New research in financial markets

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Oxford: Oxford University Press 2001

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Introduction

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This volume collects some of the best writings that European researchers have contributed to research in asset pricing and market microstructure in the last decade. Asset pricing, that relates asset prices to their fundamental determinants, lies at the very core of finance – at the same time the most traditional and the most technically sophisticated field of the subject. Market microstructure, instead, is a relatively young field, which focuses on the effect that market interactions between investors and intermediaries have on asset price formation. The two fields complement each other, the first being concerned with fundamental valuations and the second with how such valuations get impounded in prices via trading. The essays in this volume witness to the impressive quality and span of the results that European research has recently achieved in both of these fields, where the frontiers of research have been traditionally dominated by U.S. researchers.

I) Asset pricing

Though apparently diverse, the papers in this volume are all connected by a common approach, which is at the basis of modern asset pricing theory. Since the seminal work of Lucas (1978), a key relationship in asset pricing theory states that the price $P_{i,t}$ of asset *i* at time *t* is its expected cash flow multiplied by a stochastic discount factor or pricing kernel, often denoted by *m*. For example, in a discrete time context, where the cash flow generated by asset *i* at time $t+1$ is denoted by $F_i(\omega_{t+1})$ and ω_{t+1} is the state of the world at time $t+1$:

$$P_{i,t} = E\left[F_i(\omega_{t+1})m_t(\omega_{t+1})\right]. \tag{1}$$

In models of intertemporal choice, the pricing kernel m_t is the intertemporal marginal rate of substitution of the investor, and the pricing equation is the first-order condition of the consumption and investment optimisation program. For example, with a representative agent who consumes C_t at time t and $C_{t+1}(\omega_{t+1})$ at time $t+1$, this first order condition becomes:

$$P_{i,t} = E\left[F_i(\omega_{t+1}) \cdot \frac{\rho U'(C_{t+1}(\omega_{t+1}))}{U'(C_t)}\right], \tag{2}$$

where the $U(\cdot)$ is the instantaneous utility function and ρ is the rate of time preference. Thus in this case:

$$m_t(\omega_{t+1}) = \frac{\rho U'(C_{t+1}(\omega_{t+1}))}{U'(C_t)}. \tag{3}$$

Alternatively, the pricing kernel can be obtained by imposing the absence of arbitrage opportunities. This kernel is unique if and only if the market is complete. Relying on Hansen's (1982) GMM approach, the seminal paper of Hansen and Singleton (1982) offers a direct test of the first-order condition (2) along with an estimation of the risk-aversion parameter of the representative agent.

The pricing kernel is related to the notion of Arrow-Debreu securities. The Arrow-Debreu security corresponding to state ω_{t+1} is the asset paying 1 unit of consumption at time $t+1$ if state ω_{t+1} is realized and 0 otherwise. Denote $p_t(\omega_{t+1})$ the price of the Arrow-Debreu security corresponding to state ω_{t+1}. If the state space is discrete, the pricing equation can be rewritten as:

$$P_{i,t} = \sum_{\omega} p_t(\omega_{t+1}) F_i(\omega_{t+1}) . \tag{3}$$

Hence, the value of the stochastic discount factor for a given state of the world ω_{t+1} is equal to the Arrow-Debreu price of that state, $p_t(\omega_{t+1})$, divided by its probability $\mu_t(\omega_{t+1})$:

$$m_t(\omega_{t+1}) = \frac{p_t(\omega_{t+1})}{\mu_t(\omega_{t+1})} .$$

Further, note that a portfolio composed of all the Arrow Debreu securities, corresponding to all the possible states, generates with certainty a payoff of one for the next period. Hence the sum of the state prices must be equal to the price of the riskless bond yielding a unit pay-off next period. Denoting that price by B_t and the free rate by *r*, in discrete time we have:

$$\sum_{\omega} p_t(\omega_{t+1}) = B_t = \frac{1}{1+r} .$$

Finally the state prices, divided by the price of the unit riskless bond, have the properties of a probability: they are positive and add up to one over the set of all possible states. This is often referred to as the risk-neutral probability $\pi_t(\omega_{t+1})$:

$$\pi_t(\omega_{t+1}) = \frac{p_t(\omega_{t+1})}{1+r_t} . \tag{4}$$

Correspondingly the pricing equation can be written, in terms of the risk neutral probabilities:

$$P_{i,t} = \frac{\sum_{\omega} \pi_t(\omega_{t+1}) F_i(\omega_{t+1})}{1+r_t}$$

or:

$$P_{i,t} = \frac{E^*\left[F_i(\omega_{t+1})\right]}{1+r_t} . \tag{5}$$

where $E^*[\cdot]$ is the expectation operator taken with respect to the risk-neutral probability.

Performance evaluation: Dahlquist and Soderlind (1999)

Relying on the pricing kernel paradigm, Dahlquist and Soderlind (1999) revisit standard portfolio performance evaluation. Traditionally, performance evaluation relies on mean-variance analysis and involves such tools as Jensen's alpha. These traditional approaches are often limited to the extent that they are parametric and fail to take into account changes in expected returns and risk. Instead of starting from a mean variance program, Dahlquist and Soderlind (1999) start from the pricing kernel equation (1). They estimate the pricing kernel consistent with observed prices for a benchmark portfolio. Denoting by F_1 the cash flow generated by this benchmark portfolio, equation (1) yields:

$$P_{1,t} = E[F_1(\omega_{t+1}) m_t(\omega_{t+1})]. \tag{6}$$

The pricing kernel m_t is estimated under the constraint that this equation holds. Then, to test if a given fund (with cash flow F_2) outperforms the benchmark portfolio, they test if it is also priced by the same kernel. That is, they test if the condition:

$$P_{2,t} = E[F_2(\omega_{t+1}) m_t(\omega_{t+1})].$$

holds, where $m_t(\omega_{t+1})$ is the pricing kernel estimated based on equation (6).

Dahlquist and Soderlind (1999) perform this test using the Hansen (1982) GMM approach. This enables them to conduct the empirical analysis without making specific assumptions about distributions, to handle conditional heteroskedasticity and serial correlation, and to incorporate conditional information. Applying their methodology to Swedish mutual funds, they reject the hypothesis that these funds never had abnormal performance.

Option prices: Dumas, Fleming and Whaley (1998)

The analysis of Dumas, Fleming and Whaley (1998) also offers an innovative methodology to estimate Arrow-Debreu state prices, which are an important component of the pricing kernel (as shown by the pricing equation (3) above), and use these to construct empirical tests of asset pricing theories.

Rubinstein (1994) offered an interesting new approach to the pricing of options relying on implied binomial trees. Intuitively, the approach is the following:

1. First, as shown by Breeden and Litzenberger (1978), from the current stock and bond prices price and option prices with maturity T and different strike prices, one can infer the current state prices $\{p_t(\omega_T)\}_\omega$ or equivalently the corresponding risk-neutral probabilities $\{\pi_t(\omega_T)\}_\omega$, since:

$$\pi_t(\omega_T) = \frac{p_t(\omega_T)}{(1+r)^T}.$$

2. The second step is to characterize a corresponding implied binomial tree. A binomial tree is a sequence of possible up or down movements for the stock price along with the associated risk-neutral probabilities. The implied binomial tree is such that the sum of the probabilities of all the paths leading to one node (ω_T) is equal to the risk-neutral probability of that node, $\pi_t(\omega_T)$ (computed at the first step). To pin down the risk-neutral probabilities along the implied binomial tree, one needs to make some (arbitrary) identification assumptions. Rubinstein (1994) proposes to assume that paths leading to the same terminal stock price have equal probability.

Dumas, Fleming and Whaley (1998) propose a stimulating empirical strategy to test the consistency of this implied binomial trees method. The intuition of their test is the following: At time t they use the Rubinstein approach to compute an implied binomial tree, using the information contained in the current stock price and in the prices of options maturing at time T. Then, at time $t+1$ (in fact one week later), they replicate the same computations, using again the implied state prices corresponding to time T. If the Rubinstein model is well specified, the implied probabilities starting from the node reached at time $t+1$ should be the same, irrespective of whether they are computed at time t or at time $t+1$. In fact, they reject this hypothesis. They trace back the cause of this rejection to the overfitting nature of the Rubinstein method. They also show that the pricing error generated by the implied binomial tree approach exceeds that stemming from a simple extension of the Black-Scholes formula.

Concluding remarks

Although they explore different areas (namely performance evaluation and option pricing) the two papers of Dumas, Fleming and Whaley (1998) and Dahlquist and Soderlind (1999) share common features. In both cases the theoretical background of the analysis is the pricing kernel approach. In both cases the empirical strategy is to test if the pricing kernel is robust, across assets in the analysis of Dahlquist and Soderlind (1999), or over time in the analysis of Dumas, Fleming and Whaley (1998). In both cases, the paper brings an elegant theoretical approach to financial markets data, and tests the model.

II) Market microstructure

The second set of papers in this volume deals with market microstructure. While in the asset pricing literature the focus is mainly on how to adjust probabilities for risk, the microstructure literature takes an alternative perspective, where the focus is on how to adjust probabilities for the informational content of trades. In contrast with the perfect market assumption made by the asset pricing literature briefly discussed above, market microstructure endeavours to analyse the consequences of market imperfections.

The market imperfection on which this literature has focused the most is asymmetric information. When some investors have private information, the other investors must infer the information content of their trades. The seminal papers by Kyle (1985) and Glosten and Milgrom (1985) analyse the interaction between informed traders and (relatively) uninformed market makers, and show how the latter come up with an adjusted expectation operator, to compute the price of the asset, while rationally taking into account the informational content of the order flow. Denote *X* the order flow they observe, and E^{**} this adjusted expectation operator. Then, when the uninformed agents are risk-neutral, the price equation can be written, in a manner similar to equation (5):

$$P_{i,t} = \frac{E^{**}[F_i(\omega_{t+1})]}{1+r_t} \tag{7}$$

or:

$$P_{i,t} = \frac{\sum_{\omega} \pi_t^{**}(\omega_{t+1}) F_i(\omega_{t+1})}{1+r_t}, \tag{8}$$

where $\{\pi_t^{**}(\omega_{t+1})\}$ are the probabilities of the different states, updated using Bayes' law, conditionally on the observed order flow X. In fact, computing these updated probabilities, and the corresponding adjusted expectation involves more than simply using Bayes rule. It also requires correctly anticipating the informed agents' strategy. Indeed, the price function (7) is a Nash equilibrium of the trading game. In general, Nash equilibria are not unique, and consequently, there may be several possible probability measures in equilibrium.

Equilibrium uniqueness: Rochet and Vila (1994)

Rochet and Vila (1994) keep the major assumptions in Kyle (1985) and Glosten and Milgrom (1985): there is an informed trader along with exogenous noise traders, and risk-neutral competitive market makers post quotes after observing the order flow. The assumption that there are noise traders ensures that the order flow does not immediately fully reveal the informed agent's private signal. Rochet and Vila (1994) considerably generalize the Kyle (1985) framework because they consider general (bounded support) distributions and do not restrict their analysis to linear equilibria. In this context, and under the assumption that the informed agent observes the noise traders' orders, they prove that there exists a unique equilibrium of the trading game. Hence, the information adjusted probability measure $\{\pi_t^{**}(\omega_{t+1})\}_\omega$ in equation (8) is unique. The proof offered in the paper is very general and elegant, and it has an interesting economic interpretation. Trading games "à la Kyle" (1985) are zero-sum games: the gains of the informed agent are the losses of the noise traders. Rochet and Vila (1994) show that the fixed-point problem of finding the Nash equilibrium in such games is equivalent to an optimisation problem: that of finding the price function that minimises the losses of the noise traders. The paper shows that such a price function exists and is unique, which implies that the Nash equilibrium of the trading game also exists and is unique.

Option prices: Biais and Hillion (1995)

Like Rubinstein (1994) and Dumas, Fleming and Whaley (1998), Biais and Hillion analyse the adjusted probability or state price that is relevant to price stocks and options. In contrast with the asset pricing literature, however, Biais and Hillion (1995) assume asymmetric information. As in Kyle (1985), Glosten and Milgrom (1985) and Rochet and Vila (1994), the adjustment in the probability reflects the information content of orders, but in Biais and Hillion's model the randomness of the order flow does not stem from exogenous noise traders. Instead, it reflects optimal order placement by rational but uninformed hedgers who face random endowment shocks. In this context, Biais and Hillion (1995) analyse stock and option prices when (i) only the stock and the bond are traded and the market is incomplete, and when (ii) in addition to the stock and the bond, there is an option that completes the market.[1]

They analyse how the introduction of this non-redundant option induces a change in the state prices (or correspondingly the adjusted probability measure), and how this alters the informational efficiency of the market. They find that, when the option is traded (and correspondingly hedging opportunities are potentially enhanced), potential market breakdown problems are alleviated. Not only does this enhance the welfare of the uninformed agents, it also enables prices to be established and reveal information in situations where otherwise no trade would occur. But the introduction of the option can reduce the informational efficiency of prices in situations in which the incomplete market would not break down. This is because, when the option can be traded, the informed agent has access to a wider set of venues to exploit her private information, and correspondingly can better camouflage his identity.

The speed of learning: Vives (1995)

While Rochet and Vila (1994) and Biais and Hillion (1995) focus on one-shot games, Vives considers a dynamic problem, like Kyle (1985), Glosten and Milgrom (1985) or the asset pricing papers discussed above. He proposes a novel analysis of the dynamics of information revelation and, in particular, the speed at which prices converge to full revelation. To do so he considers a tâtonnement mechanism whereby heterogeneously informed, risk-averse and competitive investors place orders and tentative prices are set. This process is repeated over time until the market opens and trades actually take place. The market opening time is exogenously and randomly determined.

An important previous paper (Vives, 1993) studies the case where only two types of agents interact in the market: noise traders and limit order traders. In this context, Vives (1993) shows that the convergence of prices towards values is relatively slow. This is because, as prices become more and more informative, traders place less and less weight on their private signals relative to the public information conveyed by the price. Consequently, the order flow brings about less and less incremental information.

Vives (1995) extends this analysis to the case where there is a third type of player: risk-neutral market makers setting the price equal to the expected value of the asset, conditional on the order flow. In that setup there is a countervailing effect to that highlighted in Vives (1993): as private information gets progressively revealed, market makers' prices become less and less reactive to the order flow. This pushes the informed agents to trade more and more

[1] Considering optimising hedgers, as opposed to exogenous noise trades, is particularly important in the present context where the focus is on the comparison between the complete and the incomplete market. Indeed, changing the set of securities traded, and correspondingly the set of hedging opportunities, is bound to have an impact on the trades of the uninformed agents. Other papers where the randomness in the order flow stem from rational risk sharing motivations include Glosten (1989), Dow and Gorton (1994), which is discussed below, and Biais, Martimort and Rochet (2000).

aggressively. Thus they place more weight on their private signals than in the case analysed in Vives (1993), and the market learns faster.

Concluding remarks

As can be seen from the above remarks, recent research in market microstructure ranges from the study of deep theoretical economics issues, such as existence and uniqueness of equilibrium in signalling games, to more applied finance questions, such as the pricing of options. Also, while there is a certain (substantial as well as formal) similarity between the results obtained in market microstructure and those obtained in asset pricing (as brought out by the similarity between equations (5) and (7)), there is still a considerable gap between the two approaches. As noted in Biais, Glosten and Spatt (2000), asset pricing focuses on the long-term dynamics of fundamental valuations observed at relatively low frequencies, while market microstructure focuses more on convergence to – or deviations from – these fundamental valuations in high frequency data. An important avenue of further research should be to better integrate the two perspectives.

III) Speculation

Preliminary remarks

The study of speculation in financial markets may well be a promising area for the development of theories linking the asset pricing and market microstructure paradigms. On the one hand, papers analysing speculation often aim at characterising economically and statistically the dynamics of stock prices so as to fit observed times series data (often at relatively low frequencies). This is in the spirit of asset pricing research. On the other hand, in line with market microstructure research, papers analysing speculation often focus on trading strategies, and on the consequences of investors' beliefs for asset prices. Harrison and Kreps (1978), in their seminal paper, define speculation as follows: "An investor may buy the stock now, so as to sell it later for more than he thinks it is actually worth, thereby reaping capital gains." One of the central question in the analysis of speculation is: how can it be the case that such a resale can take place? That is, how can it be the case that the initial buyer of the asset can find somebody who is willing to buy from him, at a price that he thinks is excessively high?

In Harrison and Kreps (1978) this can happen because different classes of investors are assumed to have different beliefs about the stochastic process that generates dividends.[2] With such inconsistent beliefs, both the initial buyer and the trader to whom he sells think they are making a good deal. The former thinks that the latter is too optimistic about future dividends, and symmetrically the latter thinks the former is too pessimistic about future dividends! In this context, Harrison and Kreps (1978) show how the valuation of the stock by the investors can be decomposed into the sum of two terms: the fundamental value of the asset (the present value of expected future dividends as perceived by the investor) and a non-negative term,

[2] In addition, to simplify the analysis, Harrison and Kreps (1978), make the (rather extreme) assumption that investors do not alter these beliefs as they observe new data.

reflecting the value of the option of selling the asset in the future to another investor with a greater assessment of the fundamental value.

The four papers dealing with speculation in this volume offer insights that are complementary to the analysis of Harrison and Kreps (1978). Dow and Gorton (1994) and Morris and Shin (1998) tackle the issue in the context of rational expectations equilibria where different investors have different private signals. Balduzzi, Bertola, & Foresi (1995) rely on exogenous positive or negative feedback traders. Biais and Bossaerts (1998) consider agents with different priors, in line with Harrison and Kreps (1978).

Arbitrage chains: Dow and Gorton (1994)

Dow and Gorton (1994) consider an asymmetric information trading game in the line of Glosten and Milgrom (1985) or Kyle (1985). A key ingredient of their analysis is the assumption that the informed investors have limited trading horizons. That is, informed investors are constrained to sell back their holdings of the risky asset before a given date. Because of this constraint, they must act as speculators, i.e., they are willing to buy after receiving good news only if they anticipate to be able to resell in the future at a favourable price. Interestingly, this implies that, while when they are buying the asset they prefer their information not to be revealed, after they have built up their position they are better off if their private positive signal is revealed to the market. They anticipate that this will be the case if they expect that other informed speculators will buy after them, and before they must unwind their position. Such sequences of informed speculators constitute arbitrage chains. The paper offers a very elegant, general equilibrium analysis of these chains, in a dynamic model where all agents are fully rational.

While in Harrison and Kreps (1978),[3] speculation arises because the initial buyer disagrees with the investor to whom he resells the asset, in Dow and Gorton (1994) the situation is exactly the opposite. Speculation arises, and the informed investor initially purchases the asset after observing a good signal, if he anticipates that in the future he will encounter another investor with whom he will agree that the asset value is high, so that he will be able to unwind his inventory at a fair price.

Asset prices with speculators and feedback traders: Balduzzi, Bertola and Foresi (1995)

Balduzzi, Bertola, and Foresi (1995) analyse the situation where two types of traders coexist in the market: i) rational, infinitely lived, risk averse, competitive speculators are permanently present, while ii) feedback traders intervene once. In the case of negative feeback traders, Balduzzi, Bertola, and Foresi (1995) assume that they have initially bought all the stock, but will sell their entire holdings if the stock price reaches a certain lower bound. Although this behaviour is not modelled in the paper as reflecting optimal decisions, it is qualitatively similar to a simple form of portfolio insurance strategy. The paper also analyses the case of negative feedback traders, who initially don't own shares but will offer to buy the entire holdings of the speculators if the stock price reaches a certain upper bound. Balduzzi, Bertola, and Foresi (1995) show that the asset price is equal to the sum of two terms. The first term is

[3] Or in Biais and Bossaerts (1998) discussed below.

in the spirit of the pricing equation (2) and reflects the fundamental value of the asset for the speculators:

$$P_{i,t} = E\left[\sum_s F_i(\omega_{t+1}) \cdot \frac{\rho^s U'(C_{t+1}(\omega_{t+1}))}{U'(C_t)}\right], \tag{9}$$

where C is the consumption of the speculators, U their utility function, ρ their rate of time preference, F the dividend flow, and P the asset price. The second term reflects the value for the speculators of the option to buy the asset (in the case of positive feedback) or to sell it (in the case of negative feedback).

Balduzzi, Bertola and Foresi (1995) show that positive feedback trading amplify the response of stock prices to dividend news as well as the volatility of the market, while negative feedback trading make prices less responsive to dividends.

Asset prices when speculation reflects heterogeneous beliefs: Biais and Bossaerts (1998)

In the line of Harrison and Kreps (1978), Biais and Bossaerts (1998) analyse how differences in beliefs can induce speculation, where certain investors buy the assets hoping to resell it further to agents with more optimistic beliefs. Unlike Harrison and Kreps (1978), however, Biais and Bossaerts (1998) do not assume that the agents stick to their initial beliefs. Rather, they analyse how agents update their prior beliefs, in a Bayesian way, based on the observation of market outcomes. The paper analyses the cases where priors are identical or common knowledge, consistent with the Harsanyi doctrine. It also analyses the more complex case where agents are not supposed to have identical priors and furthermore their different priors are not assumed to be common knowledge. In general this can give rise to formidable difficulties. Agents must form (first order) beliefs about the consumption flow from the asset. They also must form (second order) beliefs about the first order beliefs of the others. Iterating, an infinite hierarchy of beliefs obtains, and this is a complicated object to deal with... However, Biais and Bossaerts (1998) show that this infinite regress problem can be avoided by assuming a common knowledge one to one mapping between each agent's utility function (which determines her valuation of a given consumption flow) and her first order prior belief. Thanks to this short-cut, Biais and Bossaerts (1998) are able to analyse speculation generated by differences in (not common knowledge) beliefs. In their analysis, as in Harrison and Kreps (1978) and Balduzzi, Bertola and Foresi (1995), prices can written as the sum of an expected fundamental value and a speculative option. Agents disagree in their evaluation of thisoption, because they have different beliefs. This is what generates speculative trading. Several statistics, computed from readily observable quote, return and volume data, are evaluated in terms of their power to discriminate the Harsanyian case and the case where agents have different priors that are not common knowledge. Only statistics that relate volume to volatility, or volume and changes in best offers, have the necessary discriminatory power.

Speculation and currency attacks: Morris and Shin (1998)

Morris and Shin (1998) also underscore the role of agent's beliefs, and beliefs about beliefs, in the context of a speculative market. When a currency is "ripe" for an attack, speculators considering whether to sell or not must form beliefs about whether the others will also decide to attack or not. This gives rise to higher order beliefs and beliefs hierarchies, where each potential speculator must ask herself what the others think about the currency, what the others think about what the others think about the currency, etc… This problem is complicated by the fact that there are complementarities between the strategies of the speculators: the expected profit from my attack depends on whether the others will also attach or not. In the previous literature this complementarity gave rise to equilibrium multiplicity, which made it difficult to rely on theory to obtain clear-cut guidance. By assuming heterogeneous information among speculators, Morris and Shin (1998) are able to offer a very elegant characterization of equilibrium uniqueness in a model of currency attacks. In their model, each speculator receives a piece of private information about the fundamental, and is uncertain as to what information the others have received. In equilibrium, she will decide to attack if and only if her own signal is below a critical threshold. As the strength of the speculators' attacks is increasing in the amount of "hot" money they handle, the greater this amount, the greater the critical threshold under which speculators attack, and correspondingly the more likely it is that currency attacks will be observed.

Concluding remarks

The above-discussed papers illustrate how rigorous economic thinking about difficult problems, involving dynamic strategies or market imperfections, can help shed light on important practical issues. Morris and Shin (1998) offer analytical tools helpful to discuss policy proposals to deflect currency attacks. Thus they offer insights on the effectiveness of policies directed at increasing transparency in the market. Dow and Gorton (1994) show how large cost of carry can break arbitrage chains and thus reduce the informational efficiency of the market. This suggests that policies aiming at reducing the cost of carry could enhance the workings of the market. Balduzzi, Bertola, and Foresi (1995) (and Biais and Bossaerts (1998)) shed light on the empirical consequences of positive feedback trading (and diversity of beliefs) on the joint dynamic behaviour of stock prices and volume.

IV) Asset pricing and corporate finance

Along with the integration of asset pricing and market microstructure, the integration of asset pricing and corporate finance is one of the most important items in the research agenda of financial economists. While in the area of asset pricing researchers have developed elegant dynamic models, extremely useful for practitioners, they have often failed to take into account the richness and complexity of the contractual relations and agency problems associated with the issuance of financial assets. On the other hand, while corporate finance has shed light on many important contracting issues in presence of conflicts of interests and information asymmetries, it has not entirely succeeded in delivering precise quantitative formulae directly applicable by practitioners.

Debt valuation in presence of moral hazard: Anderson and Sundaresan, 1996

Anderson and Sundaresan (1996) offer a path-breaking contribution to the unification of the corporate finance and asset pricing approaches. As in standard asset pricing theory, they consider a firm whose underlying value follows a binomial (up and down) process. In the line of Black and Scholes (1973) and Merton (1974) the classical asset pricing approach would entail pricing its debt and equity using risk-neutral expectations of discounted cash-flows, similarly to equation (5) in section I above. Yet, Anderson and Sundaresan (1996) depart from this approach by taking into account agency problems between the manager and the outside debtholders. They assume that at each point in time the manager can choose between servicing the debt or offering a lower pay out to the debtholders. If the latter refuse, then the firm is liquidated and the corresponding proceeds are allocated to the debtholders. Else, if the debtholders accept the offer made by the manager, they receive the monetary transfer and the game continues as if the debt had been fully served. An important assumption at this stage is that, if the firm is liquidated, the debtholders receive its fundamental value minus a liquidation cost. To avoid bearing this cost, it may be optimal for them to accept less than full debt service, rather than forcing liquidation. Taking advantage of that, managers opt for "strategic default" (and offer less than contractual debt service which they know will not be rejected by the debtholders) when the value of the firm is rather low. Having solved for the equilibrium strategy of the manager, Anderson and Sundaresan then proceed to value straight debt contracts, by computing risk-neutral expectations. This generates yield spreads over Treasuries which are more in line with stylised facts than those generated by a standard asset pricing model such as Merton (1974). Anderson and Sundaresan (1996) then push their analysis even further, by delineating the implication of their model for the design of debt contracts. For example the analysis delivers the implications that high growth firms and highly levered firms tend to use low-coupon debt contracts, while low growth firms use high-coupon debt.

Foreign equity investment restrictions: Stulz and Wasserfallen, 1995

Also Stulz and Wasserfallen (1995) analyse what type of security firm managers should issue and the corresponding asset prices. If the demand for shares of a given country differs between domestic and foreign investors, then standard discrimination theory implies that shares should be offered at different prices to the two categories of investors. For countries benefiting from capital flight, like Switzerland, the demand for shares by foreigners is likely to be different than domestic demand. Stulz and Wasserfallen (1995) offer evidence from Swiss share prices consistent with this analysis.

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