Ambiguity and the corporation: Group disagreement and underinvestment☆

Lorenzo Garlappi, Ron Giammarino, Ali Lazrak*

Sauder School of Business, University of British Columbia, 2053 Main Mall, Vancouver, BC V6T1Z2, Canada

ARTICLE INFO

ABSTRACT

We study a dynamic corporate investment problem where decisions have to be made collectively by a group of agents holding heterogeneous beliefs and adhering to a "utilitarian" governance mechanism in which each agent has a given influence in the decision. In this setting we show that: (i) group decisions are typically dynamically inconsistent, (ii) dynamic inconsistency leads to inefficient underinvestment, and (iii) the ability to trade securities among insiders or with outsiders may restore efficient investment decisions but it may, in some cases, lead to inefficient overinvestment. Our theory can help explain the empirical evidence on the effect of diversity of groups, such as corporate boards, on firms' outcomes and, more generally, on the difference between group and individual behavior.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

The word "corporation," derived from the Latin *corpus*, or body, refers to "a body formed and authorized by law to act as a single person."[1] The study of corporate decisions typically models the corporate body as either (i) a single person, e.g., a manager, who maximizes expected utility with respect to a *unique* prior belief,[2] or (ii) a decision-making group (DMG hereafter) consisting of utility-maximizing individuals with identical prior beliefs, albeit possibly differentially informed. In reality, corporate boards and management teams are examples of DMGs where individuals with different opinions must collectively decide, as a single legal person, what the corporation is to do, often in the face of dramatically different views about whose model of the world is correct.

In this paper, we study corporate decisions made by a DMG for which the "common prior" assumption does not hold. If group members must collectively make a de-

* Corresponding author.

E-mail addresses: lorenzo.garlappi@sauder.ubc.ca (L. Garlappi), ron.giammarino@sauder.ubc.ca (R. Giammarino), ali.lazrak@sauder.ubc.ca (A. Lazrak).

[1] *Merriam Webster Dictionary.*

[2] If probabilities are objective, as in Von Neumann and Morgenstern (1945), then beliefs are necessarily unique. If probabilities are subjective, then uniqueness is implied by Savage's (1954) axioms of subjective expected utility.

cision on behalf of the corporation[3] but have heterogeneous priors, the group is de facto a "multi-prior" decision maker, even if each individual member has a single-prior. The DMG, therefore, faces an "ambiguous" decision problem (e.g., Ellsberg, 1961). Although the term "ambiguity" refers typically to a single decision maker who holds multiple priors over outcomes, it is suggestive of the environment faced by a DMG with heterogeneous beliefs whose members disagree on the probability of the states of the world.

In our analysis, all group members have preferences described by Savage's (1954) Subjective Expected Utility (SEU hereafter) model with identical utility functions. Consumption is common across group members who differ only in their subjective beliefs about the likelihood of future outcomes. We assume that, when faced with choices that are not unanimously ranked by all its members, the DMG invokes a *utilitarian governance (or aggregation) mechanism*. According to this mechanism, group decisions are obtained through a fictitious SEU agent whose beliefs are the linear combinations of individual beliefs, with weights that are constant over time. The utilitarian mechanism can be thought of as a reduced-form version of the complex interplay of legal, political, and economic forces that characterize the corporate governance process. Viewed under this light, the weight attached to the utility of a DMG member in the utilitarian mechanism can be interpreted as the influence that the individual has on corporate decisions, be it through personal attributes, social status, or legal power.[4]

We study the choices of a DMG that has to decide whether or not to invest in a new project and, upon investment, whether to continue or abandon after receiving a signal about the project's likelihood of success. Our analysis delivers three main theoretical implications for dynamic decision making, corporate investment, and security design.

First, we show that the utilitarian mechanism that governs the decisions of a DMG is *dynamically inconsistent*, that is, the ex ante ranking of two alternatives can be reversed after the DMG members learn about payoff-irrelevant states of the world. Intuitively, dynamic inconsistency arises because learning may induce shifts in the relative influence of a group member on the group decision. As a result, members of a DMG who are relatively uninfluential in a decision before learning may become more influential after learning.[5]

Second, we show that dynamic inconsistency can lead to a novel form of investment inefficiency where all members of the DMG, despite their different views of the world, agree that investment is best but nevertheless collectively decide not to invest.[6] Intuitively, some group members who would support a future operating choice over another recognize potential conflicts that may arise as a consequence of future learning. Rationally anticipating how the conflict will be resolved in the future, the DMG members that disagree with the expected resolution end up opposing the initial investment. Our finding that heterogeneous beliefs and consequent future disputes may lead to current underinvestment when decisions are collectively made is a new insight. The literature has emphasized how differences in beliefs in a market-mediated environment may lead to speculative trading[7] and overinvestment at the firm level.[8] In contrast, our analysis shows that, when decisions *have* to be made collectively and trading among DMG members is not allowed, differences in beliefs lead to *underinvestment*.

Third, we show that allowing for trading typically mitigates the inefficient underinvestment that occurs in the absence of markets although, in some cases, it leads to inefficient overinvestment. Specifically, when DMG members can trade among themselves, the member with the highest valuation will take over the firm and invest. Moreover, when DMG members collectively trade with outside investors, they can resolve the underinvestment problem by issuing a security that can change the firm's payoff across different states of the world in a way that brings unanimity in operating decisions. Intuitively, the expected future conflict that causes the initial inefficiency comes about when a future decision becomes relatively more important to some group members after learning. We show that contracts can be designed to eliminate future disagreement. This finding highlights an entirely new role for financial contracting in neutralizing conflicts that may arise among group members with heterogeneous beliefs.

We contribute to several strands of literature in economics and finance. We add to the corporate finance literature by explicitly recognizing the ambiguity-like nature of corporate decisions undertaken by a group of individuals with heterogeneous beliefs. Recent studies have applied models of *individual decision making* with multiple priors to finance problems. For the most part, these applications use single-agent max-min preferences (Gilboa and Schmeidler, 1989) and focus on asset pricing and portfolio choice problems.[9] In corporate finance,

---

[3] Although there are many aspects of corporate decision making that might involve different members of a DMG being able to implement their own decisions despite disagreement from others, our focus is explicitly on cases where a number of individuals must agree on a choice.

[4] Harsanyi (1955) provides the theoretical foundations for utilitarianism in welfare analysis when agents have objective beliefs but different utilities.

[5] Given the theoretical similarities between time discounting and probability weighting of states (see Halevy, 2008), time-inconsistency may also arise in a purely deterministic choice setting when the DMG members have heterogeneous discount rates. Time-inconsistency due to differences in discount rates when decisions are collective has been explored in Hertzberg (2012) and Jackson and Yariv (2015). A direct mapping between our results to theirs does not appear to be obvious. Broadly speaking, in our context, time-inconsistency is due to the impact of learning on the individuals' intensity of preferences. In Jackson and Yariv, time-

inconsistency is due to the time variation in discount rate induced by utilitarian weighting.

[6] Our discussion of inefficient investment is based on the concept of belief-neutral inefficiency as defined by Brunnermeier, Simsek and Xiong (2014). We elaborate on this below.

[7] See, e.g., Miller (1977), Harrison and Kreps (1978), Morris (1996), and Scheinkman and Xiong (2003).

[8] See, e.g., Shleifer and Vishny (1990), Blanchard, Rhee and Summers (1993), Stein (1996), Gilchrist, Himmelberg and Huberman (2005), and Bolton, Scheinkman and Xiong (2006).

[9] Epstein and Schneider (2010) and Guidolin and Rinaldi (2013) provide excellent surveys of the application of ambiguity to the asset pricing and portfolio choice literature.