

**MAXIMIZING PREDICTABILITY
IN THE STOCK AND
BOND MARKETS. WORKING
PAPER NO. LFE-1030-96R**

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by Andrew W. Lo & A. Craig MacKinlay

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Andrew W. Lo[†] and A. Craig MacKinlay[‡]

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Abstract

We construct portfolios of stocks and of bonds that are maximally predictable with respect to a set of ex ante observable economic variables, and show that these levels of predictability are statistically significant, even after controlling for data-snooping biases. We disaggregate the sources for predictability by using several asset groups—sector portfolios, market-capitalization portfolios, and stock/bond/utility portfolios—and find that the sources of maximal predictability shift considerably across asset classes and sectors as the return-horizon changes. Using three out-of-sample measures of predictability—forecast errors, Merton's market-timing measure, and the profitability of asset allocation strategies based on maximizing predictability—we show that the predictability of the maximally predictable portfolio is genuine and economically significant.

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1 Introduction

The search for predictability in asset returns has occupied the attention of investors and academics since the advent of organized financial markets. While investors have an obvious financial interest in predictability, its economic importance can be traced to at least three distinct sources: implications for how aggregate fluctuations in the economy are transmitted to and from financial markets, implications for optimal consumption and investment policies, and implications for market efficiency. For example, several recent papers claim that the apparent predictability in long-horizon stock return indexes is due to business cycle movements and changes in aggregate risk premia.¹ Others claim that such predictability is symptomatic of inefficient markets, markets populated with overreacting and irrational investors.² And following both explanations is a growing number of proponents of market timing or “tactical asset allocation”, in which predictability is exploited, ostensibly to improve investors’ risk-return trade-offs.³ Indeed, Roll (1988) has suggested that “The maturity of a science is often gauged by its success in predicting important phenomena”.

For these reasons, many economists have undertaken the search for predictability in earnest and with great vigor. Indeed, the very attempt to improve the goodness-of-fit of theories to observations—Leamer’s (1978) so-called *specification searches*—can be viewed as a search for predictability. But as important as it is, predictability is rarely maximized systematically in empirical investigations, even though it may dictate the course of the investigation at many critical junctures and, as a consequence, is maximized *implicitly* over time and over sequences of investigations.

In this paper, we maximize the predictability in asset returns *explicitly* by constructing portfolios of assets that are the most predictable, in a sense to be made precise below. Such explicit maximization can add several new insights to findings based on less formal methods. Perhaps the most obvious is that it yields an upper bound to what even the most

¹See Fama and French (1990) and Ferson and Harvey (1991b) for example.

²For example, see Chopra, Lakonishok, and Ritter (1992), DeBondt and Thaler (1985), and Lehmann (1990).

³A few of the most recent examples include Clarke et al. (1989), Droms (1989), Hardy (1990), Kester (1990), Lee and Rahman (1990, 1991), Shilling (1992), Sy (1990), Vandell and Stevens (1989), Wagner et al. (1992), and Weigel (1991). However, see Samuelson (1989, 1990) for a caution against such strategies.