# Australian firm characteristics and the cross-section variation in equity returns

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A R T I C L E   I N F O

A B S T R A C T

Drawing on the work of Fama and French (1992) and Hou et al. (2011), this study tests the explanatory power of firm characteristics over expected returns for a large sample of Australian firms spanning the period from 1993 to 2012. Consistent with Hou et al. (2011), we find support for size and cash flows for both the full study period and the pre global financial crisis period. There are three significant aspects of this work. First, the impact of some firm characteristics appears sensitive to sample period. We find a premium to firms paying dividends during the pre-global financial crisis (GFC) period, suggesting that franking credits are valuable to Australian shareholders. This is not strongly supported for the full sample. We also observe evidence of a premium to unlevered stocks for the full study period, which is not evident in the pre-GFC period. Second, we use the Fama and French (2015) five factor model to adjust for risk and compare the results with the benchmark Fama and French (1992, 1993) three factor model. Finally, to address the errors-in-variables (EIV) problem, we focus on the risk correction approach developed by Brennan et al. (1998), instead of the traditional Fama and MacBeth (1973) approach.

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## 1. Introduction

The question of whether it is fundamental pricing factors or firm characteristics that explain cross-section variation in returns is an important one. In this paper we expand on the work of Hou et al. (2011) using both the Fama and MacBeth (1973) and the Brennan et al. (1998) cross-section regression approach in exploring this issue. Further, we use the Fama and French (1992, 1993) three factor model and the Fama and French (2015) five factor model in correcting for risk in our analysis. The Australian equity market, as a relatively small open developed market, provides a unique opportunity to study the impact of dividend imputation on equity returns. We analyse the link between leverage and cross-section variation in returns, which is ignored in recent international asset pricing studies like that of Hou et al. (2011). We provide further evidence in support of the impact of cash flows and earnings on returns, following Gharghori et al. (2009b). Lastly, we find that some of the firm characteristic effects are sensitive to inclusion of the global financial crisis (GFC) period.

Asset pricing models have developed rapidly since the 1960s. The CAPM (Black, 1972; Lintner, 1965; Sharpe, 1964) has been criticised in the literature due to its inability to explain cross-section variation in returns. This led to multifactor models like the

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three factor model (Fama and French, 1992, 1993), the five factor model (Fama and French, 2015) and the q-factor model (Hou et al., 2015). One competing model is the firm characteristics model proposed by Daniel and Titman (1997), which contends that the common characteristics of firms with similar size and book-to-market ratio, instead of priced loadings on risk factors, explain cross-section variation in expected returns. In addition to size and book-to-market, subsequent research (Chordia et al., 2015; Fama and French, 2008; Lewellen, 2015) shows that characteristics such as past returns, investment and profitability are correlated with a firm's subsequent stock returns. The central goal of this paper is to provide new evidence on the cross-section properties of expected stock returns in Australia, using a comprehensive set of firm characteristics.

There is a considerable literature exploring the question of asset pricing in Australian equity markets. Momentum has been identified as a possible pricing factor (Durand et al., 2006b; Fama and French, 1996; Galariotis, 2010; Hurn and Pavlov, 2003) and this is commonly included in asset pricing model tests, particularly when combined with the Fama and French three factor model (Carhart, 1997). There is a considerable Australian literature concerned with testing three-factor and four-factor asset pricing models (Benson et al., 2014; Brailsford et al., 2012; Dempsey, 2010; Durand et al., 2011; Durand et al., 2006a; Faff, 2001, 2006; Gaunt, 2004; Gharghori et al., 2009b; Halliwell et al., 1999; O'Brien et al., 2010). There is also a literature that attempts to explain the three factor model in terms of financial distress (Campbell et al., 2008; Chan et al., 2011; Gharghori et al., 2009a) or GDP/consumption growth (Faff et al., 2014; Nguyen et al., 2009; Vassalou, 2003) though support for these explanations is mixed. There is little evidence of applications of the more recently developed Fama and French five factor model (Fama and French, 2015) in an Australian setting and this paper addresses this gap in the literature.

There has been limited analysis of the impact of firm characteristics in an Australian context. Exceptions include the time series analysis of Gharghori et al. (2006) and Gharghori et al. (2009b). While the first paper provides some support for factor pricing over firm characteristic pricing, the second paper explores the impact of firm characteristics on mimicking portfolio returns to assess how well the Fama and French three factor model explains variation in Australian equity returns. They find that size, book to market, earnings and cash flows characteristics explain variation in returns, though there is no support for leverage or liquidity effects. In a rather different study, van Rensburg and Janari (2008) identify five significant characteristic premia out of 27 variables in both univariate and multivariate cross-section regressions. Finally, Gray and Johnson (2011) conduct Fama and MacBeth cross-section regressions using individual stocks and document an association between asset growth with returns, after controlling for other characteristics known to be associated with stock returns. While not attempting to address each of the firm characteristics noted in the literature, we revisit the question of whether firm characteristics are important in asset pricing using a different statistical approach to that generally used in the Australian literature. We also explore the impact of firm characteristics like dividend yield and leverage on returns as these are not commonly covered in prior work. Given our sample period, we also separate out the GFC period to allow us to identify the impact of the GFC on asset pricing.

We draw on the work of Hou et al. (2011) who show that the firm characteristics, size, book to market, momentum, cash flows, dividends and earnings are important in explaining cross-section variation in equity return at the world and US level. Our study differs from Hou et al. (2011) in three important aspects. First, they pool individual stocks in all countries in their cross-section regressions, in order to test for the possibility of an international asset pricing model. Their study includes around seven hundred Australian stocks, available from Datastream and Worldscope. Yet, their approach tends to ignore the possibility of cross-country differences and instead averages across a large number of countries. We focus specifically on a large sample of Australian stocks (more than three thousand Australian stocks obtained from SIRCA and Morningstar), which avoids the issue of cross-country variation arising from institutional features. For example, it is difficult to properly control for variation in dividend taxation systems in a multi-country setting (Faff et al., 2000). We avoid this issue through our focus on the Australian share market, where dividend imputation was adopted in 1987 and continued throughout the period of this study.[1] Second, Hou et al. (2011) investigate the importance of firm characteristics in the cross-section by controlling only for market beta. We use betas estimated from the Fama and French (1993) three factor model or the Fama and French (2015) five factor model to correct for risk in our study. Third, while Hou et al. (2011) exclude leverage from their analysis we specifically address the question of whether leverage matters.

There are five main contributions of this paper. First, in addition to the Fama and MacBeth (1973), we also approach employ Brennan et al. (1998) and use risk-adjusted returns as the dependent variable in cross-section regressions. A virtue of the Brennan et al. (1998) approach is that the well-known errors-in-variables problem is avoided with this technique. Second, we use the more recently developed Fama and French (2015) five factor model to adjust for risk and compare the results with the benchmark (Fama and French, 1993) three factor model. Despite the considerable literature on Australian asset pricing, we know of no study that has applied the five factor model to Australian data. This paper addresses this gap in the literature. Third, research on characteristics based on Australian financial-statement data such as earnings yield, dividend yield, and leverage is sparse. As a relatively sophisticated open financial market, Australia provides a unique insight into the impact of dividend imputation on equity returns.[2] We also explore the importance of cash flows and earnings on returns in the cross-section with some support for the cash-flow-to-price and earnings-to-price effects reported by Gharghori et al. (2009b). Fourth, we distinguish between the

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[1] There have been a number of countries that adopted and then rejected adjustments for double taxation of dividends. Dividend imputation is currently also in place in New Zealand and Malta. A form of dividend credit also exists in the UK.

[2] Yet, it is important to note that Hou et al. (2011) make no attempt to specifically cater for variation in tax systems in their international asset pricing analysis. Properly controlling for the impact of variation in dividend taxation systems in multi-country setting is difficult at best. We avoid this problem through our focus on the Australian share market where dividend imputation was adopted in the 1987 and continued throughout the study period.