Article

Does integration lead to lower costs of equity?

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Abstract
Recent evidence has suggested that the benefits of equity market integration may not be shared equally by all firms. Making use of a firm-level measure of integration we investigate whether one of the documented benefits of equity market integration, lower cost of equity capital (COEC), holds for all Australian firms. Empirical evidence suggests that the degree of integration is reflected in firm COEC, albeit not in the expected way. Our results indicate that increased integration at the firm level leaves firms exposed to higher COEC when world market conditions are volatile.

JEL Classification: **C33, F36, G32**

Keywords
Cost of equity capital, equity markets, integration

1. Introduction

The world's capital markets have become increasingly integrated over the past three decades (Bekaert et al., 2011; Pukthuanthong and Roll, 2009), spurring the interest of researchers and policy-makers regarding the nature and implications of integration. Highly integrated markets are expected to, among other benefits, reduce macroeconomic (consumption) volatility, increase capital allocation efficiency, and increase economic growth (Kose et al., 2006; Prasad et al., 2003). One way integrated equity markets are anticipated to benefit markets is via easier and

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cheaper access to capital for firms, which should stimulate additional investment activity (Bekaert et al., 2005; Henry, 2000a). Specifically, the cost of equity capital (COEC) for firms should fall due to risk sharing between domestic and foreign agents, increased competition among suppliers of capital, and increased efficiency and development of domestic financial markets (Errunza, 2001).

Empirical studies on equity market integration typically find a reduction in firms COEC (e.g. Bekaert et al., 2005; Bekaert and Harvey, 2000; Henry, 2000b); however, these studies have focused on country-level data and around specific events were expected to increase integration. Recent evidence finds that aggregate-level findings may not apply universally to all firms (e.g. Bekaert et al., 2011; Eun et al., 2008). For instance, multinationals with a strong international presence are typically more integrated with the global market than smaller, domestically orientated firms (Huang, 2007). This evidence suggests that only some firms may experience lower COECs as a result of being in an open and highly integrated equity market. Of concern, however, is that all firms in an open market are exposed to the downside risks associated with highly integrated markets, including sharp reversals in short-term capital flows and volatility spill-overs across markets (Agenor, 2003; Caporale et al., 2006; Obstfeld, 1998; Speller et al., 2011).

Given that integration may not benefit all firms, yet all firms may be harmed by its downsides, it is important to understand the likely disaggregated impact of increased integration. The literature to-date has not explicitly considered whether variation in the degree of firm-level integration, either between firms or over time, is reflected in firm COEC. This research aims to fill that gap in the literature. Specifically, we regress COEC estimates on a firm-level measure of integration for a sample of Australian firms between 1995 and 2011. We define integration as the proportion of a stock's variance in returns explained by the variance in the returns of the MSCI Global Index, consistent with Eun et al. (2008). This measure of integration, along with implied cost of capital estimates of the COEC, is then used to examine the impact of integration on COEC at the firm level.

Results show that while the Australian equity market has become more integrated in recent years, there is substantial variation in integration across sub-groups of firms. Consistent with prior literature, larger and cross-listed firms are found to be more highly integrated than their smaller, domestic counterparts, while firms in the basic materials and oil and gas industries are less integrated than firms in other industries. We find mixed evidence on the relationship between integration and COEC. While the univariate results find the expected negative relationship, with a 10% increase in integration reducing COEC by 1.58% on average, this relationship reverses once we control for other explanatory variables. Specifically, we find a marginally significant positive relationship (with a 10% increase in integration associated with COEC rising by 0.38%). This positive relationship is driven, at least in part, by a contagion effect experienced during global market crisis periods. During these periods highly integrated Australian firms are found to experience an increase in COEC, likely as a consequence of investors demanding a higher risk premium in response to heightened market uncertainty. Therefore, the results suggest that increased integration may leave firms exposed to a higher COEC when world market conditions are volatile.

We make two contributions in this paper. First, we explore the disaggregated impact of integration on firm COEC by considering firm-level integration. We show that not all firms experience integration equally, something that is masked in aggregate-level studies by the use of indices that are dominated by larger, more prominent firms. Second, we analyze the relationship over time, where previous studies have tended to use event studies, concentrating on events that dramatically increase integration. However, integration both increases as a result of major events, like free trade agreements (FTAs), and also changes year to year, including increasing during volatile periods (e.g. Pukthuanthong and Roll, 2009). Examining the relationship overtime gives an indication of the on-going relationship between integration and COEC not previously considered.

The remainder of this study is set out as follows. We begin by reviewing the theoretical and empirical evidence regarding integration and firm COEC. We then review the Australian market and prior empirical work around integration, followed by an outline of the data and methodology employed. A discussion of results is then presented, followed by concluding remarks.

2. Literature review

2.1. Integration and the cost of equity capital

There are a number of theoretical explanations why firm COEC is expected to fall due to increased integration. For instance, assuming investors care only about the expected return and variance of their portfolios, allowing foreign investors access to the domestic market means that domestic investors can share country-specific risks with foreign investors (Errunza, 2001; Stulz, 1999). Consequently, the risk premiums demanded – and, thus, the COEC for firms – should fall. In addition, globalization makes it easier for international investors to trade securities, increasing market liquidity and reducing bid–ask spreads, resulting in lower risk premiums demanded by investors (Stulz, 1999). Finally, increased integration is accompanied by the development of the broader financial market, which in turn may have flow on benefits for COEC. For example, more highly integrated and developed markets typically have more stringent investor protection and corporate governance environments, reducing the information and agency costs faced by shareholders and, subsequently, the risk premium demanded (La Porta et al., 2000; Stulz, 1999).

Relevant studies on the role of equity market integration on firm COEC have typically employed an event study approach focusing on specific ‘globalization’ or ‘liberalization’ events that are anticipated to facilitate integration of a market with the world market (e.g. Bekaert et al., 2005; Henry, 2000b). For example, Bekaert and Harvey (2000) estimate the effects of liberalization on emerging equity markets following the introduction of American Depository Receipts (ADRs) or country-funds, or the removal of restrictions on direct foreign investment in stocks. They find these events result in a decrease in aggregate (country-level) dividend yields, which they argue reflects a decrease in COEC.

However, studies at the aggregate level do not show whether all firms get a reduction in COEC. Recent integration studies find that liberalization activities do not automatically increase integration for all firms. As a result, the reduction in COEC from increased integration at the country level may only be experienced by certain types of firms. Further, in considering only the impact of specific globalization events, these studies fail to account for any on-going influence of integration on firm COEC. In particular, as integration continues to increase over time (Carrieri et al., 2007; Stulz, 1999), the COEC for companies operating in open capital markets is anticipated to decrease as the risk of these companies is shared by an increasing pool of investors (Stulz, 1999). Integration has also been found to fluctuate over time; for instance, increasing during times of heightened volatility (e.g. Pukthuanthong and Roll, 2009).

Another strand of the literature employing the international asset pricing model (IAPM) avoids these shortcomings. However, the focus of these studies is on identifying the risk factors influencing asset returns and the implications of increased globalization on diversification opportunities for investors, rather than explicitly evaluating the impact of integration on firm COEC (e.g. Errunza and Losq, 1985; Stulz, 1981). For example, Lee et al. (2009) tests IAPMs for firms within G-7 countries between 1990 and 2000. They conclude that (implied) expected returns are related to world market and currency betas, leverage, size, book-to-market (B/M) ratios, and idiosyncratic volatility. Unexpectedly, Lee et al. (2009) find that firms with high world market betas have higher implied risk premiums, suggesting firms with greater exposure to the world market have higher COECs. However, world market betas are not a direct measure of a firm’s integration level. Larger (positive) world market betas indicate greater exposure to the world market relative to stocks with smaller betas. Yet they do not explain the proportion of a stock’s return determined by world market forces compared to local or firm-specific factors. In the context of integration studies, it is this relative proportion that measures the degree of integration for a security.

2.2. Segmentation within integrated equity markets

Despite equity markets having become increasingly integrated, recent literature suggests that various sub-groups of firms may remain segmented. There is evidence that size, industry membership, and international activity are key determinants of a firm's degree of integration. For instance, the evidence suggests that country-level global pricing is driven by the large-cap stocks that dominate the market indices used in aggregate country-level studies (e.g. Eun et al., 2008; Huang, 2007). Examining integration in 10 developed countries between 1980 and 1999, Eun et al. (2008) find that the global component of size-based portfolio returns accounts for, on average, 42.2% of large-cap return variance compared to just 17.6% for small-cap returns.

Differences in integration between industries are found by Fedorov and Sarkissian (2000), Carrieri et al. (2004), and Bekaert et al. (2011). Bekaert et al. (2011) find that while segmentation decreased for countries between 1980 and 2005, integration for banks and retailers increased, while electronic equipment and mining firms experienced a decrease in integration. Further, they find the most segmented industries are largely endowment-based, such as forestry and mining. In contrast, software and computing services, media telecommunications, and utilities are the least segmented.

Finally, studying the securities of 21 developed countries over the period 1985–2002, Brooks and Del Negro (2006) show that the degree of a stock's exposure to global shocks is positively related to measures of a firm's international activity. Specifically, the authors find by a firm raising its international sales by 10% increases its exposure to global shocks by 2%.

2.3. Hypotheses

The segmentation evidence indicates that, within an open and integrated equity market, the expected benefit of lower COEC may only be experienced by certain sub-groups of firms. As highlighted above, however, there is limited literature on this point and, to the best of the authors' knowledge, none that specifically sheds light on this matter.

This study addresses this gap in the literature by examining two main hypotheses for a sample of Australian firms between 1995 and 2011. *Hypothesis 1*: We expect that the degree of integration with the global market will vary across sub-groups of firms within the Australian capital market. For example, integration will be highest for larger firms, those that have international operations, and those belonging to certain industry sectors, such as retail. *Hypothesis 2*: This variation in the degree of integration will be reflected in the firm-level COEC. Specifically, a firm's COEC is expected to be negatively related to its degree of global integration.

The segmentation literature also highlights the importance of considering the issue of equity market integration at the disaggregate level. Therefore, as a natural extension of hypotheses 1 and 2 we also investigate whether the relationship between integration and firm COEC varies across different types of firms. *Hypothesis 3*: The relationship between integration and firm COEC may differ across various sub-groups of firms. For example, an increase in integration may have a stronger impact on the COEC of domestic firms than that of cross-listed firms, which are likely to be more highly integrated to begin with.

3. The Australian market

Australian policy-makers over the past three decades have sought to eliminate barriers to trade and international money flows due to the country's reliance on foreign trade and capital for economic prosperity. The early 1980s saw a period of rapid economic liberalization due largely to financial deregulation (Reserve Bank of Australia (RBA), 2000), leading to acceleration in the Australian capital market's integration with global capital markets, marked by sharp increases in foreign investment, foreign bond issuance, and foreign ownership of Australian equities (Financial System Inquiry, 1997). In conjunction with economic liberalization, Australian policy-makers have also actively pursued economic and financial integration, such as its current participation in the Trans-Pacific Partnership Agreement (TPP) negotiations and previous FTAs. We have elected to focus on Australia as it is a developed market, both economically and financially, which has been proactive in bringing about greater integration in its economic and financial markets. As a result, the integration process is well established and continuing with active cross-listings both into and out of the country and along with foreign investment via other sources. Australia also has the added advantage of not having a strong influence on the world economy, which may have confounded our results if we were to use larger markets, such as the US. In addition, the data was relatively readily available resulting in a good sample across the spectrum, from well integrated to less integrated firms, but which has not been widely researched.

To date there have been few studies examining equity market integration within the Australian context specifically, although it is regularly included in cross-country studies.[1] Ragunathan (1999) finds that in the post-deregulation period (1984–1992) international factors became an increasingly important factor in pricing Australian industry equity portfolios, indicating that the Australian market became more globally integrated over this period. More recently, Shi (2010) examined stock market index co-movement between Australia and key bilateral trade partners including New Zealand, Canada, the UK, and the US over the period 1984–2005. Finding that the typical level of co-movement increased substantially over this period, Shi also notes that co-movement becomes more pronounced during periods of financial volatility. However, the Australian literature lacks an examination of the impact of integration at the firm level.

4. Methodology and data

To examine whether variation in the degree of integration is reflected in the COEC of Australian firms, we employ a panel data methodology:

$$ICC_{i,t} = \alpha_{i,t} + \beta_1 INT_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \tag{1}$$

where $ICC_{i,t}$ is the implied COEC for firm i at year t, our proxy for firm COEC, $INT_{i,t}$ is the measure of integration obtained for firm i for year t, and $X_{i,t}$ is a vector of control variables including firm size, M/B ratio, leverage, idiosyncratic volatility, and cross-listing status. We also control for industry and time effects, and standard errors are clustered by firms.

4.1. Integration measure

To obtain a quantifiable measure of the degree of integration for a security we follow the methodology of Eun et al. (2008) and define integration as the proportion of a security's return variance that is attributable to global risk as opposed to country- or firm-specific risk.[2] Firstly, global and country betas for each security are estimated on a five-year rolling basis using monthly returns:[3]

$$R_{i,t} = \alpha_{i,t} + \beta_{i,t}^{W} R_t^{W} + \beta_{i,t}^{AU} R_t^{AU} + \epsilon_{i,t} \tag{2}$$

where $R_{i,t}$ are the returns for firm i in year t, R_t^{W} are the returns on the global market portfolio, proxied by the MSCI world index, and R_t^{AU} is the orthogonalized MCSI Australian market index

(MCSIA) returns. We orthogonalize Australian market returns by regressing the MSCIA returns on the MSCI world index and employing the residuals as R^{AU} to isolate the country effect. Therefore, $\beta_{i,t}^{W}$ and $\beta_{i,t}^{AU}$ denote the global and orthogonalized country beta for firm *i* in year *t*, reflecting the sensitivity of each firms' price movements to global and local factors, respectively.

Monthly returns are employed to avoid downwardly biasing estimates as a result of non-synchronous trading hours between the Australian market and the rest of the world (Griffin and Karolyi, 1998) and infrequently traded securities (Campbell et al., 1997; Dimson, 1979).[4] Each firm's return variance, $var(R_i)$, is then decomposed into three components: the proportion of its variance attributable to (i) the global factor (the measure of integration); (ii) the country factor; and (iii) the idiosyncratic risk of the security:

$$var(R_{i,t}) = \left(\beta_{i,t}^{W}\right)^2 var(R_t^{W}) + \left(\beta_{i,t}^{AU}\right)^2 var(R_t^{AU}) + var(\epsilon_{i,t}) \quad (3)$$

The global factor proportion is given by

$$\frac{\left(\beta_{i,t}^{W}\right)^2 var(R_t^{W})}{var(R_{i,t})} \quad (4)$$

The underlying assumption of this definition is that as a firm becomes more integrated with the global market, the proportion of its return variance attributable to global risk increases. A potential issue with this measure is that it is sensitive to changes in return variance, such that as $var(R^{W})$ increases, ceteris paribus the proportion of $var(R_{i,t})$ attributable to the global factor will also increase, inflating integration estimates. The use of time dummies controls for changes in the level of variance in the global market.

4.2. Cost of equity capital methodology

Traditionally, estimates of COEC have been derived either directly from realized returns, or indirectly through asset pricing models such as the capital asset pricing model (CAPM). However both approaches have severe limitations in their ability to generate reliable proxies for ex ante expected returns (Pastor and Stambaugh, 1999; Sharpe, 1978, respectively). An alternative approach, the Implied Cost of Equity Capital (ICC), has recently gained popularity in the literature. The ICC of a firm is the internal rate of return that equates the firm's current stock price to the present value of expected future cash flows to equity (FCFE). Specifically, ICC estimates involve substituting the contemporaneous firm stock price and analyst earnings forecasts, which proxy for the market's expectations of future earnings, into a discounted free cash flows to equity valuation model:

$$P_{i,t} = \sum_{j=1}^{\infty} \frac{E_t(FCFE_{t+j})}{(1+r_e)^j} \quad (5)$$

where $E_t(FCFE_{t+j})$ is the expected free cash flow to equity holders for period $t+j$ conditional on the information at time *t*, and r_e is the COEC.

ICC estimates are intuitively appealing as they reflect the market's perception of the risk associated with investing in a particular firm's stock (Gebhardt et al., 2001 (GLS)), and thus reflect the current compensation demanded by shareholders to hold the security. Importantly, they are also strongly correlated with a firm's future realized returns (Hou et al., 2012; Lee et al., 2009), thus serving as more reliable proxies of firm COEC than measures based on ex post realized returns.[5] However, recent empirical evidence has highlighted shortcomings in the use of analyst-based ICCs as a proxy for expected returns, primarily regarding the quality of analysts' forecasts, which may be updated slowly (Guay et al., 2011) and can be overly optimistic (Easton and Sommers, 2007). Further, small and financially distressed firms are underrepresented (Hou et al., 2012).

To address these shortcomings, Hou et al. (2012) employ a pooled cross-sectional model to forecast firm earnings. In addition, they show that their cross-sectional earnings model explains more variation in earnings performance across firms compared to analyst-based earnings forecasts, has less forecast biases, and is a better proxy for market expectations of future earnings. Coverage is also considerably enhanced as ICCs can be computed for any publically traded equity with available accounting information.

We compute our ICC estimates based on the cross-sectional earnings methodology of Hou et al. (2012) for each year between 1995 and 2011. The following pooled cross-sectional regression is estimated using the previous 10 years of data (six years minimum):

$$E_{i,t+\tau} = \alpha + \beta_1 TA_{i,t} + \beta_2 D_{i,t} + \beta_3 DD_{i,t} + \beta_4 E_{i,t} + \beta_5 NegE_{i,t} + \beta_6 AC_{i,t} + \varepsilon_{i,t+\tau} \tag{6}$$

where $E_{i,t+\tau}$ denotes the net earnings before extraordinary items of firm i in year $t+\tau$ (τ = 1 to 5), $TA_{i,t}$, is the total assets, $D_{i,t}$ is the dividend payment, $DD_{i,t}$ is a dummy variable that takes a value of 1 for dividend payers and 0 otherwise, $NegE_{i,t}$ is a dummy variable that takes a value of 1 for firms with negative earnings, and $AC_{i,t}$ is accruals, which is calculated using the balance sheet method.[6] All explanatory variables are measured at year t and, with the exception of *DD* and *NegE*, are expressed in $AU millions. All accounting data are from Thomson Reuters Worldscope (TDS). The Newey–West correction is applied to standard errors to correct for serial dependency of the independent variables (Gebhardt et al., 2001, 2006; Hou et al., 2012). To minimize the impact of outliers, earnings and other level variables are winsorized at the 1st and 99th percentiles.

We collect both market capitalization and accounting data as at 31 December of each year. In Australia, the majority of firms have a financial year end of June (86% in 2011 according to TDS records), with a legal requirement to release their annual report within four months of that date. Accordingly, the accounting information should be incorporated by December for the majority of firms.[7]

For each firm i and each year t in the sample, earnings forecasts are computed for up to five years ahead by multiplying year t independent variables with the coefficients from the corresponding pooled regression estimated for the relevant year ahead. The ICC estimates backed out from the valuation equation are winsorized at the 5th and 95th percentiles.

Various ICC specifications have been proposed, each differing with respect to their use of analyst forecast data, the explicit forecast horizons stipulated, and the assumptions made regarding short- and long-term growth rates (see Botosan and Plumlee, 2005; Easton, 2007 for a review of the early ICC literature). We use the adaptation of the Claus and Thomas (CT) (2001) model employed by Hou et al. (2012), as this model is found to perform well when employing their cross-sectional earnings forecast methodology. As a robustness check, we also use Hou et al.'s adaption of the Gordon and Gordon (Gordon) (1997) model.[8]

CT (2001) model:

$$M_{i,t} = BV_{i,t} + \sum_{j=1}^{5} \frac{E_t\left[R.I._{i,t+j}\right]}{(1+R_i^{CT})^j} + \frac{E_t\left[R.I._{i,t+5} * (1+g)\right]}{(R^{CT}-g)(1+R_i^{CT})^5} \tag{7}$$

The CT model is a special case of the residual income valuation model where $M_{i,t}$ is market equity for firm *i* in year *t*, $BV_{i,t}$ is the book value of equity, E_t denotes market expectations based on information at year *t*, R_i^{CT} is the implied cost of capital, and $R.I._{i,\,t+j}$ is the residual income in year *t+j*, which is defined as the difference between the return on equity (ROE) and the ICC (R_i^{CT}) multiplied by the firm's book equity in the previous year $[(ROE_{i,t+j} - R_i^{CT})*BV_{i,t+j-1}]$. $ROE_{i,t+j}$ itself is given by $E_{i,t+j}/BV_{i,t+j}$ and is estimated using the earnings forecasts and book equity, which is calculated based on clean surplus accounting, $BV_{i,t+k} = BV_{i,t+j-1} + E_{i,t+j} - D_{i,t+k}$, where $E_{i,t}$ is the earnings in year *t+j* and D_{t+j} is the dividend paid in year *t+j*, computed using the current dividend payout ratio for firms with positive earnings, or by using current dividends divided by (0.06*total assets) as an estimate of the payout ratio for firms with negative earnings (Gebhardt et al., 2001; Hou et al., 2012).[9] Beyond year 5, residual income becomes a perpetuity assumed to grow at *g*, which reflects expected inflation, and is set to 2.94%, which is within the Australian Reserve Banks' target inflation rate of 2–3%.[10]

Gordon (1997) model:

$$M_{i,t} = \frac{E\left[E_{i,t+1}\right]}{R_i^G} \tag{8}$$

The appeal of this variation of the Gordon (1997) model is that there is no need to forecast *ROE* (eliminating reliance on forecasted *BV* and *Div* figures), nor an assumed growth rate. Rather, the market value of a firm at time *t* is dependent simply on the market's expectation regarding earnings at *t*+1 and the discount factor. $M_{i,t}$ is the market equity in year *t* for firm *i*, E_t denotes market expectations based on information at year *t*, and R_i^G is the implied cost of capital. In line with the literature (Hou et al., 2012), negative ICC estimates are removed, which reduces the sample size considerably, particularly in post-GFC years. Therefore, this second methodology for calculating a firm's ICC is used solely as a robustness check.

4.3. Data overview

We examine the question of whether reductions in the COEC as a result of increased Australian equity market integration are shared by all firms by examining all equity securities listed on the Australian Securities Exchange (ASX) over the sample period. The study begins in 1995 due to unreliable accounting data prior to this time. In line with Ince and Porter (2008), securities other than common equities were removed,[11] as were financial sector and non-domestic firms. Firms that delist in year *t* or lack five years of trading history prior to year *t* are also excluded.

The final sample comprises 5860 firm year observations. Summary statistics in Appendix 1 reveal that the 1995 sample consists of 97 firms with an average market capitalization of \$1.55b, increasing to a sample size of 515 firms with an average market capitalization of \$1.17b by 2011. The percentage of firms that are cross-listed doubles over the sample period. The average degree of integration at the firm level is fairly low and varies over time, while the average CT (2001) ICC estimate increases, likely due to the inclusion of smaller firms in the sample in later years. Finally, the sample is dominated by basic materials, industrial, and consumer goods and services firms; these firms accounting for ~88% (~75%) of sample firms in 1995 (2011).

5. Results

In this section we begin by examining integration at both the country and firm levels for Australia. We then discuss the ICC estimates, before turning to the relationship between integration and the ICC estimates.

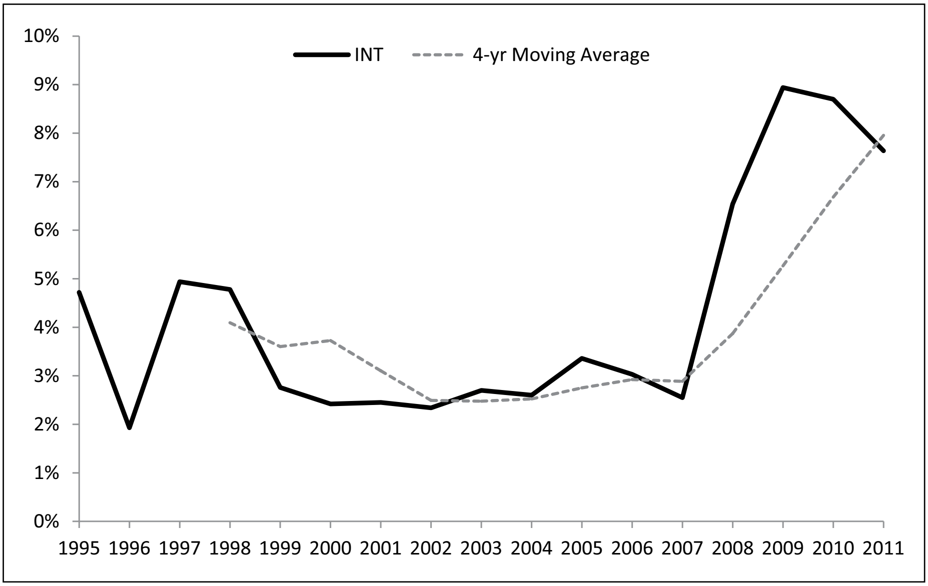

Figure 1. Average global integration of Australian Firms: 1995–2011.
Note: Global integration is defined as the proportion of variation in firm *i*'s returns explained by variation in returns of the MSCI World Index, using monthly log returns on a rolling five-year basis (see Equation (4)). The equally weighted average of all firms in the sample for year *t* is provided.

5.1. Integration

5.1.1. Integration of Australian firms – aggregate results. To examine integration at the country level, in line with Pukthuanthong and Roll (2009), we measure the proportion of total MSCI Australia Index returns variance explained by variance in the returns of the MSCI World Index over the sample period. Consistent with Shi (2010), integration of the Australian equity market has increased markedly, from 13.2% in 1985 to 46.5% by 2011. The increase in country-level integration is also consistent with studies of other markets over similar time periods.

However, at the firm level it is apparent that the degree of integration is much lower on average than for the country-level estimates, and there is little evidence of a strong upward trend prior to 2008 (see Figure 1). This may be driven by changes in the sample composition, with greater numbers of small firms entering the sample over time. The literature suggests these firms will have lower levels of integration and so may bias the average results downward over time. We do, however, observe upward spikes in average firm-level integration during the Asian Financial Crisis (AFC) and Global Financial Crisis (GFC) periods.

Table 1 presents the average firm-level results from the two-factor regressions and variance decompositions computed for the years 1995–2011. Column 3 indicates that world beta loadings increase considerably from 0.38 in 1995 to almost 0.87 in 2011. Of note, the rise in the importance of global factors is not isolated to the GFC period, 2008–2009, with an increase in average world beta loading evident from 2003 onward.

Shown in the final three columns of Table 1, idiosyncratic risk accounts for, on average, the largest proportion of total variance for Australian firms. Further, idiosyncratic exposure appears to increase as the country factor decreases. This is in line with research by Campbell et al. (2001) who find that firm-level volatility accounts for the greatest proportion of total volatility and that

Table 1. Two-factor regression and variance decomposition analysis.
Average results from the two-factor regressions and variance decompositions for each year from 1995 to 2011. Global and country betas for each security are estimated on a five-year rolling basis using monthly log returns: $R_{i,t} = \alpha_{i,t} + \beta_{i,t}^{W} R^{W} + \beta_{i,t}^{AU} R^{AU} + \epsilon_{i,t}$, where $R_{i,t}$ is the returns on firm *i* for years *t*–4 to *t*, R^{W} the returns on the global market portfolio, proxied by the MSCI world index, and R^{AU} is the residual obtained from regressing MCSI Australian market index (MCSIA) returns on MSCI world index returns for each year *t*. Each firm's return variance, *var*(R_i), is then decomposed into three components. The proportion of return variance attributable to: the global factor (Global) is defined as $\frac{(\beta_{i,t}^{W})^2 var(R^{W})}{var(R_{i,t})}$; the country factor (AU): $\frac{(\beta_{i,t}^{AU})^2 var(R^{AU})}{var(R_{i,t})}$; and the idiosyncratic risk of the security (Firm): $\frac{var(\varepsilon_{i,t})}{var(R_{i,t})}$. SEs are in brackets and * denotes statistical significance at the 10% level.

	Two-factor regression						Variance decomposition (%)			
Year	*No.*	β^{W}		β^{AU}		Adj. R^2	*var*(R)	*Global*	*AU*	*Firm*
1995	97	0.3800	*(0.265)*	0.7391*	*(0.250)*	0.1895	*0.0082*	*4.72*	*16.97*	*78.31*
1996	*112*	0.3382	*(0.362)*	0.7373	*(0.305)*	0.0754	*0.0120*	*1.93*	*8.75*	*89.32*
1997	*128*	0.3637	*(0.319)*	0.8271*	*(0.298)*	0.1844	*0.0111*	*4.94*	*16.26*	*78.80*
1998	*148*	0.3172	*(0.292)*	0.8760	*(0.342)*	0.1648	*0.0108*	*4.78*	*14.53*	*80.69*
1999	*159*	0.1809	*(0.312)*	0.8608	*(0.365)*	0.1177	*0.0105*	2.76	*12.00*	*85.24*
2000	*182*	0.1812	*(0.353)*	0.7701	*(0.438)*	0.0735	*0.0156*	2.42	*8.07*	*89.51*
2001	*202*	0.2432	*(0.360)*	0.7717	*(0.434)*	0.0663	*0.0181*	2.45	*7.34*	*90.21*
2002	*218*	0.1773	*(0.355)*	0.6637	*(0.520)*	0.0434	*0.0173*	2.34	5.24	*92.42*
2003	*253*	0.3015	*(0.423)*	0.6935	*(0.612)*	0.0388	*0.0192*	*2.70*	*4.44*	*92.86*
2004	*471*	0.4408	*(0.607)*	1.0681	*(0.882)*	0.0400	*0.0355*	2.60	*4.65*	*92.75*
2005	*610*	0.5873	*(0.648)*	1.1530	*(1.011)*	0.0492	*0.0356*	*3.36*	*4.79*	*91.85*
2006	*670*	0.4917	*(0.647)*	0.9765	*(0.975)*	0.0417	*0.0332*	*3.03*	*4.39*	*92.58*
2007	*646*	0.3528	*(0.750)*	0.7533	*(0.440)*	0.0368	*0.0333*	2.55	*4.40*	*93.05*
2008	*526*	0.7980	*(0.573)*	1.2672	*(0.652)*	0.1201	*0.0335*	*6.5*	*8.47*	*85.00*
2009	*430*	0.8308	*(0.452)*	1.1468	*(0.553)*	0.1468	*0.0286*	*8.94*	*8.63*	*82.43*
2010	*493*	0.9019	*(0.487)*	1.1701	*(0.543)*	0.1491	*0.0324*	*8.70*	*9.09*	*82.21*
2011	*515*	0.8663	*(0.518)*	1.2177	*(0.541)*	0.1486	*0.0359*	*7.64*	*10.11*	*82.26*

firm-level exposure has increased while country and global factors remained constant[12] for US securities. Meanwhile, the proportion accounted for by global factors (i.e. the degree of integration) appears to remain largely static over the sample period at around 2–3%, excluding the observed increases around the AFC and GFC periods. Regressing the 'global' figures (column 7) on a time trend reveals there is a statistically significant positive trend in average integration over the sample period; however, the coefficient is just 0.2608.[13]

5.1.2. Integration of Australian firms – disaggregated results. As explained earlier, the literature suggests that the degree of integration varies across firms. For instance, prior literature suggests that firm size is positively related to integration (e.g. Brooks and Del Negro, 2006; Eun et al., 2008; Huang, 2007). The time-series average variance decomposition results sorted by *SIZE*, which is defined as the firm's market capitalization as at the calendar year end of year *t*, are presented in Table 2, Panel A. As anticipated, global factors account for a significantly larger proportion of large-cap stock returns variance than for their mid- and small-cap counterparts. Specifically, average global factors accounted for 7.84%, 4.17%, and 2.70% of total return variance for large-, mid-,

Table 2. Two-factor regression and variance decomposition analysis by *SIZE, FEQ*, and Industry. Time-series average results from the two-factor regression variance decompositions for the period from 1995 to 2011 (see Table 1 for methodology). In Panel A, results are sorted by *SIZE*, which is defined as a firm's market capitalization as at the end of December in year *t*. Large-cap firms comprise the 20% of stocks with the largest market capitalization values, small-cap the 20% of stocks with the smallest market capitalization values, and mid-cap comprising all remaining stocks. In Panel B, results are sorted by *FEQ*, a dummy variable that takes a value of 1 if the firm is cross-listed on a foreign equity market or has an active American Depository Receipt (ADR) in year *t*, and 0 otherwise. In Panel C, results are sorted by Level 2 Industry Classifications. *** denotes significance of differences in integration (*Global*) (determined by Bonferroni pair-wise comparisons) at the 1% level.

	No.	β^{W}	β^{AU}	Adj. R^2	*var*(*R*)	*Global*	*AU*	*Firm*	Diff. in integration
PANEL A: Regression results by *SIZE*									
Small-cap	*1180*	0.5022	0.8287	0.0332	*0.0446*	*2.70*	*3.90*	*93.40*	
Mid-cap	*3501*	0.5414	1.0392	0.0787	*0.0290*	*4.17*	*6.82*	*89.01*	1.47***
Large-cap	*1179*	0.5913	1.0500	0.1712	*0.0123*	*7.84*	*12.08*	*80.08*	3.67***
PANEL B: Regression results by *FEQ*									
Cross-listed	*2111*	0.6456	1.3387	0.1259	*0.0304*	*5.72*	*9.83*	*84.45*	
Not cross-listed	*3749*	0.4860	0.8077	0.0669	*0.0279*	*3.99*	*5.86*	*90.15*	−1.73***
PANEL C: Regression results by level 2 industry classification									
Basic Materials	*1836*	0.5014	1.4943	0.0978	*0.0396*	*3.03*	*9.81*	*87.16*	
Consumer Goods	*676*	0.3614	0.5513	0.0690	*0.0142*	*4.45*	*5.61*	*89.95*	1.42***
Consumer Services	*780*	0.5126	0.6766	0.0961	*0.0184*	*6.05*	*6.63*	*87.33*	1.60***
Healthcare	*356*	0.6421	0.7657	0.7169	*0.0298*	*5.23*	*5.07*	*89.68*	−0.82***
Industrials	*1186*	0.6026	0.7540	0.0943	*0.0218*	*6.00*	*6.50*	*87.50*	0.77
Oil & Gas	*444*	0.5830	1.2085	0.0812	*0.0383*	*3.87*	*7.36*	*88.77*	−2.13***
Technology	*356*	0.7365	0.9183	0.0687	*0.0331*	*5.15*	*4.88*	*89.97*	1.28
Telecommunications	*91*	0.8987	0.8087	0.0540	*0.0380*	*5.57*	*3.04*	*91.39*	0.42
Utilities	*96*	0.5237	0.7186	0.0934	*0.0235*	*5.39*	*7.02*	*87.59*	−0.18

and small-cap firms, respectively, indicating firm size is positively related to the degree of integration for Australian firms. In results disaggregated over time (available upon request), integration is found to increase across all size categories around crisis periods.

Panel B of Table 2 is sorted by firm's participation in foreign equity markets, motivated by prior literature that suggests that cross-listed firms will be more highly integrated (e.g. Fedorov and Sarkissian, 2000; Huang, 2007). *FEQ* is a dummy variable that takes a value of 1 if a firm is cross-listed or has an active ADR in year *t*, and 0 otherwise. As expected, cross-listed firms exhibit a higher degree of integration than their non-cross-listed counterparts, with the proportion of total variance accounted for by global (country) factors found to be 5.72% (9.83%) for cross-listed firms, compared to 3.99% (5.86%) for purely domestic firms. This result is consistent over the entire sample period.

In Panel C of Table 2 we demonstrate considerable variation across industry classification. For example, the proportion of total variance accounted for by global factors is lower for basic materials firms (3.03%) than other industries, consistent with the finding of Bekaert et al. (2011) that mining and forestry firms are two of the most segmented industries. In contrast to the finding of Fedorov and Sarkissian (2000), but consistent with Carrieri et al. (2004), we also find that the Australian oil and gas sector firms have only a modest degree of global integration, 3.87%. Further, it appears that utilities are highly integrated relative to other industries, consistent with

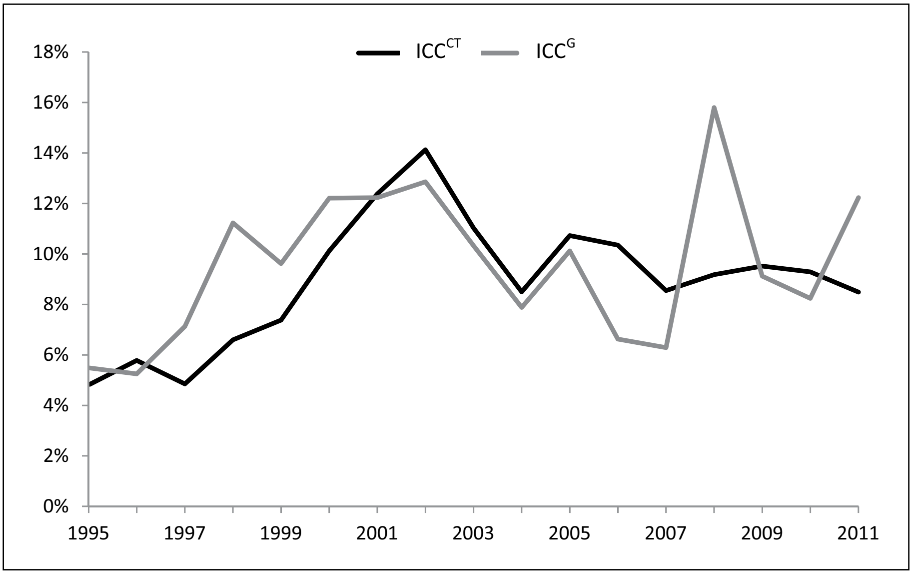

Figure 2. Average Implied Cost of Equity Capital (ICC) estimates: 1995–2011.
Note: ICC^{CT} and ICC^{G} are defined as per Equations (7) and (8), respectively. The equally weighted average of all firms in the sample for year *t* is provided.

Bekaert et al. (2011), but surprising given the domestic focus of utility firms. However, these firms are generally quite large and more likely to be cross-listed, which may explain this result. Finally, virtually all industries show a strong spike in integration around the AFC and GFC, albeit more strongly for industrials, consumer, and utilities firms – indicating that these firms are more sensitive to global effects.

We test differences in the integration level between sub-groups based on Bonferroni pair-wise comparisons, presented in the last column of Table 2. We observe significant differences in integration based on the *SIZE* and *FEQ* sub-groups at the 1% level. Although not all shown in Table 2 for the sake of parsimony, the results of the Bonferroni pair-wise comparisons for the various industry sub-groups indicate little significant difference between the industries. The only exception exists for basic materials firms (3.03%), which are significantly lower than all other industries except oil and gas firms.

5.2. Cost of equity capital

5.2.1 ICC estimates.[14] We plot mean CT (2001) and Gordon (1997) ICC estimates as per Equations (7) and (8) (henceforth ICC^{CT} and ICC^{G}) in Figure 2. We observe considerable variation in these estimates, with ICCs increasing from 4.81% (4.65%) in 1995 to 8.49% (5.89%) in 2011. This is likely due to greater numbers of small firms in later years, with smaller firms having higher COEC (Fama and French, 1992). We also observe considerable similarities between the CT (2001) and Gordon (1997) ICC estimates despite the differences in methodologies. The correlation between the two estimates is 0.695, indicating a strong relationship; as a result, for brevity we concentrate our discussion on the CT (2001) estimates.

Inspection of ICCs disaggregated by *SIZE* in Table 3 lends support to the idea that the upward trend in ICC estimates is due to the inclusion of smaller firms. Shown in Panel A, the time-series average ICC^{CT} for large-caps is 5.36%, compared to 14.3% for small-caps. This negative

Table 3. Summary statistics of Implied Cost of Equity Capital (ICC) estimates by *SIZE, FEQ*, and industry: 1995–2011.

This table presents time-series summary statistics for the CT (2001) and Gordon (1997) ICC estimates (see Equations (7) and (8), respectively) for the period from 1995 to 2011. In Panel A, results are sorted by firm size. *SIZE* is defined as a firm's market capitalization as at the end of December in year *t*. Large-cap firms comprise the 20% of stocks with the largest market capitalization values, small-cap the 20% of stocks with the smallest market capitalization values, and mid-cap comprising all remaining stocks. In Panel B, results are sorted by *FEQ*, a dummy variable that takes a value of 1 if a firm is cross-listed on a foreign equity market or has an active American Depository Receipt (ADR) in year *t*, and 0 otherwise. In Panel C, results are sorted by level 2 industry classifications. Statistics presented are the time-series mean, 25th, 50th (median), and 75th percentiles of the ICC estimates.

	ICC^{CT} estimates					ICC^{G} estimates				
	No.	Mean	25%	Median	75%	*No.*	Mean	25%	Median	75%
PANEL A: Summary statistics by *SIZE*										
Small-cap	*1180*	0.1430	0.0674	0.1299	0.1931	*822*	0.1730	0.0503	0.1618	0.2539
Mid-cap	*3501*	0.0908	0.0504	0.0741	0.1132	*2429*	0.0886	0.0448	0.0727	0.1148
Large-cap	*1179*	0.0536	0.0420	0.0512	0.0615	*823*	0.0477	0.0281	0.0434	0.0609
PANEL B: Summary statistics by *FEQ*										
Cross-listed	*2111*	0.0671	0.0411	0.0540	0.0741	*1392*	0.0654	0.0264	0.0493	0.0779
Not cross-listed	*3749*	0.1089	0.0561	0.0851	0.1421	*2682*	0.1140	0.0472	0.0825	0.1555
PANEL C: Summary Statistics by Level 2 Industry Classification										
Basic Materials	*1836*	0.0800	0.0416	0.0583	0.0952	*1003*	0.0795	0.0187	0.0526	0.0979
Consumer Goods	*676*	0.1123	0.0582	0.0932	0.1514	*590*	0.1216	0.0545	0.0945	0.1672
Consumer Services	*780*	0.0991	0.0544	0.0723	0.1247	*663*	0.0948	0.0441	0.0695	0.1130
Healthcare	*356*	0.0792	0.0451	0.0596	0.0951	*197*	0.0596	0.0253	0.0423	0.0644
Industrials	*1186*	0.1055	0.0551	0.0780	0.1383	*995*	0.1155	0.0496	0.0818	0.1555
Oil & Gas	*444*	0.0716	0.0397	0.0551	0.0797	*229*	0.0698	0.0187	0.0478	0.0869
Technology	*356*	0.1257	0.0716	0.1064	0.1660	*236*	0.1129	0.0523	0.0851	0.1480
Telecommunications	*91*	0.0918	0.0416	0.0707	0.1128	*58*	0.0894	0.0141	0.0548	0.1254
Utilities	*96*	0.0762	0.0430	0.0633	0.1012	*73*	0.0617	0.0348	0.0506	0.0776

relationship between firm size and ICC is consistent throughout the sample period. Panels B and C show the ICC summary statistics split by *FEQ* and industry classification. In line with prior literature (Errunza and Miller, 2000), the ICCs of cross-listed firms are consistently lower than those of purely domestic firms, with cross-listed (non-cross-listed) firms having a time-series average ICC^{CT} of 6.71% (10.89%). Oil and gas firms are found to have the lowest ICC^{CT} at 7.16%, followed by utilities at 7.62%. Meanwhile, firms in the technology and consumer goods sectors have the highest average ICC^{CT}s at 12.57% and 11.23%, respectively. The high ICC estimates of these industries are unsurprising given the inherently riskier nature of their cash flows.

5.3. Integration and the cost of equity capital

Having established that the degree of integration varies across different sub-groups of Australian firms, the question is whether this variation in integration is reflected in firm COEC. To examine this we employ an unbalanced panel regression based on Equation (1), where we regress our *ICC* estimates against firm-year integration estimates and appropriate control variables.[15] Drawing on the COEC literature we control for firm size, P/B ratio (defined as the natural log

Table 4. Correlation matrix – ICC^{CT} and ICC^{G}.
Presented here are the correlations between the dependent variables, ICC^{CT} and ICC^{G}, and independent variables used in the regression given by Equation (1). ICC^{CT} and ICC^{G} denote the implied cost of capital computed using the CT (2001) and Gordon (1997) models, respectively (see Equations (7) and (8), respectively). *INT* is defined as the proportion of a firm's returns variance attributable to variance in the returns of the MSCI World Index, it is the measure of integration with the global market for a firm (see Equation (4)). *MV* is the natural log of a firm's end-of-December market capitalization, *P/B* is the natural log of current market price per share/book value per share, *LEV* is the natural log of long-term debt/total assets, *VOL* is the annualized standard deviation of the previous 12 months daily returns for a firm, and *FEQ* is a dummy variable that takes a value of 1 if a firm is cross-listed, or has an active American Depository Receipt (ADR), in year *t*, and 0 otherwise. Accounting data are collected for the most recent fiscal year end in year *t*.

	ICC^{CT}	ICC^{G}	*INT*	*MV*	*P/B*	*LEV*	*VOL*	*FEQ*
ICC^{CT}	1							
ICC^{G}	0.6957	1						
INT	−0.1487	−0.0595	1					
MV	−0.6142	−0.5046	0.2587	1				
P/B	−0.1721	−0.4197	−0.0266	0.3699	1			
LEV	−0.0258	−0.0426	−0.0218	−0.0135	0.0437	1		
VOL	0.2006	0.1543	−0.0795	−0.5320	−0.1475	0.0641	1	
FEQ	−0.3232	−0.2549	0.1764	0.4573	0.1320	0.0217	−0.0006	1

of current market price per share/book value per share), leverage, idiosyncratic volatility, and cross-listing status.

The prior literature finds a negative relationship between firm size and COEC (e.g. Fama and French, 1992; Lee et al., 2009) as compensation for the additional risk involved in investing in small firms. This relationship for Australian firms was also indicated by the descriptive statistics. We define firm size as the natural log of calendar year-end firm market capitalization (*MV*).

The extant literature also documents a risk premium for low market/book, or value, firms (e.g. Fama and French, 1992; Lee et al., 2009). Therefore, we employ *P/B* as a proxy for firm growth opportunities. The literature has also established that a firm's COEC will increase as leverage increases (e.g. Lee et al., 2009). Leverage, *LEV*, is defined as the natural log of long-term debt/total assets for year *t*.

Diversification theory suggests that there should generally be a positive relationship between idiosyncratic volatility and expected returns (e.g. Merton, 1987). Empirical evidence, however, is mixed with some studies finding a negative relationship (e.g. Ang et al., 2009), others a positive one (e.g. Lee et al., 2009), and others still no relationship (e.g. Hou et al., 2012). Following Lee et al. (2009), we define idiosyncratic volatility, *VOL*, as the annualized standard deviation of the previous 12 months of daily returns for a firm.

Finally, *FEQ* is a dummy variable that takes a value of 1 if a firm is cross-listed on a foreign equity market, or has an active ADR, in year *t*, and 0 otherwise. Evidence from the cross-listing literature suggests that the COEC for firms reduces when a firm participates in a foreign equity market (e.g. Errunza and Miller, 2000). Summary statistics of the ICC estimates sorted by cross-listing status support this relationship for Australian firms. All data are obtained from Thomson Reuters DataStream.

Correlation coefficients between the ICC estimates and controls are presented in Table 4. In most instances the expected relationships outlined above are observed. Integration (*INT*) is found to have a negative relationship with firm COEC, albeit a relatively weak one with a correlation of just −0.15 and −0.06 with ICC^{CT} and ICC^{G}, respectively. *MV, P/B*, and *FEQ* also have negative relationships with COEC, while *VOL* appears to have a (weak) positive relationship with COEC and *LEV* has almost no relationship. Correlations between explanatory variables are also intuitive, with integration (*INT*) being positively correlated with *MV* and *FEQ*, and *MV* positively correlated with *P/B* and *FEQ*, while negatively correlated with *VOL*.

5.3.1. Aggregated results. Various panel regression results are presented in Table 5. The univariate results from regressing ICC^{CT} on *INT* (specification 1) confirm that integration decreases firm COEC as per hypothesis 2. Specifically, the coefficient of −0.158 indicates that, over the sample period, a 10% increase in integration for Australian firms is associated with an average reduction in COEC of 1.58%.

Interestingly, once other factors are controlled for, in specification 2, this result reverses. While retaining statistical significance, the *INT* coefficient goes from negative to positive and indicates that a 10% increase in integration is associated with an average increase in firm COEC of 0.38%. This finding is in direct contrast to what theory suggests should be the case and indicates that hypothesis 2 should be rejected. Interestingly, Lee et al. (2009) document a similar anomaly. In particular, they find that firms with high world market betas have higher implied risk premiums, or ICCs.

Presented in Panel B of Table 5 are the coefficients from regressions obtained from regressing ICC^{CT} on *INT* and each control variable separately. These results reveal that once firm size (*MV*) is controlled for, the switch in coefficient sign for *INT* occurs. With larger firms being on average more highly integrated and having lower ICC^{CT} estimates, the inclusion of *MV* serves to absorb the negative relation between integration and COEC, leaving behind a partial, positive effect. One explanation for the finding that the remaining partial effect is positive may lie in the earlier observations that the integration measure is higher during periods of world market volatility, such as during the AFC and GFC. If, when faced with heightened (volatility) risk and uncertainty surrounding performance of the world market, global investors respond rationally by demanding a higher risk premium (Anderson et al., 2009; Bekaert et al., 2009), it follows that the COEC for more highly integrated firms will be higher during these periods.

To explore this possibility, ICC^{CT} is regressed on *INT* with an additional control variable denoted *I.BEAR*, constructed by interacting *INT* with a dummy variable that takes a value of 1 for years categorized as bear market periods and 0 otherwise. Years categorized as *BEAR* (1998, 2000–2003, and 2008–2009) are those for which the annualized standard deviation of the MSCI World Index daily returns is greater than the full sample period average. The results from this regression are shown in specification 8. The coefficients for *INT* and *I.BEAR* are found to be significantly negative and positive, respectively, indicating that *BEAR* years are associated with smaller reductions in COEC than non-*BEAR* years. Further, once the remaining controls are added (see specification 9) the *INT* coefficient becomes insignificant while that for *I.BEAR* remains significantly positive. These results lend support to the hypothesis that higher integration during periods of heightened world market volatility is associated with increases in COEC.

Regressions are also run for two sub-periods: years categorized as *BEAR* versus *OTHER* years. These results, presented in Panels D and E, respectively, provide further support for the hypothesis that the positive relationship between integration and COEC is driven by *BEAR* year observations. The coefficient for *INT* is significantly positive for the *BEAR* sub-period. However, and contrary to the hypothesis that COEC is lowered by increased integration, the coefficient in non-bear years is insignificant once we control for other variables.

Taken together, these results indicate that there is no reduction in COEC as firms become more highly integrated but, rather, increased integration simply sees firms exposed to higher COEC when world market conditions are volatile.

Table 5. Unbalanced panel regression results for CT (2001) Implied Costs of Equity Capital (ICCs).
Presented in Panel A are the coefficients from regressing CT (2001) ICC estimates (ICC^{CT}) (see Equation (7)) on *INT*, then *INT* as well as all control variables. *INT* is defined as the proportion of a firm's returns variance attributable to variance in the returns of the MSCI World Index (see Equation (4)). *MV* is the natural log of a firm's end-of-December market capitalization, *P/B* is the natural log of current market price per share/book value per share, *LEV* is the natural log of long-term debt/total assets, *VOL* is the annualized standard deviation of the previous 12 months daily returns, and *FEQ* is a dummy variable that takes a value of 1 if a firm is cross-listed, or has an active American Depository Receipt (ADR), in year *t*, and 0 otherwise. Then in Panel B, coefficients from regressing ICC^{CT}s on *INT* with various combinations of the control variables are presented. In Panel C, coefficients from regressing ICC^{CT}s on combinations of *INT* and control variables plus an additional control variable *I.BEAR*, which is an interacted variable constructed by multiplying *INT* by a dummy variable, *BEAR*, which takes a value of 1 for years categorized as bear years (years for which the annualized standard deviation of the MSCI World Index daily returns in year *t* is > the average over the period from 1995 to 2011), and 0 otherwise, are presented. In Panel D, multivariate regression results for years categorized as *BEAR* years (1998, 2000–2003, and 2008–2009) are presented. In Panel E, multivariate regression results for *OTHER* years are presented. Accounting data are collected for the most recent fiscal year end in year *t*. Time and industry effects are controlled for through dummy variables, and standard errors clustered by firm are in parentheses. ** and *** denote statistical significance at the 5% and 1% levels, respectively.

	No.	α	*INT*	*MV*	*P/B*	*LEV*	*VOL*	*FEQ*	*I.BEAR*	Adj. R^2
PANEL A: Univariate (*INT* only) and multivariate regression results										
(1)	*5857*	0.0405*** *(0.003)*	−0.1580*** *(0.016)*	–	–	–	–	–	–	0.1408
(2)	*5795*	0.1620*** *(0.008)*	0.0380*** *(0.014)*	−0.0190*** *(0.001)*	0.0018 *(0.002)*	−0.0001 *(0.001)*	−0.0288*** *(0.005)*	−0.0048** *(0.002)*	–	0.3713
PANEL B: Multivariate regression results – *INT* with controls										
(3)	*5857*	0.1345*** *(0.005)*	0.0327** *(0.014)*	−0.0165*** *(0.001)*	–	–	–	–	–	0.3588
(4)	*5795*	0.0468*** *(0.003)*	−0.1443*** *(0.015)*	–	–0.0133*** *(0.002)*	–	–	–	–	0.1645
(5)	*5857*	0.0410*** *(0.003)*	−0.1568*** *(0.016)*	–	–	0.0004 *(0.001)*	–	–	–	0.1414
(6)	*5857*	0.0248*** *(0.004)*	−0.1204*** *(0.016)*	–	–	–	0.0343*** *(0.004)*	–	–	0.1702
(7)	*5857*	0.0500*** *(0.003)*	−0.1114*** *(0.015)*	–	–	–	–	−0.0353*** *(0.003)*	–	0.1954
PANEL C: Univariate and multivariate regression results – with *I.BEAR*										
(8)	*5857*	0.0418*** *(0.003)*	−0.1917*** *(0.016)*	–	–	–	–	–	0.0847*** *(0.021)*	0.1426
(9)	*5795*	0.1634*** *(0.008)*	0.0095 *(0.016)*	−0.0190*** *(0.001)*	0.0018 *(0.001)*	−0.0001 *(0.001)*	–0.0288*** *(0.005)*	−0.0048** *(0.002)*	0.0689*** *(0.019)*	0.3721
PANEL D: Multivariate regression results for *BEAR* years										
(10)	*1948*	0.2483*** *(0.014)*	0.1320*** *(0.022)*	−0.0269*** *(0.002)*	0.0084*** *(0.002)*	−0.0005 *(0.009)*	–0.0492*** *(0.009)*	0.0056 *(0.004)*	–	0.4184
PANEL E: Multivariate regression results for *OTHER* years										
(11)	*3847*	0.1381*** *(0.007)*	−0.0186 *(0.015)*	−0.0147*** *(0.001)*	–0.0015 *(0.001)*	0.0004 *(0.005)*	–0.0181*** *(0.006)*	−0.0096*** *(0.002)*	–	0.3497

5.3.2. Disaggregated results. We have established that the degree of integration and ICCs of firms vary across sub-groups of Australian firms. Specifically, this variation is driven by firm size (*SIZE*), cross-listing status (*FEQ*), and industry classification. To address hypothesis 3, we next disaggregate results in order to explore possible differences across different types of firms in the relationship between integration and COEC.

Panel A of Table 6 presents the multivariate regression results for firms by *SIZE*.[16] While insignificant for small- and large-cap firms, integration appears negatively related to the COEC of mid-cap firms. This benefit, however, is reversed during bear markets with the *I.BEAR* coefficient indicating that integration leads to a higher COEC in the case of both mid and large-cap firms. Also noteworthy is that the *FEQ* coefficient is only found to be (significantly) negative in the small- and mid-cap firm regressions, indicating that smaller Australian firms stand to gain the most in terms of lower COEC by accessing foreign equity markets, although in economic terms the average reduction is marginal at less than 0.02%.

Regression results presented in Panel B reveal no quantifiable difference in the role of increased integration on firm COEC based on cross-listing status. For both sub-groups of firms, integration is found to have a statistically significant positive relationship with COEC during bear periods only, although in economic terms this effect is greater for cross-listed firms. Interestingly, idiosyncratic volatility (*VOL*) is the only relevant determinant for firms that are not cross-listed, indicating that firm-specific risk becomes less relevant when a firm participates in foreign equity markets. This result is intuitive, as cross-listing encourages foreign investors to hold their security, thus increasing their level of diversification and reducing the importance of the security's idiosyncratic risk in determining an appropriate risk premium (e.g. Stulz, 1999).

Finally, as shown in Panel C, the role of integration in determining COEC is found to differ across industries. While an apparently irrelevant factor in determining COEC for consumer goods, healthcare, and utility firms, a strong positive influence during bear markets is identified for oil and gas, and technology (1% confidence), and basic materials and telecommunications firms (10% confidence). Interestingly, with significant (insignificant) *INT* (*I.BEAR*) coefficients, integration appears to have a positive effect on the COEC of consumer service and industrial sector firms, which cannot be explained by bear market periods, although this is only significant at the 10% level. Cross-listing status (*FEQ*) is also only found to be statistically relevant in determining COEC for firms in the basic materials and industrials sectors, although the estimated relationship with ICC^{CT} is marginally positive for industrial firms.

5.4. Robustness checks

The relationship between integration and firm COEC is re-examined using Gordon's (1997) ICC estimates (see Equation (8)), denoted ICC^{G}. Regression results presented in Panel A of Table 7 reveal that, while the same significant negative relationship holds between integration (*INT*) and firm COEC in the case of the univariate regression, integration is found to be statistically insignificant once other factors influencing COEC are controlled. As with the ICC^{CT} regression results, controlling for *MV* causes the *INT* coefficient sign to switch from negative to positive (see Panel B). In contrast to the result obtained when using ICC^{CT} as the proxy for COEC, results presented in Panel C reveal that the inclusion of the interacted variable *I.BEAR* fails to identify a statistically significant relationship between bear market periods and the effect of *INT* on ICC^{G}. However, splitting the sample into *BEAR* versus *OTHER* periods proves more informative. As before, the *INT* coefficient for bear years where controls are included is found to be significantly positive. This time, however, the *INT* coefficient for non-bear years is found to be significantly negative at −0.0535. These findings provide partial support for the hypothesis that increased integration is

Table 6. Cross-sectional regression results by *SIZE, FEQ*, and industry.

Coefficients from regressing CT (2001) Implied Cost of Equity Capital (ICC) estimates (see Equation (7)) on various firm characteristics by sub-groups of firms. In Panel A, regressions are run by firm size. *SIZE* is defined as a firm's market capitalization as at the end of December in year *t*. Large-cap firms comprise the 20% of stocks with the largest market capitalization values, small-cap the 20% of stocks with the smallest market capitalization values, and mid-cap comprising all remaining stocks. In Panel B, regressions are run for firms that are active on a foreign equity market in year *t*, and those that are not. Specifically, *FEQ* is a dummy variable that takes a value of 1 if firm is cross-listed on a foreign equity market or has an active American Depository Receipt (ADR) in year *t*, and 0 otherwise. In Panel C, regressions are run by level 2 industry classifications. *INT* is defined as the proportion of a firm's returns variance attributable to variance in the returns of the MSCI World Index; it is the measure of integration with the global market for a firm (see Equation (4)). *MV* is the natural log of a firm's end-of-December market capitalization, *P/B* is the natural log of current market price per share/book value per share, *LEV* is the natural log of long-term debt/total assets, *VOL* is the annualized standard deviation of the previous 12 months daily returns, and *I.BEAR* is an interacted variable constructed by multiplying *INT* by a dummy variable, *BEAR*, which takes a value of 1 for years categorized as bear years (years for which the annualized standard deviation of the MSCI World Index daily returns in year *t* is > the average over the period from 1995 to 2011: 1998, 2000–2003, and 2008–2009), and 0 otherwise. Accounting data are collected for the most recent fiscal year end in year *t*. Time and industry effects are controlled for through dummy variables, and standard errors clustered by firm are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	No.	α	*INT*	*MV*	*P/B*	*LEV*	*VOL*	*FEQ*	*I.BEAR*	Adj. R^2
PANEL A: Regression results by *SIZE*										
Small-cap	1138	0.1421*** (0.019)	0.0530 (0.070)	−0.0236*** (0.004)	0.0084*** (0.003)	0.0003 (0.001)	−0.0240*** (0.007)	−0.0193*** (0.005)	−0.0810 (0.129)	0.3708
Mid-cap	3483	0.2113*** (0.011)	−0.0476*** (0.018)	−0.0261*** (0.001)	0.0024 (0.002)	−0.0003 (0.001)	−0.0507*** (0.001)	−0.0101*** (0.002)	0.1182*** (0.024)	0.3671
Large-cap	1174	0.1253*** (0.007)	0.0141 (0.009)	−0.0077*** (0.001)	−0.0005 (0.001)	−0.0001 (0.0003)	−0.0433*** (0.006)	0.0024 (0.002)	0.0399*** (0.013)	0.4252
PANEL B: Regression results by *FEQ*										
Cross-listed	2091	0.1261*** (0.010)	0.0066 (0.015)	−0.0101*** (0.001)	0.0011 (0.002)	−0.0009 (0.001)	0.0012 (0.007)	–	0.0823*** (0.021)	0.2857
Not cross-listed	3704	0.2034*** (0.010)	0.0074 (0.024)	−0.0269*** (0.001)	0.0035** (0.001)	0.0001 (0.001)	0.0427*** (0.030)	–	0.0711** (0.030)	0.3781
PANEL C: Regression results by level 2 industry classification										
Basic Materials	1817	0.1336*** (0.011)	0.0446 (0.041)	−0.0129*** (0.001)	0.0024 (0.002)	0.0007 (0.001)	–0.0036 (0.007)	–0.0146*** (0.004)	0.1255* (0.068)	0.3188
Consumer Goods	673	0.2290*** (0.021)	0.0426 (0.069)	−0.0287*** (0.003)	0.0123*** (0.004)	−0.0011 (0.002)	–0.0480*** (0.014)	0.0063 (0.008)	–0.0253 (0.048)	0.5057
Consumer Services	767	0.2052*** (0.022)	0.0581* (0.034)	−0.0242*** (0.003)	0.0018 (0.003)	0.0004 (0.002)	–0.0428*** (0.015)	0.0028 (0.008)	–0.0142 (0.032)	0.4746
Healthcare	350	0.1763*** (0.021)	0.0100 (0.050)	−0.0148*** (0.003)	−0.0001 (0.004)	0.0004 (0.001)	–0.0343** (0.014)	–0.0079 (0.010)	0.0691 (0.070)	0.3198
Industrials	1177	0.2069*** (0.017)	0.0511* (0.030)	−0.0256*** (0.002)	−0.0043 (0.004)	−0.0007 (0.001)	–0.0621*** (0.016)	0.0098* (0.005)	0.0102 (0.033)	0.4571
Oil & Gas	443	0.1293*** (0.019)	0.0008 (0.062)	−0.0120*** (0.002)	0.0102** (0.005)	0.0007 (0.001)	0.0058 (0.011)	–0.0035 (0.006)	0.1976*** (0.070)	0.3072
Technology	346	0.2023*** (0.022)	0.0394 (0.084)	−0.0288*** (0.004)	0.0011 (0.006)	−0.0012 (0.002)	–0.0626*** (0.014)	–0.0033 (0.009)	0.2303** (0.115)	0.3261
Telecommunications	90	0.0940*** (0.042)	−0.1913 (0.129)	−0.0124*** (0.004)	0.0110 (0.013)	0.0025 (0.003)	0.0038 (0.028)	–0.0051 (0.022)	0.3096* (0.167)	0.3903
Utilities	96	0.1769*** (0.046)	0.1188 (0.119)	−0.0170*** (0.005)	−0.0010 (0.009)	0.0007 (0.005)	–0.0320 (0.030)	0.0273 (0.017)	0.0475 (0.131)	0.4658

Table 7. Unbalanced panel regression results for Gordon (1997) Implied Cost of Equity Capitals (ICCs).

Presented in Panel A are the coefficients from regressing Gordon (1997) ICC estimates (ICC^G) (see Equation (8)) on *INT*, then on *INT* together with the control variables. *INT* is defined as the proportion of a firm's returns variance attributable to variance in the returns of the MSCI World Index; it is the measure of integration with the global market for a firm (see Equation (4)). *MV* is the natural log of a firm's end-of-December market capitalization, *P/B* is the natural log of current market price per share/book value per share, *LEV* is the natural log of long-term debt/total assets, *VOL* is the annualized standard deviation of the previous 12 months daily returns, and *FEQ* is a dummy variable that takes a value of 1 if a firm is cross-listed, or has an active American Depository Receipt (ADR), in year *t*, and 0 otherwise. Then in Panel B, coefficients from regressing ICC^Gs on *INT* with various combinations of the control variables are presented. In Panel C, coefficients from regressing ICC^Gs on combinations of *INT* and control variables plus an additional control variable *I.BEAR*, which is an interacted variable constructed by multiplying *INT* by a dummy variable, *BEAR*, which takes a value of 1 for years categorized as bear years (years for which the annualized standard deviation of the MSCI World Index daily returns in year *t* is > the average over the period from 1995 to 2011), and 0 otherwise, are presented. In Panel D, multivariate regression results for years categorized as *BEAR* years (1998, 2000–2003, and 2008–2009) are presented. In Panel E, multivariate regression results for *OTHER* years, years other than those categorized as bear market years, are presented. Accounting data are collected for the most recent fiscal year end in year *t*. Time and industry effects are controlled for through dummy variables, and standard errors clustered by firm are in parentheses. ** and *** denote statistical significance at the 5% and 1% levels, respectively.

	No.	α	*INT*	*MV*	*P/B*	*LEV*	*VOL*	*FEQ*	*I.BEAR*	Adj. R^2
PANEL A: Univariate (*INT* only) & Multivariate Regression Results										
(1)	4071	0.0466*** *(0.004)*	−0.1831*** *(0.025)*	–	–	–	–	–	–	0.1583
(2)	4050	0.2091*** *(0.013)*	0.0276 *(0.020)*	−0.0232* *(0.002)*	−0.0224*** *(0.003)*	−0.0015* *(0.001)*	−0.0471*** *(0.010)*	0.0075** *(0.004)*	–	0.4045
PANEL B: Multivariate regression results – *INT* with controls										
(3)	4071	0.1769*** *(0.008)*	0.0457** *(0.020)*	−0.0220*** *(0.001)*	–	–	–	–	–	0.3594
(4)	4050	0.0666*** *(0.005)*	−0.1534*** *(0.022)*	–	−0.0430*** *(0.003)*	–	–	–	–	0.2726
(5)	4071	0.0433*** *(0.005)*	−0.1837*** *(0.025)*	–	–	−0.0017 *(0.001)*	–	–	–	0.1593
(6)	4071	0.0253*** *(0.006)*	−0.1455*** *(0.024)*	–	–	–	0.0511*** *(0.008)*	–	–	0.1799
(7)	4071	0.0580*** *(0.005)*	−0.1303*** (0.024)	–	–	–	–	−0.0405*** *(0.004)*	–	0.1951
PANEL C: Univariate and multivariate regression results – with *I.BEAR*										
(8)	4071	0.0470*** *(0.004)*	−0.1923*** *(0.025)*	–	–	–	–	–	0.0234 *(0.038)*	0.1583
(9)	4050	0.2087*** *(0.013)*	0.0355 *(0.024)*	−0.0232*** *(0.002)*	−0.0223*** *(0.003)*	−0.0015* *(0.001)*	−0.0470*** *(0.010)*	−0.0075** *(0.004)*	0.0195 *(0.035)*	0.4045
PANEL D: Multivariate regression results for *BEAR* years										
(10)	1462	0.3246*** *(0.021)*	0.1535*** *(0.031)*	−0.0363*** *(0.002)*	−0.0189*** *(0.004)*	−0.0001 *(0.002)*	−0.0037*** *(0.016)*	0.0164*** *(0.006)*	–	0.5131
PANEL E: Multivariate regression results for *OTHER* years										
(11)	2588	0.1666*** *(0.012)*	−0.0535*** *(0.020)*	−0.0156*** *(0.001)*	−0.0221*** *(0.003)*	0.0006 *(0.009)*	−0.0518*** *(0.011)*	−0.0002 *(0.004)*	–	0.3489

generally associated with lower COEC. However, as found when employing the ICC^{CT} estimates, this relationship reverses during bear market periods with the COEC of more highly integrated firms actually increasing.

In addition, noting that our sample size increases markedly from 2003 to 2004 due to an improvement in available data around this time (see Table 1), we explore the robustness of our results to changes in the sample by repeating the analysis in Panel A of Table 5 for the sample before 2002, and the sample after 2005. The results are virtually unchanged in the later periods, and the positive relationship between integration and COEC (controlling for other factors) is found to be stronger before 2002. Finally, re-estimating the results in Tables 5 and 7 using firm fixed effects, the results are largely unchanged for both the ICC^{CT} and ICC^{G} methods of computing COEC; the former identifying a positive relationship between integration and COEC in *BEAR* years and no relationship in *non-BEAR* years, and the latter a negative relationship during non-bear periods in addition to the positive relationship during bear periods.[17]

6. Conclusions

This study set out to determine whether one of the expected benefits of greater integration previously documented at the aggregate level, that of a lower COEC for firms, holds at the firm level and over time. The results showed that while integration of the Australian market at the aggregate level has steadily increased over the past two decades, there is substantial variation in the degree of integration across sub-groups of firms. In particular, larger firms, those active in foreign equity markets, and consumer services and industrial firms were found to be, on average, more highly integrated than their smaller, non-cross-listed, basic materials and oil and gas sector counterparts.

Based on the specific measures we employ for COEC and integration, we found that while variation in the degree of firm-level integration was reflected in COEC, it is not in the expected direction. In line with theoretical expectations, aggregated univariate results showed that increased integration is associated with lower COEC. Once other controls such as firm size were included, however, the relationship between integration and firm COEC was found to be positive, albeit marginally. Specifically, a 10% increase in integration for a firm is associated with an average reduction in its COEC of 1.58% when using ICC^{CT} estimates. Further investigation revealed the positive relationship between integration and COEC might be driven, at least in part, by a contagion effect experienced during periods of heightened market volatility. During these periods, more highly integrated firms were found to experience higher COEC, likely as a consequence of investors demanding a higher premium in response to greater risk and uncertainty.

In fact, overall the results presented using our main measure of COEC, Claus and Thomas (2001) ICC estimates, indicated that the tangible effect of increased integration at the firm level is not to decrease firm COEC, but to leave firms exposed to a higher COEC when world market conditions are volatile. This finding is useful in helping us understand both the aggregate and disaggregate impacts of moves to further increase integration.

An important caveat of this study is that Australian firms may enjoy a number of positive spillover effects as a result of greater integration, at the firm or aggregate level, which are not captured in this study (see Obstfeld, 1998, for a discussion of the key macro-level benefits of international capital markets). For example, increased financial integration is associated with an expansion in the supply of cheaper credit and financial services more broadly, for example via debt markets and local financial intermediaries, such as banks (Guiso et al., 2004). Therefore, the evidence presented here regarding the relationship between integration and firm COEC reflects just one piece in the puzzle, albeit an important one given its potential to influence firm investment behavior and, consequently, economic productivity. In addition, our findings are based on our specific measures of COEC and integration, and employ data for just a single country. Further study with different measures, and for additional countries, may provide further support for our findings.

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Notes

1. A recent example is Bekaert et al. (2011), whose findings indicate that segmentation in Australia decreased by 75.2% between the early 1980s and early 2000s.
2. Firm-level studies of integration can take one of two broad methodological approaches: (i) an IAPM approach where world market beta loadings serve as an indication of integration (e.g. Lee et al., 2009); or (ii) a return variance decomposition approach where integration is defined as the proportion of a security's return variance attributable to global risk, as opposed to country-, industry-, or firm-specific risk (e.g. Brooks and Del Negro, 2006; Eun et al., 2008). Both approaches are similar in spirit, reflecting the idea that integrated securities will be priced on the basis of common global risk factors (Bekaert and Harvey, 1995); however, as noted earlier world market betas (while indicative) do not provide an explicit measure of the degree of integration for a firm that is the subject of our interest in this study.
3. To filter out the data errors embedded in TDS price data, monthly returns $> |300\%|$ are set to missing (see Ince and Porter, 2006). All returns used are denoted in AUD.
4. The use of lower frequency data to by-pass the issue of non-synchronicity has been employed previously by Longin and Solnik (1995), Griffin and Karolyi (1998), and Hou et al. (2011).
5. Lee et al. (2009) demonstrate that on a firm-level basis, ICCs are uncorrelated with realized returns due to the noise of the latter. However, at the portfolio level they find a positive relationship in line with that documented by Hou et al. (2012), who also evaluate ICC estimates on a portfolio basis.
6. Specifically, accruals are calculated as the change in current assets less the change in current liabilities, excluding the change in cash, short-term debt, and depreciation. Note that Hou et al. (2012) use the cash flow statement approach, where accruals are defined as the difference between earnings and cash flows from operations, from 1988 as substantial evidence exists that this approach is superior to the balance sheet approach (see Hribar and Collins, 2002). However, Hou et al. (2012) find their results are robust to the use of balance sheet accruals for the entire sample period. We use the balance sheet approach as cash flows from operations data were unavailable for this study.
7. Collection of accounting data at one point in time for each year, rather than from different points in time depending on the fiscal year end of a firm, is consistent with the ICC literature (e.g. Claus and Thomas, 2001; Gebhardt et al., 2001; Guay et al., 2011; Hou et al., 2012), with Guay et al. (2011) finding their results robust to those of a sub-sample of firms with the same fiscal year end.
8. The models presented by Claus and Thomas (2001) and Gordon and Gordon (1997) vary from those presented by Hou et al. (2012) in that firm valuation is expressed on a per share basis rather than in terms of market equity.
9. Note that 0.06 represents the US long-term return on assets (Gebhardt et al., 2001) and is used as no analogous figure was found for Australia. Further, dividend payout ratios greater than 1 are set to 1 (Gebhardt et al., 2001), dividend payments less than zero are set to equal zero, and negative ROE_{t+5}s and BV_{t+4}s are set to missing, as positive values are required to compute CT ICC estimates.
10. Specifically, g is calculated as the average 10-year Australian government bond yield between 1995 and 2011 of 5.94% (a proxy for the nominal risk-free rate) minus 3% (a proxy for the long-run average real risk-free rate) as used by Claus and Thomas (2001) and Hou et al. (2012).
11. The following types of securities are removed: preference shares, convertible notes, CREST depository receipts, Real Estate Investment Trusts (REITS), ADRs, stapled securities, rights, unit shares, trusts, and funds. In addition, securities with the following terms in their name are removed: deferred delivery, nil/partly paid, fixed interest.

12. A variety of different explanations for this phenomenon, coined the 'idiosyncratic volatility puzzle', have been put forward. See Brandt et al. (2009) for a discussion of these.
13. Note that while there appears little in the way of statistical significance of world and country betas, a considerable proportion of the firm-level betas estimated are statistically significant: ranging from 35% (77%) of world (country) betas at the 5% confidence level or higher in 1995, to 45% (56%) of world (country) betas in 2011. The process of averaging across the sample appears to obscure the significance of these sub-groups.
14. Appendix 2 contains a table and discussion relating to the average coefficients from the annual estimates of the Hou et al. (2012) pool cross-sectional regressions methodology for forecasting future earnings. Appendix 3 presents summary statistics for the earnings forecast figures.
15. Analysis employing first difference variables of the *INT* and *ICC* estimates was also undertaken. Results were found to be qualitatively similar to those presented here.
16. The market capitalization variable (*MV*) is retained as a control variable in order to account for the remaining variation in firm size within the size categories.
17. Results available upon request.
18. One possible explanation is Australia's adoption of International Financial Reporting Standards in mid-2000. Adopted in 2005 (Jones and Higgins, 2006), it is possible that accounting data for 2004 has been restated in accordance with the new standards. Disaggregated results available from the authors upon request.

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Appendix 1

Sample summary statistics: 1995–2011

Summary statistics for the firms included in the sample for each year between 1995 and 2011. *No.* denotes sample size, *MV* is the average market capitalization, expressed in \$m, *FEQ%* is the proportion of firms that are cross-listed on a foreign equity market, or have an active ADR, in year *t*. *INT* is the average degree of integration – defined as the proportion of a firm's returns variance attributable to variance in the returns of the MSCI World Index (see Equation (4)), and ICC^{CT} denotes the average CT (2001) Implied Cost of Equity Capital estimate (see Equation (7)).

Year	No.	MV (\$m)	FEQ%	INT (%)	ICC^{CT} (%)
1995	97	1552	17.5	4.7	4.8
1996	112	1485	21.4	1.9	5.8
1997	128	1312	18.0	4.9	4.9
1998	148	1137	16.2	4.8	6.6
1999	159	1345	21.4	2.8	7.4
2000	182	1184	25.8	2.4	10.1
2001	202	1304	23.8	2.4	12.4
2002	218	1367	23.4	2.3	14.1
2003	253	1311	30.0	2.7	11.0
2004	471	905	33.8	2.6	8.5
2005	610	850	36.9	3.4	10.7
2006	670	928	39.3	3.0	10.4
2007	646	1252	40.6	2.5	8.5
2008	526	976	41.8	6.5	9.2
2009	430	1684	42.1	9.0	9.5
2010	493	1560	45.6	8.7	9.3
2011	515	1167	45.0	7.6	8.5

Appendix 2

Cross-sectional earnings regressions: 1995–2011

Average coefficients from the cross-sectional earnings model regressions and their time-series Newey–West standard errors (in parentheses). For each year between 1995 and 2011 (as at 31 December 31), the following pooled cross-sectional regression is estimated using the previous 10 years of data (six years minimum):

$$E_{i,t+\tau} = \alpha + \beta_1 TA_{i,t} + \beta_2 D_{i,t} + \beta_3 DD_{i,t} + \beta_4 E_{i,t} + \beta_5 NegE_{i,t} + \beta_6 AC_{i,t} + \varepsilon_{i,t+\tau}$$

where $E_{i,t+\tau}$ denotes the earnings of firm *i* in year $t+\tau$ ($\tau = 1$ to 5), $TA_{i,t}$, is the total assets, $D_{i,t}$ is the dividend payment, $DD_{i,t}$ is a dummy variable that takes a value of 1 for dividend payers and 0 otherwise, $NegE_{i,t}$ is a dummy variable that takes a value of 1 for firms with negative earnings, and $AC_{i,t}$ is accruals. All explanatory variables are measured at year *t*. Earnings (*E*) is the net income before extraordinary items (Thomson Reuters Worldscope code WC01551); total assets (*TA*) is the

Worldscope variable WC02999; dividends (D) are the total cash dividends paid (WC04551); accruals (Ac) are calculated using the balance sheet method as the change in current assets (WC02201) less the change in current liabilities (WC03101) excluding the change in cash (WC02001), short-term debt (WC03051), and depreciation (WC01051). E_{t+1}, E_{t+2}, E_{t+3}, E_{t+4}, and E_{t+5} are the one-, two-, three, four-, five-year ahead earnings, respectively. With the exception of DD and $NegE$, all variables are expressed in \$ millions. Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% confidence levels, respectively.

Dependent		α	TA_t	D_t	DD_t	E_t	$NegE_t$	AC_t	Adj. R^2
E_{t+1}	Coefficient	−3.6863	0.0099*	0.3120*	7.3823	0.5175***	4.0581	−0.0313	0.65
	SE	*(2.55)*	*(0.01)*	*(0.17)*	*(4.18)*	*(0.09)*	*(3.76)*	*(0.04)*	
E_{t+2}	Coefficient	−3.7105	0.0145*	0.3005	11.1935*	0.3721**	4.7470	−0.0684	0.56
	SE	*(3.92)*	*(0.01)*	*(0.19)*	*(5.10)*	*(0.11)*	*(6.10)*	*(0.05)*	
E_{t+3}	Coefficient	−0.1376	0.0181**	0.4667**	11.0965	0.2943	−2.1850	−0.0719	0.54
	SE	*(4.11)*	*(0.01)*	*(0.20)*	*(4.57)*	*(0.11)*	*(6.23)*	*(0.05)*	
E_{t+4}	Coefficient	1.8507	0.0208**	0.4894*	12.5331	0.1938	−7.2532	−0.0704	0.54
	SE	*(5.47)*	*(0.01)*	*(0.23)*	*(6.16)*	*(0.12)*	*(8.09)*	*(0.07)*	
E_{t+5}	Coefficient	4.7109	0.0229*	0.5248	11.1050	0.1639	−7.0272	−0.0976	0.56
	SE	*(6.43)*	*(0.01)*	*(0.31)*	*(7.73)*	*(0.11)*	*(7.68)*	*(0.07)*	

Earnings forecasts

The table in Appendix 2 reports the average coefficients from the pooled cross-sectional regressions (see Equation (6)), used to generate the earnings forecasts for each firm-year. Consistent with Hou et al. (2012), average adjusted R^2s of 65%, 56%, and 54% for the one, two-, and three-year ahead earnings regressions indicate the cross-sectional model captures substantial variation in the future earnings performance across firms. With the exception of negative earnings, the average coefficients maintain the same sign across the different forecast horizons for all the independent variables. As found by Hou et al. (2012), future earnings are significantly positively related to the total assets of the firm. In addition, dividend paying firms have, on average, higher future earnings, although this coefficient is only significant for t+1, t+3, and t+4 horizons. The dividend dummy coefficient is positive but insignificant across all horizons, with the exception of the two-year ahead coefficient, which is significant at just 10%. Finally, the average negative earnings coefficient is insignificant across all horizons.

In contrast to Hou et al.'s (2012) findings, the accruals coefficients are negative but insignificant across all forecast horizons. Further, and also in contrast to the profitability literature that finds earnings to be highly persistent (e.g. Fama and French, 2006), firm-level earnings are only found to be important out to the two-year ahead forecast horizon. Disaggregated results reveal that this result is driven by the earlier years, and that from 2004 earnings retain statistical significance over the five-year forecast horizon.[18]

Appendix 3 presents summary statistics for the earnings forecast figures scaled by end-of-December market capitalization. Note that actual earnings figures (E_t) demonstrate a downward trend between 1995 and 2011, indicating that Australian firms have become, on average, less profitable over time. This observation is in line with analogous observations by Fama and French (2004) and Hou et al. (2012) regarding the profitability of US listed firms.

Appendix 3

Summary of earnings forecasts: 1995–2011

Average earnings forecasts based on the cross-sectional earnings model (see Equation (6)) for each year between 1995 and 2011. E_{t+1}, E_{t+2}, E_{t+3}, E_{t+4}, and E_{t+5} are the average one-, two-, three, four-, five-year ahead earnings, respectively. Earnings are scaled by market value (*MV*).

Year	No.	E_t	E_{t+1}	E_{t+2}	E_{t+3}	E_{t+4}	E_{t+5}
1995	97	0.0502	0.0506	0.0498	0.0554	0.0556	0.0559
1996	*112*	0.0394	0.0420	0.0410	0.0445	0.0491	0.0539
1997	*128*	0.0369	0.0394	0.0411	0.0454	0.0496	0.0524
1998	*148*	0.0391	0.0404	0.0417	0.0492	0.0531	0.0567
1999	*159*	0.0375	0.0359	0.0375	0.0406	0.0470	0.0478
2000	*182*	0.0429	0.0409	0.0438	0.0481	0.0508	0.0579
2001	*202*	0.0276	0.0301	0.0337	0.0368	0.0393	0.0414
2002	*218*	0.0345	0.0326	0.0337	0.0358	0.0392	0.0421
2003	*253*	0.0343	0.0314	0.0317	0.0325	0.0356	0.0381
2004	*471*	0.0354	0.0304	0.0286	0.0286	0.0355	0.0380
2005	*610*	0.0353	0.0325	0.0318	0.0328	0.0382	0.0442
2006	*670*	0.0289	0.0286	0.0306	0.0323	0.0374	0.0410
2007	*646*	0.0266	0.0275	0.0297	0.0323	0.0351	0.0382
2008	*526*	0.0411	0.0419	0.0458	0.0502	0.0566	0.0606
2009	*430*	0.0218	0.0246	0.0280	0.0317	0.0366	0.0411
2010	*493*	0.0242	0.0249	0.0275	0.0300	0.0335	0.0386
2011	*515*	0.0322	0.0349	0.0361	0.0379	0.0399	0.0417