

**PHD THESIS SUMMARY:**

**A Tale Between Finance and Economics: Four Essays on the History and Methodology of the Efficient Market Hypothesis**

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Financial globalization is arguably the most important phenomenon in the economic history of the twentieth century. This thesis revisits the economic ideas that preceded and accompanied this transformation. Largely ignored or disparaged by economists at the beginning of the last century, finance gradually attracted more attention in the profession. This culminated, in the 1960s, in the emergence of the field of financial economics. This thesis contributes to the history of economic thought on financial markets (see, for example, Walter 1996; Mehrling 2005; and Jovanovic 2008) by discussing the evolution of such thought throughout the twentieth century. More precisely, I focus on North American economic thought, and, particularly, on the history and epistemology of one of its most central theories: the *efficient market hypothesis*. As it is broadly understood today, the efficient market hypothesis—associated with the work of Eugene Fama (1965, 1970)—claims that, in an efficient market, asset prices fully reflect all available information.

This thesis is partitioned into two broad parts: chapters 1–3 focus on the history of financial thought, and chapter 4 focuses on methodological issues in this history. The first three chapters analyse the origin of the efficient market hypothesis during the 1920s and its evolution until the early 1980s. This part of the thesis provides a new perspective on the history of financial economics by highlighting influences on the discipline by two types of economists: (1) those, such as inter-war agricultural economists like Holbrook Working, who preceded the emergence of financial economics as a subfield, and (2) those, such as Paul Samuelson, Thomas Sargent, and Robert Lucas, who remained outsiders of this subfield. These three chapters use a variety of materials—namely, the published writings of economists, private and administrative archives, and authors' recollections of the most recent period (the 1970s and beyond). The fourth (and last) chapter offers an epistemological, rather than a historical, analysis.

Presented in comparison with Friedrich Hayek's information theory, this last chapter discusses the conceptual foundations of the efficient market hypothesis.

The first chapter traces the roots of the contemporary debate on informational efficiency to inter-war agricultural economics—at that time, an emerging field funded mostly publicly by the United States Department of Agriculture.<sup>1</sup> In the history of economics, information is mainly perceived as a concept that emerged from the socialist calculation debate and that was subsequently developed in a more formal framework during the post-war area. Little has been said, however, in the literature about pre-war economic thought on information. Using the archives of the Department of Agriculture and its Bureau of Agricultural Economics, I show that inter-war agricultural economists understood that market prices reflect information, far before post-war information theories, such as the efficient market hypothesis, made this point. They were at the forefront of agricultural market reforms aimed at improving the production and circulation of information in agricultural exchanges. These economists were also pioneers in the empirical analysis of derivatives markets, where they advocated for greater transparency. In this chapter, I focus on and reassess the contributions of Holbrook Working (1935, 1949), a forerunner of the efficient market hypothesis. Rather than an isolated forerunner, Working was above all an important contributor to an ongoing research program in early agricultural economics led by the Department of Agriculture. One key message of this chapter is that economic policy, rather than economic theory, came first—that is, it was economists' practice of economic policy that prompted theoretical debates about information. Through the practical reform of agricultural markets, economists at the time developed and shared knowledge on the role of information in markets—knowledge that Working would later use to build his personal version of the efficient market hypothesis.

The second chapter focuses on Paul Samuelson's contribution to the development of the efficient market hypothesis during the emergence of financial economics in the 1960s and early 1970s.<sup>2</sup> The contribution of this chapter is twofold. First, it relates the development of the modern understanding of market efficiency to Working's earlier contributions. Based on Samuelson's archives, the chapter documents Samuelson's correspondence with Working in the 1960s. I show that, in his own work on

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<sup>1</sup> See Delcey and Noblet (2021) for the associated publication.

<sup>2</sup> For more on Samuelson's contribution, see Delcey (2019).

market efficiency, Samuelson (1965, 1973) both built on Working's ideas and translated them into the formal framework of post-war economics. Second, the chapter sheds light on the close but ambivalent relationship in the 1960s between early financial economists and traditional economics. Specifically, I compare Samuelson's evolving positions on market efficiency with those of Eugene Fama. I observe that not only did financial economics rely on the theoretical framework and methods of post-war economics for its development, but that it also developed a new type of economic expertise. While economists like Samuelson considered themselves to be traditional government advisors, the younger generation of financial economists employed their economic tools for producing evaluations useful to the practice of corporate and portfolio managers, rather than public officials.

The third chapter explores the growing role that macroeconomists played in the efficient market research program during the 1970s and early 1980s, a murky corner in the history of economic thought.<sup>3</sup> The chapter documents the early interactions between participants in the efficient market research program and rational expectations macroeconomists. Using bibliographical analysis and the personal recollections of authors, such as Eugene Fama, the chapter documents the meeting between these two scholarly communities and explores how they influenced each other. A key place in this story is the Carnegie Institute of Technology, where Fama's student Richard Roll met Robert Lucas and Thomas Sargent. The chapter analyses the first tangible output of this meeting—a series of articles on the 'yield curve' that were published in the early 1970s and that involved Eugene Fama, Robert Shiller, Thomas Sargent, and Franco Modigliani.<sup>4</sup> One of the main outcomes of this debate was the methodological influence of new classical macroeconomics on the market efficiency research programme, which led to a reformulation of the efficient market hypothesis. More precisely, market efficiency became commonly defined through rational expectations models. Furthermore, by the end of the 1970s, the debate on the yield curve had paved the way to two new research questions in finance, namely, the issue of asset valuation—how to correctly price the 'economic fundamentals' of assets—and of the dissemination of information in market exchanges, both of which relied on rational expectations models.

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<sup>3</sup> See Delcey and Sergi (2019) for more on the early interactions between macroeconomics and financial economics.

<sup>4</sup> For a glimpse of this conversation, see Sargent (1972, 1973), Modigliani and Shiller (1973), and Fama (1975).

Finally, the fourth chapter is a methodological analysis that compares the notion of market efficiency, as it was developed and understood by financial economists, with Friedrich Hayek's information theory (see, for example, Hayek 1937, 1945).<sup>5</sup> Hayek's rejection of the use of mathematics makes it difficult to compare his thought with mainstream (financial) economics, which relies on formal theories and econometrics. To solve this issue, the chapter introduces a distinction between two types of differences between theories, *epistemological* and *methodological differences*. I define the idea of an epistemological difference between theories as the differing core hypotheses of these theories, and I understand the methodological differences between theories as the different ways in which authors operationalize these core hypotheses. The chapter argues that there is a common epistemological core underlying Hayek's information theory and the theory of market efficiency. At their heart is the same puzzling issue, which I call *the information problem*: Is it possible to centralize locally produced knowledge for the purpose of government planning, in the case of Hayek, or for the purpose of profitably forecasting price changes, in the case of market efficiency? In each framework (Hayek's and that of market efficiency), this information problem is solved by attributing a new function to the market—that is, both theories claim that, in addition to being a traditional clearing mechanism, the market also aggregates the local knowledge of individuals into prices.

The contribution of this thesis is twofold. First, it sheds light on the analytical debates surrounding the controversial notion of market efficiency. Debated since the 1980s, the concept of market efficiency—including its meaning and implications—remains contentious in economics to this day. I analyse and discuss the diversity of formulations and interpretations of this concept throughout its history. The thesis focuses especially on the history and meaning of the concept of information, which is at the heart of the definition of market efficiency. I trace the roots of this concept back to the American economic thought of the inter-war period. While the concept of information became a guiding principle for financial research after the war, I argue that the inability to define 'information' in an objective way contributed, and still contributes, to the ambivalence of the idea of market efficiency. In particular, the ambiguity in the precise meaning of the concept of information—that is, what pieces of information are 'relevant' or 'available'—perpetuates a dual interpretation of what market efficiency refers to: (1) the absence of systematically

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<sup>5</sup> For more on this comparison, see Colin-Jaeger and Delcey (2020).

profitable investment strategies, or (2) the accurate valuation of asset fundamentals.

By focusing on the concept of market efficiency, this thesis also studies the origin and evolution of financial economics, for which the notion of market efficiency has guided several decades of research. Particularly, the thesis examines the roots of financial economics in the first half of the twentieth century and its emergence in the 1960s, and discusses its changing relationship with economics in the 1970s and the early 1980s. As I argue in the thesis, during the evolution of this relationship, financial economics adopted concepts and methods from post-war economics and, in the process, developed distinct new ways of thinking, such as the conceptual model of practical expertise discussed in chapter 2. This thesis thus also contributes to our understanding of the growing importance of financial economics, which is where ideas criticizing and legitimizing the financial world are mainly produced today.

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