

# Research Proposal

This document briefly describes three research projects that I plan to carry out between March 2024 and February 2026 within the scope of CICEE's activity, specifically in its research line on Tourism & Hospitality Business Economics, under the supervision of Professor Mário Coutinho dos Santos.

This proposal comprises three projects: (1) a project for the "Developing a conceptual framework on real option valuation applied to business strategic restructuring projects", (2) a project for "applying an abandonment valuation model to the study of the value creation potential of this strategic real option", and (3) another for the "applying a switching output valuation model to the study of the value creation potential of this strategic real option". This document describes the research context, each project's methodology, means, expected results and chronogram, and include an initial set of relevant bibliographic references.

## 1. Contextualization

Business organizations' strategic decision-making processes, typically, require commitments with significant resource allocations to projects, characterized by long expected economic lives, and non-negligible sunk costs. Advances in strategy and finance interdisciplinary research have developed a promising real option "systematic strategy framework to evaluate and structure resource investments under uncertainty, and that successful use of real options can lead to the benefits of downside risk reduction and upside potential enhancement" (Tong and Reuer, 2007, p. 2-3). Those managerial choices are taken under increasingly volatile external environments, exposing projects' realizations to both systematic and idiosyncratic uncertainty (e.g., Saloner, 1991; Tong and Reuer, 2007).

Stylized fact on the U.S. hotel industry documents that it is relatively more exposed to systematic risk, than the overall market. Although exhibiting, on average, a 13.2 percent higher systematic risk, its business risk (measured by the unlevered beta) is less sensitive to non-diversifiable risk factors than the 5,649 sample of listed firms (excluding financials), by -12.4 percent. The evidence suggests that the equity market value of the hotel industry, *ceteris paribus*, appears to be more exposed to capital market volatility than the broader market portfolio.

It is a well-established financial economics paradigm, that the market value of a firm can be estimated as the present value of the expected cash flow streams generated by both, the resources-in-place (RiP) portfolio, and the projects integrating the growth opportunities portfolio (GOP) to be undertaken in the future. Under this framework, projects' owners / managers have the discretionary strategic flexibility to exercise the real option. For example, switching projects' RiP to other(s) productive activity(ies) with higher value creation prospects. Alternatively, abandoning, downsizing, or

suspending temporarily the projects. Pursuing the objective of optimizing the firm's aggregate performance in terms of long-term value-creation.

The Covid-19 pandemic sanitary affected significantly the economic and financial condition of hotel industry around the world. Coutinho dos Santos et al. (2023) found that a sample representative of 82.42 percent of the universe of the mainland Portuguese hotel industry, has experienced during the 2020-2021 pandemic period aggregated impacts of: -64.2 percent in operating revenues; -160.1 percent in net income; -56.0 percent in the operating cash flow; and -81.1 percent in financial slack (see also, e.g., García-Gómez et al., 2021; Zhang et al., 2022). A deterioration of this magnitude in the aggregated operating, economic, and financial performance of the overall industry, one of the major contributors for Portugal's GDP, casting concern about its long-term solvency, and uncertainty about the planning and valuation of hotel industry's strategies for resilient recovery after the pandemic shock.

The development of blueprints to support the design of prospective strategic scenarios and alternative recovery paths (and paces) for post-pandemic industry sustainable recovery strategies, require the availability of a comprehensive and quantitatively substantiated understanding of the magnitude of economic, financial, and social impacts of the Covid19 shock (e.g., Fotiadis et al., 2021; Coutinho dos Santos et al., 2023).

Therefore, we intend to contribute to this understanding and provide valuation models that could estimate the value creation for both abandonment and switching output decisions under the current (post-Covid19) period. In this research project, we examine the case of the Portuguese (mainland) hotel industry, adversely impacted by the Covid19 pandemic, developing the following projects:

**Project 1** – Developing a conceptual framework on real option valuation applied to business strategic restructuring projects.

**Project 2** – Applying an abandonment valuation model to the study of the value creation potential of this strategic real option.

**Project 3** – Applying a switching output valuation model to the study of the value creation potential of this strategic real option.

## 2. Methods

- **Project 1** – To develop a conceptual framework on real option valuation applied to business strategic management, a systematic literature review will be conducted, based on a standard SLR framework (e.g., PRISMA).

- **Project 2** - In this study, a Valuation of Strategic Options for Hotel Firms Recovery After Covid19 Pandemic - An Abandonment Real Option Approach, we intend to apply a numerical approach based on a Monte Carlo simulation for valuing dynamic investment decision problems with embedded

real options dependent on numerous state variables. The complex set of available decision options will be decomposed into a set of simple options, considering the interactions and interdependences among them. The decomposition approach is numerically implemented using an extension of the Least Squares Monte Carlo algorithm, presented by Longstaff and Schwartz (2001) applied to our multi-option setting.

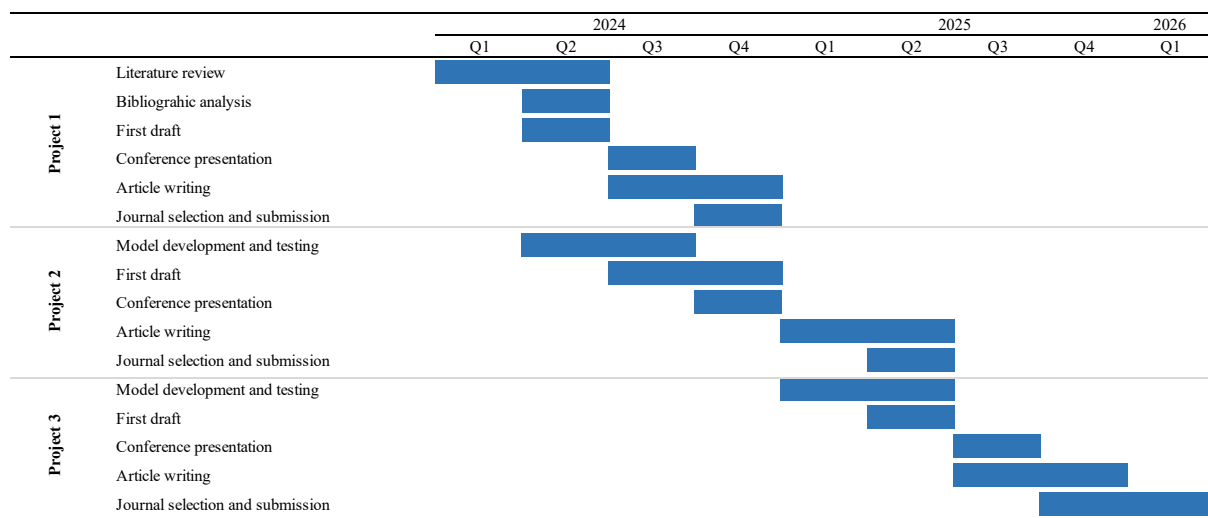
- **Project 3** – This study, Valuation of Strategic Options for Hotel Firms Recovery After Covid19 Pandemic - An Abandonment Real Option Approach, aims at developing and estimating a valuation model to appraise the value creation potential of exercising the real option of switching a hotel project to other(s) output activity(ies), such as residential real estate. Closed-form solutions for real option stochastic models are not, for most cases, analytically tractable; therefore, we will use Monte Carlo (MC) statistical bootstrapping multiple simulation methodology to approximate a solution for the model (e.g., Grovenstein et al., 2011; de Oliveira et al., 2014; Mintah et al., 2018; Sařuga et al., 2020).

### 3. Resources

The development of Project 1 (systematic literature review), we will use Clarivate’s Web of Science and Scopus databases for identifying and screening indexed papers on the theme. Projects 2 and 3 will use economic, financial, and operating data from drawn INE (Statistics Portugal), Sabi, and Orbis, spanning the 2010-2022 period. Software packages will be used according to the research needs and may include SPSS Statistic and SmartPLS.

### 4. Expected results and chronogram

The research proposal aims to publish three articles in JCR/Scopus-indexed journals with the highest possible impact. The following chronogram conveys the planned milestones:



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25<sup>th</sup> of February, 2024

## References

- de Oliveira, D. L., Brandão, L. E., Igrejas, R. & Gomes, L. L. (2014). Switching Outputs in a Bioenergy Cogeneration Project: A Real Options Approach. *Renewable and Sustainable Energy Reviews* 36(C)74-82.
- Dos Santos, M. C., Magano, J., & Mota, J. (2023). The impact of the Covid-19 pandemic on the hotel Industry's economic performance: Evidence from Portugal. *Heliyon*, 9(5).
- Fotiadis, A., Polyzos, S., & Huan, T-C. (2021). The Good, the Bad and the Ugly on COVID-19 Tourism Recovery. *Annals of Tourism Research* 87: 103117.
- García-Gómez, C., Demir, E., Díez-Esteban, J., & Biland, Y. (2021). The impact of COVID-19 Outbreak on Hotels' Value Compared to Previous Diseases: The Role of ALFO Strategy. *Heliyon* 7(8): e07836.
- Grovenstein, R., Kau, J. & Munneke, H. (2011). Development Value: A Real Options Approach Using Empirical Data. *The Journal of Real Estate Finance and Economics* 43(3): 321-335; <https://doi.org/10.1080/08985626.2021.1872937>.
- Longstaff, F. A. & E. Schwartz. (2001). Valuing American Options by Simulation: A Simple Least-squares Approach. *Review of Financial Studies* 14(1): 113-147.
- Mintah, K., Higgins, D. & Callanan, J. (2018). A Real Option Approach for the Valuation of Switching Output Flexibility in Residential Property Investment. *Journal of Financial Management of Property and Construction* 23(2): 133-151.
- Saloner, G. (1991). Modeling, Game Theory, and Strategic Management. *Strategic Management Journal* 12(Winter, 1991): 119-136.
- Saługa, P. W., Grzesiak, P. & Kaminski, J. (2020). Valuation of Decision Flexibility and Strategic Value in Coal Gasification Projects with the Option-To-Switch between Different Outputs. *Energies* 13(11): 2826; DOI: <https://doi.org/10.3390/en13112826>
- Tong, T. W. & Reuer, J. J. (2007). Real Options in Strategic Management. In J. J. Reuer & T. W. Tong, Editors. *Real Options Theory – Advances in Strategic Management* Volume 24: 3-28. Elsevier, Amsterdam, Netherlands.
- Zhang, X., Chang, B. G. & Wu, K.-S. (2022). COVID-19 Shock, Financial Flexibility, and Hotels' Performance Nexus. *Frontiers in Public Health* 10: 792946; DOI: 10.3389/fpubh.2022.792946.

## Other references

- Barone-Adesi, G. & Whaley, R. E. (1987). Efficient Analytic Approximation of American Option Values. *The Journal of Finance* 42(2): 301-320.
- Bernardo, A. & B. Chowdhry. (2002). Resources, Real Options, and Corporate Strategy. *Journal of Financial Economics* 63(2): 211-234.
- Besanko, D., Dranove, D., Shanley, M. & Schaefer, S. (2016). *Economics of Strategy*, 7<sup>th</sup> Ed. John Wiley & Sons, Hoboken (NJ), USA.

- Borison; A. (2005). Real Options Analysis: Where Are the Emperor's Clothes? *Journal of Applied Corporate Finance* 17(2): 17-31.
- Bowman, E. & Hurry, D. (1993). Strategy Through the Option Lens: An Integrated View of Resource Investments and the Incremental Choice Process. *Academy of Management Review* 18(4): 760-782.
- Bowman, E. & Moskowitz, G. (2001). Real Options Analysis and Strategic Decision Making. *Organization Science* 12(6): 772-777.
- Bulan, L., Mayer, C. & Somerville, C. T. (2009). Irreversible Investment, Real Options, and Competition: Evidence from Real Estate Development. *Journal of Urban Economics* 65(3), 237 - 251.
- Campbell, J., Lo, A. & MacKinlay, A. C. (1997). *The Econometrics of Financial Markets*. Princeton University Press. Princeton (NJ), USA.
- Chevalier-Roignant, B. & Trigeorgis, L. (2011). *Competitive Strategy Options and Games*. MIT Press, Cambridge (MA), USA.
- Ćulík, M. (2016). Real Options Valuation with Changing Volatility. *Perspectives in Science* 7: 10-18.
- de Andrés, P., de la Fuente, G. & Velasco, P. (2016). Are Real Options a Missing Piece in the Diversification-Value Puzzle? *International Review of Financial Analysis* 48: 261-271.
- de Neufville, R., Scholtes, S. & Tao Wang, T. (2006). Real Options by Spreadsheet: Parking Garage Case Example. *Journal of Infrastructure Systems* 12(2):107-111.
- Del Viva, L., Kasanen, E. & Trigeorgis, L. (2017). Real Options, Idiosyncratic Skewness, and Diversification. *Journal of Financial and Quantitative Analysis* 52(1): 215-241.
- Dixit, A. K. & Pindyck, R. S. (1994). *Investment Under Uncertainty*. Princeton University Press, Princeton (NJ), USA.
- Driouchi, T. & Bennett, D. (2012). Real Options in Management and Organizational Strategy: A Review of Decision-making and Performance Implications. *International Journal of Management Reviews* 14(1): 39-62.
- Grenadier, S. (1995). Flexibility and Tenant Mix in Real Estate Projects. *Journal of Urban Economics* 38(3): 357-378.
- Grenadier, S. (1996). The Strategic Exercise of Options: Development Cascades and Overbuilding in Real Estate Markets. *The Journal of Finance* 51(3): 1653-1679.
- Grenadier, S. (2005). An Equilibrium Analysis of Real Estate Leases. *The Journal of Business* 78(4): 1173-1214.
- Ipsmiller, E., Brouthers, K. D. & Dikova, D. (2019). 25 Years of Real Option Empirical Research in Management. *European Management Review* 16(1): 55-68.
- Keuleneer, L. & Verhoog, W. (2003). Strategic Valuation: The Relationship between Strategy, Valuation Techniques and Options. In L. Keuleneer e W. Verhoog, Editors. *Recent Trends in Valuation - From Strategy to Value*, cap. 1:1-6. John Wiley & Sons, Chichester, UK.

- Kinnunen, J. (2010). *Valuing M&A Synergies as (Fuzzy) Real Options*. Working paper presented at the 14th Annual International Real Options Conference, Rome, Italy.
- Krychowski, C. & Quélin, B. V. (2010). Real Options and Strategic Investment Decisions: Can They Be of Use to Scholars? *Academy of Management Perspectives* 24(2): 65-78.
- Lambrecht, B. M. (2017). Real Options in Finance. *Journal of Banking & Finance* 81: 166-171.
- Loncar, D., Milovanovic, I., Rakic, B. & Radjenovic, T. (2017). Compound Real Options Valuation of Renewable Energy Projects: The Case of a Wind Farm in Serbia. *Renewable and Sustainable Energy Reviews* 75: 354-367.
- Lovallo, D. & Sibony, O. (2010). The Case for Behavioral Strategy. *McKinsey Quarterly*.
- Luehrman, T. A. (1998a). Strategy as a Portfolio of Real Options. *Harvard Business Review* 76(5): 87-99.
- Luehrman, T. A. (1998b). Investment Opportunities as Real Options: Getting Started on the Numbers. Boston: Harvard Business Review 76(4): 51-67.
- Maeseneire, W. De & L. Keuleneer. (2003). Valuation of Companies: Discounted Cash Flow, Adjusted Present Value, Decision-Tree Analysis and Real Options. In L. Keuleneer & W. Verhoog, Editors. *Recent Trends in Valuation - From Strategy to Value*, Chapter 2: 7-34. John Wiley & Sons, Chichester, UK.
- Mahoney, T. J. (2005). *Economic Foundations of Strategy*. Sage Publications, Thousand Oaks (CA), USA.
- Matvos, G. & Seru, A. (2014). Resource Allocation within Firms and Financial Market Dislocation: Evidence from Diversified Conglomerates. *The Review of Financial Studies* 27(4): 1143-1189.
- McDonald, R. & D. Siegel. (1985). Investment and Valuation of Firms When There is an Option to Shut Down. *International Economic Review* 26(3): 331-349.
- McDonald, R. & Siegel, D. (1986). The Value of Waiting to Invest. *The Quarterly Journal of Economics* 101(4): 707-727.
- Michailidis, A. (2006). Managing Tourism Investment Opportunities under Uncertainty: A Real Options Approach. *International Journal of Tourism Research* 8: 381-390.
- Mun, J. (2006). *Real Options Analysis - Tools and Techniques for Valuing Strategic Investments and Decisions*, 2<sup>nd</sup> Ed. John Wiley & Sons, Hoboken (NJ), USA.
- O'Brien, J. & Folta, T. (2009). Sunk Costs, Uncertainty and Market Exit: A Real Options Perspective. *Industrial and Corporate Change* 18(5): 807-833.
- Penrose, E. (2008). Strategy/Organization and the Metamorphosis of the Large Firm. *Organization Studies* 29(08&09): 1117-1124.
- Penrose, E.T. 1959. *The Theory of the Growth of the Firm*, 4<sup>th</sup> Ed. Basil Blackwell, Oxford, UK.
- Peters, L. (2016). Impact of Probability Distributions on Real Options Valuation. *Journal of Infrastructure Systems* 22(3): DOI: [https://doi.org/10.1061/\(ASCE\)IS.1943-555X.0000289](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000289).

- Piessse, J. & de Putte, A. V. (2004). *Volatility Estimation in Real Options with Application to the Oil and Gas Industries*. Presented at the 8th Annual International Conference on Real Options of the Real Options Group, June 16-17, Montréal, Canada
- Piñeiro-Chousa, J., López-Cabarcos, M. Á., Romero-Castro, N. & Vázquez-Rodríguez, P. (2021). Sustainable Tourism Entrepreneurship in Protected Areas. A Real Options Assessment of Alternative Management Options. *Entrepreneurship & Regional Development* 33(3-4); DOI:
- Pitelis, C. N. (2009). *Edith Penrose's 'The Theory of the Growth of the Firm' Fifty Years Later*. Munich Personal RePEc Archive (MPRA) Paper No. 23180.
- Posen, H. E., Leiblein, M. J. & Chen, J. S. (2018). Toward a Behavioral Theory of Real Options: Noisy Signals, Bias, and Learning. *Strategic Management Journal* 39(4): 1112-1138.
- Ragozzino, R., Reuer, J. & Trigeorgis, L. (2016). Real Options in Strategy and Finance: Current Gaps and Future Linkages. *Academy of Management Perspectives* 30(4).
- Raynor, M. (2002). Diversification as Real Options and the Implications of Firm-Specific Risk and Performance. *The Engineering Economist* 47(4): 371-389.
- Ribeiro, J. A. & Costa-Filho, J. (2022). The Role of the Abandonment Option in Strategic Capital Allocation: A Review of Selected Literature. *European Review of Business Economics* I(2): 29-58; DOI: <https://doi.org/10.26619/ERBE-2021.I.2.3>.
- Rocha, K., Salles, L., Alcaraz Garcia, F. A., Sardinha, J. A. & Teixeira, J. P. (2007). Real Estate and Real Options - A Case Study. *Emerging Markets Review* 8(1): 67-79.
- Rogers, J. (2009). Developments in Strategy. In *Strategy, Value and Risk - The Real Options Approach*, 2<sup>nd</sup> Ed. Palgrave Macmillan, New York (NY), USA.
- Sabour, S. A. A., & Poulin, R. (2006). Valuing Real Capital Investments Using the Least-Squares Monte Carlo Method. *The Engineering Economist*, 51(2), 141.
- Sauvageau, M., & Kumral, M. (2018). Cash Flow at Risk Valuation of Mining Project Using Monte Carlo Simulations with Stochastic Processes Calibrated on Historical Data. *The Engineering Economist* 63(3): 171-187.
- Schwartz, E. S. & Trigeorgis, L. (2004). *Real Options and Investment under Uncertainty. Classical Readings and Recent Contributions*. The MIT Press, Cambridge (MA), USA.
- Smit, H. & Trigeorgis, L. (2006). Real Options and Games: Competition, Alliances and Other Applications of Valuation and Strategy. *Review of Financial Economics* 15: 95-112.
- Smit, H. & Trigeorgis, L. (2017). Strategic NPV: Real Options and Strategic Games under Different Information Structures. *Strategic Management Journal* 38: 2555-2578.
- Sutherland, A. & Williams, J. (2010). Valuing Real Options: Insights from Competitive Strategy. In R. Thomas and B. Gup, Editors. *The Valuation Handbook - Valuation Techniques from Today's Top Practitioners*, Chapter 13: 334- 366. John Wiley & Sons, Hoboken (NJ), USA.

- Titman, S. (1985). Urban Land Prices Under Uncertainty. *American Economic Review* 75(3): 505-514.
- Triantis, A. J. & Hodder, J. E. (1990). Valuing Flexibility as a Complex Option. *The Journal of Finance* 45(2): 549-565.
- Trigeorgis, L. (1996). *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. The MIT Press, Cambridge (MA), USA.
- Trigeorgis, L. & Mason, S. P. (1987). Valuing Managerial Flexibility. *Midland Corporate Finance Journal* 5: 14-21.
- Trigeorgis, L. & Reuer, J. (2017). Real Options Theory in Strategic Management. *Strategic Management Journal* 38: 42-63.
- Trigeorgis, L., Baldi, F. & Katsikeas, C. S. (2021). Valuation of Brand Equity and Retailer Growth Strategies Using Real Options. *Journal of Retailing* 97(4): 523-544.
- Trigeorgis, L., Editor. (1999). *Real Options and Business Strategy, Applications to Decision Making*. Risk Publications.
- Wang, H., Yu, F. & Zhou, Y. (2020). Property Investment and Rental Rate Under Housing Price Uncertainty: A Real Options Approach. *Real Estate Economics* 48(2): 633-665.
- Williams, J. T. (1991). Real Estate Development as an Option. *The Journal of Real Estate Finance and Economics* 4(2): 191-208.
- Yung Medeiros, P. (2003). Applications of Real Options in the Real Estate Market Focusing the City of Rio de Janeiro. *Brazilian Review of Finance* 1(1): 45-87.