

KNOWLEDGE PLATFORMS
AND RESEARCH LABS

RESEARCH REPORT 2023



THE FUTURE MUST ALWAYS BE IMAGINED AND SOUGHT



The research activity and its continuous dissemination are the destiny and duty of a School of Management. It may seem like a strong statement but this phrase expresses in the most appropriate way the sense of the challenges and times we are experiencing and that allows us to guide to the future with the strength and passion that distinguishes SDA Bocconi.

Higher-education, applied research and the growth of people are closely linked and forward-looking. There is no growth in people's lives if the gaze is not turned to the future and when the gaze is no longer able to grasp the future, growth stops, it no longer affects and it no longer has an impact on the surrounding society. Growth is not a solitary act but a path, which becomes more exciting if done with good travel companions. In this sense, growth, training, applied research, relationships and sharing are closely linked. We must therefore have the desire and ambition to talk about the future every day. This is the ambition of every School of Management, this is definitely the hallmark of our School of Management, SDA Bocconi School of Management.

To understand what it means to speak and plan the future every day, we need to reflect on the two simple words - so simple to seem obvious - that are found immediately after SDA Bocconi, that is "School" and "Management".

The concept of "School" is a concept of community and continuous construction. In a world where research, knowledge and education are seen as an act of consumption, which materializes - and is likely to run out - in the very short moment of a download, the concept of "School" is exactly the opposite in that it is not confused with the learning tool - physical or digital, synchronous or asynchronous - but is clearly above the available tools and offers a meditated synthesis, at the service of the community, and built with the support of diverse interlocutors who interact with each other, from faculty, staff, students, alumni, companies and institutions that meet every day on our campus. The quality and intensity of relations become the quality of the School and the energy to continue on its way.

The concept of "Management" is at its root a concept of responsibility. Management means guiding men and women, resources and organizations. It's an act of responsibility by definition. It is devoid of sectorial affiliation, as it crosses institutions and organizations with profoundly different characteristics: from listed companies to private ones, from small to large, from public to non-profit sector. If responsibility is the deepest nature of management, its attitude today must be that of transversality. Knowledge and therefore management can no longer be placed in predefined areas, in vertical silos that define their own rules and aspire to perfection, which becomes self-referentiality and closure. The marketing silos, the finance silos, the technology silos and so on. Vertical perfection becomes complacency and then only leads to dryness and inability to think about the future every day.

The task of a School of Management is to ensure the highest level of vertical understanding, knowing well that "teaching" or "doing" management actually means destroying vertical silos with the force of creativity, with the courage to always get out of your comfort zone, with the will to always advance those vertical knowledge that are then questioned. But it also means identifying and welcoming new vertical silos, new disciplinary areas that were not even imaginable: from artificial intelligence, to cybersecurity, to the space economy and to what is to come, that today we cannot imagine but that we are certain that it will come. SDA Bocconi in management has always seen the transversality that passes from companies, to public administrations and financial intermediaries. This transversality today is leading the SDA to have a broader spectrum ranging from geopolitics themes to data sciences and AI, because businesses, institutions and financial intermediaries demand this to understand the world and face their challenges.

The knowledge platforms that the School has created go exactly in this direction and are the inexhaustible force that continuously links the drive for innovation, the drive for vertical understanding within the disciplinary field, the push to transversality that is the necessary condition in order to understand the complexity of the scenarios that every business decision-maker must observe. But above all, without research the ability to affect with the activity of higher-education dries up and becomes a ritual. The nature of being a School is to continually strengthen the bridge between the needs of companies and institutions and the ability to always look to the future.

The challenges of the School become the collective challenges, the knowledge that is produced through research is a collective and community act, which then brings initiative, enthusiasm and benefit to individuals but remains a strongly collective act. This is why our School has the task of helping individuals and organizations to think about the future every day. Not to deny the present but to live it more intensely and with greater responsibility. This is the responsibility of the manager and is the hallmark of the leaders, who are formed in our classrooms. It is the perfect link between the School and its community, between the programs that we develop every day with passion and the participants, between the content of our training and the task of the manager. This is why the School does not offer a solution but builds the possible solutions through the extraordinary experience of many colleagues who direct our programs and live every day with those who have or have the ambition to have the responsibility of guiding men and women, resources and organizations.

The space to build the future is vast, and the School is always there whenever there is courage and a desire to design innovative solutions. That's where we have to start if we want to give answers to the people and organizations that choose the SDA. History therefore continues and always evolves, with determination and impact.

STEFANO CASELLI

Dean SDA Bocconi School of Management

Milan, 30 October 2023



TECHNOLOGY, INNOVATION AND TRANSITION KNOWLEDGE PLATFORM

Technology has always represented the key driver of change for firms, industries, and society at large. Yet, the pace of change we have been facing in the past few years is unprecedented. The digitization and development of Internet of Things, together with a shift in consumer behavior, have favored the production of a huge amount of data. Data are the oil of AI and machine learning, a fundamental technology that is reshaping many of the processes and industries we have known.

Communication, transportation of people and objects, manufacturing, and commercial activities just to mention a few have experienced a deep transformation caused by the changes in technology and in particular by the potential use of data that technology has unleashed.

The Technology, Innovation and Transition Platform of SDA Bocconi aims to provide a common and open ground to study the changing nature of managerial and operational processes in organizations in the light of the above-mentioned opportunities and challenges. By blending theory and practice, cross-sectional and panel data analysis with interviews and observation in companies and institutions, and by integrating the experiences of organizations operating in different industries, both private and public, this platform aims to provide data-based evidence and actionable insights for companies facing relevant challenges brought by the accelerated path of technological change encompassing a diverse set of processes and decisions within firms.

This platform addresses, among others, topics such as:

- Assessing current technologies and estimating their value potential for processes and activities in organizations;
- Investigating and measuring the impact on performance of the adoption of digital tools in the development of new commercial channels;
- Evaluating the impact of specific technologies on the development of sustainable practices across firm in different contexts;
- Understanding the value and organizational impact of machine learning applications on operational activities;
- Identifying the evolutionary trajectories of specific consume needs, such as mobility, housing, and health to name a few, disrupted by digital technology;
- Understanding the economics of space and other alternative resources in shaping the industries of the future.

In order to tackle these relevant issues with a broad perspective and refined analytical keys, the Innovation and Transition Knowledge Platform adopts an interdisciplinary approach, leveraging on the knowledge of top experts in the field of technology and innovation, the evolution of ecosystems, channel/retail and salesforce to commercialize innovation, as well as procurement. The functional expertise is blended with top level competences applied to the world of space economy, mobility, agribusiness, real estate, and to many other contexts, both private and public, where technology is a major driver of change. Through extended collaborations with partners from public and private institutions, by means of open discussions and workshops, and through projects co-designed by academics and research users, we aim to address pressing issues stemming from real-world problems, as well as to advance the current understanding of a complex and interconnected world, like the one we live in.



Paola Cillo

Scientific Director of the Technology, Innovation and Transition Knowledge Platform, Associate Professor of Management & Technology at Bocconi University, and Director of the Claudio Dematté Research Division for Corporate and Financial Institutions, SDA Bocconi.

Real Estate Innovation Lab

REInnovation Lab is a knowledge-based laboratory aimed at collecting transaction-based primary data and the experiences of the main players in order to develop operational tools.

1. REILab Research
2. REInnovation Academy
3. REILab Inno Forum
4. REIstat
5. REILab Conference

** Themes of this Lab are across Technology, Innovation & Transition and eSG - Excellence in Sustainability & Governance Knowledge Platform

1. Mission Contributing to Real Estate Transformation

The mission of the REInnovation Lab is to contribute to the evolution of the Real Estate sector by creating an independent knowledge-based Lab aimed at collecting transaction-level primary data, combining such empirical evidence with the most relevant experiences of the various key players in Italy to create new operational tools. REILab contributes to continuous transformation in the Real Estate sector by creating opportunities for relevant and data-driven information, essential to measure the contribution of the sector to sustainable economic growth. The REInnovation Lab pillars include applied research activities, analysis on the institutional and policy framework, and private and public events based on discussions, conferences, training courses, useful to disseminate relevant knowledge and empirical results with a focus on long term private and social sustainability.

1.1 Sustainability and data

Research is the most important activity of the Real Estate Innovation Lab, generating knowledge that can be publicly disseminated in various events as well as enriching the content of training activities conducted with the REInnovation Academy. REILab research is mainly empirical, using econometric models to process large amounts of data. Traditional linear regression tools are used for all empirical efforts aimed at testing theories where the main goal is to understand the link between private and social sources of value and real estate prices. New nonlinear Artificial Intelligence tools are used when trying to understand the structure behind Big Data and when looking for relationships among variables that cannot be reduced to linear correlations.

1.2 Data and real estate

Building empirical evidence on the Italian real estate market and using new and original datasets are key tools for increasing transparency for the main players, including developers, builders, investors, consumers, regulators and policy-makers. The Lab has produced a platform that is able to reconcile the data collection formats of the Partner Lab companies in order to produce aggregate statistics that may be released to provide a timely and complete information on the value of transactions in the Italian commercial real estate market. The availability of new data on ads by the Data Partner of the REInnovation Lab is used in order to study the price determinants from the point of view of the sellers and to compute price indices of residential real estate for a sample of Italian Capoluoghi di Provincia as well as the largest Italian cities.

1.3 Training

Blending teaching and research is one of the purposes of the Academy, that wants to exploit the complementarities between research production and teaching activities. The new results of the REInnovation Lab are presented in classroom and used as a basis for groupworks by REInnovation Academy participants who also have the opportunity to interact with Partner Academy companies.



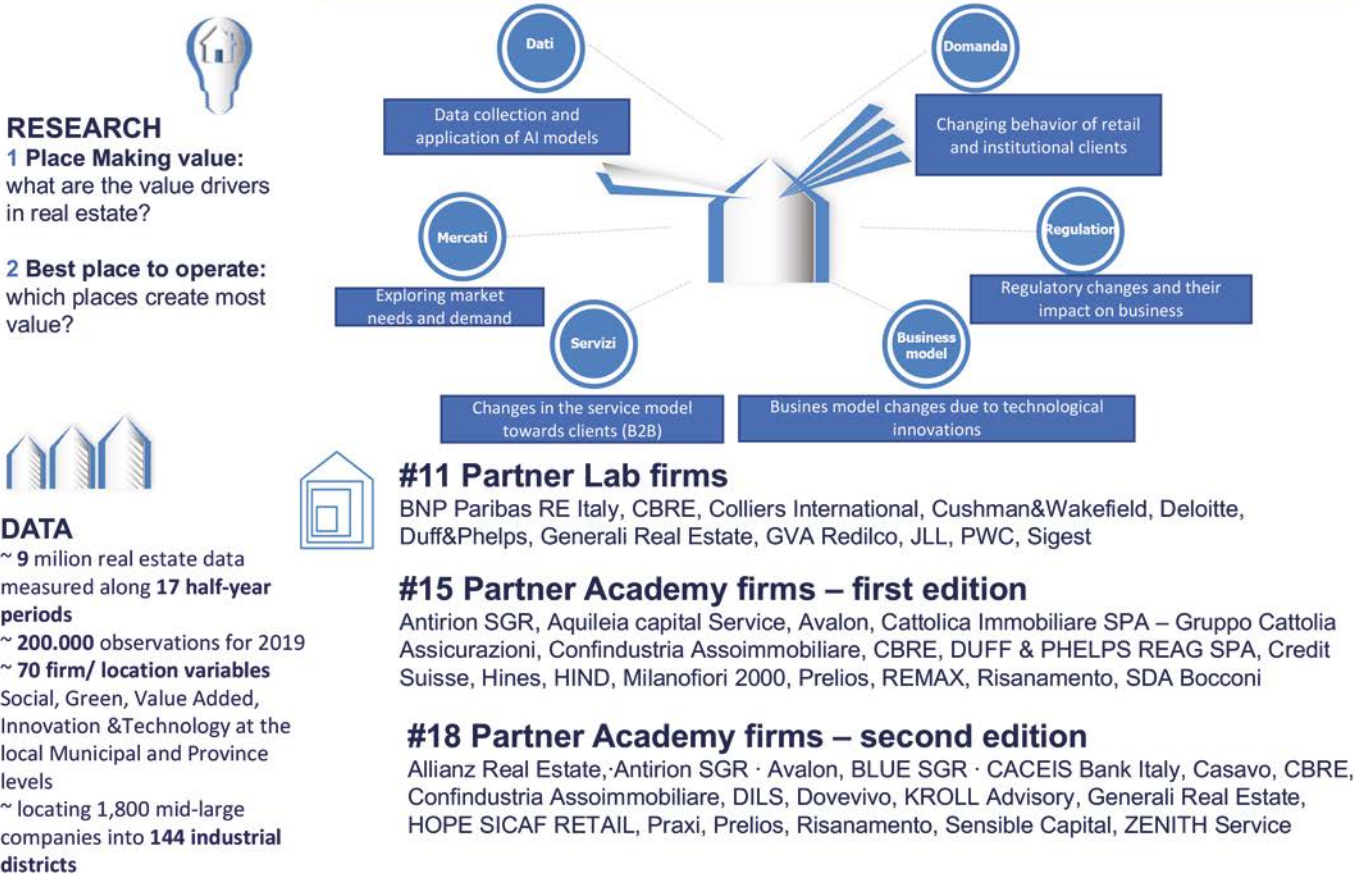
2. Membership model

The REInnovation Lab was co-founded by SDA Bocconi and Confindustria Assoimmobiliare, incorporating intellectual and financial contributions from key players in the Italian Real Estate market. These participants can engage in activities through the institutional formats of Partner Lab, Partner Academy, and/or Data Partner. Partner Lab firms participate in a steering committee, providing an opportunity for pre-discussion of proposed research ideas by researchers and members of the Scientific Committee. Partner Academy firms contribute to the Lab through direct involvement in the REInnovation Inno Forum series and the research lab focusing on ESG criteria, Sustainability, and Circular Economy in Real Estate. The Data Partner, a rapidly growing platform in the Italian residential and commercial real estate markets, supplies valuable data for research and the production of a periodic report on the state of the Italian real estate market.

Category	Benefits	Description
Partner Lab	Platform	Direct involvement in the planning and operational activities that develop the data-sharing platform on individual Real Estate transactions mainly in the commercial sector
	Research agenda	Discussing research proposals on the part of researchers and the Scientific Committee and having early exposure to preliminary results
	REInnovation Academy	Discussion of the study plan and the overall teaching/scientific set-up of training activities
Partner Academy	REInnovation Academy courses	Direct participation of firm managers in the final Business Simulations on Development Management and Asset Management
	REInnovation Academy Inno Forum	Direct participation of CEOs in the annual series of REILab Inno Forum that allows participants to gain knowledge of the interpretation and discussion of the most relevant trends in the Real Estate market
Data Partner	REInnovation Lab Research	Provision of raw data on commercial and residential ads and transactions that form the backbone of research activities
	Visibility, contribution to measurement of real estate market	Joint work on setting up and maintaining a periodic report on the state of the Italian real estate market as described by a set of key performance indicators



HIGHLIGHTS & PARTNERS



AZIENDE PARTNER ACADEMY 2022-2023
Avalon Real Estate | CACEIS Bank Italy Branch | CBRE | COIMA | Confindustria Assoimmobiliare | DeA Capital | DILS Generali Real Estate | GWM Asset Management LTD - Italian Branch | Kroll Advisory | PIMCO Prime Real Estate Prelios | Risanamento | SDA Bocconi School of Management | Sensible Capital | Yard Reaas | Zenith Service

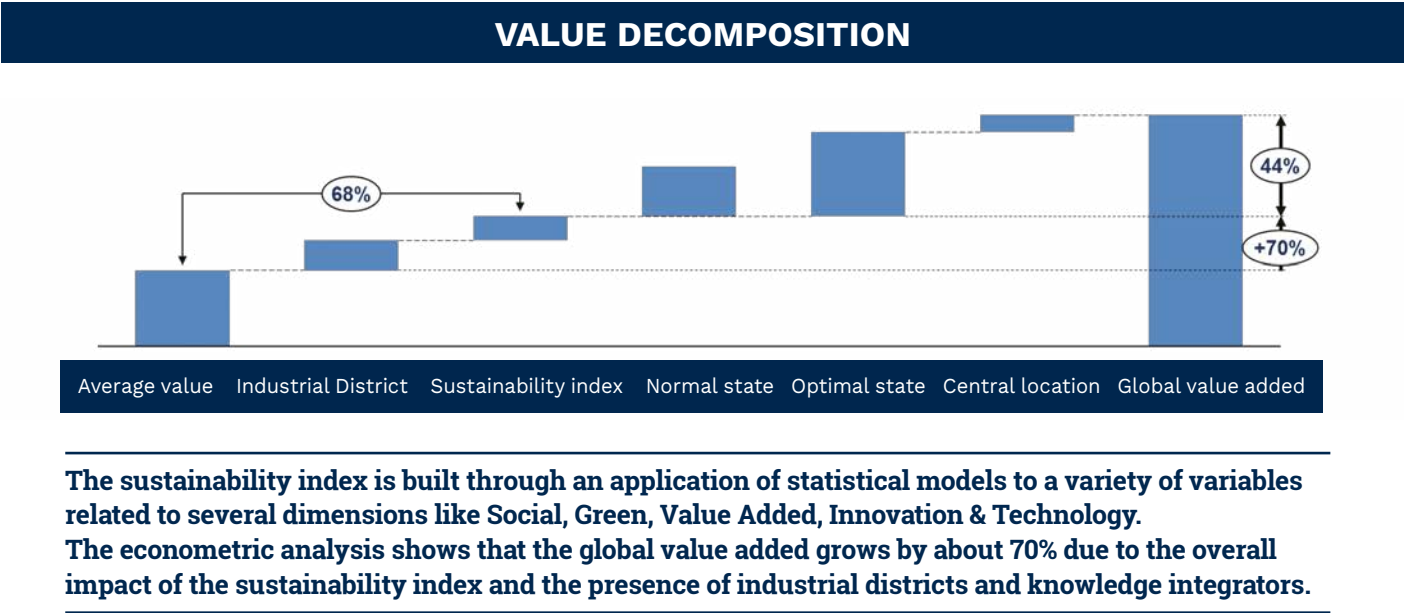
3. Activities

Research is the most important activity of the Real Estate Innovation Lab, generating knowledge that can be publicly disseminated in various events as well as enriching the content of training activities conducted with the REInnovation Academy.

3.1 REILab research

REILab research primarily relies on empirical methods, employing econometric models to analyze extensive datasets. Traditional linear regression tools are used for all empirical efforts aimed at testing theories where the main goal is to understand the link between private and social sources of value and real estate prices. Additionally, new nonlinear Artificial Intelligence tools are used when trying to understand the structure behind Big Data and exploring relationships among variables that resist simplification into linear correlations.





3.2 REInnovation Academy

The REInnovation Academy is a program that integrates finance, management, and economics content to transform talented students into professionals ready for immediate employment in real estate firms. Students from diverse backgrounds, such as Engineering, Architecture, Economics, and Law, are welcome. The teaching methodology of the REInnovation Academy combines rigorous methodological courses, case studies, practitioner lessons, and business simulations, facilitating interactive and relevant learning experiences. Notably, students incur no fees for the program, as it is fully financed by Partner Academy firms.

The Academy offers both on-campus and off-campus experiences. The on-campus program spans 12 weeks of daily activities at the SDA Bocconi campus from Monday to Thursday.

The off-campus experience extends for 6 months, supported by the scholarship granted to the student by the Academy.

Curriculum

The Curriculum includes Foundation and Empowerment courses, as well as Business Simulations and Managerial Experience courses.

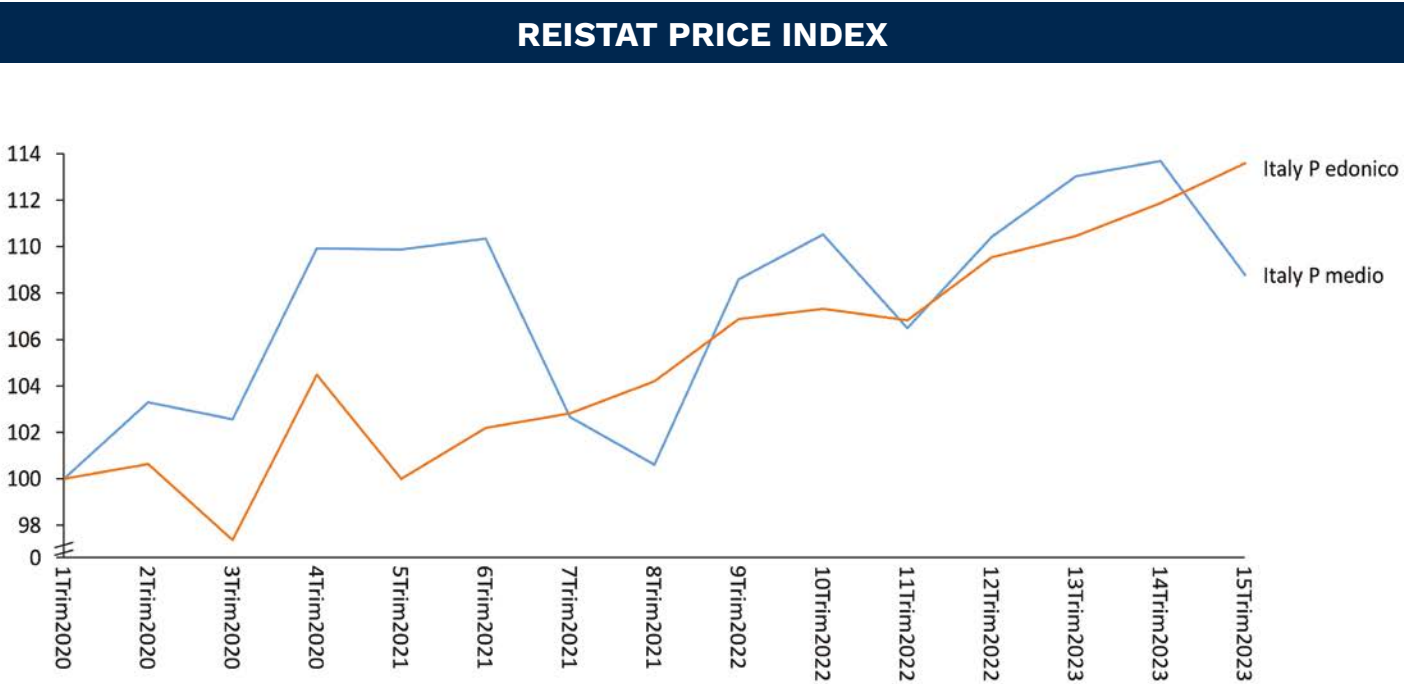
REInnovation Academy Inno Forum

Participants have the opportunity to attend a series called Inno Forum, involving direct in class teaching on the part of top managers from Partner Labs and Partner Academy firms. Inno Forum is highly complementary to the content of the various academic courses and has the purpose of sharing thoughts on the main trends of the real estate market as seen from the practitioners' perspective.

3.3 REIstat

REIstat is the REInnovation Lab platform that incorporates Commercial Real Estate data on transactions, valuations, and rent contracts. It serves the purpose of enhancing knowledge about the size and main characteristics of the Italian real estate market, providing inputs for building a comprehensive market index. REIstat builds on the results of the research project, focusing not only on the Value Added dimension but also on Social, Green, and Innovation & Technology characteristics. Importantly, the aim is to evaluate sustainability not simply at the building level but at the overall building use level including the behavior of all relevant stakeholders at the deal level. Using data provided by the Data Partner, REIstat has also produced a price index for the residential real estate market, at both the annual

and quarterly level, for a sample of capoluoghi di Provincia (Bari, Bologna, Firenze, Milano, Napoli, Roma, Siracusa, Torino) and for the main individual cities. The index is produced in two versions, known as the trend dummy methodology and the characteristic-based methodology, the former accounting for changing characteristics across time periods the second based on the specific selection of a set of characteristics of an interesting residential unit.



4. Research report, papers, business cases

4.1 Sustainable location

We utilize a sample of approximately 150,000 real estate valuations, primarily reflecting actual transactions, to assess the impact of local and national sustainability indices on prices. This sample encompasses all micro-zones included in the most detailed Italian database available as of the end of 2020. We control for typical characteristics relevant to real estate value, including the asset's location, maintenance condition, the significance of local economic activity, and observable features at the Municipal, Provincial, and Regional levels. We

find that market prices incorporate sustainability concerns.

A one standard deviation shock to measures of social and environmental capital is associated with an almost 8% increase in real estate prices, and an even higher sensitivity for rents.

Andrea Beltratti, Alessia Bezzecchi
REInnovation Lab Working Paper



4.2 Real estate, data and models: artificial intelligence and new challenges

All sectors need to face a growing «datification» trend. An increasing portion of a company's value is extracted from new methods of creating and assembling data and understanding them in the right way. The real estate sector has traditionally been characterized by a qualitative approach, with little systematic use of data, but the overall situation is quickly changing. The new frontiers of

data creation and data use through Artificial Intelligence are likely to revolutionize real estate, with clear positive implications also for banks and financial institutions that interact on a continuous basis with the real estate sector.

Andrea Beltratti, Alessia Bezzechi
Bancaria, numero 9, 2019



4.3 Sessg Real Estate and the impact of green building certification

Sustainable and Esg-compliant Real Estate is of paramount importance to both investors and policy-makers. Investor interest has induced rating companies to introduce Esg ratings in their product portfolios, and this is a strong motivation to Real Estate players to better understand the trade-off between Esg-induced revenues and Esg implementation costs. After a review of existing applications of Esg to the Real Estate sector, we present a Monte Carlo simulation methodology and apply it to a Real Estate investment project. Using the results of a meta-analysis covering the results of 70 academic papers published in the main international Real Estate journals, we consider impact ranges for six indicators that are highly relevant in investment valuation and simulate the ten-year business plan of the project

5,000 times. The simulation results show the substantial increase in the net present value and internal rate of return associated with the presence of environmental certification.

Andrea Beltratti, Alessia Bezzechi
Bancaria, numero 1, 2021

4.4 Climate Risk, Real Estate and Environmental Certification: an analysis based on RecVaR

We consider a specific example of a real estate asset, a luxury hotel, and apply a Monte Carlo methodology to understand the sensitivity of its value to climate change, considering the impact of energy and environmental certification, transition risk, estimated through changes in the simulated price of CO2 emission permits, and physical risk. We calibrate the relevant parameters by using results published in various studies and simulate the asset business plan 10,000 times in order to study the sensitivity of relevant indicators like net present value and internal rate of return, examining the marginal impact of each source of risk.

Andrea Beltratti, Alessia Bezzechi
Bancaria, numero 1, 2022

4.5 Real Estate and residential ads: determinants of economic value from the perspectives of sellers

No research has been able to estimate the value-relevance of the most relevant characteristics that are responsible for the

determination of the price, due to lack of data. The only available evidence comes from research papers produced by the Bank of Italy exploiting data provided by an online platform. Using the data provided by the REInnovation Lab Data Partner we are able to complement the evidence produced by the Bank of Italy, and find that individual characteristics have the expected sign in linear regressions explaining the asking price. The research reveals in particular a strong and growing relevance of energy certification. The output is relevant also to compute REIndex – the real estate price index for Italy and the individual cities – that has been presented at the Annual Conference of the REInnovation Lab at SDA Bocconi. The index explains the trend of the living sector better than the simple arithmetic average of prices, that are affected by heterogeneous characteristics of transacted or asked units. The results describe the dynamics of the marginal contribution of the relevant characteristics that, especially in the post-pandemics period, point to the relevance of sustainability from the point of view of energy use and service availability. For example, the ask price differential between energy classes A/ B and energy classes F/ G has gone up to 560 €/mq in 2022, amounting to 21% of the average price.

Andrea Beltratti, Alessia Bezzechi
Working paper, 2023



5. Initiatives

The REInnovtion Lab has organized several initiatives in various formats: Conferences, C-Suite Forum, Inno Forum.

“UNO, NESSUNO, CENTOMILA”- L'EVOLUZIONE DEL REAL ESTATE: TRA (NUOVE) ESIGENZE E STRATEGIE DI INVESTIMENTO”

An opportunity to debate and study the transformation of the economic role of the real estate system based on insights of the Chiefs of Partner Lab and Partner Academy firms, the Scientific Committee of the REInnovation lab as well as Faculty members. The conference is organized in conjunction with the Graduation ceremony of the third edition of the REInnovation Academy.

Real Estate Innovation Academy C-Suite Forum: People-Tech, innovazione e governance per la sostenibilità nel real estate

The Real Estate Innovation Academy C-Suite Forum's central characteristic is the dialogue and interaction with the top management of the most important and relevant real estate rms on the topic of «ESG CRITERIA, SUSTAINABILITY, CIRCULAR ECONOMY IN REAL ESTATE». The Chiefs of the top real estate firms took part in a debate in a round-table format to discuss the main research results produced by the Lab and at the same time to share their views on the most relevant trends and their implications for the management of their organizations.

SDA Bocconi 6 aprile 2022

REbuilding the Future

The real estate sector plays a crucial role for economic growth especially in light of the deep transformation affecting the economy, companies and cities. The pandemic has changed the ideal structure of the physical places where people live and work, with relevant implications that are heterogeneous across companies and sectors. Technological innovation, the development of new ecosystems, finance, big data are the main drivers representing challenges and opportunities that corporate and financial institutions have to face in order to thrive in an ever-changing environment.

SDA Bocconi 20 Luglio 2021

REInnovation Forum Real Estate 5D: strategia, valore in cinque dimensioni

RECorporate, REFlexibility, REGeneration, REModelling RELocation-Investment are the ve dimensions that help us understand the most important trends for real estate and the economy at large.

1 RECorporate – which sub-sectors are mostly affected by the transformation taking place in the corporate sector? Which sectors are more disruptive for real estate prices?

2 REFlexibility – how can we help the development of the new ways of working in the sharing-economy? What is the impact of new technological platforms on the real estate market?

3 REGeneration – what is the vision that helps increase placemaking value in large urban regeneration projects? How is it possible to plan in a flexible way also in the long run?

4 REModelling – what is the role of alternative data and Arti cial Intelligence tools in «re-modelling» life-style and working conditions? What is the contribution of smart buildings and smart districts to environmental and social sustainability?

5 RELocation - Investment – what are the characteristics of the locations that help companies to create most value? Is it possible to de ne the identity of the ideal real estate investment project?

SDA Bocconi 16 ottobre 2019

REInnovation Lab Opening Conference

The Opening Conference is an opportunity to present the REInnovation Lab, a research-based Lab that also involves training activities, founded by Assoimmobiliare and SDA Bocconi School of Management. The REInnovation Lab's mission is to collect real estate transaction data, particularly for commercial real estate, in order to create an independent platform to share data and knowledge owned by the top firms.



Cutting edge scientific partners.

