkugler, H., Jandl, J.-O., Wölfle, M. and Löffler, F. (2018), "Valuation of financial statements information: your contribution to the performance of investments in listed real estate companies", *Betriebswirtschaftliche Forschung und Praxis*, Vol. 70 No. 3, pp. 229-256.

Ricciotti, F., Cristofaro, M., Abatecola, G. and Mari, M. (2022), "Executive profiles and performance of real estate services: evidence of reverse causality from Europe", *Cities*, Vol. 130, 103854.

Rossi, S. (2019), "Mercato immobiliare, economia e politiche economiche", *Real estate innovation-Conferenza d'apertura*, Milano, Università Bocconi, pp. 1-10, available at: www.bancaditalia.it/pubblicazioni/interventi-direttorio/int-dir-2019/Rossi-29.01.2019.pdf (accessed 29 June 2023).

Rowley, J. (2005), "The evolution of internet business strategy. The case of UK estate agency", *Property Management*, Vol. 23 No. 3, pp. 217-226.

Ryan, L. (2011), "Nowhere to hide: an analysis of investment opportunities in listed property markets during financial market crises", *Journal of Property Research*, Vol. 28 No. 2, pp. 97-131.

Scenari-immobiliari.it (2021), "Rapporto sulla filiera dei servizi immobiliari in Europa e in Italia, VII edizione, from the site", available at: www.scenari-immobiliari.it (accessed 25 January 2023).

Schnell, P. (2022), "Examination of the communication strategy based on company straplines: a case study of German construction companies", *Construction Economics and Building*, Vol. 22 No. 4, pp. 81-97.

Serrallegri, M. (2022), *Imprenditore REalista. La svolta nel real estate tra tradizione e innovazione che apre le porte del successo nel mercato immobiliare*, Bruno Editore, Roma.

Shafik, M. (2006), "The many faces of property market cycles", 22nd *Annual Conference on Association of Researchers in Construction Management*, Vol. 2, pp. 591-600.

Silva, P., Mota, J. and Moreira, A.C. (2023), "Budget participation and employee performance in real estate companies: the mediating role of budget goal commitment, trust and job satisfaction", *Baltic Journal of Management*, Vol. 18 No. 2, pp. 226-241.

Simplybiz.eu (2021), "Indagine Fimaa Opisas: nel 2021 italiani hanno investito tra 41% e 100% dei risparmi nell'immobiliare, from the site", available at: www.simplybiz.eu (accessed 25 January 2023).

Sirtoli, M. (2013), *Guida alle società immobiliari. Caratteristiche, costituzione e funzionamento. Aspetti civilistici, fiscali e contabili*, Il Sole 24 Ore, Milano.

Taltavull, P. (2022), "Editorial: the aftermath of two consecutive crises: volatility and property market mechanisms", *Journal of European Real Estate Research*, Vol. 15 No. 2, pp. 145-146.

Tang, H., Xie, K. and Xu, X.E. (2022), "Real estate as a new equity market sector: market, responses and return comovement", *Real Estate Economics*, Vol. 50 No. 2, pp. 431-467.

Taşan-Kok, T., Özogul, S. and Legarza, A. (2021), "After the crisis is before the crisis: reading property market shifts through Amsterdam's changing landscape of property investors", *European Urban and Regional Studies*, Vol. 28 No. 4, pp. 375-394.

Tieghi, M. and Gigli, S. (2009), *Gli strumenti per le analisi del bilancio di esercizio*, Il Mulino, Bologna.

Troiano, U.A. (2022), "Il privilegio di abitare nella casa di proprietà, from the site lavoce.info (24/01/2023)".

Tsung, Y. (2022), "An intelligent recommendation system for real estate commodity", *Computer Systems Science and Engineering*, Vol. 42 No. 3, pp. 881-897.

Tukey, J.W. (1949), "Comparing individual means in the analysis of variance", *Biometrics*, Vol. 5 No. 2, pp. 99-114.

Tukey, J.W. (1953), "The problem of multiple comparisons, Unpublished manuscript", in *The Collected Works of John W Tukey VIII. Multiple Comparisons*, Chapman & Hall, New York, pp. 1948-1983.

Tukey, J.W. (1993), "Where should multiple comparisons go next?", in Hoppe, F.M. (Ed.), *Multiple Comparisons, Selection, and Applications in Biometry*, Dekker, New York, pp. 187-207.

Tuyet, M.D.T., Zrobek-Rozanska, A. and Zrobek, R. (2022), "The experience of the Polish real estate market as a guide to transition of real estate sector in Vietnam", *Acta Scientiarum Polonorum, Administratio Locorum*, Vol. 21 No. 2, pp. 185-195.

Vabischevich, T. (2021), *Residential Real Estate Market*, Our Knowledge Publishing, Maharashtra.

Waterson, G. and Lee, R. (2001a), "Estate agency", *Property Management*, Vol. 19 No. 4, pp. 177-178.

Waterson, G. and Lee, R. (2001b), Estate agency, *Property Management*, Vol. 19 No 2, pp. 187-188.

Wiley, J.A. and Zumpano, L.V. (2009), "Agency disclosure in the real estate transaction and the impact of related state policies", *Journal of Real Estate Research*, Vol. 31 No. 3, pp. 265-283.

Yang, A.J.-F., Huang, Y.-C. and Chen, Y.J. (2019), "The importance of customer participation for high-contact services: evidence from a real estate agency", *Total Quality Management and Business Excellence*, Vol. 30 Nos 7-8, pp. 831-847.

Yi Man Li, R. (2016), *Law, Economics and Finance of the Real Estate Market*, Springer, New York.

You, S.-M., Tseng, M.-H. and Lee, C.-C. (2014), "Extending the concepts of service quality, transaction costs, internal institutions, and external institutions to the evaluation of real estate agencies", *International Journal of Services, Technology and Management*, Vol. 20 Nos 4-6, pp. 290-314.

Zhang, H. and Wang, J. (2010), "Study on the relationship between intellectual capital and financial performance of real estate companies", *Proceedings - 3rd International Conference on Information Management, Innovation Management and Industrial Engineering, ICIII 2010*, Vol. 2, pp. 72-75, 5694521.

Further reading

DeLisle, J.R. and Grissom, T.V. (2017), "A comparative computational and behavioral analysis of real estate performance: anchoring on the post-financial crisis", *Journal of Property Investment and Finance*, Vol. 35 No. 3, pp. 290-320.

Yi, W. and Zhang, Y. (2021), "Research of equity pledge on the financial performance of real estate industry listed companies based on SPSS 23.0", *Proceedings - 2nd International Conference on E-Commerce and Internet Technology*, ECIT 2021, pp. 339-343, 9406965.

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