International Valuation Using Smart Multiples

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Abstract

This study develops and tests a general approach to international equity valuation using accounting-based multiples (accounting-variable-to-price ratios). Valuation theory suggests that the efficacy of multiple-based techniques will depend on: (1) the choice of the accounting variable, and (2) the judicious selection of comparable firms. We discuss key considerations in these two decisions in an international setting, and test our conjectures using data for firms from G7 countries. Our results show that the use of "smart multiples," which incorporate industry-, country-, and firm-specific factors in selecting peer firms, can greatly reduce problems associated with accounting diversity and differences in cross-border risks.

1. Introduction

Traditional equity analysis involves comparing firms from the same country. In conducting their analysis, financial analysts (and academics) generally place firms from different countries into separate silos. The rationale for this practice had seemed unassailable – so many of the social, economic, political, and institutional differences that could affect equity analysis are defined along national lines. Problems associated with international accounting diversity and country-specific risk factors are often perceived as insurmountable obstacles that prohibit meaningful comparison of firms from different countries.

Powerful economic forces now compel us to rethink this problem. With increased global competition, many large- to mid-sized corporations now operate in multiple countries. Even domestic firms find their competitors are increasingly likely to be foreign. In this environment, corporate managers frequently need to evaluate their firm's performance in relation to that of a foreign competitor. At the same time, firms are increasingly cross-listing in foreign exchanges and investors are venturing beyond domestic borders in search of attractive opportunities.[1] As global markets continue to integrate, the demand for analytical tools that facilitate comparison of firms from different countries has also increased.

In this study, we develop and test a general approach to international equity valuation using accounting-based multiples (accounting-variable-to-price ratios). Theory suggests that the efficacy of accounting-based valuation techniques using market multiples hinges on two decisions: (1) the choice of the accounting variable, and (2) the judicious selection of comparable firms. Two recent studies have provided new insights on these decisions using U. S. data (e.g., Liu, Nissim, and Thomas (LNT; 2002) and Bhojraj and

[1] According to data compiled by the Federal Reserve, investments by U. S. investors in international securities quadrupled between 1988 and 1998 (see Eun and Resnick (2001; page 255)).

Lee (BL; 2002)). Our study extends and generalizes these approaches to an international setting, and tests their efficacy using data from G7 countries.

The intuition behind our technique is straightforward. The choice of comparable firms should be a function of the variables that drive cross-sectional variation in a given market multiple. For example, in the case of the enterprise-value-to-sales (EVS) multiple, comparable firms should be selected on the basis of variables that drive cross-sectional differences in this ratio, including expected profitability, growth, and the cost-of-capital.[2] In this spirit, we use variables nominated by valuation theory to develop a "warranted multiple" for each firm based on large sample estimations. We then identify firms having the closest warranted valuation multiple as the target firm's "peers."

This valuation approach is particularly appealing in an international context because the theory we employ imposes minimal restrictions on the underlying accounting system. For example, the residual income model (RIM) from which we derive our price-to-book (PB) model is based on the discounted dividend model (DDM) and the additional requirement that an accounting system follows clean-surplus accounting in expectation.[3] Therefore, in theory, the effect of cross-border accounting differences should be largely accounted for by the introduction of the explanatory variables suggested by the model.[4]

Our procedures result in two end products. First, we produce four warranted multiples for each firm – that is, a warranted enterprise-value-to-sales (WEVS), a warranted price-to-book (WPB) ratio, a warranted price-to-earnings (WPE) ratio, and a warranted price-

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[2] We use the enterprise-value-to-sales ratio (EVS) rather than the price-to-sales (PS) ratio because the former is conceptually superior when firms are differentially levered. We also report results for the price-to-book (PB) ratio, the price-to-earnings (PE) ratio, and the price-to-two-year-ahead-earnings (PE2) ratio.

[3] The clean-surplus relation pertains to the accounting identity that the next period's book value is the sum of this period's book value, plus next period's earnings minus next period's net dividends.

[4] In implementation, the model relies on imperfect empirical proxies and estimation shortcuts necessitated by data constraints. See Frankel and Lee (1999) for a detailed discussion of the limitations of the RIM in international applications.

to-two-year-ahead-forecasted-earnings (WPE2). These warranted multiples are based on systematic variations in the observed multiples in cross-section over large samples. The warranted multiples themselves are useful for valuation purposes, because they incorporate the effect of cross-sectional variations in growth, profitability, and cost-of-capital. Second, by ranking firms according to their warranted multiples, we generate a list of peer firms for each target firm. For those who prefer to conduct equity valuation using market multiples, this approach results in a more objective method for identifying comparable firms.

For financial researchers, our approach suggests a new technique for selecting control firms in international settings. Recent methodology studies have demonstrated that characteristic-matched control samples provide more reliable inferences in market-based research (e.g., Barber and Lyon (1997), Lyon et al. (1999)). Our study extends this line of research by presenting a more precise technique for matching sample firms based on characteristics identified by valuation theory. Our methodology is useful whenever the choice of control firms plays a prominent role in the research design of a international market-based study.

We test our approach by examining the efficacy of the selected comparable firms in predicting future (one- to three-year-ahead) market multiples.[5] Our results show that comparable firms selected in this manner offer sharp improvements over comparable firms selected on the basis of other techniques, including industry and size matches. This result holds for all four accounting-based multiples – indeed, the adjusted r-square is typically more than double those achieved using simply industry and size matches. Interestingly, we find that the closest matching firms using the warranted multiples technique is, more often than not, from a different country. In fact, constraining the peer

[5] We forecast future multiples because we do not regard the current stock price as necessarily the best benchmark for assessing valuation accuracy. As discussed later, forecasting future multiples is not equivalent to forecasting future prices or returns.

group to firms from the same country greatly reduces the number of available peers, but does not enhance the accuracy of the valuation model.

Our tests show that accounting diversity and country-specific risk have differential effects on the four multiples. Country-specific differences are least important in explaining the enterprise-to-sales (EVS) ratio. After controlling for industry and firm-specific differences, country-based differences (as captured by the country harmonic mean of this ratio) have little power in explaining cross-sectional variations in EVS. This result is not surprising, as accounting differences governing the recognition of sales revenue is quite similar across the G7 countries.

Country-based differences also play a relatively minor role in explaining PB multiples after we control for industry, growth, profitability, and risk measures. In contrast, we find that country-based differences are extremely important in explaining variations in the two price-to-earnings (PE and PE2) ratios, even after controlling for other industry and firm attributes. These findings highlight the need to use estimation models tailored to each multiple when conducting cross-border analyses.

In summary, our results show that multiple-based valuations can be useful in an international setting. We find that the choice of comparable firms can be made more systematic and less subjective through the application of valuation theory. Indeed, the efficacy of four commonly used valuation multiples (EVS, PB, PE, and PE2) can be sharply improved by using a "smart multiple" approach. Moreover, we find that it is generally advantageous to include foreign firms when performing multiple-based valuations, particularly for firms domiciled in smaller countries.

In the next section, we further motivate our study and discuss its relation to the existing literature. In section three, we develop the theory that underpins our analysis. In section four, we discuss sample selection, research design and estimation procedures. Section five reports our empirical results, and section six concludes with a discussion of the implications of our findings.

2. Motivation and Relation to Prior Literature

Accounting-based market multiples are easily the most common technique in equity valuation. These multiples are ubiquitous in the reports and recommendations of sell-side financial analysts, and are widely used in investment bankers' fairness opinions (e.g., DeAngelo (1990)). They also appear in valuations associated with initial public offerings (IPOs), leveraged buyout transactions, seasoned equity offerings (SEOs), and other merger and acquisition (M&A) activities.[6]

Despite their widespread usage, little theory is available to guide the application of these multiples. With a few exceptions, the accounting and finance literature contains little evidence on how or why certain individual multiples, or certain comparable firms, should be selected in specific contexts. Some practitioners even suggest that the selection of comparable firms is essentially "an art form" that should be left to professionals.[7] Yet the degree of subjectivity involved in their application is discomforting from a scientific perspective. Moreover, the aura of mystique that surrounds this technique limits its coverage in financial analysis courses, and ultimately threatens its credibility as a serious alternative in equity valuation.

There are at least three situations in which comparable firms are useful. First, in conducting fundamental analysis, we often need to make forecasts of sales growth rates, profit margins, and asset efficiency ratios. In these settings, we typically appeal to comparable firms from the same industry as a source of reference. Second, in multiples-based valuation, the market multiples of comparable firms are used to infer the market value of the target firm. Third, in empirical research, academics seek out comparable

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[6] For example, Kim and Ritter (1999) discuss the use of multiples in valuing IPOs. Kaplan and Ruback (1995) examine alternative valuation approaches, including multiples, in highly levered transactions.

[7] For example, Golz (1986) Woodcock (1992), and McCarthy (1999).

firms as a research design device for isolating a variable of particular interest. Our paper is focused primarily on the second and third needs for comparable firms.[8]

Given their widespread popularity among practitioners, market multiples based valuation has been the subject of surprisingly few academic studies. Three recent studies that provide some insights on this topic are Kim and Ritter (KR; 1999), Liu, Nissim, and Thomas (LNT; 2002), and Baker and Ruback (BR; 1999). All three examine the relative accuracy of alternative multiples in different settings. KR uses alternative multiples to value initial public offers (IPOs), while LNT and BR investigate the more general context of valuation accuracy relative to current stock prices. KR and LNT both find that forward earnings perform much better than historical earnings. LNT shows that in terms of accuracy relative to current prices, the performance of forward earnings is followed by that of historical earnings measures, cash flow measures, book value, and finally, sales. In addition, Baker and Ruback (1999) discuss the advantages of using harmonic means – that is, the inverse of the average of inversed ratios – when aggregating common market multiples. None of these studies address the choice of comparable firms beyond noting the usefulness of industry groupings.

Closer to this study are three prior studies that either investigate the effect of comparable firm selection on multiple-based valuation, or examine the determinants cross-sectional variations in certain multiples. Boatsman and Baskin (1981) compare the accuracy of value estimated based on earnings-to-price (EP) multiples of firms from the same industry. They find that, relative to randomly chosen firms, valuation errors are smaller when comparable firms are matched on the basis of historical earnings growth. Similarly, Zarowin (1990) examines the cross-sectional determinants of EP ratios. He shows forecasted growth in long-term earnings is a dominant source of variation in these

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[8] Our technique is not directly relevant to the first situation, because it does not match firms on the basis of a single attribute (such as sales growth, or profit margin). Instead, our approach matches firms on the basis of a set of variables suggested by valuation theory. Our paper also does not address the trivial case whereby a firm is its own

ratios. Other factors, such as risk, historical earnings growth, forecasted short-term growth, and differences in accounting methods, seem to be less important. Alford (1992) examines the relative valuation accuracy of EP multiples when comparable firms are selected on the basis of industry, size, leverage, and earnings growth. He finds that valuation errors decline when the industry definition used to select comparable firms is narrowed to two or three digit SIC codes, but that there is no further improvement when a four-digit classification is used. He also finds that after controlling for industry membership, further controls for firm size, leverage, and earnings growth do not reduce valuation errors.

Several stylized facts emerge from these studies. First, the choice of which multiple to use affects accuracy results. In terms of accuracy relative to current prices, forecasted earnings perform relatively well (KR, LNT); the price-to-sales and price-to-book ratios perform relatively poorly (LNT). Second, industry membership is important in selecting comparable firms (Alford (1992), LNT, KR). The relation between historical growth rates and EP ratios is unclear, with studies reporting conflicting results (Zarowin (1999), Alford (1992), Boatsman and Baskin (1981)), but forecasted growth rates are important (Zarowin (1999)). Other measures, including risk-based metrics (Leverage and size) do not seem to provide much additional explanatory power for E/P ratios.

Our study is distinct from these prior studies in several respects. First, our approach is more general, and relies more heavily on valuation theory. This theory guides us in developing a regression model that estimates a "warranted multiple" for each firm. We then define a firm's peers as those firms with the closest warranted market multiple to the target firm, as identified by our model. The advantage of a regression-based approach is that it allows us to simultaneously control for the effect of various explanatory variables. For example, some firms might have higher current profitability, but lower future growth prospects, and higher cost-of-capital. This approach allows us to consider the

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comparable. As we point out later, in multiples-based valuation of public firms, a firm's own lagged multiple is often the most useful empirical proxy for its current multiple.

simultaneous effect of all these variables, and to place appropriate weights on each variable based on empirical relations established in large samples.

Our empirical results illustrate the advantage of this approach. Contrary to the mixed results in prior studies, we find that factors related to profitability, growth, and risk, play an important role in explaining cross-sectional variations of these multiples. In fact, we find that after controlling for firm-specific attributes and industry membership, country membership has little role to play in explaining EVS ratios. However, country membership continues to be important in explaining PB, and particularly, PE ane PE2 ratios.

Second, we employ recent advances in the empirical estimation of cost-of-capital (i.e., Gebhardt et al. (2001)) to help identify potential explanatory variables for estimating our model of warranted market multiples. The risk metrics examined in prior studies are relatively simple, and the results are mixed. We follow the technique in Gebhardt et al. (2001) to secure additional explanatory variables that are associated with cross-sectional determinants of a firm's implied cost-of-capital. Several of these factors turn out to be important in explaining EVS and PB ratios.

Third, we do not assume that the current stock price of a firm is the best estimate of firm value. Prior studies compare the valuation derived by the multiples to a stock's current price to determine the valuation error. In effect, these studies assume that the current stock price is the appropriate normative benchmark by which to judge a multiple's performance. Under this assumption, it is impossible to derive an independent valuation using multiples that is useful for identifying over- or under-valued stocks.

Our less stringent assumption of market efficiency is that a firm's current price is a noisy proxy for the true, but unobservable intrinsic value, defined as the present value of expected dividends. Moreover, due to arbitrage, price converges to value over time. As a result, price and various alternative estimates of value based on accounting

fundamentals will be co-integrated over time.[9] Under this assumption, we estimate a "warranted multiple" that differs from the actual multiple implicit in the current price. Consistent with this philosophy, we test the efficacy of alternative estimated multiples by comparing their predictive power for a firm's future multiples (e.g., its one, two, or three year ahead valuation ratios).[10]

3. Development of the theory

The valuation literature discusses two broad approaches to estimating shareholder value. The first is "direct valuation," in which firm value is estimated directly from its expected cash flows without appeal to the current price of other firms. Most direct valuations are based on projected dividends and/or earnings, and involve a present value computation of future cash flow forecasts. Common examples are the dividend discount model (DDM), the discounted cash flow (DCF) model, the residual income model (RIM), or some other variant.[11] The second is a "relative valuation" approach in which firm value estimates are obtained by examining the pricing of *comparable* assets. This approach involves applying an accounting-based market multiple (e.g., price-to-earnings, price-to-book, or price-to-sales ratios) from the comparable firm(s) to our accounting number to secure a value estimate.[12]

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[9] For a more formal statistical model of this co-integrated relationship between price and alternative estimates of fundamental value, see, Lee, Myers, and Swaminathan (1999).

[10] Note that forecasting future multiples is different from forecasting future prices or returns. In the current context, forecasting future price involves two steps: forecasting future multiples, and forecasting future fundamentals (e.g., sales or book value per share). Our main interest is in the stability of the multiples relation, and not in forecasting fundamentals. An example of fundamental analysis that focuses on forecasting future fundamentals is Ou and Penman (1989).

[11] We do not discuss liquidation valuation, in which a firm is valued at the "breakup value" of its assets. Commonly used in valuing real estate and distressed firms, this approach is not appropriate for most going concerns.

[12] A third approach, not discussed here, is contingent claim valuation based on option pricing theory. Designed for pricing traded assets with finite lives, this approach encounters significant measurement problems when applied to equity securities. See Schwartz and Moon (2000) and Kellogg and Charnes (2000) for examples of how this approach can be applied to "new economy" stocks.

In relative valuation, an analyst applies the market multiple from a "comparable firm" to a target firm's corresponding accounting number: Our estimated price = (Their market multiple) X (Our accounting number). In so doing, the analyst treats the accounting number in question as a summary statistic for the value of the firm. Assuming our firm in its current state "deserves" the same market multiple as the comparable firm, this procedure allows us to estimate what the market would pay for our firm.

Which firm(s) "deserve" the same multiple as our target firm? Valuation theory helps to resolve this question. In fact, explicit expressions for most of the most commonly used valuation multiples can be derived using little more than the dividend discount model and a few additional assumptions. For example, it is not difficult to derive the price-to-earnings ratio in terms of expected growth rates, the dividend payout ratio, and the cost of capital. In the case of a stable growth firm, the price-to-earnings ratio can be expressed as:

$$\frac{P_t^*}{E_t} = \frac{k\,(1+g)}{(r-g)} \quad , \qquad (1)$$

where P_t^* is the present value of future dividends at time t, E_t = earnings at time t; k is a constant dividend payout ratio (dividends as a percentage of earnings); r = cost of equity capital; and g is the expected earnings growth rate.

In the more general case, we can model the firm's growth in terms of an initial period (say n years) of high growth, followed by a period of more stable growth in perpetuity. Under this assumption, a firm's price-to-earnings ratio can be expressed as:

$$\frac{P_t^*}{E_t} = k\left[\frac{(1+g_1)(1-((1+g_1)^n/(1+r)^n))}{r-g_1} + \frac{(1+g_1)^n(1+g_2)}{(1+r)^n(r-g_2)}\right] \quad , \qquad (2)$$

where P_t^* is the present value of future dividends at time t, E_t = earnings at time t; k is a constant payout ratio; r = cost of equity capital; g_1 is the initial earnings growth rate, which is applied for n years; and g_2 is the constant growth rate applicable from period n+1 onwards.

Equation (2) shows that a firm's P/E ratio should be a function of its dividend payout ratio (k), expected growth rates (g_1 and g_2), and cost of capital (r). If the market value of equity approximates the present value of expected cash flows, these variables should explain a significant portion of the cross-sectional variation in the P/E ratio.

In the same spirit, the residual income formula allows us to re-express the discounted dividend model in terms of the price-to-book ratio:[13]

$$\frac{P_t^*}{B_t} = 1 + \sum_{i=1}^{\infty} \frac{E_t\left[\left(ROE_{t+i} - r\right) B_{t+i-1}\right]}{\left(1+r\right)^i \qquad B_t} \quad , \qquad (3)$$

where P_t^* is the present value of expected dividends at time t, B_t = book value at time t; $E_t[.]$ = expectation based on information available at time t; r = cost of equity capital; and ROE_{t+i} = the after-tax return on book equity for period $t+i$. This equation shows that a firm's price-to-book ratio is a function of its expected ROEs, its cost-of-capital, and its future growth rate in book value. Firms that have similar price-to-book ratios should have present values of future residual income (the infinite sum in the right-hand-side of equation (3)) that are close to each other.

Similarly, it is not difficult to derive the enterprise-value-to-sales ratio in terms of subsequent profit margins, growth rates, and the cost of capital. In the case of a stable growth firm, the enterprise-value-to-sales ratio can be expressed as:[14]

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[13] See Feltham and Ohlson (1995) or Lee (1999) and the references therein for a discussion of this model.

[14] See Damodaran (1994; page 245) for a similar expression.

$$\frac{EV_t^*}{S_t} = \frac{E_t(PM\ x\ k\ x\ (1+g))}{(r-g)} \quad , \quad (4)$$

where EV_t^* is total enterprise value (equity plus debt) at time t, S_t = total sales at time t; $E_t[.]$ = expectation based on information available at time *t;* PM is operating profit margin (earnings before interest); k is a constant payout ratio (dividends and debt servicing costs as a percentage of earnings; alternatively, it is sometimes called one minus the plow-back rate); r = weighted average cost of capital; and g is a constant earnings growth rate.

Equation (4) shows that a firm's warranted enterprise-value-to-sales ratio is a function of its expected operating profit margin (PM), payout ratio (k), expected growth rates (g), and cost of capital (r). If the market value of equity and debt approximates the present value of expected cash flows, these variables should explain a significant portion of the cross-sectional variation in the EVS ratio.

In the tests that follow, we employ a multiple regression model to estimate the warranted PE, PE2, EVS and PB ratios for each firm. The explanatory variables we use in the model are empirical proxies for the key elements in the right-hand-side of equations (1), (3), and (4). Specifically, we include growth, profitability, and risk-related variables, as well as a measure of the level of research and development (R&D) a firm engages in. This latter variable captures cross-sectional variations in accounting conservatism, as well as increased risk associated with the speculative nature of R&D activities.

4. Research Design

In this section, we estimate annual regressions that attempt to explain the cross-sectional variation in the four ratios. Our goal is to develop a reasonably parsimonious model that produces a "warranted multiple" for each firm. These warranted multiples reflect the

large sample relation between a firm's valuation ratio and variables that should explain cross-sectional variations in the ratio. The estimated warranted multiple becomes the basis of our comparable firm analysis.

4.1 Estimating the warranted ratios

Our initial sample consistent of all firms from the G7 countries listed in the Worldscope database. We required that each firm's home country (both country of origin and country of domicile) be clearly identified in the Worldscope database.[15] Our sample period spans 1990 to 2000, which is the period over which we have both Worldscope and I/B/E/S data.

To facilitate estimation of a robust model, we drop firms with prices below $3 per share and sales below $100 million (in U.S. dollar equivalent). We eliminate firms with missing price or accounting data needed for the estimation regression.[16] We also require that all firms belong in an industry (based on two-digit SIC codes) with at least five member firms. Each firm must also have a one-year-ahead and a two-year-ahead consensus earnings forecast in the I/B/E/S International database as of the June statistical period each year.

We exclude firms with negative common equity, negative current earnings, negative one-year-ahead forecasted earnings and negative earnings in year t+2. In addition, to facilitate the estimation of a robust model, we rank firms annually on various attributes and exclude observations in the top and bottom 3% by price-to-book, price-earning, leverage, return-on-equity, and forecasted growth rates. After these filters, we obtained 26,626 firm-year observations.

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[15] Because of their peculiar status, American Deposit Receipts (ADR's) are excluded. There are three ways by which we identify the ADR's. First, Worldscope marks some firms with an ADR indicator. Second, the names of some firms are clearly labeled as ADR's. Third, some firms have a country of origin that is different from their country of domicile. We exclude all three.

[16] The two exceptions are research and development expense and long-term debt. Missing data in these two fields are assigned a value of zero.

For each firm, we secure nine explanatory variables. We are guided in the choice of these variables by the valuation equations discussed earlier, and several practical implementation principles. First, we wish to construct a model that can be applied to private as well as public firms, we therefore avoid using the market value of the target firm in any of the explanatory variables. Second, in the spirit of the contextual fundamental analysis (e.g., see Beneish, Lee, and Tarpley (2000)), we anchor our estimation procedure on specific industries. In other words, we use the mean industry market multiples as a starting point, and adjust for key firm-specific characteristics.[17] Finally, to the extent possible, we try to use similar variables for estimating all four multiples. Our goal is to generate relatively simple models that capture the key theoretical constructs of growth, risk, and profitability. Specifically, our model includes the following variables, which are also summarized and described in more detail in Appendix A:

EVS_Ind, PB_ind, PE_ind, or PE2_ind – The harmonic mean of each of the four multiples for all the firms with the same two-digit SIC code. For example, for the 1990 regression, this variable is the harmonic mean industry multiple as of June 30, 1990. These variables control for industry-wide factors, such as accounting conservatism, risk differentials, and expected growth rates, and we expect it to be positively correlated with current year firm-specific ratios.

EVS_cty, PB_cty, PE_cty, or PE2_cty – The harmonic mean of each multiple for all the firms from the same country. This variable controls for profitability, growth, and risk characteristics that are common to all firms within the same country.

PM – Operating profit margin. We compute this variable as the firm's operating profit divided by its net sales, multiplied by 100. Theory suggests this variable should be

[17] More specifically, we use the harmonic means of industry EVS and PB ratios, that is, the inverse of the average of inversed ratios (See Baker and Ruback (1999)).

strongly positively correlated with current year EVS ratios. We included it in the EVS and PB regressions.

Losspm – This variable is computed as PM*Dum, where Dum is 1 if PM is less than or equal to zero, and 0 otherwise. Used in conjunction with PM, this variable captures the differential effect of profit margin on the valuation multiple for loss firms. Prior studies (e.g., Hayn (1995)) show that prices (and returns) are less responsive to losses than to profits. In univariate tests, this variable should be positively correlated with EVS and PB. However, controlling for PM, this variable should be negatively correlated with EVS and PB ratios. We include it in the EVS and PB regressions

Growth – Expected earnings growth. We derive this variable from the two-year-ahead earnings forecast (FY2) and the one-year-ahead forecast (FY1). Specifically, Growth = ((FY2/FY1)-1)*100. We include it in the regression for all four multiples, and expect it to be positively correlated with the dependent variable in each case.

Lev – Book leverage. This variable is computed as the total long-term debt scaled by the book value of common equity. In univariate tests, Gebhardt et al. (2001) shows that firms with higher leverage have higher implied costs-of-capital. However, controlling for market leverage, they find that book leverage is not significant in explaining implied cost-of-capital. We include this variable for completeness, in case it captures elements of cross-sectional risk not captured by the other variables.

Roa – Return on total assets. This variable is a firm's operating profit scaled by its total assets, expressed as a percentage. In our context, having already controlled for profit margins, this variable serves as a control for a firm's asset turnover. We expect it to be positively correlated with EVS, and use it only for explaining this ratio.

Roe – Return on equity. This variable is net income before extraordinary items scaled by the end of period common equity, expressed as a percentage. Conceptually, this variable should provide a better profitability proxy than ROA in explaining the PB ratio. We use

this variable in place of Roa as an alternative measure of profitability when conducting the PB regression.

R&D – Total research and development expenditures divided by sales, expressed as a percentage. Firms with higher R&D expenditures tend to have understated current profitability relative to future profitability. To the extent that this variable captures differences in accounting conservatism, as well as profitability growth beyond the consensus earnings forecast growth rate, it will be positively correlated with all four ratios.

In addition to these nine explanatory variables, we also tested three other variables – a dividend payout measure (actual dividends scaled by total assets), an asset turnover measure, and a measure of the standard deviation of the forecasted growth rate. The first two variables add little to the explanatory power of the model. The standard deviation measure (suggested by Gebhardt et al. (2001) as a determinant of the cost-of-capital) contributed marginally, but was missing for a significant number of observations. Moreover, this measure would be unavailable for private firms. For these reasons, we excluded all three variables from our final model.

To recap, our research design involves estimating a series of annual cross-sectional regressions of a valuation multiple (EVS, PB, PE, or PE2) on various explanatory variables. The estimated coefficients from last year's regressions are used, in conjunction with each firm's current year information, to generate a prediction of the firm's current and future ratio. We refer to this prediction as a firm's "warranted multiple." This warranted multiple becomes the basis for our identification of comparable firms in subsequent tests.

4.2 Descriptive Statistics

Table 1 presents annual summary statistics on the four dependent and seven explanatory variables (we do not report the industry and country harmonic means). Panel A reports these results by year; Panel B reports these results by Country. The overall average EVS

of 2.08 (median of 1.32), PB of 3.00 (median of 2.19), PE of 24.6 (median of 18.5), and PE2 of 16.3 (median of 13.6) appear reasonable. The seven explanatory variables also appear reasonable. In particular, the average PM is 11.1 (median of 9.27), growth is 21.3 (median of 15.7), and R&D is 1.48 (median of 0.00). Panel B shows that countries that appear most expensive by certain multiples (e.g. Japan on PE or PE2) do not necessarily rank highest on other multiples (Japan is 4th highest by EVS and 5th highest by PB). Overall, this table indicates that the key input variables for our analysis make economical sense.

Table 2 presents the average annual pairwise correlation coefficients between these variables. The upper triangle reports Spearman rank correlation coefficients; the lower triangle reports Pearson correlation coefficients. Shaded cells represent the explanatory variables included in the regression model for each of the four valuation multiples. The significance levels are indicated by asterisks. We did not include the industry and country harmonic means, as these correlations correspond to the correlations reported for the firm-level multiples.

As expected, EVS is positively correlated with a firm's profit margin (PM). The same positive relation is observed among loss firms (Losspm). It is positively correlated with Growth and not significantly correlated with book leverage (Lev). It is also positively correlated with accounting rates of return (Roa and Roe), as well as R&D expense (R&D). The results are similar for the PB ratio. As expected PB exhibits a stronger negative correlation with book leverage (Lev), and a more positive correlation with accounting rates of return (Roa and Roe). The PE and PE2 ratios are positively correlated with Growth and R&D expenditures. However, their correlation with Lev is mixed (Spearman correlations are negative but Pearson correlations are positive). Overall, these results indicate that the explanatory variables are likely to capture a significant portion of the cross-sectional variation in the multiples.

5. Empirical Results

5.1 Model estimation

Tables 3a through 3d present the results of annual cross-sectional regressions for each year from 1990 to 2000. The dependent variable differs for each table: Table 3a reports results for the enterprise-value-to-sales ratio (EVS); Table 3b for PB; Table 3c for PE; and Table 3d for PE2. Each multiple is regressed on explanatory variables that represent subsets of the nine variables described in the previous section. Table values represent estimated coefficients, with accompanying t-statistics presented in parentheses. Reported in the right columns are adjusted r-squares and the number of observations per year. The last two rows report the average coefficient for each variable, as well as a Newey-West autocorrelation adjusted t-statistic on the mean of the time series of annual estimated coefficients.

Table 3a shows that a consistently high proportion of the cross-sectional variation in the EVS ratio is captured by the eight explanatory variables. The annual adjusted r-squares average 53%, and range from a low of 38% to a high of 59%. The strongest six explanatory variables (EVS_ind, PM, Losspm, Lev, Roa, and R&D) have the same directional sign in each of 11 annual regressions, and are individually significant at less than 1%. Growth is positively correlated with EVS in 10 out of 11 years, and is also significant at the 1% level. Controlling for the other variables, EVS_cty has the wrong sign (is negatively correlated with EVS). Collectively, these results show that industry membership, growth, profitability, and risk factors are incrementally important in explaining EVS ratios, but country membership is not.

Table 3b reports the results of annual cross-sectional regressions for the PB ratio. The explanatory variables are the same as for the EVS regression in Table 3, except for the replacement of Roa with Roe. This table shows that all the variables except Lev contribute significantly to the explanation of PB, and are correlated with PB in the same direction as expected. The coefficient estimates all exhibit reasonable consistency from year-to-year. PB_cty remains significantly positive in every regression, indicating country differences remain important in explaining the PB ratio. Overall, the model is

less successful at explaining PB than at explaining EVS. Nevertheless, the average adjusted r-square is still 34%, ranging from a low of 24% to a high of 49%.

Table 3c reports the results of annual cross-sectional regressions for the PE ratio. Only five explanatory variables are used for this model. The results show that the industry harmonic mean (PE_ind) and country harmonic mean (PE_cty) are extremely important in establishing a firm's PE ratio. Growth and R&D also provide incremental explanatory power, but Lev does not. Overall, approximately 28% of the cross-sectional variation in PE ratios can be explained by these five variables.

Table 3d reports the results of a similar regression for the PE2 ratio. The results for this ratio closely parallel those for the PE ratio. Once again the industry harmonic mean (PE2_ind) and the country harmonic mean (PE2_cty) dominate the regression. Growth, and to a less extent, R&D also contribute incremental explanatory power, but Lev does not. The overall fit of these models are somewhat better than for PE, as 41% of the variation for PE2 ratios is explained by these five variables.

5.2 Forecasting future ratios

Recall that our goal is to identify comparable firms that will help us to forecast a target firm's future price-to-sales multiples. In this section, we examine the efficacy of the warranted multiple approach in achieving this goal. Specifically, we examine the relation between a firm's future EVS and PB ratios, and a number of ex ante measures based on alternative definitions of comparable firms. The key variables in this analysis are defined below.

EVS*n*, PB*n*, PE*n*, or PE2*n*; where *n* = 0,1, 2, and 3 – The current, one-, two-, and three-year-ahead ratios. These are our dependent variables.

***ratio*_ind** – The harmonic mean of the industry ratios; where industry membership is defined in terms of two-digit SIC codes.

IS*ratio* – Industry-size matched peers. The harmonic mean of the actual ratio for the four firms from the same industry with the closest market capitalization.

COMP – Peers selected by the warranted multiples approach. This variable is the harmonic mean of the actual ratio for the four closest firms based on their warranted multiple. To construct this variable, we rank all the firms each year on the basis of their warranted multiple, and compute the harmonic mean of the actual multiple for these four firms. The firms do not need to be from the same industry or country as the target firm.

ICOMP – Industry peers selected by the warranted multiple approach. This variable is the harmonic mean of the actual ratio for the four firms within the same industry that have the closest warranted multiple. Essentially, this is the COMP variable with the firms constrained to come from the same industry.

ICCOMP – Industry and country specific peers selected by the warranted multiple approach. This variable is the harmonic mean of the actual ratio for the firms in the same industry and country that have the closest warranted multiple. We average the closest peers ranked by warranted multiple within each country-industry pool, and include at least two (but no more than four) firms. If a target firm has less than two peers in the same industry-country pool, this variable assumes the same value as ICOMP.

In short, we compute five different ratio estimates for each firm based on alternative methods of selecting comparable firms. The first two measures, *ratio*_ind and IS*ratio*, correspond to prior studies that control for industry membership and firm size. The other measures correspond to "smart multiples" that incorporate country and industry membership, as well as risk, profitability, and growth characteristics. Our tests examine the relative power of these five approaches to forecast future realizations of each individual ratio.

Tables 4a reports the results for a series of forecasting regressions. In Panel A, the dependent variable is EVS*n*, and in Panel B, the dependent variable is PB*n*; where $n = 1$,

2, 3, indicates the number of years into the future. In each case, we regress the future market multiple on various ex ante measures based on alternative definitions of comparable firms.[18] The table values represent the estimated coefficient for each variable averaged across 8 (n=3) to 10 (n=1) annual cross-sectional regressions. The bottom row reports the average adjusted r-square of the annual regressions for each model.

These results show that the harmonic mean of the industry-matched firms explains 29% of the cross-sectional variation in future EVS ratios. Including the mean EVS ratio from the closest four firms matched on size increases the adjusted r-squares only marginally, so that collectively EVS_ind and ISEVS explain 30% to 31% of the variation in future EVS ratios. These results confirm prior evidence on the usefulness of industry-based comparable firms. However, they also show that the valuation accuracy of industry-based EVS ratios leaves much to be desired.

The predictive power of the model increases sharply with the inclusion of variables based on the "smart multiple" approach. On average, a model that includes EVS_Ind, ISEVS, and COMP explains 46% of the cross-sectional variation in two-year-ahead EVS ratios. Including an industry constraint when selecting peers (ICOMP) adds to the explanatory power, as does an industry-country constraint (ICCOMP). A model that includes EVS_ind, ISEVS, COMP, and ICCOMP explains between 54.0% (one-year-ahead) and 52% (three-year-ahead) of the variation in future EVS ratios.[19]

Panel B reports forecasting regressions for PB. Compared to EVS, a much smaller proportion of the variation in PB is captured by these models. In one-year-ahead forecasts, the combination of PB_ind and ISPB explains only 13% of the variation in PB. The inclusion of COMP increases the adjusted r-square to 25%. In future years, the

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[18] Even for the current year (n=0), the warranted multiples are based on estimated coefficients from the prior year's regression. Therefore, the models that involve warranted multiples are all *forecasting* regressions.

explanatory power of all the models decline sharply. However, over all forecast horizons, models based on the "smart multiple" approach explain approximately twice the variation in future PB ratios as compared to the industry-size matched model.

Table 4b reports the results for similar regressions conducted with PE and PE2 ratios. Once again, we find that the ability of the model to predict future PE and PE2 ratios increases sharply with the "smart multiples" approach. For example, the common practice of using industry and/or industry-size based comparable firms explains only 5% of the two-year-ahead PE ratio, and only 9% of the two-year-ahead PE2 ratio. The inclusion of COMP increases these results to 13% for PE and 31% for PE2. In three-year-ahead forecasts, the difference is even sharper. Overall, these results suggest that by systematically matching firms on the basis of their warranted multiples, we can identify superior comparable firms.

5.3 Sector and Country Analysis

Thus far, we have held the coefficients fixed across different industry sectors. However, it is possible that the estimation regressions on which our peer selection process is based would benefit from separate estimations for each industry sector. To facilitate this analysis, we grouped our industries into eight sectors, broadly in line with S&P sector classifications. Table 5 reports the results of regressions in which a separate model is estimated for each sector.

Panel A of Table 5 reports the sector regressions for the EVS ratio. Compared the Table 3a, the overall fit of these models appear to improve somewhat, suggesting that individual sector regressions might lead to superior forecasting results. As expected, profit margin (PM) is even more important in these regressions. EVS_ind (which captures the mean of the sub-industries within each sector) continues to be useful in most

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[19] We also conducted year-by-year analysis to examine the stability of these results over time. We find that a model that includes EVS_ind, ISEVS, COMP, and ICCOMP is extremely consistent in predicting future EVS ratios. All four variables are incrementally important in predicting future EVS ratios in each forecasting period.

sectors, as is Growth. However, R&D is much more important in some sectors (Consumer Non-Cyclicals, Basic Materials, and Technology) than in others (Consumer Cyclicals, Energy, Finance, and Utilities).

Panels B, C, and D report the results of similar regressions for PB, PE, and PE2 ratios. The most important patterns we observed for EVS continues for these three ratios. The relative importance of industry and country means differed across sectors, as did the role of Growth and R&D. In all three panels, we find that overall fit improves when sector-specific models are estimated. In future drafts, we plan to examine the predictive power of regression models that integrate these sector variations.

In Table 6, we report the results of separate estimation regressions for each of the seven countries. These estimations are exploratory in nature, and intended only to examine the robustness of the earlier findings. As expected, we find that the key explanatory variables (e.g. PM for EVS and Roe for PB) remain robust in all seven countries. However, variables such as R&D seem to play different roles in each country. Once again, our plan is to examine the incremental usefulness of individual country estimation procedures in a future revision.

As a final test, we also examine the proportion of domestic and foreign peer firms among the four closest matching firms using the warranted multiple approach. One of the main advantages of using an international rather than domestic pool of potential peers is the increased likelihood of finding a similar firm. In Figure 1, we examine what proportion of the closest matching peers (using the warranted multiple approach) is domestic vs. foreign.

Figure 1a reports the proportion of domestic and foreign peer firms, by country. For this graph, we deem a firm to be a peer if it is among the four closest matching firms using the warranted EVS ratio. "Foreign" is defined as those firms that do not come from the same country as the target firm. As this figure shows, approximately 44% of the closest peers for U.S. firms are foreign. The proportion increases to over 90% when the target

firm is Canadian. In general, it is clear that more often than not a firm's closest peer is foreign.

One potential problem with Figure 1a is that individual countries are differentially represented in the overall sample. For example, Italy (with 675 observations) and Canada (with 1169 observations) might be expected to have primarily foreign peers simply because they have so few firms in the sample. To alleviate this problem, Figure 1b reports the proportion of peer firms that are U.S. based, by country. Once again, the evidence indicates that a large percentage of the firms in each of the other six countries would be matched to U. S. firms using our algorithm.

6. Summary

Our goal in this paper is to develop a more systematic technique for selecting comparable firms from a pool of international candidates. Our approach selects comparable firms on the basis of profitability, growth, and risk characteristics that theory suggests should be cross-sectional drivers of a particular valuation multiple. Specifically, we use regression analysis and large sample estimation techniques to generate a "warranted multiple" for each firm. The comparable firms are those firms whose warranted multiple is closest to that of the target firm.

We test our approach by examining the efficacy of the selected comparable firms in predicting future (one- to three-year-ahead) valuation ratios. Our results show that comparable firms selected in this manner offer sharp improvements over comparable firms selected on the basis of other techniques, including industry and size matches. More often than not, the comparable firm selected is from a foreign country.

These findings represent work-in-progress, and we are currently pursuing a number of possible extensions and applications. For example, our results suggest that it might be possible to improve estimations by using sector-specific models. Moreover, it might be desirable to combine the results of from several different multiples to come up with a set of firms that are close peers based on alternative estimation procedures. We believe this

composite approach will enhance the precision and objectivity of multiples-based valuation methods, and bring much needed discipline to equity valuation.

Our main point is that any normative approach to selecting comparable firms should reflect the fundamental concepts that underpin equity valuation. Whether country membership is important in capturing these concepts is an open empirical question. We do not regard our model as in any sense "optimal." However, we believe that an industry-based approach with firm-specific adjustments is a sensible first attempt at empirically capturing these some key concepts from valuation theory. Future work might consider variables that capture the quality of earnings or other value relevant attributes not considered in this study.

From an application point of view, the contribution of this methodology is most evident when pricing non-traded firms, or when identifying a set of comparable control firms. For publicly traded firms, we find that a company is often its own best peer – i.e., a company's own lagged multiple is best at explaining its current multiple. However, it is not possible to secure lagged multiples for private firms. Nor are lagged multiples useful in identifying control firms for research purposes. In these latter applications, the warranted multiple methodology offers some important advantages.

Our approach has at least three implications for academic researchers. First, we provide a new research design device for isolating a variable of interest. Barber and Lyon (1997), Lyon et al. (1999), and others suggest that long-window tests of abnormal returns are more powerful when samples are matched on the basis of firm characteristics, such as size and the book-to-market ratio. Our study extends this line of research by suggesting a more precise technique for identifying match firms. By controlling for general determinants of market valuation, we introduce a research design device that helps to isolate the pricing effect of other specific variables of interest to the researcher. This research design should be broadly applicable in studies that examine specific research issues (e.g., pooling versus purchase accounting, or quality of earnings considerations).

Second, we introduce a parsimonious valuation methodology, which is conceptually consistent with a noisy rational expectation equilibrium framework. Most past studies either assume market efficiency (price is the best benchmark for value), or ignore it (value firms without reference to price). In a philosophically departure, we treat price as a noisy, but informative, signal for firm valuation. In this framework, the current price is not necessarily the best proxy for the true (unobserved) intrinsic value. However, it is likely that price contains information useful for valuation purposes. Our approach harnesses the information in price without relying on it entirely. This approach is in the spirit of the market-based valuation research advocated by Lee (2001).

Finally, these results suggest additional tests of market efficiency. To the extent that stock prices sometimes deviate from intrinsic value, it is possible that a firm's "warranted multiple" could contain information useful in forecasting future returns. Specifically, one can envision trading strategies based on the deviation between warranted and actual multiples. Certainly the improved precision with which future ratios can be forecasted is suggestive of such a strategy. This would appear to be another interesting venue for further research.

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Appendix A - Variable Descriptions

All accounting and forecasted variables are based on the most recent information available as of June 30th of each yea
Stock prices are as of the end of June.

Variable	Description	Calculation
EVS*t*	Enterprise Value to Sales	EVS = (Market value of equity + Total debt) / Net sales. EVS*t* is the t-year-ahead EVS ratio
PB*t*	Price to Book	PB = Market value of equity / Total common equity. PB*t* is the t-year-ahead price-to-book rati
PE*t*	Price to Earnings	PE = Price per share / earnings per share. PE*t* is the t-year-ahead price-to-earnings rati
PE2t	Price to Forecasted 2-year ahead earnings	PE2 = Price per share / analysts forecast of earnings 2 year ahead PE2*t* is the t-year-ahead price-to-earnings rati
EVS_ind	Industry EVS ratio	Harmonic mean of the EVS ratio for firms in the industry (based on 2-digit SIC code).
PB_ind	Industry PB ratio	Harmonic mean of the PB ratio for firms in the industry (based on 2-digit SIC code).
PE_ind	Industry PE ratio	Harmonic mean of the PE ratio for firms in the industry (based on 2-digit SIC code).
PE2_ind	Industry PE2 ratio	Harmonic mean of the PE2 ratio for firms in the industry (based on 2-digit SIC code).
EVS_cty	Country EVS ratio	Harmonic mean of the EVS ratio for firms in the country.
PB_cty	Country PB ratio	Harmonic mean of the PB ratio for firms in the country.
PE_cty	Country PE ratio	Harmonic mean of the PE ratio for firms in the country.
PE2_ind	Country PE2 ratio	Harmonic mean of the PE2 ratio for firms in the country
PM	Profit margin	Operating income*100 / Net sales.
Losspm	PM*Indicator variable	PM*Indicator variable; where Indicator variable = 1 if a firm's profit margin is less than or equal to 0, and 0 otherwise.
Growth	growth forecast	((two-year ahead forecasted earnings/ one-year ahead forecasted earnings) - 1)*100.
Lev	Leverage	Total debt*100 / (Total assets - Total debt)
Roa	Return on Total Assets	Operating income*100 / Total assets
Roe	Return on Common Equity	Net income*100 / Common equity
R&D	Research and development expenditures	R&D expenditures*100 / Net sales

Table 1
Summary Statistics of Estimation Variables

This table provides information on the mean and median of the variables used in the annual estimation regressions. Panel A provides yearly statistics, while Panel B provides descriptive statistics by country. Market values are as of June 30th each year. All accounting variables are from the most recent fiscal year end. EVS is the enterprise value to sales ratio, computed as the market value of common equity plus long-term debt, divided by net sales. PB is the price to book ratio. PE is the price to earnings ratio and PE2 is the price to forecasted 2-year ahead earnings. PM is the profit margin computed as operating income*100 divided by net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roa is operating profit scaled by total assets. Roe is the net income as a percentage of book value of stockholders equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales.

Panel A: Descriptive Statistics by Year

Year		EVS	PB	PE	PE2	PM	Losspm	Growth	Lev	Roa	Roe	R&D	No of obs
1990	Mean	1.53	2.35	15.95	11.86	11.68	-0.05	17.70	32.62	10.34	16.50	1.14	1215
	Median	1.02	1.91	13.11	10.42	9.77	0.00	13.89	24.15	9.75	14.95	0.00	
1991	Mean	1.48	2.42	21.45	17.23	10.48	-0.04	19.97	34.55	9.42	14.20	1.12	1674
	Median	1.06	1.98	15.41	12.33	8.62	0.00	14.05	26.33	8.65	12.83	0.00	
1992	Mean	1.61	2.42	21.07	15.07	10.26	-0.09	21.35	32.89	8.78	12.83	1.22	1711
	Median	1.10	1.90	17.28	12.70	8.18	0.00	15.79	23.60	7.99	11.66	0.00	
1993	Mean	1.83	2.80	24.54	17.41	10.28	-0.08	20.53	31.29	8.91	12.74	1.34	1749
	Median	1.26	2.26	18.90	14.21	8.32	0.00	15.66	22.28	8.02	11.90	0.00	
1994	Mean	1.82	2.74	25.16	16.56	10.64	-0.10	21.78	29.31	9.08	12.33	1.47	1911
	Median	1.28	2.26	19.38	13.90	8.82	0.00	16.54	20.24	8.18	11.96	0.00	
1995	Mean	1.81	2.70	22.76	14.84	10.65	-0.07	20.94	29.52	9.40	13.07	1.54	2395
	Median	1.22	2.07	17.80	12.86	8.68	0.00	15.93	20.64	8.52	12.15	0.00	
1996	Mean	2.10	3.07	25.38	16.69	11.42	-0.06	21.12	31.02	9.71	13.43	1.65	2513
	Median	1.42	2.33	19.00	13.95	9.63	0.00	15.71	20.83	8.93	12.37	0.00	
1997	Mean	2.11	3.07	25.65	17.29	11.01	-0.06	20.12	31.80	9.22	12.41	1.55	3272
	Median	1.37	2.35	20.27	14.68	9.02	0.00	15.33	21.44	8.30	11.64	0.00	
1998	Mean	2.27	3.30	24.44	16.84	11.50	-0.08	21.27	33.65	9.54	13.04	1.51	3423
	Median	1.47	2.44	20.17	15.20	9.74	0.00	15.61	22.00	8.58	12.08	0.00	
1999	Mean	2.32	3.21	24.99	16.30	11.68	-0.08	22.48	35.78	9.24	12.97	1.56	3443
	Median	1.46	2.15	18.69	13.66	10.06	0.00	16.04	23.90	8.37	11.77	0.00	
2000	Mean	2.84	3.67	29.95	16.55	11.84	-0.20	24.04	37.37	9.02	12.92	1.66	3320
	Median	1.59	2.05	18.33	12.54	10.09	0.00	16.91	25.96	7.98	11.84	0.00	
Pooled	Mean	2.08	3.00	24.55	16.30	11.14	-0.09	21.33	33.04	9.31	13.13	1.48	26626
	Median	1.32	2.19	18.52	13.60	9.27	0.00	15.66	22.69	8.43	12.14	0.00	

Table 1 continued on next page

Table 1 continued

Panel B: Descriptive statistics by country

Country		EVS	PB	PE	PE2	PM	Losspm	Growth	Lev	Roa	Roe	R&D	No of obs
Canada	Mean	2.57	2.41	25.43	14.67	13.98	-0.02	27.80	40.02	8.78	10.63	0.86	1169
	Median	1.72	1.83	18.79	12.84	11.48	0.00	20.00	29.91	8.28	10.94	0.00	
France	Mean	1.77	2.83	23.15	14.78	8.15	-0.14	20.20	36.64	7.31	13.39	0.49	1883
	Median	0.96	1.97	17.86	12.95	6.30	0.00	15.33	26.05	6.34	12.51	0.00	
Germany	Mean	1.60	3.11	28.35	20.24	3.55	-0.63	16.36	29.85	4.02	11.92	0.65	1360
	Median	0.75	2.52	20.93	17.02	2.78	0.00	10.71	16.47	2.54	10.44	0.00	
Italy	Mean	2.27	2.26	25.03	17.24	8.73	-0.27	18.65	34.52	4.73	10.05	0.92	675
	Median	1.16	1.58	19.36	14.32	7.00	0.00	14.24	29.19	3.71	9.12	0.00	
Japan	Mean	1.59	2.41	38.29	28.63	7.05	-0.08	16.65	45.30	5.91	6.00	1.27	3364
	Median	1.14	1.86	32.39	26.30	5.65	0.00	10.19	31.06	5.10	5.70	0.00	
United Kingdom	Mean	1.93	3.18	18.09	12.90	11.42	-0.05	18.81	24.98	10.97	17.68	0.56	5169
	Median	1.09	2.24	15.42	12.05	9.23	0.00	14.18	18.34	10.28	15.26	0.00	
United States	Mean	2.31	3.19	23.26	14.36	13.19	-0.03	23.79	32.17	10.65	13.63	2.22	13006
	Median	1.62	2.35	17.84	12.94	11.54	0.00	17.89	22.39	9.83	13.25	0.00	
Pooled	Mean	2.08	3.00	24.55	16.30	11.14	-0.09	21.33	33.04	9.31	13.13	1.48	26626
	Median	1.32	2.19	18.52	13.60	9.27	0.00	15.66	22.69	8.43	12.14	0.00	

Table 2
Correlation between Estimation Variables

This table provides information on the average annual pairwise correlation coefficients between key variables. The upper triangle reports Spearman rank correlations, the lower triangle reports Pearson correlations. All variables are as of June 30th each year. EVS is the enterprise value to sales ratio, computed as the market value of common equity plus long-term debt, divided by net sales. PB is the price to book ratio. PE is the price to earnings ratio and PE2 is the price to forecasted 2-year ahead earnings. PM is the profit margin computed as operating income*100/net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roa is operating profit scaled by total assets. Roe is the net income as a percentage of book value of stockholders equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. Shaded cells represent the explanatory variables included in the regression model for each of the four valuation multiples. The asterisks represent the p-value of correlation (** - p-value < =0.005, * - p-value <=0.025).

Average Correlation (Pearson\Spearman)

	EVS	PB	PE	PE2	PM	Losspm	Growth	Lev	Roa	Roe	R&D
EVS		0.3819 **	0.3044 **	0.3303 **	0.6446 **	0.0627 **	0.0128	-0.0090	0.0553 **	0.0769 **	0.0839 **
PB	0.4174 **		0.4137 **	0.3814 **	0.1916 **	0.0347 **	0.1142 **	-0.1562 **	0.4288 **	0.4613 **	0.1665 **
PE	0.0827 **	0.0593 **		0.7888 **	-0.1982 **	-0.0889 **	0.2746 **	-0.0250 **	-0.1737 **	-0.3707 **	0.1414 **
PE2	0.1423 **	0.1422 **	0.1873 **		-0.1030 **	-0.0736 **	0.0126	-0.0396 **	-0.1382 **	-0.2530 **	0.1172 **
PM	0.4393 **	0.1125 **	-0.0822 **	-0.1008 **		0.3786 **	-0.1747 **	-0.0796 **	0.5028 **	0.4427 **	0.0122
Losspm	-0.1194 **	-0.0229 **	-0.1148 **	-0.0554 **	0.3280 **		-0.1209 **	0.0358 **	0.3785 **	0.2395 **	-0.0161 *
Growth	0.0590 **	0.0607 **	0.1173 **	0.0053	-0.2254 **	-0.1795 **		-0.0219 **	-0.0046	-0.1767 **	0.1412 **
Lev	0.0824 **	-0.0689 **	0.0247 **	0.0783 **	-0.0177 **	0.0169 **	0.0357 **		-0.1992 **	-0.1703 **	-0.1076 **
Roa	-0.0098	0.3626 **	-0.0807 **	-0.1252 **	0.4355 **	0.2838 **	-0.1525 **	-0.2146 **		0.6434 **	0.1458 **
Roe	0.0077	0.2105 **	-0.0831 **	-0.0808 **	0.2398 **	0.1875 **	-0.2054 **	-0.1213 **	0.4055 **		-0.0062
R&D	0.2135 **	0.2014 **	0.0393 **	0.0475 **	0.0085	-0.1309 **	0.1951 **	-0.1480 **	0.0769 **	-0.0349 **	

Table 3a
Annual Estimation Regressions for Warranted Enterprise-Value-to-Sales

This table reports the results from the following annual estimation regression:

$$EVS_{i,t} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where the dependent variable, EVS, is the enterprise value-to-sales ratio as of June 30th of each year. The eight explanatory variables are as follows: EVS_ind is the industry harmonic mean of EVS based on two-digit SIC codes; EVS_cty is the country harmonic mean of EVS; PM is the profit margi computed as operating income*100 divided by net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roa is operating profit scaled by total assets. R&D is the firm's R&D expenditures expressed as a percentage of net sales. T-stats are provided in parentheses. The last row represents the time-series average coefficients along with Newey-West autocorrelation corrected t-statistics. The adjusted r-square (r-sq) and number of firms (# obs) are also reported.

Year	cons	EVS_ind	EVS_cty	PM	Losspm	Growth	Lev	Roa	R&D	R-sq	# obs
1990	-0.5283	0.7742	0.1376	0.1152	-0.1986	0.0032	0.0057	-0.0447	0.0418	0.56	1215
	(-2.59)	(9.00)	(0.69)	(25.99)	(-3.10)	(1.74)	(6.41)	(-8.23)	(3.91)		
1991	-0.7723	0.7609	0.7244	0.1097	-0.3089	-0.0021	0.0017	-0.0362	0.0351	0.59	1674
	(-5.47)	(11.87)	(5.77)	(31.09)	(-4.37)	(-2.03)	(2.49)	(-8.12)	(4.39)		
1992	-0.1980	0.9676	-0.4474	0.1009	-0.1711	0.0021	0.0061	-0.0179	0.0519	0.58	1711
	(-1.09)	(16.47)	(-2.25)	(26.17)	(-4.50)	(1.73)	(8.58)	(-3.57)	(6.43)		
1993	-0.1129	0.7826	-0.6812	0.1375	-0.2846	0.0106	0.0060	-0.0272	0.0905	0.59	1749
	(-0.64)	(12.87)	(-3.98)	(28.74)	(-5.33)	(7.18)	(6.91)	(-4.90)	(10.95)		
1994	0.4883	0.9332	-1.3394	0.1047	-0.1936	0.0076	0.0097	-0.0123	0.0703	0.57	1911
	(2.64)	(18.48)	(-7.64)	(25.86)	(-4.75)	(5.55)	(11.80)	(-2.53)	(9.69)		
1995	-0.1526	0.9185	-0.8491	0.1112	-0.3396	0.0112	0.0065	-0.0077	0.1061	0.56	2395
	(-1.00)	(19.14)	(-5.41)	(27.13)	(-8.09)	(8.56)	(8.53)	(-1.70)	(16.09)		
1996	-0.5633	0.8928	-0.3113	0.1140	-0.3086	0.0126	0.0070	-0.0107	0.0789	0.49	2513
	(-3.06)	(17.41)	(-1.99)	(24.58)	(-5.28)	(8.12)	(8.56)	(-2.05)	(9.63)		
1997	-0.1130	0.6312	-0.4003	0.1439	-0.4423	0.0112	0.0051	-0.0323	0.0847	0.54	3272
	(-0.91)	(14.85)	(-3.52)	(36.01)	(-10.13)	(8.08)	(7.62)	(-7.02)	(12.40)		
1998	-0.3244	0.7087	-0.3488	0.1443	-0.4371	0.0080	0.0065	-0.0203	0.0745	0.54	3423
	(-2.65)	(19.00)	(-3.22)	(34.62)	(-11.36)	(5.71)	(9.82)	(-4.08)	(10.92)		
1999	0.0768	0.7183	-0.8698	0.1442	-0.4044	0.0101	0.0067	-0.0199	0.1193	0.48	3443
	(0.48)	(16.54)	(-5.82)	(30.17)	(-10.35)	(7.11)	(9.36)	(-3.62)	(15.67)		
2000	1.1044	0.9554	-2.2789	0.1565	-0.3634	0.0240	0.0028	-0.0221	0.2411	0.38	3320
	(2.55)	(13.74)	(-5.78)	(21.08)	(-12.55)	(10.20)	(2.32)	(-2.56)	(20.09)		
Mean	-0.0996	0.8221	-0.6058	0.1256	-0.3138	0.0089	0.0058	-0.0229	0.0904	0.53	26626
Newey-West	(-0.59)	(23.11)	(-2.25)	(16.16)	(-7.83)	(3.61)	(8.91)	(-5.75)	(4.57)		

Table 3b
Annual Estimation Regressions for Warranted Price-to-Book

This table reports the results from the following annual estimation regression:

$$PB_{i,t} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where the dependent variable, PB, is the price-to-book ratio as of June 30th of each year. The eight explanatory variables are as follows: PB_ind is the industry harmonic mean of PB based on two-digit SIC codes; PB_cty is the country harmonic mean of PB; PM is the profit margin computed as operatin income*100 divided by net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roe is the net income as a percentage of book value of stockholders equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. T-stats are provided in parentheses. The last row represents the time-series average coefficients along with Newey-West autocorrelation corrected t-statistics. The adjusted r-square (r-sq) and number of firms (# obs) are also reported.

Year	cons	PB_ind	PB_cty	PM	Losspm	Growth	Lev	Roe	R&D	R-sq	# obs
1990	-3.0411	0.8961	1.1483	0.0199	-0.1789	0.0120	-0.0025	0.0916	0.0498	0.49	1215
	(-12.85)	(11.05)	(12.39)	(4.74)	(-2.50)	(5.74)	(-2.53)	(26.27)	(4.24)		
1991	-2.6025	0.8367	1.3069	0.0204	-0.1264	0.0019	-0.0012	0.0695	0.0341	0.40	1674
	(-11.85)	(10.28)	(17.09)	(5.17)	(-1.34)	(1.30)	(-1.30)	(24.85)	(3.15)		
1992	-2.3946	0.8639	1.1828	0.0050	-0.1035	0.0050	-0.0013	0.0941	0.0270	0.43	1711
	(-8.87)	(9.38)	(9.80)	(1.33)	(-2.23)	(3.24)	(-1.48)	(29.52)	(2.71)		
1993	-2.1450	0.6219	0.9423	0.0014	-0.0440	0.0113	-0.0004	0.1190	0.0722	0.44	1749
	(-6.57)	(6.97)	(6.89)	(0.32)	(-0.71)	(6.37)	(-0.38)	(30.41)	(7.23)		
1994	-2.9993	1.1536	1.1366	0.0130	-0.0647	0.0049	0.0019	0.0581	0.0323	0.29	1911
	(-8.00)	(13.43)	(7.47)	(3.06)	(-1.25)	(2.76)	(1.83)	(19.01)	(3.38)		
1995	-2.9884	1.2754	1.1299	0.0265	-0.1100	0.0059	0.0011	0.0384	0.1000	0.32	2395
	(-9.98)	(14.14)	(8.80)	(6.04)	(-1.96)	(3.34)	(1.10)	(16.72)	(10.79)		
1996	-2.9419	1.3022	0.8158	0.0256	-0.1089	0.0100	-0.0002	0.0704	0.0406	0.31	2513
	(-7.21)	(15.42)	(4.55)	(5.11)	(-1.39)	(4.68)	(-0.16)	(21.27)	(3.38)		
1997	-2.2283	1.3318	0.5665	0.0190	-0.3385	0.0058	0.0023	0.0655	0.0634	0.26	3272
	(-7.18)	(13.97)	(4.57)	(4.22)	(-5.36)	(2.85)	(2.39)	(23.68)	(6.22)		
1998	-2.1979	1.3115	0.6099	0.0202	-0.2357	0.0092	-0.0003	0.0739	0.0624	0.24	3423
	(-7.98)	(13.91)	(6.04)	(3.90)	(-3.90)	(4.15)	(-0.33)	(23.70)	(5.79)		
1999	-1.6931	1.5215	0.0484	0.0342	-0.1561	0.0119	-0.0008	0.0909	0.0933	0.29	3443
	(-3.66)	(15.33)	(0.20)	(6.01)	(-2.64)	(5.43)	(-0.73)	(27.14)	(7.87)		
2000	-2.6370	1.8868	0.4073	0.0365	-0.0892	0.0211	0.0015	0.0670	0.1404	0.24	3320
	(-4.29)	(17.18)	(1.23)	(4.67)	(-2.38)	(6.51)	(0.93)	(17.72)	(8.52)		
Mean	-2.5336	1.1820	0.8450	0.0202	-0.1414	0.0090	0.0000	0.0762	0.0650	0.34	26626
Newey-West	(-17.02)	(7.78)	(4.89)	(4.79)	(-4.56)	(5.46)	(0.04)	(12.07)	(5.51)		

Table 3c
Annual Estimation Regressions for Warranted Price-to-Earnings

This table reports the results from the following annual estimation regression:

$$PE_{i,t} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where the dependent variable, PE is the price-to-earnings ratio as of June 30th of each year. The eight explanatory variables are as follows: PE_ind is the industry harmonic mean of PE based on two-digit SIC codes; PE_cty is the country harmonic mean of PE; Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. T-stats are provided in parentheses. The last row represents the time-series average coefficients along with Newey-West autocorrelation corrected t-statistics. The adjusted r-square (r-sq) and number of firms (# obs) are also reported

Year	cons	PE_ind	PE_cty	Growth	Lev	R&D	R-sq	N
1990	-7.5396	0.8634	0.7848	0.1287	-0.0055	0.1281	0.28	1215
	(-6.01)	(11.12)	(15.64)	(8.58)	(-0.78)	(1.50)		
1991	-9.9370	0.6490	1.0665	0.0974	0.0107	0.1446	0.43	1674
	(-6.47)	(6.84)	(31.64)	(6.52)	(1.15)	(1.29)		
1992	-14.5092	0.6049	1.1232	0.2409	0.0240	-0.0326	0.23	1711
	(-6.98)	(5.85)	(14.12)	(15.93)	(2.78)	(-0.33)		
1993	-14.0864	0.5660	0.9496	0.3594	0.0319	0.2196	0.30	1749
	(-7.00)	(6.09)	(16.44)	(18.28)	(2.77)	(1.99)		
1994	-9.9246	0.4471	0.8053	0.3967	0.0072	0.2183	0.31	1911
	(-4.92)	(4.83)	(19.03)	(20.33)	(0.63)	(2.13)		
1995	-14.3911	0.6174	0.9702	0.3099	0.0093	0.5567	0.32	2395
	(-9.04)	(8.08)	(19.74)	(20.45)	(1.07)	(7.12)		
1996	-15.3362	0.8899	0.8516	0.3127	-0.0124	0.0743	0.30	2513
	(-9.28)	(11.94)	(21.61)	(18.28)	(-1.38)	(0.82)		
1997	-18.2281	0.8840	0.9745	0.2481	0.0031	0.2470	0.24	3272
	(-9.55)	(10.13)	(22.25)	(16.61)	(0.43)	(3.26)		
1998	-17.8806	0.9155	1.0308	0.1731	0.0004	0.0899	0.15	3423
	(-8.22)	(13.29)	(12.50)	(14.35)	(0.07)	(1.49)		
1999	-12.7387	0.7397	1.0403	0.1851	-0.0130	0.6173	0.22	3443
	(-7.61)	(9.40)	(21.09)	(13.01)	(-1.84)	(8.03)		
2000	-17.4527	1.0271	0.9573	0.4286	-0.0368	1.1700	0.28	3320
	(-8.94)	(14.35)	(12.81)	(19.43)	(-3.21)	(10.09)		
Mean	-13.8204	0.7458	0.9595	0.2619	0.0017	0.3121	0.28	26626
Newey-West	(-10.99)	(10.37)	(33.99)	(6.93)	(0.24)	(2.66)		

Table 3d

Annual Estimation Regressions for Warranted Price-to-Forecasted 2-year ahead Earnings

This table reports the results from the following annual estimation regression:

$$PE2_{i,t} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where the dependent variable, PE2 is the price-to-forecasted 2-year ahead earnings ratio as of June 30th of each year. The eight explanatory variables are as follows: PE2_ind is the industry harmonic mean of PE2 based on two-digit SIC codes; PE2_cty is the country harmonic mean of PE2; Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. T-stats are provided in parentheses. The last row represents the time-series average coefficients along with Newey-West autocorrelation corrected t-statistics. The adjusted r-square (r-sq) and number of firms (# obs) are also reported

Year	cons	PE2_ind	PE2_cty	Growth	Lev	R&D	R-sq	N
1990	-4.4769	0.8626	0.6984	0.0163	-0.0054	0.0823	0.33	1215
	(-5.10)	(11.26)	(20.93)	(2.00)	(-1.41)	(1.76)		
1991	-6.5743	0.6254	0.9857	0.0071	0.0098	0.0244	0.63	1674
	(-5.54)	(6.72)	(46.51)	(0.72)	(1.62)	(0.34)		
1992	-6.0720	0.7183	0.9171	0.0175	-0.0003	-0.0906	0.44	1711
	(-6.02)	(9.09)	(33.17)	(2.28)	(-0.07)	(-1.82)		
1993	-4.5330	0.5042	0.8894	0.0463	0.0059	0.0697	0.53	1749
	(-3.96)	(6.32)	(41.62)	(4.84)	(1.04)	(1.29)		
1994	-5.6491	0.6656	0.8470	0.0388	-0.0103	-0.0141	0.49	1911
	(-5.20)	(8.66)	(40.50)	(4.54)	(-2.03)	(-0.31)		
1995	-6.9097	0.6790	0.9089	0.0382	-0.0034	0.1529	0.42	2395
	(-8.21)	(10.77)	(38.18)	(6.20)	(-0.94)	(4.82)		
1996	-7.0414	0.7768	0.8402	0.0336	-0.0150	0.0656	0.45	2513
	(-8.34)	(13.47)	(41.60)	(4.89)	(-4.12)	(1.80)		
1997	-7.5684	0.7421	0.8955	0.0116	-0.0016	0.1067	0.40	3272
	(-7.77)	(11.29)	(42.79)	(1.79)	(-0.51)	(3.28)		
1998	-11.3803	0.8651	1.0855	0.0060	-0.0068	0.0495	0.21	3423
	(-11.08)	(16.06)	(25.35)	(1.07)	(-2.50)	(1.77)		
1999	-5.8775	0.7350	0.9453	0.0120	-0.0149	0.2365	0.30	3443
	(-7.31)	(13.15)	(33.94)	(2.05)	(-5.03)	(7.40)		
2000	-12.3827	1.1436	1.1707	0.0662	-0.0273	0.3886	0.29	3320
	(-12.84)	(20.35)	(20.61)	(8.45)	(-6.68)	(9.45)		
Mean	-7.1332	0.7561	0.9258	0.0267	-0.0063	0.0974	0.41	26626
Newey-West	(-8.26)	(13.29)	(23.14)	(4.52)	(-1.67)	(2.08)		

Table 4a
Prediction Regressions for Enterprise Value-to-Sales and Price-to-Book Ratios

This table provides average estimated coefficients from the following prediction regressions:

$$EVS_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PB_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where k=1,2,3. In Panel A, the dependent variable is the enterprise-value-to-sales ratio (EVS). In Panel B, the dependent variable is the price-to-book ratio (PB). The expanatory variables are: EVS_ind, the harmonic mean of the industry EVS based on current year (k=0), but excluding the target firm; ISEVS, the harmonic mean of the actual EVS for the four closest firms matched on size after controlling for industry; COMP, the harmonic mean of the actual EVS for the four closest firms matc on the firm's warranted EVS (WEVS), which is determined using the coefficients derived from last year's estimation regressions and current year accounting and market-based variables ; COMP, the harmonic mean of the actual EVS for the four closest firms matched on WEVS, ICOMP, the harmonic mean of the actual EVS for the four closest firms matched on WEVS after controlling for industry, and ICCOMP, the harmonic mean of the actual EVS for the four closest firms matched on WEVS after controlling for industry and country. The variables for Panel B are defined analogously, replacing EVS with PB. Table values represent the time-series average of the coefficients from annual cross-sectional regressions. The bottom row reports the average adjusted r-square and the number of observations of the annual regressions.

	Panel A - Enterprise-value-to-sales														
	One year ahead EVS					**Two year ahead EVS**					**Three year ahead EVS**				
cons	0.10	0.10	0.09	0.07	0.10	0.15	0.14	0.11	0.09	0.09	0.08	0.08	0.05	0.04	0.04
	(0.73)	(0.85)	(1.63)	(1.66)	(2.41)	(1.01)	(1.15)	(1.70)	(1.86)	(1.87)	(0.53)	(0.63)	(0.76)	(0.62)	(0.73)
EVS_ind	1.56	1.12	0.14	0.03	-0.08	1.53	1.16	0.18	0.05	0.01	1.63	1.30	0.31	0.18	0.13
	(20.08)	(7.25)	(1.44)	(0.29)	(-0.98)	(16.80)	(7.42)	(1.52)	(0.44)	(0.10)	(15.60)	(7.76)	(1.91)	(1.16)	(0.92)
ISEVS		0.35	0.28	0.21	0.18		0.30	0.23	0.17	0.12		0.26	0.18	0.11	0.08
		(4.53)	(4.10)	(3.38)	(2.63)		(4.52)	(3.76)	(2.72)	(1.74)		(4.13)	(2.56)	(1.66)	(1.14)
COMP			0.81	0.43	0.46			0.82	0.43	0.45			0.84	0.44	0.48
			(64.63)	(21.54)	(23.71)			(31.20)	(20.72)	(15.19)			(25.37)	(11.60)	(9.95)
ICOMP				0.53					0.56					0.58	
				(19.31)					(19.63)					(33.73)	
ICCOMP					0.60					0.61					0.58
					(57.37)					(21.92)					(18.88)
R-sq	0.29	0.31	0.47	0.51	0.54	0.29	0.31	0.46	0.51	0.53	0.29	0.30	0.45	0.50	0.52
obs	25411	25409	25409	25408	23632	17403	17403	17403	17403	16208	13640	13640	13640	13640	12643

	Panel B - Price-to-book value														
	One year ahead PB					**Two year ahead PB**					**Three year ahead PB**				
cons	-0.34	-0.27	-0.27	-0.24	-0.28	-0.15	-0.08	-0.07	-0.06	-0.11	0.07	0.15	0.14	0.16	0.11
	(-2.15)	(-2.02)	(-2.86)	(-2.68)	(-3.91)	(-0.73)	(-0.45)	(-0.42)	(-0.36)	(-0.65)	(0.33)	(0.80)	(0.83)	(0.92)	(0.63)
PB_ind	1.68	1.26	0.48	0.29	0.22	1.55	1.18	0.48	0.32	0.28	1.43	1.07	0.39	0.22	0.21
	(11.00)	(24.64)	(9.53)	(6.33)	(5.67)	(10.89)	(13.65)	(5.78)	(4.03)	(3.43)	(11.99)	(13.23)	(3.87)	(2.08)	(1.70)
ISPB		0.32	0.28	0.25	0.26		0.28	0.25	0.23	0.23		0.27	0.25	0.23	0.23
		(3.12)	(2.90)	(2.73)	(2.74)		(2.92)	(2.86)	(2.74)	(2.78)		(2.73)	(2.73)	(2.56)	(2.69)
COMP			0.68	0.43	0.45			0.59	0.37	0.39			0.59	0.36	0.39
			(24.58)	(16.62)	(21.69)			(27.79)	(20.33)	(33.62)			(18.28)	(43.16)	(14.87)
ICOMP				0.42					0.37					0.38	
				(19.91)					(11.42)					(7.48)	
ICCOMP					0.46					0.40					0.38
					(63.70)					(14.95)					(9.88)
R-sq	0.10	0.13	0.25	0.28	0.30	0.09	0.11	0.21	0.23	0.24	0.07	0.09	0.17	0.19	0.20
obs	25411	25409	25409	25408	23632	17403	17403	17403	17403	16204	13640	13640	13640	13640	12639

Table 4b
Prediction Regressions for Price-to-Earnings Ratios

This table provides average estimated coefficients from the following prediction regressions:

$$PE_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PE2_{i,t} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

where k=1,2,3. In Panel A, the dependent variable is the prive-to-earnings ratio (PE). In Panel B, the dependent variable is the price-to-forecasted 2-year ahead earnings ratio (PE2). The expanatory variables are: PE_ind, the harmonic mean of the industry PE based on current year (k=0), but excluding the target firm; ISPE, the harmonic mean of the actual PE for the four closest firms matched on size after controlling for industry; COMP, the harmonic mean of the actual PE for the four closest firms matched on the firm's warranted PE (WPE), which is determined using the coefficients derived from last year's estimation regressions and current year accounting and market-based variables ; COMP, the harmonic mean of the actual PE for the four closest firms matched on WPE, ICOMP, the harmonic mean of the actual PE for the four closest firms matched on WPE after controlling for industry, and ICCOMP, the harmonic mean of the actual PE for the four closest firms matched on WPE after controlling for industry and country. The variables for Panel B are defined analogously, replacing PE with PE2. Table values represent the time-series average of the coefficients from annual cross-sectional regressions. The bottom row reports the average adjusted r-square and the number of observations of the annual regressions.

	Panel B - Price-to-Earnings														
	One year ahead PE					**Two year ahead PE**					**Three year ahead PE**				
cons	1.88	1.22	-1.34	-1.74	-2.47	6.74	6.06	3.49	3.08	2.57	10.24	9.54	7.32	6.97	6.76
	(3.55)	(2.06)	(-1.47)	(-2.36)	(-4.02)	(3.68)	(3.16)	(1.73)	(1.48)	(1.12)	(10.54)	(9.17)	(5.59)	(5.31)	(4.77)
PE_ind	1.21	1.00	0.48	0.26	0.26	0.87	0.69	0.25	0.11	0.09	0.70	0.52	0.09	-0.02	-0.03
	(23.68)	(39.56)	(7.92)	(7.47)	(11.75)	(7.52)	(6.91)	(2.93)	(1.32)	(0.95)	(13.21)	(15.87)	(1.24)	(-0.25)	(-0.34)
ISPE		0.23	0.15	0.12	0.11		0.20	0.15	0.12	0.13		0.20	0.15	0.13	0.15
		(5.32)	(2.56)	(1.95)	(1.71)		(7.27)	(3.78)	(2.94)	(3.45)		(3.69)	(2.69)	(2.36)	(2.82)
COMP			0.68	0.44	0.41			0.60	0.43	0.40			0.57	0.43	0.39
			(9.96)	(7.85)	(6.71)			(11.38)	(9.52)	(10.07)			(7.33)	(6.02)	(5.17)
ICOMP				0.49					0.35					0.28	
				(26.31)					(12.28)					(8.20)	
ICCOMP					0.55					0.41					0.32
					(28.46)					(20.58)					(17.79)
R-sq	0.07	0.08	0.18	0.22	0.24	0.04	0.05	0.13	0.15	0.17	0.03	0.03	0.09	0.10	0.11
obs	25411	25409	25409	25407	23632	17403	17403	17403	17403	16189	13640	13640	13640	13640	12624

	Panel B - Price-to-Forecasted 2-year ahead earnings														
	One year ahead PE2					**Two year ahead PE2**					**Three year ahead PE2**				
cons	1.58	0.48	-0.41	-0.82	-1.13	4.12	2.99	1.73	1.18	1.20	4.52	3.55	2.55	2.15	1.92
	(1.77)	(0.71)	(-1.29)	(-2.81)	(-5.11)	(6.26)	(4.25)	(2.14)	(1.44)	(1.38)	(5.90)	(3.98)	(2.46)	(2.19)	(1.94)
PE2_ind	1.12	0.69	0.09	-0.01	0.04	0.89	0.55	0.02	-0.07	-0.04	0.86	0.53	-0.01	-0.08	-0.05
	(13.39)	(7.12)	(4.25)	(-0.19)	(1.24)	(16.13)	(9.02)	(0.30)	(-1.31)	(-0.78)	(12.92)	(11.66)	(-0.09)	(-1.03)	(-0.83)
ISPE2		0.47	0.28	0.25	0.26		0.38	0.24	0.21	0.23		0.37	0.22	0.19	0.21
		(9.54)	(3.03)	(2.56)	(2.89)		(8.35)	(3.49)	(2.92)	(3.73)		(7.82)	(3.47)	(2.96)	(3.72)
COMP			0.77	0.50	0.35			0.72	0.45	0.33			0.71	0.46	0.32
			(8.91)	(6.80)	(14.03)			(8.16)	(6.38)	(12.19)			(7.14)	(6.54)	(7.29)
ICOMP				0.42					0.42					0.38	
				(37.13)					(15.53)					(7.84)	
ICCOMP					0.53					0.48					0.48
					(12.96)					(12.38)					(8.46)
R-sq	0.07	0.12	0.36	0.40	0.42	0.05	0.09	0.31	0.34	0.35	0.05	0.08	0.29	0.32	0.34
obs	25411	25409	25409	25407	23632	17403	17403	17403	17403	16192	13640	13640	13640	13640	12619

Table 5
Estimation Regressions for Different Sectors

This table reports the results from the following sector estimation regressions:

$$EVS_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PB_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PE_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

Firms in the eight sectors are included in the sample. The dependent variable is EVS or PB or PE or PE2 which is the enterprise value-to-sales ratio or price-to-book ratio or price-to-earnings or price-to-forecasted 2-year ahead earnings as of June 30th of each year. The explanatory variables are as follows: EVS_ind, PB_ind, PE_ind and PE2_ind are the the industry harmonic means of EVS, PB, PE and PE2 based on two-digit SIC codes; EVS_cty, PB_cty, PE_cty, PE2_cty are the country harmonic means of EVS, PB, PE, PE2; PM is the profit margin computed as operating income*100 divided by net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roa is operating profit scaled by total assets. Roe is the net income as a percentage of book value of stockholders equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. The Newey-West autocorrelation corrected t-statistics are provided in parentheses. The adjusted r-square (r-sq) and number of firms (# obs) are also reported.

Panel A - Enterprise Value-to-Sales

Sector	Intercept	EVS_ind	EVS_cty	PM	Losspm	Growth	Lev	Roa	R&D	r-sq	# obs
Basic	-0.4881	0.4927	0.2456	0.1691	-0.4049	0.0057	-0.0003	-0.0669	0.0758	0.60	3635
	(-5.64)	(4.57)	(1.99)	(13.50)	(-7.43)	(4.64)	(-0.39)	(-20.17)	(3.00)		
Consumer Cyclical	-0.3125	0.4762	0.2219	0.1349	-0.4434	0.0095	-0.0019	-0.0314	0.0226	0.54	4433
	(-3.12)	(8.35)	(1.34)	(12.58)	(-2.44)	(2.55)	(-3.97)	(-9.49)	(1.06)		
Consumer Non-Cyclical	-0.3870	0.1547	0.6915	0.1581	-0.2712	0.0093	-0.0031	-0.0471	0.0956	0.61	2760
	(-3.91)	(2.10)	(4.63)	(11.15)	(-3.14)	(5.97)	(-3.08)	(-4.70)	(7.96)		
Energy	0.4360	0.5151	0.1710	0.1912	-0.1098	0.0206	-0.0067	-0.2325	0.0551	0.65	744
	(0.52)	(6.33)	(0.18)	(14.46)	(-1.06)	(3.85)	(-2.68)	(-8.84)	(1.49)		
Finance	2.1257	0.6844	-2.5087	0.1234	-0.2805	0.0085	0.0238	-0.0894	-0.3161	0.59	3850
	(3.08)	(15.69)	(-3.85)	(28.71)	(-8.87)	(1.81)	(14.64)	(-5.39)	(-3.16)		
Industrial	-0.2349	0.3189	0.2546	0.1797	-0.2598	0.0054	-0.0029	-0.0604	0.0778	0.57	7372
	(-1.13)	(6.43)	(0.86)	(11.63)	(-12.50)	(2.39)	(-3.94)	(-12.11)	(2.83)		
Technology	-0.2226	0.0293	0.5666	0.1692	-0.6078	0.0107	-0.0050	-0.0408	0.0536	0.46	2536
	(-0.39)	(0.74)	(1.09)	(8.59)	(-2.58)	(4.78)	(-3.45)	(-3.17)	(3.68)		
Utilities	0.0315	0.5043	-0.3013	0.1153	-0.3826	0.0266	0.0021	-0.0852	0.1356	0.61	1296
	(0.06)	(1.91)	(-0.54)	(20.88)	(-3.14)	(5.40)	(1.72)	(-3.76)	(0.59)		

Panel B - Price-to-Book Value

Sector	Intercept	PB_ind	PB_cty	PM	Losspm	Growth	Lev	Roe	R&D	r-sq	# obs
Basic	-3.5584	1.0125	1.2308	0.0836	-0.2551	0.0049	0.0076	0.0618	0.0662	0.42	3635
	(-8.80)	(4.28)	(30.29)	(4.80)	(-6.93)	(2.24)	(3.16)	(6.00)	(3.21)		
Consumer Cyclical	-2.3576	0.9896	0.7843	0.0339	-0.2463	0.0155	-0.0009	0.0927	0.1037	0.36	4433
	(-5.19)	(8.04)	(2.25)	(5.14)	(-2.23)	(2.93)	(-0.84)	(13.83)	(2.52)		
Consumer Non-Cyclical	-3.7097	1.2204	1.3115	0.0331	-0.3029	0.0141	0.0000	0.0979	0.0784	0.36	2760
	(-11.71)	(3.92)	(6.11)	(3.55)	(-2.33)	(4.62)	(-0.00)	(6.26)	(2.96)		
Energy	-11.4549	6.1738	0.5429	0.0173	-0.0579	0.0072	0.0055	0.0602	0.1999	0.32	744
	(-1.05)	(1.08)	(1.05)	(3.28)	(-0.52)	(2.92)	(2.50)	(3.10)	(4.87)		
Finance	-0.9751	0.5666	0.4089	-0.0053	-0.1059	0.0108	0.0004	0.1169	0.5275	0.48	3850
	(-1.39)	(4.59)	(1.03)	(-1.56)	(-1.40)	(3.89)	(0.59)	(21.21)	(1.42)		
Industrial	-1.9037	0.9315	0.6014	0.0648	-0.2422	0.0049	0.0023	0.0621	0.0757	0.33	7372
	(-6.86)	(5.73)	(1.92)	(5.26)	(-4.17)	(2.77)	(1.67)	(7.33)	(3.87)		
Technology	-3.4696	0.8751	1.6991	0.0393	-0.5402	0.0103	-0.0082	0.1032	0.0205	0.31	2536
	(-7.51)	(5.65)	(7.04)	(3.93)	(-1.02)	(3.58)	(-6.78)	(10.93)	(3.59)		
Utilities	-1.4428	0.7772	0.7525	-0.0178	-0.2407	0.0241	-0.0014	0.0814	0.2671	0.42	1296
	(-2.04)	(2.89)	(1.79)	(-3.08)	(-1.67)	(4.66)	(-1.14)	(3.31)	(1.48)		

Table 5 continued on the next page

Table 5 continued

Panel C - Price-to-Earnings

Sector	Intercept	PE_ind	PE_cty	Growth	Lev	R&D	r-sq	# obs
Basic	-16.0965	0.6536	0.9906	0.2443	0.0487	0.4201	0.31	3635
	(-6.28)	(6.05)	(16.41)	(10.38)	(3.13)	(4.63)		
Consumer Cyclical	-17.0989	0.8390	1.0451	0.2894	-0.0058	0.4328	0.30	4433
	(-5.98)	(7.03)	(18.52)	(5.96)	(-0.63)	(1.17)		
Consumer Non-Cyclical	-16.0333	0.9031	0.9689	0.2605	0.0005	0.4539	0.25	2760
	(-7.48)	(8.63)	(7.34)	(17.56)	(0.03)	(2.22)		
Energy	-14.2481	0.8268	0.7000	0.3854	-0.0060	-0.7137	0.25	744
	(-2.18)	(2.85)	(2.21)	(5.93)	(-0.28)	(-1.72)		
Finance	-19.8287	1.3360	0.9682	0.1891	-0.0026	1.0668	0.16	3850
	(-6.70)	(12.01)	(5.31)	(6.02)	(-0.39)	(0.78)		
Industrial	-13.8169	0.6326	0.9619	0.2691	0.0026	0.5113	0.28	7372
	(-4.10)	(4.53)	(24.73)	(5.84)	(0.28)	(2.03)		
Technology	-9.2862	0.4502	1.1289	0.2991	-0.0377	0.2468	0.20	2536
	(-2.71)	(2.12)	(38.42)	(4.52)	(-4.35)	(2.57)		
Utilities	-9.6825	0.0728	1.5218	0.3240	-0.0595	-1.1836	0.41	1296
	(-2.63)	(0.54)	(7.55)	(5.78)	(-4.02)	(-0.49)		

Panel D - Price-to-Forecasted 2-year ahead Earnings

Sector	Intercept	PE2_ind	PE2_cty	Growth	Lev	R&D	r-sq	# obs
Basic	-7.7613	0.6575	0.9707	0.0067	0.0129	0.1848	0.52	3635
	(-5.63)	(7.14)	(23.43)	(1.11)	(2.57)	(1.72)		
Consumer Cyclical	-8.4494	0.8612	0.9548	0.0310	-0.0135	0.0971	0.42	4433
	(-6.12)	(11.11)	(12.09)	(3.91)	(-2.87)	(1.04)		
Consumer Non-Cyclical	-3.7173	0.4970	0.9313	0.0753	-0.0104	0.2053	0.38	2760
	(-2.60)	(5.21)	(14.91)	(4.50)	(-1.30)	(2.82)		
Energy	-19.8513	0.7704	0.9568	0.0529	-0.0345	0.4695	0.33	744
	(-0.21)	(0.12)	(5.38)	(2.12)	(-2.19)	(1.31)		
Finance	-17.2161	1.1871	1.4408	0.0144	-0.0042	1.5414	0.29	3850
	(-4.68)	(8.84)	(5.00)	(1.24)	(-1.27)	(1.38)		
Industrial	-3.2533	0.4068	0.9212	0.0190	-0.0123	0.1934	0.46	7372
	(-2.54)	(8.10)	(12.64)	(2.68)	(-2.03)	(2.85)		
Technology	-2.6143	0.4954	0.9162	0.0290	-0.0135	0.0207	0.23	2536
	(-0.79)	(1.93)	(14.33)	(3.30)	(-1.79)	(0.47)		
Utilities	-10.3012	0.4714	1.6930	0.0519	-0.0428	-1.8770	0.57	1296
	(-3.00)	(1.29)	(11.70)	(2.19)	(-4.31)	(-1.18)		

Table 6
Estimation Regressions for Different Countries

This table reports the results from the following sector estimation regression:

$$EVS_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PB_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t} \qquad PE_{i,t+k} = a_t + \sum_{j=1}^{n} \delta_{j,t} C_{j,i,t} + \mu_{i,t}$$

Firms in the G7 countries are included in the sample. The dependent variable is EVS or PB or PE or PE2 which is the enterprise value-to-sales ratio or price-to-book ratio or price-to-earnings or price-to-forecasted 2 year ahead earnings as of June 30th of each year. The explanatory variables are as follows: EVS_ind, PB_ind, PE_ind and PE2_ind are the the industry harmonic means of EVS, PB, PE and PE2 based on two-digit SIC codes; EVS_cty, PB_cty, PE_cty, PE2_cty are the country harmonic means of EVS, PB, PE, PE2; PM is the profit margin computed as operating income*100 divided by net sales. Losspm is PM*indicator variable, where the indicator variable is 1 if profit margin <= 0 and 0 otherwise. Growth is the growth forecast computed as the percentage change in two year ahead analysts' forecast of growth relative to one year ahead analysts' forecast of growth. Lev is the total debt scaled by total equity. Roa is operating profit scaled by total assets. Roe is the net income as a percentage of book value of stockholders equity. R&D is the firm's R&D expenditures expressed as a percentage of net sales. The Newey-West autocorrelation corrected t-statistics are provided in parentheses. The adjusted r-square (r-sq) and number of firms (# obs) are also reported.

Panel A - Enterprise Value-to-Sales

Country	Intercept	EVS_ind	EVS_cty	PM	Losspm	Growth	Lev	Roa	R&D	r-sq	# obs
Canada	-0.8064	0.6746		0.1527	-1.4660	0.0184	0.0036	-0.0617	0.0341	0.58	1169
	(-3.02)	(6.08)		(17.20)	(-1.29)	(4.69)	(2.67)	(-5.39)	(1.01)		
France	-0.9595	1.4286		0.1237	-0.1995	0.0029	0.0101	-0.0585	-0.0171	0.67	1883
	(-6.11)	(9.67)		(8.05)	(-2.91)	(0.65)	(6.23)	(-8.47)	(-3.10)		
Germany	-1.2571	1.3819		0.2149	-0.2770	0.0092	0.0169	-0.0818	-0.0264	0.73	1360
	(-5.05)	(5.33)		(7.18)	(-8.03)	(1.39)	(6.78)	(-5.22)	(-1.68)		
Italy	-0.4842	0.9542		0.1544	-0.1863	0.0091	0.0082	-0.1054	-0.0707	0.70	675
	(-1.29)	(4.33)		(14.52)	(-1.55)	(2.45)	(3.93)	(-4.03)	(-1.64)		
Japan	0.1701	0.3668		0.2355	-0.4047	0.0083	-0.0002	-0.1278	0.1294	0.72	3364
	(0.94)	(3.61)		(14.43)	(-1.39)	(2.99)	(-0.21)	(-3.47)	(1.02)		
United Kingdom	-0.4759	0.9119		0.1394	-0.8273	0.0060	0.0091	-0.0622	0.0228	0.66	5169
	(-2.44)	(8.46)		(31.39)	(-3.08)	(1.43)	(3.23)	(-7.56)	(4.13)		
United States	-0.7635	0.6517		0.1218	-0.4043	0.0114	0.0021	-0.0044	0.1012	0.50	13006
	(-17.18)	(8.79)		(14.15)	(-7.10)	(4.33)	(4.50)	(-2.25)	(4.18)		

Panel B - Price-to-Book Value

Country	Intercept	PB_ind	PB_cty	Pm	Losspm	Growth	Lev	Roe	R&D	r-sq	# obs
Canada	-0.5367	0.7826		0.0327	-0.0765	0.0087	-0.0022	0.0619	0.0587	0.24	1169
	(-1.99)	(14.24)		(4.89)	(-0.09)	(2.63)	(-1.98)	(4.08)	(2.01)		
France	-1.7571	1.0063		0.0183	0.1298	0.0205	0.0010	0.1387	0.0347	0.41	1883
	(-2.45)	(5.13)		(2.44)	(1.92)	(2.34)	(0.84)	(4.82)	(1.80)		
Germany	1.3099	0.2797		0.0380	-0.0658	0.0156	-0.0061	0.0866	-0.0007	0.27	1360
	(1.79)	(0.81)		(2.48)	(-1.38)	(2.68)	(-8.69)	(12.01)	(-0.02)		
Italy	-0.4520	0.6201		0.0288	-0.0998	0.0161	-0.0086	0.1226	-0.0658	0.29	675
	(-0.52)	(1.59)		(2.27)	(-1.78)	(3.39)	(-4.43)	(3.54)	(-2.32)		
Japan	-0.0030	0.5772		0.0250	-0.4858	0.0099	0.0048	0.1173	0.1074	0.29	3364
	(-0.01)	(3.39)		(1.18)	(-2.79)	(2.86)	(4.86)	(4.93)	(0.89)		
United Kingdom	-1.2534	1.2011		0.0159	-0.3591	0.0167	-0.0033	0.0891	0.0760	0.48	5169
	(-2.62)	(4.86)		(5.38)	(-1.83)	(2.10)	(-2.94)	(13.13)	(2.55)		
United States	-1.2496	1.3483		0.0251	-0.2798	0.0074	-0.0008	0.0731	0.0765	0.30	13006
	(-7.41)	(14.59)		(4.75)	(-4.60)	(4.66)	(-0.63)	(9.92)	(3.50)		

Table 6 continued on the next page

Table 6 continued

Panel C - Price-to-Earnings

Country	Intercept	PE_ind	PE_cty	Growth	Lev	R&D	r-sq	# obs
Canada	-9.24	1.30		0.35	0.01	-0.31	0.26	1169
	(-3.42)	(8.59)		(6.82)	(0.37)	(-3.32)		
France	3.57	0.70		0.28	0.00	0.60	0.19	1883
	(1.38)	(3.73)		(6.87)	(-0.33)	(2.55)		
Germany	14.62	0.49		0.38	-0.07	-0.31	0.14	1360
	(1.91)	(1.39)		(4.85)	(-6.25)	(-1.83)		
Italy	16.27	0.29		0.26	-0.05	-0.74	0.13	675
	(4.13)	(0.92)		(6.52)	(-2.20)	(-12.27)		
Japan	17.62	0.75		0.34	0.06	-0.74	0.17	3364
	(5.92)	(4.30)		(6.80)	(2.03)	(-0.83)		
United Kingdom	4.58	0.47		0.23	0.01	0.21	0.16	5169
	(4.92)	(9.84)		(7.26)	(1.10)	(1.69)		
United States	0.26	0.87		0.25	-0.01	0.38	0.24	13006
	(0.25)	(9.01)		(6.03)	(-1.99)	(2.34)		

Panel D - Price-to-Forecasted 2-year ahead Earnings

Country	Intercept	PE2_ind	PE2_cty	Growth	Lev	R&D	r-sq	# obs
Canada	-1.67	1.12		0.04	0.00	-0.02	0.16	1169
	(-0.95)	(11.17)		(2.77)	(0.88)	(-0.27)		
France	2.81	0.82		0.05	0.00	0.28	0.13	1883
	(5.09)	(9.74)		(5.05)	(-0.92)	(2.03)		
Germany	9.61	0.85		0.07	-0.04	-0.09	0.07	1360
	(2.75)	(4.54)		(3.35)	(-6.45)	(-1.27)		
Italy	16.81	0.17		0.02	-0.07	-0.49	0.10	675
	(3.35)	(0.39)		(0.58)	(-5.40)	(-2.79)		
Japan	21.60	0.65		-0.03	0.03	-0.50	-0.02	3364
	(11.82)	(4.15)		(-1.56)	(1.50)	(-1.09)		
United Kingdom	5.33	0.54		0.02	0.00	0.05	0.07	5169
	(3.94)	(5.58)		(2.87)	(-0.42)	(1.13)		
United States	2.86	0.82		0.03	-0.02	0.13	0.17	13006
	(5.53)	(15.02)		(4.80)	(-6.78)	(2.42)		

Figure 1. Distribution of Peer Firms

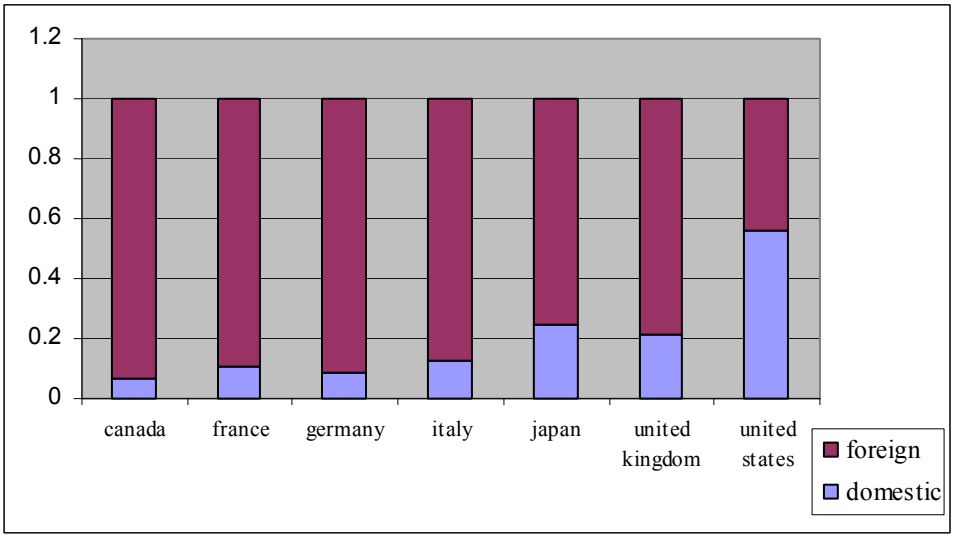

Figure 1a. Domestic and foreign peers. This chart reports the proportion of domestic and foreign peer firms, by country. A firms is deemed a peer firm if it is among the four closest matching firms using the warranted multiple technique. 'foreign' represents the proportion of comparable firms that do not belong to the same country as the target firm, while 'domestic' represents the proportion of comparable firms from the same country as the target firm.

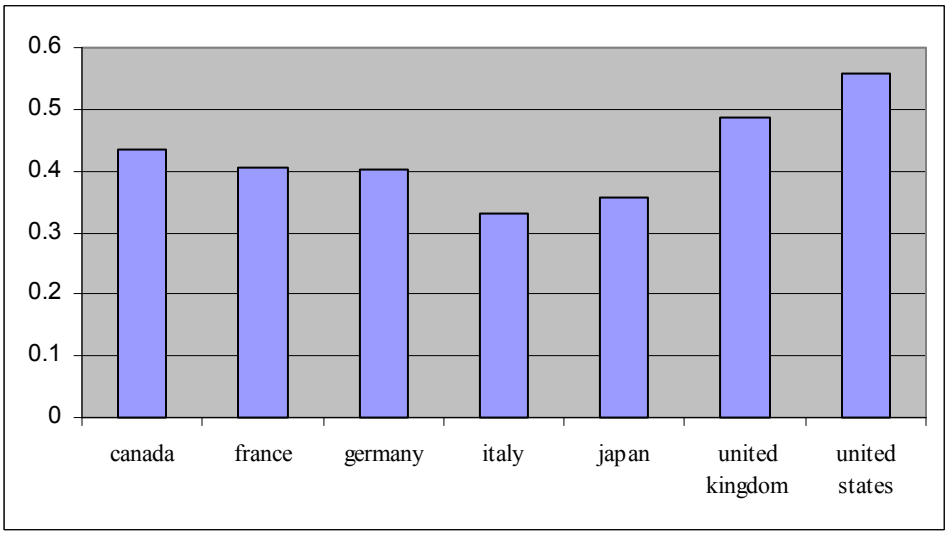

Figure 1b. Proportion of firms U.S. peers. This chart reports the proportion of peer firms that are U.S. based, by country. A firms is deemed a peer firm if it is among the four closest matching firms using the warranted multiple technique.