Real Options under Post-Entry Liquidity Constraints

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Firms often face irreversible decisions, such as when to exit or abandon an investment project, while facing uncertain cash flows. The standard theory of real options has shown how the optimal quitting decision should take into account the option value of continuation. The option to exit later must be balanced against the expected near-term losses: the firm does not exit immediately when cash flow becomes negative when it has the potential of bouncing back and earning significant profits in the future. In typical environments, the firm's optimal policy is described by a negative threshold level of cash flow below which it exits. However, the standard option value of continuation is partly due to projected future paths where cash flow remains negative for arbitrarily long periods of time. Yet it is unrealistic in many contexts that a firm with a long history of losses could keep raising more funds. The main purpose of this project is to characterize the optimal policy of a firm that would be forced to exit (regardless of its option value) if it ever runs out of cash while facing a negative cash flow.

Risk management in this environment has two main components: the decision to enter/exit, and the policy of retaining/paying out earnings. The key trade-off for the exit policy is that at some point it is better to take the remaining cash and exit before running out funds. The key trade-off for the payout policy is that it is beneficial to keep cash (or other liquid assets) at hand, so that undesired exit can be prevented in the future, but it is also costly when cash holdings yield a rate of return below the discount rate. Therefore, if the firm is sufficiently safe from forced exit---with sufficiently high cash flow and/or cash stock---it is optimal to pay out some of the cash, even though it reduces the ability to cover losses in the future.

Roughly speaking, a firm is "liquidity constrained" when it faces a high cost of raising new funds, despite the availability of profitable projects. This can be due to asymmetric information, e.g., when the firm cannot credibly convey to investors that it has a good chance of becoming profitable in the future despite current losses (however we do not plan to investigate the sources of liquidity constraints in this project). We propose to solve the optimal policy of the liquidity constrained firm.

The solution will also inform the optimal entry decision in the liquidity constrained world. How is the value of a project determined when it may require one to sustain uncertain losses for significant periods of time, but when additional funds may be hard to obtain in the event of such losses?

The existing literature on real options has answered the main questions of how firms should make irreversible decisions while facing uncertain cash flows. To put it briefly, we propose to investigate how the main answers are affected when firms cannot survive under indefinitely lasting negative cash flows.