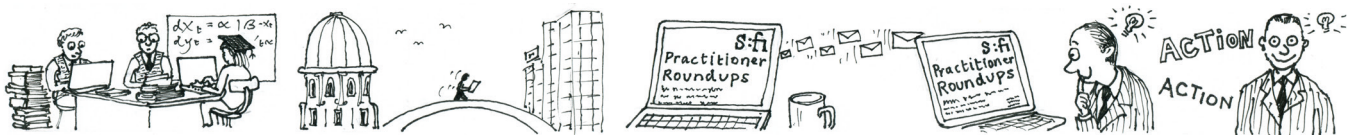
: May 2017 | No 5

s:fi KNOWLEDGE

Swiss Finance Institute Practitioner Roundups



The Pound on Brexit Night: The Market's Failure to Predict the Predictable

The result of the Brexit referendum could have been predicted once only a little over 5 percent of the results were in. So why did markets fail so miserably to predict this, and react so slowly when they did?

The nine-hour, district-by-district process of announcing the results of the EU Referendum that took place in the UK on 23 June 2016 provided a rare real-life experiment with which to test the efficient-market hypothesis. Crucially, the market—ordinarily robed in complexity—momentarily exposed itself in a simplified state, allowing an exceptionally objective analysis of responses to fundamental information. The stream of 382 local area vote count announcements provided the stimulus, and the British pound market in US dollars the response. In a new Swiss Finance Institute research paper, three ETH Zurich researchers—including SFI's Didier Sornette—show, with a simple linear model, mapping prior polling results onto early voting announcements, that the Brexit result could have been predicted with high confidence in real time after only 20 out of 382 local voting results had been revealed, and hours before the market priced in the outcome. This failure of the market suggests a glaring contradiction to the paradigm of efficient markets, in a "semi-strong" form.

Financial markets have long been regarded as efficient information aggregators, and effective predictors of the probability of future events. Belief in these properties underlies free market systems and economic liberalism. In the literature, semi-strong market efficiency has usually been tested by how quickly security prices reflect relevant information that was obviously publicly available. However, there are ongoing controversies over several definitions in the abovementioned tests: the boundary of "quickly", the level of rationality, the entanglement of different types of event impacts and reactions, the operational market efficiency, the limits to arbitrage, etc. Further, to make a test of the efficient-market hypothesis operational, one must specify additional structures like investor preferences, normal return models, etc., which create a joint hypothesis problem, and lead to the claim that it is very difficult to carry out such unambiguous tests outside of an actual laboratory experiment.

> "On Brexit night, the market values of the two possible outcomes were widely known in advance..."

During the nine hours of "Brexit night", the market was in the state of a "natural experiment", or "quasi-controlled experiment", where near-laboratory conditions for studying markets' response to fundamental information were present in the real world. The market was targeted on a single final event: the referendum result, with only two possible outcomes (leave or remain), whose market

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The full paper can be found at http://bit.ly/2p8JiPV.

values were widely known to market participants before, as seen from forecast reports from major financial institutions including JP Morgan, HSBC, and Goldman Sachs (conservatively, in the range 1.4–1.5 USD/GBP for remain and 1.1–1.35 USD/GBP for leave). In this highly active and temporarily simplified market, not only were the typical functional shortcomings and "distractors" that plague event studies naturally removed, the often fatal "joint hypothesis problem" was conveniently avoided. Being a real-world study, the market participants were directly and naturally incentivized to maximize profit, and the market was actively functioning, even reacting—with bursts of trading activity—to early "private information", identified by early local results tweeted by non-influential individuals. Further, market participants were well prepared to participate in this "field study", as all relevant prior information was basic and publicly available, and different scenarios had been widely studied and analyzed by all kinds of media, scientists, polling companies, and so on.

"… but the market failed miserably to fully reflect what the fundamental incoming information implied."

Among all the prior analysis, although the tendency was to predict a remain vote, the pollsters and analysts generated useful information about the preferences of the individual voting areas. The authors of this study show that, with only a few voting area results, one can reliably calibrate the mapping from widely available local polling information to project voting results of still unannounced areas. Based on this, at the time the model predicted a sure Brexit the pound market level of USD 1.45 was still leaning toward a high probability of remain, and only after 300 of the 382 results had been announced did it appear to accept Brexit as the outcome, reaching USD 1.32—the lowest value since 1985. Actually, the market was highly reactive, "reflecting" new fundamental information, but absolutely failed in "fully reflecting" what this information mathematically and financially implied. This "inefficiency" must be attributed to a generic lack of probabilistic sophistication, as well as an unusually biased prior belief about the remain outcome. For instance, with remain being categorized as the "politically correct" option, Euro-skeptics—often dismissed by opponents as being racially motivated—may have tended to not disclose their preference, allowing their latent Euro-skepticism to be counted as "undecided", or even as pro-remain, in the polling numbers. The three authors' method can thus be understood as providing real-time discovery of these masked intentions, revealed through a simple, calibrated renormalization of existing polls.

"Herding is reminiscent of financial bubbles—and markets can lose all their efficiency when dominated by large-scale groupthink."

More generally, such herding psychology is reminiscent of financial bubbles—in which the market is dominantly driven by sentiment and no longer reflects the real underlying value—which have been characterized as the most blatant of market failures. In a sense, the market can become massively inefficient when there is a "collective bubble spirit"—in this case a "remain bubble", formed by large-scale groupthink based on the political and social attractiveness of a remain vote, inflated and galvanized by the intense atmosphere of the Brexit debate. Briefly commenting on ex ante warning signs, analyses of online communications show that the pro-Brexit community was more organized and dedicated, which is consistent with the consequential high turnout of pro-Brexit voters. Further, it has been shown that conventional psychometric personality characteristics (whose geographical distribution in the UK is well known), such as openness and agreeableness, correlated highly with voting remain. Finally, a recent study suggests that the errors/biases in ex ante polling predictions are themselves predictable, and can thus be corrected.

Finally, recalling also the election of Donald Trump as US president, the wild-card factor, which has been ignored by many pollsters and pundits, is the re-engagement and turnout of formerly discouraged citizens. In other words, the occurrence of a vote for a perceived legitimate regime change may re-engage formerly disaffected voters, who go on to vote in the same way as one another. In the current political climate, similar election results are likely in the future. The good news is that, even when starting with biased prior information, a real-time correction is possible. And that potentially gives one an edge over a market that fails to price in this information mismatch in a timely manner. All this holding true, of course, only as long as the market ignores this paper's findings.

Key Words
Efficient-market hypothesis
Market failure
Natural experiment
Remain bubble

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