Expropriation risk by block holders, institutional quality and expected stock returns

*Bruce Hearn,

University of Sussex, School of Business, Management and Economics, Brighton BN1 9RH, UK

b.a.hearn@sussex.ac.uk

Kate Phylaktis[a]

[a] Cass Business School, City University, London 106 Bunhill Row, London EC1Y 8TZ, UK

k.phylaktis@city.ac.uk

Jenifer Piesse[a,b]

[a] The Business School, Bournemouth University, Holdenhurst Rd, Dorset BH8 8BS, UK

[b] University of Stellenbosch, Stellenbosch, South Africa

jpiesse@bournemouth.ac.uk

Abstract

We study the asset pricing implications arising from imperfect investor protection using a new governance measure. This is defined as the product of institutional quality in a country and the proportion of free float shares, which captures the impact of controlling block holders. Using monthly returns of 4,756 blue chip firms from 50 international equity markets for 13 years, we show through tests of variants of the augmented-CAPM, that a two factor CAPM augmented with a factor mimicking portfolio based on our new investor protection metric yields the highest explanatory power, especially for markets that exhibit true variation in ownership types.

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*Corresponding author: Bruce Hearn. +44 (0) 1273 67 8377.

1. Introduction

There is a considerable literature on the implications of ownership concentration, controlling block shareholders and institutional quality for the welfare of minority investors. High levels of control rights held by block shareholders, such as family or the state, are largely a function of the quality of the institutional environment (La Porta et al., 1999, 2000). This is typically associated with lower firm value (La Porta et al, 1999; Dyck and Zingales, 2004; Doidge et al, 2004), diminished stock price and Tobin's q (Dyck and Zingales, 2004; Doidge et al, 2004) and underdeveloped external capital markets (La Porta et al, 1997, 1998). There is also mounting evidence of the proliferation of pyramiding and cross-shareholder networks aimed at increasing control with respect to cash flow ownership rights in environments characterised by weaker investor protection (La Porta et al, 1999; Khanna and Rivkin, 2001). The combination of institutional environment and ownership diversification on minority investor welfare motivates us to examine whether a premium exists to compensate for this risk.

The emphasis on heightened control in countries with weaker investor protection is a clear departure from the Berle and Means (1932) view of the separation of ownership and control that may result from simple ownership diversification. This has led La Porta et al (1999) to argue that "….the theory of corporate finance relevant for most countries should focus on the incentives and opportunities of controlling shareholders to both benefit and expropriate the minority shareholders". Gompers et al (2003) investigate the importance of governance provisions and their impact on firm valuation and the distribution of stock returns. Their study builds a governance index that uses a combination of firm and state-level shareholder protection measures to rank a universe of US listed stocks into ten portfolios. The extreme highest and lowest governance-ranked portfolios are termed *democracy* and *dictatorship*, respectively, with a returns difference between the two that remains unexplained in a four factor pricing model. Their model includes the Fama and French (1993) size and book-to-market terms plus the Jegadeesh and Titman (1993) momentum factor. More recently, Albuquerue and Wang (2008) develop a dynamic stochastic general equilibrium model to study the asset pricing and welfare implications arising from imperfect investor protection. However, the closest fit to our work is Giannetti and Koskinen (2010) and Heinkel et al (2001), where restricted pricing models are constructed to account for weak segmentation in otherwise integrated universes. These notably stop short of yielding a tractable factor to account for systematic differences in investor protection and its impact on the cross section of stock returns within a convenient pricing format, such as CAPM.

We draw on this background literature and examine whether the welfare of minority investors can be affected by both the quality of the institutional environment and groups of insiders within the firm. Insiders range from managerial agents, in the traditional Berle and Means (1932) model of ownership diversification, to large controlling block holders. Thus, the ownership structures of firms can vary from a model of dispersed shareholdings to one of block holders that exercise their control through enhanced voting rights with respect to cash flow entitlements.

We make three contributions to the literature. First, we introduce a new governance index to rank stocks based on the two principal constituents of investor protection: institutional quality and the proportion of free float shares. The latter is the inverse of the level of control held by block shareholders. We extend the ranking of stocks into ten governance-related portfolios as introduced by Gompers et al (2003) with the returns difference between high and low investor protection deciles attributed to an investor protection factor mimicking portfolio (FMP). The inclusion of the investor protection FMP into asset pricing models based on augmented versions of CAPM can account for minority investor welfare differences between strong and weak shareholder protection in firms.

Our second contribution lies in the association between investor protection and ownership structures within the underlying universe upon which asset pricing models are based. Thus, we consider the seven Datastream defined ownership categories for each of our ten decile-sorted portfolios. These are cross-shareholding networks, insider employee/family, foreign, state, investment companies, pension funds and other. In this way, we link investor protection, which itself is based on the combination of institutional quality and the proportion of ownership freely held, to the dominant ownership structure. This extends the La Porta et al (1997, 1998, 2000) law and finance perspective, which relates investor protection solely to legal origin, and the separate work of La Porta et al (1999) and Dyck and Zingales (2004), which relates investor protection to ownership structure. Furthermore, we consider the legal jurisdiction of each stock based on primary listing, sorted into the ten investor protection ranked portfolios. Thus, we strengthen our comparison of investor protection based on legal origin using the legal families identified by La Porta et al, as well as on developed versus emerging markets.

Finally, our study sits at the intersection of the law and finance, corporate governance, and asset pricing literatures. Our investor protection metric is based on the former two, while we subject it to a battery of asset pricing tests using the traditional CAPM and its variants. These are the single factor CAPM, the Fama and French three factor (henceforth FF3F) CAPM that includes size and book-to-market terms, the Carhart et al (1997) four factor CAPM based on FF3F with an extra momentum term, and the liquidity-augmented CAPM (Liu, 2006). We also subject these, our proposed two-factor investor protection augmented CAPM and their time-varying equivalent, to the Kalman filter method and evaluate their performance. This extends the limited focus of the Hou et al (2011) study, where the focus is on the choice of the optimal valuation factors in pricing models that is based on the attributes of the balance sheet and cash flows of the firm. Our consideration of liquidity-based transaction costs and their impact on firm valuation enhances the insights of the Hou et al study, and builds on the cumulative evidence from Amihud (2002), Pastor and Stambaugh (2003) and Liu (2006) of a liquidity pricing premium. Our relaxation of time invariant parameter assumptions facilitates broader comparisons and more effective appraisal of rival pricing model frameworks. These considerations form our third contribution.

Using a sample of 4,756 firms that are constituents of national blue chip indices from fifty international equity markets, all of which are included in the MSCI World universe comprised of both developed and emerging markets constituent universes over the period January 2001 to December 2014, we specifically investigate the following questions:

(a) Does investor protection impact on minority investor welfare and is this reflected in a pricing anomaly?
(b) What are the specific limitations on applying such an investor protection model in terms of the prevalence of the underlying governance structure of the firm?

The results suggest there is an unpriced premium associated with investor protection. This premium is reflected in statistically significant alphas in all the augmented CAPMs and their time-varying parameter equivalents. Furthermore, when the World universe is disaggregated into developed, emerging and US only markets, the premium holds with the exception of emerging markets. With respect to ownership type, for the World overall and developed market universes this varies across investor protection deciles, as expected from the literature. That is, lower quality investor protection is associated with higher levels of control, for example, cross shareholding networks, whereas higher investor protection deciles suggest an environment with dispersed ownership. Conversely, the Emerging market universe is overwhelmingly dominated by concentrated control across all levels of investor protection and this limits the effectiveness of the model. Firms that made up the US only universe all enjoy high quality investor protection, and subsequently this group has very few ownership categories associated with high levels of control that take the form of cross shareholding networks. In considering different types of owner, our study effectively circumvents traditional concerns regarding a linear monotonic association between the level of block holder concentration and investor protection as we consider very different types of block holder with very different separation of cash flow ownership from control.

The paper proceeds as follows. Section 2 explains the composition of the new investor protection factor and provides the theoretical arguments that justify its use. Section 3 describes the data and summary statistics and outlines the techniques used to construct the FMPs. Section 4 describes the time-invariant augmented CAPM models and their time-varying parameter counterparts, and section 5 reports and discusses the empirical findings. Section 6 presents the robustness tests using an alternative proxy for institutional quality. The final section concludes.

2. Institutions, governance and ownership

2.1 Investor protection measure

Our investor protection measure is the product of country level institutional quality and the proportion of firm-level free float shares. This is defined as

$$\text{Investor Protection}_{ijt} = (\text{Institutional Quality})_{jt} * (\text{Free Float})_{ijt} \quad (1)$$

for country *i* at year *t* and Free Float is the mean monthly percentage of free float shares for each listed firm *j*.

Institutional quality is formed from the average of the six World Bank governance indicators: control of corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law and democratic voice, and accountability (Kaufman et al, 2009).[1] These indicators range from -2.5 to +2.5 but here have been rescaled to take a value between 0 – 10. Country *i* refers to the primary listing location of firm *j*. We adopt the country of primary listing as opposed to the country of incorporation on the basis of the "legal bonding" hypothesis of Coffee (1999, 2002) and Charitou et al (2007). Firms incorporated in an overseas jurisdiction adopt or "legally bond" to the governance arrangements of the country of their primary listing. The governance indicators were first reported in 1996 and were updated at two yearly intervals until 2002, after which they were produced annually. In the early years of the series, the indicators in the intermediate year were assumed to be the same as in the preceding one, given the relatively slow nature of institutional change (Williamson, 2000, 2002; North, 1991, 1994).

Free float shares are the proportion of total issued shares from the primary listing of firm *j* not held by block holders. Information on the free float proportion is easy to access for a wide cross

[1] The six indicators are recalculated and updated every two years and were calculated back to 1999. Source: http://info.worldbank.org/governance/wgi/index.asp. See Appendix B Table 1B for definitions.

section of stocks, and is used here. This is particularly important given the difficulty in tracing controlling owners within extended pyramidal and cross shareholding networks, such as business groups, where offshore entities, opaque nominee accounts and private, unlisted holding companies are frequently used to extend their control over a firm. Datastream categorizes block holders into seven types: government, cross-holdings, pension funds, investment companies, employees and family, other block entities, and foreign block holders (see Appendix B, Table 1B). Prior to August 2009, data on shareholdings and free float shares were reported on a monthly basis, but more recently they are reported on the 10^{th} and 30^{th} of each month. Two points should be noted. First, the percentage ownership threshold, after which a holding is considered as a block, changed in April 2005. Previously, there was no threshold but after April 2005 the SEC breakpoint of 5% was widely adopted. This means that no direct comparison of the level of block shareholdings and the proportion of free float is valid before and after the change. However, this is immaterial in our case as our focus is on the construction of the investor protection metric on an annual basis. The second point concerns the approach to missing data in some categories of block ownership holdings. Discrete periods that lack data on percentage ownership holdings are allocated a value of 0%, leading to the proportion of free float being 100% for the period of the missing data. These omissions and missing periods are relatively rare, although more frequent in emerging economies. We address such gaps in the time series for each category of block owner per firm by using the last known ownership percentage value for that shareholder. Finally, since the investor protection measure is the product of the institutional quality and proportion of free float, both of which are percentages, the resulting metric is denominated in units ranging from 0 to 10,000.

Instead of using the proportion of free float, which is easy to compute for our broad cross section of stocks to capture the potential risks of minority shareholder expropriation, a better measure is proposed by Claessens et al (2000, 2002) and Lins (2003). Their suggestion extends the arguments of Bebchuk (1999) and La Porta et al (1999) that controlling block shareholders revise their holdings relatively infrequently and with little dilution of their overall control, owing to their accentuated private benefits. It is worth noting that despite the obvious incentives for controlling block shareholders to expropriate minorities in terms of firm value, there are potential benefits associated with concentrated ownership by this group due to their increased incentive to monitor the incumbent management and insiders, which is likely to lead to reduced agency costs. However, while Claessens et al (2000) argue that the wedge between cash flow and voting control rights arguably better captures the potential risk of minority shareholder expropriation, the proportion of free float is much easier to compute for a broad cross section of stocks. Thus, this is the preferred choice in our setting.

In summary, since institutional quality and free float are assumed to be complements, an improvement in the quality of corporate governance associated with an increase in institutional quality is greater for a firm with higher free float.

2.2 Relationship between institutions, dispersed ownership and investor protection

Our theoretical model is based on the notion of perfectly integrated capital markets that are subject to mild segmentation in the form of differing levels of corporate control. This extends the restricted CAPM model of Errunza and Losq (1985) and Merton (1987) and follows the intuition developed in Heinkel et al (2001) in considering the asset pricing implications arising from a subset of investors emerging from within a given universe. Further, we assume that at any given time there is a finite number of listed firms and a finite pool of investors. Following Giannetti and Koskinen, (2010), two categories of investors are considered: minority portfolio investors and controlling shareholders. However, we further assume that controlling shareholders are only associated with firms that have weak investor protection, where this is reflected in higher ownership concentration in the form of large block holdings, and consequently a minimal free float would be available to minority portfolio investors. Conversely, firms with strong investor protection attract few controlling shareholders and, with minimal block holdings, these broad, dispersed ownership patterns are reflected in high free floats. Following Giannetti and Koskinen (2010), we argue that there are two payoffs arising from shares. The first is attributable to all security holders in the form of dividends and capital gains, while the second is preferential access to private benefits that accrue only to controlling block shareholders.

Thus, firms with weak investor protection are attractive solely to controlling shareholders who compete to acquire full control over firms through large block shareholdings. Conversely, firms with strong investor protection have widely dispersed investor bases with few, if any, block holdings. We argue that investor protection is not only reflected in ownership concentration but also in the quality of the overall national institutional environment. Here, institutional quality is viewed as complementary to ownership concentration and the market for corporate control. This is supported by Klapper and Love (2004), who find that average firm level governance, and hence investor protection, is lower in countries with weaker legal systems. Therefore, governance within the firm is correlated with contractual imperfections and levels of asymmetric information in their national environment. We also follow North (1991, 1994), who claims that the institutional development within a given society, or country, is a function of the continuous interaction between firm transactions, the ruling polity and the wider population and this acts as a check or balance to the moral authority of the state. In this way the internal governance of the firm is inextricably linked to the external institutional quality by the nature of the political economy.

As noted above, at the centre of our model is the assumption of perfectly integrated capital markets that are mildly segmented by restrictions in corporate control. Thus, controlling shareholders exert their control through larger block ownership holdings in firms with weak investor protection, situations that also exhibit greater information asymmetry. Here, the expropriation of private benefits motivates their participation as these augment otherwise low risk-adjusted returns associated with such weak investor protection firms. Thus, we follow Giannetti and Koskinen (2010) and Heinkel et al (2001) and assume a monotonic association between ownership concentration and investor protection that is based on the entrenchment effect of large controlling block holders.

Our model focusses on the welfare implications for minority portfolio investors arising from the need to diversify by optimising portfolios that draw on a wide cross section of stocks from weak to strong investor protection firms. Given the mild segmentation assumption, arbitrage trading to close price differentials is impeded, reflecting the laws of supply and demand (Errunza and Losq, 1985; Heinkel et al, 2001). In this way, weaker investor protection stocks attract controlling shareholders due to the relative ease of extraction of private benefits in an environment of informational asymmetry and opacity in financial reporting and governance practices. Such controlling shareholders dominate ownership of firms through large block holdings and consequently minimal free floats are available for minority portfolio investors. However, the limited supply is offset by a lack of demand by minority portfolio investors given they face the risk of expropriation. Thus, the stock price decreases in equilibrium to reflect the risks associated with informational asymmetry and increased expropriation risk. Therefore, minority portfolio investors demand higher expected returns to compensate for this lower price and this is reflected in a positive premium.

Conversely, in firms operating in an environment with high levels of investor protection, the ownership base is formed from widely dispersed minority portfolio investors and an absence of controlling blocks. The absence of controlling block shareholders implies a reduction in entrenchment and expropriation risk, while higher institutional quality implies greater protection of property rights for minority investors. Thus, the demand for these shares is greater and the price is driven up. The enhanced price is a reflection of a discount because of the lower risk and therefore expected return.

Our model considers a continuum of investor protection, ranging from weak to strong, following Giannetti and Koskinen (2010). However, we implicitly consider a notional *average* level where minority investors expect a premium when participating in weak investor protection stocks and a discount when participating in high investor protection stocks. These differences lead us to anticipate a persistent difference in the cross section of stock returns, attributable to institutional quality and free float.

Despite evidence on the links between the welfare of minority investors, ownership structure and institutional quality, there is very little in the literature that approaches this using an asset pricing framework. A seminal paper is Gompers et al (2003),[2] who created a governance index and used state- and firm-level governance to rank a universe of US firms into decile portfolios ranging from the weakest governance, or *dictatorship* portfolio, to the strongest, or *democracy* portfolio. The market universe is taken from the Investor Responsibility Research Centre (IRRC) and includes approximately 1,500 stocks, which account for over 93% of capitalization of the New York stock exchange (NYSE), the American stock exchange (AMEX) and Nasdaq. These ten governance-ranked decile portfolios were used in an application of the Carhart et al (1997) four factor augmented-CAPM pricing model. This is the standard CAPM augmented by size and book-to-market factors (Fama and French, 1993) plus the momentum factor. Un-priced premiums, the alphas, were found across all deciles, and those associated with the lowest and the highest governance quality deciles were statistically significant. The application of the Carhart et al (1997) four factor model to a zero-cost portfolio, which reflects a structure of buying firms in the weakest governance category and selling in the highest, resulted in annualized abnormal returns of 8.5%. The Gompers study also found that firms with stronger shareholder rights had higher value, higher profits, higher sales growth and lower capital expenditures, all consistent with La Porta et al (2000, 2002). However, despite finding evidence of a premium, no asset pricing application was proposed. This literature forms the basis of our first proposition:

Proposition 1*: Welfare losses arising from diversification between weak and strong investor protection firms are reflected in a premium*

In its broadest terms, our proposed theoretical view of investor protection is based on varying transaction costs that ultimately impact the property rights of minority investors seeking diversification across a mildly segmented but otherwise perfectly integrated market universe. While we link systematic changes in corporate control rights using institutional quality and levels of controlling block shareholdings to diversification premia and the cross section of stock returns, our measure is most closely associated with a liquidity effect. Liquidity provides an alternative measure of transaction costs

[2] Albuquerue and Wang (2008) develop a dynamic stochastic general equilibrium model to study the association between asset pricing and the welfare implications of imperfect investor protection. They find that countries with weaker investor protection attract larger risk premia, greater return volatility, lower Tobin's q and higher interest rates. This is in line with our theoretical model.

that vary systematically across the cross section of stock returns. Further to traditional approaches, such as Goyenko et al (2009), Lesmond (2005) and Hearn (2014), which contrast various liquidity metrics in capturing transaction costs, we adopt the multidimensional measure of Liu (2006). This combines a modified turnover ratio measured in terms of volume traded, with the proportion of daily zero trading volume days per month, to measure trading speed. This provides a multidimensional focus of transaction costs and improves on the limitations of more singular volume-based or simple price-impact measures, while also capturing a dimension of trading frequency. Thus, liquidity provides an obvious stock-ranking metric based on transaction costs, which are influenced by institutional quality, market microstructure and corporate governance (Bewley, 2002; O'Hara, 2003). However, the transaction costs captured are, by nature, external and do not reflect the ownership of the firm, and directly impacts corporate strategy and executive decision-making that are at the heart of our new investor protection measure.

Other factors commonly used to explain the cross section of stock returns are in Fama and French (1993), that is additional premiums attributable to persistent differences in size and accounting book to market value of stocks. Size premium in particular relates to small market capitalization firms that persistently underperform in terms of earnings during and following wider financial and economic downturns than larger firms (Fama and French, 1993). Accounting book to market value captures differences across the cross section in terms of underlying value, with high ratio firms less costly but with higher intrinsic value stocks while the opposite is true for low ratio firms. Fama and French (1993) proposed a three factor CAPM model with size and book to market value factors in addition to the simple market factor. Carhart et al (1997) extended this by adding a momentum factor on top of the underlying Fama and French (1993) model to create a four factor version. Momentum relies on the past returns performance of stocks with a premium attributed to differences in the cross section of stock returns between low and high performing stocks (Jegadeesh and Titman, 1993, 2001). However, a shortcoming is that size, book to market and momentum factors are based on fundamentals and performance and ignores any consideration of transaction costs, where these are most likely the source of any deviation. Thus, we propose the following:

Proposition 2*: Investor protection is more robust in capturing the cross section of stock returns than liquidity, momentum, accounting book to market value or size measures*

We perform a number of procedures to test the above propositions. Firstly, we disaggregate the World overall universe into three components: a developed and an emerging economy universe and the US as a single country. These universes are selected on the basis of classification by MSCI (see Appendix A, Table 1A) into developed and emerging market groups. This simple differentiation between the MSCI defined universes also reflects the variation in types of control structure. In the emerging universe case, this is dominated by cross-shareholding networks and pyramidal governance, which is different from the developed universe where there is greater genuine variation and a sizeable proportion of firms adhere to the dispersed ownership model. This distinction based on MSCI classification facilitates tests of the above propositions and provide an additional context for the asset pricing models. Secondly, we test our new investor protection metric by formulating a returns-based factor in a simple two-factor augmented CAPM framework and compare the performance of this with FF3F, Carhart 4F (including momentum), and Liquidity-augmented two-factor models for each of the four universes. We also compare monthly-rebalancing and annual-rebalancing factor portfolio construction techniques with different valuation factors. Additionally, we relax the time invariant parameter assumptions of the traditional CAPM framework and adopt the Kalman filter approach to the FF3F, Carhart 4F (including momentum), Liquidity 2F, and Investor Protection 2F models and compare the performance of each. This yields a robust method of evaluating factor performance in explaining the cross section of stock returns.

Finally, we test the robustness of our results by using an alternative proxy for institutional quality, the "Legal Structure and Security of Property Rights Index" developed by Gwartney and Lawson (2007), which focusses on the legal security of property rights for minorities. Our results are on the whole robust.

3. Data and summary statistics

3.1 Sample selection

Our sample is constructed in two stages. The first sorts all markets in MSCI defined[3] as *developed* and *emerging*. The second selects stock-level data from the major blue-chip index constituent lists in Datastream (see Appendix A, Table 1A). This criterion ensures they conform to international investors' selection requirements in terms of marketability and accessibility (foreign ownership restrictions). It also avoids the problem of selection bias that can arise from pre-determined minimum price criteria, as found in Hou et al (2011). The blue-chip index constituent stocks also conform to international asset diversification assumptions regarding inter-market asset market integration that is essential to the CAPM, and thus avoids intra-market segmentation prevalent in emerging stock markets.

[3] MSCI definitions are from: http://www.msci.com/products/indexes/country_and_regional/dm/

The data are from January 2000 to August 2014. This is relatively short but reflects the period within which many emerging and frontier markets were established and adopted conventional data disclosure and financial reporting. The data includes single class ordinary shares only and excludes preference shares, dual class shares, warrants, convertibles, REITs, closed-end funds, exchange traded funds and depository receipts. Finally, where any return above 300% that is reversed within one month is treated as *missing*, that is, if R_t or R_{t-1} is greater than 300%, and $(1 + R_t)*(1 + R_{t-1}) - 1 < 50\%$, then both R_t and R_{t-1} are set to *missing*. This follows Ince and Porter (2003).

Following Hou et al (2011), we ensure accounting ratios are known before returns and thus match the end of year financial statement data for year t-1 with monthly returns from July of year t to June of year t + 1. We use the inverse of the market-to-book-ratio (see Appendix B, Table 1B) to calculate the Book to Market Value ratios. In addition, size is defined as the market value of equity at the end of June of year t, while momentum (Mom) for month t is the cumulative return from month t – 6 to month t – 2, skipping month t – 1 to avoid microstructure biases such as bid-ask bounce or non-synchronous trading.

The final sample comprises 4,756 common stocks from 50 markets worldwide, all of which are constituents of blue chip indices. The sample consists of 3,077 stocks from 24 MSCI-designated developed markets and 1,679 from 26 MSCI-designated emerging markets. Figure 1 shows the distribution of the sample over the period January 2000 to August 2014. Our sample selection criterion of using blue chip constituent stocks gives a universe that is not dominated by US stocks. The mean number of North American stocks is 743.49, or 19% of the sample and Europe developed (21%). Asia emerging (18%) and Asia developed (11%) are the next largest contributors. The remainder are Middle East & Africa emerging (7%), Latin America (5%), Europe emerging (3%) and Middle East & Africa developed (2%). The rest are from Australasia and Scandinavia. Figure 2 shows the development of the sample over time. This is largely a result of including an increasing number of emerging markets, such as Dubai and Abu Dhabi in the United Arab Emirates.

Figures 1 and 2

3.2 Liquidity measurement

There are multiple liquidity estimators in the literature and for a comprehensive review and assessment of their relative performance see Goyenko et al (2009). Given our focus on monthly and annual measures and their performance, the choice of liquidity metric is constrained to a low frequency application. A further constraint arises from the heterogeneous sample, which includes some of the most developed and active markets and some of the least developed. Thus, price impact measures, such as Amihud (2002), are not appropriate given the illiquidity of many emerging markets (Lesmond, 2005). In addition, volume-based measures, such as the turnover ratio, over-estimate liquidity at times of severe market distress, for example, capital flight at times of financial crisis. The daily zero returns measure of Lesmond et al (1999) is particularly suitable for small, inactive emerging markets, but not for highly liquid ones, such as the US. A further limitation with almost all low frequency estimators is that liquidity is a one dimensional phenomenon. Liu (2006) introduced a multidimensional measure designed to capture the trading speed dimension of liquidity. This is a combination of an adjusted turnover term and the proportion of daily zero volume trading days in a given month, and is the metric of choice in this study. It is defined as LM_x which is the standardized turnover-adjusted number of zero daily trading volumes over the prior x months (x = 1, 6, 12), stated:

$$LM_x = (\text{No. of daily volumes in prior x-months}) + \left(\frac{1/x \text{ month turnover}}{Deflator}\right) \times (21x/NoTD) \quad (2)$$

where *x month turnover* is the turnover over the prior *x* months, daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day, *NoTD* is the total number of trading days over the prior *x* months, and *Deflator* is chosen such that,

$$0 \langle \frac{1/(x \text{ month turnover})}{Deflator} \langle 1 \quad (3)$$

for all sample stocks[4]. With the turnover adjustment (the second term in brackets in (2)), two stocks with the same integer number of zero daily trading volumes can be distinguished, that is, the one with the larger turnover is more liquid. Thus, the turnover adjustment acts as a tie-breaker when sorting stocks based on the number of zero daily trading volumes over the prior *x* months. Because the number of trading days can vary from 15 to 23, multiplication by the factor (21x/NoTD) standardises the number of trading days in a month to 21, which makes the liquidity measure comparable over time. *LM1* can be interpreted as the turnover-adjusted number of zero daily trading volumes over the prior year. LM_x is calculated at the end of each year for each stock based on daily data.

3.3 Summary statistics

Table 1 reports the summary statistics of monthly returns (in US$), the percentage proportion of free float, country-level institutional quality, the new investor protection measure and other firm-level characteristics. All countries are grouped according to their MSCI categories of developed versus

[4] Following Liu (2006), a deflator of 11,000 is used to estimate LM1.

emerging. Following the definition by La Porta et al (2008), 4 countries are classified as following Scandinavian civil code, 17 English common law, 19 French civil code and 10 German civil code. A number of observations can be noted. First, institutional quality across the MSCI developed markets is almost twice that of the emerging markets. Second, English common law nations are associated with higher institutional quality compared to the majority of civil code countries, reflecting the work of La Porta et al (1999, 2000). However, in contrast to La Porta et al, where civil code is grouped together under a single category, Scandinavian civil code is separate from German and French and is associated with some of the highest institutional quality worldwide.

The investor protection metric ranges from 7,689.36 in Norway and 6,850.25 in Japan to 1,680.02 in Colombia and 1,550.49 in Indonesia. This is also reflected in the percentage proportions of free float, which ranges from 82.13% in Norway and 84.60% in Japan to 35.41% in Chile, 39.38% in the Philippines and 39.45% in Portugal. However, liquidity and momentum do not follow the same pattern. For these metrics, Japan has a value of 15.66 for the Liu metric, which is one of the lowest and hence the most liquid market, while Norway is one of the highest with a value of 101.68 and similar to the emerging Dubai market of 115.37. But, apart from these two markets, high investor protection is generally closely associated with high liquidity, as is the case in North America, the large and developed markets of Europe, and in Australasia. Similarly, low levels of investor protection, proportion of free float and liquidity are in the emerging markets of Middle East & Africa. Momentum is similarly varied, with emerging markets higher than developed ones. Mean firm size is generally higher in developed markets, ranging from US$ 69.76 billion in Hong Kong and US$ 25.77 billion in the UK to US$ 1.38 billion in Peru and US$ 0.60 billion in Egypt. There is wide variation in book-to-market value ratios in these markets with 3.55 in Colombia, 2.29 in Germany and 2.09 in the Netherlands compared with 0.46 in South Africa, 0.54 in the UK, and 0.30 in Thailand, although here there is no obvious dichotomy between developed and emerging markets. Finally, the time series of monthly returns per market varies from highs of 2.22% in Canada, 2.53% in Russia (both Micex and RTS) and 2.72% in Taiwan to lows of 0.66% in Hungary, 0.67% in Japan and 0.70% in Greece.

Table 1

4 Factors driving returns

4.1 The construction of Factor Mimicking Portfolios (FMPs)

To study the influence of factors, such as size, book to market value, momentum and liquidity on the variation of world stock returns, we follow Fama and French (1993), Liu (2006) and Hou et al (2011) and construct returns-based proxies using zero-investment portfolios. These portfolios go long in stocks with high values of a given characteristic and short in stocks with low values for that characteristic. We use the time-series regressions of Black, Jensen and Scholes (1972), following Fama and French (1993) and more recently Liu (2006), to assess the pricing implications arising from the liquidity metric. In this approach, the excess returns on test portfolios are regressed on the returns of FMPs. The time series slopes are interpreted as factor loadings that inform how various combinations of these FMPs explain the average returns across the portfolios. We form market portfolios based on both equal and value weighted returns of all stocks within a universe at a given time and use the yield on the 10 year US Treasury bill as our risk free rate.

We use size and book to market value (Fama and French, 1993), momentum (Jegadeesh and Titman, 1993) and liquidity (Liu, 2006) to form the FMPs using two different techniques. The first creates 25 quintile portfolios using a two-stage sorting process. The stocks are sorted into five portfolios based on size, and then sorted again by book to market value. At any time, those with missing values for either characteristic are omitted, as are stocks with negative book to market values. FMPs relating to size are created from average returns on small size portfolios minus those on big size portfolios (SMB factor) and similarly with high book to market value portfolios minus low book to market portfolios (HML factor). Portfolio rebalancing takes place annually in June, following Fama and French (1993) and Hou et al (2011). SMB and HML factors are formed from value-weighted returns.

Construction of the momentum and liquidity FMPs are slightly different. These use 10 decile portfolios with stocks ranked on momentum across portfolios, where momentum is defined as the cumulative return over the preceding six months, and on liquidity, defined as in Liu (2006). The FMP for momentum follows the Jegadeesh and Titman (1993) six-month/six-month strategy, where monthly returns are an equally weighted average of six individual strategies of buying the winning decile portfolio and selling the losing decile portfolio. Rebalancing occurs monthly.[5] In order to minimize the bid-ask bounce effect, we skip one month between ranking and holding periods when constructing the momentum FMP. This FMP is formed from equal-weighted returns.

The liquidity FMP is created by first ranking stocks by their Liu (2006) liquidity metrics. These are sorted into 10 decile portfolios and the FMP formed from returns difference between high illiquidity decile portfolios and low illiquidity decile portfolios. Then, two FMPs are created based on the frequency of rebalancing. The first is rebalanced annually in December, following Fama and French (1993). The second is rebalanced monthly with the FMP returns formed from the averages

[5] That is, the momentum FMP return for January 2001 is 1/6 of the return spread between the winners and losers from July – November 2000, 1/6 of the return spread between winners and losers from June – October 2000, etc.

across each of twelve annually held liquidity FMPs, similar to the method used for the momentum portfolio in Jegadeesh and Titman (1993)[6]. This was also used as a robustness check in Liu (2006).

Finally, the FMP based on our new investor protection measure is created by ranking stocks by their individual investor protection metric. Ranking is by the prior month and year. The ranked stocks are then sorted by each period and then put into 10 decile portfolios with the investor protection FMP created from returns difference between low investor protection decile portfolios and high investor protection decile portfolios. In common with the liquidity portfolios, two investor protection FMPs are formed based on the frequency of rebalancing. The first is an annual rebalancing in December of each year, following Fama and French (1993), and with an annual holding period. The second is a monthly rebalancing, with annual holding periods. The resulting FMP returns are created from the averages across each of twelve annually held investor protection FMPs, similar to the method used for the liquidity FMPs. Given the investor protection metric is formed from the product of free float and institutional quality, stocks sorted into the lower investor protection decile portfolios have potential benefits. These can arise from the concentrated cash flow rights of block holders, a greater incentive to monitor in order to offset the weakness of the external contracting environment and the lack of minority shareholder protection afforded from state institutions (Lins, 2003). On the other hand, the higher investor protection decile portfolios include stocks characterised by high institutional quality jurisdictions, which are more supportive of enhanced minority shareholder rights, as reflected in high proportions of free float and few block holders. This is in line with the classic Berle and Means (1932) separation of ownership from control governance model.

4.2 Descriptive statistics of Factor Mimicking Portfolios

Table 2 reports the means, standard deviations, autocorrelations and cross-correlations of monthly returns of the FMPs using the entire sample. Of these, the market portfolio has an average excess return of 1.213% over the 164-month horizon and is statistically significant (t-stat 2.85). We select the equal-weighted market portfolio. This has an approximately normal distribution, according to the Jarque-Bera statistic rather than the value-weighted market portfolios, which are highly non-normal. The difference in distribution between these two returns series is also reflected in the levels of kurtosis and skewness. These results are not reported but are available from the authors on request.

We are especially interested in the effectiveness of the monthly versus annually rebalanced liquidity and investor protection FMPs. While small premiums do not necessarily discriminate

[6] That is, this liquidity FMP return for January 2005 is formed from 1/12 of the return spread between high liquidity ranked stocks and low liquidity ranked stocks for January 2003 - January 2004, 1/12 of return spread between high and low liquidity stocks for February 2003 through February 2004, etc.

between rival FMPs in terms of return co-movement, their standard deviations may. Panel 1 shows that while the annual FMPs have slightly lower premiums, they also have higher volatility. Also, annual liquidity and investor protection FMPs have minimal skewness and low levels of kurtosis. Another approach is to examine the correlations as if these are high they are likely to be capturing the same underlying factors. Thus, we omitted the monthly liquidity and investor protection FMPs as they are highly correlated with the annual ones (see panel 2). Therefore, the factors included in the time series asset pricing tests are the equally weighted market excess returns, the value-weighted size and book-to-market FMPs, the equal-weighted momentum FMP, and the annually-rebalanced equal-weighted liquidity and investor protection FMPs.

It is worth noting that of these FMP's, those attributable to HML and Investor Protection are smallest in average returns –under 0.50% - although all are statistically significant (1 year Investor Protection has a t-stat 2.36, while its 1 month counterparts has a -stat of 2.28). This implies that while premiums do exist for each of these factors they are smaller in absolute size. It is also worthwhile to note that the standard deviations of returns for both 1 year and 1 month Investor Protection FMPs are by far the lowest of all FMPs at 2.592% for 1 year and 2.574% for 1 month. This indicates a greater degree of certainty in the existence of investor protection premiums, despite their smaller absolute size. Finally, it is also notable that both investor protection FMPs have the least skewness and kurtosis and the lowest Jarque-Bera statistics (indicating greater Normality in returns distributions) compared to any other FMP.

In terms of correlations (see Table 2, panel 2) it can be observed that both liquidity FMPs (1 year and 1 month) have higher correlations (slightly over 0.50) with the market portfolio as well as both investor protection FMPs (1 year and 1 month). This questions the support for proposition 2. One explanation for this is the efficacy of the Liu liquidity metric, which is based on the ability to capture the multidimensional nature of liquidity where dimensions are impacted by institutional quality. A second explanation focusses on the specific type of block ownership where, in the case of cross-shareholder networks, this leads to a separation of voting control away from cash flow ownership rights (Lins, 2003). A literature based on La Porta et al (1999) argues that such separation of ownership from control engenders increased informational asymmetries and enhances expropriation risks, which leads to increased illiquidity. Consequently, it is notable that a limitation arises from potential overlap in the effects captured by each of the distinct FMPs. Finally, concerns regarding autocorrelations are mitigated due to their low absolute size and negligible statistical significance over 1, 6, and 12 month lagged periods. (Table 2, panel 3).

Table 2

4.3 Descriptive Statistics of Investor Protection Portfolios

Table 3 panel 1 reports the characteristics of the stocks for the overall universe in each of the ten decile investor protection portfolios with respect to geographical region, legal origin and form of ownership. It shows clear trends across all decile portfolios in terms of the country of primary listing. In common with La Porta et al (1998, 2000) we find that the highest investor protection deciles are dominated by stocks from English common law markets, while the lowest are dominated by French civil code stocks. In addition, there is an increasing trend in the proportion of stocks from German civil code countries towards the lowest investor protection deciles. Unlike La Porta et al (1998), we find that Scandinavian civil code stocks are more closely associated with English common law and exhibit a dramatically increasing trend towards higher investor protection deciles. This suggests a similar level of investor protection in Scandinavian civil code and English common law countries.

When we separate stocks by legal family of the country of their primary listing, and by developed or emerging country groups using the MSCI definition (see Appendix A, Table 1A), these trends are further accentuated. Although not in the highest investor protection deciles (D9 and D10), stocks from emerging English common law countries are more evenly dispersed across deciles D1 to D7. The developed country common law returns are heavily concentrated in high investor protection portfolios and reflect a move from minimal participation in lowest investor protection deciles to over 50% of the population of highest investor protection decile (D10). Stocks in emerging French civil code countries are heavily concentrated in the two weakest investor protection deciles (D1 and D2), while developed countries have a relatively even dispersion across D2 to D10. This provides further support for the relative weakness of French civil law jurisdictions in terms of investor protection, at all levels of economic development. Developed German civil code stocks are even more evenly distributed across all ten investor protection deciles than those under French civil code, with only a slight increase in concentration in the highest decile (D10). However, emerging countries using German civil code are concentrated in the lowest two investor protection deciles (D1 and D2). These findings are consistent and support the hypothesis that German and French civil code legal jurisdictions are markedly weaker than other legal origin families in providing investor protection.

We examine regional effects and find two noticeable patterns. The first concerns the developed markets of North America, Australasia and Scandinavia, all of which have very strong trends from minimal participation in lowest investor protection deciles towards increased concentration in the highest deciles. The developed markets in Europe reflect a more even distribution across all deciles. In Asia, the developed markets have the highest concentration in the middle group of mid-ranking investor protection portfolios (D3 to D9). The second concerns emerging regions, such as Latin America, Europe emerging, Middle East & Africa and Asia, where concentrations of stocks are in the lowest investor protection portfolios. This also supports the hypothesis that investor protection varies with levels of economic development (La Porta et al, 2000).

Finally, the evidence from geographic dispersion of stocks across the decile investor protection portfolios – formed from the World universe – implies some support for the notion of an "emerging market premium" over that associated solely with developed country stocks. This can be seen from the dispersion of stocks between MSCI Emerging and MSCI Developed categories ranging from deciles D1 to D10. However, this evidence is not clear cut owing to over 25% of the stocks in lowest investor protection decile (D1) originating from MSCI Developed markets. Further questions of the strength of such an emerging market premium arise from consideration of ownership structure, in the context of the separation of cash flow ownership (the definition of traditional block holder) and voting control (see Claessens et al, 2002 and Lins, 2003). This justifies the division of the World universe into distinct World developed, emerging and US only sub-universes.

Table 3

The summary statistics for firm characteristics for the ten investor protection decile portfolios are also reported in Table 3, with the overall universe in panel 2 and the US only universe in panel 3. These support the existence of an investor protection governance premium between firms with high ownership concentration in low institutional quality environments and to those that are widely held in high institutional quality environments. First, there are significant returns differences between the highest (D10) and the lowest (D1) investor protection decile portfolios, whether equal or value weighted. Returns on lowest investor protection deciles (D1) are much higher than the high investor protection ones (D10). Second, there is the expected difference between the lowest and the highest investor protection deciles in terms of the investor protection metric and the proportion of free float (%). Both are statistically significant ($p \leq 0.005$). The proportion of free float in the weakest decile (D1) in the overall universe is less than a quarter of that in the strongest decile (D10), confirming high ownership concentration in the weaker investor protection deciles. Similarly, the investor protection metric in the highest investor protection decile (D10) is almost eight times that of the lowest investor protection decile (D1). Third, the book-to-market ratios are significantly lower in the weakest investor protection portfolio (D1) compared to the high investor protection portfolio (D10), while momentum is higher in the weakest deciles (D1) compared to the strongest (D10). Fourthly, there are statistically significant differences between the highest and the lowest investor protection deciles in terms of liquidity, size, traded volume, price rigidity and price. In the overall universe (panel 1) liquidity is much lower, as shown by the high values of the Liu (2006) metric and price rigidity higher, as shown by the high proportion of daily zero returns per month in the lowest investor protection decile (D1 versus D10). These differences are statistically significant ($p \leq 0.005$). In both the overall (panel 1) and US only (panel 2) universes, stock size and price is lower in the weakest investor protection decile (D1) than in the strongest (D10). These differences are also statistically significant ($p \leq 0.005$).

These findings fit the theory with respect to low investor protection, that is, where there are weaker minority shareholder rights the stock market plays a less important role in the economy compared to high investor protection environments (La Porta et al, 1997, 1998). The lower price associated with lower investor protection deciles supports the view that poorer investor protection and the greater likelihood of insider or controlling shareholder expropriation of minorities, leads to lower prices (La Porta et al, 1999, 2000). Finally, there is an inverse relationship between the overall (panel 2) and the US only (panel 3) universes with respect to traded volume. In the overall universe, the volume of shares traded in the weakest investor protection decile (D1) is far greater (1,886m shares) than that in the strongest decile (D10) (48.97m shares). This difference is statistically significant ($p \leq 0.005$). However, the opposite relationship is found in the US only universe. Here, the weakest investor protection decile has the lowest traded volume (94.89m shares) and the strongest has the highest volume (182.78m shares). This latter relationship is also statistically significant ($p \leq 0.005$) and supports the view of a relationship between the quality of investor protection to the size, development and activity of external financial markets (La Porta et al, 1997, 1998).

5. Results

5.1 Time-invariant empirical results

Our two-factor CAPM augmented with the new investor protection factor to account for institutional differences across international markets and the comparisons with existing models are in Appendix C, Table 1C. These are the CAPM, the Fama and French three factor model (FF3F), the Carhart four factor model, that is, the FF3F model augmented with an additional momentum factor (Carhart 4F) and the Liu liquidity two factor model (Liquidity 2F). All models are estimated using time series OLS, following Black, Jensen and Scholes (1972), Fama and French (1993), Pastor and Stambaugh (2003) and Liu (2006). The expectation is that the Jensen alpha should not be statistically different from zero, given the relationship between an individual portfolio's expected returns and the market (Markowitz 1959)[7].

The estimation results of the augmented CAPM models on the equally-weighted ten investor protection decile portfolios and the equally-weighted and value-weighted FMP using D1 - D10 are reported in Table 4. These are given for all four universes: World overall, developed, emerging and US in panels 1 to 4 respectively. A general finding for all ten investor protection deciles (D1 to D10) in all models (the CAPM, FF3F, Carhart 4F, Liquidity 2F and the new Investor Protection 2F) is that the adjusted-R^2 increases by between 1% to 5% in the Investor Protection 2F model (see panel E) compared to all other models in each of the universes. However, the strongest support for the new Investor Protection 2F model is the reduced statistical significance of the alpha terms for all decile portfolios relative to the other models in the four market universes. A final characteristic of the Investor Protection 2F models is the sign on the investor protection FMP coefficient. Common to the four universes is the positive, large and statistically significant coefficient in the weakest investor protection deciles (D1) that becomes negative in the strongest (D10). This sign reversal is expected and reflects the premium associated with stocks in weak minority shareholder protection environments that is absent for stocks in strong investor protection environments. Given our new metric is the product of free float (inverse of block holding) and institutional quality, this is at its highest values when block holding is minimal (i.e. fully diversified ownership) and where institutional quality is high. So the negative coefficients infer a progressive trend towards a discount on a "dispersed ownership" governance model within high institutional quality contexts (i.e. that of Berle and Means (1932) and with optimal protection of the institutional environment that supports a third party contracting and external governance model. In such high institutional quality contexts, third party contracting is supported and minority shareholder rights are better enforced and protected. Therefore, uncertainties about the true intentions of block shareholders (e.g. from their elevated potential for expropriation) are mitigated. The presence of a premium in lower "Investor protection" deciles represents both weakness in the external contracting environment and higher uncertainties with respect to block holder intentions regarding appropriation, which occur within governance structures dominated by large block entities.

The last two columns of Table 4 show the results of the estimation of the various pricing models to the zero-cost portfolios formed from the returns difference between low investor protection

[7] One caveat is that the sample includes developed and emerging markets and this may be problematic where there is inactive trading (Dimson, 1979: Dimson and Marsh, 1983). Their proposed trading inactivity correction is noted but not used here in favour of the recent literature such as Liu (2006), Pastor and Stambaugh (2003). A further limitation to the use of standard OLS time series has been noted in the recent literature on CAPM beta instability that results from structural breaks in the underlying data generating process (see Bollerslev and Zhang, 2003; Braun et al, 1995; Lettau and Ledvigson, 2001). Thus, we also examine time-varying parameter CAPM models explained in the next section.

(D1) and high investor protection (D10) portfolios. This is the returns generated from a strategy of buying stocks in low investor protection firms and selling those where shareholder rights are protected. Estimation results for the CAPM, FF3F, Carhart 4F and Liquidity 2F models show the regression alpha can be viewed as the *abnormal return* that cannot be attributed to any of the included FMPs. Gompers et al (2003) describe these as "…the return in excess of what could have been achieved by passive investments in any of the factors" (p. 122).

Following Gompers, we include both equal and value-weighted returns difference portfolios (see the final two columns). For the World overall universe (panel 1) we find a persistent abnormal return in terms of a statistically significant alpha ($p \leq 0.05$) in all models applied to the value-weighted difference portfolio. This abnormal return ranges from +0.4 basis points per month in the CAPM to -0.8 basis points per month in the Liquidity 2F model. However, evidence to support an abnormal return attributable to investor protection is not so clear in the equal-weighted portfolio. Here, the alpha in the FF3F model and the Liquidity 2F model are statistically significant ($p \leq 0.05$), while in the CAPM and the Carhart 4F model it is statistically insignificant. This suggests that for these models, the investment styles are sufficient to capture differences in the cross section. This mixed evidence is also found in the US only universe (panel 4) where the alphas associated with value-weighted difference portfolios and the CAPM and Liquidity 2F model are statistically significant ($p \leq 0.05$). However, the alphas in the FF3F and Carhart 4F model are not statistically significant. Similarly, with respect to the equal weighted difference portfolio, the alphas associated with FF3F and Carhart 4F models are statistically significant ($p \leq 0.05$) whereas alphas in the CAPM and Liquidity 2F models are not. However it should be noted that the variance of value-weighted portfolios is largely reflective of a handful of large stocks that overwhelmingly dominate the portfolio simply because of their relative size. In contrast, equal-weighted portfolios variances are more reflective of the broader cross section of stocks constituent to the portfolio.

Finally, the strongest support for the investor protection FMP and the two-factor model is found when comparing the developed and emerging universes (Panels 2 and 3 respectively). In Panel 2, all alphas for all models, across both equal and value weighted returns difference portfolios, are statistically significant ($p \leq 0.01$), with abnormal returns ranging from -0.3 basis points to -0.8 basis points per month. However, in Panel 3, all alphas are statistically insignificant. This reflects the limitation of the new Investor Protection 2F model in universes where its applicability is contingent on a genuine diversification of ownership types, as in developed economy compared to emerging economy universes that are largely dominated by ownership types that accentuate control rights in excess of cash flow rights.

In summary the evidence so far points to the maintenance of proposition 1 that a premium exists for investor protection, where this is defined as the product of state institutional quality and proportion of free float. However, the evidence from the statistical significance of alphas and the explanatory power (adjusted-R^2) of models is more varied across the different universes. This implies weaker support for proposition 2 where other FMPs such as the size (SMB) and book-to-market (HML) and particularly Liquidity 2F (LIQ) are equally as good as Investor Protection 2F (IP) in explaining the cross section of stock returns. LIQ in particular is often equally as robust in explaining the cross section of stock returns as our IP measure. However, this is likely to be due to a large overlap in the nature of transactions costs captured by both measures. This limitation underscores the importance of considering the specific *type* of blockholder rather than simply a generic designation of block ownership that typically assumes cash flow ownership concentration. Consideration of ownership types is reported in Appendix D, Table 1D, together with some observations. One notable observation is the negligible presence of cross-shareholder networks as an ownership category in US stocks, while at the same time it is dominant across all deciles in the Emerging Markets universe. In contrast, within developed and overall universes, cross-shareholding networks tend to be concentrated in low investor protection deciles. This can explain the relative weakness of models in an Emerging Market context in contrast to all other universes.

Table 4

5.2 Time varying parameter empirical evidence

The final set of asset pricing tests is for the Kalman filter time-varying parameter coefficient models. We apply the Kalman filter estimation, which relies on the notion of state space to estimate the conditional constant term and market beta of the investor protection augmented CAPM, as well as of the comparison models[8]. The Kalman filter estimation allows the relaxation of assumptions on data generating processes and a stochastic time trend accounts for structural breaks. This is preferred to formal switching-regression models as it is not necessary to define the exact point of the switch. This is particularly important in the present study as although the timing of changes is known, the exact date of implementation is not, particularly with respect to changes in formal institutions and regulatory environments. A further benefit of Kalman filter estimation is that it is less demanding of the data compared with Markov-switching models that are generally incompatible with short sample periods (see Grout and Zalewska, 2006). The process consists of an observation equation and a transition or

[8]Applications of this method include Grout and Zalewska (2006), who examine the effects of regulation on UK and US stocks, and Brooks et al. (1998) who investigate Australian industry portfolios. This approach is appropriate to the measurement of time evolving risk premiums for market and investor protection factors (Grout and Zaleswska, (2006)

state equation, which in combination express the structure and dynamics of a time varying system. A state space model is specified where an observation at time *t* is a linear combination of a set of state variables that compose the state vector. The time-varying parameter coefficient models of the Investor Protection 2F augmented CAPM and our comparison models are outlined in Appendix C, Table 1C.

The results are reported in Table 5. The four test assets are the ten size and book-to-market decile portfolios, the ten decile investor protection sorted portfolios and a collection of equally-weighted individual market portfolios that form each of the four universes. These provide a diverse range of test assets to assess the efficiency of our models.

In general, maximum likelihood statistical convergence is achieved on average for 60% of the five models applied to the four sets of test assets in each universe. Model selection is based on two sets of statistics: information criteria (Schwarz-Bayesian Criterion, SBC; Hannan-Quinn Criterion, HQC; and Akaike Information Criterion, AIC), and the time series profile of the alpha across models.

Panel 1 (World overall universe) shows that the Investor Protection 2F model has the lowest values for decile size and investor protection test assets and outperforms all other models in terms of the three information criteria. However, the FF3F model is preferred in decile book-to-market test assets, while the Carhart 4F model is preferred in country portfolios. In the developed markets universe (panel 2) asset pricing tests using decile book-to-market and investor protection test assets favour the Investor Protection 2F model, while both decile size and country test assets favour the Carhart 4F model. In the emerging markets universe (panel 3) the FF3F model is favoured over decile size, book-to-market and investor protection test assets while the Liquidity 2F model is only superior in the country portfolios context. Finally, in the US only universe (panel 4) the Carhart 4F model is superior across all test assets, with the exception of the investor protection deciles where the Investor Protection 2F model is optimal.

In summary, these time-varying parameter results provide support for the efficiency of the Investor Protection 2F model across the overall and developed market universes and a range of test assets. This is supportive of both propositions 1 and 2. However, there is no support in the emerging markets universe context. In the US only universe there is considerable support for the Carhart 4F model, similar to the findings of Jegadeesh and Titman (1993) and Lesmond et al (2004), although the latter questions the benefits of momentum as a factor because transactions costs in the market inhibit such a strategy in practice. This implies that consideration of the context of ownership *types* prevalent to different universes is an important and hitherto overlooked issue in the majority of the asset pricing literature (see Appendix D, Table 1D). It is noted that in the investor protection decile test assets the alpha is smallest and the share of standard errors that are below zero are highest for the Investor

Protection 2F model. This provides some evidence of the benefits of the investor protection FMP in explaining the cross section of stock returns, even though in this single country setting the factor is solely related to the degree of controlling block shareholding.

Table 5

6. Robustness Tests.

We test the robustness of our results by considering another proxy for institutional quality, namely the Legal Structure and Security of Property Rights Index of Gwartney and Lawson (2007) - thereafter GL[9]. This index captures the dimensions of institutional quality that relate specifically to protection and enforcement of property rights associated with economic and financial stakeholders and particularly those associated with minority outside investors. We re-estimate all our main models using the GL index.[10] The results are not reported here but are available online.[11] The evidence provides even stronger support for our main analysis that used the broader Kaufman et al (2009) World Governance index.

We first calculate the FMP summary statistics for the aggregate World market universe, and provide details of the nationality of stocks sorted into each of the decile IP portfolios over time.[12] The distribution of stocks is on the whole similar to our main results in Table 3, providing reassurance for the robustness of our stock sorting process and models, with one difference. There is a much less sharply defined division between "Developed" and "Emerging" countries as evidenced by the relatively even dispersion of Scandinavian stocks across all ten IP decile portfolios, and the more even dispersion of stocks in both developed and emerging categories across all ten decile portfolios when using the GL index. This contrasts with the more polarized dispersion evident from using the Kaufman World Governance index in our main analysis.

We then present the estimation results from the time invariant CAPM, FF3F, Carhart 4F, Liquidity 2F and our Investor Protection 2F models, for each of the three universes, namely world overall, world developed and world emerging markets.[13] These universes are those susceptible to institutional change and differences between national institutional frameworks that is picked up in our IP measure. The US only universe is the same as in our main results as being a single country the IP measure in effect becomes a metric built on proportion free-float capitalization of stocks. The results provide substantial support for those obtained in our main analysis when using the Kaufman World

[9] We are grateful to the anonymous referee for suggesting this alternative proxy for institutional quality.
[10] Index values can be obtained from the authors' website: http://www.freetheworld.com/
[11] The tables can be accessed in Appendix E of the SSRN version of the paper.
[12] see Appendix E, Table 1E on the online version.
[13] See Appendix E, Table 2E on the online version.

Governance index. In particular, there is consistent support in all three universes, including the Emerging Markets universe and confirms the superiority of our new IP2F model over comparable FF3F, Carhart 4F and Liquidity 2F configurations. This is evident in terms of higher adjusted R^2 and low regression Jensen alphas in both in terms absolute size and negligible statistical significance. However, the strongest support for our new IP measure is in the farthest two right hand columns that outline the results from testing all other factor models that explain the variance of equal and value weighted IP portfolios. In all cases the regression Jensen alphas are large and statistically significant.

Results from the application of time varying parameter models also provide further significant support for our IP2F model.[14] Here the IP2F model outperforms all other time-varying parameter models (based on CAPM, FF3F, Carhart 4F, Liquidity 2F and IP2F) in terms of informational criteria (SBC, AIC, HQC). This is also substantiated by the high proportions of models that attain maximum likelihood convergence, for example, over 70% for our new IP2F model. These time varying results are notably better than those reported in Table 5 of the main analysis.

7. Conclusions

The level of protection given to minority investors is a critical factor in the determination of agency costs within the firm and emphasises the size, scale and development of external capital markets. The welfare of minority investors can be affected by both the quality of the institutional environment and the groups of insiders within the firm. Insiders range from managerial agents in the traditional Berle and Means (1932) model of ownership diversification to large controlling block holders. Thus, the ownership structures of firms can vary from a model of dispersed shareholdings to one of block holders that exercise their control by enhanced voting rights with respect to cash flow entitlements.

We propose a new governance measure of investor protection that is the product of national institutional quality and the proportion of free float shares to capture the impact of controlling block holders. Extensive tests of variants of the augmented-CAPM, including time-varying parameter Kalman filter methods, show that a two factor CAPM augmented with a factor mimicking portfolio based on our new investor protection metric yields the highest explanatory power for a cross section of stock returns. This is particularly the case in markets that exhibit a true variation in ownership types, that is, a combination of dispersed shareholdings and control and controlling block holder structures such as pyramids and cross-shareholding networks. This two-factor CAPM based on this new investor protection metric performs well in the overall and developed market universes, and to a lesser extent, the US only market universe. However, it lacks strength in emerging markets where there is little

[14] See Appendix E, Table 3E on the online version.

variation in ownership type due to the dominance of pyramids and cross-shareholding networks across all levels of investor protection. This evidence supports our initial propositions. Differences in investor protection impact on investor welfare and this is particularly prevalent in markets characterised by marked variation in ownership and control structures. Thus, in this context our new measure and its associated pricing model work well where there is a genuine range in the mechanisms designed to effect the separation of ownership from control, where this may result from dispersed shareholdings or accentuated control structures such as pyramids and cross-shareholding networks.

In general, our results indicate variations in abnormal returns on portfolios that reflect returns differences between low and high investor protection sorted deciles not explained by existing augmented CAPMs. These abnormal returns range from 0.4 basis points per month (4.91% per annum) for equal weighted to over -0.8 basis points per month (-10% per annum) for value weighted portfolios. This confirms the importance of differences in investor protection in multi-country studies, particularly those drawn from developed countries. This is important to minority investors that seek a premium to compensate for potential welfare losses and a means of hedging these losses within a conventional asset pricing framework.

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Table 1 Summary of ownership, free float and investor protection statistics

This table reports summary statistics for the sample markets. The start date reflects beginning of data reporting for stocks in each market in Datastream, the number is the stocks in the respective blue chip index used. National blue chip indices and their Datastream codes are in Appendix B Table 1B. Datastream reports the free float proportions (%). Institutional quality is reported on a 0-1 scale, where this is the average of the rescaled six underlying World Governance indicators (Democratic voice and accountability; Political stability and absence from violence; Government Effectiveness; Regulatory quality; Rule of law; and Control of corruption). Indicators from Kaufmann et al. (2009) "Governance Matters VIII: Governance Indicators for 1996-2008". World Bank Policy Research June 2009. These are downloadable from http://www.govindicators.org. The new investor protection metric is based on a stock-by-stock basis and is the product of free float proportion and country-level aggregate institutional quality, in units of 0 – 10,000. Descriptive statistics for trading and liquidity measures use Datastream for the daily prices, volume, market capitalization and free float information. Monthly returns are the average returns of each stock over a monthly interval. Market capitalization is measured at 1 January for each country and is the equity market value for each firm in billions of US$. The US$ market capitalization is measured at the end of month exchange rate for each country and each month. The book to market value ratio is the inverse of the Datastream price-to-book value, for each stock. Momentum is the time series average of the percentage cumulative return for each stock over the prior six months, omitting the most recent month, and is monthly, following Jegadeesh and Titman (1993). The Liu (1 year) metric is the liquidity measure of Liu (2006) estimated over a prior 1 year ranking period. Square brackets indicate median values. Developed and emerging markets are distinguished using the MSCI classification system. This is reported in Appendix A Table 2A.

Country	Start date	No. stock	Investor protection metrics			Trading and liquidity descriptive statistics				
			Investor Protection (0 – 10,000)	Institutional quality (0 - 1)	Free-Float (%)	Monthly returns (%)	Market Cap. (US$, billions)	Book to Market Ratio	Momentum (%)	Liu (1 year)
North America										
Canada	2001/01	251	7,196.34 [7,879.87]	0.9128	78.91 [87.00]	2.22 [1.72]	3.96 [1.23]	0.85 [0.56]	13.46 [6.07]	18.16 [9.61]
US Nasdaq 100	2001/01	103	5,760.83 [7,055.84]	0.8401	68.45 [84.00]	1.85 [1.61]	20.34 [6.92]	0.35 [0.25]	28.89 [7.13]	11.81 [8.68]
US S&P 500	2001/01	502	6,032.95 [6,876.88]	0.8401	72.02 [82.08]	1.44 [1.42]	26.73 [8.56]	0.46 [0.36]	8.09 [6.46]	13.63 [8.68]
Europe Developed										
France	2001/01	60	5,722.79 [6,044.13]	0.8200	69.47 [73.50]	1.00 [0.93]	20.40 [9.52]	0.66 [0.55]	5.35 [5.02]	7.16 [5.79]
Germany	2001/01	100	4,875.71 [5,351.92]	0.8803	55.31 [59.00]	0.86 [0.32]	10.44 [2.68]	2.29 [0.55]	4.67 [2.35]	20.80 [6.76]
Austria	2001/01	53	3,962.46 [3,686.39]	0.9041	43.69 [40.00]	0.79 [0.35]	1.41 [0.55]	1.67 [0.63]	4.58 [1.98]	43.45 [13.46]
Belgium	2001/01	137	4,398.75 [4,144.46]	0.8464	51.99 [49.50]	1.18 [0.55]	5.06 [0.24]	1.01 [0.79]	5.39 [2.92]	42.92 [5.79]
Ireland	2001/01	47	6,054.88 [6,166.87]	0.8837	68.15 [68.95]	1.58 [0.74]	2.69 [0.30]	0.87 [0.55]	10.12 [5.38]	76.92 [18.27]
Italy	2001/01	74	2,949.45 [2,722.45]	0.6819	43.11 [40.50]	0.70 [0.28]	0.30 [0.14]	0.69 [0.67]	4.42 [1.58]	16.92 [7.72]
Netherlands	2001/01	140	5,575.54 [5,758.56]	0.9349	59.62 [63.00]	0.73 [0.33]	4.01 [0.34]	2.09 [0.54]	4.01 [0.90]	30.17 [5.79]
Portugal	2001/01	47	3,104.99 [2,891.18]	0.7846	39.45 [37.00]	0.57 [-0.15]	1.36 [0.20]	0.84 [0.65]	2.83 [-0.29]	35.86 [5.79]
Spain	2001/01	108	4,144.68 [3,638.23]	0.7688	53.84 [50.00]	0.99 [0.91]	5.64 [0.80]	0.71 [0.61]	6.32 [5.67]	17.76 [6.78]
Switzerland	2001/01	100	6,084.24 [6,357.71]	0.9425	64.65 [68.00]	1.29 [1.13]	7.94 [1.76]	0.67 [0.51]	7.84 [6.47]	13.55 [9.61]
UK	2001/01	101	3,742.75 [4,764.91]	0.8745	71.48 [87.33]	1.21 [1.28]	25.77 [9.12]	0.54 [0.42]	12.23 [6.41]	10.34 [7.72]
Scandinavia										
Denmark	2001/01	150	5,771.32 [5,889.03]	0.9638	59.69 [60.00]	1.19 [0.56]	0.97 [0.07]	0.99 [0.91]	7.14 [5.63]	65.41 [22.20]
Finland	2001/01	131	5,930.01 [6,267.42]	0.9760	60.61 [65.00]	1.01 [0.54]	1.99 [0.22]	0.73 [0.64]	4.63 [3.33]	35.95 [10.62]
Norway	2001/01	18	7,689.36 [7,873.21]	0.9335	82.13 [84.00]	1.01 [1.31]	0.11 [0.04]	1.20 [0.97]	3.65 [3.35]	101.68 [100.41]
Sweden	2001/01	71	6,708.69 [7,094.88]	0.9480	70.73 [75.50]	1.63 [1.40]	8.52 [2.12]	0.68 [0.56]	9.97 [6.10]	14.34 [9.65]

Country	Start date	No. stock	Investor protection metrics			Trading and liquidity descriptive statistics				
			Investor Protection (0 – 10,000)	Institutional quality (0 - 1)	Free-Float (%)	Monthly returns (%)	Market Cap. (US$, billions)	Book to Market Ratio	Momentum (%)	Liu (1 year)
Europe Emerging										
Czech Rep.	2001/01	24	2,667.19 [2,314.77]	0.7257	36.71 [31.00]	1.56 [0.63]	2.84 [0.39]	1.32 [1.01]	9.22 [5.70]	62.87 [9.69]
Hungary	2001/01	14	4,080.88 [4,235.15]	0.7282	55.41 [56.00]	0.66 [0.00]	1.68 [0.17]	0.94 [0.95]	4.52 [1.53]	17.35 [10.66]
Poland	2001/01	20	3,511.79 [3,402.60]	0.6930	50.95 [50.00]	1.89 [1.50]	4.23 [3.25]	0.71 [0.64]	11.86 [6.71]	20.03 [9.65]
Russia MICEX	2001/01	50	1,810.61 [1,822.76]	0.3665	48.89 [45.50]	2.53 [2.41]	10.72 [2.63]	1.11 [0.81]	17.34 [8.80]	40.50 [13.94]
Russia RTS	2001/01	50	1,811.80 [1,822.76]	0.3665	48.92 [45.50]	2.53 [2.41]	10.70 [2.68]	1.10 [0.80]	17.31 [8.80]	40.50 [13.94]
Greece	2001/01	60	3,668.95 [3,528.02]	0.6697	53.69 [48.50]	0.40 [-0.24]	2.59 [0.25]	1.12 [0.77]	3.37 [-1.91]	16.51 [10.62]
MEA Developed										
Israel	2001/01	101	2,906.21 [2,466.07]	0.6744	43.30 [36.50]	1.62 [0.81]	1.14 [0.30]	0.78 [0.67]	9.30 [3.87]	35.76 [15.44]
MEA Emerging										
Egypt	2001/01	43	1,879.35 [1,709.68]	0.4100	45.32 [40.50]	2.35 [0.00]	0.60 [0.26]	1.06 [0.67]	17.98 [0.00]	48.88 [18.41]
South Africa	2001/01	42	3,703.93 [4,236.71]	0.6113	59.67 [69.52]	1.66 [1.16]	9.72 [4.18]	0.46 [0.42]	8.94 [7.32]	16.49 [10.62]
Qatar	2005/01	35	4,375.73 [5,007.71]	0.6559	65.16 [73.50]	2.28 [0.51]	2.19 [0.71]	0.62 [0.52]	11.33 [4.52]	41.57 [11.58]
Turkey	2001/01	100	2,036.32 [1,835.36]	0.5148	39.40 [35.00]	1.94 [1.06]	1.13 [0.18]	0.96 [0.73]	9.96 [5.25]	13.77 [9.65]
UAE (Abu Dhabi)	2004/01	50	3,288.92 [3,110.53]	0.6484	50.55 [48.00]	2.01 [0.15]	1.98 [0.73]	0.88 [0.68]	13.08 [3.60]	91.03 [23.08]
UAE (Dubai)	2004/01	57	3,313.85 [3,249.09]	0.6484	50.78 [50.50]	2.06 [0.00]	1.40 [0.31]	0.88 [0.75]	14.34 [0.00]	115.37 [71.44]
Australasia										
Australia	2001/01	200	6,482.94 [6,812.24]	0.9093	71.18 [76.92]	2.08 [2.09]	4.61 [1.29]	0.63 [0.55]	13.81 [5.91]	19.84 [7.72]
New Zealand	2001/01	50	6,536.82 [6,983.26]	0.9468	68.91 [75.00]	1.67 [1.43]	2.69 [0.43]	0.70 [0.66]	8.51 [7.14]	26.63 [9.65]
Asia Developed										
Japan	2001/01	150	6,850.25 [7,419.83]	0.8082	84.60 [90.25]	0.67 [0.05]	12.92 [8.01]	0.72 [0.65]	3.43 [0.09]	15.66 [14.53]
Singapore	2001/01	183	4,376.33 [3,929.16]	0.8770	49.95 [45.00]	1.58 [0.46]	1.52 [0.22]	1.02 [0.84]	9.82 [3.10]	39.20 [11.58]
Hong Kong	2001/01	200	4,194.32 [4,082.58]	0.8489	49.01 [47.00]	1.93 [0.36]	69.76 [0.62]	1.29 [0.94]	12.84 [0.23]	33.25 [14.53]
Asia Emerging										
China (Shanghai)	2001/01	180	1,966.62 [1,868.35]	0.4079	47.87 [46.00]	1.78 [0.53]	5.36 [0.55]	0.39 [0.33]	11.53 [0.00]	34.09 [21.24]
China (Shenzhen)	2001/01	100	2,122.45 [2,015.14]	0.4079	51.78 [50.00]	2.11 [1.08]	1.63 [0.71]	0.38 [0.36]	13.91 [0.00]	33.12 [21.64]
India (Bombay)	2001/01	100	2,766.40 [3,459.25]	0.4786	57.18 [72.00]	2.51 [1.59]	4.28 [1.66]	0.68 [0.46]	16.23 [8.48]	16.29 [11.58]
Indonesia	2001/01	45	1,550.49 [1,510.01]	0.3983	38.57 [35.00]	2.42 [0.00]	3.75 [0.70]	0.72 [0.38]	13.94 [5.88]	36.05 [17.44]
Malaysia	2001/01	102	3,288.17 [3,038.40]	0.6140	52.84 [48.05]	1.03 [0.36]	1.48 [0.32]	0.83 [0.92]	4.40 [1.52]	23.29 [14.53]
Philippines	2001/01	30	1,722.02 [1,491.18]	0.4373	39.38 [34.00]	2.17 [1.28]	2.69 [0.76]	1.14 [0.64]	15.08 [8.25]	42.22 [16.41]
South Korea	2001/01	100	4,417.40 [4,495.76]	0.6980	63.04 [64.00]	2.11 [0.00]	5.71 [2.82]	1.14 [0.91]	12.49 [7.54]	16.70 [12.55]
Taiwan	2001/01	100	5,577.43 [5,869.43]	0.7396	75.16 [78.00]	2.72 [0.42]	3.26 [1.20]	0.74 [0.65]	7.58 [3.57]	15.80 [12.60]
Thailand	2001/01	100	2,893.84 [2,844.15]	0.5136	56.26 [58.00]	2.53 [1.17]	1.43 [0.34]	0.30 [0.63]	15.99 [3.95]	23.86 [15.44]
Latin America										
Brazil	2001/01	99	3,126.90 [3,053.76]	0.5453	57.22 [56.02]	2.25 [1.17]	4.53 [1.15]	0.90 [0.61]	13.67 [7.24]	35.72 [12.55]
Chile	2001/01	40	2,875.46 [2,917.49]	0.8088	35.41 [35.18]	1.39 [0.45]	2.94 [1.34]	0.99 [0.59]	7.68 [0.22]	31.35 [11.63]

Country	Start date	No. stock	Investor protection metrics			Trading and liquidity descriptive statistics				
			Investor Protection (0 – 10,000)	**Institutional quality (0 - 1)**	**Free-Float (%)**	**Monthly returns (%)**	**Market Cap. (US$, billions)**	**Book to Market Ratio**	**Momentum (%)**	**Liu (1 year)**
Colombia	2001/01	63	1,680.02 [1,433.91]	0.4310	38.99 [32.00]	2.55 [0.00]	13.77 [0.23]	3.55 [1.05]	13.12 [0.95]	137.94 [131.77]
Mexico	2001/01	60	3,078.55 [3,925.20]	0.5167	59.23 [74.00]	1.89 [1.45]	3.18 [0.98]	1.11 [0.62]	11.95 [5.78]	49.27 [9.65]
Peru	2001/01	15	2,212.82 [2,484.94]	0.4649	47.71 [54.00]	2.28 [0.56]	1.38 [0.36]	1.79 [0.66]	16.62 [7.00]	44.24 [18.41]
MSCI Developed		3077	5,456.63 [6,039.94]	0.8678	63.61 [71.25]	1.35 [0.99]	12.32 [1.46]	0.87 [0.56]	3.48 [0.48]	30.49 [9.65]
US only		605	6,011.84 [6,850.84]	0.5579	71.77 [82.00]	1.54 [1.44]	25.86 [8.51]	0.44 [0.34]	10.95 [6.83]	14.48 [8.68]
MSCI Emerging		1679	2,868.91 [2,603.97]	0.7182	51.35 [49.00]	1.76 [0.62]	4.62 [1.02]	0.82 [0.58]	10.43 [3.09]	40.35 [14.48]
Overall		4756	4,565.64 [4,621.74]	0.9128	59.41 [63.06]	1.49 [0.88]	9.61 [1.23]	0.85 [0.56]	9.43 [4.34]	33.97 [11.58]

Table 2 Factor mimicking portfolio summary statistics – for aggregate World market universe

This table reports the descriptive statistics, autocorrelations (at 1, 6 and 12 lags) for returns-based valuation factors including the Market, the Fama and French (1993) size (SMB) and book to market value (HML), the Jegadeesh and Titman (1993) momentum factor and the Liu (2006) liquidity factor used to explain cross section of stock returns across the market universe. The market universe in this case is the aggregate world and is equal-weighted. All factors are obtained from equal-weighted portfolios while the FF size (SMB) and book-to-market value (HML) factors are value-weighted. Summary statistics are also reported, with t-difference in means, for the highest and lowest liquidity sorted portfolios (used to create the liquidity-based valuation factor). These are based on stock returns, book-to-market value, size (market capitalization US$), stock price, traded volume, monthly bid-ask spread and monthly percentage daily volatility in daily stock returns. Liquidity portfolios D1 and D10 are formed from annual rebalancing. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively

Panel 1: Descriptive statistics	**Market**	**SMB**	**HML**	**Liquidity (1 year)**	**Liquidity (1 Month)**	**Momentum**	**Investor Protection (1 year)**	**Investor Protection (1 Month)**
	Equal weight	Value weight	Value weight	Equal weight	Equal weight	Equal weight	Equal weight	Equal weight
Mean (%)	1.213%	-2.388%	-0.502%	1.012%	1.039%	0.790%	0.277%	0.248%
t-statistic	2.85	-7.14	-1.73	3.73	3.84	1.83	2.36	2.28
Standard Deviation (%)	5.446%	4.279%	3.687%	3.469%	3.463%	5.546%	2.592%	2.574%
Skewness	-0.88	-0.04	0.35	-0.39	-0.43	-2.01	0.01	-0.01
Kurtosis	6.77	4.13	9.12	3.80	3.88	10.47	2.55	2.44
Jarque-Bera statistic	118.09 (0)	8.80 (0)	259.12 (0)	8.51 (0)	10.34 (0)	491.78 (0)	1.39 (0)	2.18 (0)
Number of months	164	164	164	164	164	164	164	164
Panel 2: Pearson correlations								
Market	1.0000							
SMB	-0.2206**	1.0000						
HML (Book to Market value)	-0.3307**	-0.0414	1.0000					
Liquidity (1 Year Rebalance)	-0.5332**	-0.3104**	0.2681**	1.0000				
Liquidity (1 Month Rebalance)	-0.5671**	-0.2661**	0.2696**	0.9780**	1.0000			
Momentum	-0.3273**	-0.2075**	0.0008	0.4674**	0.4673**	1.0000		
Investor Protection (1 Year Rebalance)	-0.3290**	-0.1521*	0.2308**	0.5208**	0.5406**	0.1347*	1.0000	
Investor Protection (1 Month Rebalance)	-0.3035**	-0.1530*	0.2257**	0.5047**	0.5223**	0.1320*	0.9944**	1.0000
Panel 3: Autocorrelations								
1-Lag	0.271	0.140	0.098	-0.002	-0.007	0.310	0.048	0.069
6-Lags	-0.101	-0.142	-0.012	0.006	0.010	-0.028	-0.087	-0.089
12-Lags	-0.019	-0.046	0.140	0.076	0.097	0.016	0.071	0.081

Table 3 Factor mimicking portfolio summary statistics – for aggregate World market and US only universes

This table reports the stock counts by country and ownership descriptive statistics for all ten decile sorted investor protection portfolios (D1 – D10). The first is a breakdown of stock counts per portfolio with respect to legal origin of their listing market and is by German, French and Scandinavian civil code versus English common law classification, following La Porta et al (2008). Developed and emerging markets are distinguished using the MSCI classification system. The second reports the descriptive statistics for all ten decile sorted investor protection portfolios (D1 – D10), with panel 1 for the World overall and panel 2 for the US-only universes. These show summary statistics for several stock-characteristic variables per decile-sorted portfolio. These are returns (equally and value weighted decile portfolios), momentum, the Liu-liquidity metric, market capitalization (US$ billions), traded volume (US$ millions), the monthly proportion of daily zero returns (%), mean daily stock closing price (US$), Book-to-market value, free float proportion (%) and the investor protection metric. In the first column a t-difference in means statistical significance confidence level is provided for mean values in decile portfolio D1 in relation to the differences between these and D10. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
Panel 1: Stock count (#) – World market universe										
English common law	82.87	126.62	143.20	168.60	189.93	199.30	193.65	203.08	191.90	192.84
French civil code law	160.07	111.86	115.29	108.07	90.44	68.20	68.46	47.70	45.66	72.83
German civil code law	97.55	91.66	70.03	59.45	54.92	61.73	63.16	78.97	98.15	26.49
Scandinavian civil code law	7.61	10.49	13.41	23.23	26.68	31.17	39.02	40.59	39.32	85.63
English common law - Developed	34.70	83.09	100.57	126.43	146.26	163.74	180.99	201.40	191.90	192.84
English common law - Emerging	48.17	43.53	42.63	42.17	43.68	35.56	12.66	1.68	0.00	0.00
French civil code law - Developed	34.39	52.30	68.68	68.73	66.35	52.54	58.24	47.70	45.22	72.61
French civil code law - Emerging	125.68	59.56	46.62	39.34	24.09	15.66	10.21	0.00	0.44	0.22
German civil code law - Developed	26.68	7.76	10.90	17.23	18.88	18.41	23.41	46.59	91.12	26.49
German civil code law - Emerging	70.87	83.91	59.13	42.22	36.04	43.32	39.75	32.38	7.02	0.00
North America	3.21	18.17	28.73	45.80	50.10	65.70	115.97	145.66	151.33	118.82
Europe Developed	54.88	61.45	85.41	86.28	91.13	83.34	60.31	51.02	46.76	68.78
Scandinavia	7.61	10.49	13.41	23.23	26.68	31.17	39.02	40.59	39.32	85.63
Europe Emerging	36.39	28.12	17.95	16.46	11.85	9.49	6.51	5.78	4.32	0.00
Middle East & Africa Developed	17.59	19.02	11.76	9.80	6.88	5.85	4.90	2.56	0.00	0.00
Middle East & Africa Emerging	49.30	29.66	27.96	21.29	21.55	22.56	9.00	1.10	0.00	0.00
Australasia	1.71	2.78	5.44	7.22	14.10	16.85	26.73	28.56	25.51	55.44
Asia Developed	9.78	33.09	39.87	52.93	56.43	50.58	40.49	54.10	89.59	15.41
Asia Emerging	130.54	133.38	101.21	77.90	65.33	65.37	51.26	35.38	6.44	0.00
Latin America	37.57	17.66	22.20	15.05	11.37	9.80	4.02	0.00	0.00	0.00
MSCI Developed	103.38	153.63	193.57	235.63	258.16	265.86	301.67	336.27	367.55	377.57
MSCI Emerging	278.30	213.09	176.05	137.58	114.01	108.00	72.30	38.24	7.46	0.22
Total	387.27	378.46	378.52	378.67	378.73	378.64	378.66	378.53	378.75	377.79

Panel 2: Summary statistics – World market universe	**D1 (Low)**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal	Equal
Returns – equal weight, %	**1.73***	1.73	1.69	1.52	1.60	1.53	1.47	1.44	1.33	1.45
Returns – value weight, %	**1.37†**	1.11	1.13	0.70	0.98	0.77	0.64	0.42	0.80	0.72
Investor Protection metric	**1,121.41****	2,103.50	2,775.06	3,463.22	4,221.33	4,981.82	5,856.35	6,681.22	7,408.91	8,347.75
Free Float (%)	**22.62****	37.43	44.87	50.87	57.89	66.64	72.05	79.04	86.18	89.70
Momentum	**0.1085***	0.1090	0.1119	0.0941	0.0988	0.0913	0.0856	0.0894	0.0736	0.0839
Book to Market value ratio	**0.7003****	0.7435	0.8718	1.0349	0.8893	0.7753	0.7637	0.7969	0.7145	0.9729
Liu Liquidity (1 year)	**42.27****	28.63	27.72	24.93	21.13	19.23	18.16	15.90	16.52	20.61
Market Cap. (US$ billions)	**4.18****	3.48	4.03	4.99	6.72	10.71	12.45	22.46	16.15	9.63
Traded volume (shares millions)	**1,886.24****	142.85	120.12	131.96	88.49	91.72	79.50	85.44	105.89	48.97
Daily zero returns per month (%)	**33.42****	22.34	21.35	20.54	18.86	17.11	16.43	14.05	12.63	17.15
Price (mean month, US$)	**20.97****	16.21	19.93	24.74	41.68	37.92	37.27	43.29	40.21	73.51

Panel 3: Summary statistics – US only universe	**D1 (Low)**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**
Returns – equal weight (%)	1.66	1.50	1.41	1.53	1.26	1.34	1.27	1.22	1.14	1.24
Returns – value weight (%)	**1.09****	1.11	1.09	1.08	0.92	0.88	0.86	0.48	0.83	0.12
Investor Protection metric	**4,115.06****	4,967.98	5,354.03	5,652.81	5,923.72	6,166.08	6,384.66	6,615.00	6,859.81	7,277.17
Free Float (%)	**53.89****	62.09	66.27	69.12	72.46	74.76	76.98	79.45	81.92	85.82
Momentum	**0.0954†**	0.0863	0.0910	0.0935	0.0748	0.0785	0.0721	0.0644	0.0629	0.0724
Book to Market value ratio	**0.4028****	0.4043	0.4139	0.4457	0.4458	0.4231	0.4368	0.4337	0.5696	0.4786
Liu Liquidity (1 year)	9.13	9.12	9.12	9.12	9.12	9.12	9.12	9.12	9.12	9.19
Market Cap. (US$ billions)	**17.55****	12.36	11.79	10.55	13.58	15.37	43.83	56.65	42.38	40.05
Traded volume (shares millions)	**94.89****	91.07	83.54	89.63	85.23	106.26	160.75	172.43	207.43	182.78
Daily zero returns per month (%)	4.56	4.57	4.52	4.55	4.54	4.45	4.55	4.62	4.60	4.90
Price (mean month, US$)	**42.17****	41.18	42.75	42.27	41.20	41.93	46.71	50.08	43.89	47.75

Table 4 Empirical results for 10 investor protection (1 year rank and holding period) decile portfolios – for all universes

This table reports the beta coefficients for valuation factors with t-statistics, explanatory power (R^2) and standard errors for the Fama and French (1993) three factor model (size and book to market value), the Carhart (1997) four factor model (size, book to market value and momentum) and the Liu (2006) two factor liquidity model of Liu (2006) in modelling returns of 10 liquidity sorted quintile portfolios (single-pass stock sorting following Liu, 2006). 1y indicates annual rebalancing used in factor formation (as opposed to monthly rebalancing). D1 is the lowest illiquidity and D10 the highest. These portfolios are formed from annual rebalancing using the liquidity metric. 10 year US Treasury yield is used as the risk free rate. HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 5.0000). Numbers in square brackets are t-statistics. †, *, ** indicates significance at the 10%, 5%, and 1% levels respectively.

	D1 (Low)	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10 (High)**	**D1 - D10**	**D1 - D10**
Weighting:	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Equal**	**Value**
Panel 1: World market universe												
Panel 1A: CAPM												
Alpha (%)	0.003	0.002	0.001	-0.001	-0.003	-0.001	-0.001	-0.001	-0.001	-0.002	0.001	**0.004**
	[2.03]	[1.18]	[0.91]	[-1.10]	[-0.50]	[-1.17]	[-1.12]	[-0.54]	[-0.43]	[-1.66]	[0.53]	**[1.72]***
Beta: Market (excess return)	0.909	0.977	1.020	1.036	1.058	1.048	1.009	0.951	0.859	1.066	-0.156	-0.093
	[53.35]	[45.43]	[61.29]	[53.74]	[65.55]	[82.13]	[59.48]	[58.74]	[37.9]	[57.71]	[-5.16]	[-1.16]
Adjusted R^2	0.9129	0.9081	0.9591	0.9776	0.9782	0.9762	0.9661	0.9502	0.9091	0.9525	0.1020	0.0069
Panel 1B: FF3F												
Alpha (%)	0.001	0.001	0.001	-0.001	-0.001	-0.001	0.001	0.001	0.001	-0.001	**-0.002**	**-0.005**
	[0.32]	[0.22]	[0.55]	[-1.77]	[-0.88]	[-1.54]	[0.86]	[0.65]	[0.27]	[-1.36]	**[-1.75]***	**[-1.71]***
Beta: Market (excess return)	0.896	0.973	1.028	1.034	1.052	1.039	1.020	0.951	0.866	1.059	-0.161	-0.159
	[58.26]	[51.37]	[66.41]	[55.65]	[64.23]	[76.75]	[66.25]	[57.86]	[42.76]	[49.84]	[-5.08]	[-1.95]
Beta: SMB	-0.110	-0.080	-0.028	-0.030	-0.012	-0.013	0.083	0.065	0.046	0.025	-0.131	-0.399
	[-3.33]	[-1.65]	[-0.98]	[-1.91]	[-0.64]	[-0.62]	[3.39]	[2.28]	[1.33]	[0.68]	[-1.99]	[-5.07]
Beta: HML	0.024	0.045	0.057	0.017	-0.018	-0.027	-0.016	-0.048	-0.003	-0.052	0.079	0.016
	[0.62]	[0.92]	[1.44]	[1.01]	[-0.81]	[-1.18]	[-0.69]	[-1.52]	[-0.07]	[-1.32]	[1.07]	[0.11]
Adjusted R^2	0.9204	0.9118	0.9604	0.9780	0.9781	0.9762	0.9699	0.9537	0.9096	0.9533	0.1534	0.1371
Panel 1C: Carhart 4F												
Alpha (%)	0.001	0.002	0.001	-0.001	-0.001	-0.001	0.001	0.001	0.003	-0.002	-0.001	**-0.005**
	[0.30]	[0.18]	[0.52]	[-1.68]	[-0.77]	[-1.51]	[0.90]	[0.64]	[0.24]	[-1.42]	[-0.74]	**[-1.37] †**
Beta: Market (excess return)	0.900	0.983	1.031	1.030	1.038	1.030	1.012	0.955	0.875	1.069	-0.167	-0.104
	[42.57]	[32.32]	[49.50]	[49.56]	[72.97]	[69.67]	[54.11]	[49.38]	[34.29]	[44.23]	[-4.08]	[-0.98]
Beta: SMB	-0.106	-0.071	-0.026	-0.035	-0.025	-0.021	0.076	0.069	0.054	0.034	-0.137	-0.350
	[-3.11]	[-1.54]	[-0.82]	[-1.96]	[-1.21]	[-0.89]	[2.93]	[2.34]	[1.54]	[0.92]	[-2.05]	[-3.63]
Beta: HML	0.026	0.050	0.058	0.014	-0.025	-0.032	-0.021	-0.046	0.002	-0.047	0.076	0.045
	[0.65]	[1.04]	[1.48]	[0.83]	[-1.13]	[-1.41]	[-0.89]	[-1.40]	[0.04]	[-1.18]	[1.01]	[0.29]
Beta: Momentum	0.008	0.021	0.006	-0.011	-0.031	-0.020	-0.018	0.008	0.018	0.022	-0.014	0.120

	[0.36]	[0.60]	[0.20]	[-0.80]	[-1.98]	[-1.17]	[-1.16]	[0.41]	[0.72]	[0.85]	[-0.32]	[1.09]
Adjusted R^2	0.9199	0.9116	0.9602	0.9779	0.9786	0.9763	0.9700	0.9535	0.9094	0.9533	0.1488	0.1495
Panel 1D: Liquidity 2F(1y)												
Alpha (%)	-0.001	-0.001	-0.001	-0.001	0.001	0.001	0.001	0.001	0.001	-0.003	**-0.004**	**-0.008**
	[-0.68]	[-0.60]	[-0.16]	[-1.39]	[1.08]	[0.18]	[1.91]	[1.58]	[0.99]	[-0.32]	**[-1.93]***	**[-2.71]****
Beta: Market (excess return)	0.995	1.045	1.050	1.047	1.035	1.024	0.951	0.902	0.815	1.029	-0.034	0.204
	[38.93]	[30.82]	[52.07]	[44.28]	[52.45]	[70.87]	[87.17]	[55.31]	[31.85]	[44.83]	[-0.77]	[3.43]
Beta: Liquidity	0.251	0.200	0.088	0.033	-0.069	-0.069	-0.171	-0.143	-0.131	-0.109	0.358	0.875
	[7.48]	[4.52]	[2.43]	[1.14]	[-2.79]	[-2.58]	[-6.59]	[-4.13]	[-2.74]	[-3.25]	[6.58]	[8.64]
Adjusted R^2	0.9329	0.9186	0.9609	0.9778	0.9793	0.9773	0.9741	0.9562	0.9148	0.9551	0.2639	0.3354
Panel 1E: Investor Protection 2F(1y)												
Alpha (%)	0.001	-0.001	-0.001	-0.001	0.001	-0.003	1.36E-05	0.001	0.001	0.001	-- --	-- --
	[0.26]	[-0.66]	[-0.29]	[-1.23]	[0.15]	[-0.49]	[0.02]	[1.13]	[0.86]	[0.26]		
Beta: Market (excess return)	0.996	1.060	1.064	1.040	1.044	1.030	0.973	0.901	0.805	0.996	-- --	-- --
	[94.43]	[60.32]	[69.40]	[52.36]	[62.70]	[84.17]	[66.25]	[61.99]	[38.04]	[94.43]		
Beta: Investor Protect	0.555	0.530	0.280	0.024	-0.091	-0.114	-0.230	-0.319	-0.342	-0.445	-- --	-- --
	[25.56]	[10.64]	[8.58]	[0.88]	[-4.13]	[-3.77]	[-7.99]	[-9.77]	[-7.74]	[-20.52]		
Adjusted R^2	0.9817	0.9621	0.9736	0.9776	0.9795	0.9784	0.9762	0.9717	0.9381	0.9861	-- --	-- --
Panel 2: World developed markets universe												
Panel 2A: CAPM												
Alpha (%)	0.001	-0.001	-0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	**-0.003**	**-0.004**
	[0.40]	[-0.56]	[-0.64]	[-0.89]	[-0.42]	[0.21]	[0.14]	[0.30]	[0.38]	[0.19]	**[-1.84]***	**[-1.50] †**
Beta: Market (excess return)	0.904	1.087	1.042	1.028	1.026	0.989	0.960	0.894	0.960	1.095	-0.190	-0.106
	[48.45]	[67.29]	[50.59]	[109.97]	[85.61]	[67.43]	[72.42]	[42.96]	[58.89]	[60.61]	[-7.80]	[-2.10]
Adjusted R^2	0.9228	0.9571	0.9631	0.9816	0.9790	0.9666	0.9675	0.9359	0.9637	0.9606	0.1977	0.0402
Panel 2B: FF3F												
Alpha (%)	-0.002	-0.001	-0.002	0.001	0.001	0.002	0.001	0.001	0.001	-0.001	**-0.004**	**-0.008**
	[-1.14]	[-1.19]	[-1.88]	[-0.18]	[-0.10]	[2.34]	[0.98]	[0.61]	[1.41]	[-0.84]	**[-2.44]****	**[-2.81]****
Beta: Market (excess return)	0.872	1.075	1.019	1.032	1.036	1.015	0.967	0.903	0.971	1.088	-0.214	-0.153
	[46.93]	[55.17]	[58.16]	[104.01]	[74.81]	[56.00]	[75.57]	[46.31]	[54.79]	[53.73]	[-6.99]	[-3.08]
Beta: SMB	-0.099	-0.040	-0.056	0.018	0.008	0.086	0.040	0.022	0.049	-0.051	-0.044	-0.151
	[-2.91]	[-1.06]	[-2.15]	[0.99]	[0.49]	[4.12]	[1.73]	[0.70]	[1.87]	[-1.96]	[-0.82]	[-2.24]
Beta: HML	-0.060	-0.022	-0.061	0.002	0.040	0.039	-0.007	0.025	0.003	0.020	-0.077	-0.381
	[-1.70]	[-0.63]	[-2.71]	[0.12]	[1.55]	[1.41]	[-0.47]	[0.78]	[0.15]	[0.67]	[-1.73]	[-3.65]

Adjusted R^2	0.9294	0.9574	0.9653	0.9815	0.9793	0.9708	0.9681	0.9357	0.9646	0.9613	0.2061	0.1905
Panel 2C: Carhart 4F												
Alpha (%)	-0.001	-0.001	-0.002	0.001	0.001	0.002	0.001	0.001	0.001	-0.001	**-0.004**	**-0.008**
	[-1.10]	[-1.05]	[-1.62]	[-0.05]	[0.11]	[2.32]	[0.85]	[0.53]	[1.22]	[-0.99]	**[-2.24]***	**[-2.78]****
Beta: Market (excess return)	0.861	1.046	0.994	1.020	1.011	1.021	0.988	0.922	0.995	1.119	-0.256	-0.150
	[42.58]	[42.56]	[47.28]	[99.52]	[56.70]	[52.73]	[69.32]	[38.7]	[51.15]	[59.23]	[-8.00]	[-3.06]
Beta: SMB	-0.107	-0.060	-0.073	0.010	-0.008	0.090	0.054	0.035	0.066	-0.030	-0.072	-0.151
	[-3.09]	[-1.66]	[-2.71]	[0.57]	[-0.42]	[4.30]	[2.25]	[1.12]	[2.58]	[-1.22]	[-1.41]	[-2.23]
Beta: HML	-0.066	-0.038	-0.075	-0.005	0.026	0.043	0.005	0.036	0.017	0.037	-0.101	-0.379
	[-1.80]	[-1.14]	[-2.86]	[-0.30]	[1.08]	[1.51]	[0.27]	[1.04]	[0.98]	[1.29]	[-2.10]	[-3.71]
Beta: Momentum	-0.020	-0.054	-0.047	-0.022	-0.046	0.013	0.039	0.035	0.046	0.058	-0.078	0.008
	[-0.83]	[-2.02]	[-2.72]	[-1.89]	[-2.54]	[0.68]	[2.48]	[1.58]	[2.45]	[2.43]	[-2.07]	[0.14]
Adjusted R^2	0.9292	0.9588	0.9665	0.9817	0.9806	0.9707	0.9690	0.9363	0.9660	0.963	0.2254	0.1856
Panel 2D: Liquidity 2F (1y)												
Alpha (%)	-0.001	0.001	-0.001	0.001	0.001	0.001	0.001	0.001	0.001	-0.001	**-0.004**	**-0.003**
	[-0.82]	[-0.30]	[-1.27]	[-0.33]	[0.85]	[1.34]	[1.18]	[0.52]	[1.08]	[-0.49]	**[-2.20]***	**[-1.36] †**
Beta: Market (excess return)	0.940	1.081	1.059	1.022	1.005	0.968	0.940	0.887	0.943	1.112	-0.172	-0.085
	[49.02]	[42.08]	[43.28]	[78.44]	[82.11]	[66.12]	[55.84]	[37.21]	[45.09]	[55.32]	[-5.92]	[-2.04]
Beta: Liquidity	0.119	-0.021	0.055	-0.021	-0.071	-0.07 [-	-0.068	-0.022	-0.055	0.057	0.058	-0.034
	[2.45]	[-0.46]	[1.42]	[-0.86]	[-2.86]	1.79]	[-2.04]	[-0.51]	[-1.55]	[1.66]	[0.91]	[-0.44]
Adjusted R^2	0.9270	0.9569	0.9636	0.9816	0.9802	0.9678	0.9687	0.9357	0.9644	0.9611	0.1982	0.0363
Panel 2E: Investor Protection 2F (1y)												
Alpha (%)	0.001	-0.001	-0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-- --	-- --
	[0.43]	[-0.80]	[-0.73]	[-0.91]	[-0.40]	[0.27]	[0.20]	[0.34]	[0.54]	[0.43]		
Beta: Market (excess return)	1.012	1.144	1.075	1.036	1.017	0.964	0.929	0.867	0.921	1.012	-- --	-- --
	[58.51]	[60.28]	[43.05]	[96.11]	[80.14]	[73.42]	[52.40]	[39.12]	[47.33]	[58.51]		
Beta: Investor Protect	0.567	0.298	0.173	0.042	-0.046	-0.132	-0.167	-0.137	-0.204	-0.433	-- --	-- --
	[16.55]	[7.21]	[3.77]	[1.49]	[-1.59]	[-3.30]	[-3.79]	[-2.19]	[-5.85]	[-12.63]		
Adjusted R^2	0.9744	0.9671	0.9667	0.9817	0.9791	0.9689	0.9715	0.9387	0.9697	0.9819	-- --	-- --
Panel 3: World emerging markets universe												
Panel 3A: CAPM												
Alpha (%)	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	-0.002	-0.003	0.002	0.001
	[1.53]	[-0.22]	[0.49]	[0.26]	[0.25]	[1.78]	[0.50]	[0.75]	[-1.21]	[-1.70]	[0.62]	[-0.07]
Beta: Market (excess return)	0.905	0.980	0.989	0.944	0.933	0.979	1.035	1.066	1.058	1.017	-0.112	-0.161

	[52.45]	[35.64]	[24.7]	[35.07]	[37.08]	[67.41]	[39.09]	[41.05]	[31.88]	[30.7]	[-2.56]	[-2.06]
Adjusted R^2	0.9284	0.9147	0.8784	0.8817	0.9168	0.9547	0.9376	0.9014	0.8960	0.8453	0.0331	0.0346
Panel 3B: FF3F												
Alpha (%)	0.002	-0.001	0.001	0.001	0.001	0.002	0.001	0.001	-0.004	-0.003	0.001	0.001
	[1.50]	[-0.35]	[0.30]	[0.30]	[0.74]	[1.79]	[0.82]	[0.03]	[-1.97]	[-1.38]	[0.40]	[0.27]
Beta: Market (excess return)	0.900	0.989	0.999	0.961	0.950	0.985	1.029	1.049	1.035	0.994	-0.093	-0.096
	[50.81]	[37.29]	[22.59]	[40.73]	[36.22]	[65.92]	[36.63]	[52.46]	[42.20]	[30.13]	[-2.27]	[-1.05]
Beta: SMB	0.009	-0.043	-0.051	-0.052	-0.015	-0.003	0.036	-0.004	0.013	0.091	-0.083	-0.014
	[0.35]	[-0.86]	[-0.76]	[-1.02]	[-0.35]	[-0.13]	[1.04]	[-0.06]	[0.27]	[1.69]	[-1.23]	[-0.12]
Beta: HML	-0.032	0.057	0.066	0.112	0.125	0.042	-0.033	-0.125	-0.164	-0.150	0.122	0.207
	[-1.39]	[2.05]	[1.52]	[2.71]	[3.46]	1.71]	[-1.37]	[-3.24]	[-4.09]	[-3.80]	[2.22]	[2.11]
Adjusted R^2	0.9284	0.9173	0.8816	0.8918	0.9279	0.9554	0.9384	0.9087	0.9101	0.8626	0.0721	0.0634
Panel 3C: Carhart 4F												
Alpha (%)	0.002	-0.001	0.001	0.001	0.001	0.002	0.001	0.001	-0.003	-0.002	0.001	0.001
	[1.40]	[-0.33]	[0.24]	[0.22]	[0.67]	[1.60]	[0.79]	[0.04]	[-1.84]	[-1.26]	[0.26]	[0.18]
Beta: Market (excess return)	0.908	0.985	1.006	0.971	0.956	0.996	1.031	1.048	1.026	0.972	-0.063	-0.063
	[52.37]	[35.72]	[19.60]	[35.11]	[39.25]	[58.02]	[37.09]	[45.9]	[39.17]	[35.98]	[-1.91]	[-0.82]
Beta: SMB	0.021	-0.048	-0.041	-0.037	-0.006	0.013	0.038	-0.005	0.001	0.058	-0.038	0.068
	[0.86]	[-1.04]	[-0.69]	[-0.78]	[-0.14]	[0.58]	[1.11]	[-0.10]	[-0.01]	[1.17]	[-0.61]	[0.74]
Beta: HML	-0.022	0.053	0.075	0.125	0.133	0.055	-0.031	-0.126	-0.175	-0.178	0.159	0.285
	[-0.92]	[1.75]	[1.73]	[3.17]	[3.62]	[2.15]	[-1.32]	[-3.36]	[-4.62]	[-4.34]	[2.78]	[3.12]
Beta: Momentum	0.034	-0.015	0.030	0.042	0.025	0.044	0.006	-0.004	-0.037	-0.094	0.127	0.264
	[1.96]	[-0.44]	[0.63]	[1.07]	[0.69]	[2.77]	[0.20]	[-0.14]	[-1.43]	[-3.52]	[3.52]	[4.12]
Adjusted R^2	0.9294	0.9170	0.8818	0.8931	0.9282	0.9573	0.9380	0.9082	0.9109	0.8701	0.1239	0.1831
Panel 3D: Liquidity 2F (1y)												
Alpha (%)	0.002	-0.001	0.001	-0.001	0.001	0.001	0.001	0.003	-0.002	-0.003	0.001	0.001
	[1.41]	[-0.33]	[-0.21]	[-0.56]	[-0.25]	[0.99]	[0.43]	[1.84]	[-1.01]	[-1.44]	[0.41]	[0.09]
Beta: Market (excess return)	0.904	0.987	1.046	0.997	0.961	1.005	1.037	0.997	1.043	0.995	-0.091	-0.032
	[37.09]	[31.27]	[22.25]	[32.95]	[39.24]	[60.1]	[30.91]	[30.85]	[24.60]	[22.29]	[-1.53]	[-0.28]
Beta: Liquidity	-0.001	0.013	0.101	0.092	0.050	0.044	0.003	-0.121	-0.025	-0.038	0.037	-0.130
	[-0.03]	[0.45]	[3.05]	[2.93]	[1.64]	[2.07]	[0.10]	[-3.20]	[-0.66]	[-0.76]	[0.58]	[-1.27]
Adjusted R^2	0.9279	0.9143	0.8831	0.8860	0.9179	0.9556	0.9372	0.9078	0.8956	0.8451	0.0296	0.0495
Panel 3E: Investor Protection 2F (1y)												
Alpha (%)	0.001	-0.002	0.001	0.001	0.001	0.001	0.001	0.003	-0.001	0.001	-- --	-- --
	[0.52]	[-0.88]	[-0.13]	[-0.30]	[-0.13]	[1.26]	[0.64]	[1.64]	[-0.32]	[0.52]		

Beta: Market (excess return)	0.938	1.006	1.019	0.966	0.946	0.988	1.031	1.036	1.020	0.938	-- --	-- --
	[78.65]	[34.27]	[22.81]	[34.15]	[40.57]	[71.57]	[37.02]	[41.25]	[32.88]	[78.65]		
Beta: Investor Protect	0.298	0.237	0.267	0.190	0.118	0.078	-0.039	-0.266	-0.340	-0.702	-- --	-- --
	[13.53]	[5.77]	[4.41]	[3.57]	[3.50]	[2.66]	[-0.95]	[-4.75]	[-8.45]	[-31.83]		
Adjusted R^2	0.9596	0.9310	0.8978	0.8922	0.9209	0.9563	0.9377	0.9184	0.9243	0.9709	-- --	-- --
Panel 4: US-only universe												
Panel 4A: CAPM												
Alpha (%)	0.003	0.001	0.001	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	**0.007**
	[3.32]	[0.46]	[-0.05]	[0.95]	[-1.15]	[-1.08]	[-0.80]	[-1.12]	[-1.02]	[-0.59]	[-0.06]	**[2.49]***
Beta: Market (excess return)	0.992	1.039	1.014	1.011	0.989	1.077	0.961	0.957	0.851	0.924	0.070	-0.291
	[37.57]	[39.59]	[31.63]	[26.93]	[32.42]	[25.86]	[28.12]	[29.61]	[21.07]	[27.10]	[1.67]	[-2.89]
Adjusted R^2	0.9311	0.9204	0.9236	0.9277	0.9274	0.9327	0.9346	0.9166	0.8836	0.8976	0.0193	0.1327
Panel 4B: FF3F												
Alpha (%)	0.001	-0.002	-0.001	0.001	-0.003	-0.002	0.001	0.001	0.001	0.002	**-0.004**	-0.001
	[1.07]	[-1.29]	[-0.39]	[0.44]	[-3.11]	[-1.50]	[0.50]	[1.18]	[0.42]	[1.11]	**[-2.02]***	[-0.08]
Beta: Market (excess return)	0.986	1.031	1.012	1.008	0.982	1.073	0.966	0.967	0.855	0.930	0.058	-0.251
	[41.68]	[39.95]	[36.16]	[32.89]	[35.34]	[30.26]	[30.09]	[34.6]	[30.78]	[32.4]	[1.40]	[-2.66]
Beta: SMB	-0.082	-0.121	-0.028	-0.031	-0.105	-0.045	0.080	0.143	0.070	0.107	-0.185	-0.340
	[-2.49]	[-3.13]	[-0.7]	[-0.86]	[-2.69]	[-1.06]	[1.89]	[4.17]	[1.50]	[2.02]	[-2.70]	[-2.52]
Beta: HML	-0.079	0.006	-0.073	-0.106	-0.007	-0.094	0.033	0.091	-0.200	-0.132	0.054	0.070
	[-2.27]	[0.19]	[-2.54]	[-2.21]	[-0.18]	[-2.4]	[1.06]	[2.37]	[-2.77]	[-3.35]	[1.13]	[0.68]
Adjusted R^2	0.9356	0.9245	0.9253	0.9321	0.9308	0.9360	0.9369	0.9276	0.9095	0.9107	0.0874	0.2117
Panel 4C: Carhart 4F												
Alpha (%)	0.001	-0.002	0.001	0.001	-0.003	-0.002	0.001	0.001	0.002	0.002	**-0.005**	-0.001
	[0.59]	[-1.26]	[-0.36]	[0.57]	[-2.49]	[-1.17]	[0.34]	[1.11]	[1.79]	[1.39]	**[-2.32]****	[-0.14]
Beta: Market (excess return)	0.965	1.036	1.015	1.018	1.016	1.095	0.957	0.955	0.931	0.955	0.014	-0.262
	[41.83]	[34.72]	[33.46]	[40.60]	[34.02]	[31.98]	[30.31]	[43.79]	[43.10]	[35.29]	[0.34]	[-2.70]
Beta: SMB	-0.115	-0.114	-0.023	-0.016	-0.053	-0.012	0.065	0.124	0.189	0.144	-0.254	-0.357
	[-3.00]	[-2.65]	[-0.56]	[-0.35]	[-1.11]	[-0.22]	[1.38]	[3.62]	[4.40]	[2.52]	[-3.55]	[-2.42]
Beta: HML	-0.090	0.009	-0.071	-0.101	0.010	-0.083	0.028	0.085	-0.161	-0.120	0.032	0.064
	[-2.37]	[0.24]	[-2.28]	[-2.15]	[0.29]	[-1.90]	[0.98]	[2.15]	[-3.34]	[-3.55]	[0.63]	[0.64]
Beta: Momentum	-0.034	0.007	0.005	0.015	0.054	0.034	-0.015	-0.020	0.123	0.039	-0.071	-0.022
	[-1.44]	[0.30]	[0.18]	[0.48]	[2.21]	[0.82]	[-0.56]	[-0.54]	[4.75]	[1.52]	[-2.25]	[-0.43]
Adjusted R^2	0.9364	0.9241	0.9248	0.9319	0.9335	0.9366	0.9367	0.9275	0.9296	0.9119	0.1110	0.2079
Panel 4D: Liquidity 2F (1y)												

Alpha (%)	0.003	0.001	0.001	0.001	-0.002	-0.001	-0.001	-0.002	0.001	0.001	-0.001	**0.005**
	[3.08]	[0.42]	[0.18]	[0.96]	[-2.00]	[-0.88]	[-1.08]	[-1.16]	[1.18]	[0.08]	[-0.34]	**[1.88]***
Beta: Market (excess return)	1.008	1.040	1.027	1.021	0.965	1.092	0.947	0.948	0.947	0.961	0.048	-0.439
	[40.54]	[35.86]	[32.28]	[31.61]	25.53]	[24.06]	[28.05]	[29.47]	[40.9]	[35.67]	[1.07]	[-3.55]
Beta: Liquidity	0.039	0.002	0.031	0.024	-0.060	0.037	-0.035	-0.021	0.241	0.094	-0.055	0.116
	[0.89]	[0.04]	[0.79]	[0.52]	[-1.24]	[0.79]	[-1.12]	[-0.45]	[4.75]	[1.93]	[-0.91]	[1.52]
Adjusted R^2	0.9314	0.9199	0.9236	0.9275	0.9288	0.9329	0.9349	0.9163	0.9203	0.9019	0.0214	0.1512
Panel 4E: Investor Protection 2F (1y)												
Alpha (%)	0.001	0.001	0.001	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.001	-- --	-- --
	[1.67]	[-0.07]	[-0.17]	[0.83]	[-1.22]	[-0.93]	[-0.51]	[-0.61]	[-1.00]	[1.67]		
Beta: Market (excess return)	0.963	1.027	1.012	1.009	0.988	1.082	0.967	0.969	0.851	0.963	-- --	-- --
	[45.25]	[36.80]	[31.19]	[28.52]	[31.80]	[25.90]	[28.57]	[32.26]	[21.49]	[45.25]		
Beta: Investor Protect	0.435	0.180	0.041	0.034	0.008	-0.069	-0.091	-0.182	0.010	-0.565	-- --	-- --
	[8.63]	[3.00]	[0.92]	[0.51]	[0.18]	[-1.25]	[-2.31]	[-3.88]	[0.14]	[-11.18]		
Adjusted R^2	0.9649	0.9252	0.9234	0.9274	0.9270	0.9330	0.9358	0.9224	0.8829	0.9610	-- --	-- --

Table 5 Time varying parameter model tests of CAPM-type and multifactor models using monthly excess returns for decile liquidity-sorted portfolios with annual and monthly rebalancing, momentum and country portfolios for the period January 2001 – August 2014

This table reports the average time varying alpha terms, proportions of the sample for which the lower standard error band is negative (that is, where the alpha lacks statistical significance) and proportions of testing asset portfolios (deciles or quintile portfolios) where convergence is achieved. Time-varying parameter Kalman filter CAPM-type and multifactor CAPM-based models are used where these are based on CAPM, three factor Fama and French (1993) Size and Book-to-Market augmented CAPM, Liu (2006) two factor liquidity-augmented CAPM and the two factor investor protection augmented CAPM. 1y indicates annual rebalancing used in factor formation (as opposed to monthly rebalancing). < denotes the largest negative value of each of the three information criterion (that is the model of choice).

	Time series		**Information criterion**				**Time series**		**Information criterion**			
	Mean alpha	**% SE (alpha) negative**	**SBC**	**HQC**	**AIC**	**% Converge**	**Mean alpha**	**% SE (alpha) negative**	**SBC**	**HQC**	**AIC**	**% Converge**
Panel 1: World market universe	**Size decile portfolios**						**Book-to-Market decile portfolios**					
CAPM	0.0044	85.29	-4.94	-4.90	-4.92	100.00	0.0040	88.36	-5.07	-5.03	-5.05	100.00
FF3F	0.0018	86.05	-5.31	-5.23	-5.28	40.00	0.0030	81.36	-5.16<	-5.08<	-5.12<	60.00
Carhart 4F	0.0014	87.83	-5.07	-4.97	-5.03	40.00	0.0049	78.95	-4.92	-4.82	-4.88	40.00
Liquidity 2F (1yr)	0.0076	80.27	-5.17	-5.11	-5.15	30.00	0.0041	86.09	-5.12	-5.06	-5.09	70.00
Investor Protect 2F (1yr)	0.0037	81.97	-5.61<	-5.56<	-5.59<	40.00	0.0037	85.75	-5.05	-5.00	-5.03	60.00
	Investor Protection-1y decile portfolios						**Country portfolios**					
CAPM	0.0033	86.32	-5.23	-5.19	-5.21	100.00	0.0011	92.12	-2.60	-2.56	-2.58	80.85
FF3F	0.0037	84.87	-4.76	-4.69	-4.73	50.00	0.0001	90.79	-2.66	-2.58	-2.63	36.17
Carhart 4F	0.0033	85.24	-4.90	-4.80	-4.86	70.00	0.0004	91.08	-22.81<	-22.72<	-22.78<	89.36
Liquidity 2F (1yr)	0.0043	80.27	-5.31	-5.26	-5.29	20.00	0.0015	91.23	-2.71	-2.65	-2.69	44.68
Investor Protect 2F (1yr)	0.0033	83.04	-5.69<	-5.63<	-5.66<	90.00	0.0007	91.42	-2.23	-2.17	-2.20	46.81
Panel 2: World developed market universe	**Size decile portfolios**						**Book-to-Market decile portfolios**					
CAPM	0.0040	84.93	-5.00	-4.96	-4.98	100.00	0.0033	86.45	-5.37	-5.34	-5.36	100.00
FF3F	0.0035	82.73	-5.26	-5.19<	-5.23	80.00	0.0034	82.15	-5.35	-5.27	-5.31	80.00
Carhart 4F	0.0016	86.84	-5.28<	-5.19<	-5.25<	30.00	0.0039	83.97	-5.26	-5.17	-5.22	70.00
Liquidity 2F (1yr)	0.0039	83.19	-5.08	-4.52	-5.06	90.00	0.0041	83.19	-5.35	-5.30	-5.33	90.00
Investor Protect 2F (1yr)	0.0041	84.58	-4.92	-4.87	-4.90	90.00	0.0039	82.89	-5.39<	-5.34<	-5.37<	70.00
	Investor Protection-1y decile portfolios						**Country portfolios**					
CAPM	0.0034	86.32	-5.23	-5.19	-5.21	100.00	0.0012	92.12	-2.60	-2.56	-2.59	80.85
FF3F	0.0038	84.87	-4.76	-4.69	-4.73	50.00	0.0001	90.79	-2.66	-2.59	-2.63	36.17
Carhart 4F	0.0033	85.24	-4.90	-4.80	-4.86	70.00	0.0004	91.08	-22.82<	-22.73<	-22.78<	89.36
Liquidity 2F (1yr)	0.0043	80.27	-5.31	-5.26	-5.29	20.00	0.0016	91.23	-2.72	-2.66	-2.69	44.68
Investor Protect 2F (1yr)	0.0033	83.04	-5.69<	-5.63<	-5.66<	90.00	0.0008	91.42	-2.23	-2.17	-2.21	46.81

Panel 3: World emerging market universe	**Size decile portfolios**						**Book-to-Market decile portfolios**					
CAPM	0.0052	91.16	-3.63	-3.59	-3.61	70.00	0.0067	91.28	-3.49	-3.45	-3.47	80.00
FF3F	0.0028	89.34	-4.38<	-4.30<	-4.35<	50.00	0.0028	89.12	-4.38<	-4.30<	-4.35<	50.00
Carhart 4F	0.0041	64.47	-4.02	-3.93	-3.98	10.00	0.0041	64.47	-4.02	-3.93	-3.98	10.00
Liquidity 2F (1yr)	0.0021	89.04	-4.07	-4.02	-4.05	60.00	0.0021	89.04	-4.07	-4.02	-4.05	60.00
Investor Protect 2F (1yr)	0.0023	90.53	-3.97	-3.91	-3.95	50.00	0.0023	90.34	-3.97	-3.91	-3.95	50.00
	Investor Protection-1y decile portfolios						**Country portfolios**					
CAPM	0.0032	88.16	-4.35	-4.32	-4.34	90.00	0.0035	91.30	-1.96	-1.92	-1.94	100.00
FF3F	0.0045	83.81	-4.53<	-4.45<	-4.50<	50.00	-0.0009	91.69	-1.76	-1.69	-1.73	47.83
Carhart 4F	0.0036	86.84	-4.31	-4.22	-4.27	40.00	0.0017	90.98	-1.77	-1.68	-1.73	34.78
Liquidity 2F (1yr)	0.0032	87.17	-4.24	-4.19	-4.22	80.00	0.0052	89.51	-1.97<	-1.92<	-1.94<	73.91
Investor Protect 2F (1yr)	0.0036	87.76	-4.41	-4.35	-4.39	60.00	0.0057	90.07	-1.81	-1.75	-1.79	43.48
Panel 4: US only universe	**Size decile portfolios**						**Book-to-Market decile portfolios**					
CAPM	0.0032	89.21	-4.70	-4.66	-4.68	100.00	0.0033	89.28	-4.51	-4.47	-4.49	100.00
FF3F	0.0072	77.55	-4.71	-4.63	-4.68	40.00	0.0028	84.01	-4.55	-4.48<	-4.52	60.00
Carhart 4F	0.0056	68.71	-5.04<	-4.95<	-5.00<	10.00	0.0035	83.81	-4.57<	-4.47	-4.53<	50.00
Liquidity 2F (1yr)	0.0018	90.46	-4.71	-4.66	-4.69	80.00	0.0033	88.30	-4.47	-4.41	-4.45	90.00
Investor Protect 2F (1yr)	0.0041	86.51	-4.53	-4.48	-4.51	60.00	0.0035	86.73	-4.49	-4.43	-4.46	60.00
	Investor Protection-1y decile portfolios						**Country portfolios**					
CAPM	0.0033	88.03	-4.75	-4.71	-4.74	100.00	0.0044	95.72	-4.79	-4.75	-4.77	100.00
FF3F	0.0032	83.55	-4.67	-4.59	-4.64	40.00	-- --	-- --	-- --	-- --	-- --	-- --
Carhart 4F	0.0034	77.96	-4.58	-4.49	-4.54	20.00	0.0039	52.30	-6.22<	-6.13<	-6.18<	100.00
Liquidity 2F (1yr)	0.0032	86.94	-4.76	-4.70	-4.74	80.00	0.0040	79.61	-5.77	-5.71	-5.75	100.00
Investor Protect 2F (1yr)	0.0031	90.95	-4.98<	-4.93<	-4.96<	50.00	0.0036	78.91	-5.54	-5.49	-5.52	100.00

Figure 1
Global equity market firm sample by country and region, January 2001 to August 2014

The figure shows the distribution of sample stocks by country or region, with the sample size and percentage of the total for each. The sample selection criteria are described in the data section.

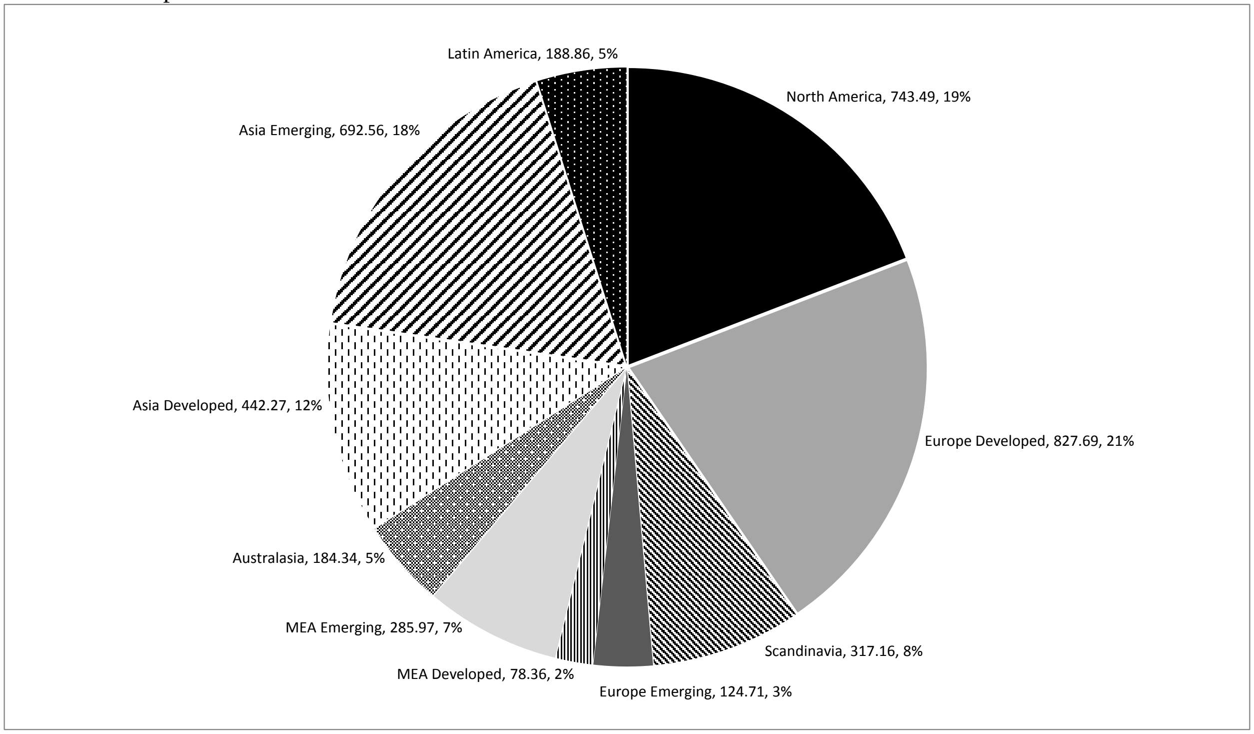
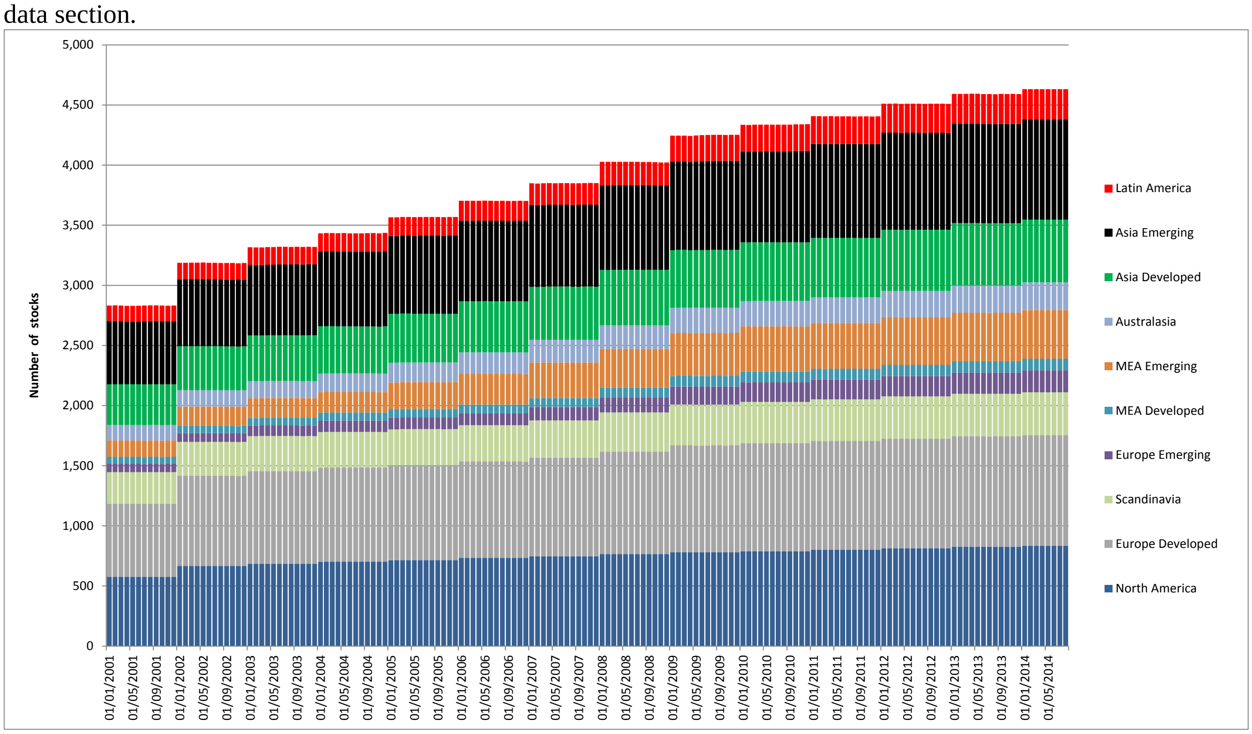


Figure 2
Global equity market firm sample by month, January 2001 to August 2014

The figure shows the distribution of sample stocks by region and month. The sample selection criteria are described in the data section.



Appendix A. Table 1A.
Datastream variable definitions

All data are from Datastream and Worldscope (accessed through Datastream) with the exception of the MSCI index range, which are from the MSCI website http://www.msci.com/products/indexes/country_and_regional/dm/. *High income threshold for 2012: GNI per capita of USD 12,615 (World Bank, Atlas method)

Coverage	Index	Description	Datastream Mnemonic
MSCI Developed	North America: Canada, US Europe Developed: Austria, Belgium, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, Switzerland, UK Scandinavia: Denmark, Finland, Norway, Sweden Middle East & Africa Developed: Israel Asia Developed: Singapore, Japan, Hong Kong	Country must meet 3 criteria: (1) Sustainable economic development. Country GNI per capita 25% above the World Bank high income threshold* for 3 consecutive years (2) Size and Liquidity Requirements: - Company size (full market cap): USD 2519 mm - Security size (float market cap): USD 1260 mm - Security liquidity: 20% ATVR (3) Market Accessibility Criteria: - Openness to foreign ownership: Very high - Ease of capital inflows / outflows: Very high - Efficiency of the operational framework: Very high - Stability of the institutional framework: Very high	N/A (MSCI)
MSCI Emerging	Latin America: Brazil, Chile, Colombia, Mexico, Peru Europe Emerging: Czech Rep., Greece, Hungary, Poland, Russia Middle East & Africa Emerging: Egypt, Qatar, South Africa, Turkey, UAE, Asia Emerging: China, India, Indonesia, South Korea, Malaysia, Philippines, Taiwan, Thailand	Country must meet 3 criteria: (1) Sustainable economic development. No requirement (2) Size and Liquidity Requirements: - Company size (full market cap): USD 1260 mm - Security size (float market cap): USD 630 mm - Security liquidity: 15% ATVR (3) Market Accessibility Criteria: - Openness to foreign ownership: Significant - Ease of capital inflows / outflows: Significant - Efficiency of the operational framework: Good and tested - Stability of the institutional framework: Modest	N/A (MSCI)
Individual market indices			
North America			
Canada	S&P/TSX Composite [251]	Source: S&P/TSX	LTTOCOMP
US Nasdaq 100	Nasdaq 100 [103]	Source: Nasdaq	LNASA10W
US S&P 100	S&P 100 [101]	Source: S&P	LS&P100I
Europe Developed			
France	France CAC Large 60 [60]	Source: Euronext Paris	LFRCLR60
Germany	DJ DAX 100 [100]	Source: Deutsche Börse	LDAX100I0700
Austria	ATX 50 [53]	Source: Wiener Bourse	LATXIN500601
Belgium	BEL All-Share [137]	Source: Belgium stock exchange	LBRUSIDX
Ireland	ISEQ Overall [47]	Source: Irish stock exchange	LISEQUIT
Italy	All Stars [74]	Source: Milan Bourse	LMIBASTR
Netherlands	All Share General [140]	Source: CBS	LCBSKGEN
Portugal	PSI All-Share [47]	Source: Euronext Lisbon	LPOPSIGN
Spain	Madrid SE General [108]	Source: Bolsas y Mercados Españoles	LMADRIDI
Switzerland	Medium Large companies [100]	Source: SWX Swiss stock exchange	LSWMLCOS
UK	FTSE 100 [101]	Source: FTSE	LFTSE100
Scandinavia			
Denmark	OMX Copenhagen [150]	Source: Nasdaq OMX [150]	LCOSEASH
Finland	OMX Helsinki [131]	Source: Nasdaq OMX	LHEXINDX

Norway	Oslo GFBX [18]	Source: Oslo Bors	LOSLOGFB
Sweden	OMX Stockholm Benchmark [71]	Source: Nasdaq OMX	LSWEBENC
Europe Emerging			
Czech Republic	Prague SE PX Global [24]	Source: Prague stock exchange	LCZPXGLB
Hungary	Budapest (BUX) [14]	Source: Budapest stock exchange	LBUXINDX
Poland	Warsaw General 20 [20]	Source: Warsaw stock exchange	LPOLWG20
Russia Federation	MICEX Composite [50]	Source: Red Star Financial	LRSMICEX
Russia Federation	Russian RTS [50]	Source: Red Star Financial	LRSRTSIN
Greece	Athex Composite [60]	Source: Athens stock exchange	LGRAGENL
Middle East & Africa (MEA) Developed			
Israel	Dow Jones Tel Aviv 100 [101]	Source: Israel stock exchange	LISTA100
Middle East & Africa (MEA) Emerging			
Egypt	Hermes Financial [43]	Source: Egyptian Stock Exchange	LEGHFINC
South Africa	FTSE/ JSE Top 40 [42]	Source: FTSE	LJSEAL40
Qatar	S&P Qatar Domestic price index in US$ [35]	Source: S&P	LSPDQAT$
Turkey	BIST National 100 [100]	Source: Istanbul stock exchange	LTRKISTB
UAE (Abu Dhabi)	DS market constituents [50]	Source: Thomson Datastream	LTOTAE
UAE (Dubai)	DS market constituents [57]	Source: Thomson Datastream	FDUBAI
Australasia			
Australia	S&P/ASX 200 [200]	Source: S&P/ASX	LASX200I
New Zealand	NZX 50 [50]	Source: New Zealand stock exchange	LNZ50CAP
Asia Developed			
Japan	S&P TOPIX 150 [150]	Source Standard & Poors	LSPTOPIX
Singapore	TR Singapore (Composite) [183]	Source: Thomson Reuters	LXSGFLDL
Hong Kong	S&P Hong Kong [200]	Source: Standard & Poors	LSBBVHK$
Asia Emerging			
China (Shanghai)	Shanghai SE 180 [180]	Source: Shanghai stock exchange	LCHSH180
China (Shenzhen)	Shenzhen SE 100 [100]	Source: Shenzhen stock exchange	LCHZH100
India (Bombay)	S&P BSE (100) National [100]	Source: S&P. 100 stocks from across India.	LIBOMBSE
Indonesia	Jakarta LQ45 (Top 45) [45]	Source: Indonesian stock exchange	LJAKLQ45
Malaysia	Composite [102]	Source: FTSE	LFBMKLCI0901
Philippines	Manila Composite [30]	Source: Philippine stock exchange	LPSECOMP
South Korea	KOSPI 100 [100]	Source: Korea stock exchange	LKOR100I
Taiwan	Taiwan Top 100 [100]	Source: Taiwan stock exchange	LTATP100
Thailand	Bangkok SET 100 [100]	Source: Stock exchange of Thailand	LBNGK100
Latin America			
Brazil	Brazil (IBX) [99]	Source: Sao Paolo stock exchange	LBRIBXIN
Chile	IPSA [40]	Source: Santiago stock exchange	LIPSASEL
Colombia	Worldscope coverage [63]	Source: Worldscope via Datastream	COLOM
Mexico	Indice Compuesto del Mercado Acciones [60]	Source: Mexican stock exchange	LMXIRTCM
Peru	Lima Selective [15]	Source: Lima Stock Exchange	LPESELEC

Appendix B Table 1B.
Datastream variable and Worldwide governance indicator definitions

All data are from Datastream and Worldscope (accessed through Datastream) with the exception of the six World Bank Governance indices, which are from http://info.worldbank.org/governance/wgi/index.aspx#home

Variable	Definition	Datastream Mnemonic
Datastream items		
Free Float Number Of Shares	The percentage of total shares in issue available to ordinary investors (NOSHFF). That means total number of shares (NOSH) less the strategic holdings (NOSHST). In general, only holdings of 5% or more are counted as strategic. Strategic ownership data is collected by the Thomson Reuters Ownership team, the data is derived from 11 primary sources, including SEC filings (such as schedule 13D and form 13FD) and the UK Register. Also annual, interim reports, stock exchanges, official regulatory bodies, third party vendors, company websites, approved news sources and direct contact with company investor relations departments Ownership updates were obtained at end of month prior to August 2009 while after this date values are updated on the 10th and 30th of each month Strategic holdings are defined as the sum of the following categories of shareholding: (1) Government: State (government) or state (government) institution (NOSHGV) (2) Cross Holdings: Holdings by one company in another (NOSHCO) (3) Pension Fund: Pension funds or Endowment funds (NOSHPF) (4) Investment Co.: Investment banks or institutions seeking a long term return. Note that holdings by Hedge Funds are not included (NOSHIC) (5) Employees: Employees, or by those with a substantial position in a company that provides significant voting power at an annual general meeting, (typically family members) (NOSHEM) (6) Other holdings: Entities outside one of the above categories (NOSHOF) (7) Foreign block holders: Holdings by an institution domiciled in a country other than that of the issuer (NOSHFR)	NOSHFF
Price	This is the adjusted default official daily closing price. It is denominated in primary units of local currency. Prices are generally based on 'last trade' or an official price fixing. The 'current' prices taken at the close of market are stored each day. These stored prices are adjusted for subsequent capital actions, and this adjusted figure then becomes the default price available	P
Book to Market Value	This is defined as the inverse of the market value of the ordinary (common) equity divided by the balance sheet value of the ordinary (common) equity in the company (Worldscope item 03501) which is available through Datastream	BTMV
Traded Volume	This shows the number of shares traded for a stock on a particular day. The data type is reported in thousands. Both daily and non-daily figures are adjusted for capital events. However, if a capital event occurs in the latest period of a non-daily request, then the volume for that particular period only is retrieved as unadjusted.	VO
Number of Shares	This is the total number of ordinary shares that represent the capital of the company. The data type is expressed in thousands.	NOSH
Worldwide governance indicators		
Voice and Accountability	This captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media	-- --
Political Stability and	This measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence	-- --

Absence of Violence/ Terrorism	and terrorism.	
Government Effectiveness	This captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	-- --
Regulatory Quality	This captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	-- --
Rule of Law	This captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	-- --
Control of Corruption	This captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media	-- --

Appendix C. Table 1C. Empirical models

This table outlines the time invariant (Panel A) and the time varying parameter models (Panel B). The time invariant parameter models are estimated by OLS. The conditional betas of the Kalman-filter time-varying parameter models are estimated using the observation equation, where R_{it} and R_{Mt} are the excess returns of the individual and market portfolios at time *t* and ε_t is the disturbance term. The exact form of the related transition equation depends on the nature of the stochastic process the betas are assumed to follow and in this case a simple random walk process is imposed, following Brooks et al (1998). The observation equation and the transition equation constitute the Kalman filter state space model. However, a set of prior conditional values are necessary for the Kalman filter to forecast the future value. This technique uses the first two observations to establish the prior conditions and then estimates the entire series recursively providing conditional estimates of the parameters. The random walk specification imposes a filter on the data where parameters evolve smoothly and are contingent on the observations surrounding time *t*. The exact amount of data around time *t* needed to estimate the coefficients, that is, the dependent variable in state equations, is contingent on their variance and is estimated from the data. This approach is appropriate for the measurement of time evolving risk premiums for market and investor protection factors (Grout and Zalewska, 2006). Thus, one-step ahead predicted states and their associated standard errors are estimated for all FMPs.

Panel A: Time invariant parameter models	**Panel B:Time varying parameter models**
Model 1a: CAPM The standard CAPM can be estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \varepsilon_{it}$	**Model 1b: CAPM** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + \varepsilon_t, \quad \varepsilon_t \sim N(0,\Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0,Q)$ with a set of prior conditional values: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$
Model 2a: FF3F Following Fama and French (1993), additional SMB and HML terms are the size and book-to-market factors and estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \varepsilon_{it}$	**Model 2b: FF3F** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + s_i^{Kalman} SMB + h_i^{Kalman} HML + \varepsilon_t, \quad \varepsilon_t \sim N(0,\Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0,Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0,Q)$ $s_{it}^{Kalman} = s_{it-1}^{Kalman} + \eta_{st,} \quad \eta_{st} \sim N(0,Q)$ $h_{it}^{Kalman} = h_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0,Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$

	$\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $s_0^{Kalman} \sim N(s_0^{Kalman}, P_0)$ $h_0^{Kalman} \sim N(h_0^{Kalman}, P_0)$
Model 3a: Carhart 4F Following Carhart (1997), we augment FF3F with the momentum term, which is estimated by OLS regression: $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + \beta_{Mom} Mom_t + \varepsilon_{it}$	**Model 3b: Carhart 4F** The conditional betas are estimated using the following observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + s_i^{Kalman} SMB + h_i^{Kalman} HML + m_i^{Kalman} Mom + \varepsilon_t$, $\varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0, Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0, Q)$ $s_{it}^{Kalman} = s_{it-1}^{Kalman} + \eta_{st,} \quad \eta_{st} \sim N(0, Q)$ $h_{it}^{Kalman} = h_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ $m_{it}^{Kalman} = m_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $s_0^{Kalman} \sim N(s_0^{Kalman}, P_0)$ $h_0^{Kalman} \sim N(h_0^{Kalman}, P_0)$ $m_0^{Kalman} \sim N(m_0^{Kalman}, P_0)$
Model 4a: Liquidity 2F Liu (2006) introduces a two-factor liquidity model, which is estimated by OLS regression: $r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \beta_{Illiq} ILLIQ_t + \varepsilon_{it}$ We use two versions of the investor protection factor, created from the two rebalancing methods, monthly and annual, both with annual holding periods.	**Model 4b: Liquidity 2F** The conditional betas are estimated using following the observation equation: $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + z_i^{Kalman} ILLIQ + \varepsilon_t, \quad \varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t,} \quad \eta_{\alpha t} \sim N(0, Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t,} \quad \eta_{\beta t} \sim N(0, Q)$ $z_{it}^{Kalman} = z_{it-1}^{Kalman} + \eta_{ht,} \quad \eta_{ht} \sim N(0, Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$

	$z_0^{Kalman} \sim N(z_0^{Kalman}, P_0)$
Model 5a: Investor Protection 2F A two-factor CAPM augmented with the new investor protection factor to account for institutional differences across international markets is proposed and can be stated $E(r_{pt}) - r_{ft} = \beta_M \left[E(r_{mt}) - r_{ft}\right] + \beta_{INV-PROTECT} E(INV - PROTECT)$ where r_{pt} is the returns on a portfolio p of stocks at time interval t, r_{mt} is the returns on the market portfolio and r_{ft} the risk free rate. INV-PROTECT is the investor protection factor. This can be rearranged and estimated by OLS regression $r_{pt} - r_{ft} = \alpha_i + \beta_M (r_{mt} - r_{ft}) + \beta_{INV-PROTECT} INV - PROTECT_t + \varepsilon_{it}$ where α_i is the constant, β_M is the market coefficient and ε_{it} is an *iid* disturbance term. We use two versions of the investor protection factor, created from the two rebalancing methods, monthly and annual, both with annual holding periods.	**Model 5b: Investor Protection 2F** The conditional betas are estimated using the following observation equation $R_{it} = \alpha_t + \beta_{it}^{Kalman} R_{Mt} + \beta_{INV-PROTECTit}{}^{Kalman}(INV - PROTECT) + \varepsilon_t, \quad \varepsilon_t \sim N(0, \Omega)$ The corresponding transition equation is defined: $\alpha_{it}^{Kalman} = \alpha_{it-1}^{Kalman} + \eta_{\alpha t}, \quad \eta_{\alpha t} \sim N(0, Q)$ $\beta_{it}^{Kalman} = \beta_{it-1}^{Kalman} + \eta_{\beta t}, \quad \eta_{\beta t} \sim N(0, Q)$ $\beta_{INV-PROTECTit}^{Kalman} = \beta_{INV-PROTECTit-1}^{Kalman} + \eta_{st}, \quad \eta_{st} \sim N(0, Q)$ with prior conditional values denoted by: $\alpha_0^{Kalman} \sim N(\alpha_0^{Kalman}, P_0)$ $\beta_0^{Kalman} \sim N(\beta_0^{Kalman}, P_0)$ $\beta_{INV-PROTECT0}^{Kalman} \sim N(\beta_{INV-PROTECT0}^{Kalman}, P_0)$

Appendix D. Block owner categories per investor protection sorted decile

As an additional exercise we report the distribution of the seven ownership categories across the ten decile sorted investor protection portfolios. These are reported in the Table 1D below. Four sets of distributions are given, one for each market universe. The overall sample is in panel 1, the emerging market in panel 2, the developed market in panel 3 and the US alone in panel 4. Evidence for all four universes supports the hypothesis regarding concentration of control versus cash-flow rights in relation to the quality of the external contracting environment and investor protection (see La Porta et al, 1999; Doidge et al, 2004; Dyck and Zingales, 2004). Some interesting observations can be made. The proportions of cross-shareholding networks used to separate ownership from control dominate the weakest investor protection deciles in the overall universe (panel 1) and this trend is also seen in the developed market universe (panel 3). However, it is clearly missing in the emerging market universe (panel 2) where there is a very high proportion of cross shareholding networks and this is evenly distributed across all investor protection deciles. Another clear difference between the World emerging and World developed market universes is the increasing trend of insider employee/family ownership from low to high investor protection in the former (panel 2) but a decreasing trend in the latter (panel 3). In contrast, the proportion of foreign ownership between both developed and emerging market universes shows an increasing trend from minimal ownership in highest investor protection deciles (D9 and D10) to a significant concentration in the lowest investor protection deciles (D1 and D2). State ownership is minimal and generally confined to the weakest investor protection portfolios across all market universes. Finally, it is noted that increased ownership by investment companies and pension funds is strongly concentrated in developed markets (panel 2c) and in particular, in the US where this is the most common form of ownership (panel 2d).

Table 1D. Block owner categories per investor protection sorted decile

The second panel provides details of block shareholders per decile-sorted investor protection portfolio by category. These are cross-shareholder networks, employee/family, foreign, state, institutional investor, other, and pension funds. Categories of block shareholder are from Datastream.

Block owners (%)										
Panel 1: World Market universe	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**
Cross-shareholder networks	52.21	24.64	30.98	32.02	25.29	19.72	8.48	4.32	4.59	3.30
Employee/ Family	7.87	22.00	17.59	15.52	21.60	5.73	11.31	10.21	16.47	5.40
Foreign	12.61	9.82	9.17	14.81	12.86	4.79	3.54	4.38	8.97	0.28
State	9.07	0.00	4.21	1.05	3.33	0.00	0.00	1.29	0.00	0.00
Investment companies	1.77	12.71	1.05	7.09	9.28	9.04	15.22	9.59	5.26	3.12
Other	0.77	4.24	2.60	6.89	18.57	4.93	1.49	2.23	2.44	0.36
Pension Funds	1.11	7.32	5.68	0.89	1.71	3.29	2.53	2.19	2.21	1.49
Panel 2: World Emerging Markets universe										
Cross-shareholder networks	50.05	42.26	37.29	37.71	29.24	22.74	37.47	27.57	27.18	40.57
Employee/ Family	8.56	8.40	10.31	22.47	20.55	10.39	16.74	7.04	9.82	29.49
Foreign	22.25	22.16	13.08	18.54	22.34	5.38	10.16	5.50	8.69	8.95
State	7.18	6.66	12.55	8.77	4.20	2.69	6.83	5.61	7.39	0.00
Investment companies	2.40	5.31	10.05	5.62	9.42	2.88	5.78	8.19	5.67	1.50
Other	3.44	3.86	12.25	2.70	5.34	0.89	4.55	0.70	4.40	0.93

Pension Funds	0.38	0.86	0.45	4.99	1.05	4.13	1.58	0.70	3.33	2.53
Panel 3: World Developed Markets universe										
Cross-shareholder networks	39.07	39.99	31.54	21.40	14.04	6.19	5.09	7.93	8.11	3.30
Employee/ Family	38.86	27.60	23.66	19.00	20.28	7.32	15.74	6.88	6.94	5.40
Foreign	19.03	16.28	6.47	16.36	10.97	4.70	10.95	6.96	6.83	0.28
State	2.38	0.48	0.00	6.04	0.08	1.77	0.30	0.00	2.40	0.00
Investment companies	18.44	8.89	15.67	6.36	8.68	12.60	8.54	6.28	10.54	3.12
Other	4.24	5.40	24.27	9.15	11.44	6.85	7.43	5.10	2.49	0.36
Pension Funds	1.51	0.79	6.43	2.18	3.60	5.32	0.21	2.31	4.74	1.49
Panel 4: US only universe										
Cross-shareholder networks	1.96	1.36	5.32	0.00	4.50	4.67	2.90	5.02	3.22	2.92
Employee/ Family	11.17	2.73	6.66	3.45	4.89	3.79	0.48	3.81	3.14	0.48
Foreign	4.78	2.27	2.13	2.74	4.60	2.51	1.52	2.11	4.15	5.77
State	1.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Investment companies	25.63	24.86	18.21	22.14	19.43	17.07	14.37	17.72	11.57	4.16
Other	0.41	2.15	1.37	0.58	0.00	1.29	0.00	0.00	0.40	4.83
Pension Funds	4.07	7.54	4.42	4.46	4.77	3.32	4.19	2.14	3.43	3.44