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### AN EXPOSITION ON THE MATHEMATICS AND ECONOMICS OF OPTION PRICING

Luke Miller, St. Anselm College, Manchester Mark Bertus, Auburn University, Auburn

### ABSTRACT

The application of options pricing theory to value irreversible investment decisions has witnessed a marked increase over the last decade. For instructional and simplified applications, the Black-Scholes model is commonly demonstrated due to its tractability and acceptance in the finance community. This paper provides a detailed mathematical exposition of the Black-Scholes model. The main contribution of this paper is the step-by-step instructional account of the Black-Scholes model that can be used directly in the classroom to introduce stochastic calculus, arbitrage-free valuation, and option-pricing theory. In contrast with most Black-Scholes derivations found in the pedagogical literature, this paper develops the fair option price from an economic equilibrium perspective. Through this approach, it is hoped the reader will comprehend both the mathematics and economics underlying option pricing theory, as both are equally important.

JEL: A22, A23, C02, G00, M19

KEYWORDS: Options Pricing, Black-Scholes Model, Stochastic Calculus, Pedagogy

### **INTRODUCTION**

B lack and Scholes (1973) and Merton (1973) published their seminal work on pricing financial options using a continuous-time model that is known as the Black-Scholes equation. Their work led to an explosion of financial risk management practices within firms, and some attribute their efforts to the successful Chicago Board Options Exchange (CBOE) which today has an estimated nominal value of \$100 trillion.

In order to fully comprehend and appreciate options literature, a basic understanding of financial option pricing mathematics is required. As the majority of these mathematical efforts have been initiated and developed under the financial economist umbrella, many business professionals and non-finance experts lack the appropriate exposure to the material. Numerous texts exist on the subject; however, a detailed step-by-step and line-by-line treatment of the Black-Scholes equation are not easily found in texts and related materials.

As such, the purpose of this paper is to formally develop the mathematics and economics behind the Black-Scholes equation. In contrast with most Black-Scholes derivations found in the pedagogical literature, this paper develops the fair option price from an economic equilibrium perspective. Through this approach, it is hoped the reader will comprehend both the mathematics and economics underlying option pricing theory, as both are equally important. This paper does not develop new theories, but instead contributes with its detailed exposition of existing material. For those interested in options pricing, we believe this detailed presentation provides a clear and concise path to comprehend and/or teach basic option pricing mathematics. We have used the techniques in this paper for our *Financial Engineering* courses and find it appropriate for advanced undergraduate and graduate students across numerous disciplines.

### BUSINESS ETHICS AS AN ACCREDITATION REQUIREMENT: A KNOWLEDGE MAPPING APPROACH

Rita A. Franks, Louisiana Tech University Albert D. Spalding, Jr., Wayne State University

#### ABSTRACT

Most of the more prominent and highly ranked business and management schools in the United States and elsewhere are accredited by one of two international accrediting organizations, the Association to Advance Collegiate Schools of Business (AACSB) or the Accreditation Council for Business Schools & Programs (ACBSP). Both of these organizations require the inclusion of business ethics in the curriculum of each accredited institution. "Business ethics," however, is a concept that includes, overlaps or integrates with such notions as social issues in management, corporate social responsibility, corporate citizenship and sustainability. Larger disciplines such as philosophy, psychology, the social sciences and even religion can also impact and interact with business ethics. This paper uses knowledge mapping to organize the various pockets of knowledge that comprise the business ethics domain, relying in part on traditional library science classification systems. The paper concludes that the accreditation regime would benefit from a more carefully constructed articulation of the content of business ethics.

**JEL:** A2, M14, Z12

KEYWORDS: Business Ethics, Accreditation, Knowledge Mapping, Philosophy, Religion.

### **INTRODUCTION**

There are two international accreditation bodies for higher education business schools, the Association to Advance Collegiate Schools of Business (AACSB) and the Accreditation Council for Business Schools and Programs (ACBSP). Both of these organizations require business schools to incorporate ethics into their curricula. The standards put forth by the AACSB are more detailed than those put forth by the ACBSP.

Under the AACSB approach, ethics education is required as part of the general knowledge and skills portion of the standards for undergraduates, and in the management-specific portion of the standards for undergraduate and master's students. Ethics education under this regime involves four subject areas: (a) responsibility of business and society, (b) ethical leadership, (c) ethical corporate governance, and (d) ethical decision-making (2004).

Under the ACBSP regime, ethical issues are expected to be addressed within several contexts. For example, business ethics is considered to be part of a member school's education in regard to the impact of business on society. In addition, the standards require that ethical awareness and global awareness be included in the student skills that are assessed by member schools. Business ethics is also included as part of the common professional component of a typical business school curriculum (2011).

Despite these accreditation requirements, the content of business ethics is not specifically defined or circumscribed by either of the major business school accreditation bodies. In their glossary section, for example, the ACBSP provides a definition of ethical behavior that refers to how organization insures that all its decisions, actions and stakeholder interactions conformed to the organization's moral and professional principles. Even though the ACBSP standards acknowledge that an organization's "moral

# ACCOUNTING STUDENT AND LECTURER ETHICAL BEHAVIOR: EVIDENCE FROM INDONESIA

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### ABSTRACT

Research on ethical behavior has been conducted to understand human behavior in their environment. It became an issue in Indonesia since there are many issues related to accountant behavior in their professional role. This study provides empirical evidence on an ethical behavior issue related to accounting student and lecturers in a private university in Surabaya, East Java-Indonesia. We added a personal variable of gender and locus of control to identify how women differ from men. Women in Indonesia have been treated as second citizen, not only in education but also in the working environment. This has held despite efforts of emancipation undertaken for many years. The locus of control as an individual factor represents how individuals react to making decision. About half of 23 private universities in Surabaya and 548 respondents engaged in the survey. The universities were separated by accounting program accreditation. Using analysis of variance and Pearson correlation the result of this study show women's ethical attitudes were better than men's. Second, it was concluded that individuals with internal locus of control are more reluctant to do unfair and unethical acts than individual with external locus of control. Finally, accounting programs with better accreditation revealed better ethical behavior, even though the difference was statistically insignificant.

**JEL:** M49

KEYWORDS: Ethical Behavior, Gender, Locus of Control.

#### **INTRODUCTION**

Research in accounting ethics is growing rapidly throughout the world especially since the Enron case in 2002. In Indonesia, the issue of accounting ethics developed along with the occurrence of multiple violations of ethics involving the accounting profession. In public accounting, based on the accountability report of the Honorary Board of IAI (Institute of Indonesian Accountants) in 1990 – 1994 period, there were 53 public accountant cases of ethics violations (Husada, 1996). Other cases of unethical behavior are quite common. This paper addressed these issues by conducting research on ethical behavior in accounting education.

This research was built upon the work of Ameen et al (1996). It conducted a survey to identify the relationship between individual factors such gender with the willingness to tolerate unethical academic behavior. The result ascertained that female accounting students are more sensitive to ethical issues and less tolerant of unethical behavior than male students are. In this research, gender was chosen since there are some gender related issues in education in Indonesia. The condition and position of women in Indonesia still lags far behind men. The data showed that there were less female students in higher education and levels of illiteracy for women 5.3% higher than 2.7% in men (Pulungsih, 2007). There are a number of traditional cultural values in Indonesia that identify the main tasks of women in domestic positions. When the funding sources of a family are limited, the school should come first to the boy. Although the task of women is in the domestic area, they also must educate children and maintain the welfare of the family. Thus, women should remain knowledgeable for the task. Limitations of education and training opportunities for women by gender equality still require a more serious struggle. Even

### APPLIED PROJECT LEARNING OUTCOMES: DIFFERENCES BETWEEN UNITED STATES AND INTERNATIONAL STUDENTS

Robert D. Green, Lynn University Farideh A. Farazmand, Lynn University

#### ABSTRACT

The presence of international students on college campuses has been a significant source of cultural diversity and globalization of college campuses. Therefore, determining factors for successful learning experiences of international students on American campuses could result in better recruitment strategies. This paper investigates the learning experiences of students in applied project courses and compares learning outcomes of international and the U.S. students in applied courses. Results show positive impacts of applied project courses on students' learning outcomes with better results for international students.

JEL: I21, M31, A22

KEYWORDS: Applied Projects, Learning Outcomes, Global Business Education

### **INTRODUCTION**

Given the successful careers, specific standards must be met, e.g., assurances of learning (AACSB International students for successful careers, specific standards must be met, e.g., assurances of learning (AACSB International students are actively involved with an experience and then reflect on that experience)" (Frontezak and Kelly, 2000, p. 3).

Moreover, active learning projects provide opportunities for culturally diverse students to work together outside of the classroom, e.g., requiring this as a team assignment. As universities provide diversity opportunities for student learning, e.g., recruiting and admitting international students, there is a pedagogical need to determine the impact on the diverse student populations learning outcomes (Geringer, Stratemeyer and Canton, 2009; Grayson, 2005). The purpose of this study is to examine the differences between United States and international students' experiences and the influences on their successful performance in courses that include applied learning projects. Therefore, are there differences between U.S. and international students' learning outcomes? What factors influence their successful applied project performance? This study includes applied projects literature review, the methodology and design, data analysis results, implications of the findings and the conclusions.

# LEARNING SKILLS AND MOTIVATION: CORRELATES TO SUPERIOR ACADEMIC PERFORMANCE

Richard Griffin, University of Tennessee at Martin Angie MacKewn, University of Tennessee at Martin Ernest Moser, University of Tennessee at Martin K. W. VanVuren, University of Tennessee at Martin

### ABSTRACT

This paper describes a study that was conducted at a mid-sized public state-university in the mid-south, USA, to examine various factors affecting student academic performance. In this study, the 10-scale Learning and Study Strategies Inventory (LASSI) assessment device was administered. This set of scales measures students' receptivity to skills and strategies that purportedly enhance one's ability to learn and successfully perform in an academic setting. Results from this instrument showed that the single most influential learning and study skill promoting positive academic performance was level of intrinsic motivation. To explore the individual aspects of motivation, the 8-scale Downing Self-Assessment Questionnaire was also administered. The Downing questionnaire examines motivational factors, for example, behaviors and beliefs, which might maximize one's potential for positive achievement in college. Along with motivation, the subscale measuring an attitude of life-long learning significantly predicted academic performance. The results of this study have pedagogical implications for helping students maximize their academic performance in college.

**JEL:** I21; I23

KEY WORDS: Learning Skills, Academic Performance, Student Success, LASSI

### **INTRODUCTION**

t present, it can be safely said without exaggeration that a crisis of sorts currently exists in college education in the United States. As recently as the late 1990s the US led the world in the percentage of students who graduate from college (Abel, 2000). In just a little more than a decade, the US has fallen from first to sixteenth in world college graduation rates (Chalian, 2012). This startling statistic has serious socio-economic implications for the future of the US; and in response, President Obama has urgently expressed the goal of having the US retake the lead in world college graduation rates by 2020 (Carey, 2010). College educators are naturally keenly interested in all aspects of inducing student academic success which would in turn result in higher graduation rates. One area of particular interest to academicians is the question of what personality characteristics, beliefs, and behaviors contribute most positively to student academic performance as measured by student GPA. There is a rich history of academic research on this topic (see the literature review below), but much ambiguity persists. In a recent study (Griffin, MacKewn, Moser & VanVuren, 2012) it was found that amongst learning and study skills, the student's level of motivation is the single most important determinant of superior academic performance. This paper expands upon the earlier Griffin, et al., study by delving more deeply into specific aspects of student motivation.

The specific motivation for this paper was to bring additional clarity to the issue of determinants of superior academic performance in a business school setting. The college or university level of instruction is chosen for examination. In the Griffin, et. al. (2012) study, the Learning and Study Strategies

### POSITIONING COMPUTER LITERACY AS A VALUE-ADDED BUSINESS CORE COURSE

Richard T. Grenci, John Carroll University

#### ABSTRACT

Many business students are introduced to information systems via computer literacy coursework and/or assessment tests. Such an introduction can be less than ideal, particularly in a field that suffers from declining enrollment. Introductory computing often is software skills-specific and tutorial-intensive and thus may not offer an engaging view of the field or capture the larger relevance of information technology. In addition, the mere existence of an assessment or "test-out" option can further trivialize the perceived value of the course. This research develops a solid foundation for advancing beyond a focus on computer literacy and software skills to tap the value-added potential of an introductory computing course. The proposed approach ultimately frames the course content around the documentation and presentation of a business plan. A business plan provides an integrative vehicle for teaching information concepts and software applications in the larger context of business analysis and communications. The importance of the framework goes beyond the teaching of skills – it provides for a broadly relevant and engaging approach that promotes a higher level of learning. The direction and implications of the approach are discussed.

**JEL**: I29, M15

**KEYWORDS**: Introductory Computing, Computer Literacy, Business Plan, Pedagogical Framework, Business Core

#### **INTRODUCTION**

The function and value of an introductory computer literacy course has been debated and analyzed for nearly two decades (e.g., Harris 1993; Gordon and Chimi 1998; Dyeret al. 2004; Wallace and Clariana 2005; Hulick and Valentine 2008; Shannon 2008; Grant et al. 2009; Rondeau and Li 2009; Morris 2010). Along the way, the "IS 2002" curriculum guidelines relegated the "Personal Productivity with IS Technology" course to a discretionary prerequisite status with the use of self-study modules (Davis et al. 2001; Gorgone et al. 2003); and "IS 2010" removed it from its guidelines (Topi et al. 2010). However, not only does research continue to show the need for a personal productivity course (e.g., Grant et al. 2009; Rondeau and Li 2009; Morris 2010), but tutorial-based modules can serve to trivialize the course by considering it primarily with respect to software mastery rather than the use and usefulness of the tools. This paper develops a foundation for viewing the value-added potential of an introductory computing course as more than just limited to computer literacy or software skills proficiency. By advancing beyond content and focusing on context, an introductory computing course can be positioned as a value-added core course for all students and majors regardless of prior levels of computer skills. While value-added positioning can be realized via various contexts, a computer literacy course is particularly fitting to business analysis and communications.

The direction and implications of this type of context are discussed with respect to a framework and coursework centered on the development of a business plan pertaining to the students' entrepreneurial ideas. Not only does the framework provide for a higher level of learning, but it also can help to personalize interest in the course and in the relevance of technology, which is especially important to a field of study that has experienced declining enrollment (Walstrom et al. 2008). In developing the framework, the paper will proceed with a literature review of research on computer literacy and student

# INTEGRATING THE OUTPUT AND SUBSTITUTION EFFECTS OF PRODUCTION INTO THE INTERMEDIATE MICROECONOMICS TEXTBOOK

Ranjini L. Thaver, Stetson University

### ABSTRACT

Intermediate microeconomics textbooks employ indifference curve analysis to explain the income and substitution effects of a change in the price of a good x on the demand for it, holding other variables constant. Further, they demonstrate how the shape and slope of the demand curve changes depending on whether good x is defined as normal, inferior, or Giffen. This analysis in turn enables an evaluation of public policies aimed to increase consumer welfare. Unfortunately, these textbooks do not apply a parallel analysis in production theory, creating an analytical vacuum at the undergraduate level. This paper develops a model to analyze the output and substitution effects in production when the price of one input (labor) changes, holding technology, resource availability, and the price of the other input constant. This study will also address the production equivalents of normal, inferior, and possibly Giffen inputs affecting the shape and slope of the input demand curve. Such an exercise may allow students to gain a better understanding of producer and consumer theories, and encourage them to employ these concepts to real economic problems such as the effect of wage subsidies on labor demand. It should therefore be included in intermediate microeconomics textbooks.

JEL: A22, D11, D24

KEYWORDS: Substitution Effect, Output Effect, Isoquants, Consumer Theory, Producer Theory

### **INTRODUCTION**

Every intermediate microeconomics textbook devotes substantial attention to the income and substitution effects of a change in the price of a good on a consumer's demand for that good using indifference curve analysis. The good in question may be defined as a normal good, an inferior good, or a Giffen good. While these are rather tricky concepts for students to understand, the reward for understanding them is considerable. For example, knowledge of these effects have allowed students to better understand how and why the labor supply curve may be backward bending, or why an increase in income taxes may cause some people to decrease their labor supply, while others may work more. Further, because of its subtle insights economists have debated many policies, among them, whether the food stamp voucher system or a cash subsidy is more effective in increasing the welfare of its recipients (Pindyck and Rubinfeld, 2013; Perloff, 2012; Salvatore 2008; Browning and Zupan, 2004; Nicholson, 2002; Mansfield and Yohe, 2003).

The production equivalent of the income and substitution effects, namely the output and substitution effects, using isoquant analysis is rarely if ever adopted in intermediate microeconomics textbooks (e.g., Salvatore 2008; Mansfield and Yohe, 2003; Varian, 2010; Pindyck and Rubinfeld, 2013; Perloff, 2012) to analyze the labor demand curve for an individual firm. In addition, neither general nor academic Internet sites (About.com Economics, 2012; Resources for Economists on the Internet, 2012) cover such analyses. It is the contention in this paper that integrating these effects into intermediate textbooks will provide a service to the discipline. These concepts may not only be useful to those preparing for graduate school; they may also facilitate a better learning in the intermediate macro and other advanced economic courses, such as industrial organization and public finance, at the undergraduate level. Further, it may stimulate

### INTRAPORTFOLIO CORRELATION: AN APPLICATION FOR INVESTMENTS STUDENTS

Lynda S. Livingston, University of Puget Sound

### ABSTRACT

Intraportfolio correlation (IPC), a measure of portfolio diversification, is becoming increasingly popular among investment practitioners. However, despite the assertions of these adherents, IPC is far from a free lunch. Instead, it is a simplistic and flawed measure that ignores material information about the relationships among portfolio assets. Deconstructing the IPC therefore can be a productive and educational exercise (and a cautionary tale) for students of portfolio theory. In this paper, we describe IPC and offer suggestions for incorporating it into an introductory investments course.

**JEL:** G10, G11

KEYWORDS: Portfolio Theory, Diversification, Finance Pedagogy

### **INTRODUCTION**

Introductory courses on investments are almost certain to cover the portfolio theory of Markowitz (1952) and the Capital Asset Pricing Model of Sharpe (1964), Lintner (1965), Mossin (1966), and Treynor (1961). However, the theory students tackle in the classroom may have morphed into something quite different by the time they encounter it in the "real world."In this paper, we consider one such transformation: a metric called "intraportfolio correlation" (IPC, or "Q"), a "weighted average intraportfolio correlation that translates the range of correlations to percentage values" (Damschroeder, 2010). It is a weighted, standardized correlation coefficient. This measure has recently found favor with some practitioners, who assert that it easily quantifies a portfolio's diversification. However, confounding these claims are inconsistencies in various definitions of IPC and apparent confusion about basic mechanics of portfolio variance. These inconsistencies invite critical examination by investments students.

We discuss the claims made for intraportfolio correlation, then describe ways instructors can incorporate investigation of those claims into basic investments courses. The paper proceeds as follows. In the next section, we briefly review the literature underlying traditional approaches to teaching portfolio theory in introductory investments courses. We then turn to the intraportfolio correlation measure, first defining it, then exploring its applicability to two- and three-asset portfolios. Finally, we propose some ways that students could enhance their understanding of portfolio theory by evaluating the IPC.

#### LITERATURE REVIEW

Our goal is to demonstrate how investments instructors can incorporate an analysis of Q into the traditional curriculum. Thus, we are concerned with the concepts making up this curriculum and with the pedagogical approaches to teaching it. In this section, we consider both. We will show that, on the conceptual side, Q integrates easily into discussions of portfolio theory and market efficiency; as for pedagogy, Q fits seamlessly into applied spreadsheet projects. Markowitz (1952) derived the portfolio theory concepts that underlie the curriculum in investments courses. Students of portfolio theory—and therefore students of Q—are by definition students of Markowitz, and, while they may not recognize his notation, students should be very familiar with his development of portfolio expected return and variance. He starts by defining the mean and variance for random variables, moves to weighted sums of those variables (i.e., "[t]he expected value of a weighted sum is the weighted sum of expected values") and to

# TRADITIONAL VERSUS ONLINE INSTRUCTION: FACULTY RESOURCES IMPACT STRATEGIES FOR COURSE DELIVERY

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### ABSTRACT

Advances in communication technologies have provided alternative ways to deliver instruction to learners. With the availability of the Internet as a learning tool, educators are able to use this instrument for course delivery. This study takes an empirical look at course design and delivery factors that impact student perceptions of learning and course satisfaction. Students completed surveys addressing a variety of topics as they relate to traditional classroom and Internet courses. Results of the study suggest that online learning is a viable alternative to traditional classes in the information systems discipline. Students were active participants in the evaluation and comparative analysis of an undergraduate business course delivered in an online format for the first time. Implications of the results are discussed.

**JEL:** I20

KEYWORDS: Information Systems; Online Learning; Traditional Course

### INTRODUCTION

In the debate over online versus traditional classroom courses, the decision is often predicated on faculty resources. In 2008, the United States experienced the worst economic recession since 1930. As a result, this crisis greatly affected colleges and universities. Many institutions have been forced to find alternatives to "business as usual" to maintain their academic standards. According to an article in U.S. News & World Report, several universities have "frozen construction, cut employees' pay and laid off instructors" (Clark, 2009, p. 1). To mitigate the resulting economic challenges Hampton University's School of Business decided to explore other avenues that would allow them to sustain the quality of learning and maintain enrollment for the Management Information Systems course offered in the Department of Management. The information systems professors chose this course because they were eager to gain valuable insights into how this instruction method affects learning in the information systems discipline.

Hampton University's Management Information Systems (MGT 323) class is a required course for all business majors. Four sections of this course are provided each semester and each section is always filled to capacity. The decision was made to convert two sections of the Management Information Systems course to an online format. The customary enrollment cap for the course is 25 however; student need influenced the decision to increase the enrollment cap to 35. The enrollment cap was increased to 35 because a large number of seniors needed the course that semester to graduate. Students met face-to-face the first day of class with the instructor. During this meeting, the students were made aware that their sections would be held entirely online. The notification was met with mixed reactions, some students preferring an online class were excited and others were disappointed. Students were given the syllabus and directions to access their class section online. The Blackboard platform was used to transmit course information, assignments, e-mails, and discussion posts.

# SEMANTIC MAPPING OF LEARNING ASSETS TO ALIGN CURRICULUM AND EVIDENCE LEARNING EFFECTIVENESS IN BUSINESS EDUCATION

Chad Patrizi, American Public University System Phil Ice, American Public University System Melissa Burgess, American Public University System

### ABSTRACT

Ensuring the alignment of course content against desired goals and objectives has always been at the core of effective instructional course design—whether the instruction is delivered face-to-face, or via the support of distance technologies. Nonetheless, with the latter delivery of instruction, two distinct challenges have recently emerged, thus prompting the need to re-examine the term "quality" as it relates to accreditation. The first challenge lies within the ability to locate and/or create and align digital learning objects to course goals and objectives. The second challenge lies within the ability to demonstrate learning effectiveness from learning management system metadata. A research and development team at American Public University System addressed these challenges by employing an open source repository and semantic engine for analysis and alignment of content, materials, and learning activities to goals and objectives across all courses within the School of Business. The result was a highly detailed, accurate mapping of the programs' knowledge base to established goals and objectives. As an added benefit, resources were disaggregated to a very granular level and sorted into taxonomies that can be independently referenced and utilized for cross-curricular consumption.

**JEL**: I23, O31, O32

**KEYWORDS**: Accountability, Accreditation, Business Education, Quality, Excellence, Online Learning, Semantic Mapping, Semantic Analysis, Learning Assets, Learning Management Systems, Goals and Objectives

### **INTRODUCTION**

efining, assessing, and evaluating the term "quality" continues to be a challenging and evolving task for all sectors in society. Whether a good or service, defining quality has been heavily reflective of current economic and societal trends; therefore establishing definitions and associated indicators continues to be a highly fluctuant undertaking.

In recent years, however the field of higher education has been abruptly faced with the task of re-defining, re-assessing, re-evaluating, and re-evidencing quality in terms of: (1) online learning objects; and (2) accreditation. Ensuring the alignment of course content against desired goals and objectives has always been at the core of effective instructional course design—whether the instruction is delivered face-to-face, or via the support of distance technologies. Nonetheless, with the latter method of instructional delivery, the architecture of a Learning Management System (LMS) challenges online instructors and Information Technology (IT) departments to locate and/or create digital learning objects that align to goals and objectives.

This challenge is further compounded by increased pressure for accountability and demonstration of learning effectiveness at institutions of higher education. From the organizational perspective, the overwhelming amount of information stored within internal and/or external systems presents a significant

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