QuantitativeStrategy
Asia Pan-Asia

Deutsche Bank

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Quantiles

Launching Asian quantitative strategy

Research Summary
This is the first report in our new research series Quantiles, which focuses on researching innovative new quantitative strategies for the Pan-Asian region. In this paper we study whether a unique database of securities lending data can enhance quant models in Asia

Quant in Asia: Unique challenges but rich opportunity

We are proud to introduce our inaugural Asian Quantitative Strategy research series, *Quantiles*. Following the successful launch of our European and North American Quantitative Strategy product in 2010, we are expanding the Global Equity Quant Strategy Team to establish a local presence in Asia.

New alpha or back to the basics?
In many Asian markets, basic quantitative strategies – like value and momentum – are working quite well. At the same time, finding new sources of systematic alpha is hard, particularly in Asia, where data quality and breadth can be problematic. Is it worth it? We believe it is, and in this research we show why.

Case study: Beyond short interest
To support our argument, we show how a unique new database of securities lending activity can enhance the performance of a traditional quant model in Asia. Short interest is the most common metric for gauging borrowing activity in a stock, but it is not always the best. We show that more sophisticated measures of shorting activity can lead to better returns.

Best buy ideas
Our high conviction buy ideas, based on our securities lending factors, are China Shenhua Energy Co Ltd, Sony Financial Holdings Inc, Newcrest Mining Ltd and Hyundai Mobis Co Ltd.

Source: gettyimages.com

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Table of Contents

Stock screens 3
Ranking stocks based on securities lending factors 3

A letter to our readers 4
Launching DB Global Equity Quantitative Strategy in Asia 4

Wandering across Asia 6
An investment process in seven steps 6
Defining our Pan-Asia universe 6

Asia: The last frontier for quants? 12
The story so far 12

Case study: Beyond short interest 15
Introducing the DataExplorers database 15
Securities lending in Asia: The state of play 15
Australia 16
China 17
Hong Kong 17
India 18
Indonesia 18
Japan 19
South Korea 19
Malaysia 20
New Zealand 20
Philippines 21
Singapore 21
Taiwan 22
Thailand 22

Testing securities lending signals in Asia 23
Pan-Asia 25
Australia 30
China (Hong Kong listed) 33
Hong Kong 36
Japan 39
South Korea 43
Singapore 46
Putting it all together 48

Digging deeper 50
What's wrong with the traditional factors? 50
Correlation analysis 51
Incremental alpha 52
Conclusion 53

Appendix 54
Percent of factor scores that are zero 54

Stock screens

Ranking stocks based on securities lending factors

The screen below shows our best 20 buy ideas, based on the securities lending factors we discuss in this report. In our backtests, we find that a strategy of buying lightly shorted stocks with a large available lendable inventory tends to outperform on average.

For the complete details on how we construct our screens, please see the remainder of this report.

Best buy ideas

Figure 1: Our Top 20 buy ideas based on DB Quant security lending factors

SEDOL	Name	Country	Industry Group	Market Cap ($US, m)	Supply (%)	Utilisation (%)
677381	Samsung Elec Preference S1	Korea	Semi. & Semi. Equipment	12,803	19.6	0.1
695799	West Japan Railway Co	Japan	Transportation	6,773	44.0	0.2
B09N7M	China Shenhua Energy Co Ltd	China	Energy	15,957	25.5	0.8
B249SN	Sony Financial Holdings Inc	Japan	Insurance	3,213	20.6	0.3
663710	Newcrest Mining Ltd	Australia	Materials	31,316	26.9	0.6
659760	Mitsui Fudosan Co Ltd	Japan	Real Estate	14,920	19.7	0.4
625050	Daito Trust Construction Co Ltd	Japan	Real Estate	7,240	26.1	0.8
689567	Tokyo Electron Ltd	Japan	Semi. & Semi. Equipment	9,284	17.8	0.2
659730	Mitsui & Co Ltd	Japan	Capital Goods	30,010	15.6	0.1
644954	Hyundai Mobis Co Ltd	South Korea	Automobiles & Components	27,467	11.2	0.1
677172	Samsung Electronics Co Ltd	South Korea	Semi. & Semi. Equipment	117,397	11.9	0.2
695757	Iluka Resources Ltd	Australia	Materials	7,251	31.8	1.7
664137	Nippon Telegraph And Telephone	Japan	Telecommunication Services	23,323	11.7	0.0
B232R0	Sk Innovation	South Korea	Energy	12,155	7.2	0.0
669323	Posco	South Korea	Materials	30,717	10.3	0.1
B10RB1	Inpex Corp	Japan	Energy	15,685	15.8	0.4
686774	Swire Pacific Ltd	Hong Kong	Real Estate	9,291	19.8	0.5
667304	Incitec Pivot Ltd	Australia	Materials	6,577	22.8	0.7
680458	Shin Etsu Chemical Co Ltd	Japan	Materials	19,380	17.9	1.0
656302	Sumitomo Mitsui Financial Group	Japan	Banks	43,865	16.8	0.8

Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

A letter to our readers

Launching DB Global Equity Quantitative Strategy in Asia

It is with great pride and pleasure that we introduce our inaugural Asian Quantitative Strategy research series, *Quantiles*. Following the successful launch of our European and North American Quantitative Strategy product in 2010, we are expanding the global quant team to establish a local presence in Asia. This is a testament to the success of the quantitative research initiative within Deutsche Bank Global Markets Research over the last eighteen months. At the same time, it is a reflection of our belief that the Asian markets present a rich opportunity for quantitative investors.

Whilst setting out on a path that may seem well-trodden -- and increasingly commoditized -- we believe we have managed to differentiate ourselves globally through innovative research regarding fresh alpha sources, new portfolio construction techniques, and thematic research on current investment opportunities. Our North American and European teams already produce a series of regular reports covering both bottom-up and top-down topics.

Similar to our teams around the globe, our mission in Asia is to deliver a product that gives regular and ad-hoc quantitative insights into financial markets, as well as customized analyses based on your portfolios and risk scenarios. Our unified global approach, our partnerships with academic centres of excellence, and our close relationship with the Deutsche Bank Quantitative Trading and Derivatives Strategy teams should serve us in good stead in our efforts to deliver a world-class research product.

Quant in Asia: Unique challenges but rich opportunity

Quantitative investing in Asia is, like the region itself, an emerging discipline. Unlike the more developed markets (to which Japan belongs), where quants have successfully plied their trade for decades, the Asian markets present unique challenges. First and foremost among these is the frustrating lack of clean, good quality data in many, if not most, Asian markets. Finding a reliable source of information on company fundamentals in a region where even the companies themselves are often not entirely forthcoming about their true metrics can be difficult. Even getting a clean history of prices and returns can be a struggle at times. However, while data quality is perhaps the most visible hurdle for Asian quant investors, it is unfortunately not the only one. Implementation issues – for example market access and the ability to short securities – can present challenges, as can the lack of liquidity in many securities.

"In the middle of difficulty lies opportunity" – Albert Einstein

Paradoxically, these pitfalls are also the reason we are bullish on quant investing in Asia. We think there is significant alpha on the table for those who are willing to roll up their sleeves and put in the hard work necessary to overcome these challenges, Indeed, we would argue that Asian markets are rapidly approaching a "sweet spot" for quantitative investing, where data quality and liquidity are good enough for systematic trading, but before the weight of money chasing quant strategies starts to arbitrage away their profitability. We can see this if we look at the performance of the "bread and butter" quant factors -- like value, momentum, and earnings revisions -- which have held up much better in Asia compared to their developed market counterparts.

Proactively searching for new alpha

Having said that, markets are evolutionary, and good strategies don't last forever. Even in Asia -- where simple strategies like value and momentum investing still work quite well – there is the need to constantly stay one step ahead. As quant investing becomes more popular in Asia, it is inevitable that we will start to observe the same decline in the profitability of simple strategies that we have experienced in more developed markets, hence the need to constantly explore new alpha sources.

Case study: Harnessing securities lending data in Asia

In this report, we start our quest for new sources of alpha with an intriguing question: can we use securities lending data for stock selection in Asia? In our previous research, we found that stock selection factors derived from securities lending activity had good predictive power in the U.S. market.[1] Even better, these signals were relatively uncorrelated with more traditional alpha strategies. Can we take this idea and apply it to Asian markets, or do data quality issues and implementation hurdles mean we should stick to the basics? For the answer, read on.

We look forward to your comments and suggestions.

Sincerely,

Khoi & the Global Quant Team
Deutsche Bank Asian Equity Quantitative Strategy

[1] Cahan, R., Y. Luo, M. Alvarez, J. Jussa, and Z. Chen, 2011, "Signal Processing: The long and the short of it", *Deutsche Bank Quantitative Strategy*, 18 January 2011

Wandering across Asia

An investment process in seven steps

Designing an investment process is not a straightforward task. It requires several steps, each of which requires resources, patience, experience, and indeed genuine craftsmanship. We suggest the steps are:

- Data collection, normalization and integration
- Investment universe definition and characterization
- Investment criteria definition, strategy formulation
- Risk analysis and portfolio construction
- Transaction cost analysis, strategy capacity analysis
- Trading
- Performance evaluation

The common thread linking these steps is the investment philosophy.

The scope of our Pan-Asian research is genuinely broad. It is our intention to cover all developed and emerging markets in the region. Although it has been traditional to distinguish Japan and Asia ex-Japan across most investment firms and investment funds, we take the view that we can enrich our opportunity set by integrating these legacy clusters. Just to avoid any doubt, we do not believe that markets in the region are or will become more integrated in the short term, at least not to the extent that European markets are, for example. What we are after is depth and breadth, that is, the opportunity to take as many diversified bets as possible.

As we wander across Asia, it is our aspiration to provide down the road a flexible framework to quantify investment opportunities. Flexible because it will have to be aware of emerging regional dynamics and local specificities in order to identify opportunities that can be expressed in terms of regional risk premia, country and industry tactical allocation, and finally stock selection. In our upcoming research we will expand on these points. For now, we start by introducing our universe.

Defining our Pan-Asia universe

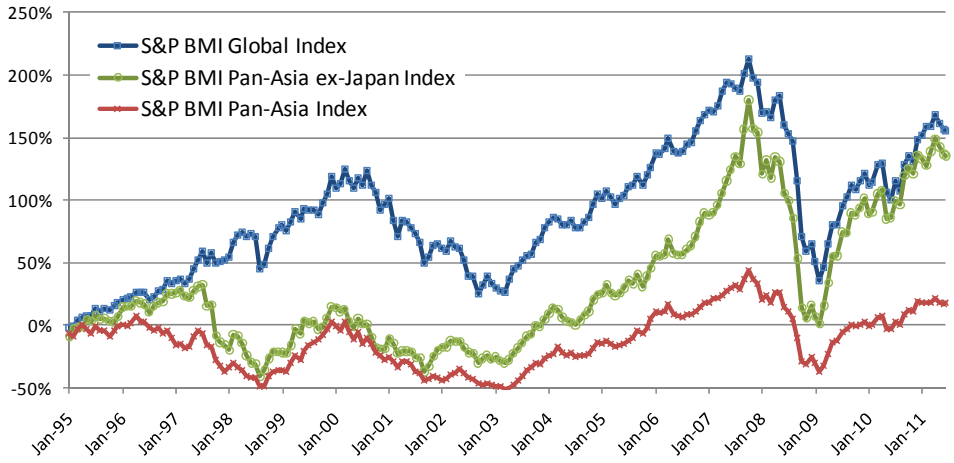
In order to start with the broadest investable universe possible and avoid potential survivorship bias, we have decided to work with S&P's suite of Broad Market Indices (S&P BMI). Historical data is available from July 1989 for some markets, but for a large proportion of emerging markets we have historical data only from 1994. Emerging markets specialists will be quick to point out the well established S&P IFCI index, which has a history tracing back to 1988. We can however also interpret the data availability as a moment in time when the opportunity set in Asian emerging equity markets has started to be recognized by institutional investors.

One weakness of using a benchmark to define one's investment universe lies in the fact that we are focusing on stocks that have been "promoted", i.e. have a track record that makes them "worthy" of belonging to a particular index. On the other hand, most market participants use an index to define their universe, which means that liquidity typically is better for stocks that are constituents of a well recognized index. On the whole, we think the benefits of using a well defined index as a universe outweigh the drawbacks.

Asian markets performance

Asian markets have performed particularly well over the past 10 years, with the notable exception of Japan. Investors have allocated considerable capital to the region, attracted by the growth potential it offers (Figure 2).

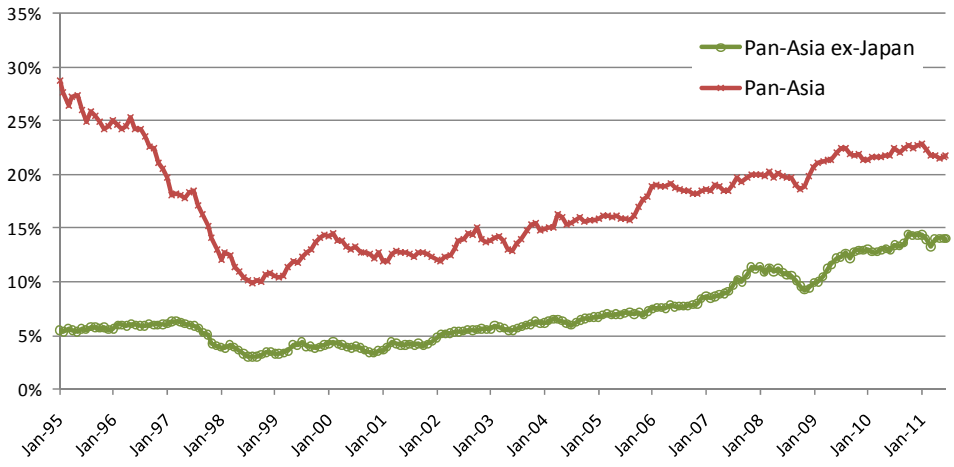
Figure 2: Historical Performance of S&P BMI Global, Pan-Asia, Pan-Asia ex-Japan



Source: S&P, Deutsche Bank

This impressive performance of Asian markets is reflected in the weight of the S&P BMI Pan-Asia index within the S&P BMI Global index (Figure 3).

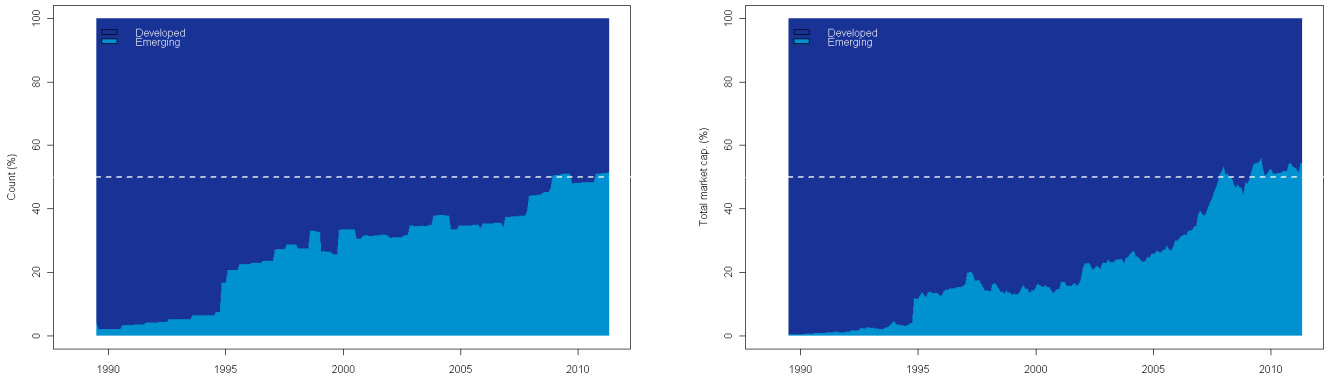
Figure 3: S&P BMI Pan-Asia weight in S&P BMI Global



Source: S&P, Deutsche Bank

Another impressive fact is the increasing weight of emerging markets in the S&P BMI Pan-Asia universe. We show below the proportion of stocks within the S&P BMI Pan-Asia universe stemming from emerging and developed markets, as well as the relative proportion of overall market capitalization. Both these proportions are above 50% in 2011.

Figure 4: S&P BMI Pan-Asia, developed. vs. emerging markets breakdown (count and market capitalization)



Source: S&P, Deutsche Bank

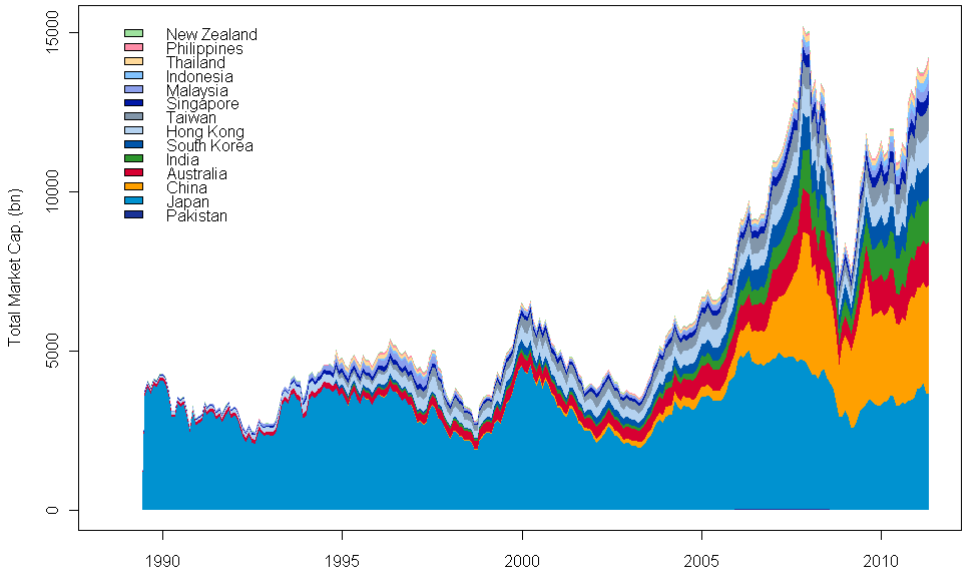
S&P BMI Pan Asia universe country composition

We do not believe that Asia as a whole can be considered one integrated market. It isn't one today and certainly hasn't been during the course of our historical sample. It also probably won't be in the near future either. The following countries are represented in the history of the S&P BMI Pan-Asia index:

- **Developed:** Japan, Australia, New Zealand, Hong Kong, Singapore, South Korea
- **Emerging:** Pakistan, China, India, Taiwan, Malaysia, Indonesia, Thailand, Philippines

Figure 5 shows a breakdown by country, which reveals the stagnation of Japan and the rise of China during the past 10 years.

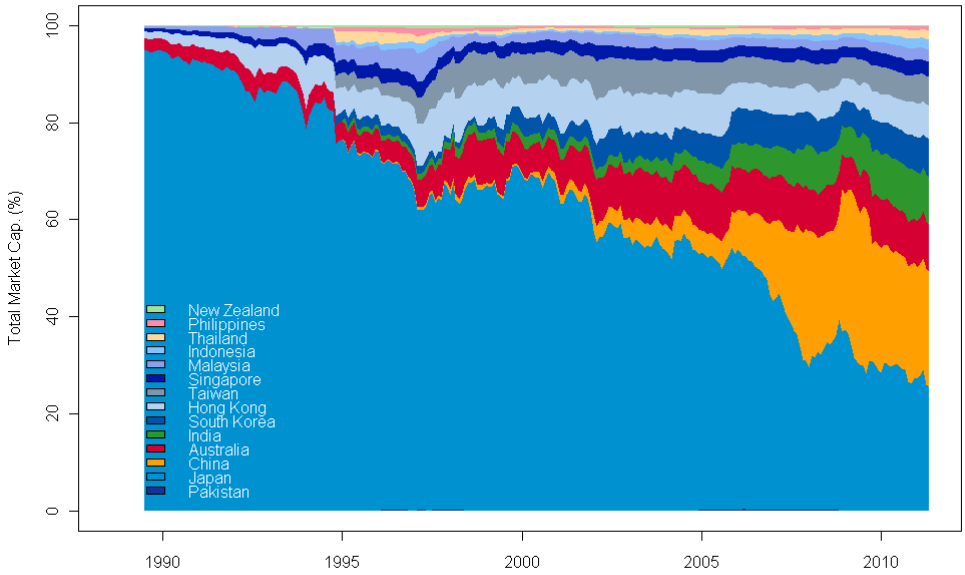
Figure 5: Asia total market capitalization breakdown by country (bn.)



Source: S&P, Deutsche Bank

From more than 60% of the overall market capitalization of the Asian universe, Japan's weight has now fallen below 30%.

Figure 6: Asia total market capitalization breakdown by country (%)



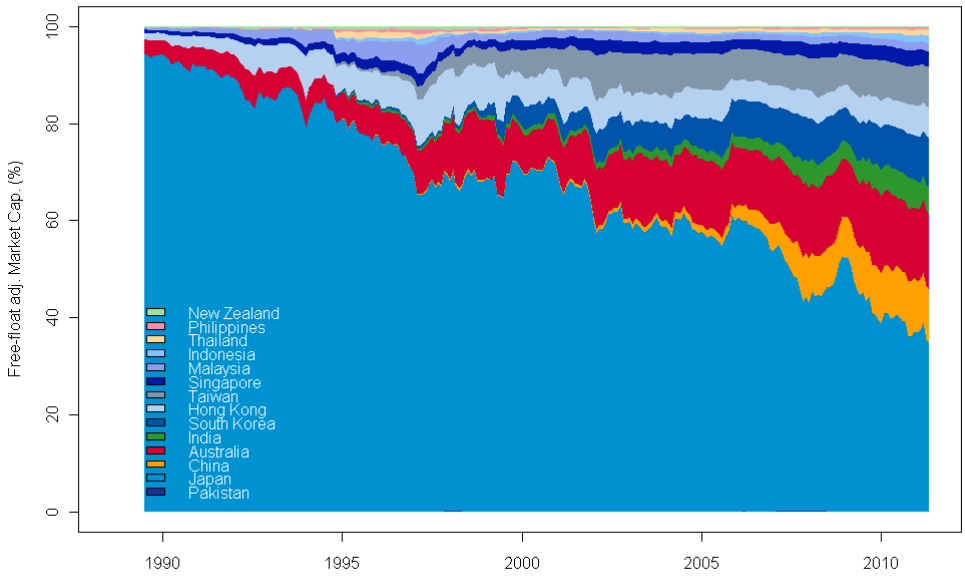
Source: S&P, Deutsche Bank

Caveats

There are, however, various caveats. Even if we assume that the S&P BMI is an investable universe (i.e. with stocks meeting for instance minimum liquidity requirements), we also have to take into account the proportion of market capitalization that can genuinely be captured. Foreign investment restrictions and significant insider ownership stakes (for example in the case of state-owned companies) are structural constraints that limit the market capitalization available for investment purposes. The graphs below show how the composition of our universe varies once we adjust the market capitalization by the "free-float" factor provided by S&P.

At the country level, the most striking impact is on China: the whole market capitalization of the A share market is considered off-limits by S&P, leaving us with only H & B shares (Figure 7).

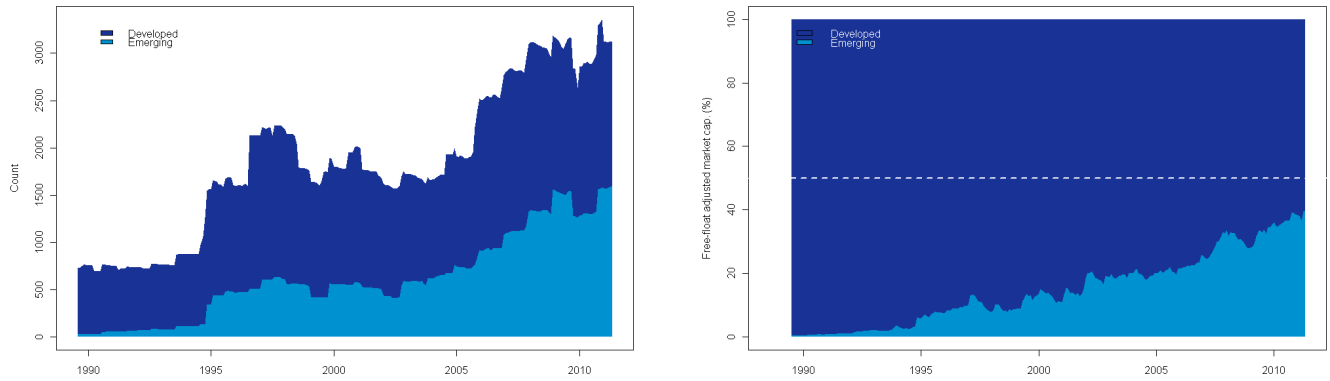
Figure 7: Asia free-float adjusted market capitalization breakdown by country (%)



Source: S&P, Deutsche Bank

The breakdown between developed and emerging markets is still interesting (Figure 8). We have in the more recent period over 3000 stocks in our universe, with about half in both categories. The weight of the emerging market stocks in our float adjusted market has risen steadily since the early 1990s and is now close to 40%.

Figure 8: Free-float adjusted universe: breakdown developed vs. emerging markets (count & market capitalization)



Source: S&P, Deutsche Bank

S&P BMI Pan Asia universe composition by GICS sectors

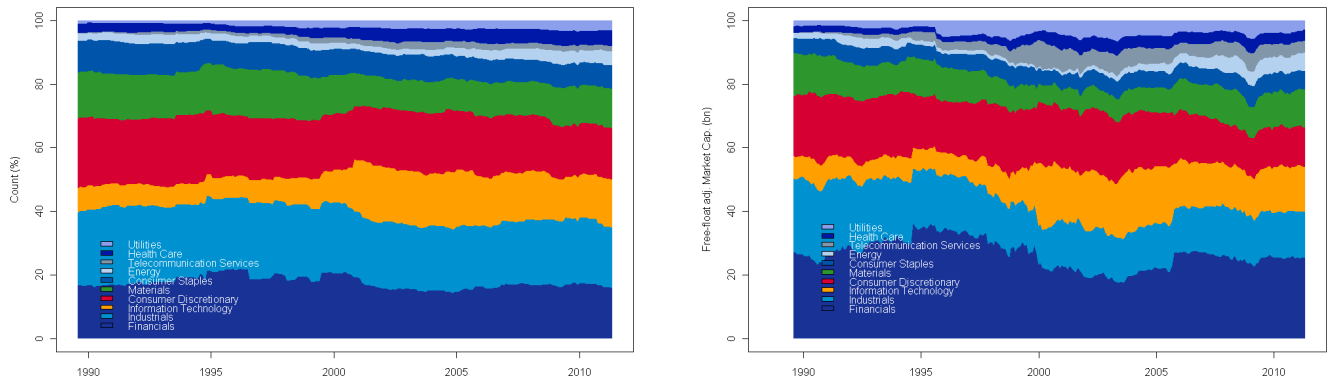
Choosing the right industry classification is also an important decision. Since we are working with S&P data, "GICS" (Global Industry Classification Standard) is readily available to us with a full history. We do not intend to review in this report the relevance of this industry mapping in Asia, but it is fair to say that in our experience, it is hard for a "global" classification to fit the "local" realities. One can for example wonder where Hong Kong conglomerates should be classified. Should they really be assigned to a single industry? Should they have their own category ,as in the Hang Seng classification?

We present below a breakdown by sector of the free float-adjusted universe (Figure 9). Interestingly, the distribution in terms of number of names across sectors is rather stable over time. This has also been more or less the case for the market capitalization distribution over the past 10 years.

The largest sectors are Financials, followed by Industrials, Consumer Discretionary. The smallest sectors are Telecommunication Services, Utilities and Healthcare. With about 50 stocks in the most recent years, the Telecommunication Services could potentially still provide enough depth and breadth for stock selection.

Information technology is the one sector that has seen a marked increase in number of names and market capitalization.

Figure 9: Free-float adjusted universe: breakdown by GICS sector (count & market capitalization, in %)



Source: S&P, Deutsche Bank

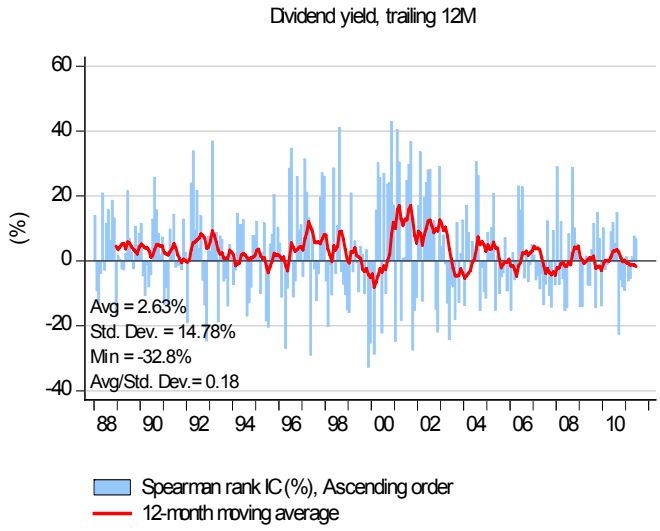
Asia: The last frontier for quants?

The story so far

From afar, investors often look longingly to Asia as a land of limitless opportunity. With the rest of the world mired in a depressing quagmire of tepid growth, debilitating austerity plans, and endless bailouts, Asia unsurprisingly stands out for all the right reasons. This may be true at a macro level, but for a quantitative investor is Asia really so very different?

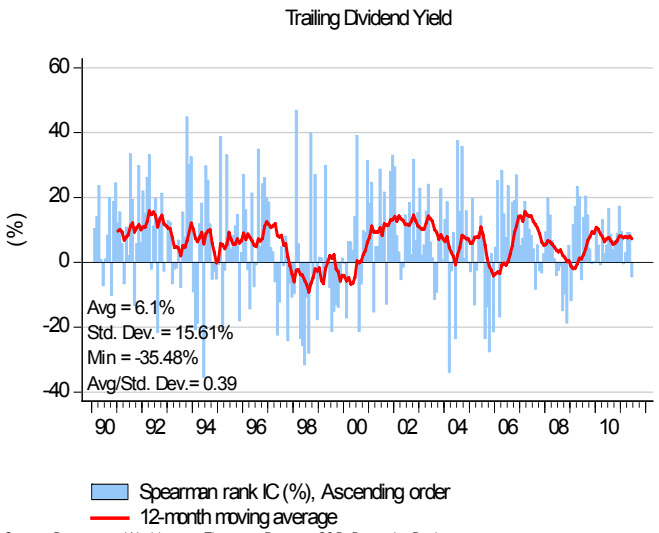
To help answer this question, consider the performance of some of the "bread and butter" quant factors in Asia compared to, say, the U.S. market. For example, the charts below show the performance of one of the simplest possible quant factors – trailing dividend yield – in the U.S. market and in our Pan-Asian universe.

Figure 10: Dividend Yield factor in the U.S., rank IC



Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 11: Dividend Yield factor in Pan-Asia, rank IC

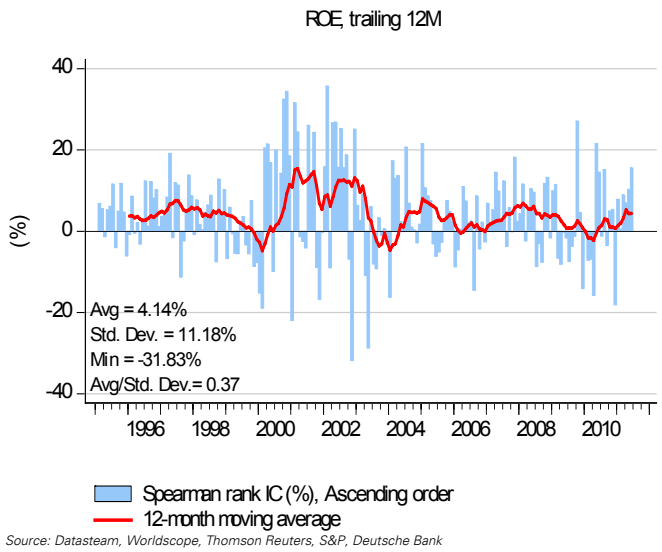


Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

The results are stark. In the U.S., dividend yield as a factor has added very little value for at least the last five years. In contrast, the performance of even this simple factor continues to be remarkably strong in the Pan-Asian universe. Of course, we are measuring performance here using the information coefficient (IC), which doesn't take into account the higher transaction costs in the Asian market. But even so, the contrast between the two regions is quite remarkable, and is one of the key reasons Asia is often cited as the next frontier for quantitative investors.

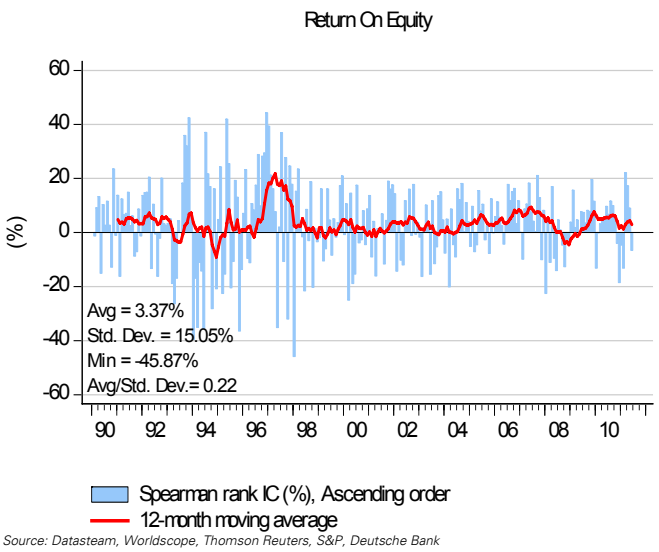
Let's take a look at another common factor, ROE. Figure 12 shows the historical performance of this factor in the U.S., and Figure 13 shows the results for Asia. Interestingly, in this case the U.S. has the edge. Perhaps this is because investors have less faith in accounting-based metrics in Asia, or perhaps the companies that perform best in Asia are "growth" companies that are not generating strong earnings yet. In our future research these are the kinds of questions we will seek to answer, but for now suffice it to say that again the Asian markets look somewhat different from a more mature market like the U.S.

Figure 12: ROE factor in the U.S., rank IC



Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

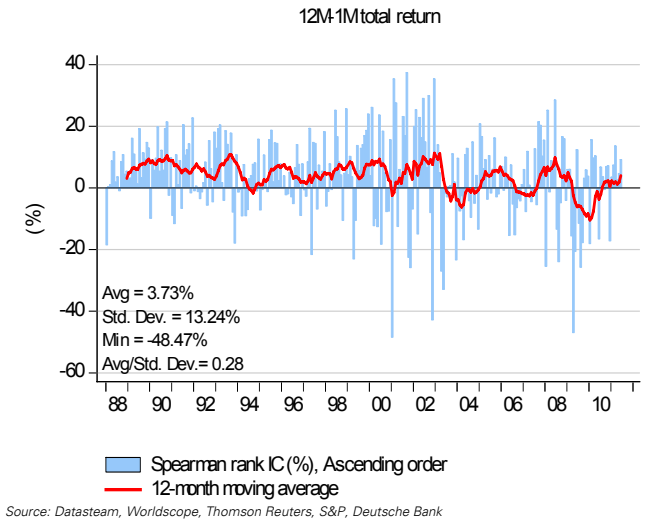
Figure 13: ROE factor in Pan-Asia, rank IC



Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

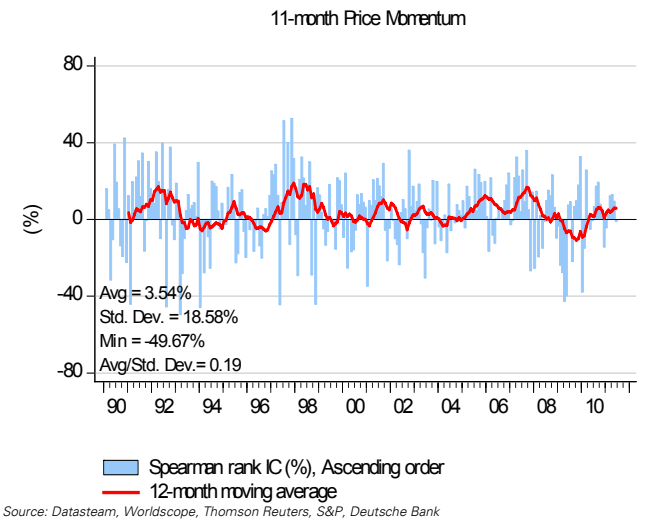
One final example is mid-term price momentum (which we measure as the total return for each stock over the past year, excluding the most recent month). Again, the chart on the left is for the U.S. and the chart on the right is Asia.[2]

Figure 14: Price Momentum factor in the U.S., rank IC



Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 15: Price Momentum factor in Pan-Asia, rank IC



Source: Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Here the similarities outweigh differences. In both markets momentum has been woeful in the risk-on/risk-off environment that has dominated post the financial crisis. Nonetheless, in the long run, momentum has generated consistent positive returns in both markets.

[2] We recently proposed an innovative technique for improving momentum by harnessing the term-structure of the factor. Our current research is for the U.S. market, but we will be testing the same idea in Asia. For more details, see: Alvarez, A., Y. Luo, R. Cahan, J. Jussa, and Z. Chen, 2011, "Signal Processing: Reviving momentum: Mission impossible?", *Deutsche Bank Quantitative Strategy*, 6 July 2011.

So what can we learn from this cursory comparison? We think there are two important lessons. First, simple factors that have lost their efficacy in developed, quant-saturated markets can still be effective in Asian markets, where the forces of arbitrage have yet to erode alpha. Second, and somewhat paradoxically, there are also a lot of similarities between markets. This is a good thing, because it means that quant is often region-agnostic: a good factor in one market can often be extended to another market without too much incremental effort. In the next section we offer a case study where we explore just such a factor.

Case study: Beyond short interest

As we mentioned in our introduction, one of the central philosophies that underpins our quantitative research at Deutsche Bank is the belief that markets are evolutionary. Strategies rotate in and out of favor, factor performance ebbs and flows, and new data sources emerge every day. Our goal is to stay one step ahead, by constantly researching new factors and new ways to capture alpha. In this case study we focus on a particularly interesting new alpha source: securities lending data.

The securities lending market has traditionally been an opaque market, and one where good quality data has been hard to come by. Needless to say, these issues are exacerbated in the Asian markets. However, in our recent U.S. research, we introduced an interesting new database.[3]

Introducing the DataExplorers database

Finding a good data source for securities lending data has always been a challenge due to the fragmented nature of the market and the fact that these transactions occur over-the-counter. This is particularly true in Asia, where the lending markets in many countries are still in the developmental stage. In this study, we use data provided by a data vendor called DataExplorers, who have constructed a large database of securities lending data by collecting data from a wide range of participants in the stock lending market, including beneficial owners (i.e. lenders), buy-side investors (i.e. borrowers), and intermediaries (i.e. prime brokers).

According to DataExplorers, the data set now covers around 90% of the global securities lending market by market capitalization, and draws data from a wide range of market participants including 120 global custodian banks, over 100 institutional buy-side firms, and 9 of the top 10 prime brokers.[4] Of course, as with any database, coverage is skewed towards the developed markets. Below we examine the coverage statistics in each Asian market.

Securities lending in Asia: The state of play

Unsurprisingly, the securities lending market in Asia is very much delineated along the usual developed (or mostly developed) and emerging lines. Australia, New Zealand, Hong Kong, South Korea, Japan, and Taiwan all have well defined securities lending regulations and rules, and reasonably liquid borrowing markets. In contrast, the younger Asian markets – for example India, China, Indonesia, Malaysia, Thailand, and the Philippines – tend to be much more piecemeal in terms of availability of borrow and market access.

These differences become obvious when we examine the coverage of the DataExplorers database by country. As DataExplorers adds more Beneficial Owners, Lenders and Buy-Side clients, we can expect their data to reflect more accurately the overall securities lending landscape. But as of now, our understanding is that DataExplorers are expanding their coverage on a market-by-market basis, reaching out to domestic players after having managed to bring on board many of the major global institutions.

[3] Cahan, R., Y. Luo, M. Alvarez, J. Jussa, and Z. Chen, 2011, "Signal Processing: The long and the short of it", *Deutsche Bank Quantitative Strategy*, 18 January 2011

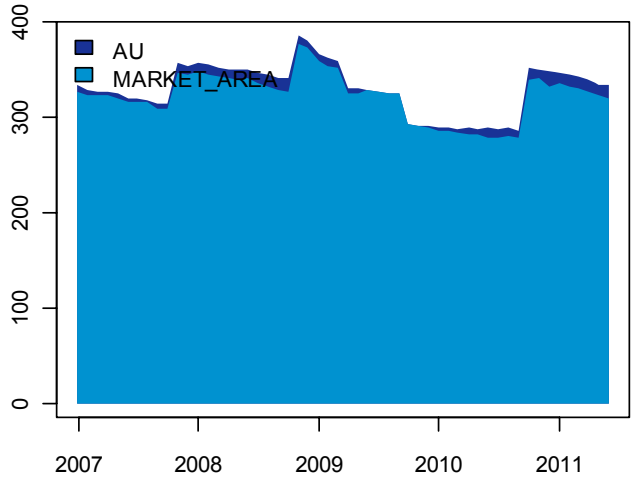
[4] DataExplorers, 2011, "Strategic Update Q1 2011: Securities Finance", January 2011

In the charts below, we show the number and percent of stocks in each market with securities lending data. In each case, our base case universe is the S&P BMI country index. As a first pass, we focus on the raw coverage statistics; as we begin backtesting the potential factors we will drill down into the data in more detail.

Australia

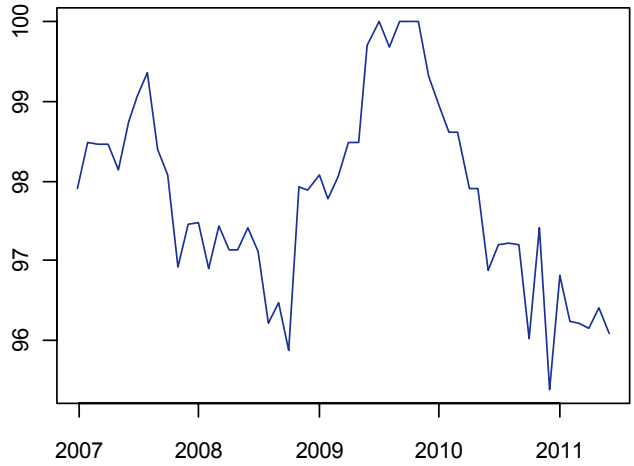
Overall coverage in the Australian market is excellent, which is not surprising given the well developed and relatively deep securities lending market in that country. Coverage is consistently above 95% over time.

Figure 16: Number of stocks in S&P BMI Australia index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 17: Percent of stocks in S&P BMI Australia index with DataExplorers coverage

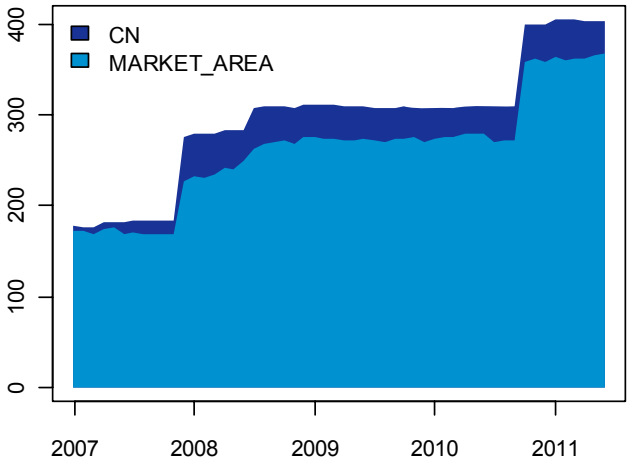


Source: DataExplorers, S&P, Deutsche Bank

China

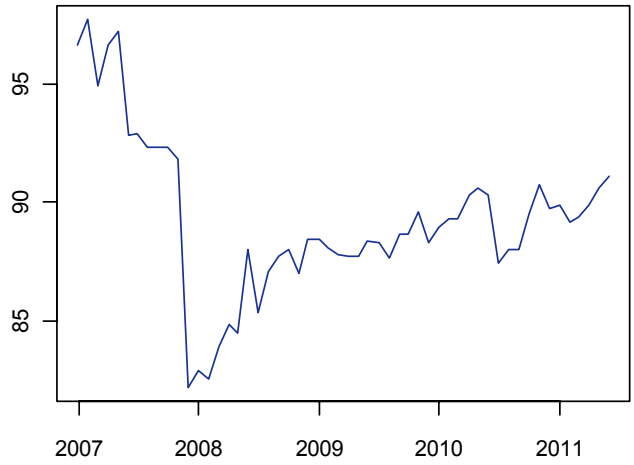
The bulk of the securities in the S&P BMI China with a strictly positive free-float will actually be listed in Hong Kong. These securities will of course be available as part of the pool of securities lendable in Hong Kong. As a result, coverage – at least in raw terms – is reasonably good.

Figure 18: Number of stocks in S&P BMI China index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 19: Percent of stocks in S&P BMI China index with DataExplorers coverage

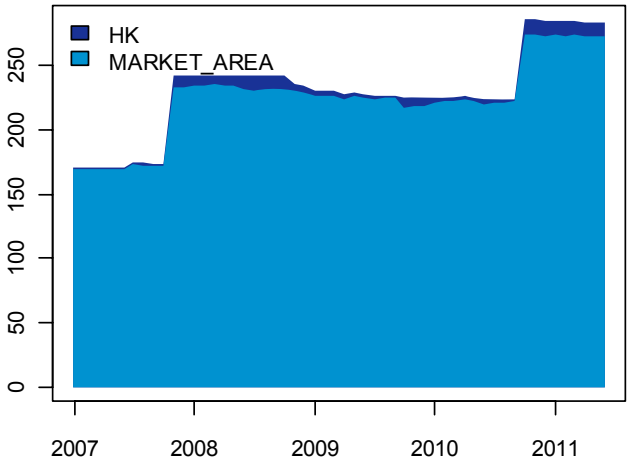


Source: DataExplorers, S&P, Deutsche Bank

Hong Kong

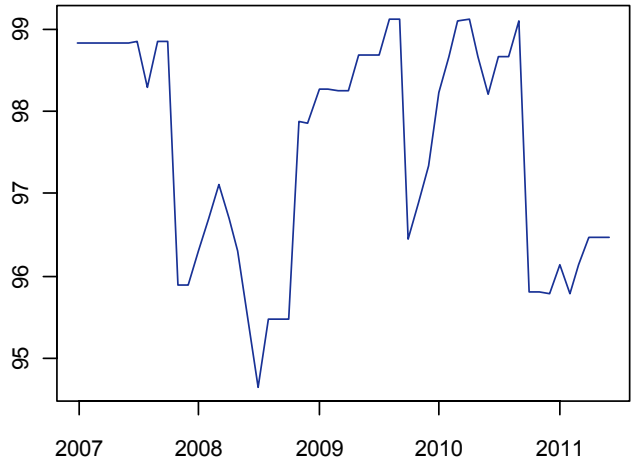
Coverage in Hong Kong is also relatively good, albeit with a bit of a dip through the 2008 financial crisis. This is a feature we see in many markets, and is not too surprising – through the turmoil of the crisis many securities owners withdrew from lending programs, and many borrowers were either restricted from borrowing by temporary shorting restrictions or were forced to liquidate short positions as they deleveraged.

Figure 20: Number of stocks in S&P BMI Hong Kong index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 21: Percent of stocks in S&P BMI Hong Kong index with DataExplorers coverage

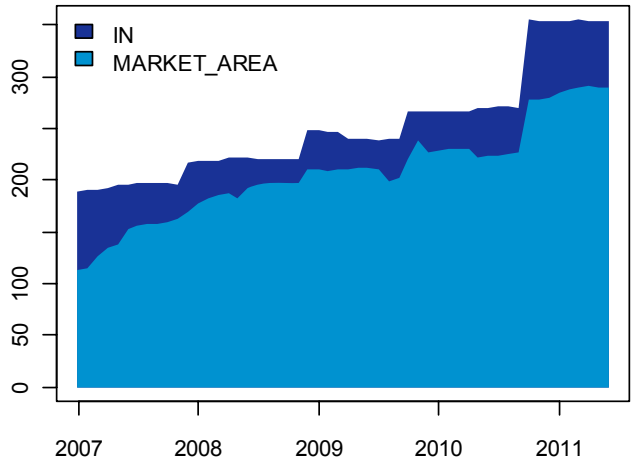


Source: DataExplorers, S&P, Deutsche Bank

India

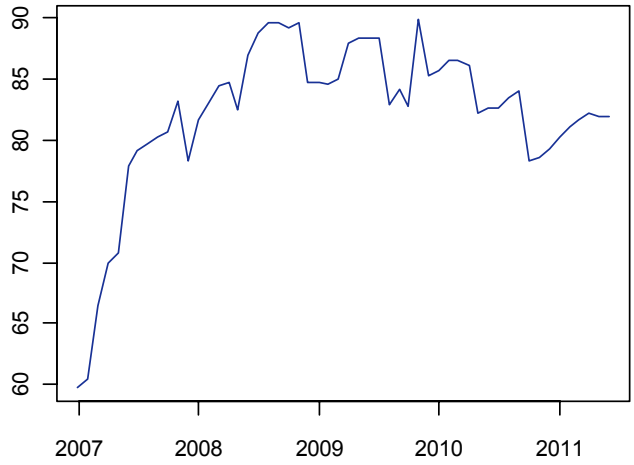
Coverage in India is improving, and currently runs at around 80% of securities in the S&P BMI index. However, as with many of the other developing markets, data quality is an entirely different question. Just because data exists does not imply it is necessarily perfect quality, something that will become apparent as we begin to backtest factors based on the data.

Figure 22: Number of stocks in S&P BMI India index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 23: Percent of stocks in S&P BMI India index with DataExplorers coverage

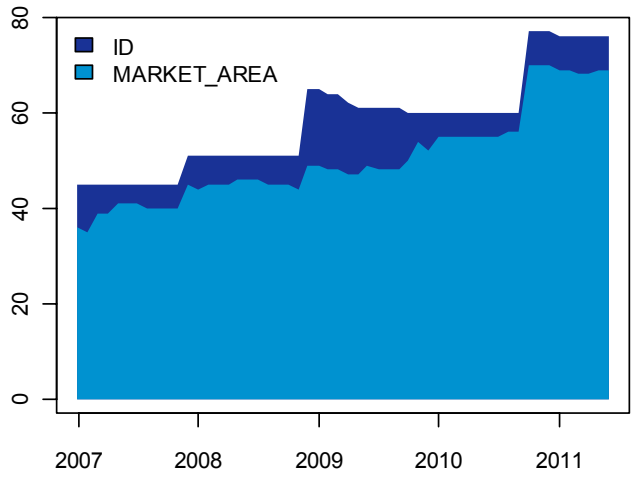


Source: DataExplorers, S&P, Deutsche Bank

Indonesia

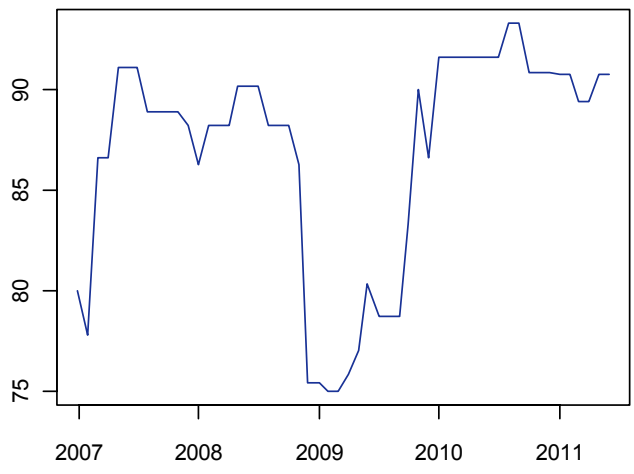
Like India, coverage in Indonesia looks relatively good on face value, but the question again will be whether the quality of the underlying data is sufficient to build a robust stock selection signal.

Figure 24: Number of stocks in S&P BMI Indonesia index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 25: Percent of stocks in S&P BMI Indonesia index with DataExplorers coverage

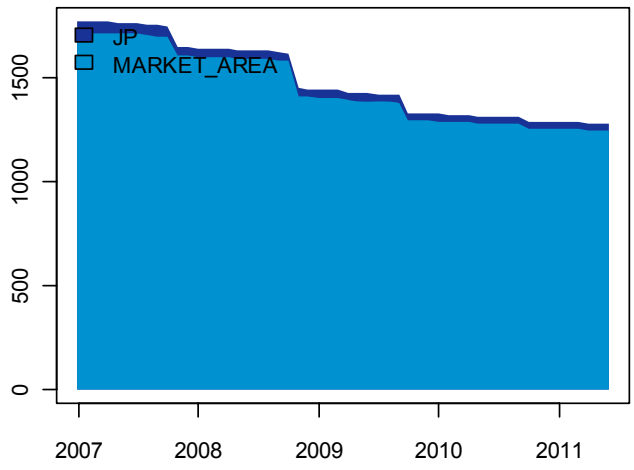


Source: DataExplorers, S&P, Deutsche Bank

Japan

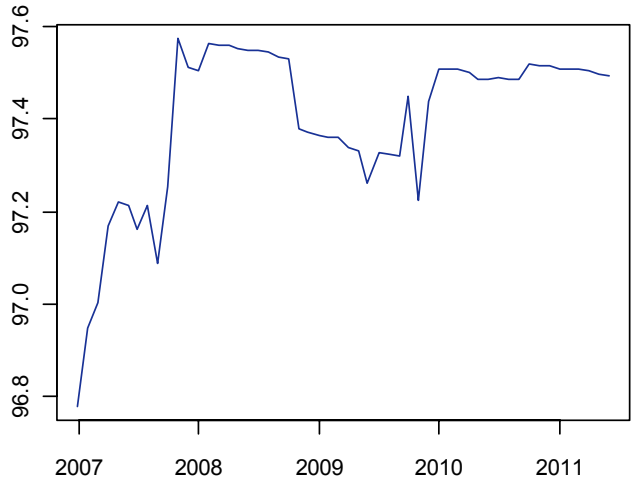
Of all the markets we consider, Japan is of course the most developed. This is reflected in the coverage which is excellent; the majority of stocks have securities lending data available for the complete history.

Figure 26: Number of stocks in S&P BMI Japan index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 27: Percent of stocks in S&P BMI Japan index with DataExplorers coverage

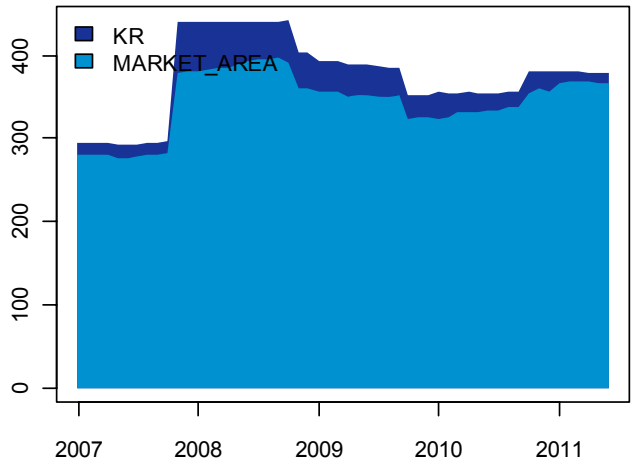


Source: DataExplorers, S&P, Deutsche Bank

South Korea

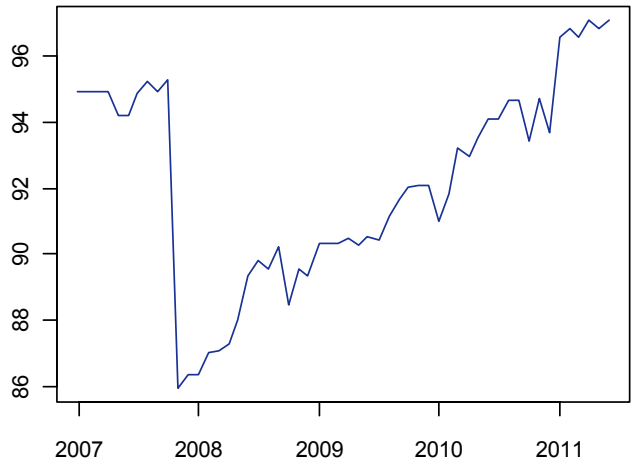
The number of stocks with securities lending data has been recovering steadily since a low in the throes of the financial crisis in 2008.

Figure 28: Number of stocks in S&P BMI South Korea index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 29: Percent of stocks in S&P BMI South Korea index with DataExplorers coverage

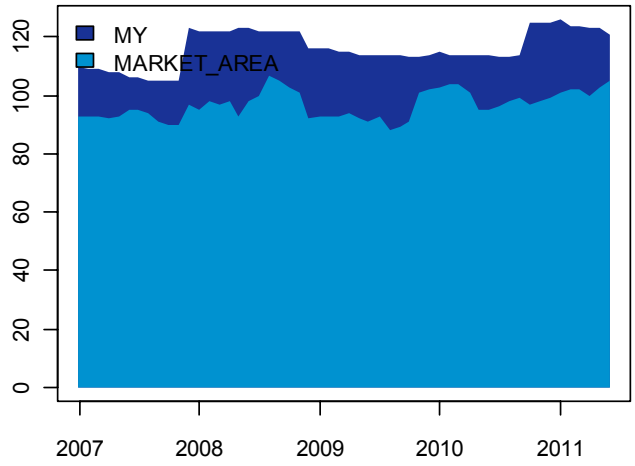


Source: DataExplorers, S&P, Deutsche Bank

Malaysia

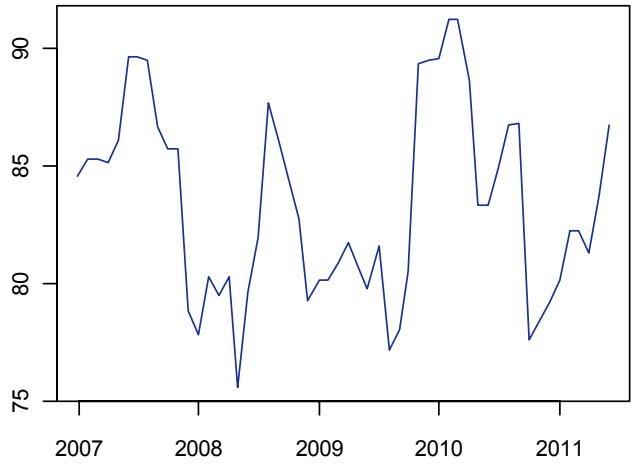
The availability of securities lending data in Malaysia has been somewhat volatile over time, which is probably to be expected in a market that is still firmly in the "emerging" bucket.

Figure 30: Number of stocks in S&P BMI Malaysia index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 31: Percent of stocks in S&P BMI Malaysia index with DataExplorers coverage

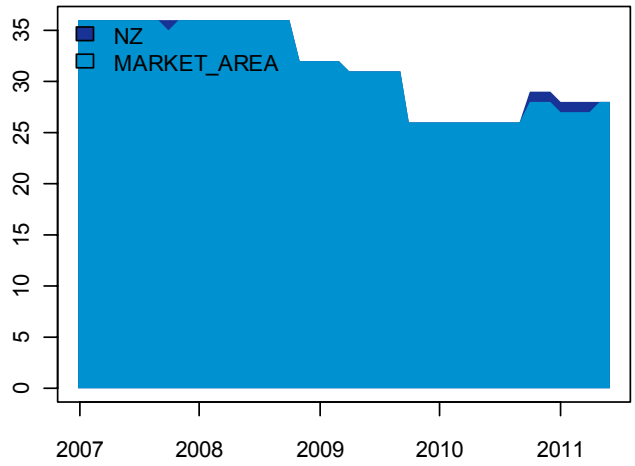


Source: DataExplorers, S&P, Deutsche Bank

New Zealand

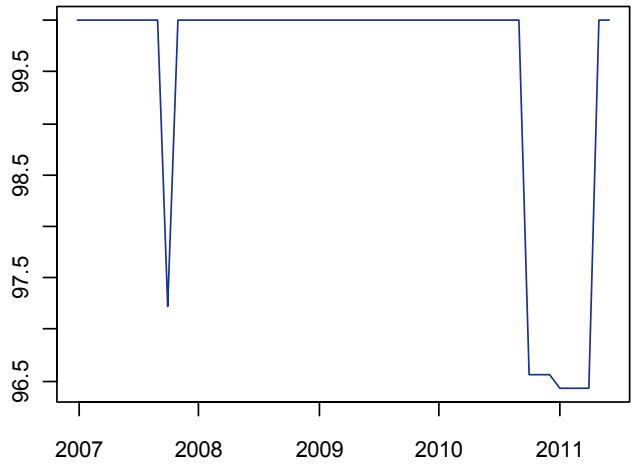
For a small country, New Zealand has a well developed securities lending market, and on the whole data availability is good across the breadth of the small universe.

Figure 32: Number of stocks in S&P BMI New Zealand index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 33: Percent of stocks in S&P BMI New Zealand index with DataExplorers coverage

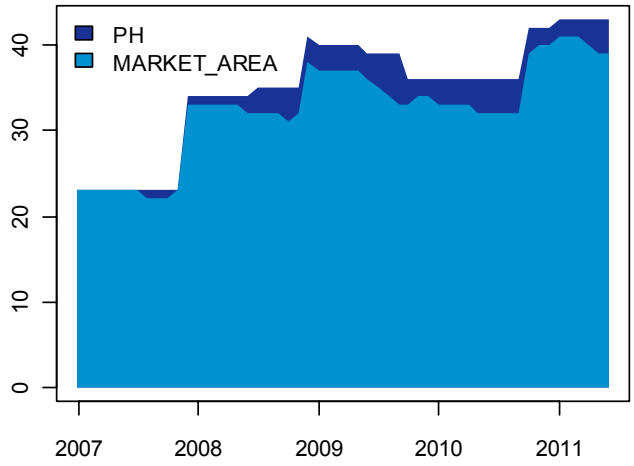


Source: DataExplorers, S&P, Deutsche Bank

Philippines

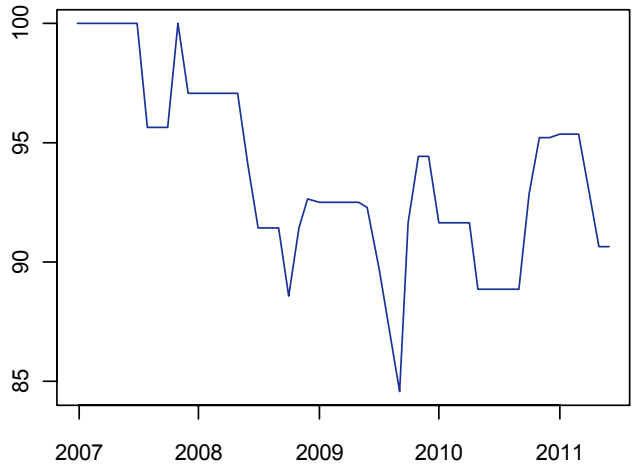
Raw data coverage in the Philippines is relatively good, but pure coverage statistics disguise the fact that the data is relatively sporadic.

Figure 34: Number of stocks in S&P BMI Philippines index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 35: Percent of stocks in S&P BMI Philippines index with DataExplorers coverage

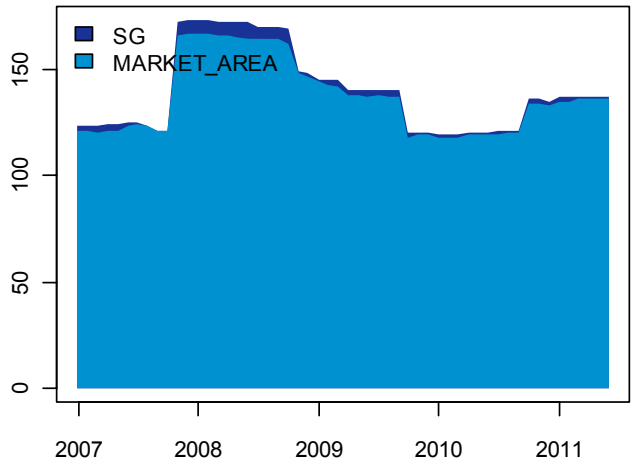


Source: DataExplorers, S&P, Deutsche Bank

Singapore

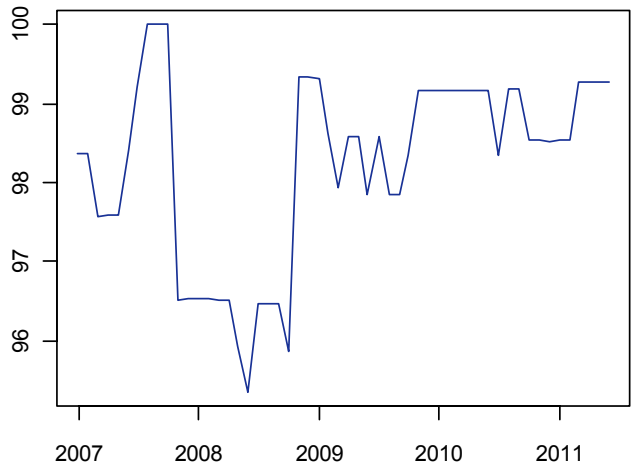
Like the other developed Asian markets, Singapore has a relatively well established securities lending market and as a result most stocks in the universe have coverage.

Figure 36: Number of stocks in S&P BMI Singapore index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 37: Percent of stocks in S&P BMI Singapore index with DataExplorers coverage

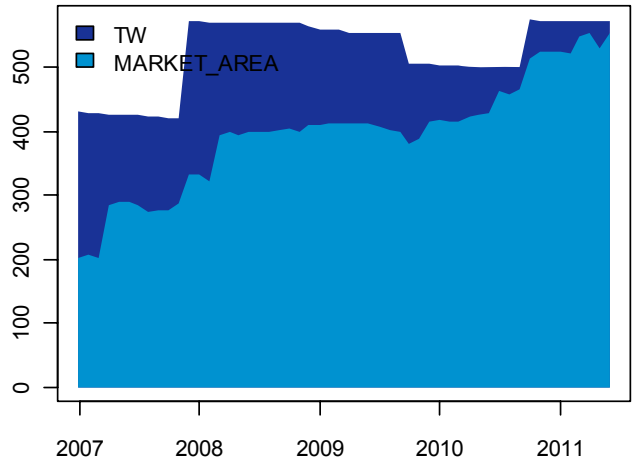


Source: DataExplorers, S&P, Deutsche Bank

Taiwan

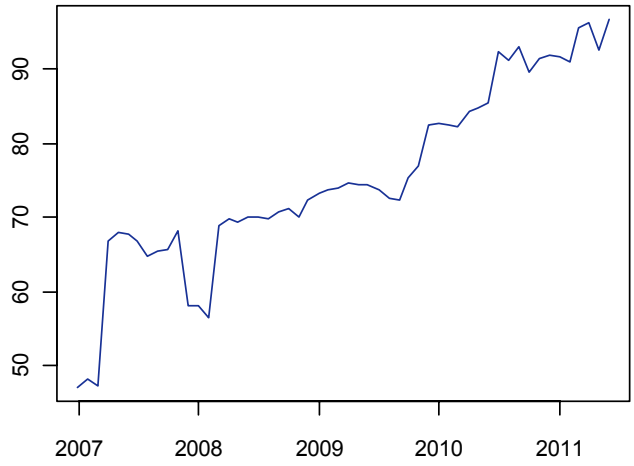
Data coverage in Taiwan has been improving steadily over the data history, and is now running at over 90%.

Figure 38: Number of stocks in S&P BMI Taiwan index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 39: Percent of stocks in S&P BMI Taiwan index with DataExplorers coverage

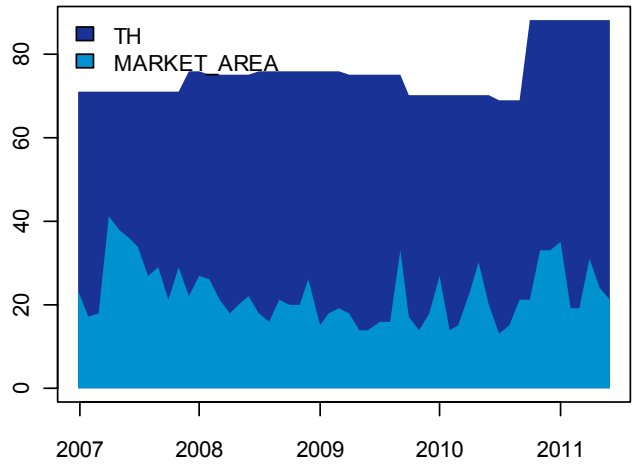


Source: DataExplorers, S&P, Deutsche Bank

Thailand

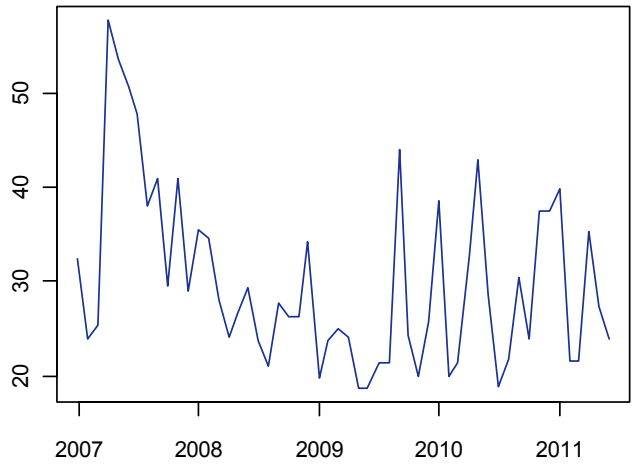
Of all the markets, coverage in Thailand is by far the worse. On average, only around 20% of stocks have securities lending data at any point in time.

Figure 40: Number of stocks in S&P BMI Thailand index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Figure 41: Percent of stocks in S&P BMI Thailand index with DataExplorers coverage



Source: DataExplorers, S&P, Deutsche Bank

Testing securities lending signals in Asia

Overall, the charts in the previous suggest that securities lending data is available in most Asian markets. However, the real question is whether the data is of sufficient quality to derive any useful stock-selection signals. In this section we take a closer look at the potential factors we can build out of this data, and test them in the markets where we have adequate data.

The first step in determining if there are any alpha opportunities in the securities lending data is to test some potential factors on a stand-alone basis. The DataExplorers database is quite a rich dataset, so there are numerous factors we could potentially pick. Figure 42 lists some of these. Broadly speaking, we can classify the factors into four categories:

- **Demand** metrics measure the borrowing demand in each security, i.e. how many shares are currently on loan to borrowers, and how has this changed over time.
- **Supply** metrics capture the available inventory, or shares available to borrow, for a given security. In other words, this captures the number of shares that beneficial owners (e.g. pension funds, mutual funds, etc.) have available to lend out.
- **Utilization** metrics combine supply and demand, by measuring the percent of available inventory that is currently on loan.
- **Costs** are measured by a variety of metrics that capture the cost of borrowing a particular security. This is a particularly important category for quant investors, who tend to follow long-short market neutral strategies and hence need to short frequently.

Figure 42: Examples of potential securities lending factors

Type	Examples	Definition	Rationale
Demand	Total Demand Quantity	Total quantity of borrowed/loaned securities net of double counting	Designed to capture the amount of stock that is currently being borrowed. Most of the traditional short interest metrics that quants use fall into this category.
	Short Interest	Total Demand Quantity / Shares on Issue	
	Days to Cover	Total Demand Quantity / Average Daily Volume	
Supply	Active Agents	Number of custodians and lending agents with open transactions	Measures the amount of stock that is available for lending. Can be a proxy for institutional ownership, because it is almost exclusively institutional investors who make their holdings available for lending.
	Active Available BO Inventory Quantity	Quantity of shares realistically available for borrowing by removing BO On Loan Quantity from Active BO Inventory Value	
	Percent of Shares Available for Borrow	Active Available BO Inventory Quantity / Shares on Issue	
Utilization	Active Utilization	Demand value as a % of the realistically available supply (BO On Loan Value / Active BO Inventory Value)	A fusion of the supply and demand categories. Measures the percent of available inventory that is currently being lent out. Potentially a useful measure for identifying short squeeze candidates, where the available supply of lendable stock is becoming exhausted.
	Change in Utilization, 1M	One month change in Active Utilization	
Borrow Cost	VWAF Score 30 Day	Value weighted average fee for all new trades on the most recent 30 calendar days expressed in undisclosed fee buckets 0-5, where 0 is the cheapest to borrow and 5 the most expensive	Measures the cost of borrowing a particular stock. This can either be from the perspective of a custodian bank or broker who pays the beneficial owner (e.g. DCBS) or a hedge fund who pays a prime broker (e.g. SAF/SAR)
	DCBS	Data Explorers Daily Cost of Borrow Score; a number from 1 to 10 indicating the rebate/fee charged by the agent lender based on the 7 day weighted average cost, where 1 is cheapest and 10 is most expensive	
	SAF	Simple average fee of stock borrow transactions from hedge funds in this security	
	SAR	Simple average rebate of stock borrow transactions from hedge funds in this security	

Source: DataExplorers, Deutsche Bank

In our U.S. research[5], we tested around 30 potential factors, but given the data coverage limitations highlighted in the previous section, we focus on a much smaller list in Asia. Specifically, we pick five factors that we think are (1) representative of the broader set of potential securities lending factors, and (2) have relatively good coverage in at least the developed Asian markets. These five factors are shown in Figure 43.

Figure 43: Securities lending factors for Asia

Factor	Definition	Rationale
Short Interest	Total shares being borrowed as percent of total float shares on issue	Most basic measure of the level of shorting in a stock. The higher the percentage of shares that are being shorted, the more negative the sentiment around that stock.
Days to Cover	Total shares being borrowed as percent of average daily volume traded	Measures how long it would take to cover all the shares sold short, assuming we trade at average daily volume. A higher number is more negative.
Supply	Total shares still available for lending out as percent of total shares on issue	Measures how much inventory remains for a particular security as a percent of the float shares for that company. A higher number is positive because it means there is a lot of supply left for lending which has not yet been used up.
Utilisation	Total shares being borrowed as percent of total shares of inventory	Measures how much of the lendable inventory in a security has been used up, e.g. if this number is 50%, it means half the shortable shares are already being borrowed. A higher number is negative.
Active Utilisation	Total shares being borrowed as a percent of active total shares of inventory	Same as the above factor, except uses a proprietary DataExplorers algorithm to infer the proportion of inventory that is really available for lending, after controlling for stale positions etc.

Source: DataExplorers, Deutsche Bank

Data issues: Quality not quantity is the name of the game

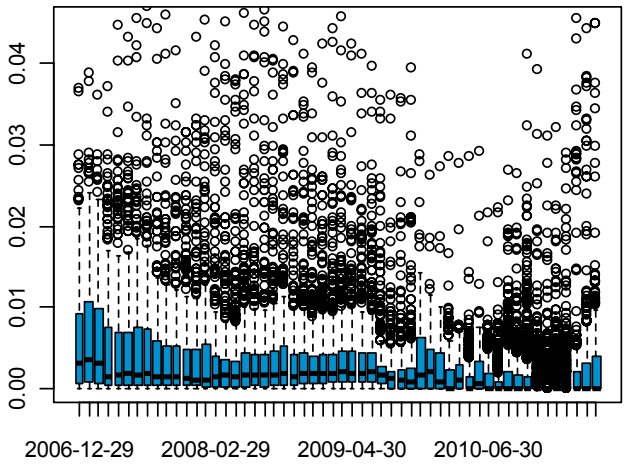
After analyzing the quality of the securities lending data in each market, we settle on six markets where we believe the data is good enough to get sensible results: Australia, China (Hong Kong listed stocks only), Hong Kong, Japan, South Korea, and Singapore. [6] Unsurprisingly, these tend to be the more developed markets in Asia (other than China, but there we only consider Hong Kong listed shares). For the less developed markets, we found that despite the reasonable coverage (typically above 80%, see previous section), the actual coverage for individual data items was sporadic at best. This is not necessarily a shortcoming in the DataExplorers database per se. Rather, for many of the developing markets shorting is difficult – it is expensive or restricted by regulations – so borrowing activity itself can be fairly sparse, and consequently factors built on it somewhat random.

In fact, even some of the more developed markets face data quality issues. For example, consider the case of Taiwan. The charts below show the evolution of the cross-sectional distribution for two variables, Supply (Figure 44) and Utilisation (Figure 45). Although Supply seems to have a reasonable distribution, the lack of coverage for Utilisation and/or a historical mode at 0 in the middle of the available history is problematic, and as a result we chose to remove Taiwan from our analysis.

[5] Cahan, R., Y. Luo, M. Alvarez, J. Jussa, and Z. Chen, 2011, "Signal Processing: The long and the short of it", *Deutsche Bank Quantitative Strategy*, 18 January 2011

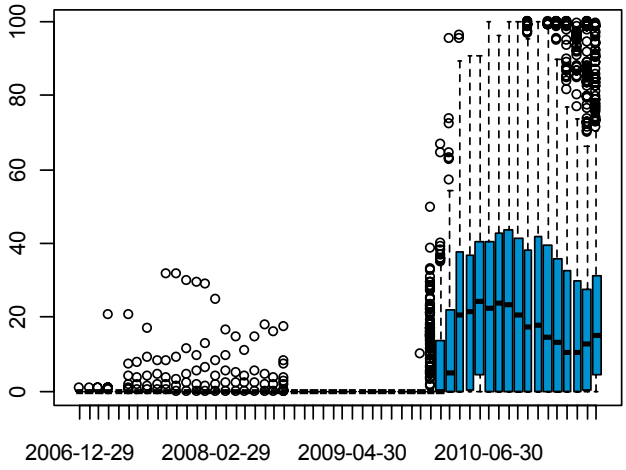
[6] Complete analysis of the markets we have not selected is available on request.

Figure 44: Historical cross-sectional distribution for Supply in Taiwan



Source: DataExplorers, Deutsche Bank

Figure 45: Historical cross-sectional distribution for Utilisation in Taiwan



Source: DataExplorers, Deutsche Bank

In addition, there are two more important considerations that lead us to limit our study to the six markets mentioned above. First, we want to focus on countries where the securities lending market is deep enough to give us confidence that the numbers being reported by participants in the DataExplorers database are reasonably representative of the overall market. If there are only a few participants in a given market, then there will be a major impact on data coverage if a handful of participants choose not to submit their data to DataExplorers. By focusing on markets with a relatively large number of players, we hope to mitigate this issue to some extent.

Second, we want to ensure that we can realistically implement a long-short strategy based on the securities lending data, should we find any stock selection ability in the signals. This requirement, of course, is not limited to the securities lending factors per se; for any long-short quant strategy this is also a basic requirement. However, it is particularly important in the case of securities lending signals, because in our past research we have found that such signals usually work best when one follows the shorts, which in turn requires one to take short positions in securities which are already more heavily shorted and therefore likely to be more expensive to short.

Pan-Asia

The charts below show the backtested performance for each factor[7] in a Pan-Asian universe, which comprises the union of the six markets where we are comfortable with the data: Australia, HK-listed China, Hong Kong, Japan, South Korea, and Singapore. We measure performance in three ways: the rank information coefficient (IC), the average annualized return to each quintile portfolio, and the cumulative performance of the quintile portfolios. For complete details on our backtesting methodology, please refer to our *DB Quant Handbook* where we discuss in detail our backtesting framework and philosophy.[8]

[7] We report only the results for Utilisation, rather than both Utilisation and Active Utilisation, because we find the results to be qualitatively similar in Asia.

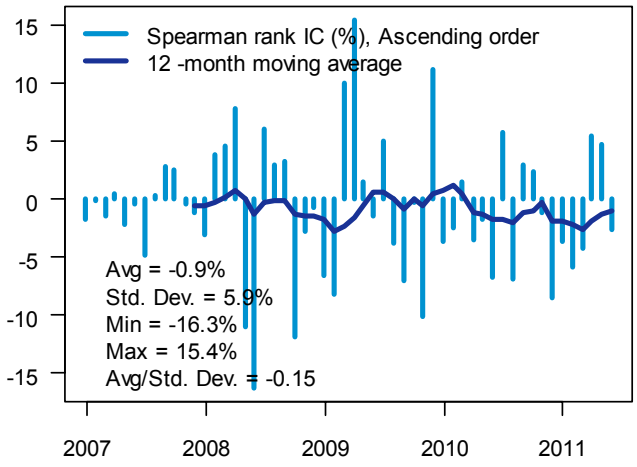
[8] Luo, Y., R. Cahan, J. Jussa, and M. Alvarez, 2010, "QCD Model: DB Quant Handbook", *Deutsche Bank Quantitative Strategy*, 22 July 2010

Rank information coefficient

Figure 46 to Figure 49 show the performance of the Short Interest, Days to Cover, Supply, and Utilisation factors, respectively. Qualitatively the results are quite similar to what we find empirically in the U.S. market (again, see our report *The Long and the Short of It*, 19 January 2011). On average, stocks with high short interest (Figure 46) tend to underperform over the following month. In other words, over a one month timeframe short sellers do appear to have some ability to pick stocks which will underperform.

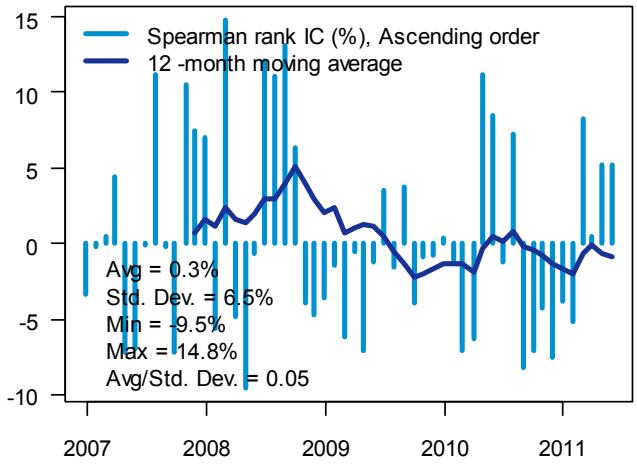
However, for Days to Cover (Figure 47), the results are mixed. The average IC over the backtest period is close to zero (in fact it is statistically insignificant), and the factor performance tends to oscillate between positive and negative over time.

Figure 46: Short Interest: Rank IC



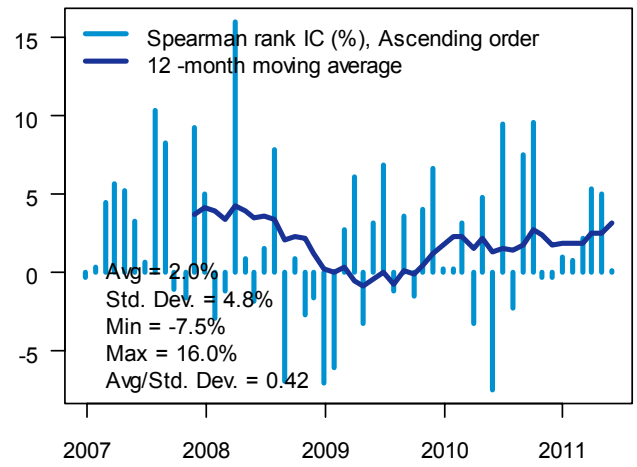
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 47: Days to Cover: Rank IC



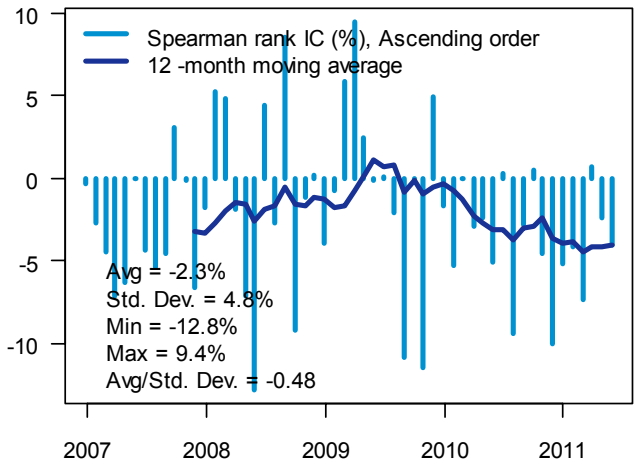
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 48: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 49: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

In contrast, the results for Supply (Figure 48) are more in line with our expectations. Recall that Supply measures the percent of float shares that are still available for lending out, so a high score on this factor means a stock has lots of available supply left. On balance we would expect this to be a good thing, because such a stock tends to be well held institutionally and lightly shorted, and indeed the direction of our backtesting results confirms this. A strategy of buying stocks with large Supply and selling those with limited Supply works reasonably well.

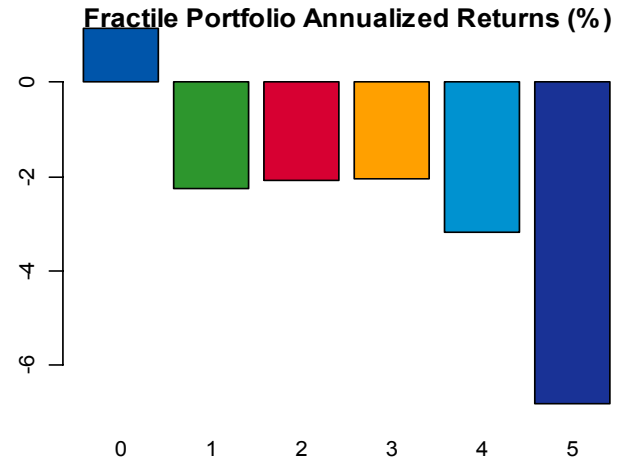
The final factor, Utilisation (Figure 49), is a fusion of the demand and supply side of the equation. The factor measures the percent of lendable shares that is currently being lent out. For example, if Utilisation is 100% then it would be difficult to borrow the stock, because all the available supply has been used up; if it is 0% then none of the available inventory is being borrowed. Again, the direction of the factor lines up with our expectations – stocks with high utilisation tend to underperform on average in the following month. This again supports the thesis that short sellers do have some ability to predict future underperformance, since stocks with high utilization are those with heavy short selling relative to the available inventory in the stock.

Average quintile returns

The ICs in the previous chart are useful for gauging the raw signal efficacy of the factors, but the drawback of this metric is that it can't be interpreted in terms of actual returns to a real-life portfolio. So we also consider the average annualized average annualized return to simple quintile portfolios, with one important modification: we separate out stocks with a zero factor score so that we can track their performance separately. This bucket is the one labeled "0" in the charts. The reason for this adjustment is that many stocks in Asia tend to have a zero factor score for certain factors – for example, on average for the Pan-Asian universe about 20% of stocks have zero Short Interest, Days to Cover, Supply, and Utilisation.[9] In the case of these securities lending factors, a zero score is not the same as missing data; having zero short interest for example means that a stock is lendable but currently no lending is taking place.

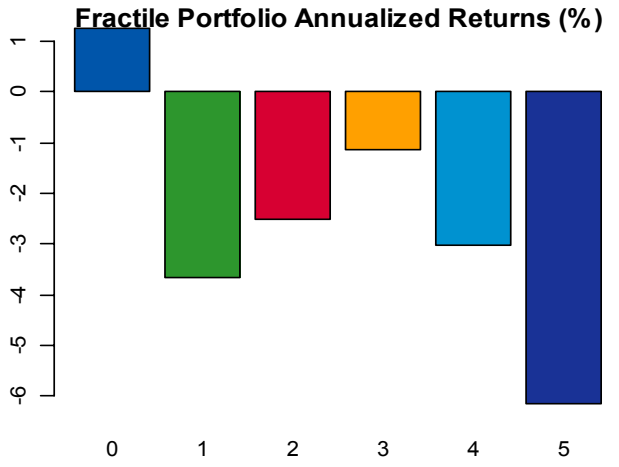
The next four charts show the average annualized return to each quintile, and also the zero-stock portfolio.

Figure 50: Short Interest: Average quintile returns



Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

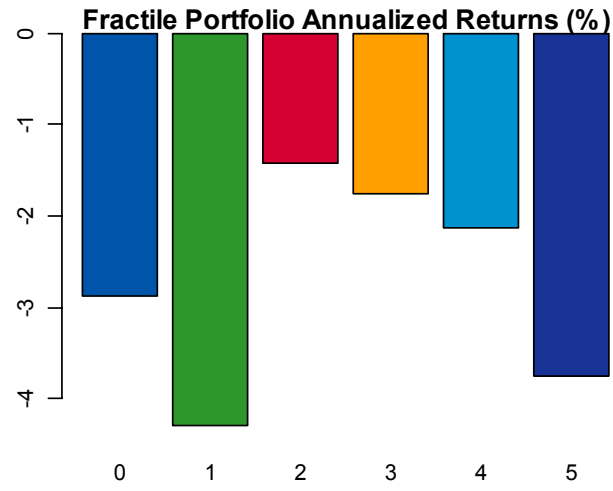
Figure 51: Days to Cover: Average quintile returns



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

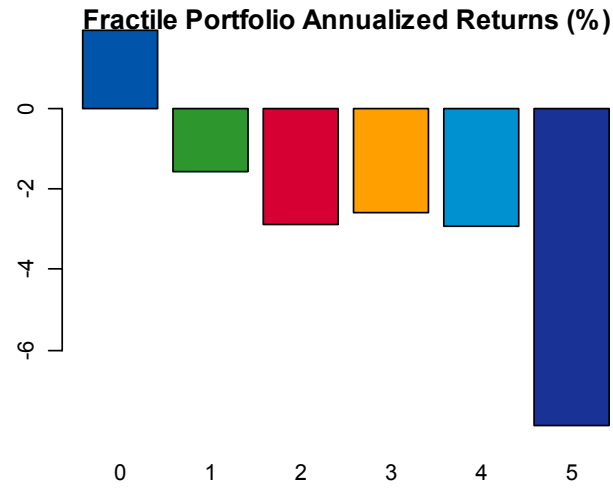
[9] See the Appendix for detailed charts showing the proportion of the universe that has zero factor scores for each factor.

Figure 52: Supply: Average quintile returns



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 53: Utilisation: Average quintile returns



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

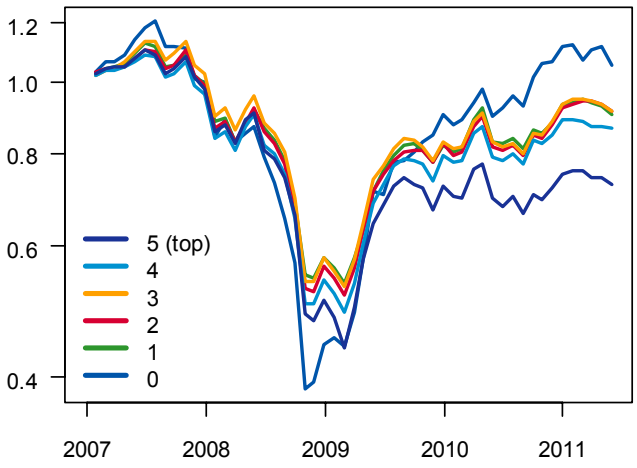
Overall, the results are largely in line with the IC results. For Short Interest (Figure 50), Utilisation (Figure 51), and Days to Cover (Figure 53) quintile 5 -- which contains on average more heavily shorted stocks -- underperforms significantly. The differentiation in returns between quintiles 1-4 is less pronounced, which suggests the underperformance of heavily shorted stocks is primarily the result of those with the most extreme positive factor scores. For Supply (Figure 52) we see that quintile 5 – which in this case contains stocks with lots of lendable inventory still available for borrow – does slightly better than quintile 1.[10] Having said that, the pattern of returns is not very monotonic, which again suggests most of the predictive power is in the tails.

Cumulative performance

To get a feel for the time-series performance of each quintile portfolio, the next set of charts shows the cumulative performance, pre costs, for the five quintile portfolios, plus the portfolio of stocks with zero factor scores. Again, the most obvious feature of the results is the significant underperformance of stocks with high Short Interest, Days to Cover, and Utilisation.

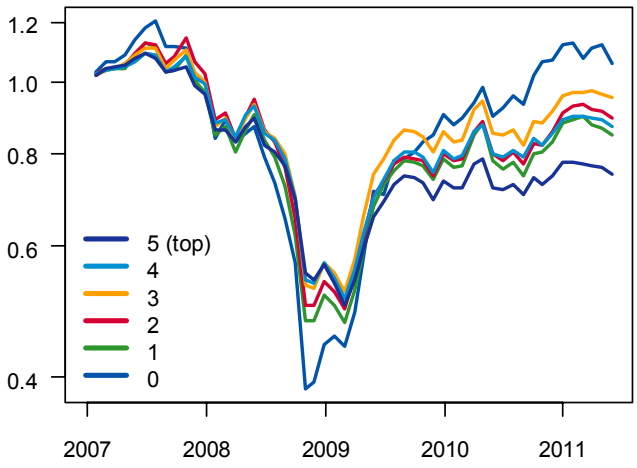
[10] Note that on average all returns are negative. This is because our backtest period runs from 2007-present, during which Asian markets have declined overall. Hence the average return over the period is negative.

Figure 54: Short Interest: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 55: Days to Cover: Cumulative performance

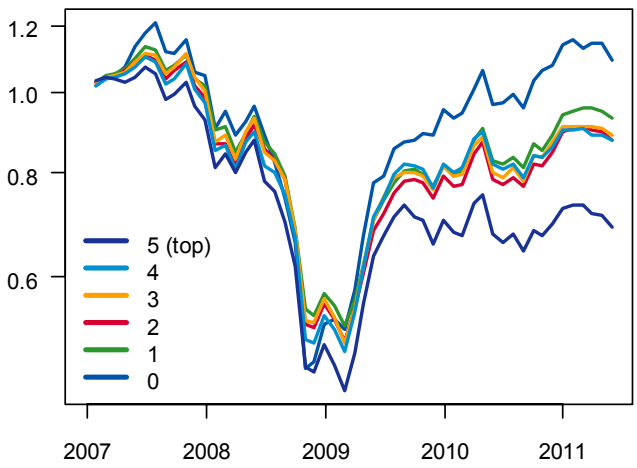


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 56: Supply: Cumulative performance

Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 57: Utilisation: Cumulative performance



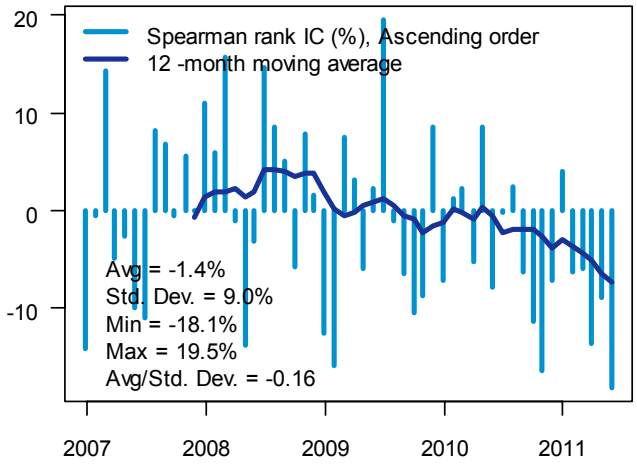
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Next we drill down into the six individual markets that make up our Pan-Asian region.

Australia

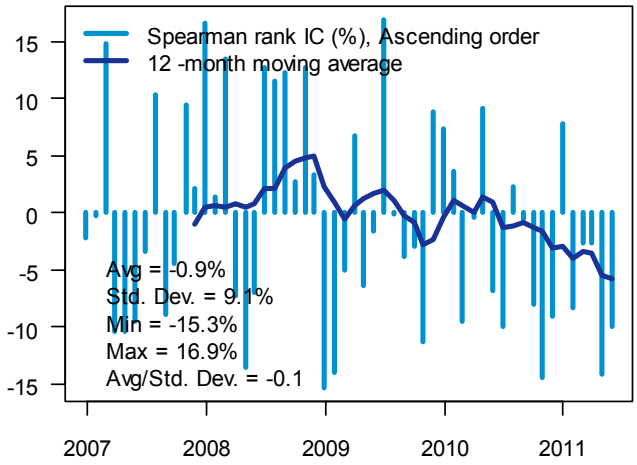
Overall the results for Australia are somewhat cyclical. As the financial crisis abated in 2010 and 2011, stocks which heavy shorting -- as measured by Short Interest, Days to Cover, and Utilisation -- have started to underperform significantly. But through the financial crisis it was a different story – stocks with more shorting actually outperformed. We examine this puzzling result in more detail below.

Figure 58: Short Interest: Rank IC



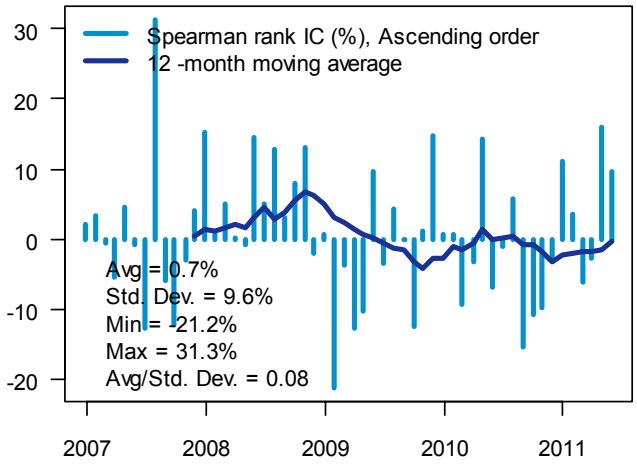
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 59: Days to Cover: Rank IC



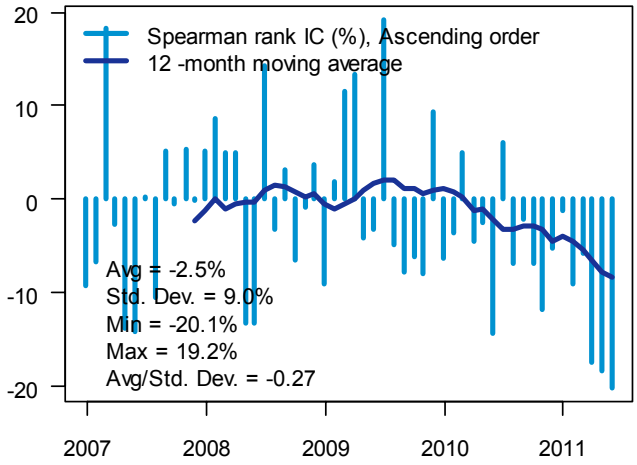
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 60: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

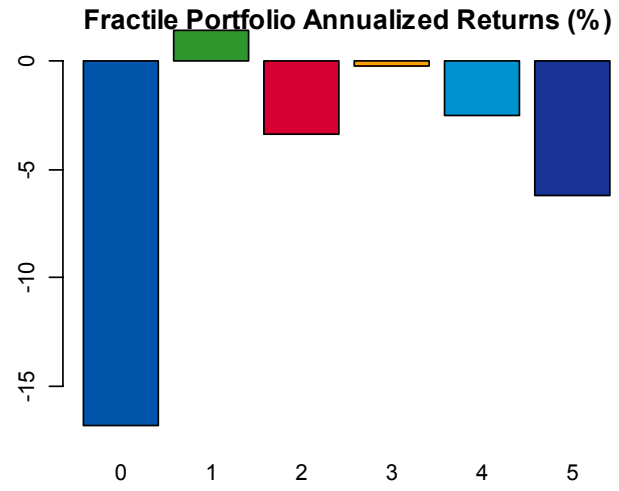
Figure 61: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

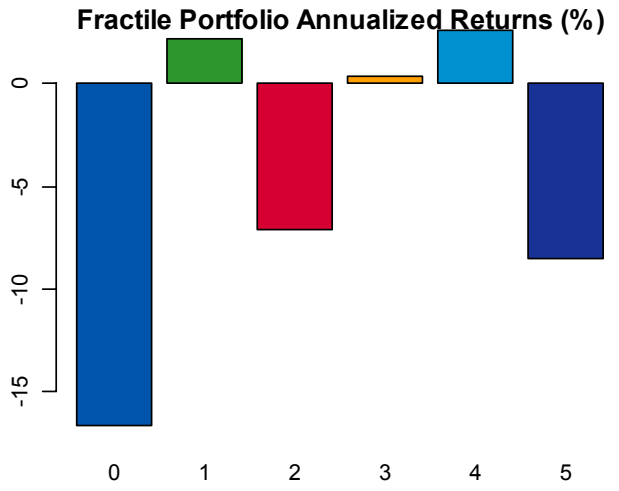
Looking at the average quintile returns in the four charts below, the most noticeable result from the first two charts is the significant underperformance of the stocks with zero Short Interest (Figure 62) and zero Supply (Figure 63). The magnitude of these negative returns is quite surprising – intuitively we might have expected stocks with zero scores for these factors to *outperform*, because these stocks are the most lightly shorted stocks of all. But in fact they underperform.

Figure 62: Short Interest: Average quintile returns



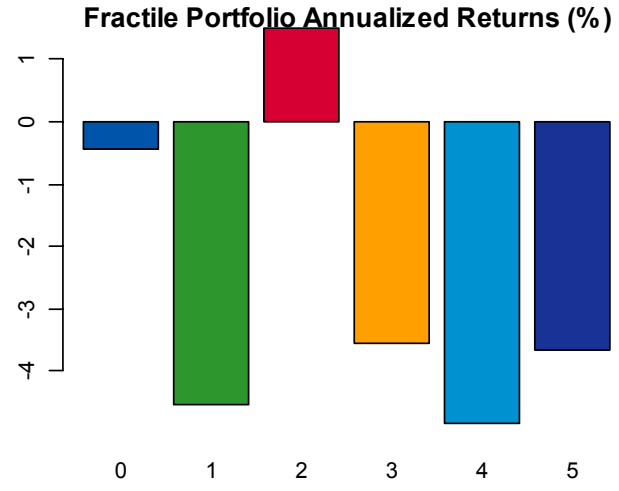
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 63: Days to Cover: Average quintile returns



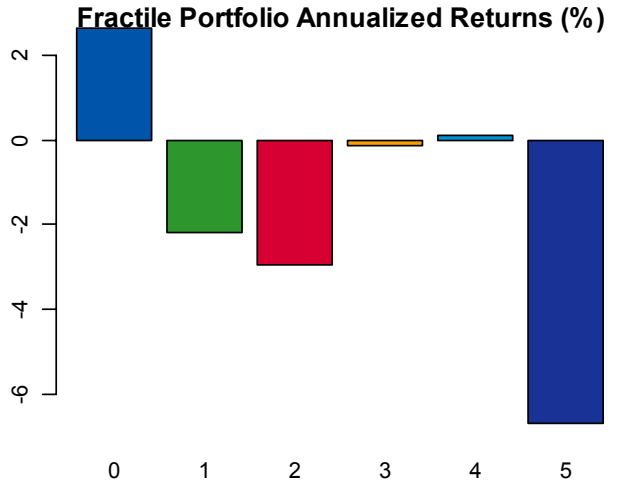
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 64: Supply: Average quintile returns



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

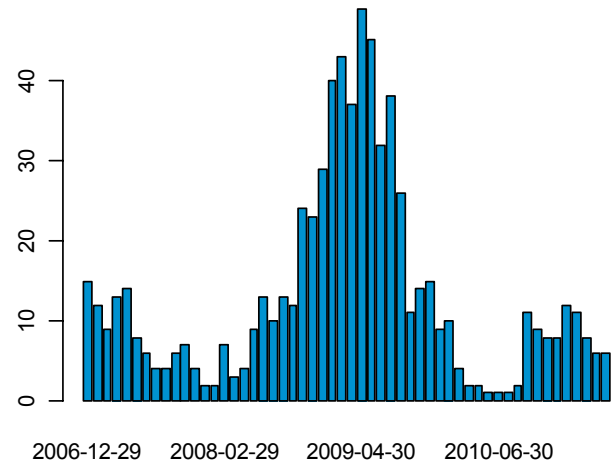
Figure 65: Utilisation: Average quintile returns



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

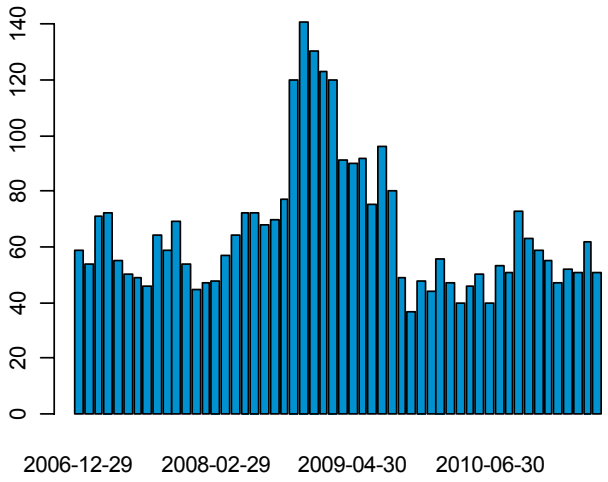
To better understand what is happening, consider Figure 66 and Figure 67, which show the number of stocks in the Australian universe with zero factor scores for Short Interest and Supply respectively. The large increase in zero stocks corresponds to the depths of the credit crisis, and on further reflection also coincides with the regulatory ban on the short selling of Financials stocks from September 2008 to May 2009. One explanation for the poor performance of stocks with zero Short Interest could be that Financials were disproportionately represented in the zero-stock portfolio through the crisis, which would explain the severe underperformance.

Figure 66: Number of Australian stocks with zero Short Interest



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

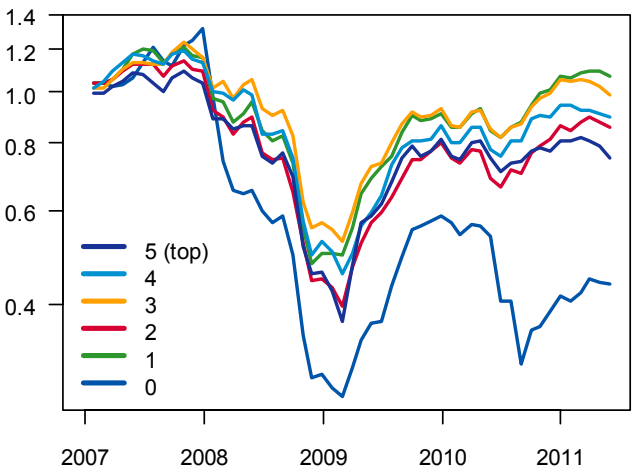
Figure 67: Number of Australian stocks with zero Supply



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

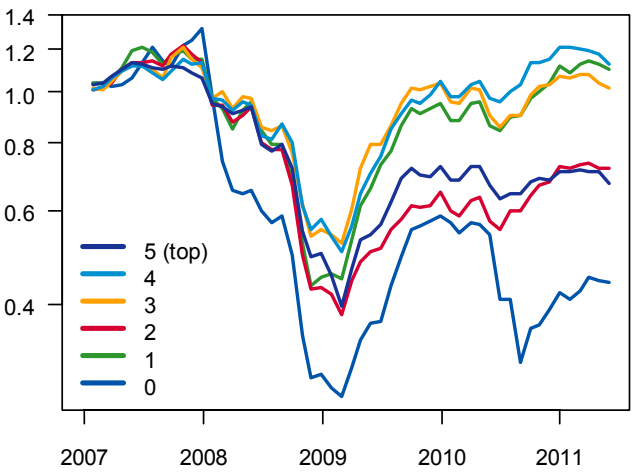
The last set of charts shows the cumulative performance for each portfolio. As discussed, the stocks with zero scores significantly underperform over the life of the backtest, but this is likely to be tied to the unique set of circumstances through the financial crisis.

Figure 68: Short Interest: Cumulative performance



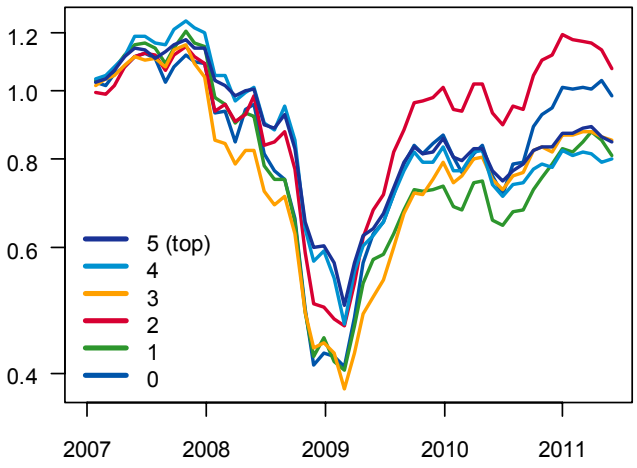
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 69: Days to Cover: Cumulative performance



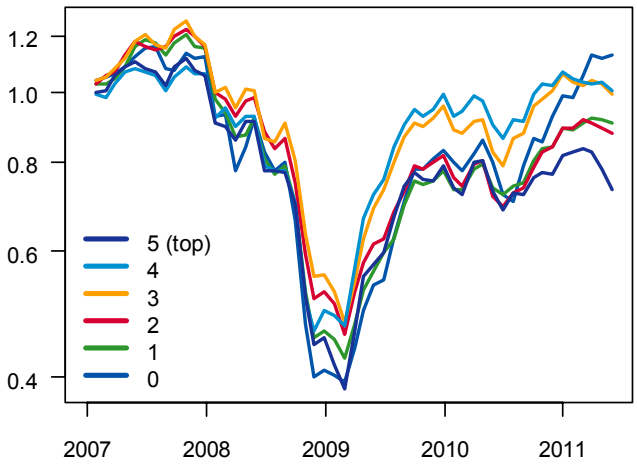
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 70: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 71: Utilisation: Cumulative performance

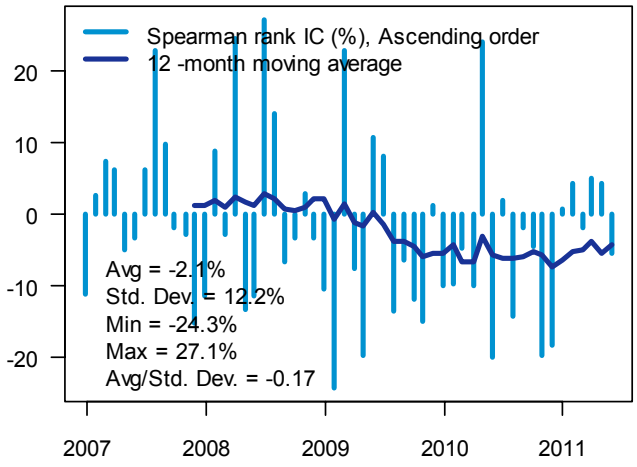


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

China (Hong Kong listed)

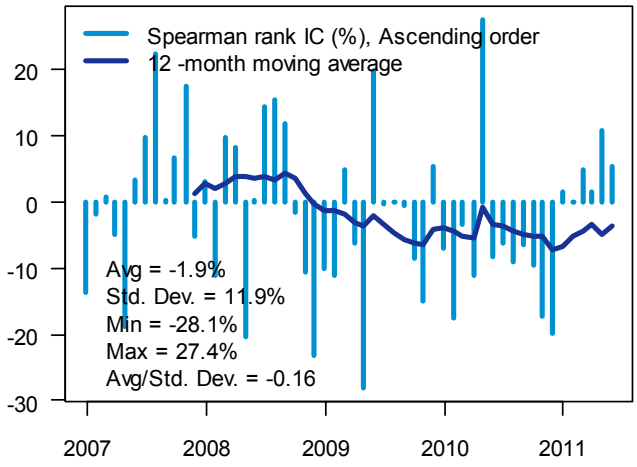
Similar to Australia we find that Short Interest, Days to Cover, and Utilisation all have the expected negative sign, i.e. stocks with more shorting tend to underperform in the next month. Also like Australia, we find some cyclicality in that the factors have worked better recently as markets have normalized following the crisis. Having said that, Supply is again the exception – intuitively we expect a positive sign but recently this has not been the case.

Figure 72: Short Interest: Rank IC



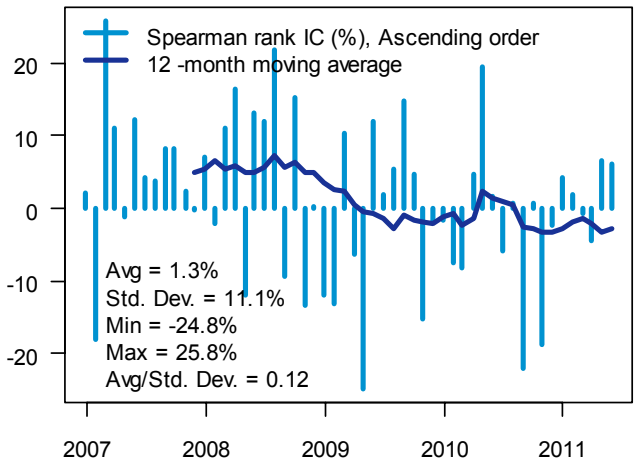
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 73: Days to Cover: Rank IC



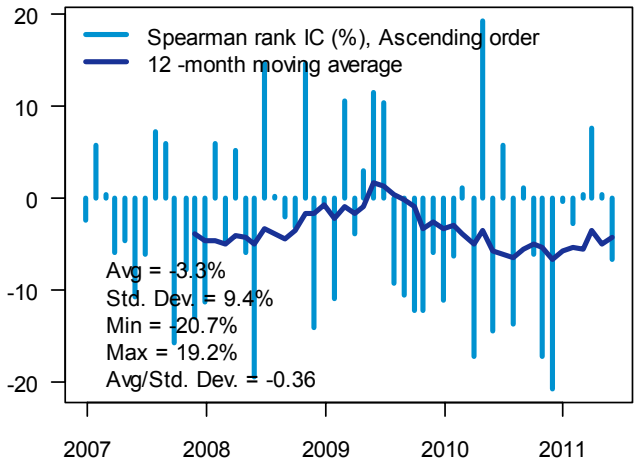
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 74: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

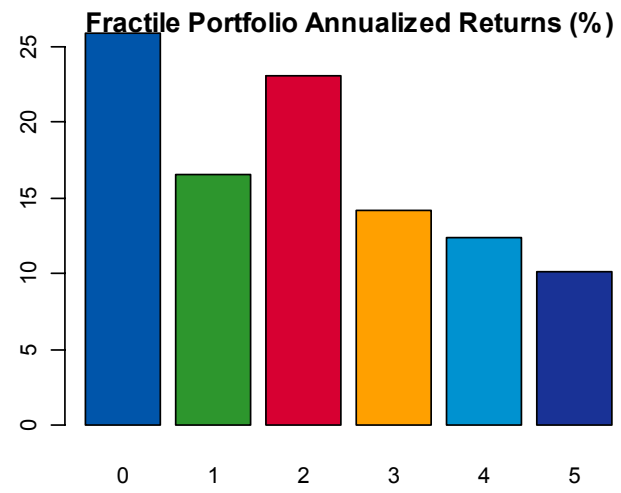
Figure 75: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

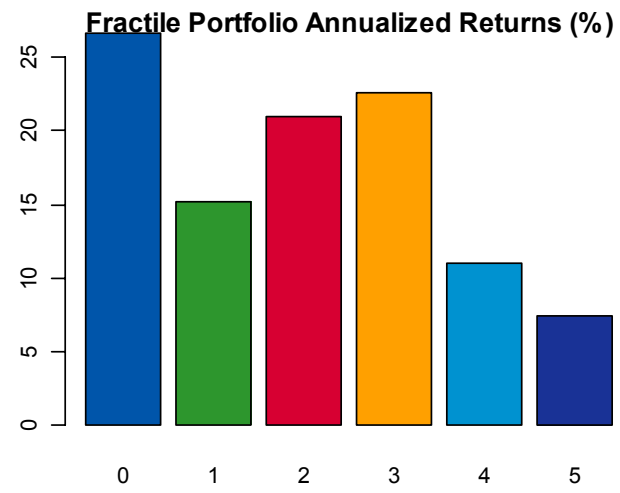
The quintile return profiles line up with the ICs, except in the case of Supply where we find that stocks with large supply actually do worse than stocks with low supply in the following month (Figure 78).

Figure 76: Short Interest: Average quintile returns



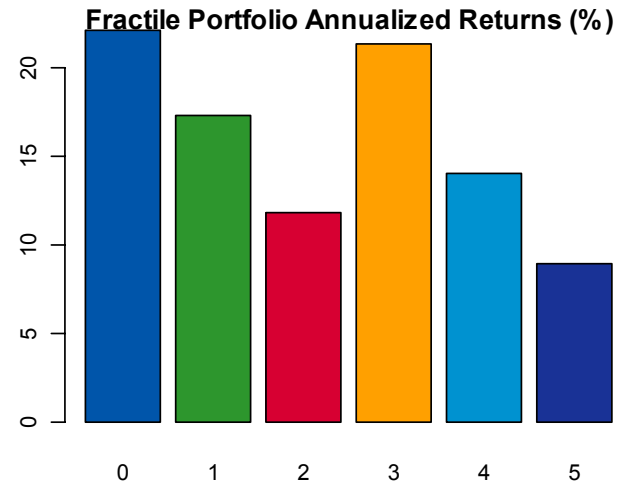
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 77: Days to Cover: Average quintile returns



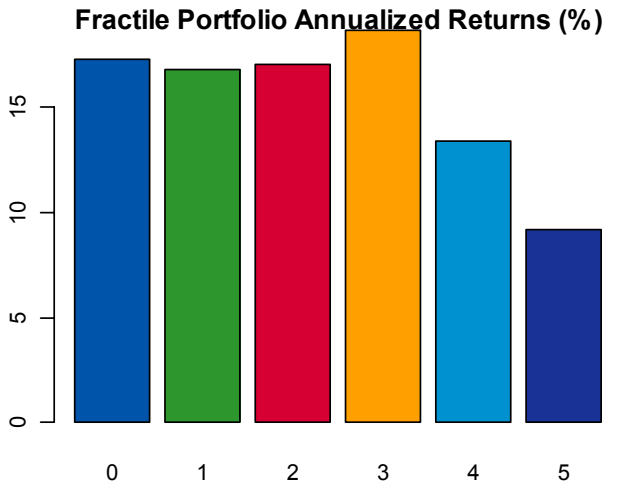
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 78: Supply: Average quintile returns



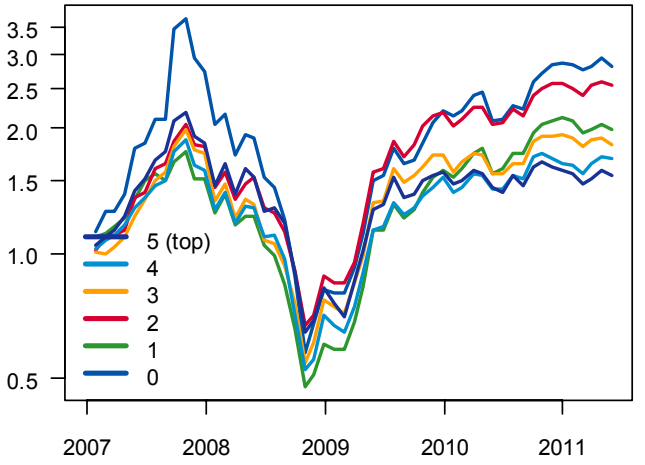
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 79: Utilisation: Average quintile returns



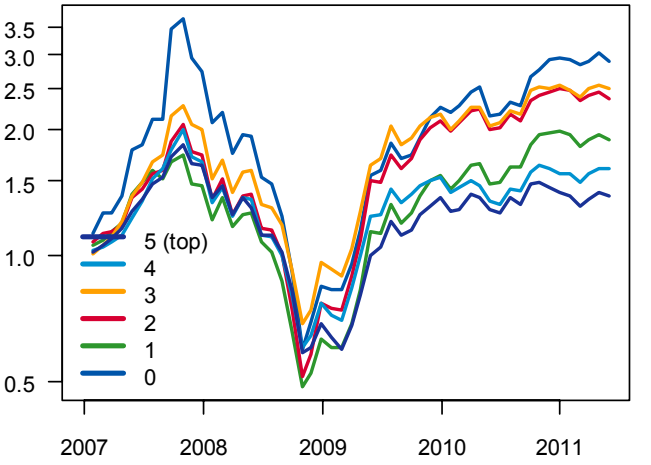
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 80: Short Interest: Cumulative performance



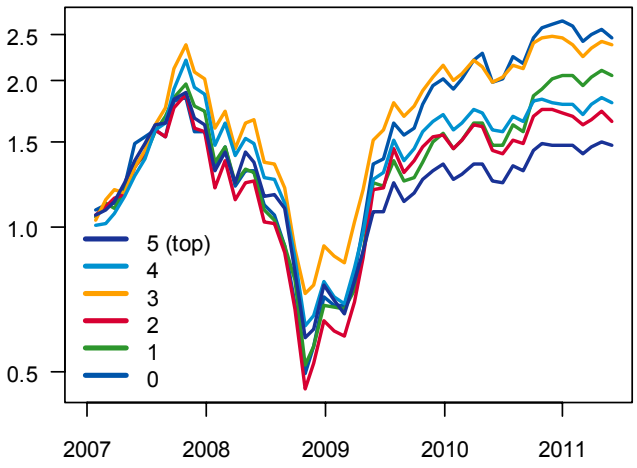
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 81: Days to Cover: Cumulative performance



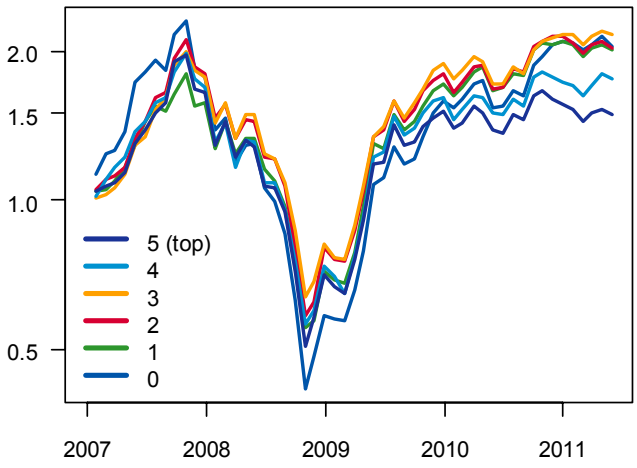
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 82: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 83: Utilisation: Cumulative performance

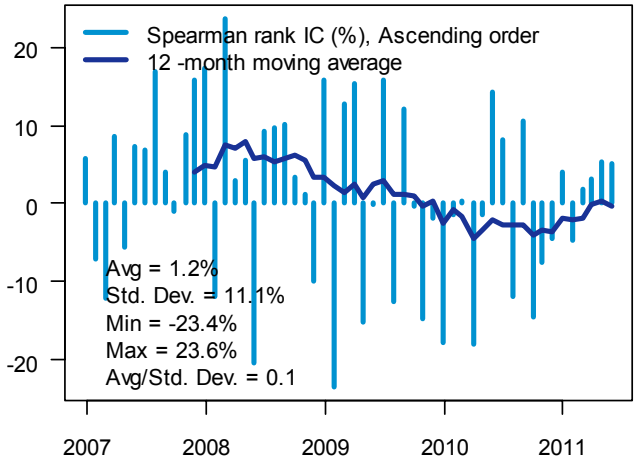


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Hong Kong

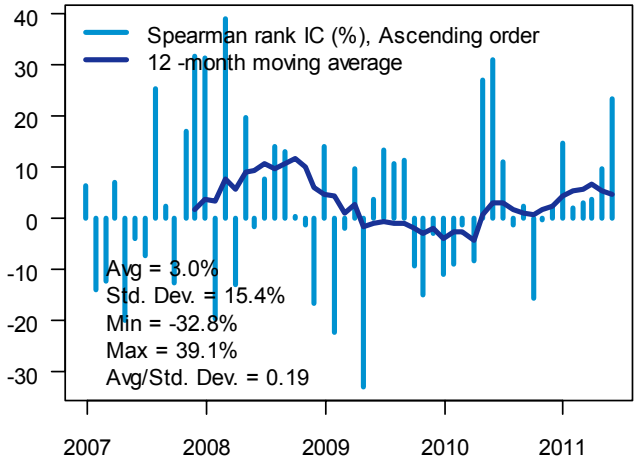
In Hong Kong the most notable result is the fact that Supply is a very strong factor in this market. In contrast, demand-side factors have mixed results.

Figure 84: Short Interest: Rank IC



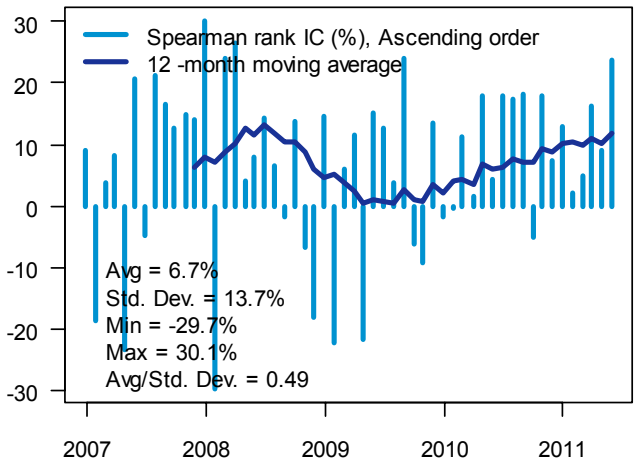
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 85: Days to Cover: Rank IC



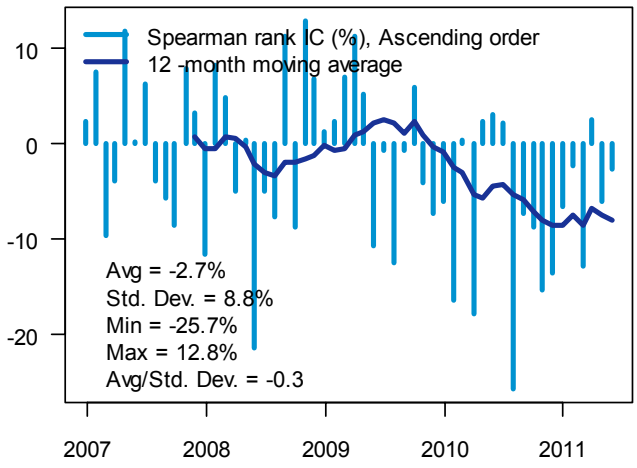
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 86: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

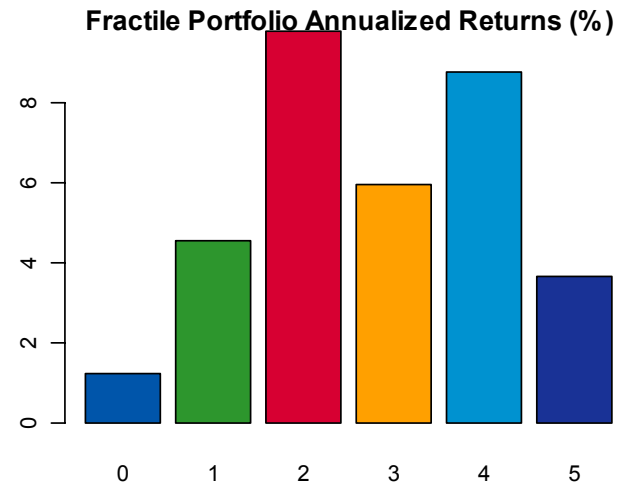
Figure 87: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

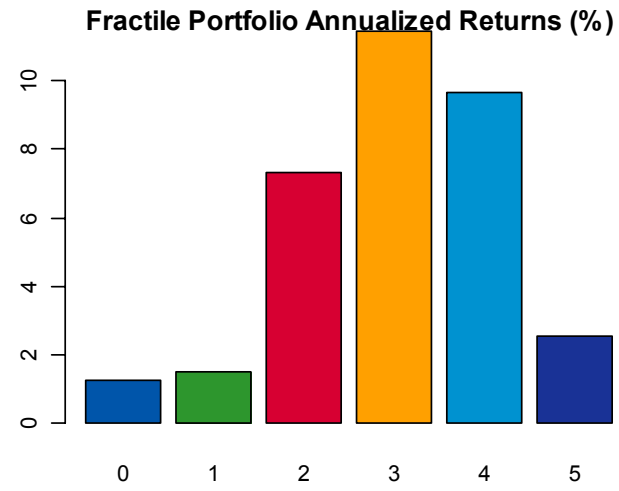
In terms of quintile portfolios, the results are also mixed. Again the Supply side appears to be the most promising, although even this factor does not show a clean monotonic pattern in average returns, e.g. quintile 4 outperforms quintile 5 (Figure 90).

Figure 88: Short Interest: Average quintile returns



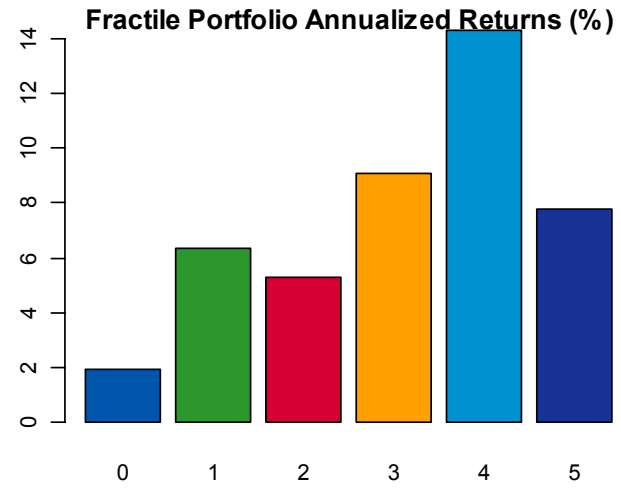
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 89: Days to Cover: Average quintile returns



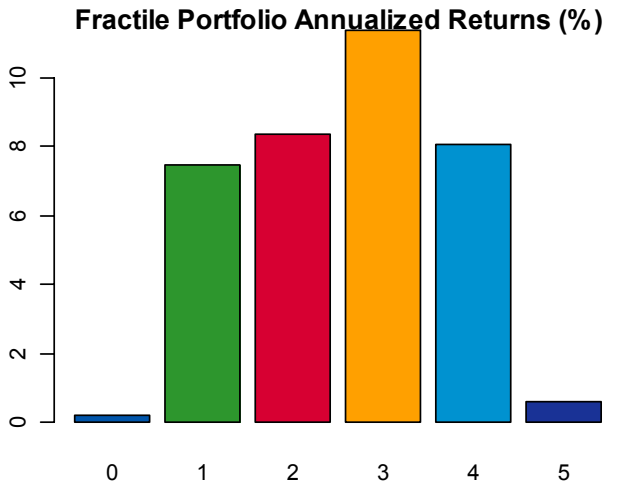
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 90: Supply: Average quintile returns



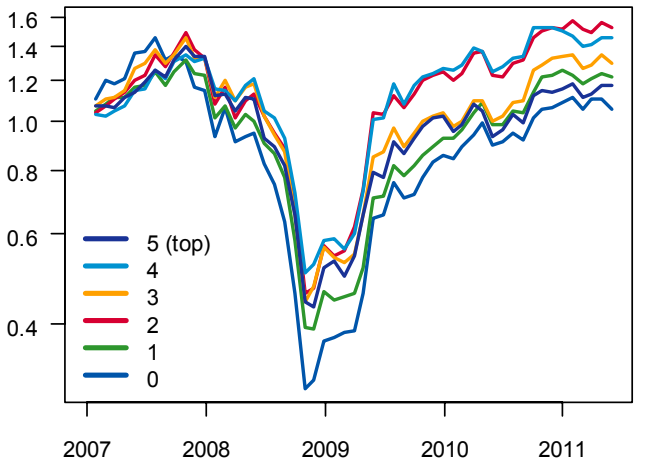
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 91: Utilisation: Average quintile returns



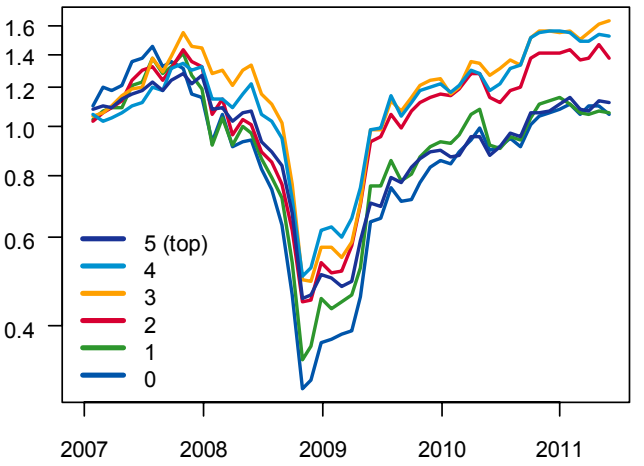
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 92: Short Interest: Cumulative performance



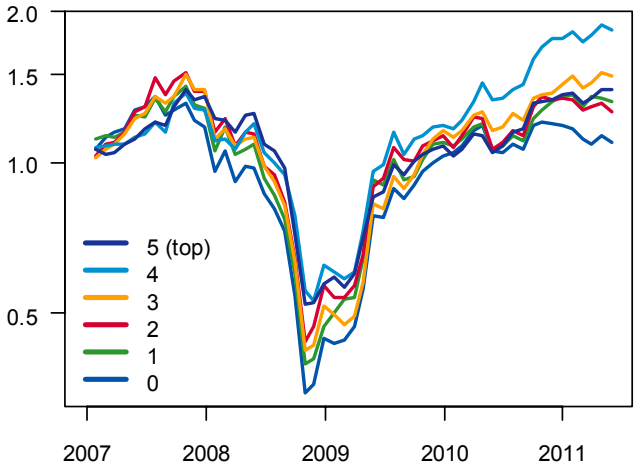
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 93: Days to Cover: Cumulative performance



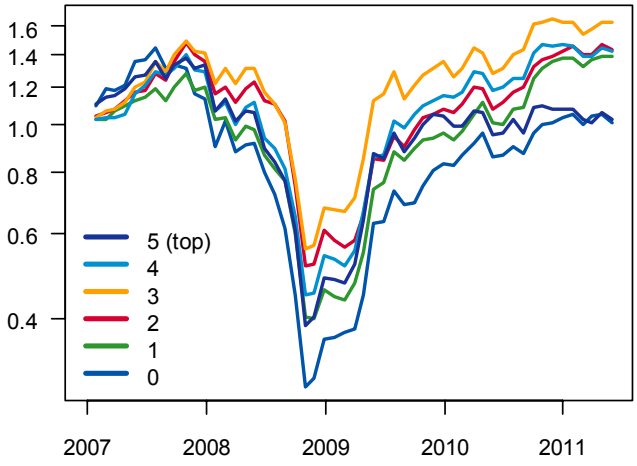
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 94: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 95: Utilisation: Cumulative performance

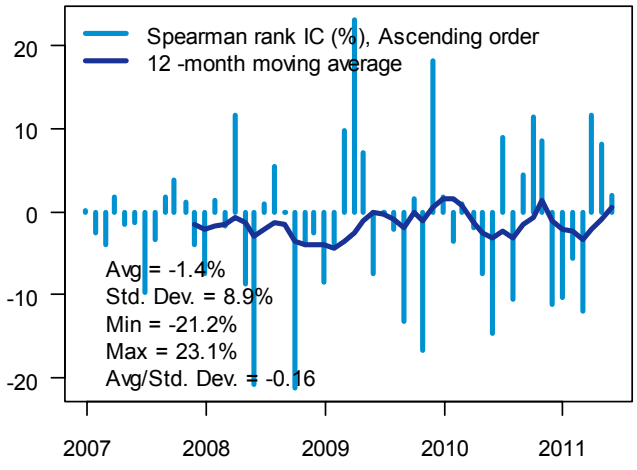


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Japan

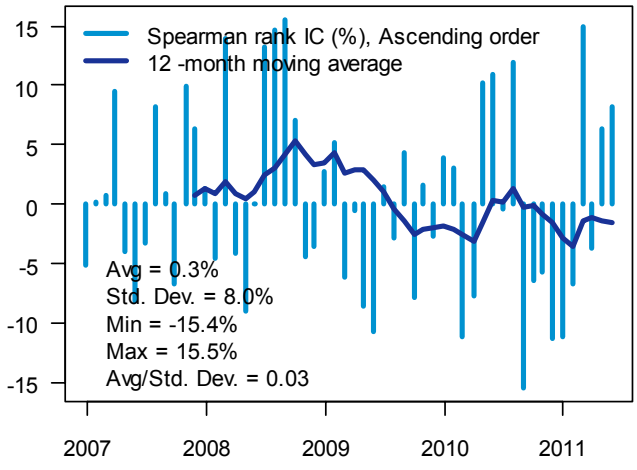
The prevailing view of quantitative investors is that the Japanese market is a different beast in terms of factor efficacy. However, when it comes to the securities lending factors, the similarities outweigh the differences. As with the other countries we examined, Short Interest and Utilisation are negative signals – we want to avoid stocks that are heavily shorted. Similarly, Supply also has the expected positive sign.

Figure 96: Short Interest: Rank IC



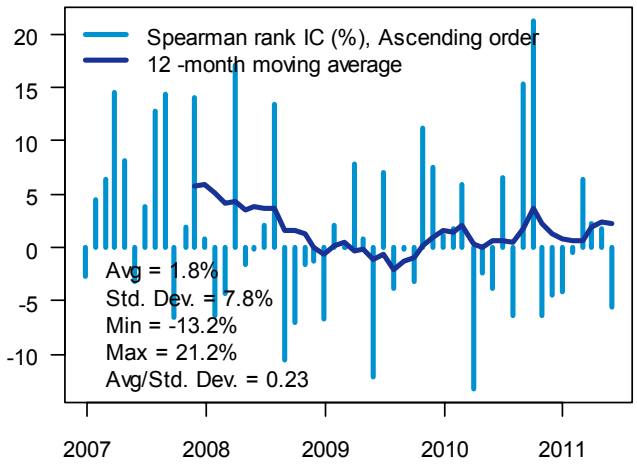
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 97: Days to Cover: Rank IC



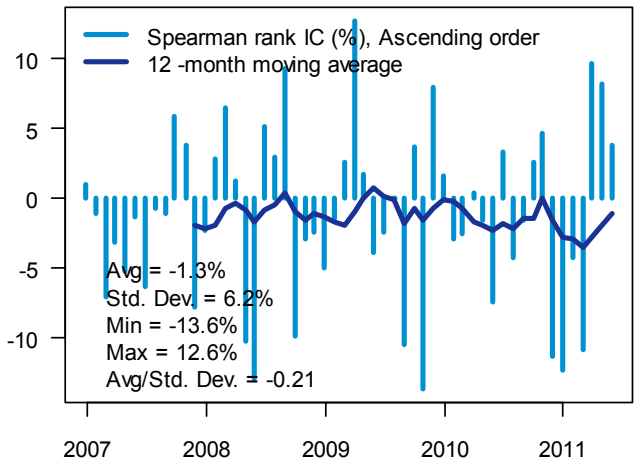
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 98: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

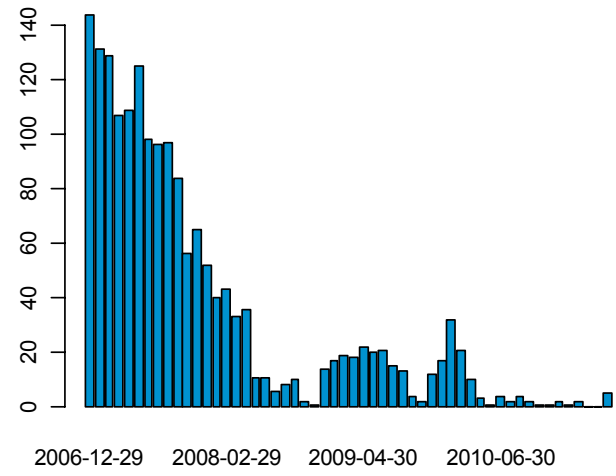
Figure 99: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

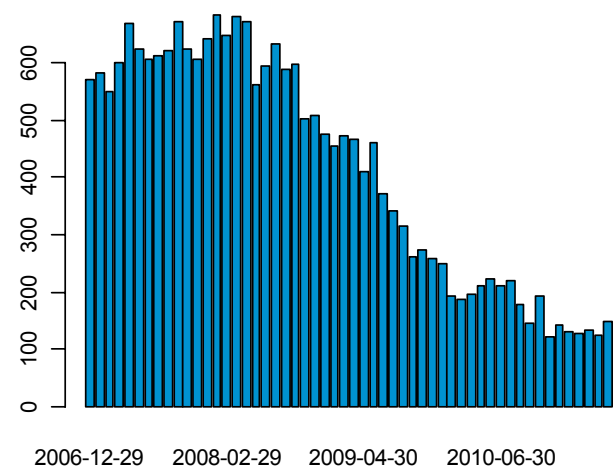
Before turning the quintile results for Japan, it is important to point out a unique feature of the securities lending data for Japan. As shown in Figure 102 and Figure 101, the number of stocks with zero factor scores has been declining steadily in Japan. For this reason, instead of separating out the stocks with zero scores into their own bucket, we combine them with the bottom quintile, i.e. bucket "1" in the charts.

Figure 100: Number of stocks in Japan with zero Short Interest



Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

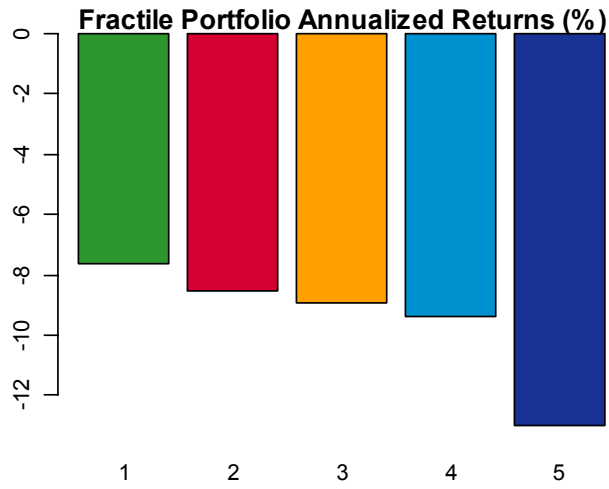
Figure 101: Number of stocks in Japan with zero Supply



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

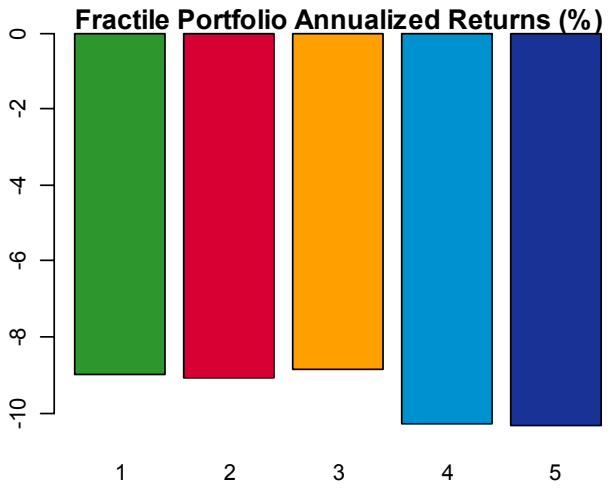
After making this adjustment, both Short Interest (Figure 102) and Utilisation (Figure 103) show nicely monotonic return patterns. The other two factors are less effective in delineating the portfolios.

Figure 102: Short Interest: Average quintile returns



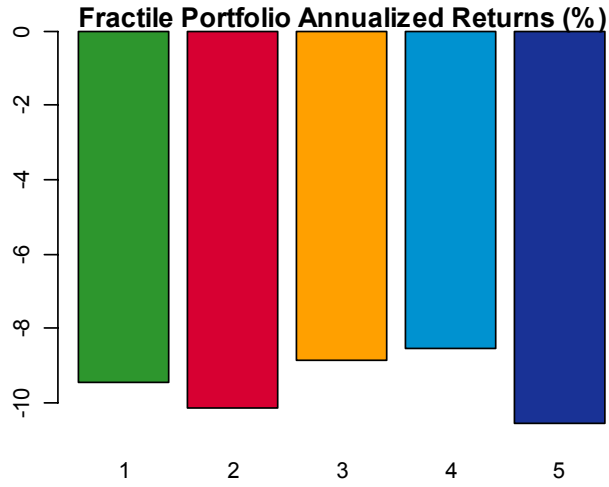
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 103: Days to Cover: Average quintile returns



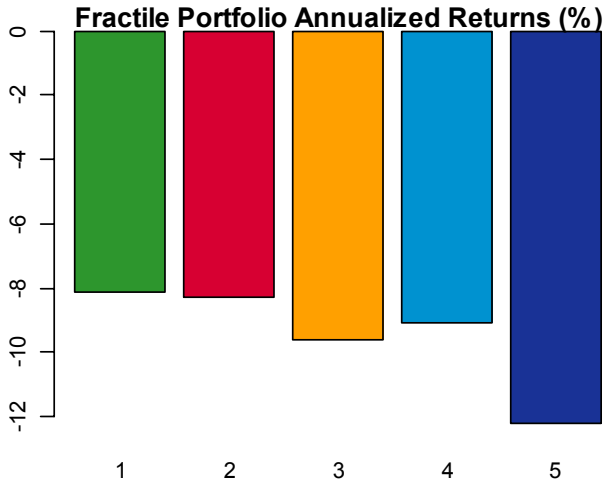
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 104: Supply: Average quintile returns



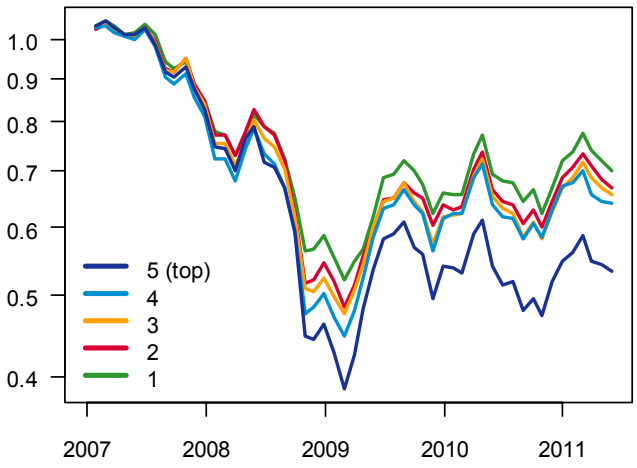
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 105: Utilisation: Average quintile returns



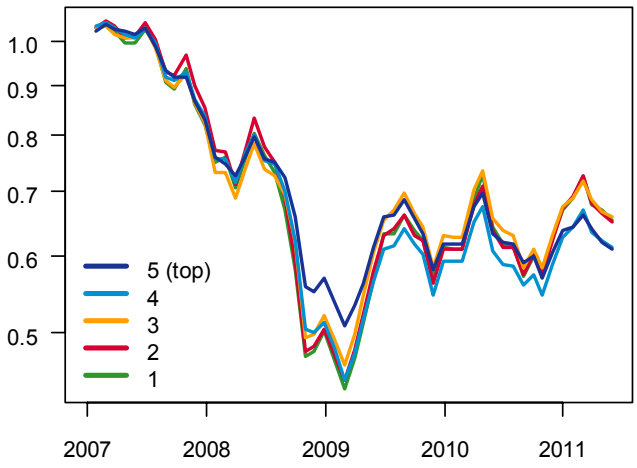
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 106: Short Interest: Cumulative performance



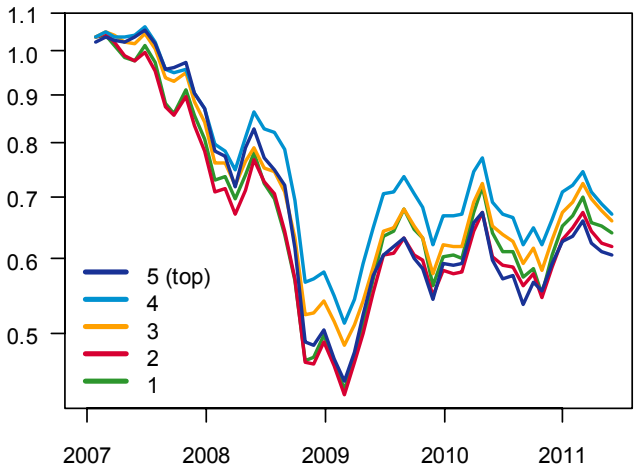
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 107: Days to Cover: Cumulative performance



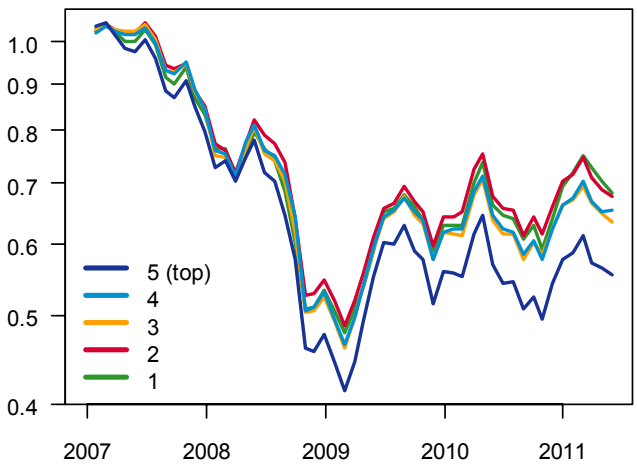
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 108: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 109: Utilisation: Cumulative performance

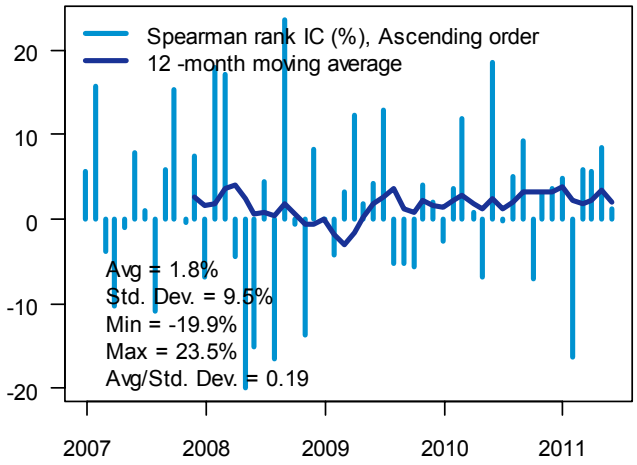


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

South Korea

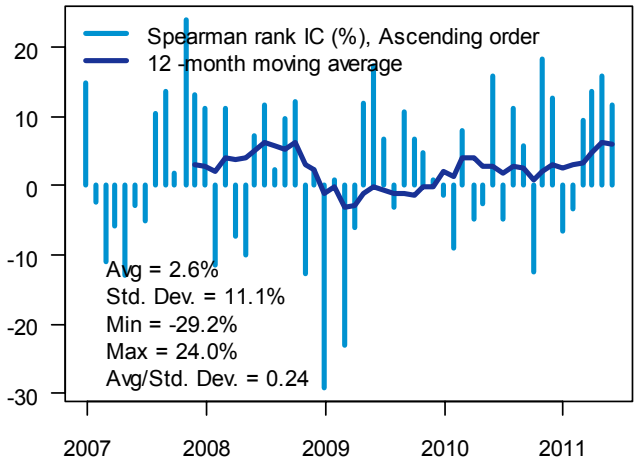
The performance results in South Korea are interesting. Similar to Hong Kong, the supply side of the securities lending market seems to offer a more promising signal (Figure 112). Utilisation – which blends both the demand and supply sides of the equation – is also effective (Figure 113). In contrast, Short Interest and Days to Cover actually have the "wrong" sign, in that stocks with greater borrowing tend to outperform in the next month.

Figure 110: Short Interest: Rank IC



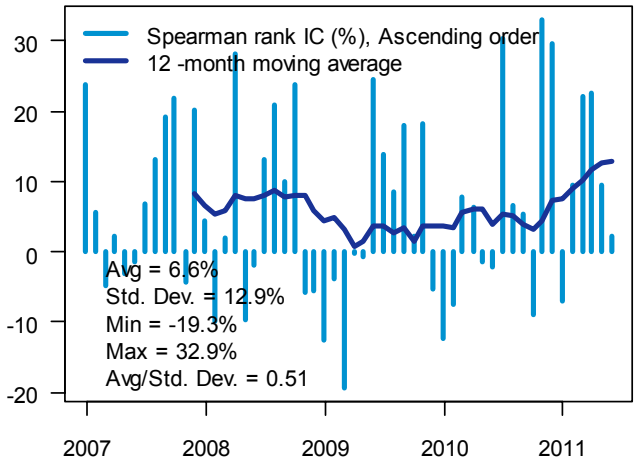
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 111: Days to Cover: Rank IC



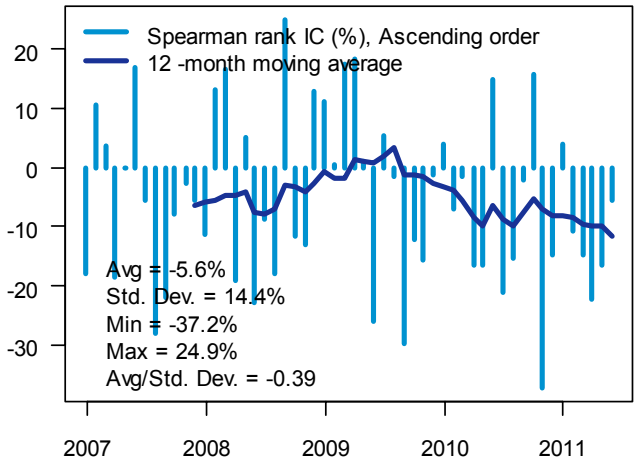
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 112: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

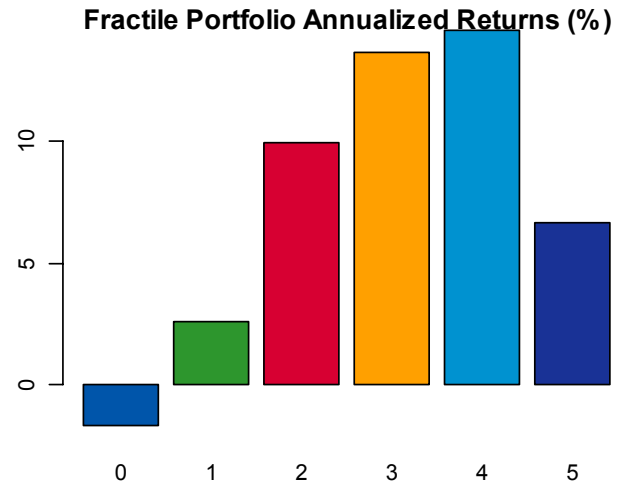
Figure 113: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

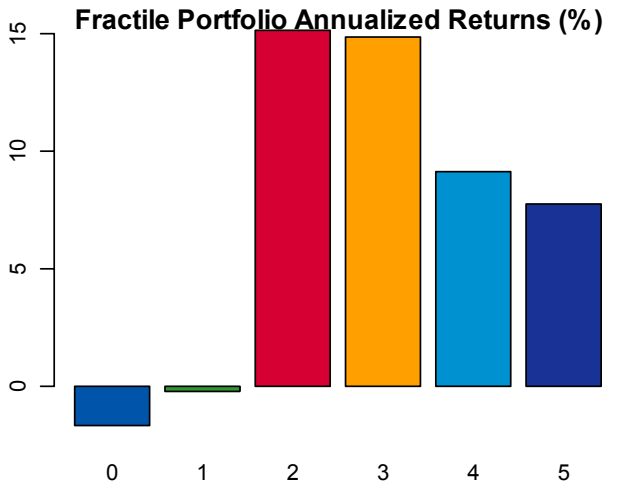
The quintile portfolio results confirm the findings in the IC analysis. Supply and Utilisation are very effective in ranking stocks within the Korean market.

Figure 114: Short Interest: Average quintile returns



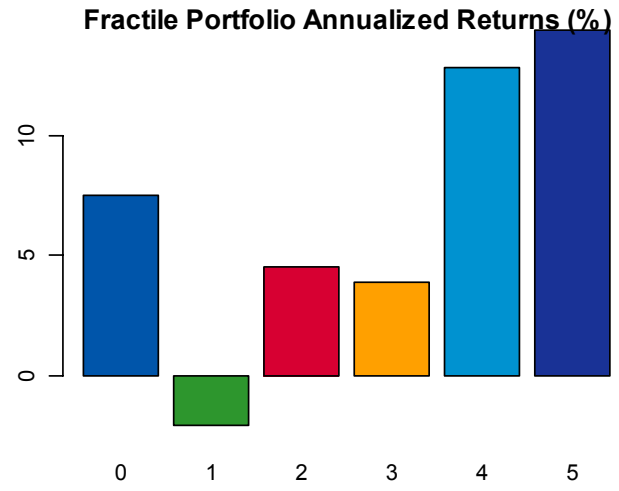
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 115: Days to Cover: Average quintile returns



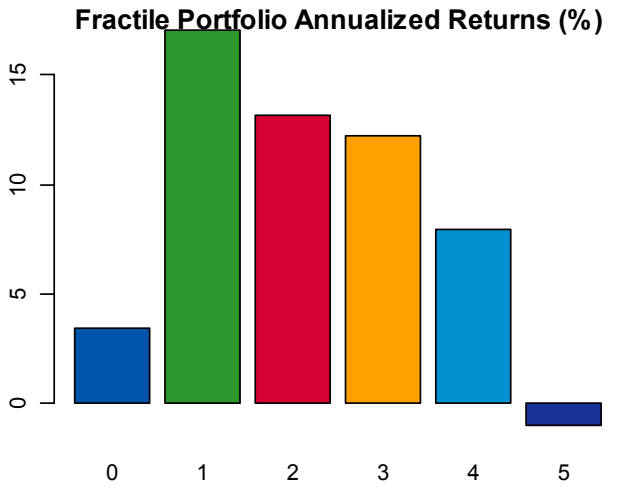
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 116: Supply: Average quintile returns



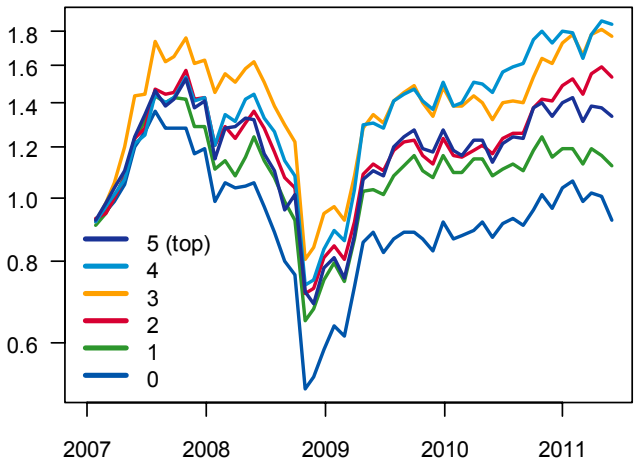
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 117: Utilisation: Average quintile returns



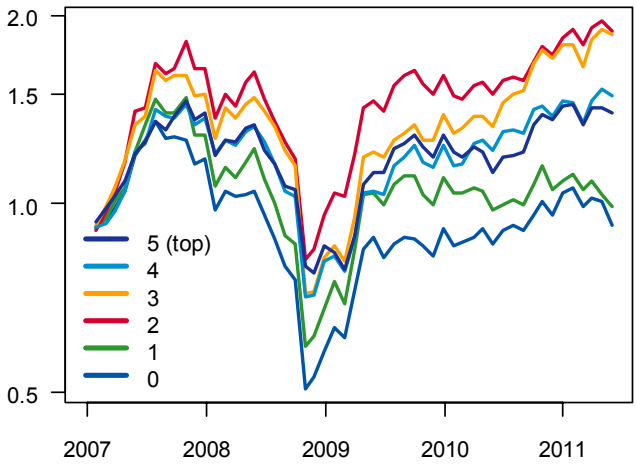
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 118: Short Interest: Cumulative performance



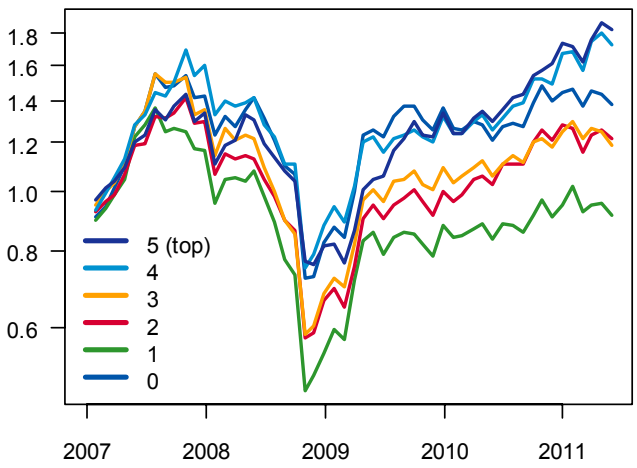
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 119: Days to Cover: Cumulative performance



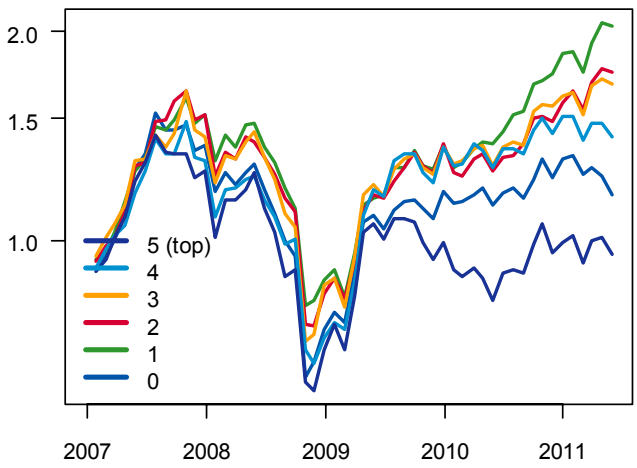
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 120: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 121: Utilisation: Cumulative performance

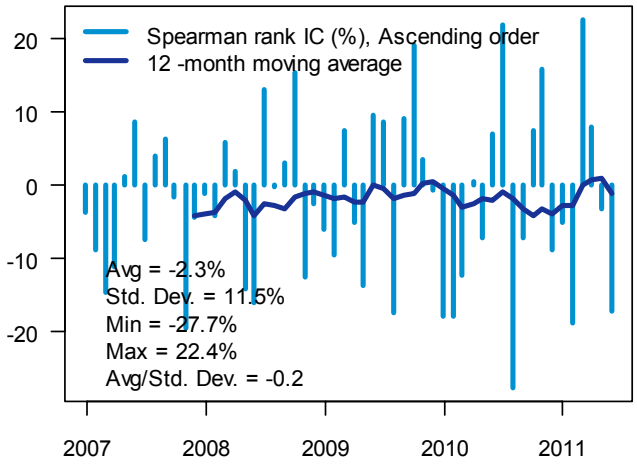


Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Singapore

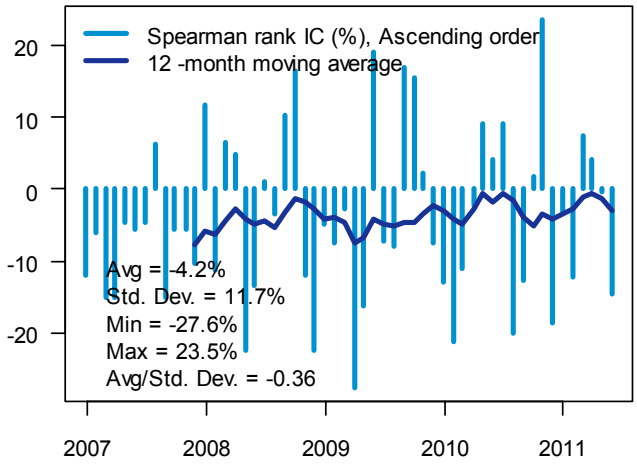
All four of our securities lending factors show good efficacy in Singapore. Short Interest, Days to Cover, and Utilisation all have the expected negative sign, and the magnitude of the average ICs is relatively high, particularly for Days to Cover (Figure 123) and Utilisation (Figure 124). Supply is equally effective, but in the expected positive direction.

Figure 122: Short Interest: Rank IC



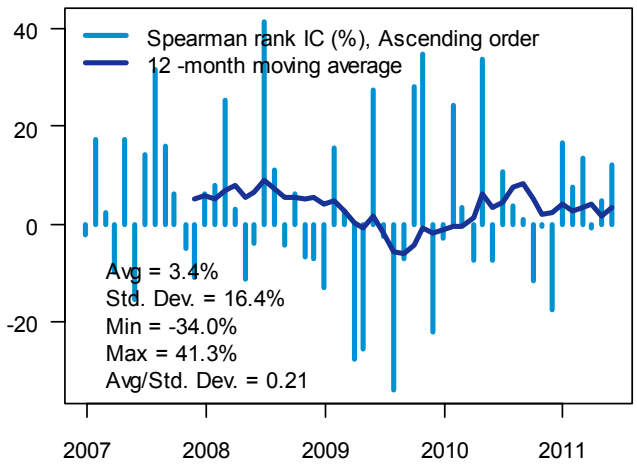
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 123: Days to Cover: Rank IC



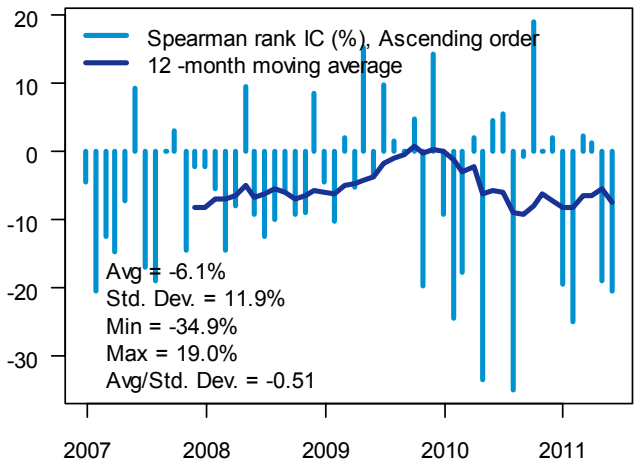
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 124: Supply: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

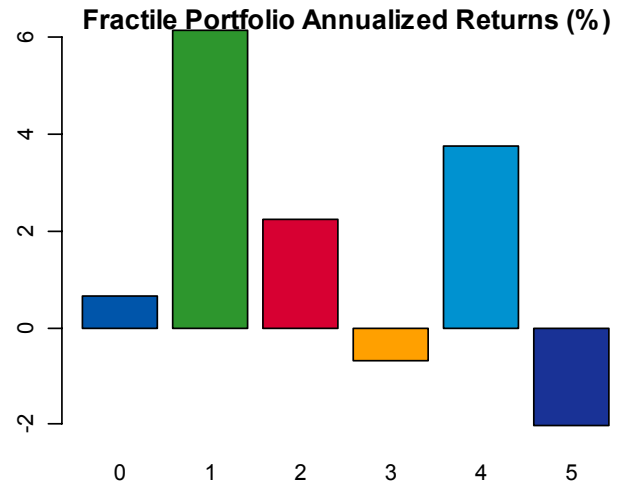
Figure 125: Utilisation: Rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

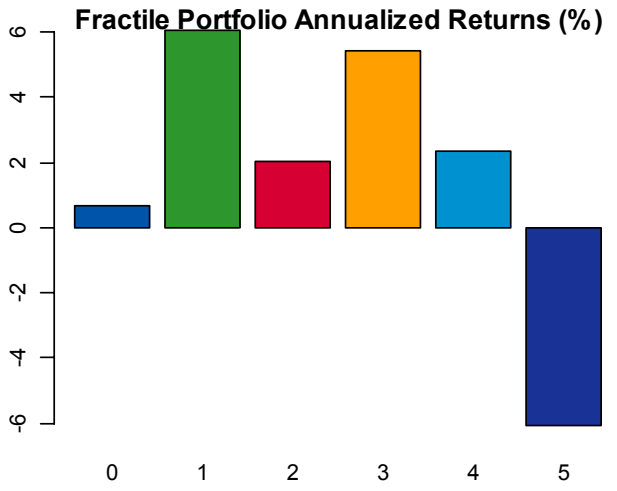
The quintile portfolios are consistent with the IC results, with the exception of Supply (Figure 128). For that factor, the spread between the top and bottom deciles is non-existent.

Figure 126: Short Interest: Average quintile returns



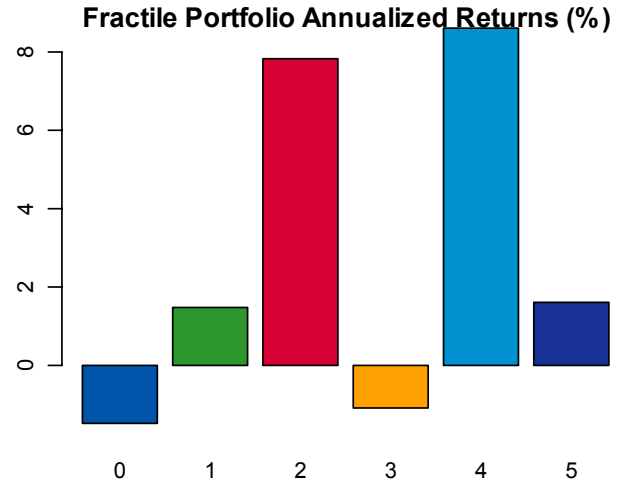
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 127: Days to Cover: Average quintile returns



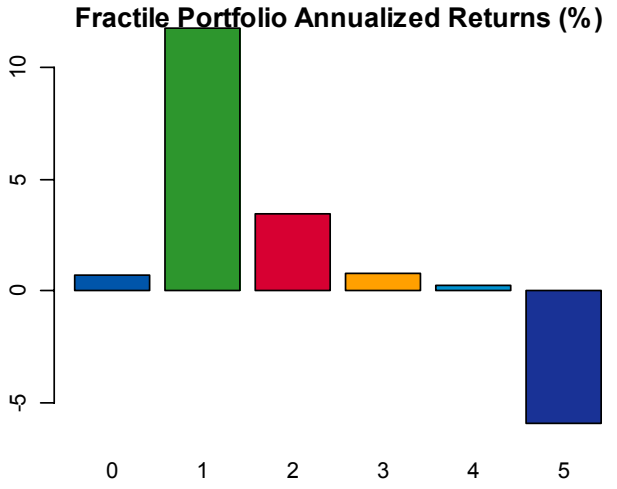
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 128: Supply: Average quintile returns



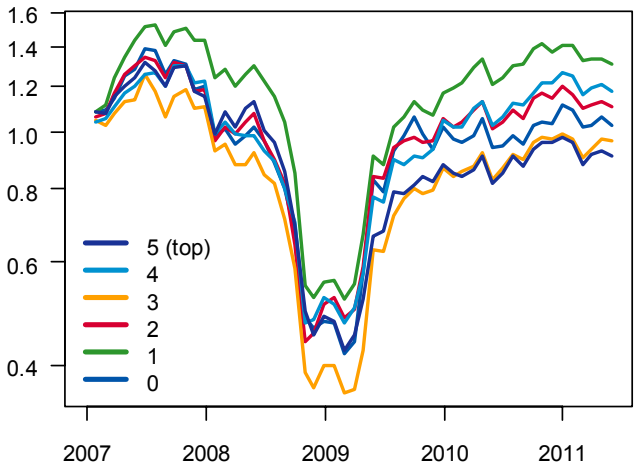
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 129: Utilisation: Average quintile returns



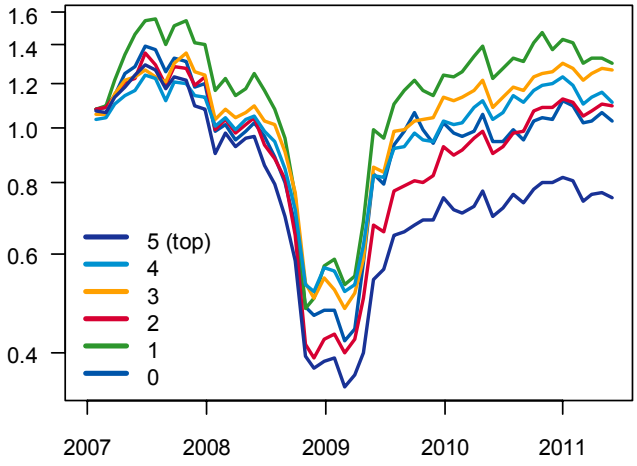
Source: DataExplorers, Datastream, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 130: Short Interest: Cumulative performance



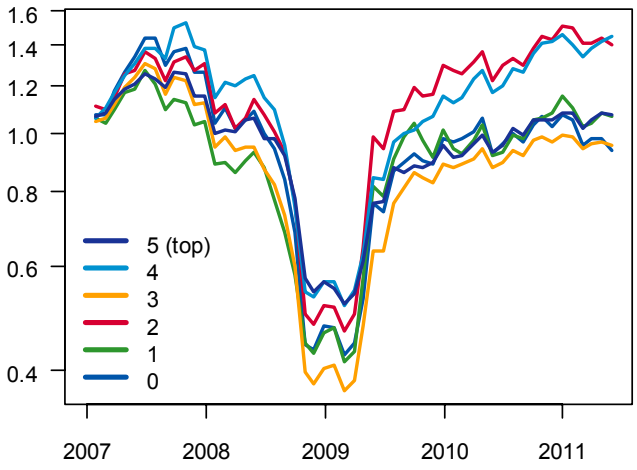
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 131: Days to Cover: Cumulative performance



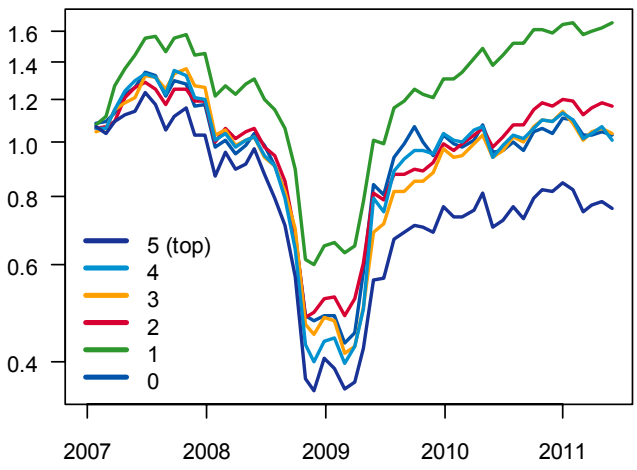
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 132: Supply: Cumulative performance



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 133: Utilisation: Cumulative performance



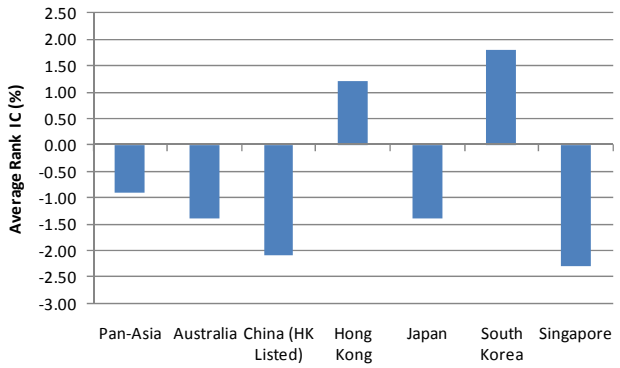
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Putting it all together

To summarize the flurry of charts so far, the charts below plot the average rank IC for each factor in each country. Put this way, the similarities and differences between markets become readily apparent. There are two key conclusions:

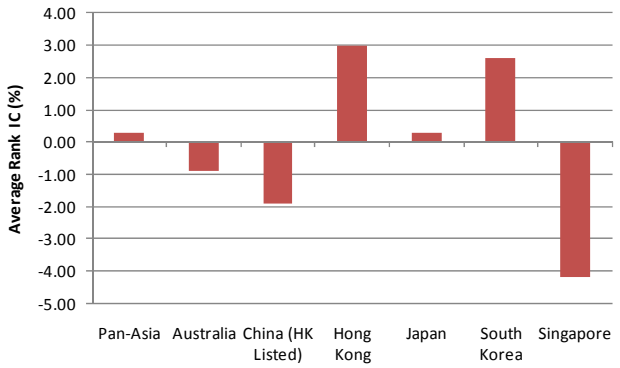
- **We can do better than simple short interest.** As shown in Figure 134, the performance of Short Interest is somewhat inconsistent across markets. It does have the expected negative sign in four of the six countries, but in two of the most important Asian markets – Hong Kong and South Korea – the sign is opposite.
- **Supply-side data is important.** The two factors that use supply-side securities lending data – Supply (Figure 136) and Utilisation (Figure 137) – show much better consistency of performance across the different markets. Supply is on average positive across all markets, while Utilisation is consistently negative.

Figure 134: Short Interest: Average rank IC, by country



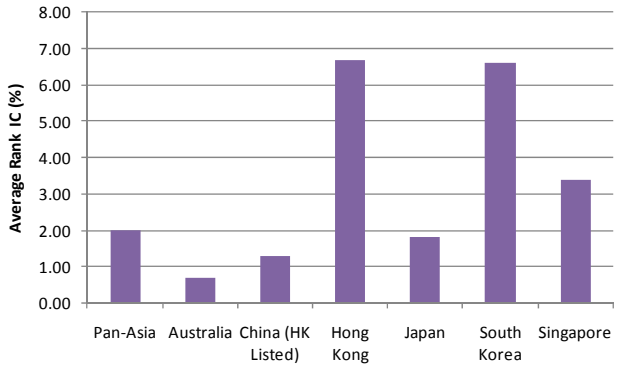
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 135: Days to Cover: Average rank IC, by country



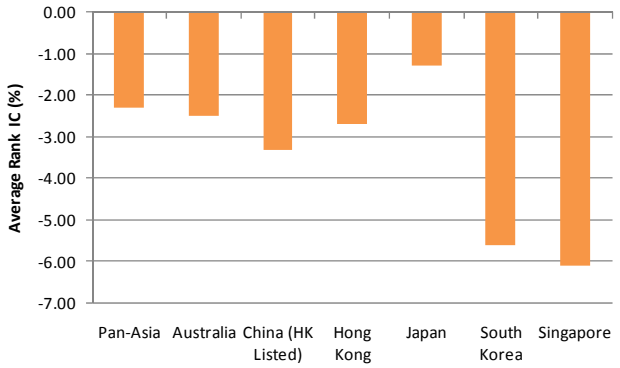
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 136: Supply: Average rank IC, by country



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 137: Utilisation: Average rank IC, by country



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Indeed the key takeaway is similar to what we found in our U.S research: following the short money is, on average, a fruitful strategy, but there are much better ways to measure shorting activity than the traditional short interest factor. By moving to more advanced metrics that factor in the less common supply-side inventory data, we can build factors that are more consistent across Asian markets.

However, a bigger question is whether these new factors can add value relative to the more traditional quant factors. We test this in the next section.

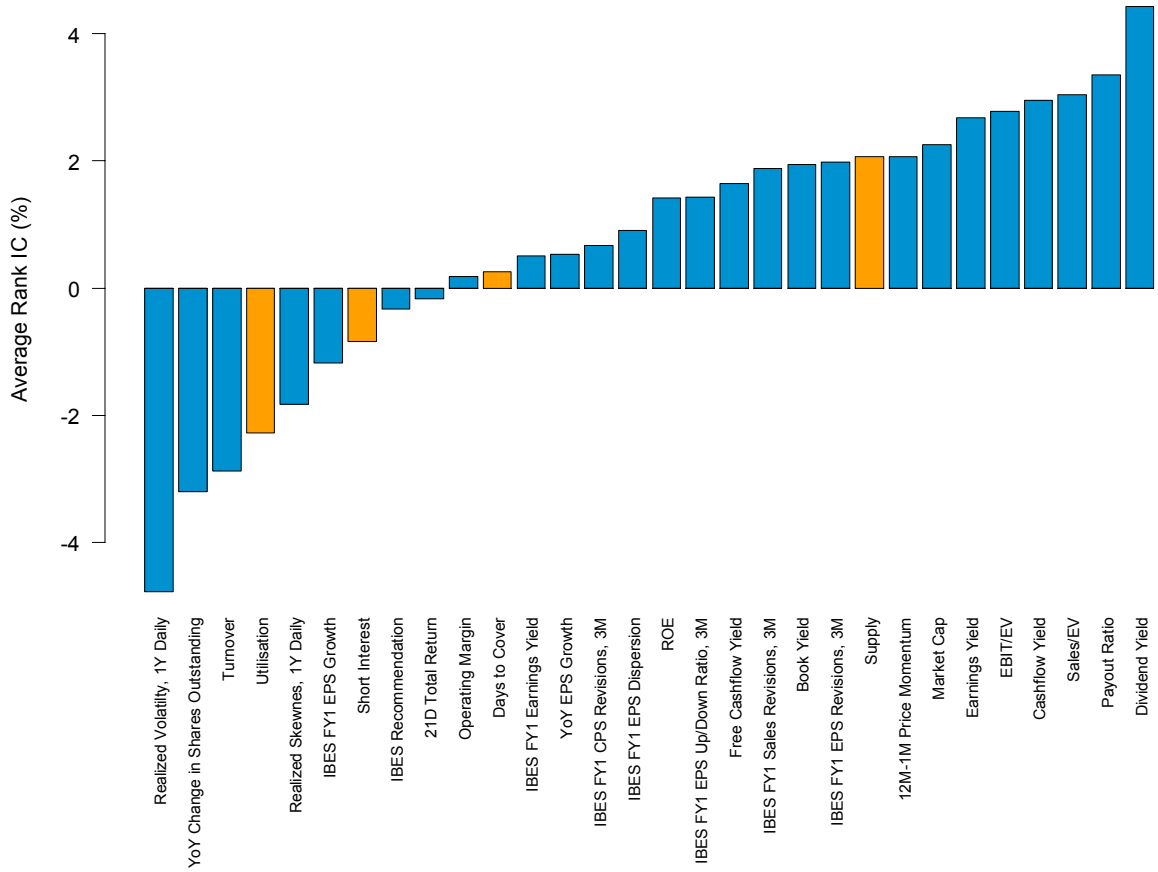
Digging deeper

What's wrong with the traditional factors?

The results in the previous section suggest that there is some predictive power in securities lending factors, particularly on the supply side. However, the more important question is how the factors rank relative to the more traditional factors. One of the common refrains we hear from Asian quantitative investors is that the basic factors still work quite well, so why bother looking for new factors?

Figure 138 offers a counter to this oft cited conclusion. If we rank the performance of the securities lending factors relative to a representative set of traditional quant factors, we find that while they certainly don't rank at top of the table, Supply and Utilisation do stack up quite well.[11] Supply, for example, performs on par with 12-month price momentum, which is a staple quant factor in most models.

Figure 138: Average performance (rank IC) for selected quant factors in Pan-Asian universe, 2007-present



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

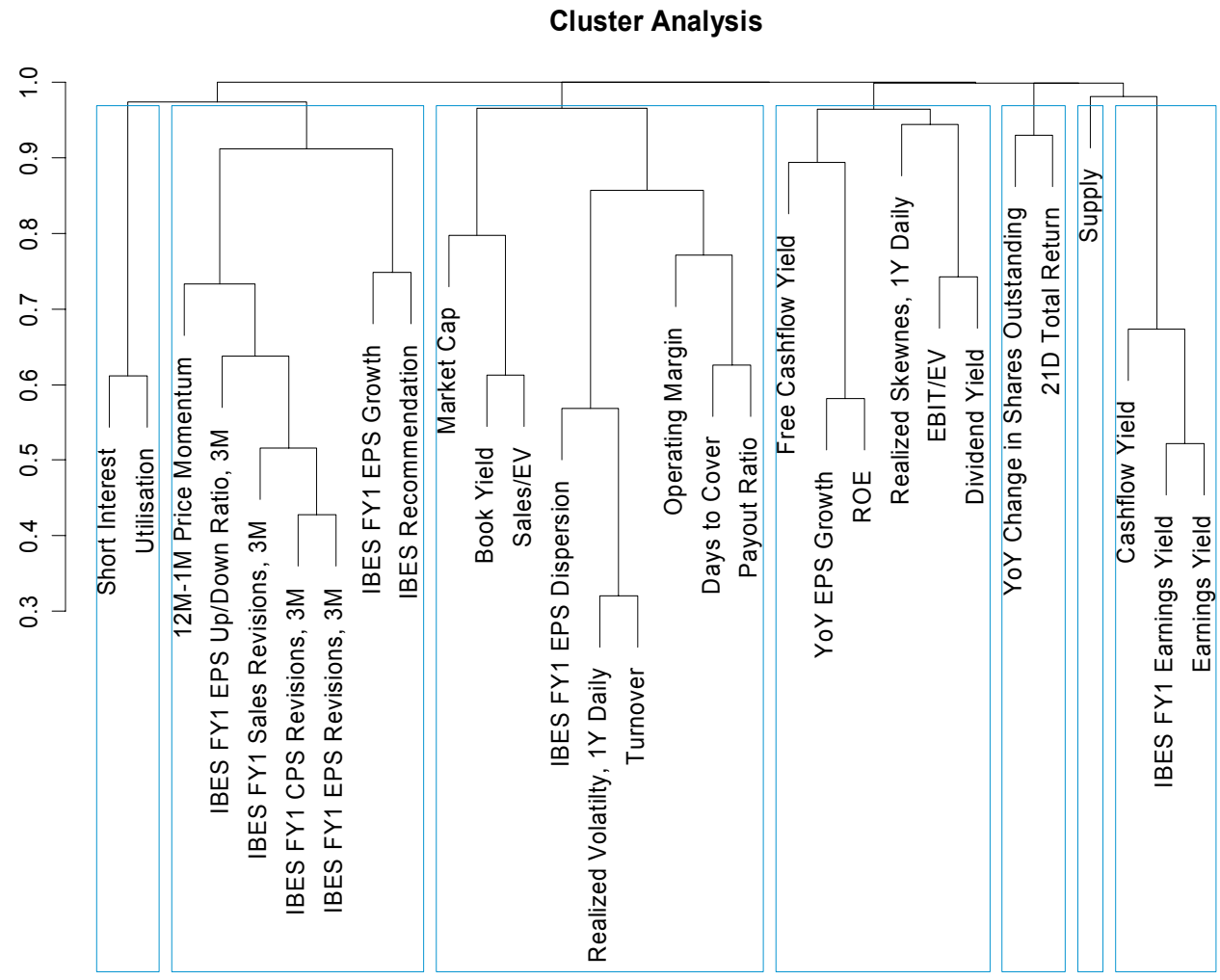
[11] To keep the comparison fair, we test all factors over the same period (2007-present) for which we have securities lending data.

However, raw performance numbers do not tell the whole story. Even though the securities lending signals are not the most spectacular performers in the quant toolbox, they can still add value if they are somewhat uncorrelated with the other factors in one's quant model. This is because a low or negative correlation between factors can offer diversification benefits by lowering the volatility of the alpha model.

Correlation analysis

One way to visualize the correlation between the factors is to do a cluster analysis, like the one shown in Figure 139. In the diagram, factors within the same "branch" are highly correlated, while those in different branches have a low correlation. For example, the second cluster of factors from the left includes analyst 3-month EPS, CPS, and DPS revisions, as well as 12-month price momentum. This means that these factors tend to be relatively highly correlated, which intuitively makes sense – analysts do tend to upgrade or downgrade these metrics in unison, and hence we would expect the performance of strategies built on these factors to be similar. The fact that long-term price momentum is included in this cluster is also intuitive – analysts often tend to upgrade stocks that are outperforming and vice versa.

Figure 139: Correlation analysis



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

For the purpose of this report, the most interesting feature of the chart is the fact that three of the securities lending factors tend to fit into branches by themselves. For example, Short Interest and Utilization group into the left-most branch, separate from the other factors. This indicates two things. First, these two factors are somewhat correlated to each other (this is not surprising, we saw the same thing in our U.S. research). Second, and more important, these two factors are reasonably uncorrelated with the other quant factors. The same goes for Supply, which sits in a branch completely by itself. Figure 140 below shows the five factors with the most positive and most negative correlations with Supply

Figure 140: Largest correlations with Supply

Five most positive correlations		Five most negative correlations	
IBES FY1 EPS Dispersion	0.46	Realized Skewness, 1Y Daily	-0.24
Short Interest	0.45	21D Total Return	-0.22
Market Cap	0.42	IBES FY1 EPS Up/Down Ratio, 3M	-0.08
Cash flow Yield	0.32	Utilisation	-0.05
Turnover	0.29	Payout Ratio	-0.01

Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

None of the correlations, either positive or negative, are greater than 50%, which gives us further comfort that the securities lending factors are indeed picking up on information different from what is captured by the more traditional quant factors.

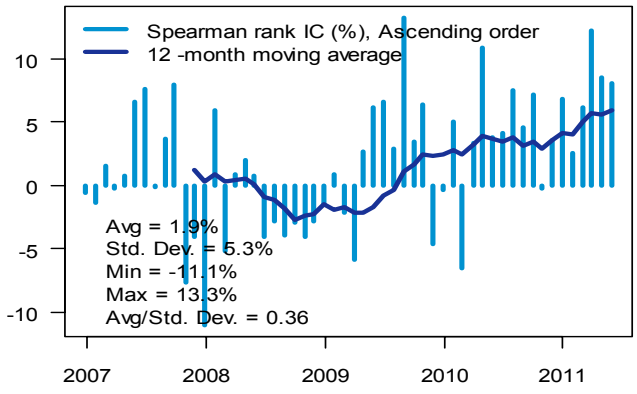
Incremental alpha

The correlation results are promising, but the bottom line is whether the securities lending factors can add incremental value on top of a real-world quant model. To test this, we build a representative alpha model, and then study what happens if we add in our securities lending factors at 20% weight. Our base-case model is:

- **Value:** 50% Dividend Yield and 50% Sales/EV
- **Sentiment:** 3-Month FY1 EPS Revision
- **Profitability:** ROE
- **Quality:** YoY Change in Shares Outstanding

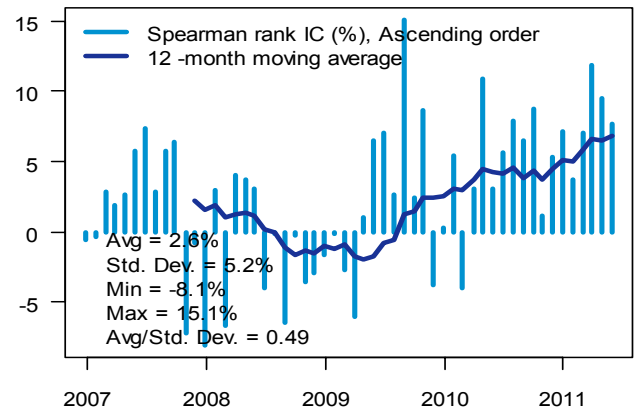
Figure 141 shows the performance of the base case model (measured using rank IC), while Figure 142 shows the model with the securities lending factors (we use a 50/50 blend of Supply and Utilisation) included with a weight of 20%.

Figure 141: Alpha model without securities lending factors, rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

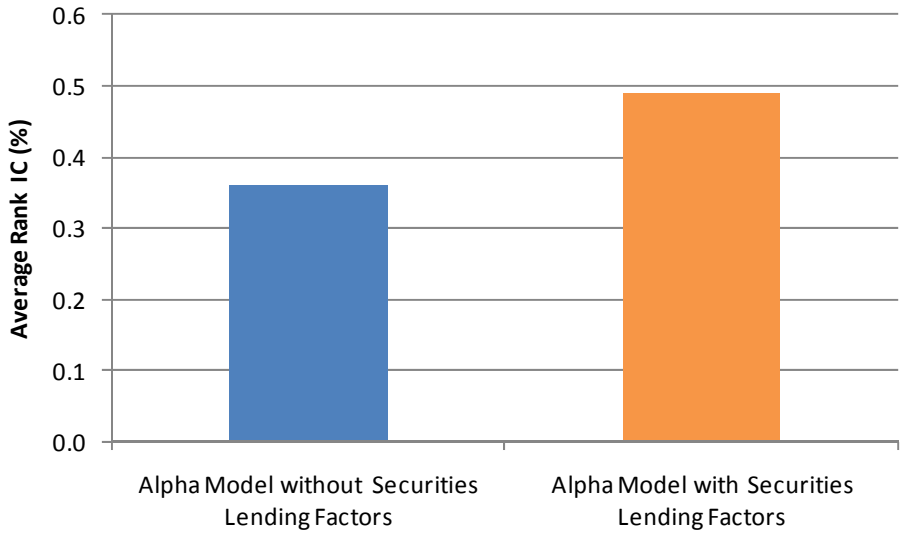
Figure 142: Alpha model with securities lending factors, rank IC



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

While the backtest period is limited, we do find that adding the securities lending factors into the model does improve performance. In fact, the average IC of the model improves from 1.9% to 2.6% with the addition of the securities lending factors (Figure 143), a gain of 27% in percentage terms.

Figure 143: Average performance (rank IC) for alpha model with and without securities lending factors



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Conclusion

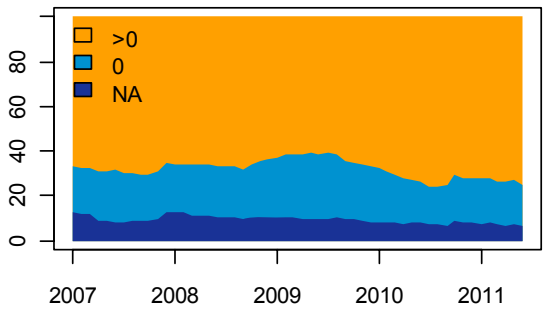
Overall, our results are promising. Even though the traditional quant factors are still relatively robust in Asia, this is no reason for quantitative investors to rest on their laurels. The painful message we can learn from the more developed markets is that even the best performing factors do not last forever. The forces of arbitrage, coupled with a volatile macroeconomic environment, mean that just because a factor has worked for 20 years does not mean it will work tomorrow. Unique databases like the securities lending database we study in this paper offer the opportunity to augment the traditional factors with relatively uncorrelated new alpha.

Appendix

Percent of factor scores that are zero

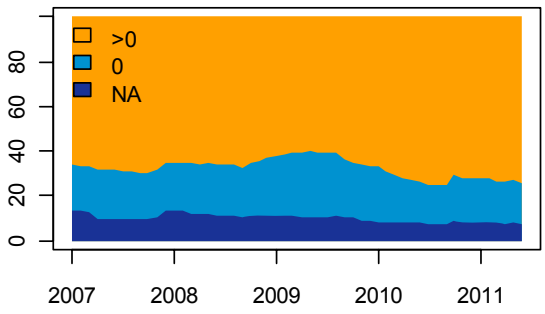
Anything that doesn't fit elsewhere

Figure 144: Short Interest



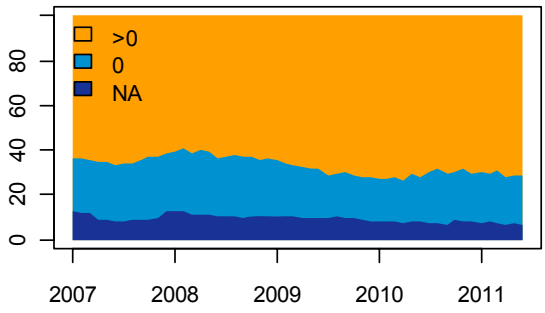
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 145: Days to Cover



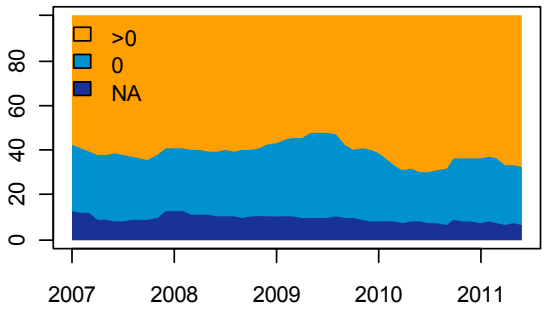
Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 146: Supply



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Figure 147: Utilisation



Source: DataExplorers, Datasteam, Worldscope, Thomson Reuters, S&P, Deutsche Bank

Appendix 1

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