Discussion of "Sidelined Investors, Trading-Generated News, and Security Returns"

Pietro Veronesi
University of Chicago

The article of Cao, Coval, and Hirshleifer (hereafter CCH) presents a stylized model of security trading able to explain some of the features of stock returns, such as (i) positive (negative) skewness after rundowns (run-ups); (ii) volatility clustering; and (iii) large changes in prices with no apparent information arrival. In this discussion I first outline the basic mechanism of the model (Section 1) and then discuss its assumptions and conclusions (Sections 2 and 3), also in light of competing theories. Final remarks are contained in Section 4.

1. The Basic Mechanism

The main idea underlying CCH's model can be summarized as follows. There are informed, uninformed, and noise traders, along with an uninformed competitive market maker (MM). Investors have heterogeneous transaction costs (TCs). Schematically the following chain of events occurs upon receiving a signal: (1) signal arrives $\Longrightarrow$ traders with low TCs place an order (buy or sell); (2) $\Longrightarrow$ the price moves (say up if buy order) and yields two effects: (a) it reveals information; (b) it makes the asset more expensive.

Effect (a) makes optimistic traders even more optimistic, while the pessimistic ones become "sidelined" and do not participate in the market. In addition, if the new information revealed by the increase in prices is strong enough, traders with even higher TCs enter the market and keep moving the price up (with high probability). At some point we have that the inactive optimistic traders are few, while the inactive pessimistic ones may be relatively more. And from here, the main (new) effects described in CCH's model occur.

In fact, chances of a sell order are still present even after a sequence of buy orders, because a pessimistic trader with *low* transaction costs will still try to sell. Now, what is the effect of a sell order in the market? Since the price run-up made "inactive" those who received a bad signal, a sell order makes it more likely they will enter in the market, thereby revealing their information. This information revelation will drive the price substantially

Address correspondence to Pietro Veronesi, Department of Finance, Graduate School of Business, University of Chicago, 1101 East 58th St., Chicago, IL 60637.

The Review of Financial Studies Special 2002 Vol. 15, No. 2, pp. 649–654

down [effect (i) described in the introduction: negative skewness after run-ups]. In addition, because of the sudden release of information, the sell order also increases the market-maker uncertainty about to the true state [effect (ii): higher market volatility]. Finally, the market correction may occur even if no new piece of information hits the market on the same date [effect (iii)].

2. Discussion of the Model

CCH's model is highly stylized and has a number of assumptions. I will discuss them in turn.

Assumption 1. *Asymmetric information.*

This is rather standard in this class of models and it has many interpretations, including different abilities to process *public* information [see, e.g., Glosten and Milgrom (1985)]. The latter interpretation seems the most realistic if the authors want to use their model to discuss issues related to the market portfolio returns. Indeed, it is this interpretation that the authors seem to emphasize more. Notice, however, that CCH's setup still implies *common priors* and hence it is different from the literature on difference of opinions, which by definition assumes different priors [see, e.g., Detemple and Murthy (1994), Basak (2000), Basak and Croitoru (2000), Li (2000)]. It is worth mentioning that these authors explore full-fledged dynamic models of learning with differences of opinion, and show that as the fraction of optimistic versus pessimistic agents (endogenously) fluctuate over time, stock returns (or interest rates) display many of the characteristics uncovered in the empirical literature, including volatility clustering. The key difference in the model of CCH is that agents also learn from price changes, whereas this cannot occur in the other literature on differences of opinions. In fact, in the latter case, if agents know that others have different opinions (priors), changes in prices would not convey any new information to anyone, since every agent can compute what the posterior of anybody else would be upon receiving a *public* signal.

Assumption 2. *Heterogeneous transaction costs.*

It is key in the model that transaction costs are heterogeneous across agents. In particular, there must be somebody with very little transaction costs, because there must always be somebody willing to buy/sell at any price (see the chain of events in Section 1). The authors push various interpretations of this assumption, settling seemingly on the case where TCs are really individual setup costs and not industry related. The latter interpretation would otherwise suggest a clear test for the model, since one could argue that in the past 10 years TCs decreased substantially and they are probably more uniform now than they have been in the past. I will return to this below.

Assumption 3. *Risk neutrality.*

Although standard in this literature, this assumption is very important in order to obtain many of the effects the authors discuss. In fact, if agents were risk averse, the existence of transaction costs makes it optimal to rebalance the portfolio very infrequently [see, e.g., Constantinides (1986)]. This implies it would be less likely to observe the swift changes in market participation described in the article. In turn, this would dampen the size of the effects.

Assumption 4. *Risk-neutral competitive market maker.*

This is a standard assumption in this type of model. However, in CCH's model the MM sets the bid and ask price *equal*. Although this assumption is made for tractability, I believe it is a rather *strong assumption* in this model, and this at least for two reasons. First, because the MM should be compensated for the informational disadvantage with respect to other traders [see, e.g., Glosten and Milgrom (1985), Avery and Zemsky (1998)], or otherwise the MM would not be a *rational* agent in this model. Second, because although probably the qualitative results of the model would not change by incorporating the bid-ask spread in the model, it is also likely that their size would be much smaller. In fact, by allowing the MM to set a bid and an ask price, (part of) the transaction costs become *endogenous* (rather than exogenous) and would depend on past trades as well. This in turn would soften the effects in CCH's model for the following reason: Consider again the chain of events discussed in Section 1. In that example we asked: What is the effect of a sell order after a run-up in price? The answer was that a sell orders would reveal the information of the (pessimistic) agents that have been "sidelined" by the run-up, which implies that the price would drop. However, this same argument also implies that if allowed, the MM would set the bid price very low. In fact, recall that the bid price must equal the expected final value of the asset conditional on information *and* the fact that the order is a sell order. By the above argument, this expectation would be very low compared to the ask price after a run-up in prices. Hence, rather than a sharp correction, we would just observe a large bid-ask spread. (Clearly this is a heuristic argument: With a high bid-ask spread, fewer agents would participate in the market and things become quite messy to solve).

3. Other Competing Theories

The question at this point is what other explanations do we have for the same set of phenomena that the CCH model explains. To recap, the main testable implications are (1) conditional heteroscedasticity, (2) path-dependent conditional skewness, and (3) large changes in prices with no information revelation.

Theories explaining (1) and (2) are many and can be grouped as follows:

3.1 Theories within the (out of fashion) rational expectations paradigm

3.1.1 The leverage effect [Black (1976)]. Equity is leveraged, hence negative returns are associated to increases in volatility due to higher risk. It can explain (1) and part of (2).

3.1.2 The volatility feedback [e.g., Campbell and Hentschell (1992)]. Large good news increases prices and volatility: the latter effect dampens the former. Large bad news decrease prices and increase volatility: the latter effect reinforce the former. Again, this explains (1) and part of (2).

3.1.3 Fluctuating uncertainty [David (1997), Veronesi (1999)]. Learning about an unobservable regime for a fundamental process leads to changes in investors' "uncertainty" on the true state. In turn, this generates changes in volatility and conditional skewness of stock returns. Hence it explains (1) and (2).[1]

3.2 Theories with some "behavioral traits"

3.2.1 Habit formation and changing risk aversion [Campbell and Cochrane (1999)]. During recessions investors become more risk averse, increasing the sensitivity to news and hence the volatility of stock returns. It explains (1).

3.2.2 Differences of opinion [Detemple and Murthy (1994), Li (2000)]. (Endogenous) changes in the fraction of optimistic versus pessimistic traders generates changes in the reactivity of prices (or interest rates) to news on fundamentals. The volatility of returns (or interest rates) changes over time as a result, explaining (1) [and possibly (2)].

3.2.3 Differences of opinions with no short sales [Hong and Stein (1999)]. Constrained bearish investors are at times out of the market. Hence their information is not fully incorporated in prices. During market declines they may participate again revealing their negative information and hence generate a further decline.

3.2.4 Mental accounting and loss aversion [Barberis, Huang, and Santos (2001)]. Investors are more unhappy for losses than happy about gains. Again, it increases reaction to bad news and hence explains (1).

[1] Indeed, David and Veronesi (2001) show that the *risk-neutral density* of stock returns has negative skewness after run-ups and positive after rundowns.

3.3 How is CCH theory different?

How can CCH's model distinguish itself from other competing explanations? The theory by CCH has a number of more specific predictions, not fully shared by other models.

1. Higher transactions costs imply bigger effects (i.e., higher conditional skewness, etc.). This can be tested on the cross sections and on the time series [Is the conditional skewness lower (closer to zero) now than 20 years ago?]
2. Sizable increases in volatility after reversals. This is also implied by other theories, but in CCH is probably more important, in particular at a high frequency level (see below). On this issue the opposite empirical regularity seems to hold in currency trading. That is, volatility increases with trend [see, e.g., Johnson (2001)]. Is there any difference between the characteristics of traders/trading in currency markets versus the stock market?
3. Positive skewness after persistent declines in prices. As the article explains, there is some evidence on this fact. Additional independent evidence stems from option prices, which suggest frequent positive skewness in individual stocks. There seems to be some evidence that this indeed happens after price declines.
4. The setup seems more realistic to explain high-frequency data: this is a key difference from most models above (although the authors warn that this is not the only interpretation of the model). Too bad the model does not seem to have implications for trading volume. Can we proxy for it using the percentage of buy orders and sell orders to the market maker? Recent research shows "regime shifts" within intraday data [see, e.g., Russell, Tsay, and Zhang (2000)]. Within a day, there are periods with high volatility, high volume, and large bid-ask spreads, and other periods with low volatility, low volume, and smaller bid-ask spreads. Can the model explain these effects?

4. Conclusion

Overall I think it is a nice model, with a new economic mechanism at work and interesting implications. The stylized assumptions made in the article for tractability reasons, such as risk neutrality and a null bid-ask spread, tend to increase the size of the effects. Given in particular that the latter assumption would entail some "irrationality" from a "rational" market maker, I would have been happier to see some numerical results in the case where the bid and ask prices are allowed to be different. On the other hand, calibration exercises are notably difficult to perform with this type of models in general, so it is difficult to gauge what *is* a "large effect." It is possible that after correcting

for the above-mentioned caveats, the effects are still "strong" under some metric.

References

Avery, C., and P. Zemsky, 1998, "Multidimensional Uncertainty and Herd Behavior in Financial Markets," *American Economic Review*, 88, 724–748.

Barberis, N., M. Huang, and T. Santos, 2001, "Prospect Theory and Asset Prices," *Quarterly Journal of Economics*, 116, 1–53.

Basak, S., 2000, "A Model of Dynamic Equilibrium Asset Pricing with Heterogeneous Beliefs and Extraneous Risk," *Journal of Economic Dynamics and Control*, 24, 63–95.

Basak, S., and B. Croitoru, 2000, "Equilibrium Mispricing in a Capital Market with Portfolio Constraints," *Review of Financial Studies*, 13, 715–748.

Black, F., 1976, "Studies of Stock Price Volatility Changes," in *Proceedings of the 1976 Meetings of the Business and Economic Statistics Section*, American Statistical Association.

Campbell, J. Y., and J. H. Cochrane, 1999, "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior," *Journal of Political Economy*, 107, 205–251.

Campbell, J. Y., and R. Hentschell, 1992, "No News is a Good News: An Asymmetric Model of Changing Volatility in Stock Returns," *Journal of Financial Economics*, 31, 281–318.

Constantinides, G., 1986, "Capital Market Equilibrium with Transaction costs," *Journal of Political Economy*, 94, 842–862.

David, A., 1997, "Fluctuating Confidence in Stock Markets: Implications for Returns and Volatility," *Journal of Financial and Quantitative Analysis*, 32, 427–462.

David, A., and P. Veronesi, 2001, "Option Prices with Uncertain Fundamentals: Theory and Evidence on the Dynamics of Implied Volatilities," CRSP working paper, University of Chicago.

Detemple, J. B., and S. Murthy, 1994, "Intertemporal Asset Pricing with Heterogeneous Beliefs," *Journal of Economic Theory*, 62, 294–320.

Glosten, L., and P. Milgrom, 1985, "Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders," *Journal of Financial Economics*, 14, 275–298.

Hong, H., and J. Stein, 1999, "Differences of Opinions, Rational Arbitrage and Market Crashes," working paper, Stanford University.

Johnson, T., 2001, "Volatility, Momentum, and Time-Varying Skewness in Foreign Exchange Returns," IFA working paper, London Business School.

Li, T., 2000, "Heterogeneous Beliefs, Asset Prices, and Volatility in a Pure Exchange Economy," mimeo.

Russell, J., R. Tsay, and M. Zhang, 2000, "Information Determinants of Bid and Ask Quotes: Implications for Market Liquidity and Volatility," working paper, University of Chicago.

Veronesi, P., 1999, "Stock Market Overreaction to Bad News in Good Times: A Rational Expectations Equilibrium Model," *Review of Financial Studies*, 12, 975–1007.