“Equilibrium Equity Premium and Interest Rate of a Large-Firm Economy under Moral Hazard”

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Comment by Bernard Dumas
Features of the model

- Consumption by principal and agent at times 0 and 1
- Effort expended during that time interval determines drift of cumulative dividend process. Accumulated dividend at time 1 is outcome.
- Agent and principal both have exponential utilities, possibly with different risk aversions
- Cost of effort is subtracted from consumption
- i.e., same assumptions as Holmstrom and Milgrom (1987)
- But add equilibrium, including financial-market equilibrium:
  - Single firm
  - Agent is not an equity investor (shown to be best anyway)
    - trades ST bonds only
  - Principal is an investor: trades both bonds and equity
Main contribution/result

• Not the first model of equilibrium with moral hazard: Zame (2007), Danthine and Donaldson (2008)
• But the first model of equilibrium that draws implications for pricing:
  • interest rate reduced by moral-hazard problem:
    • Interpretation: Moral-hazard problem reduces effort and productivity?
  • equity premium may be increased
Other comments

1. Specification of marginal utility of effort as in Holmstrom and Milgrom:
   \[ e^{-\gamma P(c_p - h(\mu))} \]
   - As opposed to, for instance, \( u(c^P) + h(\mu) \)
   - Or generally, \( u(c^P, \mu) \) and study the impact of the cross-derivative

2. Principal, not agent, makes physical investment decision
   - Agent only makes effort decision
   - Investment decision influences future consumption and, therefore, state price deflators
   - Agent, not being able to trade and having, therefore, different state price deflators, would make a different investment decision
   - Danthine and Donaldson have shown that optimal second-best contract would then involve future aggregate consumption

3. Vocabulary: firm here is a single firm, not a “large” firm:
   - It exercises no market power
   - Only principal is leader and agent follower
Conclusion

• The idea of calculating properties of interest rate and equity premium arising from moral hazard is an important one
• It is an important *economic* idea
  • Should be developed first in a static model: take H&M static and get equilibrium
  • I am not sure that couching it directly in a dynamic model and in terms of BSDEs is the best way to get it across
    • I note, however, that the BSDE approach, developed for quadratic $f$ and $h$ by Bismut (1976), was already in the appendix of Holmstrom and Milgrom (1987)!
      • From H&M proof, it is clear that it is useful only because of special form of agent utility
      • In other cases, I suspect that one must restrict to Markovian case and that the solution of a PDE is required anyway
    • That PDE approach would be more familiar to Finance people