DENNIS WU, Goss Institute of Research Management
Falling Stock Prices in China, IPO Moratorium, and Private Equity Challenges

EXCLUSIVE INTERVIEW
RUYIN HU, Shanghai Stock Exchange Research Center
On the Success of Shanghai-Hong Kong Stock Connect

DA-BAI SHEN, Soochow University
Preliminary Study on the Impact of Shanghai-Hong Kong Stock Connect on Taiwan’s Stock Market

DENNIS WU, Goss Institute of Research Management
Falling Stock Prices in China, IPO Moratorium, and Private Equity Challenges
MESSAGE FROM THE EDITORS

COVER ARTICLE
Falling Stock Prices in China, IPO Moratorium, and Private Equity Challenges
Dennis Wu

INDUSTRY DIALOGUE
A Dialogue with Dr. Ruyin Hu: On the Success of Shanghai-Hong Kong Stock Connect

ACADEMIC INSIGHTS
Preliminary Study on the Impact of Shanghai-Hong Kong Stock Connect on Taiwan’s Stock Market
Da-Bai Shen

CASE STUDY
Shanghai-Hong Kong Stock Connect: Milestone with Far-Reaching Implications for Hong Kong
Yankun Hou

Brief Analysis of the Differences between Japan’s Stock Market and those of Hong Kong, Other Asian Regions, and the US
Yoshinaga Toho

COLUMN
An Overview of Anti-Money Laundering and Counter-Terrorist Financing Programs and Quantitative Methodologies
Yimin Yang

Setting Financial Transaction Threshold for Anti-Money Laundering Monitoring
Yimin Yang

Using a Liquidation Boundary and a Deposit Account to Separate Skilled and Unskilled Fund Managers
Xuedong He, Sang Hu, and Steven Kou
A MESSAGE FROM THE EDITORS

For many investors, the year 2015 came with its share of disappointments. Due to low inflation and slowing job gains in the US, the Federal Reserve has been delaying the much anticipated rate hike until potentially the first quarter of 2016. Falling stock prices and manufacturing output in China have caused concerns about global growth and demand. Indeed, the above and other such topics surrounding the financial and regulatory environment were discussed in depth by panels of experts at the Second GOSS Private Equity & Ninth RMI Annual Risk Management Joint Conference held in Singapore on 30 and 31 July 2015. The conference was an immense success with exchanges of many inspirational ideas about the opportunities and challenges facing the areas of private equity (PE) and financial risk management in Asia.

This issue of the PE Review follows the same structure as the first and includes a cover article, interviews and academic insights, in-depth analysis of current events via case studies, and lastly a column presenting academic research data. The cover article of this issue, written by Dr. Dennis Wu from GOSS, aims to analyze the impact of China’s recent equity market crisis on IPOs and PE deals, and provide suggestions for PE firms to take measures in a bearish and volatile environment.

China’s stock market has received much policy support in the past year, and the Shanghai-Hong Kong Stock Connect program was definitely one of the most important initiatives. Consequently, this issue features a number of articles discussing the Stock Connect and its implications on China, Hong Kong, and other Asian regions. First, this issue features an interview with Dr. Ruyin Hu, Director of the Research Center at Shanghai Stock Exchange. During the interview, Dr. Hu discussed the significance of the Stock Connect to the internationalization of the renminbi (RMB), the developmental process of the program, and concerns about Hong Kong as an offshore RMB market. Additionally academic insights by Soochow University’s Prof. Da-Bai Shen discuss the possible threats posed by the Stock Connect to other regional capital markets focusing on its influence on Taiwan’s stock market, comparing the credit ratings of Taiwanese and Chinese companies and the implications for long-term development. This issue also features two case studies, one by Mr. Yankun Hou (UBS) studies the milestones of the Stock Connect and its implications for Hong Kong and another by Mr. Toho Yoshinaga (NEEDS Co., Ltd) talks about the development of Japan’s stock market in the context of ongoing Abenomics, presenting a comparative perspective to the Chinese stock market.

Lastly, this issue includes a column of latest research results on anti-money laundering (AML) methodologies and compensation schemes for discerning skilled fund managers. AML programs have gained increased regulatory scrutiny but lack appropriate methodologies and technical guidance for the detection and monitoring of suspicious financial activities. Dr. Yimin Yang (Protiviti Inc.) has contributed two papers on AML, one discussing the thresholds for monitoring transactions and another on quantitative methodology for AML and terrorist financing programs. In addition, RMI researchers, Prof. Steven Kou and Dr. Sang Hu along with their affiliate Dr. Xuedong He from Columbia University, discuss how liquidation boundary and a deposit account can help to distinguish the skilled from the unskilled fund managers. Private equity is a highly skilled profession, and the importance of selecting the best GPs cannot be overstated.

With the PE Review, we strive to provide our readers with insightful discussions on the current market along with policy outlook and academic innovations. We sincerely hope you find this issue helpful in making investment decisions and organizational improvement and thank you for your continued readership. Please do not hesitate to let us know any comments you might have.
Falling Stock Prices in China, IPO Moratorium, and Private Equity Challenges
Dennis Wu, GOSS Institute of Research Management

1. Stock Market Crisis
China’s stock market bubble started deflating on 12 June this year, and within one month a third of the value of A-shares on the Shanghai Stock Exchange (SSE) evaporated (S.R., 2015a), the largest three-week drop since 1992. In an effort to prop up its stock market, China suspended initial public offerings (IPOs) along with other measures such as creating a market stabilization fund and asking investors not to panic (Bloomberg News, 2015). The People’s Bank of China (PBOC) also cut fixed deposit rates by 0.25% and cut the required reserve ratio by 0.5% three times, on 28 June, 26 August, and 23 October (Monetary Policy, 2015).

2. IPO Moratorium
After the IPO moratorium in 2013, both the SSE and to a lesser extent the Shenzhen Stock Exchange (SZSE) experienced a surge of IPOs along with a bull market encouraged by policy reforms. A higher proportion of SME’s and high-tech industries on the SZSE potentially indicates a decrease of high-tech industries in the Chinese economy. In fact, the growth rate of the prime operating revenue of high-tech industries has been declining since 2004, hitting its minimum in 2008 with some rebound in recent years (Li, 2015).

3. Private Equity Challenges
3.1 IPO Moratorium
With the domestic IPO channel closed, Chinese companies turned to overseas listing opportunities. However, affected by the cautious mood of the investors, Chinese overseas financing reached only US$2.5 billion in the third quarter of 2015, a decline of 75.2% from the previous quarter. By mid-September this year, the total offshore IPO volume of Chinese...
companies was US$18.5 billion, down 55.8% as compared to last year (Sina, 2015).

A large number of Chinese companies are waiting to be listed in Hong Kong, including the imminent IPO of China Huarong Asset Management Corporation which is expected to be listed around US$3 billion, and the deal was approved by Hong Kong Exchanges and Clearing (HKEx) in August. Challenging domestic market conditions have made other Chinese companies seek listing in Hong Kong for IPOs of considerable scale, including China Reinsurance Group’s US$2 billion IPO, as well as the US$1 billion IPO of China International Capital Corporation Limited (Sina, 2015).

Due to the temporary suspension of IPOs in China, Chinese private equity is facing challenges of exits, including the challenge of listing overseas and the lack of trading platforms required for mergers & acquisitions’ (M&A) transactions (Preqin Special Report, 2015). An alternative is China’s National Equities Exchange and Quotations (NEEQ), an over-the-counter (OTC) market that provides greater financing opportunities for small companies because of the lower listing requirement (Xu, 2015). NEEQ has grown rapidly in the past few years, with over 2,100 institutions currently listed. However, key factors such as liquidity drain, a lack of market makers, and moral risks are hindering the process (Preqin Special Report, 2015).

3.2 Competition from Strategic Buyers
Private equity firms are also facing challenges from strategic players such as Baidu, Alibaba, and Tencent. According to Vinit Bhatia, a partner at Bain & Company, “Baidu, Alibaba, and Tencent are not just looking at Internet deals, but they’re actually looking at everything. They’ve got a lot of capital and their return requirements are a little different than a typical general partner” (Macfarlane, 2015).

Ecommerce firm Alibaba alone has made 18 acquisitions worth US$11.2 billion in Asia by late September this year, against 14 acquisitions worth US$5.9 billion last year, according to Dealogic, a data provider (Macfarlane, 2015). One of the latest buyouts Alibaba proposed is to purchase the remainder of the video site Youku Tudou in which Alibaba had acquired an 18.3% stake in 2014 (Financial Times, 2015). Chinese tech giant Tencent has made 18 acquisitions worth US$8.7 billion in the region this year, compared with 22 worth US$7.2 billion in 2014. Meanwhile, China’s largest search engine Baidu has done eight deals so far this year worth US$1.6 billion, compared with seven deals worth US$187 million for the whole of 2014. Their deals vary from acquisitions of technology companies to professional services firms, in addition to retail, leisure, and telecommunications businesses (Macfarlane, 2015).

4. Gloomy Economic Outlook
On the growth front, data published on 19 October 2015 showed that China’s GDP grew an annual 6.9% in the third quarter, the lowest since 2009 [China Finance Corporation, 2015]. In an effort to remedy slowing growth, China allowed the yuan to devalue against the US dollar by over two percent on 11 August (Chan and Spence, 2015). In light of the stock market crash, GDP slowdown, and yuan depreciation, we have seen capital outflows from China. According to the data released by China’s central bank on Friday 16 October 2015, the new yuan funds outstanding for foreign exchange of China’s central bank and financial institutions dropped significantly by around 761 billion yuan in September compared to the previous month (Wall Street Journal, 2015).

This is the fourth consecutive monthly decline in the new yuan funds outstanding for foreign exchange, following a decline of more than 723 billion yuan in August, showing the continuing outflow of foreign capital from China (Wall Street Journal, 2015) and a tightening effect on domestic yuan liquidity (Xinhua, 2015). In fact, capital outflow had started much earlier, for example Li Ka-Shing, Chairman of Cheung Kong Holdings Ltd and Hutchison Whampoa Ltd, was “moving away from the markets in Hong Kong and mainland China, in particular the real estate market.  

**Figure 5. Change of new yuan funds outstanding for foreign exchange**

Source: China Finance Corporation (CFC)
Between the announcement to sell ParknShop, one of Hong Kong’s two largest supermarket chains, in July 2013 and the sale of Metropolitan Plaza complex in Chongqing on 10 November 2014, Li had cashed in more than HK$70 billion by liquidating real estate assets in China” (Li, Liang, & Wong, 2014).

5. Investment Opportunities

Despite the relative economic slowdowns, investors still hold positive opinions of investment opportunities in emerging markets. For example, Preqin views that the gross domestic product (GDP) per capita in emerging markets will continue to outperform that of the developed markets in the long run. Furthermore, urbanization and a growing middle class lead to great investment opportunities. Many of the attractive investment opportunities are in private equity and we discuss a couple of these areas below (Preqin Special Report, 2015).

5.1 Healthcare in the Emerging Markets

Healthcare in emerging markets presents an investment opportunity well suited for private equity investors. The healthcare industry includes healthcare delivery, services, diagnostics, medical devices, and pharmaceuticals and life sciences. Within the BRIC nations, which consists of Brazil, Russia, India, and China, the market capitalization of the healthcare industry is valued at more than US$850 billion and grows at a rate of 9.1%, significantly greater than the aggregate GDP growth rate of those countries (Jaeger, Khubchandani, & Singh, 2014).

In addition to size, the fragmentation of the industry across emerging markets makes it attractive to investors. Healthcare in emerging markets consists of more than 50 distinct sub-sectors and is driven by a model of localized doctor’s practice. The fragmentation offers great consolidation opportunities at discounted valuations. Furthermore, with a commercial pay-based system and low insurance penetration of the healthcare industry in the emerging markets, operating margins across most of the industry sub-sectors are very high, as a growing emerging middle class is willing to pay for high-quality medical services (Jaeger et al, 2014).

In particular, the aging population, economic growth, and expanding basic health insurance are driving the large healthcare market of China to grow rapidly. In 2013, China’s healthcare expenditure reached 3.2 trillion yuan, maintaining an annual growth rate of 17.2% over the past nine years (Chen, Ding, & Tao, 2015). The country’s annual expenditure is forecast to grow at an average rate of 11.8% per annum between 2014 and 2018, reaching US$692 billion by 2018 (Jacobson and Wu, 2015). However, healthcare expenditure accounts for only 5.6% of the GDP, compared with the average ratio of 7.7% of a high-income country (Chen, Ding, & Tao, 2015). As an example of private equity investment in this area, HAO Capital, the China-focused private equity firm, announced on 16 September that it had invested US$12.5 million in DJ HealthUnion Systems Corporation, a leading domestic provider of digital hospital solutions, with a focus on health data sharing solutions. The financing will be used to further support DJ HealthUnion’s development of its interoperable Health Information Exchange (HIE) system (HAO Capital News, 2015). As another example, Olympus Capital Asia said in mid-September that it has committed US$40 million to Tian Jian Hua Xia Medical Group Holdings Pte. Ltd, or Tendcare Medical Group, one of the largest private hospital management companies in China, to help fund the company’s expansion program (Olympus Capital Asia, 2015).

5.2 Overseas Investment Opportunities

Forecasts show that China’s global stock of outbound foreign direct investment (OFDI), which includes investing in corporate mergers, acquisitions, and start-ups, would grow from US$744 billion to as much as US$2 trillion by 2020 (Anderlini, 2015). In the past decade, China’s government and state-owned companies have invested over US$1 trillion in transactions tracked by the American Enterprise Institute (AEI), but most of the investments have concentrated on the energy sector, as shown in the graph below (Schoen, 2015).

![Figure 6. In the past decade, China’s government and state-owned companies have invested over $1 trillion in transactions tracked by the American Enterprise Institute](source: AEI)
While early Chinese investments focused on energy and natural resource assets in developing countries, Chinese investors are increasingly looking to the US and Europe for new opportunities. From 2000 to 2014, Chinese companies spent €46 billion on 1,047 direct investments in 28 EU countries, and most of the transactions came after the 2008-09 global financial crisis (Anderlini, 2015). The following graph shows historical (by 2012) and forecast (out to 2020) assets in China’s international investment position based on the assumption of fully convertible capital account by 2020, in US$ trillion (Hanemann and Huotari, 2015).

Great Britain is the largest recipient of Chinese direct investment, with a cumulative total of €12.2 billion between 2000 and 2014. Germany comes in second with €6.9 billion and France third with €5.9 billion. Europe’s energy, automotive, food, and real estate sectors were the most attractive to Chinese investment (Anderlini, 2015).

5.2.1 Technology and Media Industries
Chinese investment is increasingly interested in the technology sector as well. In 2014, for example, Chinese direct investment in the US information and communications technology industry accounted for about half of all Chinese investment into the United States. In some areas, such as semiconductors, biotechnology and green energy, investment came almost entirely from private Chinese investors (Stratfor Global, 2015).

One recent recipient of Chinese overseas investments is Israel. For example, Alibaba in January invested an undisclosed sum in Visualead, an Israeli company specializing in QR code technology. Baidu, China’s largest search engine, has put US$3 million into Pixellot, an Israeli video capture start-up. Additionally, it provided funds for Carmel Ventures, an Israeli venture capital firm, last year (Clover and Reed, 2015).

Chinese investment in Israel has experienced little political backlash, unlike in the US, where the officials blocked a Chinese investment in wind farms in 2012 and more recently raised concerns that the Chinese government is linked to hacking attacks on US defense contractors (Clover and Reed, 2015).

China is also extending its investment into the media industry. Back in January, Hugo Barra, vice president of Xiaomi’s global division, expressed plans to invest in Indian startups and overseas media content (Lee, 2015). Alibaba Pictures, the movie division of Jack Ma’s Chinese e-commerce giant, also announced in June that it would invest in Paramount Pictures’ Mission: Impossible – Rogue Nation (Hanemann and Huotari, 2015). In addition, Alibab Pictures said on 12 October that it plans to invest in the South Korean film Real, starring Asian superstar Kim Soo-hyun (Lee, 2015).

5.2.2 Insurance Industry
China is also beginning to pursue overseas opportunities in the insurance sector. Health and property insurers have started to pursue strategic tie-ups and outright M&A to tap into Western expertise, keen for knowledge on products, pricing, and technology as a nascent market for health and property insurance takes off (Naidu, 2015).

China is set to become the world’s third largest insurance market this year, according to state-run news agency Xinhua, which quoted a January statement by Insurance Regulator Chief Xiang Junbo (Chen, Ding, & Tao, 2015). According to Swiss Reinsurance Company, China’s non-life insurance premiums jumped 17% in real terms in 2014, the 13th straight year of double-digit growth (Naidu, 2015).

The push to widen product portfolios has been propelled by falling demand for car insurance as vehicle sales weaken on slower economic growth, as well as the planned introduction of tax breaks on health insurance premiums (Naidu, 2015). Insurers including Fosun International Ltd and Anbang Insurance Group have launched US$6.1 billion worth of overseas deals this year. China Pacific Insurance Group Co., Ltd has widened its partnership with Allianz SE to sell long-term care and health products. According to Malcolm Steingold, Aon Benfield’s head of Asia Pacific, Chinese underwriters are now being
trained in London and other European capitals, and some products are customized to include a savings component since Chinese customers are not used to protection-only policies (Naidu, 2015).

6. Concluding Remarks
China’s economy is cooling down with lower growth rates and outflowing foreign capital. After experiencing a surge in the beginning of the year, IPOs in China came to a stop with the implementation of IPO moratorium as a remedy for the domestic stock market crisis. In addition to the blocked IPO channel, private equity firms in China face other challenges such as a lack of trade sales platform and competition from strategic buyers like Baidu, Alibaba, and Tencent. However, there are still areas of good potential. For example, the healthcare market in China is growing rapidly. In addition, Chinese investors are urged to look for overseas opportunities e.g. in the insurance, technology, and media industries.

There have also been some tentative signs of improvement in the Chinese economy such as property sales, infrastructure investment, income growth and consumption, and the risk of a hard landing remains low (S.R., 2015b). Globally, a rate hike in the US is still anticipated, though it could be delayed to 2016. In Europe, on 22 October President of European Central Bank, Mario Draghi, hinted on extending the quantitative easing program by re-iterating a commitment to adjust the ‘size, composition and duration’ of the program if needed (Barnato, 2015; Fletcher and Kollewe, 2015). Among the diverging monetary policy cycles, cautiousness seems to be the major mood for investors. However, there clearly exists some niche sectors where strong growth and strategic values prevail, and to benefit from these opportunities would require greater skills and deeper insights.

Reference:


Introduction

In a dialogue between Dr. Ruyin Hu and Mr. Dong Liang from GOSS, Dr. Hu talked about the key factors behind the success of Shanghai-Hong Kong Stock Connect. As it stands now with the Renminbi (RMB) being not fully internationalized, Stock Connect has made a big leap forward for the internationalization of RMB. However, the ultimate success of Stock Connect depends on the additional net benefits that it brings. At present, Stock Connect is not fully developed, and the most important thing is learning-by-doing. In addition, although he believes that the Mainland has a great impact on the economy of Hong Kong, his attitude towards Hong Kong being an offshore RMB market is rather reserved. At the same time, he suggests that the Shanghai Stock Exchange should be more aggressive in developing the international board to increase its competitive advantage.

GOSS: As it stands now, there are clearly more funds participating in Shanghai Connect than funds in Hong Kong Connect. What is the reason behind this?

RH: I think there are five factors behind this occurrence. First of all, there is an investment threshold of 50 million yuan for mainland investors to participate in Hong Kong Connect. However, only 0.85% of the A-share accounts satisfy this criterion. Subsequently, the majority of the mainland investors are excluded from Hong Kong Connect.

Second, many individual investors with a high net-worth have invested in Hong Kong Connect long ago, and no longer need the platform of Stock Connect.

Third, compared with Hong Kong stocks, the A-share market itself is more active and volatile, and mainland investors are more familiar with A-shares. As far as mainland investors are concerned, there is a home advantage to investing in a domestic market. In addition, mainland investors have corresponding routes to rely on due to their greater familiarity with the regulations and information of the A-share market.

Fourth, as the situation is, there are many factors that inconvenience the investors, such as restrictions on the funds of mainland investors, no hedging, and limited derivatives, etc. Furthermore, if one of the two markets is not open, it is not possible to trade in the other market either.

Fifth, for mainland investors to invest in Hong Kong stocks it is necessary to exchange for Hong Kong dollars, and since the Hong Kong dollar is pegged to the US dollar, investors face additional currency risk.
GOSS: What do you think is the key factor that will determine the ultimate success of the Shanghai-Hong Kong Connect?

RH: In the short term, the RMB is not yet fully internationalized and capitals are not fully exchangeable. Therefore the Stock Connect represents a big leap forward for the internationalization of RMB. In light of this, will there be a need for the existence of the Stock Connect after the full internationalization of the RMB? It depends on whether utilizing the platform of Stock Connect would save effort, have better cost-effectiveness, and bring more net benefits, compared with directly going abroad to invest. If you go abroad for direct investment, there are many inconveniences. For example, you need to open an account, learn about local financial rules, deal with the local financial protection, etc. Investment through Stock Connect is operated by domestic institutions and is relatively speaking much more convenient.

To this end, in theory, one can construct a concise model for analysis: taking a look at whether this stock connect scheme can bring additional net benefits, compared to directly going abroad for investment. These benefits include a series of factors such as convenience in information gathering. If its additional net benefits are negative, then it will definitely be abandoned. Sometimes people choose the longer route instead of the shorter one because the shorter path is difficult to walk on. However, if it is convenient to use the shorter route, why would anyone give up the shorter option for the longer one? Therefore, in the end it all depends on the cost effectiveness, and the Stock Connect’s comparative advantage.

The Stock Connect is not fully developed yet; its rules, investment targets, and ranges of investment are continually being corrected and improved. Therefore, the destiny of Stock Connect will be determined by the degree of future improvement. To consider whether the platform will ultimately bring absolute net benefits and relative net benefits. The former begs the question, if using the platform will bring users benefits. On the other hand, the latter takes a look at, if it is more convenient and advantageous to use the platform compared with other means such as directly going abroad to invest.

In any case, this is a different type of choice and attempt. In the end, we can only speculate but not predict how a new venture will turn out to be, and can only learn by doing. This is a dynamic process of self-improvement and survival of the fittest.

GOSS: In your opinion, what is the impact of the operation of Shanghai-Hong Kong Stock Connect on Hong Kong and Shanghai, respectively?

RH: Currently, there are many free markets in the world, of which currencies are freely exchangeable, but they still have interconnecting schemes similar to Stock Connect. Some of which are no longer in operation while others are still in place. I personally think there are a lot of similar schemes, but why have they not become a very hot and popular platform with large trading volumes? Generally speaking, if an exchange is connected with another exchange, and if the trading volume of one exchange increases, would it be a good thing or a bad thing for the other exchange? Both are possible. It is a good thing, as a larger trading volume increases the revenue of the exchange and enhances the investment channels of the investors. It is a bad thing because if it is too convenient here, then does the local market loose its relative attractiveness e.g. for a company’s initial public offerings (IPOs)? This is a dilemma inherent to the interconnection scheme. It appears to be a win-win situation, but things may not actually be so.

Of course, the situation may be different in China. Through this platform, your market expands and another new business also develops, which is particularly true for Hong Kong Exchange (HKEx). There are many mainland companies listed in Hong Kong, and the trading volume of the stocks of mainland companies also accounts for more than 50% of the total volume. As far as HKEx is concerned, the connect scheme with the mainland of course is very good.

The mainland has always played an extremely important role for the economy of Hong Kong. In this regard, Hong Kong is significantly different from Singapore, another major Southeast Asian economy. Singapore is well developed as an offshore financial center, and it also plays a prominent role as a harbor
trading and shipping hub. On the other hand, Hong Kong has been losing its advantage in shipping. In the past there was no reform & opening up in the mainland, and geopolitical factors allowed Hong Kong to develop its trade, shipping, and finance. Now the reforms and opening up in the Mainland is progressively increasing, and thus the scope of Hong Kong’s advantage is decreasing. Hence, as long as the mainland’s reform and opening up is not fully in place, Hong Kong will still have opportunities.

Currently offshore RMB markets are being built in many places, such as Singapore, London, Frankfurt, and more. Relatively speaking, Hong Kong is merely one of the offshore RMB markets. As I mentioned earlier, the advantages of Hong Kong are: first, Hong Kong is geographically close to mainland China. And second, the mainland government invests a lot in Hong Kong. It has geopolitical advantages and therefore Hong Kong can become a leading offshore RMB center, but it won’t be the only one.

At the same time, there are disadvantages to Hong Kong becoming an offshore RMB center. The investment space for mainland investors to invest in Hong Kong is relatively small. Manufacturing, technological innovation, internet, and e-commerce are relatively weak in Hong Kong.

As far as Shanghai, or even the entire Chinese mainland capital market is concerned, I personally have been advocating that Shanghai Stock Exchange should aggressively develop an international board to allow a large number of high-quality international companies to be listed directly on Shanghai Stock Exchange, which will be better for the mainland securities market. Why is that? First, if international enterprises come to be listed in mainland China, the volume of agency business in the mainland will increase. Second, if international businesses come to mainland China for listing and publicly disclose information, mainland investors’ understanding of these businesses will deepen. Third, many international companies have always been willing to go public in mainland China, because there is an investor base that matches the consumer base, forming a more positive interaction. Both Unilever as well as Mercedes-Benz had such intentions. Also, for some large international companies, different businesses are listed in different places, so there are still a lot of opportunities for China. Fourth, it also promotes the internationalization of RMB, which would reduce China’s currency mismatch risk. Worldwide, there are only a handful of markets such as China and Vietnam that are without international enterprises listed, so it is very much necessary for China to develop an international board.

**GOSS:** Can the model of Shanghai-Hong Kong Connect be replicated or serve as a reference? Is there going to be Shenzhen-Hong Kong Connect, Shanghai-Taiwan Connect, Shenzhen-Taiwan Connect, or Shanghai-Seoul Connect?

**RH:** This also depends on how the scheme develops and whether there is a necessity and is it economically feasible. As an independent economist, I think this type of interconnecting platform has very limited effects, and I would much rather recommend the scheme of international boards, which would be more direct with lower costs. NYSE has never had any interconnecting schemes with other exchanges because it doesn’t consider such schemes necessary. Singapore Exchange and the Australian Stock Exchange in Sydney had engaged in some kind of interconnecting platform but it was terminated at the end because it was not economical or financially sustainable.
1. The Initial Performance of Shanghai–Hong Kong Stock Connect

The “Pilot Interconnection Trading Mechanism between Shanghai and Hong Kong Stock Markets,” popularly known as the Shanghai–Hong Kong Stock Connect refers to the program which connects the Shanghai Stock Exchange and Hong Kong Stock Exchange via a technical link, so that investors of one exchange can purchase stocks listed on the other exchanges via local securities dealers.

Originally, Stock Connect was scheduled to be launched in October 2014, but it was postponed to 17 November 2014 for the official operation, which as most people suspected was due to the political conditions at the time. This makes the Stock Connect not only a milestone in commerce and finance, but it also carries a great economic, political, and strategic significance.

During the initial phase, there are limits on the investment quotas of the two-way trading through Stock Connect. The limit on the total investment amount through Shanghai Stock Connect is set to 300 billion yuan with a daily trading limit of 13 billion yuan, while the limit on the total investment amount through Hong Kong Stock Connect is set to 250 billion yuan with a daily trading limit of 10.5 billion yuan.

On the day of its launch, the 13 billion yuan daily quota of Shanghai Stock Connect was used up, but on the Friday of that week, 21 November 2014, the trading volume was only worth 2.3 billion yuan. The situation for Hong Kong Stock Connect was even worse with only 1.8 billion yuan of trading volume on the first day, which was further reduced to 190 million yuan on 21 November, only 2% of the total daily quota of 10.5 billion yuan. This demonstrates the current predicament of a shortage of capital in China. Moreover, people realized that Stock Connect has the nature of leaning towards Shanghai, so the enthusiasm quickly subsided within just a week.

Actually, Shanghai Stock Connect’s initial total quota of 300 billion yuan accounts for only about 1.5% of the market capitalization of the Hong Kong Stock Exchange (HKEx). We can see that the initial scale of Stock Connect is relatively small. Therefore, if we compare the conditions and limitations of Hong Kong-Bound Stock Connect with those of Shanghai-Bound Stock Connect, people generally think that more support was given to Shanghai and less to Hong Kong. (See Figure 1).

From the perspective of Taiwan the short-term impact of Stock Connect on Taiwan is not yet clear, since the cross-strait A-shares through-train scheme was already launched on April 1, 2014. Even though some people think that it will have a fairly significant impact on Taiwan’s securities industry or even that Stock Connect has been the major cause for the lack of momentum in Taiwan’s stock market in the past month. Tseng Ming-Chung, Chairman of Taiwan’s Financial Supervisory Commission (FSC), emphasized that the amount of domestic funds transferred to Hong Kong for investment through sub-brokerage averaged to only NT$200 million to 300 million daily, and the funds flowing to Stock Connect were mostly those that had been previously remitted abroad by large investors.

2. Differences between Taiwan’s Stock Market and that of Hong Kong and Mainland China

We can have a rough understanding of the stock markets of mainland China, Hong Kong, and Taiwan from Figure 2:
Roughly speaking, the price to earnings (P/E) ratio is lower in Taiwan and so is the scale of the market. In terms of industry characteristics, real estate is quite prominent in Hong Kong, while the proportions of high-tech industries such as biotechnology and electronics are larger in Taiwan. It is also worth mentioning that Figure 2 does not show transactions of equity derivatives such as futures and options, of which development in Hong Kong and Taiwan is quite ahead of that in China.

3. Mid to Long-Term Analysis of the Stock Markets of Mainland China, Hong Kong, and Taiwan After the Launch of the Shanghai-Hong Kong Stock Connect

There are many reasons for the recent increase in the expected degree of trading on the Hong Kong stock market, and although Stock Connect might not be the major reason, it is more or less related.

In the long term, due to multiple factors such as the capital gains tax on securities transactions, the yuan appreciation, and the expected inclusion of China’s A-shares on the Morgan Stanley Capital International (MSCI) Indexes, many large Taiwanese investors turned into foreign investors with funds flowing to Shanghai. For the overall Asian capital, there is definitely going to be a marginalizing effect, which of course is a concern for Taiwan.

However, these are mostly considerations from the perspective of transaction cost; and stock market development ultimately still relies on the fundamentals. Considering the dynamic trend of development, the Taiwanese financial executives are gradually realizing cross-strait and international pressure, and have started to adjust the policies that put more emphasis on regulations rather than development. These adjustments include measures...
such as Taiwan-Japan Stock Connect and Taiwan-Singapore Stock Connect in discussion, as well as loosening the restrictions on purchase of Taiwanese stocks by mainland investors. If these measures can be properly implemented, there are still many fundamental advantages to Taiwan’s stock market.

For example, the average credit reputation of Taiwanese companies is still ahead of that of mainland companies. Few years back companies such as Muddy Water and Citron shorted China concepts stocks many times. Whether the earnings fraud hidden behind these transactions is only an individual case or currently a common phenomenon among China’s listed companies is still a shadow of doubt in the heart of many investors dealing with Chinese stocks. Stock prices in mainland China have been failing to reflect the book profits, and according to the many mainland finance scholars that I consulted, the unreliability of the earnings of mainland enterprises could be the major cause.

Below we compare the credit ratings of Taiwanese and mainland Chinese listed companies on exchange and over-the-counter (OTC) markets, based on the results by Taiwan Economic Journal (TEJ), the only publication that carries out cross-strait credit rating. The horizontal axis is the year, and the vertical axis represents the percentage of companies that belong to a certain grade. The green bar is the best grade (1,2,3,4), followed by the orange bar (5,6). The red bar represents the worst rated grade (7,8,9), and the blue bar represents companies that have defaulted. The chart above shows that in the past two decades there are relatively more Taiwanese companies with the best credit rating grade. Another observation in most years the percentage of companies in intermediate credit rating grades is almost always higher in China than in Taiwan. Note that intermediate credit rating grades imply difficulties in discerning the best or the worst. In other words, they are the more ambiguous areas. Thus the credit of mainland Chinese companies is relatively hard to assess. On the other hand, it is also interesting to note that for many years the proportion of the worst credit rated companies was higher in Taiwan than in the mainland.

There are two main possible reasons for the prolonged slump of China’s stock market in the past; one of which is the relationship between government and business enterprises in mainland China. Political connection of Chinese enterprises has recently been a hot research topic among the international academic community. A 2013 article by Guoping Li titled “Political Connections: An Explanation for the Performance of China’s Stock Markets” reports that in mainland China, there is a tendency for the earnings of companies with tighter political connection to worsen, which as the article infers is also related to the low performance of China’s stock market.

With respect to another much criticized issue of earnings fraud of Chinese companies, Steven Ching and Da-Bai Shen reported research on related problems in the 2013 article “Correlation between Credit Default and Financial Reporting Fraud of Listed Companies in Mainland China under the Internal Rating System.”

The main motivation for this study is the fact that the mainland government and state-owned companies often take the initiative to provide support and help for companies with financial difficulties in the process of restructuring, even if there are frequent incidents
of earnings manipulation and financial reporting fraud. After the government provides tacit support for the company with financial difficulties, the timing of a crisis with the company is often delayed, which may make future crises more severe. However, at present in mainland China the reform plan by the new leadership targeted at state-owned enterprises and the financial sector liberalization mechanism that respects the market are being deployed step-by-step. Therefore the government’s tacit support for or involvement in companies facing hardship will gradually reduce.

The study analyzed a number of cases to summarize the type and the definition of various tacit default and earnings fraud in China. The research also found that about 5% of the defaulted companies had adopted measures of financial statement fraud, of which about 30% had used the fraud measure for longer than five years.

However, with the tacit support of the mainland government being reduced, would the corporate earnings fraud in the mainland just be mitigated, or would there be improvement due to the development of Stock Connect? The answer to this is not yet clear logically as the incentives for stock price manipulation might even increase.

As the saying goes “there is no fish in clear water,” in some ways given the uneven qualities of mainland Chinese enterprises, there may be a more profitable space for the more professional institutions.

On the other hand, capital market is closely related to economic freedom. According to the 2015 Index of Economic Freedom’s annual report published by the US think tank Heritage Foundation, Hong Kong was ranked first for 21 consecutive years. Taiwan was ranked 14th globally, up from 17th in the prior year, and was ranked fifth among the 42 economies in the Asia-Pacific region. The economic freedom of China was ranked 139th globally and 30th in the Asia-Pacific region.

Overall, we believe that in the long term Stock Connect will be an important milestone for Asian and even global stock markets. It also represents a big step in the Chinese government’s determination to push forward the internationalization of renminbi (RMB) capital, demonstrating the irreversible trend of the liberalization and internationalization of RMB.

Even though Stock Connect may lower transaction costs, its long-term impact on the information transparency of the mainland’s stock market is still hard to gauge. Therefore, in the future, institutional investors with better professional assessment capabilities will continue to have the advantage in China’s stock market, while individual investors who are weaker in collecting and analyzing information will need some luck to profit in China’s capital market. On the other hand, there is better information transparency and higher yields in Taiwan’s market, which should be attractive to individual retail investors.

For the Taiwanese government which in the past has been rather conservative about the regulation of the capital market, seems to have been under quite some pressure after the launch of Stock Connect and have come up with many capital market policies and measures to loosen regulation and even accelerate the pace of internationalization. Therefore, from a dynamic standpoint, Stock Connect had some positive impact on Taiwan’s capital market as well.

Although in the past Taiwan has put internationalization as the goal, due to political factors, many policies are relatively conservative and lack innovation. Even though Taiwan has a good fundamental base in Information Industry, it is very difficult for Taiwan to develop into an international financial center. However, at present it seems possible for Taiwan to be an international capital market that is gradually being opened up. The largest contribution of Stock Connect to Taiwan’s capital market is perhaps what historian Arnold J. Toynbee called “growth brought about by stress.” By the establishment of new special purpose vehicle (SPV) authorized securities dealers and measures such as Taiwan-Singapore Stock Connect and Taiwan-Japan Stock Connect, Taiwan Stock Exchange is marching towards a platform for cross-border international trading.

4. Developmental Trend of the Stock Markets of Taiwan, Hong Kong, and Mainland China from the Perspective of the Launch of Shanghai-Hong Kong Stock Connect

Although the general trend of integration of the three securities markets is inevitable, if Taiwan’s stock market cannot make the most of its uniqueness and advantages; in the long run it will eventually be squeezed and consumed by China’s huge economies and markets. Compared to mainland China, Taiwan has better financial derivatives [e.g. financial futures and options] and advantages in the middle office and back office [including accounting and risk management]. Hong Kong as an international financial center has ample experience; together with Singapore they are the leaders of finance in Asia. China’s free trade zones are no match for Hong
Kong which is the laboratory for China’s financial internationalization.

Financial securities are concerned with “security,” and before the political, economic, and legal environments in China have sufficiently opened up with thoroughly implemented responsibilities and penalties for the rest of the world to consider reliable, the Hong Kong and Taiwan stock markets (including the peripheral industries) still have decent comparative advantages.

China’s Shanghai Stock Exchange and Shenzhen Stock Exchange had a late start among stock exchanges in the greater China region, and in the beginning they had also looked at the system design and experience of Taiwan and Hong Kong as reference. With their aggressive developmental efforts and favorable environments, their future growth is limitless. Although the scale of front office development in the mainland is beyond the reach of Hong Kong and Taiwan, both the regions lead in the regulation and monitoring of securities markets as well as corporate governance and risk management, including valuable experience in mid and back office management in the greater China region, establishing a solid and smooth bridge with the more advanced European and American markets. In the future there are still many related opportunities for China, Hong Kong, and Taiwan to complement each other, making stock markets in Greater China play a more important role on the global stage.
Shanghai-Hong Kong Stock Connect officially launched on 17 November 2014. Hailed by many as a milestone for China’s capital market development - for opening up domestic Chinese markets for international investors - Stock Connect has garnered mixed sentiments among investors from its conception to its launch.

When announced, Stock Connect met with cautious investor sentiment, but enthusiasm increased near to its launch. The sluggish performance in the first two weeks after the launch disappointed many market participants, leading some to call it a “ghost train.” However, given the bullish performance from A-share market over the past few months, it seems that the enthusiasm for northbound investment from Hong Kong into the mainland has revived.

As shown in Figure 1 and Figure 2, the overall turnover was lower than market expectations during the first month since the launch. Northbound capital (purchases totaled 295.8 billion yuan as of 9 February) also far exceeded southbound capital (purchases totaled 61.4 billion yuan as of 9 February).

According to us, lower-than-expected northbound investment primarily resulted from technical issues (such as clearing and settlement) and investment scope. Some large global publicly offered funds could not trade in A-shares immediately. Whereas mainland investors had already made advance purchases before the launch of Stock Connect. The advance purchases from mainland investors supported the underlying stocks at high levels, but may have discouraged northbound capital investment at an early stage.

Furthermore, we believe the lower-than-expected southbound trading volume was a result of the Shanghai-Hong Kong Stock Connect: A Milestone with Far-Reaching Implications for Hong Kong

Yankun Hou, UBS

Figure 1. CSI 300 Index and Northbound flow

Figure 2. Hang Seng China Enterprises Index (HSCEI) and Southbound flow
disparity between Hong Kong’s market operations and the mainland’s investment style. This difference in styles dampened mainland investor’s interest in southbound investment. Moreover, institutional investors could not invest directly in H-shares as they are restricted by product contracts. Individual investors also need a minimum trading account balance of 500 thousand yuan to qualify for southbound investment, which limits southbound capital flow to some degree. The 6% forex cost for southbound trading also reduced investors’ enthusiasm greatly.

Even though Stock Connect has arguably fallen short of the bullish market expectations in the short term, we believe the Stock Connect, as an innovative new mechanism for cross-border investment, is bound to have far-reaching implications in the long run.

The benefit for Hong Kong is obvious and quantifiable: Stock Connect has started with aggregate buy/sell orders averaging HK$8 billion of average daily turnover (ADT). This is c10% of Hong Kong Exchange’s (HKEx) equity mainboard ADT for 2015, of which HKEx has a 50% economic interest. In addition, the Stock Connect program potentially gives HKEx access to mainland China’s large liquidity pool. As the aggregate quotas of this scheme increase over time, and Shenzhen-Hong Kong Stock Connect launches in foreseeable future, we believe this will provide HKEx the potential for ADT increase.

As mentioned earlier, the success of Stock Connect didn’t come easy. The strategic vision of China’s top leadership and the pragmatic planning of regulatory bodies, from both the mainland and Hong Kong, played prominent roles in undertaking such important reform. Stock Connect in fact was built as “another bridge” between China’s relatively closed financial market and the global financial market via Hong Kong. It also demonstrates Chinese government’s strong commitment to liberalizing the Chinese market, and more importantly, to globalizing the renminbi (RMB).

1. A Supplement to Hong Kong’s Offshore RMB Market

The launch of Stock Connect not only brings HKEx incremental commission, but more importantly also enhances Hong Kong’s status as a leading offshore center for RMB market. The offshore RMB market started in Hong Kong in 2004 but two important changes in 2010 marked the moment when the development of this market sped up.

In 2010, China permitted all corporations in Hong Kong to open a RMB account. Thereafter, the number of institutions engaged in RMB related business in Hong Kong tripled to 132 by end of 2011. RMB denominated certificates of deposits have also increased more than 16-fold since cross-border RMB trade first took off in 2013. It went from 60 million yuan in late-2009 to over 1.2 trillion yuan today, 75% of which remains in Hong Kong. Further development of offshore RMB pool can be attributed to RQFII (Renminbi Qualified Foreign Institutional Investor) scheme, which gave offshore RMB liquidity a “flow-back” channel, and another point-of-entry to onshore market. The offshore RMB market development has gained momentum after that.

Likewise, China also authorized the launch of diversified offshore RMB services to non-Hong

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov-02</td>
<td>Domestic Securities Investment by Qualified Foreign Institutional Investor (QFII regulation) was announced in November allowing foreign investors to access mainland stock markets (A-shares).</td>
</tr>
<tr>
<td>Feb-04</td>
<td>RMB deposits in Hong Kong are allowed. By the end of 2013 RMB deposits totalled 860 billion yuan, an increase from 315 billion yuan in 2010, which account for around 12% of total deposits in the Hong Kong banking system, up from 1% in 2008.</td>
</tr>
<tr>
<td>Jul-07</td>
<td>The offshore RMB bond market, ‘dim sum bonds’, was created when the People’s Bank of China allowed the issuance of RMB bonds in Hong Kong.</td>
</tr>
<tr>
<td>May-09</td>
<td>HSBC and Bank of East Asia are the first foreign banks to gain approval for issuing offshore RMB [dim-sum] bonds.</td>
</tr>
<tr>
<td>Jul-10</td>
<td>All corporates allowed to hold RMB accounts and RMB effectively made convertible in offshore market.</td>
</tr>
<tr>
<td>Aug-10</td>
<td>Scheme to allow foreign central banks, offshore RMB clearing banks, and participating banks to invest RMB raised offshore in the mainland interbank bond market.</td>
</tr>
<tr>
<td>Sep-10</td>
<td>First issue of RMB bond by a multinational corporation - McDonald.</td>
</tr>
</tbody>
</table>
Kong residents in 2012, allowing onshore non-financial institutions to issue dim sum bonds for the first time. As a result, the volume of offshore RMB deposits in Hong Kong, referred to as CNH, increased exponentially. The latest banking statistics show CNH deposits in Hong Kong had reached 1.2 trillion yuan by January 2015, which accounts for 9% of the deposits in Hong Kong’s banking system. Today, Hong Kong is the main RMB settlement center for cross-border trade and is the largest offshore pool of RMB funds. When the CNH market starts to mature, we witness a growing demand for a broader range of higher quality financial products. In addition to the dim sum bonds and RMB insurance policies, current offshore RMB investment products in Hong Kong also include RMB Real Estate Investment Trust (REIT), RMB futures, Gold Exchange-Traded Fund (ETF) and China A-share Exchange-Traded Fund (ETF).

Furthermore, it is worth noting that China’s stock, bond, and futures’ markets have long been subject to capital controls and are relatively fragmented compared to other international markets. Therefore, to break free from such closed and fragmented status is not an easy task and requires time. As early as a decade ago, the Chinese government had attempted to create a QFII mechanism to allow qualified foreign institutional investors to invest in A-shares with US dollars. Subsequently, it created the Qualified Domestic Institutional Investor (QDII) and RQFII mechanisms to attract more foreign investors. Since then, the capital flow volumes have been on rise significantly.

The RQFII system in particular has enabled investors to access the A-share market directly through ETFs. There are over 20 China equity ETFs at the moment, accounting for around 50% of RQFII quota. Foreign investors can also participate in fixed income products under RQFII mechanism. Nevertheless, most offshore RQFII products at current stage only involve these two options. The channel foreign investors can use to purchase individual A-share stock is still limited to the QFII scheme [introduced in 2002]. Under Stock Connect arrangement, this has changed.

From the comparison table between Stock Connect and QFII/RQFII in Figure 4, we see that Stock Connect allows Hong Kong investors to purchase A-shares [constituent stocks of the SSE 180 and SSE 380 indices, plus A/H dual-listed shares] via HKEx with a daily limit of 13 billion yuan and a maximum yearly amount of 300 billion yuan. The quota is limited for the moment, but we believe as China further liberalizes its capital market, there is a potential for increase in the quota. Compared to QFIIRQFII scheme which are only limited to selected institutional investors, the Stock Connect is open to both institutional and individual investors.

We can conclude that Stock Connect offers the market participants higher aggregate quota, wider pool of eligible investors, faster time to market, and

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr-11</td>
<td>The first offshore RMB-denominated IPO (by Chinese property investment trust, Hui Xian).</td>
</tr>
<tr>
<td>Oct-11</td>
<td>Rules formalised to allow approved foreigners to invest RMB raised offshore, directly in mainland firms, including through the provision of RMB cross-border loans.</td>
</tr>
<tr>
<td>Dec-11</td>
<td>Eligible mainland-based brokerages and asset management firms in Hong Kong permitted to invest in mainland’s bond and equity markets under Renminbi Qualified Foreign Institutional Investor (RQFII) channel.</td>
</tr>
<tr>
<td>Jan-12</td>
<td>First approval for a mainland company to borrow RMB directly from an offshore bank.</td>
</tr>
<tr>
<td>Apr-12</td>
<td>QFII (from US$30 billion to US$80 billion) and RQFII quotas (from 20 billion yuan to 70 billion yuan) expanded.</td>
</tr>
<tr>
<td>May-12</td>
<td>Mainland non-financial institutions permitted to issue RMB bonds in Hong Kong.</td>
</tr>
<tr>
<td>Jun-12</td>
<td>Hong Kong Monetary Authority (HKMA) launches RMB liquidity facility for participating banks(a) in Hong Kong.</td>
</tr>
<tr>
<td>Aug-12</td>
<td>Personal RMB business in Hong Kong expanded to non-Hong Kong residents.</td>
</tr>
<tr>
<td>Dec-12</td>
<td>Qianhai special economic zone established, allowing Hong Kong participating banks using offshore Hong Kong RMB to provide cross broader non-trade credit facilities to Qianhai mainland Chinese enterprises.</td>
</tr>
<tr>
<td>Nov-14</td>
<td>Stock Connect established to allow both Hong Kong and Shanghai markets to trade shares on the other’s market using their local brokers and clearing houses.</td>
</tr>
</tbody>
</table>

Source: UBS
lower start up and running costs than the existing RQFII and QFII investment systems. It acts as a good supplementary to the current offshore RMB market products that exist in Hong Kong, providing additional access to Chinese equities for foreign investors.

Last but not least, Stock Connect scheme bypassed the current foreign exchange controlling system. As all the RMB needed for northbound transactions is financed by HKEx, the offshore RMB liquidity won’t be affected. As a result, Stock Connect acts as a trial platform for the Chinese government to divide its capital market. It is intended that MMA will co-exist with the current QFII/RQFII schemes.

2. A Key Subject to RMB Internationalization

A more ambitious intention behind Stock Connect is RMB internationalization. It is believed that Stock Connect will help China accelerate its RMB internationalization process.

An “international currency” is defined as a generally acceptable currency in the global market which serves as function of money (medium of exchange, store of value, and unit of account) in the global financial market. Following are the three major stages for a country’s currency to be internationalized based on past trends seen with Pound, US dollar, Japanese Yen, and Euro:

(i) Trading currency: The currency firstly acts as a medium of exchange in the regional and international trade,

(ii) Investment currency: The currency then becomes a unit of account in the international monetary and commodities transaction, and

(iii) Reserve currency: Finally, the currency becomes a major reserve currency in different countries central banks’ foreign exchange reserve portfolios.

Increasing use of the RMB outside mainland China, in the pricing and settlement of trade and financial transactions, as an investment vehicle, and eventually as an international reserve currency, will help the RMB on its journey to becoming an international currency.

The benefit of RMB becoming an “international currency” is well-documented, and can be summarized in four aspects:

First of all, it will help China preserve its developmental achievement of the past 35 years of reformations. Since the financial crisis, different central banks had launched different degrees of monetary policies which had largely increased the volatility within international financial market. If RMB can be used
as a global trade and settlement currency, Chinese enterprises could enjoy lesser foreign exchange risk and the Chinese government could also face a smaller pressure to manage its foreign exchange reserves.

Secondly, it can balance the economic growth rate between export, investments, and domestic consumption demand which could reduce the revaluation pressure of RMB and co-ordinate the economic/trade balance development with its trading counterparties.

Thirdly, China will be able to obtain the benefit of seigniorage effect. Taking US dollar as an example, the US government issued notes to the rest of the world in exchange for other goods and services which allow the US government to abrogate and occupy the wealth from different countries.

Lastly, it can also help China to increase its influence in global political and economic affairs.

During the last few years, we’ve already seen the Chinese government has made enormous efforts in promoting overseas use of RMB, to make it a “trading currency”. These include the launch of cross-border RMB trade settlement pilot scheme in mid-2009, and later the scheme’s expansion to 20 provinces and cities to ultimately cover the whole of mainland China. Eligible exporters in mainland China under cross-border RMB trade settlement scheme also expanded.

A next step is to promote RMB as an investment currency, and make foreigners more willing to hold the currency. The number and width of new/existing channels for RMB cross-border flows has expanded considerably, via: 1) standardization of RMB-FDI rules; 2) near-doubling of the QFII quota to US$150 billion; 3) significant loosening of RQFII rules; 4) allocation of new RQFII quotas to London, Singapore, and Taiwan; and 5) National Development and Reform Commission’s (NDRC) granting of a 75 billion yuan quota to China state owned entities to issue bonds offshore. Stock Connect gives foreign investors another convenient way to invest RMB.

Another point worth mentioning is that although reverse currency is regarded as the final step in the process of currency internationalization, several central banks have already added RMB to their foreign exchange reserves. For example, Nigeria has added the equivalent of US$500 million in RMB to its reserve. At the same time, Chile, Thailand, Brazil, and Venezuela have begun efforts to include RMB in their reserves portfolio.

In addition, we believe the move of RMB towards an international currency no doubt will bring enormous opportunities for local financial industry, similar to what happened during the development of the Eurodollar market in London back in the 1950s. Hong Kong will as a result offer the widest range of RMB financial products and become the most liquid offshore financial center for RMB business.

3. A Window for Domestic Investors to “Go Out”

The “Go out” strategy was originally initiated in 1999 by the Chinese government to promote Chinese investment overseas. Several schemes were introduced to assist domestic companies to develop a global strategy and exploit opportunities in expanding local and international markets. Since then, interest in overseas investing by Chinese companies has increased significantly. The volume of Chinese outward foreign direct investment (ODI) rose tremendously from only US$3 billion in 1991 to a historical high US$108 billion in 2013, making China the third-largest investor in the world.

Moreover, China’s outward foreign direct investment (ODI) exceeded foreign direct investment (FDI) for the first time in 2014, fresh evidence that China has become an economy with a net capital outflow and has transformed from a capital importer to a capital exporter. This historical moment also proves that the government, private sector, and individuals all benefit from the increase in accumulation of wealth and capital, making a case that “go out” is the best and inevitable path for China’s future development.

Most of China’s outbound investments have been executed via state-owned enterprises, but the number of private firms is also actively increasing in investing overseas. We believe that an increasing number of Chinese investors from different institutions will participate in the global market. However, on their way to “go out”, many Chinese investors may go through a difficult stage where investment decisions both in industrial sectors and securities such as stocks and
bonds may not generate a positive outcome because of their lack of knowledge of overseas markets. With the new Stock Connect, Chinese investors will gain exposure to not only how different market and regulatory system work in a non-Chinese environment, but also different investment ideologies and strategies adopted by foreign investors. Thus, the Hong Kong market after Stock Connect has become not only a door that links China’s financial markets with foreign capital markets, but also a training ground for Chinese investors before they truly go global.

Furthermore, there has been news about the establishment of Shenzhen-Hong Kong Stock Link since Chinese Premier Li Keqiang mentioned its possibility during a visit to Shenzhen. Some people even argue that Shenzhen market is likely to be more attractive to overseas investors for its Nasdaq style with high-tech firms and start-ups. We have no doubt that the Stock Connect will enable us to prepare for the coming Shenzhen-Hong Kong Stock Connect and accumulate valuable experience for the full liberalization of capital accounts in the future.

4. A Long Yet Promising Way Ahead

The success of Stock Connect didn’t come easy. Countless difficulties in trading, clearing, exchanges, and taxes were experienced in a span of just six months. Both mainland and Hong Kong regulatory bodies showed strong determination all the way through "Occupy Central" protests. When challenged by weaker than expected market activities, they also responded sufficiently and retooled in an orderly manner. For instance, the SSE is researching a more rational trading method to reduce forex costs.

The HKEx has also set up a working group to hold brokerage roadshows in mainland to promote the value of investing in Hong Kong stocks to institutional and individual investors. One can sense that the two regulatory bodies are giving careful consideration to the issues before making any decisions.

Looking ahead, we believe index providers such as MSCI and FTSE will eventually add A-shares to their global index systems despite the fact that initial capital flow after the launch of Stock Connect is relatively small. The weighting of A-shares among international indexes will also increase gradually from being “small/micro” to “significant”. As a result, investment in China will become more important for overseas investors as well. Compared with other emerging countries, foreign investors currently account for a very small proportion of market cap in China’s stock market (about 2% of the total A-share market cap).

Generally speaking, after capital account convertibility, the market cap of stocks held by foreign investors usually can reach up to 10-20%, with an average of about 15% of total market cap. For example, after Japan liberalized its capital account in 1995, foreign investors’ market-cap weighting increased from 7% to about 28%. After South Korea did the same in 1995, weighting increased from 4.5% to 20% in the early 2000s. Foreign investors in Taiwan also enjoyed a rising market cap weighting up to 25% after the government liberalized the capital account.

More importantly, while western investors increased their assets under management (AUM) shares in the South Korean/Taiwanese markets, turnover rates in these markets fell from 300%+ per year to 100% in the same period of time. These examples indicate that once the capital market opens up, China will see significant improvements in its investor mix, value investing concept, and capital market stability. The alignment of valuation systems and trading practices with international standards will likely have the biggest impact on the market.

At the moment, China has the world’s largest corporate bond market and the second-largest economy and stock market. With the launch of Stock Connect, more overseas investors will be attracted to the Chinese market with smoother interactions in the long run. There is no doubt that the financial market in China will become a significant player on the global stage. Just like an old Chinese saying by famous Poet Qu Yuan “The road ahead will be long and our climb will be steep,” the integration between two markets has already shown an encouraging start and we believe this is just the beginning.
On the Reform and Core Competitiveness of the Japanese Stock Market

1. The Impact of Shinzō Abe’s Economic Strategies on Tokyo’s Stock Market

After Shinzō Abe’s re-election as prime minister, Tokyo’s stock market has been rising steadily since November 2012, buttressed by the power of Abenomics, the fiscal policies advocated by Prime Minister Abe. By the end of 2014, Tokyo Stock Price Index (TOPIX) had risen nearly 90% since the end of October 2012, far greater than the price rise in US and European markets.

The average daily trading volume on the Tokyo Stock Exchange (TSE) has also been raised to above 2 trillion yen (US$20 billion). The level of activity on the second section and the market of the high-growth and emerging stocks (Mothers) section is even more prominent, which shows that both foreign institutions and domestic individual investors are actively involved in stock trading.

As of the end of November 2014, a total of 3,444 companies were listed on the TSE, on a worldwide scale it is second only to the TMX Group’s exchanges such as the Toronto Stock Exchange (TSX) and higher than America’s Nasdaq and New York Stock Exchange (NYSE).

Figure 1. TOPIX, which represents the movement of the Tokyo market overall, is recording a high growth rate as compared with other markets

Source: Bloomberg
Note: As of December 30, 2014. Indices rebased to 100 as of November 1, 2012

In terms of market capitalization and trading volume, market capitalization of the TSE recovered to US$4.4 trillion and the annual trading volume recovered to US$5.5 trillion, becoming the world’s third largest and Asia’s largest stock market. The stock turnover rate was 123%, second only to those of the Shanghai, Nasdaq, and Shenzhen stock markets. However, we see that 55% of the trading volume in the Nasdaq market occurs on 10 major stocks, while the ratio in the Tokyo market is only 15.4%, far below those of other major securities markets in Europe and America, demonstrating that investors in the Tokyo market tend to have more diversified investment.

Figure 2. Daily average trading volume has exceeded US$ 20 billion on an ongoing basis since January 2013

Source: Tokyo Stock Exchange
Note: 1 US$ = 100 JPY. JASDAQ was integrated with TSE market in July 2013

Figure 3. Tokyo Stock Exchange exceeds NYSE and NASDAQ in terms of number of listed companies

Source: WFE
Note: Number of listed companies as of the end of November 2014
As far as the listed companies are concerned, the soundness of the secondary market is much better than that in other markets. In terms of valuation level, the price-earnings (P/E) ratio of TOPIX in 2014 was 15.6, higher than those of other European and Asian markets.

As seen in the above charts, in the past two years the Tokyo stock market is coming out of many years of stagnant impasse. At the end of 2014, Prime Minister Abe dissolved parliament and the Liberal Democratic Party once again won the election of House of Representatives, obtaining the rare opportunity for long-term governance and political stability for the Abe administration to implement a number of stimulating policies and economic structural reforms. With the casting of Abe’s three arrows of fiscal stimulus, including (1) yen depreciation, (2) quantitative easing, and (3) growth strategy, the performance of Japanese companies led by large export-oriented enterprises started to pick up. Even though last year’s consumption tax hike in April suppressed domestic consumption in the short term and the rapid yen depreciation caused rising input prices, subsequent sharp decline in crude oil prices mitigated the negative impact of yen depreciation. As more companies responded to the government’s call to raise wages, the government-led economic structural reform is improving progressively.

2. Performance of Japan’s Initial Public Offerings (IPO) Market in 2014

With the market environment continuing to improve under Abenomics, IPO market conditions in Japan regained long lost prosperity. Due to the global financial crisis that occurred in 2008, there were only 19 companies going public in Japan throughout the year of 2009. Nevertheless, the situation greatly improved after 2012, and as of the end of 2014 a total
According to a report by Ernst & Young, statistics show that, among world’s major financial markets in 2014, the number of IPOs in Japan was ranked fourth behind those in the US, China, and the UK markets. The number of IPOs in the Tokyo market is expected to exceed 100 this year.

However, in terms of size, the IPO volume in Japan was about US$8.6 billion in 2014, far lower than that on NYSE and Nasdaq. Among the Asian markets, the amount of financing was more than US$26 billion in the Hong Kong IPO market last year. Due to the slow internationalization of the primary market, listing on Tokyo’s market is clearly limited to Japan’s domestic enterprises with limited volume.

This point is also demonstrated by the sizes of the world’s top 10 IPOs in 2014.

Speaking of IPO rankings in Japan in 2014, from our data of the top 22 companies we can see several characteristics of the Japanese IPOs last year: first of all, the top three companies were Japan Display in panel manufacturing, RGF in human capital, and Hitachi Maxell in high-density tape storage. Japan Display resulted from an effort led by the Japanese government to revitalize the international competitiveness of Japanese panel makers. In April 2012, the panel departments of Sony, Toshiba, and Hitachi were stripped out and restructured into a large enterprise of panel design, production, and sales. The government’s initial investment accounted for 86.7% of the shares, and it was determined to recover the costs of investment in the short term. After two years, as expected, Japan Display’s net profit surfaced with the weakening yen and rising demand from overseas markets. In fiscal year 2013, sales volume rose to US$6.1 billion and net profit reached US$340 million.
After the IPO, the government-backed investment fund released 51% of the shares, and this case can be regarded as a model for government-led industrial restructuring. The third largest IPO last year, Hitachi Maxell, was also a classic case of revival. Founded in 1960, Maxell an old Japanese manufacturer of high-density tape, storage devices, and battery, suffered from a sharp decline in performance in 2008 after the financial crisis, experiencing losses for three consecutive years. Maxwell was acquired by Hitachi Ltd. in March 2013 and its performance gradually stabilized. The annual sales surged in 2013 and the company finally launched an IPO, with Hitachi recovering its investment costs in a timely manner. We can see that strong capital operations and support from government and enterprises for core manufacturing was the foundation of large Japanese IPOs last year.

Secondly, among the top 10 IPOs and top 22 IPOs, REITs accounted for third and sixth of them, respectively. After the introduction of Abenomics, the central bank also set a 2% inflation target. Real estate investment recovered rapidly after 2012. With European and Asian capital also entering the Tokyo market, real estate prices began to bounce back. The main factor that supports the listing of REITs is the series of quantitative easing policies introduced by the government to treat government bonds and REITs as investment targets, which undoubtedly gives real estate investment trusts a boost. Investors have become more active in purchasing REIT products with relatively stable returns on investment. Meanwhile, the world’s largest pension management institution, Government Pension Investment Fund (GPIF) also announced an increase in the proportion of investment in Japan-REITs. By the end of 2014, the size of the REITs market in Tokyo has surpassed 10 trillion yen, becoming the third largest REITs market after the United States and Australia.

Among IPOs in the Tokyo market in 2014, transactions were particularly active on the Japanese equivalent of Hong Kong’s growth enterprise market (GEM), known as market of the high-growth and emerging stocks (Mothers); especially striking and the biggest IPO on TSE Mothers was that of Cyberdyne Inc., a Japanese robotics and electronics company. The company achieved three records, including the first healthcare robotics company listed on the TSE, the first listed company of which sales have not exceeded the break-even point, and the first listed company on TSE Mothers that implemented a variable interest entity (VIE) structure. As a selling point of the Abenomics growth strategy the government will focus on fostering the healthcare industry, to ease the impact of Japan’s aging society. As a result, Cyberdyne, a company founded in 2004 by Prof. Yoshiyuki Sankai at the University of Tsukuba in Japan, received attention and investment from several venture capitalists. The company developed and produced the walking assistive medical robot named Robot Suit HAL which received European Commission’s (EC) certification for clinical use in Europe in 2013, and in December 2014 the company submitted an application to the US Food and Drug Administration (FDA) for the HAL exoskeleton robot to enter the US market. As a representative enterprise in the health service industry promoted by the government, the company also performed well after its IPO. This rare high-tech service company employs an equity structure similar to the VIE structure commonly used by IT companies in Silicon Valley, that maintain controlling rights for the management and the founding shareholders and involve a large number of institutional and individual investors.

Looking at the distribution of the Tokyo IPO market, among the 86 newly listed companies, 44 or 51% of them chose TSE Mothers, showing that the TSE is becoming the first choice of direct financing for small and medium enterprises (SMEs). There were 10 companies listed on the First Section and 10 listed on the Second Section, each taking up 12% of the market. In addition, there were 11 companies listed on the Jasdaq Stock Index, three listed on TOKYO PRO Market, six listed on the Japanese REITs, and two listed on Nagoya Stock Exchange (NSE).

From the perspective of the industry distribution, more and more IT companies have chosen to be listed on the TSE. As of the end of 2014, there were 39 IT-related companies that went public on the TSE, accounting for 51% of the total IPOs. These IT-related companies deal in digital content, gaming, network services, software development, e-commerce, big data, cloud services, and electronic components. It is evident that Japanese IPO market is favored by the IT industry, whereas large manufacturing companies are not relying on the capital market.
3. Supplementary Financial Services Industry for Japan’s IPO Market

Let us now take a look at some of Japan’s investment banks and accounting/auditing firms. By the end of 2014, among the 77 IPOs excluding those on TOKYO PRO Market and Japan’s REITs, Nomura, a Japanese financial holding company, underwrote 26 of the deals, accounting for 34% of the market share, while the other three major Japanese securities firms, Daiwa Securities, SMBC Nikko Securities, and Mizuho Securities underwrote 21, 8, and 7 of the deals, respectively. These four Japanese securities firms nearly monopolized three-quarters of the Japanese IPO market. With regards to accounting and auditing, Deloitte, KPMG, and Ernst & Young are the three major players occupying a 90% share of the market.

4. Historical Perspectives and Structural Characteristics of the Tokyo Stock Market

The market structure of TSE is shown in the illustration below:

As the world’s third largest and Asia’s largest market, the TSE experienced 65 years of ups and downs since it was established in 1949. As of the end of 2014, a total of 3468 corporations, 49 REIT, 168 exchange-traded funds (ETF), and 27 exchange-traded notes (ETN) were listed on the TSE. The stock market of TSE is mainly divided into the First Section that covers 1866 large enterprises, the Second Section that covers 541 medium-sized enterprises, and the Mothers section that consists mostly of 208 high-growth companies. On July 16, 2013, two subsidiaries of Japan Exchange Group (JPX), TSE, and Osaka Securities Exchange (OSE) merged, and the previous over-the-counter exchange of Jasdaq that had belonged to OSE was incorporated into TSE. In addition, the predecessor of TOKYO PRO Market was TOKYO AIM co-founded by TSE and the London Stock Exchange aiming to foster international startups. There are still nine companies listed on that exchange but with only sporadic trading, and the exchange has ceased to function in practice.

Analyzing the constituents of the investment on TSE, we can see a clear polarization: on the First Section, foreign investors play the leading role with 59% of the trading volume on the coming from foreign investors in 2013. On the contrary, investment from Japanese domestic individual investors accounted for 70% of the market share on the Second Section, Mothers section, and the Jasdaq market.

Compared to the daily trading volume of over US$26 billion on the First Section, the daily trading volume on the relatively more active Mothers section is merely US$1.1 billion. The First Section of TSE is influenced more by overseas market trends and capital flows, while a larger number of Japanese individual investors look for investment targets among small and medium-sized enterprises. Therefore, we often see funds shifting between blue chips on the major section and small caps on the growth enterprise market, and many local Japanese hedge funds are good at cruising in between the small-cap growth stocks and blue-chip companies with long-short strategies.

With respect to business fundamentals, among the companies going public between 2010 and 2014, the operating income and net profit vary greatly across the First Section, the Second Section, and
the Mothers section of TSE. However, the net profit margins of companies on TSE Mothers are higher than 10%, much larger than those of blue chips on the First Section. This is also reflected in the differences among the price to earnings (P/E) ratios of various markets, e.g. the P/E ratio of TSE Mothers is as high as 63.8, while that of Jasdaq is 15. The companies listed on Jasdaq are mostly family businesses, and although the level of their sales, profits, and net assets is higher than the companies listed on TSE Mothers, they belong to the third board of over-the-counter (OTC) market before merging with TSE due to the generally higher proportion of family shares in the business. Therefore the IPO size and P/E ratio of Jasdaq are lower than those of TSE Mothers. We can clearly see from the IPO size of each market from 2011 to 2014 that TSE Mothers suddenly emerged after 2012 and the Second Section, where SMEs were listed, kept expanding, showing that small and medium-sized non-family enterprises were the major players in the Japanese IPO market in the past couple years.

From the market data of 2013, we can see the role that venture capital firms played in the IPOs of Japanese companies. Among the 58 newly listed companies in 2013, 34 of them obtained venture capital investment, accounting for 59% of total investment, and each of the venture capital-backed companies had investment from on average 4-8 venture capital firms and had gone through several rounds of fundraising with an average venture capital shareholding of around 20%. We can see that venture capital plays no small role in boosting the IPO process, but the Japanese venture capital has a strong herd instinct, and we often see several venture capital firms in the shareholder list of a start-up, each investing a small proportion.

5. Highlights and Differentiation of the Tokyo IPO Market

From the cross-sectional comparison of the scale of enterprises that have launched an IPO in the international market, we can clearly see that IPOs of SMEs with sizes less than US$50 million accounted for 80% of the IPOs on TSE, while the proportion in the United States is only 15% and that in Hong Kong is only 44%. The Tokyo Stock Exchange has become a platform for financing SMEs in Japan. (See Figure 18).

This is mainly due to the development of the Mothers board on TSE, which currently has 193 listed companies, with an overall market value of US$34.2 billion, a market capitalization nearly twice that of Hong Kong’s GEM. The trade volume of TSE Mothers reached US$265 billion in 2013 and the turnover rate reached 775%. In comparison, the annual trade volume of the GEM is only US$10 billion with a
Figure 20. Listing expenses at listing on TSE Mothers is much lower than at listing on HKEX GEM or SGX Catalist. IPO valuation in TSE Mothers is relatively higher than IPO valuation in the others.

The reason why there are so many Japanese SMEs willing to be listed on TSE Mothers is related to the low cost and high valuation of the board. From the 2012 data, the cost of getting listed on the Mothers section of TSE was approximately US$320 thousand, while the listing fees of the HKEx GEM of Hong Kong and SGX Catalist of Singapore were as high as US$2.2 million and US$1.38 million respectively. From a valuation point of view, in 2012 the P/E ratio of TSE Mothers was 19.6 and the P/E ratio of the IPO price was 32, much higher than 13.6 and 16.9 of the HKEx GEM.

The average amount of financing on TSE Mothers is only US$39 million, less than half of the average amount of financing in HKEx GEM at US$89 million. However the listing fee of TSE Mothers is only 8%, far lower than HKEx GEM’s 30%.

To be listed in the United States, the upfront cost averages up to US$2.5 million, and the annual maintenance cost is as high as US$1.5 million. Because of TSE Mothers’ reasonable fees and good valuations, in the past Japanese SMEs rarely chose any other market for listing. Amidst uncertain market conditions in Asia, the TSE is able to maintain its status as an Asian leader due to the activity on the Mothers board. In addition to the cost and valuation, TSE Mothers is developing its own characteristics. It is not hard to see from the industry distribution that biopharmaceutical and information technology (IT) companies account for 55% of the market, which shows that the Japanese government and private funds continue to foster high-tech industries.

For example, within the IT industry, currently Japan is relatively ahead of the rest of world in game development, with eight out of the world’s top ten game developers from Japan. Even Nexon Co., Ltd, a leader in the gaming industry of South Korea listed on TSE in 2011.

Similarly, the biopharmaceutical industry has also become the main player on TSE, with 5 biopharmaceutical companies listing on TSE in 2013, next only to the 41 companies listed on Nasdaq in the US. In 2014, among the 113 biomedical IPOs worldwide three were listed on TSE. Last year, the
national growth strategy of Abenomics listed the biopharmaceutical industry as a key area. Jointly promoted by the government, businesses, and funds from exchanges and the market, Japan’s biopharmaceutical sector will expand with more rapid development.

Thus, we can predict that the TSE, particularly the Mothers board, will adopt a core development strategy focused on the uniqueness of the industry instead of going after scale, in order to compete with the markets of Hong Kong, Singapore, and Shenzhen. The efforts made before the listing as well as the services provided after the listing equally contribute to the rise of TSE Mothers. As of the end of November 2014, 73 (21%) of the companies on TSE Mothers were transferred to the main board of TSE, and the trend is continuing. Meanwhile, TSE also provides a sustainable platform of financing for listed enterprise on the Mothers board. For example, last year Cyberdyne Inc obtained US$220 million of additional financing from local and foreign investors.

6. Concluding Remarks

After experiencing some of its lowest market moments in the decade following 2007, the TSE made a comeback after 2012 with its IPO volume exceeding US$10 billion, reaching a record high of the past 12 years.

In 2015, the IPO market of Tokyo will welcome greater development, with the number of newly listed companies reaching 90 or even 100. Many of them will be large-scale IPOs, such as the privatized Japan Post, Japan Post Bank, Japan Post Insurance, Tokyo Metro, aiming in online game planning and development, LINE, and Osaka Universal Studios, of which the IPO sizes are likely to be larger than 10 billion yen. There will also be growth spurts in the development of Tokyo’s IPO market in 2015, striking for all.
An Overview of Anti-Money Laundering and Counter-Terrorist Financing Programs and Quantitative Methodologies
Yimin Yang, Protiviti Inc.

In this issue, Dr. Yimin Yang, Director of Protiviti Inc., presents papers on two topics in the field of anti-money laundering (AML). AML programs, while gaining increased regulatory attention and scrutiny, lack appropriate methodologies and technical guidance for the detection and monitoring of suspicious financial transactions or account activities. Given this, the following paper sheds light on the quantitative methodologies of AML and counter-terrorist financing programs. In the next paper, Dr. Yang develops a method using knee point to set the initial threshold in a bank’s AML systems to monitor financial transactions. It can incorporate both quantitative and qualitative judgements into the estimation.

1. Introduction
International Monetary Fund (IMF) and the World Bank estimate that each year, the amount of money laundered globally is 3-5% of global gross domestic product (GDP), or approximately US$2.17 - US$3.61 trillion. Money laundering and terrorist financing activities threaten the integrity and stability of financial systems, undermine business and economic growth, and cause social and political corruptions. The international community has made a priority to fight against money laundering and terrorist financing and many countries have adopted stringent Anti-Money Laundering (AML) and Counter-Terrorist Financing (CTF) regulations.

In response to the 11 September 2001 terrorist attacks, the US adopted the “Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act” (USA Patriot Act), commonly known as the Patriot Act, to deter and punish terrorist acts in the US and around the world, and to prevent and prosecute international money laundering and the financing of terrorism. The Patriot Act amends the Bank Secrecy Act (BSA) of 1970 that requires U.S. financial institutions to establish AML programs.

Meanwhile, the Financial Action Task Force (FATF), an inter-governmental body initially established by the Group of Seven (G-7) for developing measures to combat money laundering, expanded its mandate to incorporate efforts to combat terrorist financing. The FATF has developed a series of recommendations that are recognized as the international standards for combating money laundering and the financing of terrorism. It monitors the progress of its members in implementing necessary measures, reviews money laundering and terrorist financing techniques and counter-measures, and promotes the adoption and implementation of appropriate measures globally. The FATF currently comprises 36 members representing most major financial centers around the world, eight associated members, and 25 observer members including IMF, World Bank and UN expert groups.

The United Nations (UN) established its Global Programme against Money Laundering, Proceeds of Crime, and the Financing of Terrorism (commonly known as GPML) in 1997 to assist member states to comply with the UN conventions and other instruments that deal with money laundering and terrorism financing including the 1988 Vienna Convention, the UN Convention against Transnational Organized Crime (2003), and the UN Convention against Corruption (2005). These conventions urge States to create a comprehensive domestic supervisory and regulatory regime for banks and non-bank financial institutions. The UN Security Council and the UN General Assembly also passed separate resolutions (Resolution 1373, 1617, and...
60(288) to enact the UN Counter-Terrorism Strategy and to stress the importance of the implementation of the FATF recommendations.

Efforts to prevent money laundering are often expensive and sometimes less effective. In the US, regulators are increasingly scrutinizing AML compliance and imposing a string of enforcement actions on financial institutions for alleged violations of BSA regulations. Recent enforcement actions and penalties include:

- Commerzbank AG paid US$1.45 billion in 2015 for AML and sanctions penalty
- JPMorgan Chase Bank NA. paid US$2.6 billion in 2014 to settle alleged BSA violations
- Standard Chartered Bank paid US$300 million in 2014 for AML violations
- HSBC Holdings PLC paid US$1.9 billion in 2012 for inadequate AML compliance program
- MoneyGram International Inc. paid US$100 million in 2012 to reach an agreement with US authorities
- Wachovia Bank NA paid US$160 million in 2010 for AML settlement

2. Fundamentals of Money Laundering and Terrorist Financing

Money laundering involves the disguising of funds derived from illegal activities. Its objective is financial gain or the hiding of illicit proceeds. The objective of terrorist financing is to use legally raised funds to support activities of terrorist organizations. Terrorists use techniques similar to those of money launderers to protect the identity of their sponsors and the ultimate beneficiaries. Both money launderers and terrorists need to evade authorities’ attention and to disguise the association between themselves and their funding sources. AML is to link the funds to a criminal act that has already taken place, while CTF is to prevent the funds to be accessed for future criminal activities.

Money laundering typically occurs in three phases: placement, layering, and integration.

- **Placement** is the phase of introducing the funds gained from illegal activities into the banking and financial systems anywhere in the world
- **Layering** phase involves conducting multiple transactions designed to give these funds the appearance of having a legal origin and to make it more difficult to identify the initial source of funds
- **Integration** is the phase of reintroducing the funds into the legal economy or disbursing back to the money launderers

Authorities issue advisories containing red flags or indicators of potentially suspicious activities for both money laundering and terrorist financing. Financial institutions are required to scrutinize the red flags and report suspicious activities. The red flags are overview of the types of activities that can be suspicious. Examples of red flags include, among others:

- **Customers Who Provide Insufficient or Suspicious Information**
  - Documents that cannot be verified
  - Multiple tax ID numbers with variations of the name
  - Large cash transactions with no history of prior employment experience

- **Activity Inconsistent with the Customer’s Business**
  - Currency transactions change in number, type, or volume
  - Transaction patterns for the customer are significantly different than those for other similar businesses
  - Goods or services purchased by the business do not match the customer’s stated line of business

- **Funds Transfers**
  - Many funds transfers are sent in large, round dollar, hundred dollar, or thousand dollar amounts
  - Many small, incoming transfers of funds are received, or deposits are made using checks and money orders
  - Payments or receipts with no apparent links to legitimate contracts, goods, or services are received
  - Funds transfers are sent or received from the same person to or from different accounts

- **Changes in Bank-to-Bank Transactions**
  - The size and frequency of currency deposits increases rapidly with no corresponding increase in non-currency deposits
  - Changes in currency-shipment patterns between correspondent banks are significant

There are hundreds of common red flags defined, covering customer identification, account management, transaction execution, fund and currency transferring, product-specific activities for a wide range of financial products, special businesses, and human behaviors.

3. AML/CTF Programs and Key Requirements

The AML requirements as promulgated by the FATF are becoming the international AML standards to
be complied by the members of the FATF. In the US, similar but not identical measures have been implemented mainly through two agencies of the US Department of Treasury: Financial Crimes Enforcement Network (FinCEN) and Office of Foreign Assets Control (OFAC). FinCEN administers the BSA and is charged with safeguarding the financial system from illicit use, combating money laundering, and promoting national security. OFAC administers and enforces economic and trade sanctions against targeted foreign countries, terrorism sponsoring organizations, and international narcotics traffickers. Many of the OFAC sanctions are based on UN and other international mandates and involve close cooperation with other authorities.

Although there are variations in policy and regulations, AML/CTF programs required by various jurisdictions/authorities have similar framework and share several key components.

- **Designated Role in Compliance:**
  - An AML Compliance Officer designated by the Board of Directors

- **Risk Assessments**
  - **Enterprise-wide Risk Assessment:**
    - The big picture view of an organization’s money laundering risks that aggregates the results of other risk assessment exercises
  - **Business Line Risk Assessment:**
    - To identify each business line’s level of vulnerability by evaluating the inherent risk of products/services, the customer base and geography at a macro level and the controls that mitigate those risks
  - **Customer Risk Assessment:**
    - To identify the level of money laundering and terrorist financing risk inherent in a financial institution’s customer base
  - **Sanctions Program Risk Assessment:**
    - To identify an organization’s level of vulnerability to noncompliance with economic sanctions or any sanction program as required by the financial institution’s policy

- **Customer Acceptance and Maintenance Program**
  - **Know Your Customer (KYC) and Customer Identification Program (CIP):**
    - KYC is the process of by which a financial institution establishes the identity of a customer and is satisfied that the source of the customer’s funds is legitimate. CIP requires a financial institution to collect customer’s information, verify his/her identity, consult lists of known or suspected terrorists or terrorist organizations, and maintain records of the information
  - **Customer Due Diligence (CCD):**
    - CDD is information obtained for all customers. Information obtained for CDD should enable a financial institution to verify the identity of a customer and assess the risks associated with that customer
  - **Enhanced Customer Due Diligence:**
    - EDD refers to additional information that would be collected for those customers deemed to be of higher risk
  - **Politically Exposed Person (PEP):**
    - PEP includes current or former senior foreign political figures, their immediate family, and their close associates

- **Large Currency Monitoring and Currency Transaction Reporting (CTR):**
  - Financial institutions are required to file CTRs for cash currency transactions of more than US$10,000 in one business day.

- **Transaction Monitoring, Investigating, and Suspicious Activity Reporting (SAR):**
  - All transactions are subject to monitoring. Levels of monitoring may include customer level, transaction level, account level, household level, and geographic level. Financial institutions are required to file SARs for suspicious or potentially suspicious activities.

- **Sanctions Program**
  - Screenings of customers and transactions against the sanctions listings designated by the authorities such as Specially Designated Nationals, Blocked Persons List, and Country Sanctions List.

- **Training**
  - Financial institutions are required to provide customized ongoing AML training programs for relevant employees.

### 4. AML/CTF Systems and Key Components

Financial institutions have deployed various AML detection systems and solutions to uncover suspicious financial activities. Rule-based systems work with pre-defined thresholds to detect specific suspicious patterns or scenarios. Many rules are derived from red flags. Risk-based profiling software uses a combination of predictive profiles developed from CIP and CDD information, as well as historical transactions to flag the ones that are out of profile. Advanced systems also include Data Mining and Artificial Intelligent technologies for real-time customer risk scoring, real-time transaction monitoring, and detection.

In general, a system provides basic features including a) Customer risk assessment (CIP,
Although such systems often offer a wide range of functionality and services, financial institutions need customized solutions based on the products/services, industry, size, data availability, and profile of their customer bases. Such system customization requires appropriate personnel to translate regulatory and industry requirements into analytical procedures or technical specifications. Challenges in implementing and maintaining an AML system include significant resources and efforts for system customization and potential overreliance on vendors to tailor and adjust the system.

5. Know Your Customer (KYC), Customer Due Diligence (CDD), and Risk Scoring

KYC is the process to be performed by financial institutions to ascertain relevant information from customers before doing business with them. It includes:

- Customer Identification Program (CIP)
- Customer Due Diligence (CDD)
- Enhanced Due Diligence (EDD)

These procedures depend on risk profiles for financial institutions, as well as jurisdictions and regulatory regimes. They involve continuously risk assessment of existing client base and prospective clients.

The risk assessment process starts with risk factor identification that identifies the specific products, services, customers, entities, transaction types, and geographic locations unique to a financial institution. These factors then are incorporated in the BSA/AML risk assessment for the institution and risk scoring for the customers.

Risk factors can be geographic risk, business/industry/occupation risk, product and service risk, sanctions risk, and even legal, relationship, or reputation risk. Common high risk factors include:

---

**Figure 1. AML detection system**

**Data Management**

- Customer Data
- Transaction Data
- Historical Data
- External Data

**Reporting/SAR/CTR**

- Transaction Monitoring & Detection
- Rule-based Monitoring
- Risk-based Monitoring
- Real-time Profiling
- Alert & Case Management Workflow
- Threshold setting
- Threshold Tuning & Testing
- Alert/Case Investigation
- Customer Identification
- Know Your Customer
- Customer Due Diligence
- Enhanced Due Diligence
- Lifecycle/Ongoing Risk Scoring
- Entity Management
- Entity Link
- Sanctions Screening
- Real-time Filtering
- Watch-list Management

---

**Figure 2. The risk assessment process**

- Risk Factors
- Products and Services
- Customers and Entities
- Geographic Locations
- BSA/AML Risk Profile for the Bank
- Sanctions Screening
- PEP Screening
- Risk Scoring Models & CDD
- Real-time Screening & Scoring
- Transaction Monitoring Models
- EDD
- Periodic Re-assessment
- Re-assessment based on changes of data & risks

---

**Figure 3. The risk assessment process**

- Risk Identification
- Customer Acceptance
- Transaction Monitoring
- Ongoing Assessment
Risk factors are assigned weights and scored subjectively relative to their money laundering or terrorist finance vulnerabilities. Customer’s risk rating is calculated based on the aggregation of these risk scores. In using an AML system, a financial institution needs to conduct risk profile assessment and determine the weights and the method for aggregation prior to the implementation. The risk weights and scores should be re-visited periodically or when there are changes in customer information or risks. Criteria for revisit could be, for example, frequent alerts, the number of new accounts added, or regulatory action. (See Figure 3 on the left).

### 6. Challenges in Using Risk-based AML/CFT Systems

Risk scoring is a simple and common approach. However, the efforts of making the weights/scores more statistically driven (such as using supervised or unsupervised learning) are less popular and successful. Developing appropriate quantitative techniques for AML/CFT systems is in fact, very challenging. First and foremost is the data.

#### Data Challenges

Due to the unique circumstances associated with AML/CTF processes, data presents greater challenges.

- **Very large volume of data**: each data set is often in multiple gigabyte size
- **Very low incidence**: the numbers of observed money laundering and terrorist financing violations are often very small and not sufficient for meaningful statistical analysis
- **No confirmed cases**: Financial institutions receive no feedback on the SARs they file with the authorities
- **Security**: AML/CFT data are subject to the highest level of security. Accessing the data and processing it with necessary analytical tools could be challenging
- **Data deficiency**: incomplete, inaccurate, fragmentary with mapping errors
- **Truncated data and observations**
- **Varying Qualities**
- **Data system not designed for risk management purpose**
• Data formats and types are not-standardized

Other Major Road-Blocks
• To meet the regulatory expectations, one needs to improve system effectiveness and reduce false negatives
• To maximize the use of resources, one needs to increase system efficiency and reduce false positives
• One has to be well-balanced between efficiency and effectiveness
• Initial setting of the system parameters is not easy (for example, clustering method is not very effective for setting thresholds of transaction monitoring)
• Fine-tuning the parameters is difficult (for example, existing methods for threshold tuning cannot incorporate the observed cases appropriately)
• Lack of good way for testing and validation
• It is very difficult to incorporate experts’ judgements into quantitative analysis

In the subsequent sections, we will demonstrate some of these difficulties. In particular, we will discuss existing quantitative techniques and methodologies including our new researches for monitoring transactions: Sanctions Screening and Threshold Adjustment.

7. Sanctions Screening and Watch-list Matching

The UN along with countries like US enforce economic and trade sanctions against certain individuals, entities, and foreign government agencies and countries; and publish sanctions lists of individuals or entities involving in criminal activity such as money laundering, terrorism, and financial crime. Examples of the sanctions lists include Specially Designated Nationals (SDN) and Blocked Persons List, and Country and List-Based Sanctions published by OFAC.

One of the primary functions of Transaction Monitoring is to screen customers and transactions against watch-list that comprises the sanctions listings, the PEP list, and other lists of suspicious individuals and entities. The screening process matches a customer or entity’s information (name, birthday, etc.) with the information on the watch-list using record linkage techniques.

There are typically two approaches in performing the record matching: deterministic method and probabilistic method.

• Deterministic method is rule-based. It starts with one or a set of common identifiers (e.g. name, birthday, sex, tax ID, etc.) and compares to see if the identifiers are the same for both records. Here “the same” does not necessarily mean “identical”. For example, “John Smith” could be the same as “Smith, John”, or “Jennifer” could be the same as “Jenny”. Deterministic method applies appropriate rules to determine if both records are the same. For example, English name matching often uses phonetic rules such as Soundex, Metaphone, Permutation, New York State Identification and Intelligence System (NYSIIS), etc. Typical name variations include
  - Phonetic variations: the phonemes of the name are modified
  - Spelling variations: names with interchanged or misplaced letters, substituted letters, additional letters, or omissions
  - Incomplete names: part of the first or last name is missing
  - Nicknames: acronyms and abbreviations

Deterministic method works best when there is a single unique identifier and when the quality of data is high.

• Probabilistic method uses fuzzy logic to perform the matching. It recognizes that different identifiers have different discriminatory powers and uses multiple identifiers to improve the matching. More specifically, probabilistic method calculates an odds ratio for each identifier and improves the odds ratio (through multiplications) by adding additional identifiers. The odds ratio is estimated based on two probabilities:
  - The u-probability: is the probability that the identifier agrees on UNMATCHED records. For example, if the identifier is month of birth, then the u-probability for any two unmatched person is 1/12=8.3%.
The m-probability is the probability that the identifier agrees on MATCHED records. Even if the records are matched, some identifiers may disagree because of data errors or missing data. For example, it is possible that the month of birth of the same person could be different in two records.

If we assume that for MATCHED records, month of birth agrees 98% of the time, then the odds ratio for month of birth is 98% : 8.3% = 11.76.

Probabilistic method calculates a probability at the end of the process indicating the likelihood of a match between the two records. A financial institution has to select an acceptable level for this probability (the matching threshold) to indicate a match. Higher threshold reduces false positives but increases false negatives while lower threshold increases false positives and reduces false negatives.

System vendors often offer their proprietary matching algorithms. However, tests showed that discriminatory powers of different systems vary.

8. Threshold Setting & Tuning

Transaction monitoring detects behavioral changes by working with scenarios. A scenario is a combination of rules or conditions which define the transaction pattern that is being detected. Scenarios are often derived from red flags and monitored using triggers or thresholds. When the thresholds of a scenario are triggered, an alert will be generated by the system and an investigation will be conducted to determine whether the alert is a case reportable to the authorities.

For example, a scenario could be the weekly aggregated amount of international wire from an account with a threshold of US$10,000. An alert will be generated for this account if the amount exceeds that threshold.

Thresholds are extremely useful in elimination of false positives and ensure that only the most relevant results will be reported. However, the setting and adjusting of thresholds require considerable efforts as higher thresholds could also generate more false negatives.

Many financial institutions use clustering techniques to establish and tune thresholds. One such approach starts with a small but expanding number of clusters. Using some selection criteria (for example, optimizing global within-group variability), one can select a cluster number so that additional clusters will result in very little changes to the optimization. For example, in the following analysis, six seems to be an appropriate number for clusters as addition clusters will have almost no further reduction in global variation.

In paper [2], a different method using what is known as the knee point is studied for the setting of the initial threshold. This approach recognizes that any transactions below a threshold are ignored so the distribution of transactions is left-truncated, as demonstrated by the following example.

Thresholds are extremely useful in elimination of false positives and ensure that only the most relevant results will be reported. However, the setting and adjusting of thresholds require considerable efforts as higher thresholds could also generate more false negatives.

Many financial institutions use clustering techniques to establish and tune thresholds. One such approach starts with a small but expanding number of clusters. Using some selection criteria (for example, optimizing global within-group variability), one can select a cluster number so that additional clusters will result in very little changes to the optimization. For example, in the following analysis, six seems to be an appropriate number for clusters as addition clusters will have almost no further reduction in global variation.

In paper [2], a different method using what is known as the knee point is studied for the setting of the initial threshold. This approach recognizes that any transactions below a threshold are ignored so the distribution of transactions is left-truncated, as demonstrated by the following example.
clustering method is not very appropriate for tuning the threshold because it cannot easily incorporate the alerts or the cases in the process.

In paper [3], a method that generalizes the common concept of case-to-alert ratio is proposed. A cluster-based case-to-alert ratio is often unstable and unusable. Instead, we apply a transformation so that the alerts become uniformly distributed. The case-to-alert ratio is therefore replaced by the true case distribution (over uniformly distributed alerts). This technique makes the estimation for the entire case distribution possible (including the cases that are below the threshold and are unobservable).

In the following example, 258 alerts and 22 cases were above the threshold and observed. Using the method from paper [3], we estimate that there were 30 cases in total (with eight being below the current threshold). The current threshold captures about 74% of the cases.

Our estimated case distribution is shown below. For details, please see paper [3].

<table>
<thead>
<tr>
<th>Threshold</th>
<th># Alerts</th>
<th># Cases</th>
<th>% Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4,662</td>
<td>406</td>
<td>28</td>
<td>95%</td>
</tr>
<tr>
<td>$7,500</td>
<td>315</td>
<td>25</td>
<td>85%</td>
</tr>
<tr>
<td>$10,189</td>
<td>258</td>
<td>22</td>
<td>74%</td>
</tr>
<tr>
<td>$15,960</td>
<td>185</td>
<td>16</td>
<td>54%</td>
</tr>
<tr>
<td>$43,605</td>
<td>74</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>$85,113</td>
<td>37</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

The setting of thresholds is a trade-off between false positives and false negatives, between effectiveness and efficiency, as well as between the regulatory expectations and the resources financial institutions need to invest.

9. Other Things Related to Quantitative Analysis
Model Validation

From risk management perspective, AML/CTF systems are models that need to be validated independently on a regular basis. In the US, model risk management is supervised by the Office of the Comptroller of the Currency (OCC) and the Board of Governors of the Federal Reserve (FRB). The OCC and FRB define an effective challenge framework for all model validations, and the Federal Financial Institutions Examination Council’s (FFIEC) BSA/AML manual outlines the AML system validation expectations.

Generally speaking, all major components of an AML/CTF system need to be validated. They include

- Risk assessment and scoring
- Customer risk rating
- Watch-list matching and filtering
- Transaction monitoring and threshold setting
- Scenarios, rules and alerts verification

Validation under the Effective Challenge framework includes the following procedures. See paper [7] for more details.
Qualitative Assessment
Risk assessment is a comprehensive process. It is essential to combine both qualitative and quantitative analysis in AML/CTF programs as behavioral activities cannot be fully captured by rigorous mathematical or statistical designs. For example, it is always a good practice if any changes made to thresholds are also scrutinized qualitatively by AML specialists.

10. Conclusion
AML/CTF presents new challenges to financial institutions, as well as to technologies and quantitative methodologies.

References


[5]. A. Lait and B. Randell: An Assessment of Name Matching Algorithms Department of Computing Science, University of Newcastle upon Tyne; 1993

[6]. X. Liu and P. Zhang: A scan statistics based Suspicious transactions detection model for Anti-Money Laundering (AML) in financial institutions Multimedia Communications (Mediacom), International Conference on. IEEE, 2010


Setting Financial Transaction Threshold for Anti-Money Laundering Monitoring

Yimin Yang, Protiviti Inc.

1. Financial Industry and Anti-Money Laundering (AML) Programs

Money-laundering is a global problem. The International Monetary Fund (IMF) estimates that over US$1,500 billion is laundered worldwide every year. In USA, regulators have strengthened their efforts with new compliance and aggressive enforcement. Financial institutions are required to establish rigorous AML programs to detect and report suspicious activities, and to monitor financial transactions. In recent years, many banks including HSBC (US$1.9 billion), Citibank (undisclosed), and JP Morgan Chase (US$2 billion) were penalized for deficiencies in their AML programs. Being placed in the frontline, banks have devoted significant resources to develop and improve AML systems.

2. The Issue

Financial institutions often rely on various AML systems to monitor financial transactions. These systems implement rules or scenarios and detect abnormal activities automatically through the monitoring of certain pre-defined thresholds. If a transaction breaches these thresholds, an alert will be generated to prompt the bank for further investigation. As an alert is not necessarily a real money laundering activity, the bank needs to manually analyze it to determine whether it is a case reportable to authorities. In general, low thresholds produce more alerts and involve more investigative efforts while high thresholds might be deceptive and miss more cases. Low thresholds could also prompt potential regulatory scrutiny as many unlawful activities could dodge the system.

Ideally, thresholds should be determined based on observed cases. However, it is not unusual for a system to take several months or even longer to observe a case. In particular, when an AML system is newly implemented or updated, the setting of the initial thresholds often relies on expert judgments.

The objective of this paper is to propose a mathematical framework through the use of knee point to set up the initial thresholds for financial transaction monitoring. The advantage of this approach is its easy implementation and its capability of incorporating expert judgments.

3. The Challenges from Data

The main challenges in modeling the transaction activities are from data. Not just because the data size is often huge (multi-millions of records on a daily basis), but also because certain customer behaviors could skew the statistical distribution. For example, the so-called “round dollar” phenomena where heavy transactions are often found in round dollar amounts of 500s, 1,000s, etc., presents technical difficulties in describing the distribution using standard statistical approaches.

Another challenge is that the cases reported to the authorities may not be true money laundering activities. They will be investigated by the government but no feedback will be provided to the financial institutions as the results of such investigations could be highly sensitive.

Last but not least, threshold-based approaches often produce data that are left-truncated.

4. Literature Background

Today, many financial institutions use expert judgments in setting up their initial thresholds. Some use divisive hierarchical clustering analysis as a quantitative method to set up or tune thresholds. However, the clustering approach is often very sensitive to data noise and outliers. In threshold tuning exercise, the focus is on the regions near the existing threshold (often depending on expert judgment) and it is not straightforward to incorporate the existing threshold or expert opinions into the clustering techniques.

In this paper, we study an approach leveraging our extensive experience with AML systems. One of the key concepts in this approach is the knee point which is, mathematically, the point where the curvature is maximized. The curvature is a fundamental mathematical concept that measures the change of unit tangent vector with respect to the change in arc length. Its variations and applications to clustering algorithms have been explored by papers [1], [2], [3], and [4] cited as references at the end of this article.

Historically, the knee point approach has been an important tool in finding the optimal number of
clusters. In cluster analysis, the number of clusters is a parameter that the user has to provide. In order to determine this parameter, researchers often introduce cluster validity indices to measure the quality of the clustering algorithms (Zhao, 2012). The Validity Index can be an internal index that is based on information intrinsic to the data, or an external index that is based on prior knowledge about the data. The problem of finding the optimal number of clusters is solved by finding the knee point with sharp change (the curvature change) of the validity index values (Zhao, 2012). Validity indices with a maximum (or minimum) value are preferred. Many validity indices have been used over the years, but Bayesian Information Criterion (BIC) (Hautamäki, Fränti, & Zhao, 2008) or Sum-of-Squares (SS) based indices are among the popular choices. The number of clusters is usually a parameter in the validity index.

Following papers [1] and [4], we will adopt the knee point approach to determine the sharp change of a particular type of curve (the reverse cumulative distribution function). Because the data size is huge, instead of using a validity index, we will take a large value (often 1,000 to 10,000) as the number of clusters based on prior data knowledge and industry experience so the desired level of granularity can be achieved. The selected number of clusters will be tested and compared later. The idea of using a large number of clusters bears some resemblance to divisive hierarchical clustering method and it will make the process more efficient. In papers [1] and [4], no validity indices were involved either and their focus was on the algorithms to find the knee point.

However, papers [1] and [4] used very few data points and the algorithms cannot be applied to data with significant noises and outliers. On the other hand, the curvature approach only applies to differentiable functions. We will develop a method that can combine both features and advantages.

5. Our Framework

Our framework is designed specifically for transactional data. It consists of several components and procedures.

1) Use appropriate data buckets: Like in agglomerative hierarchical clustering, we put data into as many clusters (or buckets) as possible with a few special concerns. Because the threshold will be selected from the boundaries of these buckets, the sizes of the buckets need to be granular enough but not too granular (large than US$1, for example). Each bucket needs to have sufficient number of transactions due to heavy data noise. Unlike the agglomerative method, the number of our buckets will be fixed. As the transaction value becomes large, the data becomes sparser. Based

2) Define the “risk” – the quantity of interest: We can choose to use transaction frequency (if our concern is the number of money laundering activities), total transaction value (if our concern is the total amount of the money laundering activities), or other quantities that are reflective of our concerns or risks.

3) Build cumulative probability curve: Instead of probability density curves, we will use cumulative density curves. To deal with left-truncation, we build our curves from right side to generate reverse cumulative curves.

4) Incorporate expert judgments or other information: It is often quite important to include real world experience in the threshold setting. For example, AML experts may emphasize specific regions for scrutiny or banks might have observed a few cases in some range. We incorporate such information through a weight scheme.

5) Calculate the curvature: Strong data noise makes common knee point search algorithms inappropriate for the transaction buckets. We use a smoothing technique and derive explicit formulae for the curvature calculation.

6) Find the knee point by a simple search through all buckets.

We will illustrate this framework using a real world example consisting of over 800,000 transactions. The range of the transaction amounts is between US$0.01 and US$376,000.

5.1 Transaction Data Buckets

Transactions can be viewed as arrival processes which are often associated with exponential inter-arrivals. Buckets with equal sizes are not very appropriate as most of the transactions will be concentrated in the first few buckets. For example, our sample data consists of 804,496 transactions and if we group them into 1,000 buckets, the first 10 buckets will account for over 98% of the transactions.
However, if we use buckets with an exponential growth rate \( \lambda > 1 \), then the distribution of transaction numbers becomes more reasonable. Our next figure is generated by using 1,000 buckets with

\[
\lambda = \frac{\text{Max Transaction Amount}}{1000} = \frac{376,000}{1000} = 1.01292
\]

The \( i^{th} \) bucket is \([\lambda^{i-1}, \lambda^i)\) and all transactions with a value < US$1 are grouped into the first bucket.

The number of buckets, 1,000, can be different. However, it needs to be large enough to have the necessary granularity, but not too large so each bucket will have sufficient transactions. Later we will see the impact of the number of buckets on the threshold.

5.2 Risk Exposures
The distribution of transaction frequency often cannot fully reflect the risk of suspicious activities as transactions have different amounts. At each bucket, the risk is proportional to its total transaction value (will be called the “risk exposure”) defined as the sum of all transactions in that bucket. Of course, one can consider other risk exposures.

The risk exposure distribution is different from the transaction frequency distribution as this is demonstrated by Figure 4.

5.3 Cumulative Risk Exposure
Since all transactions above the threshold will be scrutinized, one needs to consider the aggregated risk exposure above any given bucket (this will be called the cumulative risk exposure). It can be defined as the following: let \( \mu_i \) be the risk exposure for bucket \( i \). Then the (reverse) cumulative risk exposure is defined as

\[
S_i = \sum_{p} \mu_p
\]

It can be normalized as

\[
\hat{S}_i = \frac{S_i}{S_0} = \frac{\sum_{p} \mu_p}{\sum_{p} \mu_p}
\]

which will be called reverse cumulative density function (reverse CDF) curve. The following figure shows the reverse CDF curve.

5.4 Curvature Calculation
One of the main issues in using the knee point approach is that the data is discrete and noisy. Algorithms such as Kneedle’s algorithm (see [1]) or L algorithm (see [2]) that use only few data points at each step may not be sufficient or appropriate. We introduce a smoothing technique that uses multiple neighboring points/buckets. The curvature is then calculated using the first and the second order derivatives. In fact, for a smooth function \( f(x) \), its curvature at point \( p \) is given by:

\[
K(p) = \frac{f''(p)}{(1 + f'(p))^2}
\]

The risk exposure distribution is different from the transaction frequency distribution as this is demonstrated by Figure 4.
5.4.1 Smooth the Reverse CDF

Because our concern is the first and second order derivatives, at each bucket on the reverse CDF curve, we use a polynomial of degree 2 as an approximation. This polynomial is obtained through its multiple neighboring buckets (often 100 – 200). More specifically, for each bucket \( p \), let \( \mu_p \) be its risk exposure and

\[
S_p = \sum_{i \leq p} \mu_i
\]

be the cumulative risk exposure. Choose an integer \( k > 0 \), we consider \( 2k \) neighbors around bucket \( p \) and assume their cumulative risk exposures are:

\[
S_{p-k}, \ldots, S_{p-1}, S_p, S_{p+1}, \ldots, S_{p+k}.
\]

We seek a polynomial \( h(x) = a x^2 + b x + c \) such that

\[
h(i) = S_{p+i} \quad \text{for} \quad i = 0, \pm 1, \ldots, \pm k.
\]

The coefficients \( a \), \( b \), and \( c \) are obtained by minimizing the quadratic equation:

\[
L = \sum_{j=-k}^{k} \left( a \cdot i^2 + b \cdot i + c - S_{p+i} \right)^2
\]

In the above calculation, \( k \) (the number of neighboring buckets) is 75. The following figure shows the impact of \( k \) on the curvatures (curvatures are normalized to 1). Although the curvatures are different when \( k \) is different, the knee points where the curvatures reach their maximums are quite consistent.

5.4.2 The Curvature

We can derive explicit formulae for the coefficients \( a \), \( b \), and \( c \), and the curvature.

Proposition 1 (Curvature Formulae): The curvature is given by

\[
K(p) = \frac{h''(p)}{(1 + h'(p))^2} = \frac{2a}{(1 + b)^2} \left( \frac{0}{1 + b} - \sum_{i=-k}^{k} \frac{1}{k(2i+1)(2k+3)} \right)^2
\]

5.4.3 The Knee Point

We graph the curvature at each bucket. It reaches its maximum at US$9,689 for our example.

5.5 Qualitative Adjustments

One of the advantages of our framework is its capability of incorporating qualitative judgments into the calculation. We achieve this by assigning a weight to each bucket. Suppose the bucket \( i \) has the weight \( w_i \), then the weighted cumulative risk exposure is defined as
Figure 10. Example of weight assessment by expert

Figure 11. Example of weight assessment by management

For the weighted cumulative risk exposure, we have a similar curvature formula.

**Proposition 2 (Curvature Formula for Weighted Exposure):**

\[
K_x(p) = \frac{1}{k(k+1)(2k-1)(2k+1)(2k+3)} \left[ \sum_{i=1}^{k} wS_i - \frac{k(k+1)}{3} \sum_{i=1}^{k} wS_i \right] - \frac{1}{k+1} \sum_{i=1}^{k} wS_i - \frac{1}{k+1} \sum_{i=1}^{k} wS_i + \frac{1}{k+1} \sum_{i=1}^{k} wS_i.
\]

5.5.1 Example: Expert Assessment
AML experts often have experience for the range where suspicious activities are more likely to occur. For example, if AML experts determine that most suspicious transactions could be around US$20,000, one can assign bell-shaped weights around this bucket. Our calculation shows that this will increase the knee point to US$16,400.

5.5.2 Example: Management Consideration
Management often concerns the resource needed for conducting transaction investigations. They may decide that the effort or cost is associated with the average transaction amount. For example, investigating one transaction of US$10,000 may cost the half of investigating two transactions of US$5,000. We could weight buckets by their average transaction amounts and our example changes the knee point to US$12,051.

5.5.3 Other Adjustments
We can also adjust the threshold based on other considerations. For example, one might have observed a few cases. Such information can be used to narrow the search for knee point through appropriate weighting.

6. Conclusion
We introduce the concepts and techniques of cumulative risk exposure, reverse CDF and knee point to define and identify potential points that represent a better AML efficiency/effectiveness trade-off. Qualitative adjustments can be incorporated through a weighting scheme.

References
[2]. P. Chan and S. Salvador: *Determining the Number of Clusters/Segments in Hierarchical Clustering/Segmentation Algorithms* Proceedings of 16th IEEE International Conference on Tools with Artificial Intelligence (ICTAI 2004); Boca Raton, FL, USA 15-17; Nov. 2004
1. Introduction
Hedge fund investors hire managers to make investment on behalf of them. Fund managers with good historical investment performance, e.g., outperforming the market index, are therefore preferred by the investors. A skilled manager is believed to beat some benchmark such as the S&P 500 index or the risk-free asset consistently. An unskilled manager, however, cannot beat the benchmark rate consistently: on average, she performs the same as the benchmark. Foster and Young (2010) show that the unskilled manager can take a mimic strategy so that she delivers the same return as the skilled manager with positive probability. Because one cannot differentiate skilled and unskilled fund managers from their past returns, it becomes important to design compensation contracts to separate these two types of managers, i.e., to screen out unskilled managers and attract skilled managers. Foster and Young (2010) claim that it is difficult to do so. In particular, when not required to cover investors’ loss, unskilled managers are always attracted because they can take a performance fee when the mimic strategy succeeds but do not lose anything if the strategy fails. Common practices such as postponing bonuses and claw back provisions cannot deter the unskilled managers as well because these practices do not involve loss covering either.

In He, Hu, and Kou (2015), we show that skilled and unskilled fund managers can be separated if [1] there is a liquidation boundary and [2] fund managers have to use their own money to set up a deposit to cover investors’ loss. The liquidation boundary is contracted in a fund so that fund investors have the right to be informed and to liquidate their stake once the fund return hits the boundary. As a result, the fund manager is prevented from taking excessive risk to bring the fund value to zero. Indeed, if the fund value evolves continuously over time, and is regularly monitored, the fund will be liquidated once its value hits the liquidation boundary. As a result, in the worst case scenario, the fund is liquidated with a positive residual value. On the other hand, the fund manager needs to use her own money to set up a deposit to cover the loss from the fund investors, and this deposit can be a combination of cash and equities of the fund. The cash deposit can only be held in the benchmark portfolio but the equity deposit can be invested along with the investors’ stake.

As a real example, the scheme used by hedge fund Topwater Capital is a first-loss scheme with an equity deposit. The size of deposit $w = 10\%$ and the incentive rate $\alpha = 40\%$, much higher than 20\%, a common incentive rate in the traditional scheme. Moreover, a liquidation boundary is enforced in Topwater Capital; the manager’s account is liquidated once it loses 9\% of its initial capital.

2. Literature Review
Foster and Young (2010) consider that a manager is called skilled if she can earn a return consistently higher than the benchmark return rate because of her skills [e.g., private knowledge or accurate prediction], while a manager is unskilled if she cannot deliver a return in excess of the benchmark rate. Not being able to beat the benchmark rate consistently, the unskilled manager can take a mimic strategy that matches the skilled manager’s return if it succeeds. Foster and Young (2010) assume that the skilled manager can deliver a deterministic total return $m$, which is strictly higher than the benchmark rate $R$. By investing in the benchmark portfolio (e.g., the risk-free asset) and shorting a digital option, the unskilled manager can deliver return $m$ with probability $R/m$ and return 0 with probability $1 - R/m$; see Figure 1 for an illustration. Foster and Young (2010) show that incentive schemes with only equity stakes cannot separate skilled and unskilled managers if they are risk neutral: any unskilled risk-neutral manager is attracted. The authors also consider a scheme in
which fund managers need to make a cash deposit to launch a fund. The deposit can only be held in the risk-free asset and is used to cover investors’ loss rst. The authors nd that this scheme cannot separate the risk-neutral skilled and unskilled managers either, because the performance fee needs to be suciently low to deter the unskilled manager, and in this case the skilled manager is also deterred.

Figure 2: Mimic strategy with a liquidation boundary

3. The Model
Consider a hedge fund with initial value $X_0$. Denote $R_f$ as the risk-free total return rate in this period from time 0 to time 1. Denote $M$ as the total return rate that the manager of the fund can deliver in this period. In the first-loss scheme, the manager invests her own capital with size $wX_0$ in the fund, but this capital is used to set up a deposit. The investors then hold the remaining $(1-w)X_0$. Part of the manager’s deposit with size $\gamma wX_0$ is cash that has to be held in the risk-free asset and thus earns the risk-free rate $fR_t$. The remaining deposit $(1-\gamma)wX_0$ can be invested along with the investors’ stake, so it is an equity of the fund and earns the fund return rate $M$. Parameter $\gamma \in [0,1]$ measures the size of the cash component of the deposit. Therefore, at the end of the period, the value of the deposit become $D(M) := \gamma w X_0 R_f + (1-\gamma)w X_0 M$ and the value of the investors’ stake becomes $(1-w)X_0 M$. At the end of the period, if the investors are at a gain, i.e., $M \geq R_f$, the manager takes a performance fee $\phi(M) := \alpha (1-w)X_0 (M-R_f)^+$ Parameter $\gamma \in [0,1]$ is called the incentive rate for the manager. Investors are at a loss if the value of their stake at the end of the period is less than the reference rate. Thus, the loss of the investors in this case is $L(M) := (1-w)X_0 (R_f-M)^+$. The deposit is then used to cover this loss; i.e., the loss covered by the manager is $\min(D(M), L(M))$. As a result, the manager’s payoff at the end of the period is $D(M) - \min(D(M), L(M))$.

The liquidation boundary is $bR_t^{(1-w)}(1-w)X_0$, $t \in [0,1]$ for some $b \in (0,1)$. Once the value of the investors’ stake hits this boundary, the fund is liquidated. We further assume that the boundary is continuously monitored and the fund asset value evolves continuously in time. As a result, the total return is $M = b$ if the fund is liquidated. The return generated by the skilled manager is denoted as $m$.

The unskilled manager employs the mimic strategy. If this mimic strategy succeeds, which occurs with probability $p_s$, the unskilled manager performs the same as the skilled one. If it fails, the fund asset value hits the liquidation boundary, so the fund is at a significant loss; see the illustration of the mimic strategy in Figure 2.

4. Main Results
The skilled or unskilled manager is deterred by an incentive scheme if her expected payoff in the fund is less than the opportunity cost; otherwise, the manager is attracted.

(i) The traditional scheme attracts both the skilled and the unskilled managers.

(ii) The first-loss scheme without a deposit (i.e., with $w=0$) attracts both the skilled and the unskilled managers.

(iii) The first-loss scheme without a liquidation boundary (i.e., with $b=0$) cannot separate the skilled and the unskilled managers.

(iv) The first-loss scheme with a deposit and a liquidation boundary (i.e., with $w \in (0,1)$ and $b \in (0,1)$) deters the unskilled manager if and only if

$$\alpha < \frac{w b}{1-w} \left( \frac{w b}{(1-w)(R_f-b)} \right)$$

and attracts the skilled manager if and only if
\[ \alpha > \frac{\gamma w}{1-w} \]

Consequently, the first-loss scheme separates the skilled and unskilled managers if and only if

\[ \frac{\gamma w}{1-w} < \alpha < \frac{\gamma w}{1-w} + \frac{wb}{(1-w)(R_f - b)}. \]

Figure 3 shows range of the incentive rates that separate the skilled and unskilled managers. The range is plotted with respect to the liquidation boundary \( b \) and is highlighted as the blue area. The size of the manager’s deposit \( w = 10\% \) and the risk-free rate \( R_f = 105\% \). The size of the cash deposit \( \gamma \) takes three values: 0 (left panel), 0.5 (middle panel), and 1 (right panel).
Figure 4 shows range of the incentive rates that separate the skilled and unskilled managers. The range is plotted with respect to the liquidation boundary $b$ and is highlighted as the blue area. The size of the manager’s deposit $w = 15\%$ and the risk-free rate $R_f = 105\%$. The size of the cash deposit $\gamma$ takes three values: 0 (left panel), 0.5 (middle panel), and 1 (right panel).

Let’s take a look at a numerical example. We plot this range of the incentive rate as a function of the liquidation boundary $b$ with $w = 10\%$ in Figure 3 and $w = 15\%$ in Figure 4; the range is highlighted as the blue area. The risk-free rate is set to be $R_f = 105\%$. Parameter $\gamma$, which measures the size of the cash component in the deposit, is set to be 0, 0.5, and 1, corresponding to the left, middle, and right panels, respectively, of Figures 3 and 4.

5. A Real Example: Topwater Capital

Hedge fund Topwater Capital requires its managers to fund 10% of their account from their own pockets, and the managers’ stake is placed in a first-loss position to absorb potential fund losses. For example, if the account of a manager amounts to US$50 million at the beginning, then US$5 million is this account must be funded by the manager. The manager’s stake is an equity deposit, so it can be invested along with the investors’ stake. Suppose after the first period the manager’s account loses US$1 million and she covers the loss completely. So now the managers’ stake decreases to US$4 million, while the investors’ stake remains at US$45 million. On the other hand, the account is liquidated once the manager’s stake depletes to 1% of her initial stake in the account, i.e., US$0.5 million. In other words, the account is liquidated if it loses 4.5/50=9% of its initial capital. The manager is compensated for covering the investors’ loss: her incentive rate is 40%, much higher than 20%, a common incentive rate in the traditional scheme. If the manager’s stake is less than 10% due to losses in previous periods, she receives first-profit in the current period. Any profit in the current period is first used to top up the manager’s stake back to 10%, and then the remaining profit is shared by the manager and the investors. We can see that in our single period setting, the scheme used by Topwater Capital is a first-loss scheme with an equity deposit, i.e., with $\gamma = 0$. The size of deposit is $w = 10\%$ and the incentive rate is $\alpha = 40\%$. Moreover, a liquidation boundary is enforced in Topwater Capital: the manager’s account is liquidated once it loses 9% of its initial capital. Therefore, $b$ is set to be 91%.

6. Conclusion

We proposed a new managerial incentive scheme, named first-loss scheme to separate the skilled and unskilled managers, i.e., to attract the skilled manager and deter the unskilled one. A liquidation boundary is contracted so that once the fund return hits the liquidation boundary, the fund is liquidated. The manager has to use her own money to set up a deposit to cover the investors’ loss. The deposit can consist of cash that can only be invested in a risk-free asset and equities of the fund that can be invested along with the investors’ stake. We showed that without the liquidation boundary or the deposit, the skilled and unskilled managers cannot be separated. With the liquidation boundary and deposit in place, a proper choice of the incentive rate can separate the skilled and unskilled managers.

Reference


