Finance Research Letters 10 (2013) 1–11

Contents lists available at SciVerse ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

A value premium without operating leverage

Graeme Guthrie *

School of Economics and Finance, PO Box 600, Victoria University of Wellington, Wellington, New Zealand

ARTICLE INFO

Article history:
Received 29 June 2012
Accepted 24 October 2012
Available online 2 November 2012

JEL classification:
D92
G12
G31
D21

Keywords:
Value premium
Real options
Capacity constraints
Operating leverage

ABSTRACT

The existing real options literature explains the value premium as a consequence of either operating leverage raising risk in low-demand states or industry-wide investment lowering risk in high-demand states. This paper presents a simple model in which a value premium arises solely from capacity constraints. Profit is more sensitive to demand shocks when there is excess capacity, and the book-to-market ratio is high, than when capacity constraints bind, and the book-to-market ratio is low. The option to adjust capacity weakens the value premium arising from assets in place, but does not eliminate it for a wide range of parameters.

1. Introduction

Average stock returns tend to be higher for "value" stocks (firms with high book-to-market ratios) than "growth" stocks (firms with low book-to-market ratios). Several authors explain this value premium using real options models in which the book-to-market ratio proxies for firm characteristics that affect the systematic risk of returns. In this literature, the value premium originates in a firm's assets in place. One approach assumes firms have fixed operating costs, with the resulting operating leverage increasing the risk of assets in place in low-demand states by diverting a low-risk operating expenditure cash flow stream (Carlson et al., 2004; Cooper, 2006; Hackbarth and Johnson, 2011; Zhang, 2005). Another approach assumes that investment by other firms in the same industry buffers demand shocks, reducing the risk of assets in place in high-demand states (Aguerrevere, 2009; Kogan, 2004). In both cases, assets in place generate the value premium: in the first, operating leverage

* Fax: +64 4 4635014.
E-mail address: graeme.guthrie@vuw.ac.nz

1544-6123/$ - see front matter © 2012 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.frl.2012.10.001

increases risk when the book-to-market ratio is high; in the second, industry-wide investment lowers risk when the book-to-market ratio is low. This paper shows that a value premium exists even without operating leverage or industry-wide investment: all that is required is that there are periods when a firm carries excess productive capacity and periods when its capacity constraint is binding.

Operating leverage and industry-wide investment will contribute to observed value premia, but they are not entirely satisfactory as explanations of this phenomenon. For example, the assumption that firms have fixed operating costs ignores suspension options and other forms of operational flexibility that allow firms to reduce operating expenditure in low-demand periods, reducing the elevation of risk in low-demand states.[1] The buffering effects of industry-wide investment mean that the risk exogenous to an individual firm is high when the book-to-market ratio is high, and low when the book-to-market ratio is low, so that the value premium is largely imposed from outside the firm. In contrast, this paper recognizes firms' operational flexibility and generates a value premium even when each firm's exogenous risks are constant over time. That is, in this paper the value premium of an individual firm is generated entirely endogenously.

In the model in this paper, the firm maximizes profit when demand is low by operating with excess capacity; it maximizes profit when demand is high by setting a high output price to dampen demand to a level it can supply. In the former case, positive demand shocks lead to higher prices and quantities of output. In the latter case, the output quantity is constrained, so only price can adjust. The capacity constraint causes the firm to raise its output price even further in response to a positive demand shock, dampening the increase in profit. Thus, profit is more sensitive to demand shocks when there is excess capacity (and a high book-to-market ratio) than when there is a binding capacity constraint (and a low book-to-market ratio). The expected rate of return on assets in place thus exhibits a value premium.

The firm can adjust its capacity, but reversals are costly, leading to periods when the firm operates at less than full capacity, and periods when the capacity constraint is binding. When demand is low, positive demand shocks lower the value of the contraction option, offsetting the increase in value of assets in place: the contraction option reduces risk in low-demand states. When demand is high, positive demand shocks raise the value of the expansion option, reinforcing the increase in value of assets in place: the expansion option increases risk in high-demand states. Thus, the ability to adjust capacity reduces risk when there is excess capacity (and the book-to-market ratio is high) and increases risk when the capacity constraint is binding (and the book-to-market ratio is low). These effects weaken the value premium arising from assets in place, but the value premium survives for a wide range of parameter values.[2]

Capacity constraints already appear in the literature investigating the value premium, but, unlike this paper, they do not generate a value premium unless operating leverage is also present. For example, Cooper (2006) suggests that positive demand shocks have a larger effect on firms with high book-to-market ratios because these firms have excess capacity and so can meet the increased demand without costly investment; in contrast, firms with low book-to-market ratios have to increase capacity in order to benefit from positive demand shocks, and the cost of this investment dampens the effect of the demand shock. However, Cooper's model features fixed costs of production, and the value premium disappears when the fixed costs are set to zero.[3] Similarly, the firms in Aguerrevere (2009) have flexibility in utilizing and expanding their capacity, but the value premium in that model also disappears if operating leverage disappears and competing firms do not affect the firm's residual demand risk.

Section 2 describes the model's structure and Section 3 derives the firm's market-to-book ratio and expected rate of return. The results of numerical simulations are reported in Section 4, which demonstrates the existence of a value premium, and Section 5 concludes the paper.

[1] Moreover, Guthrie (2011) shows that the relationship between operating leverage and expected returns is non-monotonic when allowance is made for the option to abandon an unprofitable project.

[2] The model extends Pindyck (1988) by considering nonlinear demand functions and contraction options—both key determinants of the value premium. Pindyck (1988) does not consider the implications of capacity constraints on expected rates of return, focussing instead on investment behavior and the long-run marginal cost of production.

[3] I prove this result formally in Appendix A.3.