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Value versus growth in dynamic equity investing

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Abstract

Purpose – The value-premium is the empirical observation that "value" stocks (low market/book) have higher returns than "growth" stocks (high market/book). The purpose of this paper is to propose a new explanation for the value-premium that the authors call the limits to growth hypothesis.

Design/methodology/approach – To guide the testing, a dynamic equity valuation model was used that has the property that profitability increases risk for value firms in anticipation of future growth-leverage, whereas, profitability "covers" the capital expenditure costs of growth, which decreases risk for growth firms. Because the authors interpret dividends as a corporate response to growth-limits, they test for this predicted differential relation between profitability and risk for value versus growth stocks with the returns of profitable dividend-paying firms.

Findings – It is found that profitability increases returns to a greater extent for dividend-paying value firms compared to dividend-paying growth firms, which is consistent with a differential relation between profitability and risk. At the same time, it is also found that growth firms have lower returns than value firms.

Originality/value – The authors use the limits-to-growth hypothesis to explain why profitability can either increase or decrease risk. High-profitability dividend-paying growth firms have lower returns than low-profitability dividend-paying value firms. This value-premium is consistent with the argument that high profitability "covers" the capital expenditure costs of growth, which decreases risk and, thus, returns. At the same time, profitability increases returns to a greater extent for value stocks compared to growth stocks, which is consistent with the hypothesis that profitability increases risk for value firms in anticipation of future growth-leverage.

Keywords Dividends, Returns, Equity capital, Value premium, Value versus growth stocks, Dividend paying firms

Paper type Research paper

JEL classification – G12, G32, G35

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1. Introduction

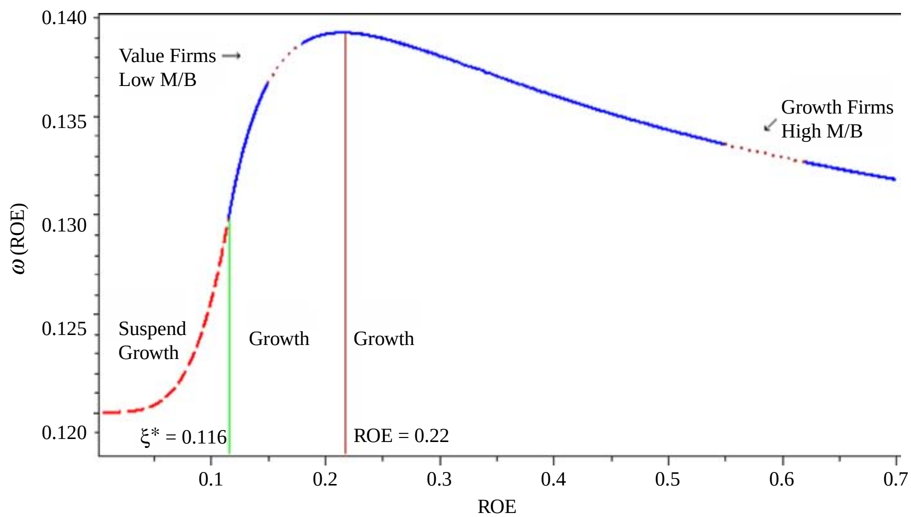
The value-premium is the empirical observation (Fama and French, 1998) that "value" stocks (low market/book) have higher returns than "growth" stocks (high market/book). In this paper, we propose an explanation for the value-premium that we call the "limits-to-growth hypothesis." If firms face financing constraints (Froot *et al.*, 1993), they finance growth internally when profitability permits, which means that profitability and growth relate positively[1]. In addition, Arrow (1974) argues that organizational impediments restrict managers from all possible wealth creating business investments that they uncover. Tobin (1969) also presumes these limits because, otherwise, firms invest (or divest) until diminishing returns force Tobin's "q" permanently to unity. Because profitability and growth relate positively, but organizational impediments constrain growth, high profitability "covers" growth capital expenditures, which decreases risk and, thus, expected return. We use the expression "growth leverage" to describe this relation between profitability, growth, risk and expected return predicted by the limits-to-growth hypothesis. High-profitability "growth" firms have high market/book, low risk, and low expected return compared to low-profitability, low-market/book, "value" firms[2].

We test the limits to growth hypothesis with dividend-paying firms because we believe that a primary reason that businesses pay dividends is the growth-limits that they face[3]. This focus on dividend-paying firms does not induce a selection bias in our study because we do not generalize our results to other business classes. Indeed, rather than the value-premium that Fama and French (1998), the current paper, and others identify, Blazenko and Fu (2010b) report evidence of a negative value-premium for non-dividend-paying firms. Blazenko and Fu (2010a) find a value-premium for firms in financial distress but for reasons quite distinct from the profitable dividend-paying firms that we investigate in the current paper. Because not all business classes have a value-premium and the reason for a value-premium (if one exists) differs by business class, we learn a great deal about the economic forces that generate a value-premium by investigating these classes separately before we compare them directly in future research.

To distinguish the limits-to-growth hypothesis from other explanations for the value-premium in the financial literature, we use it to explain a puzzle for which other explanations are ineffective: why does profitability sometimes increase and sometimes decrease stock returns (which implies that that profitability sometimes increases and sometimes decreases risk)? The relation between profitability and returns "in-the-large," the value-premium (that is, unconditionally), means that high-profitability high-market/book growth firms have lower returns than low-profitability low-market/book value firms. On the other hand, the relation between profitability and returns "in-the-small" (that is, conditionally, for either growth or value stocks separately) is positive. Haugen and Baker (1996), Piotroski (2000), Mohanram (2005) and Fama and French (2006) document this empirical regularity without economic explanation. A complete theory of the value-premium requires explanations for the relation between returns and profitability in-the-large as well as in-the-small, which we offer in this paper and test with dividend-paying firms.

Any equity valuation model that we use to guide our testing must have the property that risk and profitability relate positively under some conditions and negatively under others. However, standard static equity-valuation models do not have this property. For example, in the non-equilibrium constant-growth discounted dividend model (Williams, 1938), there is no relation between expected return (that discounts dividends) and profitability because expected return is an exogenous constant. On the other hand, with equilibrium but static valuation of a firm whose manager hypothetically commits permanently and irrevocably to growth, the relation between expected return and profitability is negative. Using Goldstein and Zapatero's (1996) equilibrium valuation methodology, market/book for a firm whose manager commits to growth is[4] $\pi_g(ROE) \equiv ROE/(r* - g) - g/(r - g)$, where r is the riskless interest rate, $r^* > r$ is expected return for an otherwise similar firm that commits to "no-growth" (that is, a firm "un-levered" by growth, $g = 0$), ROE is the rate of return on equity (business return for shareholders), and g is the growth rate for dividends, earnings, and capital. Loosely speaking, r^* is the discount rate for risky earnings and r is the discount rate for capital expenditures that produce growth. Expected return for shareholders is dividend yield plus growth, $(ROE - g)/\pi_g(ROE) + g$, which strictly decreases with ROE. The capital expenditure costs of growth impose a risk on shareholders similar to fixed costs in operating leverage. Risk and expected return decrease as profitability "covers" these capital expenditure costs. This predicted relation between expected return and profitability explains a negative relation between returns and profitability in-the-large but not a positive relation between returns and profitability in-the-small. Because static equity valuation is inadequate to guide our analysis, we use a dynamic equilibrium valuation model instead.

The importance of Blazenko and Pavlov's (2009) dynamic equity valuation model for our purposes is that it explains why risk can either increase or decrease with profitability. Their hill-shaped relation between expected return and profitability (Figure 1) predicts that returns increase with profitability for value stocks and decrease with profitability for growth stocks. However, like others cited above, we find that,



Notes: This figure plots expected return, $\omega(ROE)$, versus profitability, ROE (earnings volatility, $\sigma = 0.2$; earnings growth, $g = 0.06$; the risk-adjusted expected return for a hypothetical business that permanently does not grow, $r^* = 0.12$); the value-maximizing return threshold for business expansion is $\xi^* = 0.116$ (from equation (A3))

Figure 1.
Expected return, $\omega(ROE)$, versus profitability, ROE

generally, returns increase with profitability for both value and growth stocks. Thus, we use a modified version of the limits-to-growth hypothesis to explain the relation between returns and profitability in-the-small[5].

There are numerous explanations for the value-premium in the financial literature that are typically tested in the entire cross-section of firms. A number of these explanations are consistent with a negative relation between returns and profitability in-the-large, but none explains the positive relation between returns and profitability in-the-small that we identify for dividend-paying firms in the current paper. Fama and French (1995, 1998) argue that the value-premium arises from financial distress due to the poor profitability of value firms. They report evidence that low-market/book "value" firms have low profitability compared to high-market/book "growth" firms. Carlson *et al.* (2004) and Garcia-Feijoo and Jorgensen (2010) show that operating leverage and market/book relate negatively. Anderson and Garcia-Feijoo (2006) argue that growth firms have large past capital expenditures that they interpret as growth-option exercise, which decreases risk and expected return. Similarly, Fama and French (2007) argue that growth-option exercise reduces market/book for growth firms, while restructuring improves market/book for value firms. This market/book reversion creates high expected-return for value firms and low expected-return for growth firms. Zhang (2005) argues that the irreversibility of assets-in-place makes value firms riskier than growth firms. Campbell and Vuolteenaho (2004) argue that value stocks have higher "cash-flow" betas that lead investors to demand higher expected returns. Debondt and Thaler (1985) and Lakonishok *et al.* (1994) argue that investor irrationality is the source of the value-premium.

In the following section, we use Blazenko and Pavlov's (2009) dynamic equity valuation model to show that expected return is the sum of two terms: expected return from the static constant-growth discounted dividend model that we call static-growth expected return (*SGER*) plus a term from a business expansion option that depends on earnings volatility. *SGER* is easy to calculate with forecasted earnings and other readily available financial market measures. It does not require statistical estimation and represents a large portion of expected return from the dynamic model. In Sections 3 and 4, we use *SGER* to guide our investigation of relations between returns and profitability (which *SGER* imbeds) in-the-large and in-the-small. In Section 5, we report evidence that portfolios formed with *SGER* (in-the-small) earn abnormal returns. Section 6 concludes and offers suggestions for future research.

2. Dynamic financial analysis

2.1 Expected return

Appendix 1 describes Blazenko and Pavlov's (2009) model of a dynamically expanding business where profit growth requires capital growth. The manager's expansion decision depends on profitability, *ROE*. When *ROE* exceeds a value maximizing expansion threshold, ξ^*, that equation (A3) describes, the manager expands earnings and capital at the rate g. When *ROE* is less than the expansion boundary, ξ^*, the manager suspends growth ($g = 0$) until profitability improves. The upper branch of equation (A1) is the market/book ratio when the manager optimally grows the business. The lower branch of equation (A1) is the market/book ratio when the manager suspends growth, $g = 0$. Expected return for shareholders, which we denote as $\omega(ROE)$, is[6]:

$$\omega(ROE) = \begin{cases} \frac{ROE - g + g\pi + \frac{1}{2}\pi''\sigma^2 ROE^2}{\pi}, & growth, \; ROE \geq \xi* \\ \frac{ROE + \frac{1}{2}\pi''\sigma^2 ROE^2}{\pi}, & suspend \; growth, \; ROE < \xi*, \end{cases} \quad (1)$$

where g is the growth rate for earnings and capital (when the manager grows the business), *ROE* is the return on equity that follows a non-growing geometric Brownian motion with volatility σ, ξ^* is the value-maximizing expansion boundary described in equation (A3) of Appendix 1 and $\pi(ROE)$ is the market/book ratio in equation (A1).

Blazenko and Pavlov (2009) model the return on capital as a geometric Brownian motion because they investigate the relation between the cost of capital and a value maximizing return threshold for business expansion. Alternatively, we model the return on equity (*ROE*) as a geometric Brownian motion, which means that the manager maintains a target financial structure by increasing both debt and equity at the rate g to finance investment when the manager grows the business. A geometric Brownian motion requires strictly positive *ROE*, which restricts our analysis away from firms in financial distress. Thus, one of the sample selection criteria that we use later is that firms have positive trailing-twelve-month earnings. Blazenko and Fu (2010a) investigate the value-premium for firms in financial distress.

2.2 Numerical example

Figure 1 plots expected return from equation (1) versus profitability, *ROE*, for a numerical example. The difference between expected return for a hypothetical business that permanently does not grow, $r* = 0.12$, and the riskless rate, $r = 0.05$, represents the primary source of business risk with a risk-premium of $0.12 - 0.05 = 0.07$. As the manager grows the business, growth capital expenditures (which themselves grow) "lever" business risk and, thus, expected return is above 0.12. In addition, investor expectations of this risk, even when the firm suspends growth, influence expected return. Because the manager's decision to grow depends upon profitability (which alters growth-leverage), profitability is an important determinant of expected return in equation (1).

In the left-most section of Figure 1, when *ROE* increases, risk increases because of increasing likelihood that at some future date *ROE* will cross the expansion boundary, $\xi* = 0.116$ (from equation (A3)), where the firm begins growth and incurs growth-leverage. Expected return $\omega(ROE)$ increases in anticipation of this risk.

Once profitability, *ROE*, crosses the expansion boundary, $ROE \geq \xi* = 11.6$ percent, the manager begins to grow the business with growth investments. As *ROE* increases, expected return increases until $ROE = 0.22$ in Figure 1. For $0.116 \leq ROE \leq 0.22$, profitability increases the likelihood of remaining in the growth state and continuing to incur growth-leverage rather than fall back into the state with suspended growth and without growth-leverage. This increasing likelihood of growth-leverage increases risk, which increases expected return. For $0 \leq ROE \leq 0.22$, profitability, *ROE*, increases risk and expected return, $\omega(ROE)$.

When profitability is high in Figure 1 ($ROE > 0.22$), the likelihood of suspending growth becomes remote and, thus, this possibility has little impact on risk. Rather, with increasing profitability the firm "covers" growth expenditures, g, which decreases risk. For $ROE > 0.22$, profitability decreases risk and expected return.

2.3 Static-growth expected return

The first portion of the upper branch of equation (1) is:

$$\frac{ROE - g + g^{*}\pi}{\pi} \tag{2}$$

The term *ROE-g* is dividend per dollar of equity investment. Dividend yield, *dy*, is *ROE-g* divided by market/book, $dy \equiv (ROE - g)/\pi$. Hence, we can rewrite equation (2) as:

$$SGER \equiv ROE + (1 - \pi)^{*}dy \tag{3}$$

We refer to equation (3) as *SGER* because it arises not only as a component of expected return in Blazenko and Pavlov's (2009) dynamic model, but also as expected return itself from the static-growth discounted dividend model. See Appendix 2 for a proof of this assertion. While the form of these expressions is the same, it is important to recognize that they are different because share price in the first is from a dynamic model, whereas share price in the second is from a static model. Note that the component terms of *SGER* are either observable (that is, market/book, π, and dividend yield, *dy*) or relatively easy to forecast[7], *ROE*. Note, in particular, that growth "*g*" does not appear directly in equation (3) but only indirectly through its impact on price, which determines market/book, π, and dividend yield, *dy*.

The last term on either branch of equation (1) depends upon earnings volatility, σ. However, in empirical testing (not reported), we find that the contribution of volatility to returns beyond market/book and *SGER* is neither economically nor statistically significant. We also find with some numerical analysis (again not reported) that this empirical result is not unexpected. We find that *SGER* is a large portion of expected return from the dynamic model (equation (1)) and that the contribution that volatility makes to expected return is generally modest. The study of profitability is important in finance only to the extent that it impacts expected return. The importance of *SGER* in our analysis is that it proxies for expected return with an easy to calculate measure that does not require statistical estimation but yet captures the relation between expected return and profitability, *ROE*, predicted by Blazenko and Pavlov's (2009) equity valuation model in equation (1) and shown in Figure 1.

3. Data and portfolio characteristics

3.1 Data and portfolio selection

We impose a number of screens on firms for study inclusion. First, firms must have data from the COMPUSTAT, CRSP, and Thomson I/B/E/S databases. These are mainly US companies, but they also include some foreign inter-listed companies and some American depositary receipts. If not in US dollars, we convert accounting data (forecast or historical) into US dollars. Second, because both market/book and forward *ROE* for *SGER* in equation (3) entail division by book equity (*BVE*), we require firms have positive *BVE* from the latest reported quarterly or annual financial statements prior to portfolio formation. Third, in our application of Blazenko and Pavlov's (2009) dynamic equity valuation model we presume that *ROE* follows a geometric Brownian motion, which means that *ROE* is always positive. This *ROE* property restricts our analysis away from firms in financial distress and, thus, we require positive trailing-twelve-month earnings. Fourth, to test the limits to growth hypothesis with firms most likely to have growth limits, we impose the requirement that firms have positive trailing-twelve-month dividends at the time of portfolio formation[8].

3.2 Corporate performance forecasting and financial measures

COMPUSTAT is our source for book equity (*BVE*), reported *earnings per share* (*EPS*), and other corporate financial data. We measure *BVE* as Total Assets less Total Liabilities less Preferred Stock plus Deferred Taxes and Investment Tax Credits (from the COMPUSTAT quarterly file). CRSP is our source for dividends, split factors, shares outstanding, daily share price, and daily returns. Thomson I/B/E/S is our source for reported *EPS* and consensus analysts' *EPS* forecasts.

I/B/E/S reports a snapshot of analysts' *EPS* forecasts for the Thursday preceding the third Friday of the month, which they refer to as a "statistical period" date. We forecast *ROE* in three ways with three different median I/B/E/S analysts' *EPS* forecasts at a statistical period date. These *EPS* forecasts are for one, two, and three unreported fiscal years hence. We use annual rather than quarterly *EPS* forecasts to avoid seasonality. Denote these median analysts' *EPS* forecasts as EPS_1, EPS_2, and EPS_3. Our three *ROE* forecasts for a firm are EPS_1/BPS, EPS_2/BPS, and EPS_3/BPS, where *BPS* is book equity per share (calculated as *BVE* from the most recent quarterly or annual financial statements prior to a statistical period date divided by shares outstanding). Denote these *ROE* forecasts as ROE_1, ROE_2, and ROE_3 and *SGER* in equation (3) calculated with these *ROE*s as $SGER_1$, $SGER_2$, and $SGER_3$. We rebalance portfolios at closing prices on statistical period dates (we describe rebalancing in more detail below).

After selecting firms with positive trailing-twelve-month earnings, we use forecasted earnings in our analysis thereafter because these better represent investor information at the time of portfolio formation than do historical earnings[9]. As an aspect of this information, forecasted earnings recognize reversion of the type that Fama and French (2000) document in a way that historical earnings cannot. Because we select firms with positive historical earnings (and thus relatively high), by using forecasted earnings in our analysis thereafter, we avoid a reversion bias in historical earnings as a future earnings forecast. In an unreported examination, we find analysts' earnings forecasts to be quite accurate for the upcoming unreported fiscal year and become overly optimistic only for longer forecast periods. In using forecast *EPS* divided by *BPS* as a *ROE* forecast, we presume that accounting return is a good economic return forecast. It need not be. For example, if corporate managers choose inappropriate depreciation schedules, then both *EPS* and *BPS* mis-measure their corresponding economic counterparts. The net effect is to bias accounting returns relative to economic returns[10]. In addition, we present evidence that accounting *ROE* overstates economic *ROE* for growth stocks and understates economic *ROE* for value stocks. Nonetheless, the ability to identify abnormal returns in Section 5 with *SGER* calculated with forecasted earnings illustrates the information content of these forecasts.

We make no claim that ROE_1, ROE_2, and ROE_3 are the best possible *ROE* forecasts. The simplicity of our forecasts highlights the fact that we do not "snoop" the data for best fit measures that unlikely represent future return as well. We opt for simplicity but recognize that evidence we uncover might guide the search for better *ROE* forecasts for representing expected returns with *SGER* (Blazenko and Fu, 2011).

The first statistical period date, which begins the I/B/E/S database, is January 15, 1976. Common database coverage (that is, I/B/E/S, COMPUSTAT, and CRSP) is up to October 2010 where the last statistical period date is October 14, 2010. Our test period for $SGER_1$ and $SGER_2$ is 34 years and nine months (417 months). Our test period for $SGER_3$ is between September 20, 1984 and October 14, 2010, which is 26 years and two months (314 months). The test period is shorter for $SGER_3$ because I/B/E/S begins reporting EPS_3 only at the September 20, 1984 statistical period date.

The forward dividend yield for *SGER* in equation (3) is the current dividend yield (trailing-twelve-month dividends divided by closing share price on a statistical period date) adjusted by equation (A16) in Appendix 3. With this expression, because we use three separate *ROE* forecasts, there are three corresponding, forward dividend yields, dy_1, dy_2, and dy_3, respectively. The market/book ratio for *SGER* in equation (3) is the closing share price multiplied by shares outstanding (both on the statistical period date), divided by *BVE* from the most recently reported quarterly or annual financial statements prior to a statistical period date.

3.3 Portfolio rebalancing and portfolio characteristics

Figure 1 shows non-linearity in the relation between return and profitability. Depending upon where firms in a particular sample fall along this hill-shaped curve, a linearized relation between returns and profitability might be positive or negative but it is unlikely to be strong or persistent. Therefore, we do a preliminary sort based on a financial variable related to profitability: market/book. This sort allows us to investigate the relation between returns and profitability in-the-large (the value-premium) and in-the-small (for value and growth stocks separately).

For each statistical period date from January 15, 1976 to October 14, 2010 we calculate *SGER* in equation (3) for each firm with positive trailing-twelve-month dividends, positive trailing-twelve-month earnings, and positive *BVE*. We sort firms into five market/book quintiles ($b = 1,2,3,4,5$) and then into five *SGER* portfolios ($k = 1,2,3,4,5$). This double sort leads to 25 portfolios that we rebalance at each statistical period date over the test period. In addition, because we sort firms within market/book quintiles in three ways, with $SGER_1$, $SGER_2$, and $SGER_3$, we investigate $3 \times 25 = 75$ portfolios. Over our test periods (417 months for $SGER_1$ and $SGER_2$ and 314 months for $SGER_3$), the average numbers of stocks in the 25 portfolios is 44.6, 40.1, and 17.0, respectively. The relatively small number of stocks in $SGER_3$ portfolios is because analysts' annual *EPS* forecasts are sparser for three unreported fiscal years hence compared to one and two unreported fiscal years hence. Since the average number of stocks in $SGER_1$, $SGER_2$, and $SGER_3$ portfolios is not overly great, investors can replicate the portfolios in Table I, which increases the economic significance of our results.

Table I reports median market cap for the $SGER_1$, $SGER_2$, and $SGER_3$ portfolios. Notice first that growth firms ($b = 1$) tend to be larger than value firms ($b = 5$). Second, for any market/book quintile, b, and for any *SGER* portfolio, k, market cap increases for $SGER_3$ compared to $SGER_2$ compared to $SGER_1$ portfolios. This increase reflects the fact that analysts forecast *EPS* further in the future for larger firms. Also in Table I, we report the most common 1-digit SIC code and the percent of firms within a portfolio with that SIC code for each of the double-sorted portfolios and for each of the three

Table I.
Descriptive statistics

						Portfolio ranking measure					
			$SGER_1$	$SGER_2$	$SGER_3$	$SGER_1$	$SGER_2$	$SGER_3$	$SGER_1$	$SsGER_2$	$SGER_3$
			Median market cap (millions)						Percent of firms with		
Market/book quintile	*SGER* quintile		MVE_b^1	$MVE_{b,k}^2$	$MVE_{b,k}^3$	Most common 1-digit SIC			Most common 1-digit SIC		
Highest market/book	Lowest *SGER*	$k = 1$	1,269	1,536	3,556	2000	2000	2000	28.1	29.8	27.8
$b = 1$		$k = 2$	1,779	1,783	5,420	2000	2000	2000	31.5	31.9	31.3
Growth stocks		$k = 3$	1,636	1,641	6,860	2000	2000	2000	29.9	29.4	31.7
		$k = 4$	1,197	1,378	6,170	2000	2000	2000	28.4	28.3	32.6
	Highest *SGER*	$k = 5$	1,391	1,527	5,847	3000	3000	2000	26.5	25.8	34.6
$b = 2$	Lowest *SGER*	$k = 1$	864	1,032	2,842	2000	2000	4000	22.2	24.6	23.5
		$k = 2$	827	924	2,820	2000	2000	2000	26.2	26.1	25.2
		$k = 3$	737	921	2,998	3000	3000	3000	25.9	26.2	26.8
		$k = 4$	839	839	3,027	6000	6000	3000	28.1	28.4	29.4
	Highest *SGER*	$k = 5$	550	617	2,153	3000	3000	3000	30.4	31.4	32.1
$b = 3$	Lowest *SGER*	$k = 1$	594	737	2,052	3000	4000	4000	21.1	26.0	32.1
		$k = 2$	458	547	2179	6000	6000	4000	27.3	30.3	23.7
		$k = 3$	404	518	2,257	6000	6000	6000	35.4	37.6	33.4
		$k = 4$	471	557	2,250	6000	6000	6000	44.8	44.8	40.8
	Highest *SGER*	$k = 5$	506	532	1,975	6000	6000	6000	43.9	40.5	32.2
$b = 4$	Lowest *SGER*	$k = 1$	398	524	1,512	6000	4000	4000	24.1	31.5	42.9
		$k = 2$	485	634	2,160	4000	4000	4000	37.6	40.4	56.1
		$k = 3$	374	454	1,963	6000	6000	4000	32.6	35.0	33.8
		$k = 4$	330	404	1,836	6000	6000	6000	46.9	46.7	39.8
	Highest *SGER*	$k = 5$	401	432	1,723	6000	6000	6000	55.3	53.3	48.8
Lowest market/book	Lowest *SGER*	$k = 1$	170	211	1,002	6000	6000	4000	24.9	26.1	33.1
$b = 5$		$k = 2$	221	429	2,008	4000	4000	4000	27.5	41.6	64.4
Value stocks		$k = 3$	415	539	2,188	4000	4000	4000	42.6	44.6	61.0
		$k = 4$	382	405	1,690	4000	6000	4000	35.9	35.1	37.7
	Highest *SGER*	$k = 5$	243	273	1,236	6000	6000	6000	54.1	55.9	49.4

Notes: This table reports descriptive statistics for 25 portfolios formed by sorting firms at a statistical period date into five market/book quintiles and then into five portfolios by $SGER_J$, $J = 1,2,3$; *SGER* is $ROE_J + (1 - M/B)^* dy$, where *M/B* is market/book and *dy* is the forward dividend yield; the *I/B/E/S* consensus analysts *EPS* forecasts are for $J = 1,2,3$ unreported fiscal years from a statistical period date; the three *ROE* forecasts are $ROE_J = EPS_J/BPS$, where *BPS* is book value per share; $MVE_{i,t,b,k}^J$ is market value of equity for firm $i = 1,2,\ldots,N$, in month $t = 1,2,\ldots,TP$, for portfolio $b = 1,2,3,4,5$, $k = 1,2,3,4,5$; median market value is $\overline{MVE}_{b,k}^J$ $median(MVE_{i,t,b,k}^J, i = 1,2,\ldots,N, t = 1,2,\ldots,TP)$; TP is 417 months for $SGER_1$ and $SGER_2$ and 314 months for $SGER_3$

SGER portfolios. For reference purposes, for the overall sample of firms that satisfy our selection criteria, the percentage of firms in the five most common 1-digit SIC codes, 2000-2999, 3000-3999, 4000-4999, 5000-5999, and 6000-6999 are 19.14, 20.43, 14.13, 8.53 and 28.04 percent, respectively. The fractions in Table I do not vary markedly from these benchmarks, which indicates that *SGER* portfolios are not over-weight particular industries compared to randomly selected portfolios.

Table II reports summary portfolio measures[11] for market/book, current dividend yield, forward *ROE*, implicit annual growth (that is, equation (A15)) and annual capital expenditure (CAPX) relative to net fixed assets (NFA) for the 75 portfolios we investigate. CAPX and NFA are from the most recent annual report prior to a statistical period date (all other historical accounting data that we use are from the most recent quarterly or annual report). M/B_J is median portfolio market/book, dy_J is median portfolio current dividend yield, $\overline{ROE}^J$ is median portfolio forward *ROE*, $\overline{g}^J$ is median portfolio implicit growth, and $\overline{\gamma}^J$ is median portfolio CAPX/NFA. The numbering $J = 1,2,3$ refers to earnings forecasts 1,2,3 unreported fiscal years hence. Table II reports each of these summary measures for portfolio *b, k* that we rebalance at each statistical period date $t = 1,2,\ldots TP$ by sorting firms into $b = 1,2,3,4,5$ market/book quintiles and then into $k = 1,2,3,4,5$ *SGER* quintiles.

Market/book is high for growth stocks ($b = 1$) compared to value stock ($b = 5$) because both forward *ROE* and growth (as measured by implicit growth and the rate of capital expenditure) are high. Further, within any market/book quintile, $b = 1,2,3,4,5$, forward *ROE* (that is, $\overline{ROE}^J_{b,k}$), implicit growth, $\overline{g}^J_{b,k}$, and market/book, $\overline{M/B}^J_{b,k}$, increase from low *SGER* portfolios to high *SGER* portfolios[12], $k = 1,2,3,4,5$. Comparing the upper portion of Table II to the lower portion illustrates that growth firms ($b = 1$) have higher profitability, *ROE*, than value firms ($b = 5$).

For any market/book quintile ($b = 1,2,3,4,5$) and for any *SGER* portfolio ($k = 1,2,3,4,5$), forward *ROE*, (that is, $\overline{ROE}^J_{b,k}$), increases for $SGER_3$ compared to $SGER_2$ compared to $SGER_1$ portfolios. That is, $\overline{ROE}^3_{b,k} > \overline{ROE}^2_{b,k} > \overline{ROE}^1_{b,k}$. These median *ROE*s use *EPS* forecasts three, two, and one unreported fiscal years hence, respectively. Because they use the same *BPS* denominator but growth is inherent in analysts' annual *EPS* forecasts further out in the future (in the numerator), *ROE* is greater for more distant forecasts. In addition, part of this result arises from overly optimistic analysts' earnings forecasts for longer forecast intervals.

The dividend yield of value stocks, at the bottom of Table II, exceeds that of growth stocks at the top of Table II. An interpretation of this result is that firms maintain dividends despite deteriorating financial conditions reflected by low share price and low forward *ROE*.

For value stocks ($b = 5$) and each *SGER* portfolio ($k = 1,2,3,4,5$) market/book is less than one but implicit annual growth $\overline{g}^J_{b,k}$ is, nonetheless, positive. Growth with market/book less than one is inconsistent with Tobin (1969) and Blazenko and Pavlov (2009). On the other hand, Blazenko and Pavlov (2010) argue that business-development risk in the process of capital investment creates real options for unexpected ancillary investments (so-called "shadow" options), which encourage the original investment in the first instance and economically justifies corporate growth even when market/book is less than unity.

Table II.
Portfolio characteristics

Market/book quintile	*SGER* quintile		Market/book			Current dividend yield			Forward ROE			Implicit growth			CAPX/NFA		
			M/B_1	M/B_2	M/B_3	dy_1	dy_2	dy_3	$\overline{ROE}^1_{b,k}$	$\overline{ROE}^2_{b,k}$	$\overline{ROE}^3_{b,k}$	$\bar{g}^1_{b,k}$	$\bar{g}^2_{b,k}$	$\bar{g}^3_{b,k}$	$\bar{\gamma}^1_{b,k}$	$\bar{\gamma}^2_{b,k}$	$\bar{\gamma}^3_{b,k}$
Highest market/book	Lowest *SGER*	$k = 1$	3.217	3.166	3.357	0.025	0.025	0.023	0.154	0.184	0.209	0.078	0.105	0.130	0.204	0.202	0.190
$b = 1$		$k = 2$	3.240	3.249	3.547	0.018	0.017	0.016	0.183	0.213	0.246	0.119	0.148	0.178	0.215	0.213	0.199
Growth stocks		$k = 3$	3.520	3.559	4.073	0.015	0.015	0.014	0.206	0.239	0.283	0.147	0.179	0.215	0.222	0.223	0.210
		$k = 4$	4.040	4.052	4.843	0.014	0.013	0.013	0.240	0.281	0.351	0.176	0.216	0.262	0.238	0.240	0.224
	Highest *SGER*	$k = 5$	5.816	6.032	7.511	0.012	0.012	0.012	0.350	0.417	0.539	0.249	0.306	0.386	0.260	0.262	0.231
$b = 2$	Lowest *SGER*	$k = 1$	2.078	2.064	2.213	0.027	0.028	0.026	0.106	0.132	0.136	0.051	0.074	0.076	0.177	0.176	0.166
		$k = 2$	2.083	2.083	2.229	0.022	0.023	0.021	0.137	0.158	0.171	0.087	0.105	0.118	0.195	0.194	0.185
		$k = 3$	2.110	2.122	2.262	0.022	0.022	0.019	0.154	0.175	0.192	0.105	0.125	0.142	0.202	0.203	0.191
		$k = 4$	2.168	2.166	2.364	0.020	0.019	0.017	0.171	0.194	0.217	0.124	0.147	0.169	0.204	0.206	0.198
	Highest *SGER*	$k = 5$	2.234	2.264	2.371	0.017	0.016	0.015	0.205	0.234	0.261	0.160	0.187	0.213	0.221	0.221	0.209
$b = 3$	Lowest *SGER*	$k = 1$	1.512	1.495	1.601	0.033	0.036	0.037	0.084	0.104	0.108	0.031	0.047	0.051	0.156	0.146	0.138
		$k = 2$	1.498	1.500	1.617	0.029	0.029	0.027	0.112	0.129	0.134	0.067	0.083	0.088	0.164	0.170	0.151
		$k = 3$	1.516	1.527	1.647	0.027	0.027	0.024	0.129	0.146	0.155	0.085	0.100	0.113	0.186	0.184	0.167
		$k = 4$	1.537	1.532	1.663	0.027	0.026	0.022	0.145	0.162	0.177	0.100	0.118	0.135	0.193	0.192	0.179
	Highest *SGER*	$k = 5$	1.548	1.564	1.678	0.025	0.024	0.019	0.173	0.191	0.214	0.130	0.149	0.174	0.210	0.210	0.187
$b = 4$	Lowest *SGER*	$k = 1$	1.152	1.142	1.199	0.034	0.040	0.044	0.066	0.083	0.086	0.022	0.031	0.028	0.139	0.130	0.117
		$k = 2$	1.141	1.142	1.203	0.039	0.038	0.039	0.089	0.101	0.104	0.044	0.056	0.054	0.128	0.126	0.114
		$k = 3$	1.156	1.161	1.216	0.035	0.033	0.030	0.103	0.117	0.121	0.063	0.077	0.085	0.145	0.153	0.130
		$k = 4$	1.168	1.170	1.251	0.033	0.030	0.025	0.120	0.136	0.143	0.083	0.097	0.109	0.169	0.173	0.150
	Highest *SGER*	$k = 5$	1.179	1.191	1.252	0.030	0.030	0.023	0.149	0.164	0.180	0.110	0.125	0.146	0.192	0.196	0.184

(*continued*)

Table II.

Market/book quintile	SGER quintile		Market/book M/B_1	M/B_2	M/B_3	Current dividend yield dy_1	dy_2	dy_3	Forward ROE $\overline{ROE}^1_{b,k}$	$\overline{ROE}^2_{b,k}$	$\overline{ROE}^3_{b,k}$	Implicit growth $\bar{g}^1_{b,k}$	$\bar{g}^2_{b,k}$	$\bar{g}^3_{b,k}$	CAPX/NFA $\bar{\gamma}^1_{b,k}$	$\bar{\gamma}^2_{b,k}$	$\bar{\gamma}^3_{b,k}$
Lowest market/book	Lowest *SGER*	$k = 1$	0.734	0.700	0.757	0.027	0.029	0.033	0.035	0.051	0.052	0.014	0.028	0.025	0.141	0.137	0.112
$b = 5$		$k = 2$	0.804	0.811	0.897	0.037	0.044	0.045	0.063	0.075	0.078	0.033	0.037	0.033	0.131	0.107	0.089
Value stocks		$k = 3$	0.843	0.841	0.880	0.051	0.052	0.049	0.077	0.084	0.087	0.037	0.046	0.045	0.102	0.103	0.094
		$k = 4$	0.837	0.826	0.868	0.054	0.045	0.041	0.089	0.100	0.104	0.052	0.065	0.070	0.120	0.129	0.110
	Highest *SGER*	$k = 5$	0.844	0.857	0.900	0.043	0.041	0.031	0.115	0.126	0.135	0.081	0.093	0.106	0.143	0.158	0.135

Notes: $M/B^J_{i,t,b,k}$, $dy^J_{i,t,b,k}$, $ROE^J_{i,t,b,k}$, $g^J_{i,t,b,k}$, and $\gamma^J_{i,t,b,k}$ are market/book, current dividend yield, forward *ROE*, implicit growth (equation (A15)), and annual capital expenditure (CAPX) relative to net fixed assets (NFA) for firm $i = 1,2,\ldots,N$, in month $t = 1,2,\ldots,TP$, for portfolio $b = 1,2,3,4,5$, $k = 1,2,3,4,5$, where the 25 portfolios are formed by sorting firms at a statistical period date by market/book into five quintiles and then into five portfolios by $SGER_J$ $J = 1,2,3$, respectively; CAPX and NFA for a firm are from the annual report immediately prior to a statistical period date; TP is 417 months for $SGER_1$ and $SGER_2$ and 314 months for $SGER_3$; this table reports:

$$\overline{M/B}^J_{b,k} = median(M/B^J_{i,t,b,k}, i = 1,2,\ldots,N, t = 1,2,\ldots,TP);$$

$$\overline{dy}^J_{b,k} = median(dy^J_{i,t,b,k}, i = 1,2,\ldots,N, t = 1,2,\ldots,TP);$$

$$\overline{ROE}^J_{b,k} = median(ROE^J_{i,t,b,k}, i = 1,2,\ldots,N, t = 1,2,\ldots,TP);$$

$$\bar{g}^J_{b,k} = median(g^J_{i,t,b,k}, i = 1,2,\ldots,N, t = 1,2,\ldots,TP);$$

$$\bar{\gamma}^J_{b,k} = median(\gamma^J_{i,t,b,k}, i = 1,2,\ldots,N, t = 1,2,\ldots,TP)$$

CAPX/NFA in Table II measures the rate of capital expenditure by businesses to maintain existing depreciable assets and for growth. Comparing the upper portion of Table II to the lower portion illustrates that growth firms ($b = 1$) undertake capital expenditures at a higher rate than value firms ($b = 5$). In addition, for most market/book quintiles, the rate of capital expenditure increases from low to high *SGER* portfolios, $k = 1,2,3,4,5$. Fama and French (2001) identify modest growth opportunities as one of the characteristics of dividend-paying firms. Nonetheless, growth firms ($b = 1$) have capital expenditure rates that exceed 20 percent per annum for each *SGER* portfolio, $k = 1,2,\ldots,5$. These high growth rates indicate that even for dividend-paying firms, high market/book is associated with high growth and extensive growth opportunities.

3.4 Realized versus expected returns

We measure returns from a statistical period date (Thursday preceding the third Friday of the month), where we form a portfolio, to the following statistical period date (approximately a month later). Because we rebalance portfolios at statistical period dates but measure portfolio returns for the following statistical period month, our results are out-of-sample. We cannot use CRSP monthly returns because statistical period dates are mid-month rather than month-end. Instead, for firm $i = 1,2,\ldots N$ that is a member of portfolio b, k ($b = 1,2,3,4,5$, $k = 1,2,3,4,5$), formed with market/book and *SGER* that uses a consensus analyst *EPS* forecast J unreported fiscal years hence, and for statistical period month $t = 1,2,\ldots TP$,[13] return is:

$$R^J_{i,t,b,k} = \left(\frac{P_{i,t+1} + D_{i,t+1} - P_{i,t}}{P_{i,t}}\right) \tag{4}$$

where $P_{i,t}$ and $P_{i,t+1}$ are split-adjusted closing share prices[14] for firm i on statistical period date t and $t + 1$, and $D_{i,t+1}$ is the split-adjusted dividend with an ex-date between statistical period dates.

The equally weighted return[15] for portfolio b, k in month t is:

$$\overline{R}^J_{t,b,k} = \frac{1}{N}\sum_{i=1}^{N} R^J_{i,t,b,k}.$$

Because *SGER* is an annual measure, for comparison purposes in our descriptive statistics (Table III), we annualize realized monthly portfolio returns over the test period as:

$$\overline{R}^J_{b,k} = \frac{12}{TP}\sum_{t=1}^{TP} \overline{R}^J_{t,b,k}.$$

Denote *SGER* calculated with an *EPS* forecast J unreported fiscal years hence, for firm $i = 1,2,\ldots,N$, in portfolio b, k ($b = 1,2,3,4,5$, $k = 1,2,3,4,5$), for statistical period month $t = 1,2,\ldots,TP$, as $SGER^J_{i,t,b,k}$. Mean *SGER* for portfolio b, k is:

Table III. Realized portfolio returns, expected portfolio returns, and realized minus expected portfolio returns

Market/book quintile	*SGER* quintile		Average portfolio returns $\bar{R}^1_{b,k}$	$\bar{R}^2_{b,k}$	$\bar{R}^3_{b,k}$	Expected portfolio returns $\overline{SGER}^1_{b,k}$	$\overline{SGER}^2_{b,k}$	$\overline{SGER}^3_{b,k}$	Realized less expected returns $\bar{R}^1_{b,k} - \overline{SGER}^1_{b,k}$	$\bar{R}^2_{b,k} - \overline{SGER}^2_{b,k}$	$\bar{R}^3_{b,k} - \overline{SGER}^3_{b,k}$
Highest market/book	Lowest *SGER*	$k = 1$	0.091	0.086	0.106	0.077	0.108	0.133	0.014	−0.022	−0.027
$b = 1$		$k = 2$	0.113	0.110	0.122	0.140	0.169	0.198	−0.028	−0.059	−0.076
Growth stocks		$k = 3$	0.134	0.131	0.124	0.166	0.198	0.235	−0.032	−0.067	−0.111
		$k = 4$	0.145	0.151	0.147	0.198	0.237	0.289	−0.053	−0.085	−0.142
	Highest *SGER*	$k = 5$	0.163	0.159	0.135	0.332	0.398	0.520	−0.168	−0.239	−0.385
$b = 2$	Lowest *SGER*	$k = 1$	0.088	0.085	0.089	0.067	0.089	0.093	0.020	−0.004	−0.004
		$k = 2$	0.109	0.109	0.148	0.111	0.131	0.141	−0.002	−0.022	0.007
		$k = 3$	0.142	0.133	0.151	0.129	0.150	0.165	0.012	−0.018	−0.013
		$k = 4$	0.158	0.170	0.124	0.148	0.171	0.191	0.010	−0.001	−0.066
	Highest *SGER*	$k = 5$	0.199	0.191	0.170	0.194	0.221	0.250	0.005	−0.030	−0.080
$b = 3$	Lowest *SGER*	$k = 1$	0.102	0.094	0.117	0.061	0.080	0.079	0.040	0.014	0.038
		$k = 2$	0.114	0.122	0.104	0.097	0.114	0.116	0.017	0.008	−0.012
		$k = 3$	0.152	0.159	0.136	0.114	0.131	0.139	0.038	0.028	−0.003
		$k = 4$	0.188	0.184	0.184	0.131	0.148	0.162	0.058	0.036	0.022
	Highest *SGER*	$k = 5$	0.222	0.221	0.164	0.168	0.187	0.213	0.054	0.033	−0.049
$b = 4$	Lowest *SGER*	$k = 1$	0.091	0.099	0.087	0.057	0.074	0.071	0.034	0.025	0.017
		$k = 2$	0.132	0.121	0.134	0.086	0.099	0.097	0.045	0.022	0.037
		$k = 3$	0.163	0.167	0.162	0.101	0.114	0.115	0.062	0.053	0.048
		$k = 4$	0.202	0.203	0.177	0.118	0.132	0.137	0.084	0.071	0.041
	Highest *SGER*	$k = 5$	0.247	0.242	0.160	0.153	0.168	0.186	0.093	0.074	−0.026

(*continued*)

Table III.

Market/book quintile	*SGER* quintile		Average portfolio returns $\bar{R}^1_{b,k}$	$\bar{R}^2_{b,k}$	$\bar{R}^3_{b,k}$	Expected portfolio returns $\overline{SGER}^1_{b,k}$	$\overline{SGER}^2_{b,k}$	$\overline{SGER}^3_{b,k}$	Realized less expected returns $\bar{R}^1_{b,k} - \overline{SGER}^1_{b,k}$	$\bar{R}^2_{b,k} - \overline{SGER}^2_{b,k}$	$\bar{R}^3_{b,k} - \overline{SGER}^3_{b,k}$
Lowest market/book	Lowest *SGER*	$k = 1$	0.136	0.135	0.123	0.045	0.060	0.061	0.091	0.075	0.062
$b = 5$		$k = 2$	0.176	0.173	0.157	0.074	0.086	0.085	0.102	0.087	0.072
Value stocks		$k = 3$	0.190	0.189	0.155	0.089	0.098	0.096	0.101	0.090	0.058
		$k = 4$	0.230	0.224	0.190	0.103	0.113	0.113	0.127	0.112	0.076
	Highest *SGER*	$k = 5$	0.268	0.263	0.248	0.139	0.148	0.156	0.128	0.115	0.092
Average over 25 portfolios									0.034	0.012	−0.017

Notes: Annualized portfolio return is:

$$\overline{R}^J_{b,k} = \frac{12}{TP}\sum_{t=1}^{TP}\left(\frac{1}{N}\sum_{i=1}^{N}\left(\frac{P_{i,ft+1} + D_{i,t+1} - P_{i,t}}{P_{i,t}}\right)\right),$$

where TP is the number of months in the test period, $P_{i,t}$ and $P_{i,t+1}$ are share prices on statistical period date t and $t + 1$ for firm i, $D_{i,t+1}$ is the dividend with ex-date between t and $t + 1$:

$$\overline{SGER}^J_{b,k} = \frac{1}{TP}\sum_{t=1}^{TP}\left(\frac{1}{N}\sum_{i=1}^{N} SGER^J_{i,t,b,k}\right),$$

where $SGER_{i,t,b,k}$ is *SGER* for firm $i = 1,2,\ldots,N$, in month $t = 1,2,\ldots,TP$; returns, *SGER*, and the difference, $\overline{R}^J_{b,k} - \overline{SGER}^J_{b,k}$, are for 25 market/book and *SGER* portfolios formed with $SGER_J$; the forecast interval for *EPS* that is used as input in *SGER* is for $J = 1,2,3$ unreported fiscal years from a statistical period date

$$\overline{SGER}^J_{b,k} = \frac{1}{TP}\sum_{t=1}^{TP}\left(\frac{1}{N}\sum_{i=1}^{N} SGER^J_{i,t,b,k}\right)$$

Table III reports portfolio returns, *SGER*, and the difference, $\overline{R}^J_{b,k} - \overline{SGER}^J_{b,k}$.

Within each of the five market/book quintiles, $b = 1,2,3,4,5$, realized average portfolio returns, $\overline{R}^J_{b,k}$, increase from the low *SGER* portfolio ($k = 1$) to the high *SGER* portfolio ($k = 5$). This increase is monotonic for $SGER_1$ and $SGER_2$ portfolios and almost monotonic for the $SGER_3$ portfolios. Realized returns strongly follow *SGER*, which gives us confidence that there is economic content to *SGER*.

While a positive relation between realized returns and *SGER* would seem to be a minimum requirement for a return measure for either the weighted average cost of capital or for investors in their security analysis, *SGER* is unique among implicit returns[16] with this feature (Easton, 2006; Gebhardt *et al.*, 2001). The purpose of implicit expected returns is for the corporate financial decision making with the weighted average cost of capital. This objective requires an unbiased expected equity return measure, and therefore, this literature often compares these measures against average realized equity returns. Because this standard is rather demanding, in a study of seven expected return proxies, Easton and Monahan (2005) find that in the entire cross-section of firms, these proxies are unreliable and none has a positive association with realized-returns.

There are differences between *SGER*'s representation of returns for growth and value stocks. For growth stocks ($b = 1$) at the top of Table III, *SGER* tends to overstate realized returns with growth forecasts (implicit growth) that are unlikely sustainable indefinitely. On the flip side, *SGER* is lower than realized returns for value stocks ($b = 5$). Because *ROE* is low, growth prospects, as measured by implicit growth, are low. These observations suggest that forward *ROE*, with analysts' *EPS* forecasts, understate economic *ROE* for value stocks and overstates economic *ROE* for growth stocks[17].

4. Profitability, growth, and the value-premium

4.1 The value-premium (preliminary evidence)

In this section, we investigate return differences between growth and value firms. The dynamic model in Section 2 indicates that as profitability (*ROE*) increases, risk can either increase or decrease. Low profitability firms (value firms in the left-most section of Figure 1) are at risk of suspending growth. Increasing profitability increases the likelihood of growth-leverage, which increases risk and expected return. On the other hand, profitability (*ROE*) reduces risk for high profitability firms (the right-most section of Figure 1). For these firms (growth firms), high profitability covers the costs of growth to reduce growth-leverage and decrease expected return. Consequently, growth firms have low expected returns,. Greater return for value compared to growth firms is the value-premium. This dynamic model is consistent with a value-premium but it does not require one. For example, if profitability, *ROE*, of both value and growth firms is lower than shown in Figure 1, then because expected return to value stocks decreases and expected return to growth stocks increases, the expected-return difference decreases and a value-premium can reverse and even become negative.

In Table III, value firms ($b = 5$) have high-realized average returns compared to growth firms ($b = 1$). That is, $\overline{R}^J_{5,k} > \overline{R}^J_{1,k}$ $k = 1,2,3,4,5$ (low to high *SGER*) and for any EPS forecast period, $J = 1,2,3$. Notice also in comparing Table III with Table II, that value firms ($b = 5$) have both high realized average returns and low profitability compared to growth firms ($b = 1$). That is, $\overline{R}_{5,k}^{J} > \overline{R}_{1,k}^{J}$ and $\overline{ROE}_{5,k}^{J} < \overline{ROE}_{1,k}^{J}$ $k = 1,2,3,4,5$ (low to high $SGER$) for portfolios formed with any EPS forecast period, $J = 1,2,3$. This is the value-premium "in-the-large." Growth firms ($b = 1$) have low returns and high profitability.

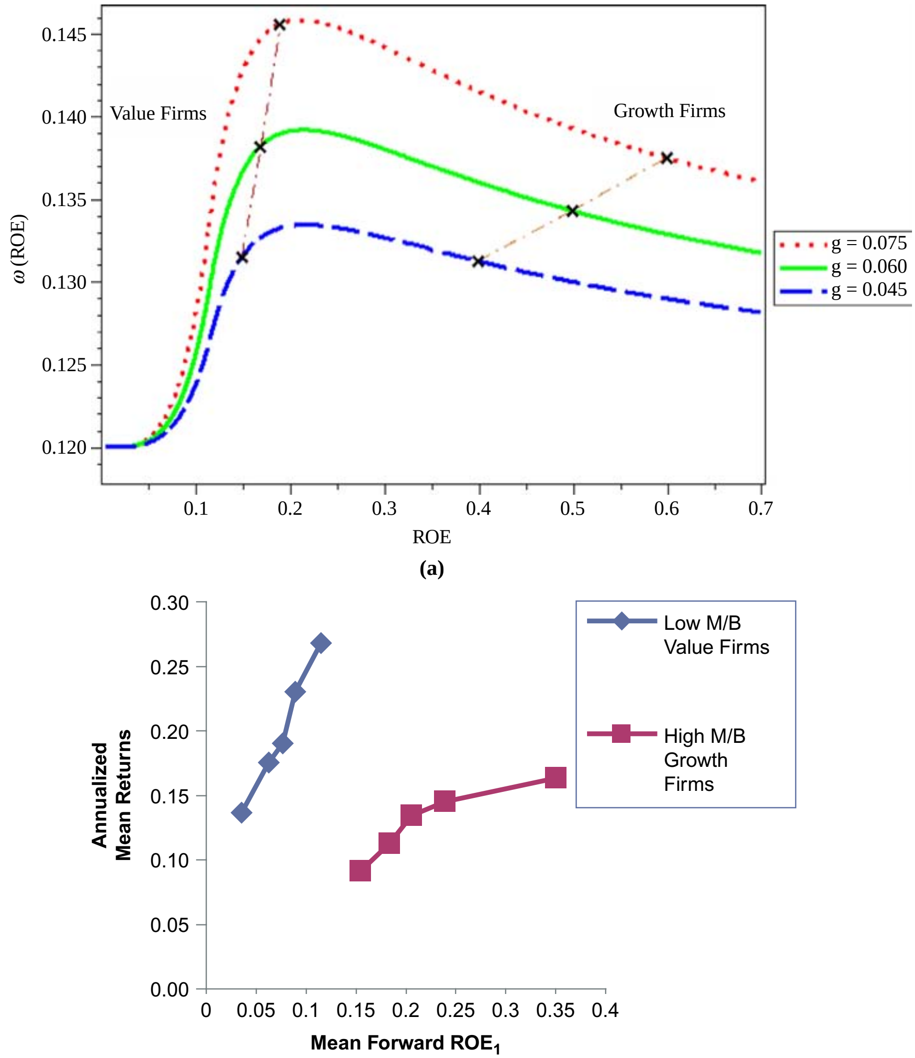
4.2 Returns versus profitability in-the-small (preliminary evidence)

Blazenko and Pavlov's (2009) dynamic equity valuation model shown in Figure 1 indicates that as profitability (ROE) increases, risk can either increase or decrease. It increases for value stocks but it decreases for growth stocks. However, in Tables II and III, for either value or growth stocks separately (that is, within a market/book quintile), there is evidence that profitability increases return[18]. For each of the portfolios formed with $SGER$ and analysts' earnings forecasts $J = 1,2,3$ unreported fiscal years hence, within any market/book quintile $b = 1,2,3,4,5$, forward ROE (that is, $\overline{ROE}_{b,k}^{J}$) increases with respect to $SGER$, $k = 1,2,3,4,5$ (low to high $SGER$). In addition in Table III, within any market/book quintile $b = 1,2,3,4,5$, realized average portfolio returns $\overline{R}_{b,k}^{J}$ increase with respect to $SGER$, $k = 1,2,3,4,5$, (low to high $SGER$). Figure 2(a) plots this relation between return, $\overline{R}_{b,k}^{J}$, and profitability, $\overline{ROE}_{b,k}^{J}$, $k = 1,2,3,4,5$, for growth ($b = 1$) and value stocks ($b = 5$). Returns increase with profitability. That is, $\overline{R}_{5,k}^{1}$ increases with $\overline{ROE}_{5,k}^{1}$, $k = 1,2,3,4,5$ and $\overline{R}_{1,k}^{1}$ increases with $\overline{ROE}_{1,k}^{1}$, $k = 1,2,3,4,5$.

Contrary to Blazenko and Pavlov's (2009) hill-shaped relation between expected return and profitability (Figure 1) that predicts that returns increase with profitability for value stocks and decrease with profitability for growth stocks, Figure 2(b) shows that returns increase with profitability for both value and growth stocks. Thus, alternatively, we use a modified version of the limits-to-growth hypothesis to explain why the relation between returns and profitability is stronger for value stocks compared to growth stocks[19].

There are two forces that impact expected return as profitability ROE increases with the result that returns increase with profitability for both value and growth stocks (that is, within a market/book quintile). First, in the dynamic model, holding maximum growth, g, constant, profitability, ROE, can either increase or decrease risk as represented in Figure 1. Profitability, ROE, increases risk for value stocks but decreases risk for growth stocks. Second, there is evidence in Table II, that profitability increases growth. In Table II, for each of the forecast intervals, $J = 1,2,3$, within any market/book quintile $b = 1,2,3,4,5$, median forward ROE ($\overline{ROE}_{b,k}^{J}$) and implicit growth, $\overline{g}_{b,k}^{J}$, increase with respect to $SGER$, $k = 1,2,3,4,5$, (low $SGER$ to high $SGER$). If firms are financially constrained (Froot *et al.*, 1993), increasing profitability increases the ability of the firm to finance growth internally when they cannot finance externally, which increases growth.

Figure 2(a) plots expected return, $\omega(ROE)$, with respect to profitability, ROE, for different growth rates, g. For value firms (low market/book and low profitability), profitability, ROE, increases risk and expected return, $\omega(ROE)$, holding growth, g, constant (that is, on any one of the curves, $g = 0.045$, $g = 0.06$, or $g = 0.07$). On the



(b)

Notes: (a) Expected return, *ω(ROE)*, versus profitability, *ROE*, for different earnings growth rates, $g = 0.075$, $g = 0.06$, $g = 0.045$ (with earnings volatility $\sigma = 0.2$ and expected return for a hypothetical firm that permanently does not grow $r^* = 0.12$); (b) annualized mean return, $R_{b,k}$, $k \overset{-1}{=} 1,2,3,4,5$, from table 3, and median profitability, $\overline{ROE}^{1}_{b,k}$, $k = 1,2,3,4,5$, from Table 2, for growth ($b = 1$) and value stocks ($b = 5$) for portfolios sorted by $SGER_1$ (that is, with forward *ROE* one unreported fiscal year hence)

Figure 2.
(a) Profitability, growth, and the value-premium; (b) observed returns versus profitability for value versus growth firms

other hand, profitability increases growth, which Figure 2(a) shows as shifting upward to a higher growth curve. Higher growth, g, increases growth-leverage for any level of profitability, *ROE*, which increases expected return, $\omega(ROE)$. For value firms, these two forces work together so that the relationship between expected return, $\omega(ROE)$, and profitability, *ROE*, depicted for value firms at the left most section of Figure 2(a) is steep compared to growth firms at the right most section. Figure 2(b) shows a similar pronounced relation between returns and profitability for portfolios of value firms in the left-most curve.

For growth firms in Figure 2(a), profitability, *ROE*, decreases risk and expected return, $\omega(ROE)$, holding growth, g, constant (that is, on any one of the curves, $g = 0.045$, $g = 0.06$, or $g = 0.075$). On the other hand, profitability increases growth, which Figure 2(a) shows as shifting upward to a higher growth curve, which increases expected return, $\omega(ROE)$. For growth firms, these two forces work in opposite directions and therefore, either effect might dominate and profitability, *ROE*, might either increase or decrease expected return, $\omega(ROE)$. However, because these two forces work in opposite directions, we expect the relation between returns and profitability to be weaker for growth compared to value stocks.

Figure 2(b) plots the two joint empirical phenomena that we investigate in this paper. First, the relation between returns and profitability is positive and stronger for value stocks (on the left) compared to growth stocks (on the right). Second, at the same time, value stocks have higher returns than growth stocks.

4.3 The value-premium (formal testing)

Table III is a report of summary statistics that suggest a value-premium without formal statistical testing. Table IV gives formal statistical results in cross-sectional regressions of stock returns for individual companies on market/book and profitability, *ROE*, for each statistical period, t. The dependent variable, $R_{i,t}$, is the monthly return for firm i for statistical month t and the independent variables are market/book and forward *ROE*. Specifically, $M/B_{i,t}$ and $ROE^J_{i,t}$ are market/book and the forward *ROE* for firm $i = 1,2,...,N$, for $J = 1,2,3$ as yet unreported fiscal years hence (both at the beginning of statistical period $t = 1,2,...,TP$):

$$R_{i,t} = \delta_{0,t} + \delta_{1,t} \cdot \frac{M}{B_{i,t}} + \delta_{2,t} \cdot ROE^J_{i,t} + \mu_{i,t}, \quad i = 1, 2, \ldots, \mathrm{N} \tag{5}$$

While our primary objective in regression (6) is to determine the impact of M/B on returns, we include profitability, *ROE*, as an explanatory variable to account for profitability impacts not fully captured by M/B.

Table IV reports the temporal average of cross-sectional coefficient estimates in these regressions (that is, $\sum_{t=1}^{TP} \hat{\delta}_{0,t}/TP$, $\sum_{t=1}^{TP} \hat{\delta}_{1,t}/TP$, and $\sum_{t=1}^{TP} \hat{\delta}_{2,t}/TP$). Panel A of Table IV reports the coefficient estimates for the entire sample of firms when forward *ROE* is for $J = 1,2,3$ as yet unreported fiscal years hence. Panels B, C, and D report the coefficient estimates when firms are sorted into low versus high *SGER* quintiles ($k = 1,2,3,4,5$). Panels B, C, and D use forward *ROE* for $J = 1,2,3$ as yet unreported fiscal years hence, respectively.

$$R_{i,t} = \delta_{0,t} + \delta_{1,t} \cdot M/B_{i,t} + \delta_{2,t} \cdot ROE^{J}_{i,t} + \mu_{i,t} \quad i = 1, 2, \ldots, N$$

		TP	$\bar{\delta}_o$	t-stat.	$\bar{\delta}_1$	t-stat.	$\bar{\delta}_2$	t-stat.
Panel A: all sample								
	$J = 1$	417	0.0129	5.60	−0.0031	−7.33	0.0380	8.33
	$J = 2$	417	0.0122	5.38	−0.0034	−7.49	0.0397	7.95
	$J = 3$	417	0.0112	4.18	−0.0013	−3.11	0.0186	3.27
Panel B: earnings forecast interval one fiscal year hence, $J = 1$								
Low SGER1	$k = 1$	417	0.0101	3.90	−0.0015	−2.54	0.0146	1.67
	$k = 2$	417	0.0119	4.99	−0.0032	−3.35	0.0351	2.19
	$k = 3$	417	0.0131	5.53	−0.0032	−3.80	0.0371	2.64
	$k = 4$	417	0.0186	7.48	−0.0024	−2.99	0.0036	0.28
High SGER1	$k = 5$	417	0.0191	6.82	−0.0017	−3.84	0.0126	1.93
Panel C: earnings forecast interval two fiscal years hence, $J = 2$								
Low $SGER_2$	$k = 1$	417	0.0103	4.17	−0.0012	−1.63	0.0031	0.31
	$k = 2$	417	0.0110	4.41	−0.0050	−4.60	0.0597	3.52
	$k = 3$	417	0.0134	5.77	−0.0043	−4.47	0.0426	3.09
	$k = 4$	417	0.0173	6.63	−0.0028	−3.16	0.0177	1.38
High $SGER_2$	$k = 5$	417	0.0184	6.25	−0.0019	−3.86	0.0140	2.05
Panel D: earnings forecast interval three fiscal years hence, $J = 3$								
Low $SGER_3$	$k = 1$	314	0.0080	2.74	−0.0020	−1.39	0.0358	1.59
	$k = 2$	314	0.0079	2.73	−0.0074	−3.81	0.1073	3.75
	$k = 3$	314	0.0125	3.93	−0.0014	−1.07	0.0122	0.59
	$k = 4$	314	0.0122	3.55	−0.0023	−2.35	0.0284	1.94
High $SGER_3$	$k = 5$	314	0.0156	4.16	−0.0008	−1.73	0.0032	0.48

Notes: This table reports the temporal average of the coefficient estimates in the above cross-sectional regression (that is, $\bar{\delta}_0 = \sum_{t=1}^{TP} \hat{\delta}_{0,t}/TP$, $\bar{\delta}_1 = \sum_{t=1}^{TP} \hat{\delta}_{1,t}/TP$, and $\bar{\delta}_2 = \sum_{t=1}^{TP} \hat{\delta}_{2,t}/TP$); Panel A of this reports the coefficient estimates for the entire sample of firms when forward *ROE* is for $J = 1,2,3$ as yet unreported fiscal years hence; Panels B, C, and D report the coefficient estimates when firms are sorted into low versus high *SGER* quintiles ($k = 1,2,3,4,5$); Panels B, C, and D use forward *ROE* for $J = 1,2,3$ as yet unreported fiscal years hence, respectively

Table IV. Fama-MacBeth regressions of monthly returns for individual companies on market/book (M/B) and profitability, *ROE*

In all of the regressions reported in Table IV, the coefficient estimate on market/book is negative and generally statistically significant, which is evidence of a value-premium for profitable dividend-paying firms. Value stocks have higher returns than growth stocks. The coefficient estimates on forward profitability, *ROE*, are always positive, but not always statistically significant.

4.4 Returns versus profitability in-the-small (formal testing)

Figure 2(b) suggests that the relation between returns and profitability, *ROE*, is stronger for value stocks than growth stocks but it is a plot of summary statistics without formal testing. Table V gives formal statistical results in cross-sectional regressions of stock returns for individual companies on profitability, *ROE* for each statistical period, t. Both market/book and forward *ROE* are at the beginning of the statistical period month and monthly return is for the following statistical period month. The dependent variable, $R_{i,t}$, is the monthly return for firm i for statistical month t. The independent

		TP	$\bar{\gamma}_0$	t-stat.	$\bar{\gamma}_1$	t-stat.	$\bar{\gamma}_2$	t-stat.	t-statistic for $\bar{\gamma}_2(b=5)-\bar{\gamma}_2(b=1)$
$R_{i,t}=\gamma_{0,t}+\gamma_{1,t}\cdot\frac{M}{B_{i,t}}+\gamma_{2,t}\cdot ROE^{J}_{i,t}+\mu_{i,t}\quad i=1,2,\ldots,\mathrm{N}$									
Panel A: earnings forecast interval one fiscal year hence, J = 1									
Growth	*b = 1*	417	0.0106	4.26	−0.0013	−4.12	0.0215	4.85	6.01
	b = 2	417	0.0100	3.09	−0.0048	−3.17	0.0727	6.94	
	b = 3	417	0.0067	1.68	−0.0040	−1.42	0.0953	7.40	
	b = 4	417	0.0209	5.50	−0.0220	−5.87	0.1398	9.20	
Value	*b = 5*	417	0.0195	4.73	−0.0215	−4.90	0.1309	7.42	
Panel B: earnings forecast interval two fiscal years hence, J = 2									
Growth	*b = 1*	417	0.0099	3.99	−0.0016	−4.37	0.0241	5.36	5.68
	b = 2	417	0.0079	2.32	−0.0042	−2.51	0.0740	6.64	
	b = 3	417	0.0078	1.91	−0.0064	−2.20	0.0982	6.87	
	b = 4	417	0.0219	4.99	−0.0262	−5.63	0.1386	7.68	
Value	*b = 5*	417	0.0174	4.18	−0.0246	−4.57	0.1581	6.82	
Panel C: earnings forecast interval three fiscal years hence, J = 3									
Growth	*b = 1*	314	0.0112	3.82	−0.0007	−1.45	0.0073	1.17	2.83
	b = 2	314	0.0072	1.09	−0.0015	−0.52	0.0299	1.90	
	b = 3	314	0.0057	0.62	−0.0021	−0.35	0.0409	2.03	
	b = 4	314	0.0166	2.04	−0.0130	−2.02	0.0757	2.89	
Value	*b = 5*	314	0.0131	2.31	−0.0156	−2.02	0.1158	3.06	

Notes: This table reports the temporal average of the cross-sectional coefficient estimates in the Fama and MacBeth (1973) regressions of return on market/book and forward *ROE* (that is, $\bar{\gamma}_0=\sum_{t=1}^{TP}\hat{\gamma}_{0,t}/TP$, $\bar{\gamma}_1=\sum_{t=1}^{TP}\hat{\gamma}_{1,t}/TP$, and $\bar{\gamma}_2=\sum_{t=1}^{TP}\hat{\gamma}_{2,t}/TP$); the panels of this report the coefficient estimates when firms are sorted into high versus low market/book quintiles (b = 1,2,3,4,5); Panels A, B, and C use forward *ROE* for J = 1,2,3 as yet unreported fiscal years hence, respectively

Table V.
Fama-MacBeth regressions of monthly returns for individual companies on market/book (M/B) and profitability, *ROE*

variables are market/book and forward *ROE*, $M/B_{i,t}$ and $ROE^{J}_{i,t}$ firm i = 1,2,...,N (both at the beginning of statistical period t = 1,2,...,TP):

$$R_{i,t}=\gamma_{0,t}+\gamma_{1,t}\cdot\frac{M}{B_{i,t}}+\gamma_{2,t}\cdot ROE^{J}_{i,t}+\mu_{i,t},\quad i=1,2,\ldots,\mathrm{N} \tag{6}$$

Table V reports the temporal average of cross-sectional coefficient estimates in in the Fama and MacBeth (1973) regressions[20] of return on market/book and forward *ROE* (that is, $\bar{\gamma}_0=\sum_{t=1}^{TP}\hat{\gamma}_{0,t}/TP$, $\bar{\gamma}_1=\sum_{t=1}^{TP}\hat{\gamma}_{1,t}/TP$, and $\bar{\gamma}_2=\sum_{t=1}^{TP}\hat{\gamma}_{2,t}/TP$). The panels of Table V report the coefficient estimates when firms are sorted into high to low market/book quintiles (b = 1,2,3,4,5). Panels A, B, and C use forward *ROE* for J = 1,2,3 as yet unreported fiscal years hence, respectively. We include market/book as an independent variable in regression (6) to account for residual market/book effects not captured by profitability, $ROE^{J}_{i,t}$.

The slope estimate, $\bar{\gamma}_2$, is positive and increases monotonically with market/book (from growth to value, b = 1,2,3,4,5) for each forecast interval J = 1,2,3 (panels A-C). Statistical tests for slope differences between growth and value stocks ($b=1$ versus $b=5$), $\bar{\gamma}_2(b=5)-\bar{\gamma}_2(b=1)$, are strongly significant for each forecast interval J = 1,2,3 (panel A to panel C). These results are consistent with the dynamic model of Section 2 and our discussion of Figure 2(a). The relation between returns and profitability is stronger for value stocks than it is for growth stocks.

5. Abnormal returns and profitability in-the-small

The fact that we use a non-linear asset-pricing model (that is, Blazenko and Pavlov, 2009) to guide our testing is possibly not critical or important if standard linear asset-pricing models commonly employed empirically in the financial literature represent and benchmark returns without pricing errors. However, in the current section (with such a model) within each of the market/book groupings that we investigate (that is, in-the-small), we report negative abnormal returns for stocks that we expect to have low risk and positive abnormal returns for stocks that we expect to have high risk. These abnormal returns suggest that dynamic and non-linear asset-pricing models, like Blazenko and Pavlov (2009), may be useful for representing returns. However, before we abandon linear asset-pricing models as the standard for benchmarking returns, the finance profession needs to consistently uncover pricing errors not explained by these models in future research. While rational analysis guides our empirical investigation, we cannot dismiss market-inefficiency as an explanation for abnormal returns. Either equity-markets over-price stocks that we expect to be low risk (and vice-versa), or current asset-pricing models do not capture the relation between returns and profitability in-the-small for either value or growth stocks.

5.1 Normal returns

The positive association between realized returns and *SGER* in Table III may be risk compensation and does not assure abnormal returns for investment strategies based on *SGER*. We test for these abnormal returns in this section. We use a conditional four-factor model[21] to represent normal returns. Fama and French (1996) and Carhart (1997) suggest a market/book factor[22], a size factor, a market factor and a momentum factor.

Unconditional asset-pricing models, like, Fama and French (1996) and Carhart (1997), presume that expected returns and factor loadings are constant over time. However, Ferson and Warther (1996) report evidence that economic variables like the lagged aggregate dividend yield and the risk free rate capture variation in risk and expected return. Ferson and Harvey (1999) use these common lagged information variables in the Fama and French (1996) three factor model to capture these dynamic patterns in returns. Since our sample period is over 34 years for $SGER_1$ and $SGER_2$ portfolios and 26 years for $SGER_3$ portfolios we allow for time-variation in the factor loadings. We represent the factor loadings as a linear function of two information variables: lagged aggregate dividend yield and the risk-free rate.

From Ken French's web site[23], we download daily returns for the six Fama and French (1993) size and B/M portfolios that they use to calculate *SMB* and *HML* portfolios (value-weighted portfolios formed on size and then market/book) and the six size and momentum portfolios (value-weighted portfolios formed on size and return from 12 months prior to one month prior). We compound daily returns for the riskless rates, for the CRSP value weighted portfolio, for the six size-*B/M* portfolios, and for the six size-momentum portfolios between I/B/E/S statistical period dates. Following the methodology on Ken French's web site, we create monthly *SMB*, *HML*, *MOM* risk factors, and the market risk premium that we use to benchmark *SGER* portfolios.

We risk-adjust the 25 market/book and *SGER* portfolios with the Fama-French-Carhart four-factor model:

$$R_{b,k,t} - R_{f,t} = \alpha_{b,k} + s_{b,k}SMB_t + h_{b,k}HML_t + m_{b,k}MOM_t + \beta_{b,k}(R_{M,t} - R_{f,t}) + \varepsilon_t \quad (7)$$

$$\begin{aligned} s_{b,k} &= s_{0,b,k} + s_{1,b,k}DY_{t-1} + s_{2,b,k}R_{f,t} \\ h_{b,k} &= h_{0,b,k} + h_{1,b,k}DY_{t-1} + h_{2,b,k}R_{f,t} \\ m_{b,k} &= m_{0,b,k} + m_{1,b,k}DY_{t-1} + m_{2,b,k}R_{f,t} \\ \beta_{b,k} &= \beta_{0,b,k} + \beta_{1,b,k}DY_{t-1} + \beta_{2,b,k}R_{f,t} \end{aligned} \quad b=1,2,3,4,5,\ k=1,2,3,4,5,\ t=1,2,\ldots TP \quad (8)$$

where $R_{b,k,t}$ denotes the return on portfolio $b = 1,2,3,4,5$, $k = 1,2,3,4,5$, in month $t = 1,2,\ldots,TP$, $R_{f,t}$ is the riskless rate, DY_{t-1} is the CRSP value-weighted index dividend yield lagged one period, $R_{M,t}$ is the return on the market portfolio measured as the CRSP value weighted return between statistical period dates (by compounding daily CRSP value weighted returns), SMB_t and HML_t are the small-minus-big and high-minus-low Fama-French factors, and MOM_t is the momentum factor. Substitute equation (8) into equation (7) for the conditional Fama-French-Carhart four-factor model.

5.2 Null hypothesis

In this section, we discuss multivariate tests of abnormal returns: the $\hat{\alpha}$s, of equation (7). The purpose of the GRS statistic (Gibbons *et al.*, 1989) is to test for errors in an asset-pricing model[24]. We use the GRS statistic to test the null hypothesis that the regression intercepts are jointly equal to zero, $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$. The alternative hypothesis is that there is a missing factor in the asset-pricing model. We do this multivariate test across the five *SGER* portfolios $k = 1,2,\ldots,5$ for each of the five market/book quintiles, $b = 1,2,\ldots,5$. The GRS statistic is F distributed with degrees of freedom equal to (5,400) for our $SGER_1$ and $SGER_2$ portfolios and (5,297) for $SGER_3$ portfolios.

Hansen's J statistic tests the null hypothesis that abnormal returns jointly equal one another, $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha$ but not necessarily equal zero[25]. The purpose of Hansen's J test is to identify differences in abnormal returns. A rejection of the null hypothesis suggests that investors can discriminate portfolio performance in such a way as to form profitable investment strategies. Hansen's J statistic is χ^2 distributed with degree of freedom equal to 4 (number of restrictions minus one) for $SGER_1$, $SGER_2$, and $SGER_3$ portfolios.

5.3 Abnormal returns

We now turn to abnormal return evidence in Table VI. We focus our discussion on $SGER_1$ portfolios for which the evidence is strongest. For each market/book quintile, $b = 1,2,3,4,5$ (growth to value firms), estimated abnormal return, $\hat{\alpha}$, for the lowest *SGER* portfolios ($k = 1$) is always negative and statistically significant. On the other hand, $\hat{\alpha}$ for the highest *SGER* portfolios ($k = 5$) is always positive and statistically significant for low market/book quintiles ($b = 3,4,5$). Further, within market/book quintiles, these alpha estimates, $\hat{\alpha}$, increase from most negative for the lowest *SGER* portfolio ($k = 1$) to positive for the highest *SGER* portfolio ($k = 5$). For each market/book quintile in Table VI, $b = 1,2,3,4,5$, the GRS test rejects the null hypothesis that alphas for the five *SGER* portfolios ($k = 1,2,3,4,5$) jointly equal zero.

Table VI. Abnormal returns from the conditional Fama-French-Carhart four-factor asset-pricing model

$$R_{b,k,t} - R_{f,t} = \alpha_{b,k} + s_{b,k}SMB_t + h_{b,k}HML_t + m_{b,k}MOM_t + \beta_{b,k}(R_{M,t} - R_{f,t}) + \varepsilon_t$$

$$s_{b,k} = s_{0,b,k} + s_{1,b,k}DY_{t-1} + s_{2,b,k}R_{f,t} \quad h_{b,k} = h_{0,b,k} + h_{1,b,k}DY_{t-1} + h_{2,b,k}R_{f,t} \quad m_{b,k} = m_{0,b,k} + m_{1,b,k}DY_{t-1} + m_{2,b,k}R_{f,t}$$

$$\beta_{b,k} = \beta_{0,b,k} + \beta_{1,b,k}DY_{t-1} + \beta_{2,b,k}R_{f,t}$$

$$b = 1,2,3,4,5, \quad k = 1,2,3,4,5, \quad t = 1,2,\ldots,TP$$

Market/ book	*SGER* quintile		*SGER* 1 α	$t(\alpha)$	*J* (*p-value*)	*GRS* (*p-value*)	*SGER*2 α	$t(\alpha)$	*J* (*p*-value)	*GRS* (*p*-value)	*SGER*3 α	$t(\alpha)$	*Hansen's J* (*p-value*)	*GRS* (*p-value*)
Highest	Lowest *SGER*	$k=1$	−0.0034***	(−3.98)	16.11	4.12	−0.0041***	(−4.65)	27.34	6.60	−0.0019	(−1.60)	2.99	0.77
$b=1$		$k=2$	−0.0016*	(−1.66)	(0.0029)	(0.0012)	−0.0022**	(−2.14)	(0.0000)	(0.0000)	−0.0015	(−1.12)	(0.5587)	(0.5688)
Growth		$k=3$	−0.0006	(−0.58)			−0.0003	(−0.28)			−0.0005	(−0.36)		
stocks		$k=4$	0.0007	(0.70)			0.0014	(1.32)			0.0009	(0.66)		
	Highest *SGER*	$k=5$	0.0011	(0.79)			0.0010	(0.68)			−0.0001	(−0.06)		
$b=2$	Lowest *SGER*	$k=1$	−0.0058***	(−5.14)	21.84	9.33	−0.0055***	(−4.76)	20.91	8.41	−0.0029	(−1.17)	1.54	0.65
		$k=2$	−0.0040***	(−4.18)	(0.0002)	(0.0000)	−0.0041***	(−3.71)	(0.0003)	(0.0000)	−0.0008	(−0.47)	(0.8199)	(0.6643)
		$k=3$	−0.0017	(−1.50)			−0.0022**	(−1.98)			−0.0009	(−0.56)		
		$k=4$	−0.0010	(−0.83)			−0.0007	(−0.50)			−0.0020	(−1.11)		
	Highest *SGER*	$k=5$	0.0014	(1.05)			0.0013	(1.01)			−0.0004	(−0.22)		
$b=3$	Lowest *SGER*	$k=1$	−0.0058***	(−4.79)	32.83	11.54	−0.0060***	(−4.85)	25.58	8.98	−0.0027	(−1.36)	3.30	1.32
		$k=2$	−0.0049***	(−4.48)	(0.0000)	(0.0000)	−0.0037***	(−3.38)	(0.0000)	(0.0000)	−0.0033*	(−1.87)	(0.5096)	(0.2545)

(continued)

Table VI.

$$R_{b,k,t} - R_{f,t} = \alpha_{b,k} + s_{b,k}SMB_t + h_{b,k}HML_t + m_{b,k}MOM_t + \beta_{b,k}(R_{M,t} - R_{f,t}) + \varepsilon_t$$

$$s_{b,k} = s_{0,b,k} + s_{1,b,k}DY_{t-1} + s_{2,b,k}R_{f,t} \quad h_{b,k} = h_{0,b,k} + h_{1,b,k}DY_{t-1} + h_{2,b,k}R_{f,t} \quad m_{b,k} = m_{0,b,k} + m_{1,b,k}DY_{t-1} + m_{2,b,k}R_{f,t}$$

$$\beta_{b,k} = \beta_{0,b,k} + \beta_{1,b,k}DY_{t-1} + \beta_{2,b,k}R_{f,t}$$

$$b = 1,2,3,4,5, \quad k = 1,2,3,4,5, \quad t = 1,2,\ldots,TP$$

			SGER$_1$				*SGER*$_2$				*SGER*$_3$			
Market/ book	*SGER* quintile		α	$t(\alpha)$	*J* (*p-value*)	*GRS* (*p-value*)	α	$t(\alpha)$	*J* (*p*-value)	*GRS* (*p*-value)	α	$t(\alpha)$	*Hansen's J* (*p-value*)	*GRS* (*p-value*)
		$k=3$	−0.0016	(−1.46)			−0.0016	(−1.44)			−0.0021	(−1.08)		
		$k=4$	0.0005	(0.41)			0.0004	(0.30)			0.0005	(0.25)		
	Highest *SGER*	$k=5$	0.0029**	(2.02)			0.0025*	(1.80)			−0.0015	(−0.60)		
$b=4$	Lowest *SGER*	$k=1$	−0.0071***	(−6.24)	37.74	12.33	−0.0058***	(−4.81)	22.08	8.81	−0.0043**	(−2.10)	4.67	1.55
		$k=2$	−0.0035***	(−3.68)	(0.0000)	(0.0000)	−0.0042***	(−4.06)	(0.0002)	(0.0000)	−0.0012	(−0.65)	(0.3225)	(0.1742)
		$k=3$	−0.0011	(−1.02)			−0.0010	(−0.99)			0.0006	(0.31)		
		$k=4$	0.0012	(0.97)			0.0006	(0.49)			0.0000	(−0.01)		
	Highest *SGER*	$k=5$	0.0035**	(2.26)			0.0029*	(1.93)			−0.0031	(−1.26)		
Lowest	Lowest *SGER*	$k=1$	−0.0064***	(−5.33)	29.42	9.82	−0.0053***	(−4.45)	19.27	6.33	−0.0023	(−1.17)	2.57	*0.51*
$b=5$		$k=2$	−0.0011	(−0.97)	(0.0000)	(0.0000)	−0.0018	(−1.44)	(0.0007)	(0.0000)	0.0008	(0.42)	(0.6320)	(0.7686)
Value		$k=3$	0.0002	(0.18)			−0.0001	(−0.10)			0.0002	(0.08)		
stocks		$k=4$	0.0033**	(2.24)			0.0020	(1.47)			0.0019	(0.82)		
	Highest *SGER*	$k=5$	0.0033*	(1.83)			0.0027	(1.52)			0.0012	(0.40)		

Notes: Significant at: *10, **5 and ***1 percent *p*-values underlie Hansen's J statistics and GRS statistics; $R_{b,k,t}$ is the return on portfolio $b = 1,2,3,4,5$, $k = 1,2,3,4,5$, in month $t = 1,2,\ldots$, $R_{f,t}$ is the riskless rate (the yield on a US Government 1-month Treasury bill), $R_{M,t}$ is the return on the market portfolio (the return on the *CRSP* value weighted index of common stocks), SMB_t and HML_t are the small-minus-big and high-minus-low Fama-French factors, is the momentum factor in month *t*, and DY_{t-1} is the *CRSP* value-weighted index dividend yield lagged one period; *t*-statistics are Newey and West (1987) adjusted with lag length two

A monotonic relation between $\hat{\alpha}$ and *SGER*, $k = 1,2,\ldots,5$, in Table VI suggests that investors might use *SGER* as a stock selection measure with some benefit. For each market/book quintile, $b = 1,2,3,4,5$, Hansen's J statistic rejects the null hypothesis of joint equality of abnormal returns for the five portfolios $k = 1,2,3,4,5$. Significant abnormal returns suggest that investors might form long/short investment strategies to some advantage. In particular, negative $\hat{\alpha}$ for lowest *SGER* portfolio ($k = 1$) suggests that investors might use *SGER* is to identify stocks not to hold or short in portfolios.

6. Summary and conclusion

In this paper, we propose a new explanation for the value-premium that we call the limits to growth hypothesis, which we test with profitable dividend-paying firms. High profitability "covers" the capital expenditure costs of growth, which decreases risk and is consistent with low returns for growth firms that commonly have high profitability. At the same time, we argue that profitability increases risk and expected return "in-the-small" (that is, conditionally) for both value and growth stocks. We report confirming evidence for the hypothesis that this phenomenon is stronger for value stocks.

Our study motivates topics for future research. In the current paper, we report evidence that, *SGER* based on analysts' forecasts over-states realized returns for growth stocks and under-states realized returns for value stocks. A possible source of this bias is forward accounting ROE, which overstates economic-ROE for growth firms and understates economic-ROE for value firms. If ROE follows a mean-reverting process rather than a random walk, then an order bias exists for our ROE-forecasts, which are more extreme than their "true" values and revert to a "grand" mean over time. Blazenko and Fu (2011) investigate several adjustments to ROE-forecasts to be used with SGER as an absolute return measure for cost of capital analysis.

Blazenko and Fu (2010b) report evidence that profitability increases returns for non-dividend-paying firms. They argue that these firms use profitability to finance growth without limit (because these firms have better growth prospects than dividend-paying firms), which increases risk. Consistent with this argument, they find evidence of a "negative" value-premium for non-dividend-paying firms. On the other hand, Blazenko and Fu (2010a) find a value-premium for firms in financial distress (negative trailing-twelve-month earnings) from a U-shaped relation between returns and profitability and a hill-shaped relation between market/book and profitability. Returns are high when market/book is low (high or low profitability), which is a value-premium for firms in financial distress.

A comparison of the current paper with Blazenko and Fu (2010a, b) suggests that the economic reasons for a value-premium differ across business classes if a value-premium exists. Studies that test value-premium hypotheses in the entire cross-section of firms without discriminating between business classes can obscure these economic forces. Thus, in research currently in process, we investigate whether these economic forces can explain both the value-premium in the entire cross-section of firms and return differentials that exist across business classes.

Notes

1. New ventures that are in their product development stages without revenues cannot finance business investments from profitability and must use alternative financing sources, like, for example, venture capitalists. We restrict our empirical testing away from this type of business with the requirement that firms have positive trailing-twelve-month earnings.
2. In the dynamic equity-valuation model that we use to guide our testing, profitability jointly determines market/book and expected return. Because market/book is high when profitability is high, we describe "growth" firms as high-market/book and high-profitability and vice versa for value firms. In Table II, we report evidence that high market/book "growth" firms have high profitability.
3. Theoretically, we make no distinction between dividends and share repurchases. Empirically, we restrict attention to dividend-paying firms because Lee and Rui (2007) find that repurchases are associated with temporary components of earnings, whereas dividends depend on permanent earnings. Grullon and Michaely (2002) find that most firms that repurchase shares also pay dividends. Rather than dividends, there are other financial measures that one might use to represent growth limits, like, for example, the rate of business investment. However, because this investment is difficult to start, stop, or slow down, it is at best a reflection of past growth-limits. Managerial dividend choice has the advantage that it is an immediate and recurring reflection of growth-limits.
4. This expression is a component of the upper branch of equation (A1), which is market/book for a firm whose manager grows his/her business at a rate, g, but has an indefinite real-option to suspend growth upon inadequate profitability (the remainder of the expression is the value of the real-option to suspend and recommence growth).
5. In our empirical testing, we do not find exactly what we had expected from our theoretical modelling. We do, however, find a very close empirical phenomenon. We do not believe this to be a limitation of the paper. Theoretical modelling is always a crude reflection of the real business world. As we find empirical results that confirm or fall short of predictions, we have the opportunity to refine our analysis. It is this interplay between theoretic modelling and empirical testing that advances any discipline.
6. Determine equation (1) for expected return using equation (A1) for the market/book ratio (π), the stochastic process for profitability, $dROE = \sigma * ROE * dz$ (where dz is a Weiner increment), and Ito's lemma. There is no growth factor in the *ROE* process because profitability of a typical business investment does not grow "spontaneously," but instead requires capital growth.
7. For example, the market/book ratio and the forward price/earnings ratio are widely available for most public common companies. Forward earnings in the forward price/earnings ratio uses the consensus analysts' forecasted earnings. The market/book ratio divided by the forward price/earnings ratio is forward *ROE*.
8. We investigate dividend-paying companies in the current paper that have data in the COMPUSTAT, CRSP, and Thomson I/B/E/S databases with positive trailing-twelve-month earnings. Blazenko and Fu (2010b) investigate non-dividend-paying firms with otherwise similar features. Blazenko and Fu (2010a) investigate firms with negative trailing-twelve-month earnings (firms in financial distress). The numbers of firms that meet these selection criteria over the test periods of these studies is 4,688, 10,766, and 8,844, respectively. Monthly observations are 465,132, 442,247, and 245,685, respectively. Dividend-paying firms are the fewest in number but they have the most monthly observations. The reason for this sampling characteristic is that dividend-paying firms tend to be larger and older, which are characteristics that justify our study of this particular class of firms for the limits to growth hypothesis. For all firms with positive trailing-twelve-month earnings, when we sort firms each month into market/book

quintiles and average over time we find that the fraction of firms that pay dividends are 43.17, 55.36, 61.08, 62.51 and 54.09 percent for high to low market/book quintiles, respectively. Growth firms are least likely to pay dividends. Nonetheless, in each market/book quintile, there is a large fraction of firms that pay dividends.

9. Blazenko and Fu (2011) investigate both historical and analysts' *EPS* forecasts for forward *ROE* in *SGER* determination.

10. There is a literature on the accuracy of accounting returns as economic return proxies (Rajan *et al.*, 2007).

11. We report median values for portfolio forward *ROE* and for market/book, because, while we restrict *BVE* to be positive, it can approach zero, which produces extreme values. To be consistent, in Table II, we also report median portfolio dividend yield, median portfolio implicit growth, and median portfolio CAPX/NFA.

12. Empirical evidence in Table II shows a positive correlation between forward *ROE* and *SGER* within any market/book quintile. An interesting question is why we do not sort firms by *ROE* or another profitability measure like, for example, earnings yield rather than *SGER*. There are three answers to this question. First, we identify this positive relation only as the result of producing Table II. This positive relation need not exist a priori. Figures 1 and 2 in Section 2 show that *ROE* and *SGER* can relate negatively. Second, Blazenko and Pavlov's (2009) dynamic equity valuation model suggests *SGER* as a component of equity return rather than an alternative measure (equation (1)). Third, while our primary purpose in this paper is to test the limits to growth hypothesis for equity returns, we also have an interest in *SGER* for its potential in cost of capital determination. *SGER* in Table II is a start to this analysis.

13. TP is 417 for portfolios $SGER_1$ and $SGER_2$ and 314 for portfolio set $SGER_3$.

14. If a stock is delisted during statistical period month t or closing share price is missing on the Statistical Period date $t + 1$, we use the CRSP delisting price (if available) or last trading price in the statistical period month as P_{t+1}. If closing share price is missing on the statistical period date t, we use the next opening price (if available from CRSP) or the first closing price in the statistical period month t.

15. Yan (2007) argues that equally weighting the monthly returns of individual stocks formed from compounding daily returns yields a portfolio return that is free of market microstructure bias. Thus, in addition to returns calculated with equation (4), we also calculated returns for individual companies between Statistical Period dates by compounding CRSP daily returns. Results in this paper with this return methodology are qualitatively similar (not reported). Results in Table III are also qualitatively similar with value-weighted portfolio returns. Abnormal return results in Table V are qualitatively similar, but weaker with value weighted portfolio returns. Both Kothari *et al.* (1995) and Loughran (1997) find that the value-premium is stronger for small firms.

16. Implicit returns in the existing literature generally employ equity valuation models that use the explicit-forecast period/terminal-value approach.

17. Possibly the reason for this "value-versus-growth bias" for *SGER* compared to realized returns is that economic *ROE* follows a mean-reverting process (Fama and French, 2000) rather than the random walk that we presumed in our dynamic equity valuation model represented by equation (1). Blazenko and Fu (2011) investigate whether reversion in profitability reconciles the value-versus-growth bias. They compare several *ROE* forecasts adjusted for profitability reversion using both historical and analysts' forecasted earnings.

18. Our paper offers strong theoretical modeling, which predicts relations between profitability and risk that we use to guide our empirical tests. However, in this testing, we cannot control the determinants of risk like we can in a stylized theoretical model. Thus, we investigate

observable relations between profitability and returns that we hypothesize arise from underlying relations between profitability and risk from the theoretical model.

19. While we do not uncover evidence that profitability decreases returns for growth firms, we do report evidence in the following sub-section that the relation between returns and profitability is stronger (more positive) for value firms compared to growth firms. Together with evidence of a value-premium in-the-large for dividend-paying firms in the previous sub-section, the limits to growth hypothesis is useful for our understanding of why profitability can either increase or decrease risk and returns.

20. Rather than Fama-MacBeth regressions, results are qualitatively similar (not reported) using panel regression with standard errors clustered by statistical period. Analysis suggests a stronger time effect than a firm effect. When panel data have only a time effect, Petersen (2009) concludes that Fama-MacBeth regressions produce unbiased test statistics. Thus, we report results in Table IV only for Fama-MacBeth regressions.

21. Results in Table V are similar if we estimate an unconditional rather than a conditional version of the Fama-French-Carhart four-factor model. They are also similar if we us a conditional version of the Chen *et al.* (2010) three factor model (not reported).

22. Jaffe *et al.* (1989) find that earnings yield explains stock returns beyond a market-factor. However, Fama and French (1996) show that this earnings yield effect is subsumed by a market/book factor. The economic rationale for a market/book factor is that it represents distressed companies that have had poor operating performance in the recent past and that, therefore, have higher than normal leverage. Alternatively, Debondt and Thaler (1985) and Lakonishok *et al.* (1994) argue that the explanatory power of market/book beyond a market-factor is a reflection of investor irrationality.

23. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library

24. In order to interpret the $\hat{\alpha}$s, of equation (7) as "abnormal returns," the factors have to be traded assets, which they are. Dividend yield on the right-hand-side of equation (8) is not a traded asset. However, dividend yield is used only to represent variation in factor coefficients over time and, thus, need not be a traded asset for this purpose.

25. Following the methodology in Cochrane (2001, pp. 201-64), the J statistic is distributed under the hypothesis that intercepts equal one another with degrees of freedom equal to the number of over-identifying restrictions minus one in generalized method of moments (GMM) estimation.

References

Anderson, C.W. and Garcia-Feijoo, L. (2006), "Empirical evidence on capital investment, growth options, and security returns", *Journal of Finance*, Vol. 61 No. 1, pp. 171-94.

Arrow, K.J. (1974), *The Limits of Organization*, Norton & Company, New York, NY.

Blazenko, G.W. and Fu, Y. (2010a), "Financial distress and the value-premium", available at: http://ssrn.com/abstract=1694216

Blazenko, G.W. and Fu, Y. (2010b), "Non-dividend paying stocks and the negative value-premium", available at: http://ssrn.com/abstract=1654705

Blazenko, G.W. and Fu, Y. (2011), "Dynamic growth equity returns", available at: http://ssrn.com/abstract=1776194

Blazenko, G.W. and Pavlov, A.D. (2009), "Investment timing for dynamic business expansion", *Financial Management*, Vol. 38 No. 4, pp. 837-60.

Blazenko, G.W. and Pavlov, A.D. (2010), "Value maximizing hurdle rates for R&D investment", *Economics of Innovation and New Technology*, Vol. 19 No. 8, pp. 719-41.

Campbell, J.Y. and Vuolteenaho, T. (2004), "Bad beta, good beta", *The American Economic Review*, Vol. 94 No. 5, pp. 1249-75.

Carhart, M. (1997), "On persistence in mutual fund performance", *Journal of Finance*, Vol. 56 No. 1, pp. 57-82.

Carlson, M., Fisher, A. and Giammarino, R. (2004), "Corporate investment and asset price dynamics: implications for the cross-section of returns", *Journal of Finance*, Vol. 59 No. 6, pp. 2577-603.

Chen, L., Novy-Marx, R. and Zhang, L. (2010), "An alternative three-factor model", available at: http://ssrn.com/abstract=1418117

Cochrane, J.H. (2001), *Asset Pricing*, Princeton University Press, Princeton, NJ.

Debondt, W.F.M. and Thaler, R.H. (1985), "Does the stock market overreact?", *Journal of Finance*, Vol. 40 No. 4, pp. 557-81.

Easton, P.D. (2006), "Use of earnings forecasts to estimate and compare cost of capital across regimes", *Journal of Business Finance & Accounting*, Vol. 33 Nos 3/4, pp. 374-94.

Easton, P.D. and Monahan, S.J. (2005), "An evaluation of accounting-based expected return measures", *The Accounting Review*, Vol. 80 No. 2, pp. 501-38.

Fama, E.F. and French, K.R. (1993), "Common risk factors in the returns on stocks and bonds", *Journal of Financial Economics*, Vol. 33 No. 1, pp. 3-56.

Fama, E.F. and French, K.R. (1995), "Size, book-to-market, earnings, and returns", *Journal of Finance*, Vol. 50 No. 1, pp. 131-55.

Fama, E.F. and French, K.R. (1996), "Multifactor explanations of asset pricing anomalies", *Journal of Finance*, Vol. 51 No. 1, pp. 55-84.

Fama, E.F. and French, K.R. (1998), "Value versus growth: international evidence", *Journal of Finance*, Vol. 53 No. 6, pp. 1975-99.

Fama, E.F. and French, K.R. (2000), "Forecasting profitability and earnings", *Journal of Business*, Vol. 73 No. 2, pp. 161-75.

Fama, E.F. and French, K.R. (2001), "Disappearing dividends: changing firm characteristics or lower propensity to pay?", *The Journal of Financial Economics*, Vol. 60 No. 1, pp. 3-43.

Fama, E.F. and French, K.R. (2006), "Profitability, investment, and average returns", *The Journal of Financial Economics*, Vol. 82 No. 3, pp. 491-518.

Fama, E.F. and French, K.R. (2007), "The anatomy of value and growth stock returns", *Financial Analysts Journal*, Vol. 63 No. 6, pp. 44-54.

Fama, E.F. and MacBeth, J.D. (1973), "Risk, return, and empirical tests", *Journal of Political Economy*, Vol. 81 No. 3, pp. 607-37.

Ferson, W.E. and Harvey, C.R. (1999), "Conditioning variables and the cross section of stock returns", *Journal of Finance*, Vol. 54 No. 4, pp. 1325-60.

Ferson, W.E. and Warther, V.A. (1996), "Evaluating fund performance in a dynamic market", *Financial Analysts Journal*, Vol. 52 No. 6, pp. 20-8.

Froot, K.A., Scharfstein, D.S. and Stein, J.C. (1993), "Risk management: coordinating corporate investment and financing policies", *Journal of Finance*, Vol. 48 No. 5, pp. 1629-58.

García-Feijóo, L. and Jorgensen, R.D. (2010), "Can operating leverage be the cause of the value-premium?", *Financial Management*, Vol. 39 No. 3, pp. 1127-54.

Gebhardt, W.R., Lee, C.M.C. and Swaminathan, B. (2001), "Toward an implied cost of capital", *Journal of Accounting Research*, Vol. 39 No. 1, pp. 135-76.

Gibbons, M.R., Ross, S.A. and Shanken, J. (1989), "A test of the efficiency of a given portfolio", *Econometrica*, Vol. 57 No. 5, pp. 1121-52.

Goldstein, R. and Zapatero, F. (1996), "General equilibrium with constant relative risk aversion and Vasicek interest rates", *Mathematical Finance*, Vol. 6 No. 3, pp. 331-40.

Grullon, G. and Michaely, R. (2002), "Dividends, share repurchases and the substitution hypothesis", *Journal of Finance*, Vol. 57 No. 4, pp. 1649-84.

Haugen, R.A. and Baker, N.L. (1996), "Commonality in the determinants of expected returns", *Journal of Financial Economics*, Vol. 41 No. 3, pp. 401-39.

Higgins, R.C. (1981), "Sustainable growth under inflation", *Financial Management*, Vol. 10 No. 4, pp. 36-40.

Jaffe, J., Keim, D.B. and Westerfield, R. (1989), "Earnings yields, market values, and stock returns", *Journal of Finance*, Vol. 44 No. 1, pp. 135-48.

Kothari, S.P., Shanken, J. and Sloan, R.G. (1995), "Another look at the cross section of expected stock returns", *Journal of Finance*, Vol. 50 No. 1, pp. 185-224.

Lakonishok, J., Shleifer, A. and Vishny, R. (1994), "Contrarian investment, extrapolation, and risk", *Journal of Finance*, Vol. 49 No. 6, pp. 1541-78.

Lee, B.-S. and Rui, O.M. (2007), "Time series behavior of share repurchases and dividends", *Journal of Financial and Quantitative Analysis*, Vol. 42 No. 1, pp. 119-42.

Loughran, T. (1997), "Book-to-market across firm size, exchange and seasonality: is there an effect", *Journal of Financial and Quantitative Analysis*, Vol. 32 No. 3, pp. 249-68.

Mohanram, P. (2005), "Separating winners from losers among low book-to-market stocks using financial statement analysis", *Review of Accounting Studies*, Vol. 10 Nos 2/3, pp. 133-70.

Newey, W.K. and West, K.D. (1987), "A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix", *Econometrica*, Vol. 55 No. 3, pp. 703-8.

Petersen, M.A. (2009), "Estimating standard errors in finance panel data sets: comparing approaches", *The Review of Financial Studies*, Vol. 22 No. 1, pp. 435-80.

Piotroski, J.D. (2000), "Value investing: the use of historical financial statement information to separate winners from losers", *Journal of Accounting Research*, Vol. 38 No. 3, pp. 1-41.

Rajan, M.V., Reichelstein, S. and Soliman, M.T. (2007), "Conservatism, growth, and return on investment", *Review of Accounting Studies*, Vol. 12 Nos 2/3, pp. 326-70.

Tobin, J. (1969), "A general equilibrium approach to monetary theory", *Journal of Money, Credit and Banking*, Vol. 1 No. 1, pp. 15-29.

Williams, J.B. (1938), *The Theory of Investment Value*, Augustus M. Kelly, New York, NY.

Yan, Y. (2007), "Research impacts and correction of the upward biased CRSP daily equal-weighted index", available at: http://ssrn.com/abstract=971073

Zhang, L. (2005), "The value-premium", *Journal of Finance*, Vol. 60 No. 1, pp. 67-103.

Further reading

Fama, E.F. and French, K.R. (1992), "The cross-section of expected stock returns", *Journal of Finance*, Vol. 47 No. 2, pp. 427-65.

Shackleton, M.B. and Sødal, S. (2005), "Smooth pasting as rate of return equalization", *Economic Letters*, Vol. 89 No. 2, pp. 200-6.

Appendix 1

This Appendix describes Blazenko and Pavlov's (2009) model of a dynamically expanding business where profit growth at the rate, g% per annum, requires capital growth, at the rate g% per annum. Because we presume that the manager maintains a target financial structure, both debt capital and equity capital grow that this same rate g to finance business expansion. Because these rates are the same, when a manager grows his/her business or suspends growth, the return on equity, *ROE*, which is earnings divided by book equity, follows a non-growing geometric Brownian motion with a volatility parameter σ. If growth of earnings at the rate g requires growth in book equity at the rate g, then *ROE* does not grow.

The manager's expansion decision depends on profitability, *ROE*. When *ROE* exceeds a value maximizing expansion threshold, ξ^*, which equation (A3) describes, the manager expands earnings at the rate g with growth in book equity (and also growth in debt capital) at the rate g. When *ROE* is less than the expansion boundary, ξ^*, the manager suspends growth ($g = 0$) until profitability improves. Using the equilibrium valuation methodology of Goldstein and Zapatero (1996), market/book, $\pi(ROE)$, for equity for $0 \le g < r^*$ with $r^* \equiv r + \theta\sigma_{x,c}$ is (Blazenko and Pavlov, 2009):

$$\pi(ROE) = \begin{cases} \frac{ROE}{r^*-g} + \frac{g\xi^*}{r^*(r^*-g)}\frac{(1-\alpha)}{(\alpha-\lambda)}\left(\frac{ROE}{\xi^*}\right)^{\lambda} - \frac{g}{(r-g)}\left(1-\frac{\alpha}{(\alpha-\lambda)}\left(\frac{ROE}{\xi^*}\right)^{\lambda}\right), & growth, \quad ROE \ge \xi^* \\ \frac{ROE}{r^*} + \frac{g\xi^*}{r^*(r^*-g)}\frac{(1-\lambda)}{(\alpha-\lambda)}\left(\frac{ROE}{\xi^*}\right)^{\alpha} - \frac{g}{(r-g)}\frac{\lambda}{(\lambda-\alpha)}\left(\frac{ROE}{\xi^*}\right)^{\lambda}, & suspend \ growth, \quad ROE < \xi^* \end{cases} \tag{A1}$$

where,

$$\alpha \equiv \frac{1}{2} + \frac{\theta\sigma_{x,c}}{\sigma^2} + \sqrt{\frac{2r}{\sigma^2} + \left(\frac{1}{2} + \frac{\theta\sigma_{x,c}}{\sigma^2}\right)^2}, \quad \lambda \equiv \frac{1}{2} + \frac{\theta\sigma_{x,c}}{\sigma^2} - \sqrt{\frac{2(r-g)}{\sigma^2} + \left(\frac{1}{2} + \frac{\theta\sigma_{x,c}}{\sigma^2}\right)^2}, \tag{A2}$$

$$\xi^* = r^* \times \left[\frac{r^*-g}{r-g}\right] \times \left[\frac{\alpha}{\alpha-1}\right] \times \left[\frac{\lambda}{\lambda-1}\right] \tag{A3}$$

The parameter, θ, is constant relative risk aversion for a representative investor. The parameter $\sigma_{x,c}$ measures business risk of the common share and equals covariance of the log of *ROE* (equivalently the log of earnings) with the log of aggregate consumption in the economy. For expositional simplicity, we presume, $\theta\sigma_{x,c} > 0$, which means the risk premium for equity ownership is positive. The parameter, r, is risk free rate. The risk adjusted rate for a firm that permanently does not growth, $r^* \equiv r + \theta\sigma_{x,c}$, is risk free rate, r, plus a risk premium $\theta\sigma_{x,c}$. Equation (A3) is the value maximizing expansion boundary, ξ^*_c. If $ROE \ge \xi^*$, the manager grows the business at the maximum rate g.

Appendix 2

In this Appendix, we show that *SGER* in equation (3) is expected return from the static growth discounted dividend model – the *Gordon Growth Model*. If forward dividend per share per annum is D, if g is the expected per annum dividend growth rate, and if *SGER* is expected per annum return, then share price, P_0, is:

$$P_0 = \frac{D}{SGER - g} \tag{A4}$$

Forward dividend yield is $dy \equiv (D/P_0) = SGER - g$. So:

$$P_0 = \frac{D}{dy} \tag{A5}$$

The payout ratio is one minus the retention ratio, b:

$$1 - b = \frac{D}{EPS}$$

where EPS is forward EPS per annum. Forward dividend is the product of the payout ratio and forward earnings:

$$D = (1 - b)*EPS \tag{A6}$$

The forward ROE, is:

$$ROE = \frac{EPS}{BPS} \tag{A7}$$

where BPS is book equity per share. Substitute equations (A6) and (A7) into equation (A5) and divide by book equity per share, BPS, to write market/book as:

$$\frac{P_0}{BPS} = \frac{(1 - b)*ROE}{dy} \tag{A8}$$

Rearrange equation (A8):

$$\frac{P_0}{BPS} dy = ROE - b \times ROE = ROE - g \tag{A9}$$

The second equality in equation (A9) uses the "sustainable" growth relation (Higgins, 1981):

$$g = b \times ROE \tag{A10}$$

Rearrange equation (A9):

$$g = ROE - \left(\frac{P_0}{BPS}\right) dy \tag{A11}$$

Forward dividend yield, dy, in equation (A11) is unobservable. However, current dividend yield (the current dollar rate of dividend payment per share per annum divided by share price) is observable. Equation (A16) in Appendix 3 shows how to calculate a firm's forward dividend yield, dy, from forward ROE, market/book and current dividend yield, dy_0. Because expected return is dividend yield plus growth, and with equation (A11):

$$SGER = ROE + \left(1 - \frac{P_0}{BPS}\right) dy \tag{A12}$$

Appendix 3

In this Appendix, we calculate the forward dividend yield from current dividend yield, dy_0. Forward dividend yield, dy, is current dividend yield times growth:

$$dy = dy_0*(1 + g) \tag{A13}$$

Substitute equation (A13) into equation (A11):

$$g = ROE - \left(\frac{P_0}{BPS}\right) dy_0 (1+g) \tag{A14}$$

Rearrange equation (A14) to find an expression for growth:

$$g = \frac{ROE - (P_0/BPS)dy_0}{1 + (P_0/BPS)dy_0} \tag{A15}$$

Substitute equation (A15) into equation (A13) and rearrange:

$$dy = \left(\frac{1 + ROE}{1 + (P_o/BPS)dy_0}\right) dy_0 \tag{A16}$$

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