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Fundamental factors versus herding in the 2000–2005 US stock market and prediction

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Abstract

We present a general methodology to incorporate fundamental economic factors to the theory of herding developed in our group to describe bubbles and antibubbles. We start from the strong form of rational expectation and derive the general method to incorporate factors in addition to the log-periodic power law (LPPL) signature of herding developed in ours and others' works. These factors include interest rate, interest spread, historical volatility, implied volatility and exchange rates. Standard statistical AIC and Wilks tests allow us to compare the explanatory power of the different proposed factor models. We find that the historical volatility played the key role before August of 2002. Around October 2002, the interest rate dominated. In the first six months of 2003, the foreign exchange rate became the key factor. Since the end of 2003, all factors have played an increasingly large role. However, the most surprising result is that the best model is the second-order LPPL without any factor. We thus present a scenario for the future evolution of the US stock market based on the extrapolation of the fit of the second-order LPPL formula, which suggests that herding is still the dominating

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force and that the unraveling of the US stock market antibubble since 2000 is still qualitatively similar to (but quantitatively different from) the Japanese Nikkei case after 1990.

1. Introduction

As an extension of [1], since October 2002, we have posted an analysis of the US (and later other) markets after the collapse of the "information technology bubble," forecasting a continuation of the downward correction, decorated with ups and downs organized according to a pattern we call "log-periodicity." Monthly updates[1] are available from October 31, 2002 till November 17, 2004.

Our projections have been based on the generalization to "bearish" markets (we call them "antibubbles" when they follow market bubble peaks) of the concept of positive feedback based on imitation and herding that our team has demonstrated mostly for bubbles preceding financial crashes (see [2] for a review and references therein).

In December 2004, we decided to discontinue the update, concluding that, after more than two years, our projections for the US market have not been verified. In contrast, our projections for the US market translated in foreign currencies (in particular in euro) have been rather accurate. Thus, a foreigner (European, say) investing in the US market and counting her wealth in euros would have found our forecasts to be accurate, while her US counterpart counting in US dollar would not. Similarly, our projections for non-US developed markets have also been good. This might suggest a dollar effect. In December 2004, we attributed our failure to forecast the rebound of the market in 2003 to the fact that we had neglected all factors except the imitation and herding behavior of investors. In particular, our approach had neglected the fundamental input of the economy as well as the external manipulations by the Fed and other institutions, the impact of foreign policy and foreign investors, the dollar effect (all these being possibly inter-related). Our projections had taken the extreme view that all these actions are endogenously determined and driven by the collective action of the investors. We thought this is too simplistic because, in general, one can understand the evolution of a system as the result of an entangled combination of endogenous organization but also as a response to external news and exogenous shocks (see [3] for a recent quantitative discussion on the issue of endogeneity versus exogeneity). In December 2004, we concluded that our live experiment from October 2002 until November 2004 had clearly demonstrated the limits of this approximation.

We announced at the web site that we had found a methodology to incorporate the Feds action and the dollar effect in an extended version of our theory, to

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[1]See the website at http://www.ess.ucla.edu/faculty/sornette/prediction/index.asp#prediction.