

# Noise trader risk: Evidence from the Siamese twins<sup>☆</sup>

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## Abstract

This paper provides new evidence regarding the magnitude and nature of noise trader risk. I examine returns for two pairs of “Siamese twin” stocks: Royal Dutch/Shell and Unilever NV/PLC. These unusual pairs of fundamentally identical stocks provide a unique opportunity to investigate two facets of noise trader risk: (1) the fraction of total return variation unrelated to fundamentals (i.e., noise), and (2) the short-run risk borne by arbitrageurs engaged in long-short pairs trading. I find that about 15% of weekly return variation is attributable to noise. Noise trader risk has both systematic and idiosyncratic components, and varies considerably over time. The conditional volatility of long-short portfolio returns ranged from 0.5% to over 2.75% per week during the 1989–2003 sample period. Noise trader risk was especially high around the failure of Long-Term Capital Management in 1998 and during the collapse of the technology bubble in 2000. I conclude that noise trader risk is a significant limit to arbitrage.

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## 1. Introduction

Trading that is uncorrelated with changes in fundamental or intrinsic value is known as noise trading. Noise trading may occur for exogenous reasons (e.g., portfolio rebalancing,

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liquidity, etc.) or it may occur when investors trade on noise (e.g., changes in sentiment) as if it were information. To the extent that noise trading moves security prices, it contributes to return volatility. Noise trading now occupies an important place in the theory of finance. It has been a cornerstone of market microstructure theory since Kyle (1985). It has been suggested as an explanation for asset pricing “anomalies” such as the “excess volatility puzzle” first documented by Shiller (1981) and LeRoy and Porter (1981). And noise trading plays a central role in the burgeoning literature on behavioral finance. For example, De Long et al. (1990) suggest that noise trader risk is a significant limit to arbitrage that may hinder informationally efficient markets. Black (1986) concludes that “Noise makes financial markets possible, but also makes them imperfect.”

Despite its increasingly important role in finance, we have little empirical evidence regarding the magnitude or nature of noise trader risk. This is because it is difficult to distinguish empirically between fundamental shocks and noise shocks. In this paper, I circumvent this obstacle by exploiting a natural experiment: “Siamese twin” stocks. I examine two pairs of dual-listed securities: Royal Dutch/Shell and Unilever NV/PLC. Each of these twin stocks represents a nearly identical claim to a common cash flow stream. Thus, twin stocks have nearly identical risk exposures and should respond almost identically to news regarding fundamental value. The existence of twin stocks trading in different markets permits the investigation of two important facets of noise trader risk: (1) the fraction of total return variation unrelated to news about fundamentals (i.e., noise), and (2) the nature of the noise trader risk faced by arbitrageurs engaged in long-short pairs trading. Although twin stocks represent a very special case, the lessons learned have wider implications for asset pricing and market efficiency.

Twin stocks offer a model-free approach for estimating the contribution of noise trading to stock return volatility. Previous research in this area has produced mixed results. One branch of the literature (e.g., Cutler et al., 1989; Roll, 1988; Fama, 1990) finds that news about fundamentals explains relatively little of the variation in total returns. For example, Roll (1988) reports that only 20% of the average large stock’s daily return variation is attributable to fundamentals. Explained variation is less than 40% for monthly returns. Roll charges that “the paucity of explanatory power represents a significant challenge to our science.” It is unclear whether the unexplained return variation reported in these papers is due to noise trading, or whether the empirical models do not fully account for all information relevant for valuation.

In simple linear regressions, I find that about 85% of weekly return variation, and up to 90% of monthly return variation, can be explained by the returns of a twin stock. This explanatory power greatly surpasses that of the ex post information models examined by Cutler et al. (1989), Roll (1988) and Fama (1990). However, a substantial fraction of return variation (about 15% for weekly returns) remains unexplained by fundamentals. I attribute this unexplained variation to noise trading.

Due to their special nature, Siamese twin stocks also provide a unique opportunity to examine the role of noise trader risk as a limit of arbitrage. Because twin stocks represent nearly identical claims to a common cash flow stream, the law of one price implies that the ratio of twin stock prices should equal the theoretical parity ratio. No model of intrinsic value is required. Thus, the arbitrageur faces minimal bad-model risk and the joint-hypothesis critique (see Fama, 1970, 1991) does not apply. The arbitrageur also faces minimal fundamental risk. An appropriately constructed long-short relative value position should hedge out nearly all fundamental shocks.

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