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## Uncertainty about average profitability and the diversification discount ☆, ☆ ☆

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### ABSTRACT

The diversification discount (multiple segment firm value below the value imputed using single segment firm multiples) is commonly thought to be generated by agency problems, a lack of transparency, or lackluster future prospects for diversified firms. If multiple segment firms have lower uncertainty about mean profitability than single segment firms, rational learning about mean profitability provides an alternative explanation for the diversification discount that does not rely on suboptimal managerial decisions or a poor firm outlook. Empirical tests which examine changes in firm value across the business cycle and idiosyncratic volatility are consistent with lower uncertainty about mean profitability for multiple segment firms.

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## 1. Introduction

Traditional explanations for the diversification discount (multiple segment firm value is less than the imputed value using single segment firm multiples) rely on agency problems, a lack of transparency, or lackluster future prospects for diversified firms. Rational learning about future average long-term profitability provides an alternative explanation for the diversification discount that does not rely on suboptimal managerial decisions or a poor firm outlook. If diversified firms have less uncertainty about future mean profitability, we predict the following: (1) In the cross-section, diversified firms will trade at a discount relative to single segment firms due to convexity of the discounting function. (2) As firms age, the sales or assets multiples of single segment firms will drop more than the sales or assets multiples of diversified firms as more uncertainty about mean profitability will be resolved for single segment firms than for diversified firms. (3) The difference in the value change

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across time for single segment and diversified firms will be larger during economic booms (when the equity risk premium is low) and smaller during economic recessions (when the equity risk premium is high). (4) After controlling for volatility in profitability, diversified firms will have lower idiosyncratic return volatility than single segment firms due to the idiosyncratic nature of learning. We confirm these predictions in a sample comparable to the previous literature (1978–1997) and in an expanded sample from 1978 to 2005. Though more agency problems, more asymmetric information, and weaker future prospects for diversified firms generate a predicted diversification discount, these explanations do not generate the same dynamic or volatility predictions as the rational learning model. The empirical findings are consistent with rational learning and lower uncertainty about mean profitability for diversified firms as an explanation for the diversification discount.

In the rational learning model developed by Pástor and Veronesi (2003) mature firms have lower uncertainty about average profitability which leads to lower cross-sectional market-to-book ratios, but not higher returns due to the idiosyncratic nature of the learning.<sup>1</sup> As investors rationally learn about average profitability, the market value of the firm converges to its book value and market-to-book ratios change through time at a slower rate for mature firms. Mature firms also have lower idiosyncratic return volatility after controlling for the volatility of profitability which is consistent with lower uncertainty about average profitability and the idiosyncratic nature of learning.

Using the intuition from Pástor and Veronesi (2003), we empirically examine whether lower uncertainty about average profitability for diversified firms is an explanation for the diversification discount. First, we confirm the diversification discount (a negative excess value for multiple segment firms) in our sample. As in Berger and Ofek (1995), we measure firm excess value as a log ratio of firm total capital to an imputed firm value. The imputed firm value is calculated using the median sales or assets multiple for the single segment firms in each segment.<sup>2</sup> In our sample diversified firms have an average excess value of negative 9.7%, which is similar in magnitude to the diversification discount reported in the literature. Second, we examine the change in firm excess value over time. If diversified firms have less uncertainty about mean profitability, the drop in excess value should be larger for single segment firms than for diversified firms due to a larger resolution of growth rate uncertainty for single segment firms. Consistent with these predictions, the annual change in excess value is 3% lower for single segment firms (7% lower after controlling for endogeneity via instrumental variables).<sup>3</sup> Our finding of a larger drop in

excess value for single segment firms remains after removing firms that enter or exit the sample, addressing the wealth transfer effects between stockholders and bondholders noted in Mansi and Reeb (2002), and using a much broader sample (from 1978 to 2005) than is used in previous literature. The broader sample includes data after the release of Statement of Financial Accounting Standards (SFAS) 131 defined in Financial Accounting Standards Board (1997), a new segment reporting standard designed to increase transparency. Third, we show that the difference in changes in excess value across diversified and single segment firms co-varies with the business cycle in a predictable manner. When the equity risk premium is high future cash flows are discounted at a higher rate, and the discrepancy in uncertainty about mean profitability between multiple segment and single segment firms will have its least effect. On the other hand, when the equity risk premium is low the discrepancy will have its greatest effect. An empirical implication of this effect is that differences in the change in excess value of diversified and single segment firms will be greater during business cycle booms and lesser during contractions. In support, we show that single segment firms have a change in excess value that is 5.6% lower than diversified firms in years not surrounding recessions, but this difference is indistinguishable from zero in the period directly prior to a recession. We report a similar finding using shifts in the aggregate dividend payout ratio as a proxy for shifts in the equity risk premium. The final prediction of the rational learning model is that stocks with lower uncertainty about average profitability will have lower idiosyncratic return volatility after controlling for volatility in profitability. In support, we find that diversified firms have lower idiosyncratic return volatility than single segment firms.

In the literature, the diversification discount has been ascribed to many factors. Among the most prominent of these explanations is that agency problems exacerbated by the diversified organizational form result in inefficient internal capital markets which cross-subsidize projects with lower cash flows and/or higher risks than those of their more focused competitors.<sup>4</sup> Other prominent explanations are that agency problems cause overinvestment due to access to additional capital as in Jensen (1986, 1988), or there may be a lack of transparency due to diversified firm structure as discussed in Krishnaswami and Subramaniam (1999). We show that an assumption of constant asset returns (including as the simplest case, the constant dividend growth model) will generate zero

(footnote continued)

focused firms, in the sense suggested by La Porta (1996) and Lakonishok, Shleifer, and Vishny (1994) for value and growth firms. Brav and Heaton (2002) show that predictions of learning and behavioral models are strikingly similar. However, a behavioral explanation would need to predict the firm valuation effects we document, including the business cycle dynamics and idiosyncratic return results.

<sup>4</sup> Influential papers are Shin and Stulz (1998), Rajan, Servaes, and Zingales (2000), Scharfstein and Stein (2000), Lamont and Polk (2002), Dittmar and Shivdasani (2003), and Ahn and Denis (2004).

<sup>1</sup> See footnote 1 in Pástor and Veronesi (2003) for a simple example demonstrating the effect of convexity on market-to-book ratios.

<sup>2</sup> See Section 3.2 for more detail.

<sup>3</sup> These results could also be explained using arguments from behavioral finance. Our finding of larger annual changes in excess value for diversified firms could be interpreted to suggest that investors are either too pessimistic about diversified firms or too optimistic about

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