

EXCHANGE TRADED OPTIONS AND THE SUPPLY OF CAPITAL

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1. Introduction

The introduction of the exchange traded option [1] by the Chicago Board Options Exchange (CBOE) in 1973 revolutionized options trading. The success of the CBOE led to the initiation of option trading on the American Stock Exchange, the Philadelphia Stock Exchange, the Pacific Stock Exchange and the Midwest Stock Exchange. The New York Stock Exchange has been seeking authorization from the Securities and Exchange Commission to initiate such trading.

The innovations associated with exchange traded options (as compared with options traded over-the-counter) are four-fold: (i) Strike prices are set at intervals of \$ 5, \$ 10, or \$ 20, depending on whether the price of the underlying stock is below \$ 50, between \$ 50 and \$ 200, or over \$ 200, respectively; a new contract must be written at the same strike price as outstanding contracts or at a strike price close to the current market price of the underlying stock if the market price has moved at least half way through the interval that would be bounded by the new strike price. (ii) Expiration dates are set on the Saturday following the third Friday in the month and, for a given class of options (*i.e.*, options with a given underlying stock), expiration dates are three months apart. (iii) Following the example of the futures markets, the Option Clearing Corporation (OCC) is interposed between the writer and buyer of an option contract, *i.e.*, all contracts are with the Corporation. The OCC is looked upon as the issuer of option contracts and as such publishes regularly updated prospectuses which are distributed to all active option accounts. (iv) All contracts are for 100 shares of the underlying stock. These innovations concentrated trading in a relatively small number of contracts for each underlying stock and eliminated the need for buyers to investigate the credit worthiness of each contract writer.

The effect on trading has been phenomenal. Writing in 1969 before the advent of exchange trade options, Merton Miller noted that "the conventionally accepted

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estimate of volume in the option market is 1 to $1\frac{1}{2}$ percent of the volume on the NYSE" [2]. A decade later, the Securities Industry Association reported that the number of shares represented by the contracts traded on the CBOE and the AMEX in 1978 was sixty-five percent of the New York Stock Exchange volume. When the trading on the Philadelphia and the Pacific Stock Exchanges was included, the percentage was close to seventy. Furthermore, the average daily volume of trading on the NYSE in 1978 was two and one-half times the volume in 1969.

This phenomenal increase in the interest in options has given rise to two concerns: the possibility of trading abuses and price manipulation and the possible impairment of the securities markets as capital raising mechanisms. Rubinstein has dealt with all of these concerns briefly in this issue of the Journal [3]. The present article is a critical review of the scant literature that exists on the option exchange markets' effect on the capital raising mechanism; it is not a report on new research.

In Part 2, I review the justification of options markets. In Part 3, I review the effect of options markets on the aggregate supply of capital. In Part 4, I explore the effect of the options markets on the equity market as a whole and on the market for small firm issues in particular.

2. In defense of options markets

Contemporary finance literature views assets as being substantially claims to the probability distributions of returns that those assets may subsequently earn. Assets with the same assessed probability distributions of returns are considered completely substitutable. Under certain conditions specification of the mean and variance of the distribution is sufficient to identify the entire distribution. This risk of the asset is then represented by the variance of the distribution [4].

Investors are viewed as striving to achieve an asset configuration with a risk-return combination most suited to their particular attitudes towards risk. The risk-return combination they can achieve depends upon the risk-return characteristics of the totality of assets available. If the risk-return combinations of the available assets are not sufficiently varied, the particular risk-return combinations desired by some investors may not be achievable. The advantages of additional strategies have been succinctly illustrated in the umbrella analogy by Baumol, Malkiel, and Quandt in their study for the Chicago Board of Trade, of the merits of an exchange market for options [5]. They pointed out that an individual about to leave for work, without an umbrella but anticipating the possibility of rain, had two strategies and four possible outcomes. He could report sick, in which case he would not care whether it rained or did not rain. Or he could go to work, in which case he would be comfortable if it did not rain but miserable if it did. In contrast, if he had an umbrella, his strategies and outcomes were increased. He could choose not to use the umbrella and face the same consequences as those just described, in which case he would be no worse off. Alternatively, he could take the umbrella with him and, while he

would be only mildly inconvenienced if it failed to rain, he would be a good deal more comfortable if it did rain. Likewise, new financial instruments may enlarge the array of risk-return combinations available to investors. These instruments will find a ready market among investors whose target risk-return combinations are among those that now become possible. However, since the choices are rich even without the options markets, the contribution of the latter may be minimal. Fortunately the potential advantages of an options market are more extensive: theoretically it may make the reduction in the cost of a variety of investment strategies possible, improve the information dissemination mechanism of the economy, and improve firm resource allocation. These potential contributions of the options markets have all been noted by Rubinstein [6].

The least obvious contribution is the possible improvement in the information dissemination mechanism. This improvement may result from the fact that stock prices reflect information. The relevant information is, of course, the probability distribution of future returns or prices. The specific facts that determine that distribution are irrelevant. If, therefore, some investors obtain hitherto unavailable information, they will attempt to buy or sell stock, depending on the nature of the information. Their activity will alter the price of the stock. Other investors observing the price changes can draw inferences about the probability distribution of returns. When we say that stock prices *reflect* information, we mean that they do so in the full sense of that word. They not only respond to information but broadcast the essence of it. The prices (premiums) investors are willing to pay for options similarly depend upon investors' assessments of the probability distribution of future prices of the underlying stock. Reassessments following the discovery of additional information are similarly reflected in the premiums. Thus, the number of signals generated by available information is multiplied when options markets exist. The economy then behaves as though the underlying information itself was more widely available.

This function of the options markets is, however, somewhat difficult to reconcile with the literature on the efficiency of the stock market that maintains that all available information is reflected in prices whether or not that information is uniformly distributed [7]. If the doctrine expounded in this literature is correct, the existence of options markets should have no effect on stock prices, or on the availability of capital to the private sector as a whole, or on the distribution of capital throughout the private sector.

The empirical literature suggests that the stock market is remarkably efficient in rapidly reflecting the information that is available in stock prices. There may, nevertheless, be some room for improvement in the market. Information that is too costly to obtain is not reflected in prices rapidly. The empirical literature on insider trading provides evidence that insiders are able to profit from their information for a considerable length of time [8]. In addition, institutional constraints on short sales retard the adjustment of prices to the information held by would-be short sellers.

In the idealized world depicted in the recent theoretical work on informational efficiency, prices always reflect all information, and the prices that prevail when only some investors are informed are the same as those that would prevail if everybody had the same information. But while this literature provides important insights into the pricing mechanism, it is the type of insight that frictionless mechanics provide the physicist. It is not difficult to enumerate the special assumptions of this literature that might convince the reader that the conclusions are implausible descriptions of the securities markets we observe, but it would be pointless. Insights should not be confused with descriptions. The fact that rational people spend enormous sums to unearth information should make anybody pause before concluding that all information is immediately reflected in prices. If that were the case, the information acquired at such expense would be worthless. Thus, granted that the information dissemination mechanism of our markets is less than perfect, there may be room for improvements made possible by an options market. Whether the improvements outweigh the costs of operating an options market remains to be determined.

3. The supply of capital

There is no reason to believe that the existence of options markets will adversely affect the economy's propensity to save or the productivity of investment opportunities. On the aggregate level, national balance sheets are unaffected by the existence of options markets. All outstanding options are netted against the obligations incurred by the writers. These exactly offset each other.

A market for financial instruments performs an intermediary function. It involves the repackaging of the claims against the basic income stream of productive physical assets. It may thus make possible the financing of some activities that might otherwise not have been financed and increase social choices. Financial markets may ultimately determine not only where claims against real assets finally come to rest, but to some extent the volume of real assets against which claims may be issued. A mutual fund, for example, combines the claims against the equity income of a number of different firms and makes available to investors the package of claims in fractional amounts. While all the funds raised by these investment companies are channeled back into the financial markets, investors may commit funds to equity that would not otherwise have been invested in equities. Whether the enhancement of the supply of equity will actually result in more capital expenditures being undertaken, hence more income and therefore more savings, remains to be determined.

The case of options is analogous. The buyer of options diverts funds from other segments of the capital market to invest in options. The writer of options reinvests the proceeds in other financial instruments. If some of those instruments are other options, the writer of the latter options will reinvest the resulting proceeds in some

other financial instrument. By making possible a more efficient deployment of risks, options markets, like other financial intermediaries, may facilitate capital formation, but there is no real presumption that they will.

Furthermore, if the options markets do in fact encourage capital formation, they do so at the cost of the resources absorbed by their operations. This constitutes a leakage which may or may not be larger than any additional resources devoted to capital formation.

4. Options and the equity market

Up to this point I have argued that the development of options markets is unlikely to affect the total supply of capital significantly, one way or another. If options markets can affect the aggregate supply of equity, it must be by altering the attractiveness of competing markets.

Let us first consider the ways in which options markets might affect interest rates.

Fischer Black argues that "an appropriate mixture of a long position in options with short-term money market instruments is less speculative from almost any point of view than an investment in the underlying stock" [9]. Since option premiums move up and down with the prices of the underlying stocks, one can always determine the number of contracts that will vary in total value by exactly the same amount, for small price movements, as the price of the stock. Thus if the premium of an option changes by 0.5 when the price of the underlying stock changes by 1, an investment in two option contracts will produce the same dollar gain or loss as the purchase of 100 shares of the underlying stock. The purchase of two contracts will, however, require a much smaller investment than the purchase of 100 shares. The difference in the investment requirements can be used to purchase debt instruments. For small changes in the price of the stock the value of the options will rise and fall by roughly the same amount. If the price of the stock rises significantly, the value of the option package will start to rise twice as fast as the stock, and for large declines in the price of the stock the loss is limited to the premium paid. As a consequence of the possibility of creating this kind of portfolio, we might expect a deflection of funds from the stock market to the debt market. But if there were a deflection to the debt market, the effect of this increase in the supply of debt funds would be offset by the fact that a call is an alternative to margin buying. Thus, the use of calls in the fashion described above would create a reduction in the demand for debt funds. The two forces (increase in supply and reduction in demand) both depress interest rates and thus make equity relatively more attractive.

Therefore I believe it is highly probable that the shift of funds from the equity market to the debt market as a consequence of the development of the options markets is likely to be minimal.

Second, let us consider the effect of the options markets on the supply of risk assets. It is easy to exaggerate the consequence of the development of options on that supply. To a large extent the writing of options is merely the repackaging of the income distribution of the underlying stock. As noted, all assets are claims to income distributions. A call gives the buyer the right to the upper part (right-hand tail) of the distribution accruing to the underlying stock. If the price rise is sufficiently limited, the gain is claimed in its entirety by the option writer. If the price rises above the strike price, the gain is shared with the holder of the call. The latter is entitled to all gains represented by the price rise in excess of the strike price. A covered call (one written by a holder of the underlying stock) does not represent a claim to a hitherto nonexistent income distribution. When the writer purchased the stock, he purchased the claim to the whole distribution: all of the possible gains and all of the possible losses. By subsequently writing the call he disposed of his claim to a portion of that distribution. The writer of an uncovered call, however, has no specific income distribution claim to partition. He thus creates a new one, and in so doing does create a new risk asset.

It would not be useful to catalogue all the options transactions into those that do and those that do not create new risk assets. It suffices to note that only about four percent of option investors write uncovered calls [10]. Hence the volume of risk assets that this market contributes is only a small fraction of the outstanding options. Insofar as the writers of uncovered options do create additional risk assets, there is no reason to believe that the proceeds are invested in small firm issues (SFI) or even that the funds eventually trickle down to that submarket. Indeed, when options are held, instead of other financial instruments, it is difficult to predict just which instruments are likely to fall into disfavor. Thus, the additional supply of risky assets is not necessarily offset by a comparable addition on the demand side of the market.

It is highly unlikely that the demand would shift entirely from the SFI market to the options markets. Venturesome investors are likely to include both types of securities in well-balanced portfolios. While some impairment of the SFI market must occur, it is unlikely that this impairment is significant enough to offset the advantages of having options markets.

Sensitive to the suggestions that exchange traded options had absorbed some of the funds available for investing in the equities of small business, the CBOE commissioned a study by Robbins and his associates [11]. The study pointed out that the decline in the availability of funds for investment in initial public offerings (IPO) preceded the initiation of exchange traded options and reflected the general problems of the equity market. The authors were not able to find significant evidence of a negative impact of options trading on the IPO market. As they note, the market of IPO is volatile and is likely to be attractive in an ebullient stock market, but not in a depressed one. Since IPO are generally riskier than seasoned securities, the required rates of return on IPO are higher than on seasoned securities. In the case of two stocks equal in all respects but risk, the price per dollar of current earnings

will be more for less risky stocks. If seasoned and unseasoned firms were equally productive and the market price of the seasoned stock equaled its book value, the prospective market price of the unseasoned stock would be less than book value. Under such circumstances the flotation of an unseasoned stock would not appear attractive to management. If, as is often the case in a depressed market, the price of seasoned stock is less than book, the price of unseasoned stock would be that much more below book. It is hardly surprising that in a depressed market few IPO or SFI are made. Considering the state of the market in recent years and the vulnerability of many publicly traded firms to takeover, it would be surprising indeed if the SFI market were vigorous.

The only available empirical evidence on the relationship of the development of the options markets to the SFI market is that supplied by the Robbins study. Unfortunately, while the authors' conclusions are plausible, much of the statistical work in that study in support of those conclusions is vitiated by a failure to use the proper statistical model. By resorting to the classical economic relationship between quantity and price, the authors of the study measure the statistical relationship between the number of small new equity issues appearing quarterly and the average price earnings ratio, for the preceding quarter, of the stocks listed on the American Stock Exchange. However, since the number of small new equity issues the investing public will demand is also a function of the price, it is impossible to say whether the authors have produced a demand or a supply function. There is well-developed statistical theory dealing with the problem of supply and demand equations having substantially the same form. Unfortunately, the authors either ignored this body of theory or failed to recognize the problem.

In addition, their discussion of their survey of the investment strategies of options investors leaves much to be desired. For example, they contend that "small new issues and options fall into significantly different risk categories and therefore do not draw on the same 'pool' of funds" [12]. Robbins and his colleagues overlook the fact that options make it possible to "create" investments with risks comparable to SFI. Their report of investors' perception of effects on portfolios of adding stock options or small new issues is rather meaningless without a knowledge of the portfolios to which the options are added. A call in isolation is risky. A call added to a portfolio already short the underlying stock actually makes the portfolio safer.

They contend that "if a speculative pool of funds existed that remained fixed over time, at least the buyers of options would be using funds that otherwise might go into the purchase of small new equities. There is little evidence, however, that such a fixed pool exists" [13]. This argument is irrelevant. If options are competitive (or substitutable) for small equity issues, the amount of funds invested in such equities will be smaller than it would have been in the absence of options markets. They also report "that options trading seems not to have grown at the expense of small new issues" [14]. This statement is based on the finding that seventeen percent of the options buyers who had previously bought small new issues bought as

much or more such stock after the introduction of exchange traded options. That is a relatively small percentage. An equal percentage bought less stock in part because options appeared more attractive, and the remaining sixty-six percent bought less stock, but presumably not because options were more attractive. Of the six answers posed to the respondents for their choice, only one (accounting for thirteen percent of the respondents) is clearly unrelated to the development of options markets. Others, such as "new issues aren't available" and "already available common stocks appear more attractive", could simply reflect the fact that the options markets had already taken their toll on the SFI market.

There is no evidence in their survey that, even to the extent that the options markets encroached on the SFI market, the fault lay with the attractiveness of the options markets rather than with the depressed state of the stock market in general and in the SFI market in particular.

There is, however, one aspect of options markets that does not bode well for the SFI market. The options markets make it possible for market makers to hedge their positions in the underlying stocks. They are, therefore, more willing to make markets in such stocks, and that adds to the liquidity of these stocks. The added liquidity should reduce somewhat the required rate of return on those stocks and thus favor established firms in comparison with unseasoned firms.

The fact that the public market for the issues of venture capital firms deteriorates does not in itself mean that the supply of capital for the development of new technology is reduced. There has been a significant change in the institutional structure of the venture capital market. Basically venturesome individuals have been replaced by venture capital subsidiaries of major corporations. This can actually lead to an improvement in the allocation of resources. The firms that resort to corporate venture capital subsidiaries are more assured of second and third financings as they grow than firms that remain independent. Staffed as they are by professionals, the venture capital firms are less likely to be carried away by sexy firms' names or products. Less capital is therefore likely to be wasted. The social consequences of these developments, however, may not be wholly desirable. They further accentuate the bias of the economy in favor of big business as compared with small and moderate size business.

5. Conclusion

There is fairly widespread agreement among economists that options markets, despite their resemblance to a pure gamble, have some redeeming features. There appears to be no adequate reason to expect that the options markets will drain funds from either the debt or the equity market. There appears to be some reason to believe that liquid options markets have the potential for draining some equity funds away from small business, although the current inadequacies of that market appear to stem from the equity market itself rather than from the development of

the options markets. The options markets also have the potential for improving the relative attractiveness of the market for stocks already heavily traded and hence for accentuating the diversion of capital from small business to firms that are already very large. Furthermore, the benefits offered by the options markets are hardly free. The operations of the exchanges are costly. The brokerage firms devote considerable resources to the operations of these markets. Finally, the regulation of the markets also involves costs. In sum, the potential benefits and costs are not difficult to identify, but the magnitudes of those benefits and costs have remained virtually unexplored. In a society that values allowing its citizens to make their own choices, the burden of establishing a lack of balance and its nature must belong to those who would narrow investors' choices.

Notes

[1] A call (put) is a contract granting the holder the right to buy (sell) a number of shares of a specified stock (the underlying stock) at a designated price (the strike or exercise price) on or before an expiration date. A perpetual warrant is an option that extends the right in perpetuity. An exchange trade option is simply one that is traded on an exchange rather than over the counter.

[2] Miller, *The Effect of an Improved Option Market on the Costs of Debt and of Equity Capital*, in II Public Policy Aspects of a Futures-Type Market in Options on Securities (Appendix) 33 (Robert R. Nathan Associates, Inc., 1969) (memorandum for CBOE) [hereinafter cited as Nathan Report].

[3] Rubinstein, *An Economic Evaluation of Organized Option Markets*, *supra* this issue of this Journal.

[4] The variance of a distribution is the expected value of the squares of the deviations of possible values from the expected value of the variable under consideration.

[5] Baumol, Malkiel, and Quandt, *An Organized Option Market and the Public Interest*, in II Nathan Report, Appendix.

[6] *Op. cit. supra* n. 3.

[7] *Cf.* Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. Fin. 383 (1979); Grossman, *On the Efficiency of Competitive Stock Markets Where Traders Have Diverse Information*, 31 J. Fin. 573 (1976); Grossman, *Further Results on the Informational Efficiency of Competitive Stock Markets*, 18 J. Econ. Theory 81 (1978); Kihlstrom and Mirman, *Information and Market Equilibrium*, 6 Bell J. Econ. 357 (1975).

[8] *See, e.g.*, Jaffe, *The Effect of Regulation Changes on Insider Trading*, 5 Bell J. Econ. and Management Science 93 (1974).

[9] Black, *Fact and Fantasy in the Use of Options*, 31 Fin. Analysts J. 36 (1975).

[10] Robbins, Stobaugh, Sterling and Howe, *The Impact of Exchange-Traded Options on the Market for New Issues of Common Stock of Small Companies* 74 (1977) (memorandum of Management Analysis Center, Cambridge, Mass. for CBOE).

[11] *Op. cit. supra* n. 10.

[12] *Id.* at 73.

[13] *Id.* at 76.

[14] *Id.* at 79.

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