

# The Development of Equity Derivative Markets in Emerging Asia

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Working Paper

This Version: January 17, 2007

## *Abstract*

Amid benign monetary policy in mature market countries and high liquidity-induced demand, lower risk premia have encouraged risk diversification of alternative asset classes outside the scope of conventional investment. The development of derivative markets in emerging economies plays a special role in this context as more institutional money is managed on a global mandate, with more and more capital being dedicated to emerging market equity. The following paper reviews the recent development of equity derivative markets in Emerging Asia and discusses future challenges in areas of cash market liquidity, trading infrastructure as well as legal and regulatory frameworks based on a set of principles for the capital market development of derivatives.

*Keywords: equity derivatives, derivative markets, hedging, Emerging Asia, capital market development.*

JEL classification: D81, G15, M20.

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## I. DEFINITION OF DERIVATIVES

Benign monetary policy in mature market countries and high liquidity-induced demand have spawned a global proliferation of derivatives. Amid an insufficient supply of investment assets, increasing global cash surplus (“liquidity glut”) has encouraged more risk taking for yield through leveraged investment. This trend puts a premium on risk diversification<sup>2</sup> particularly in areas where vulnerabilities to changes in credit risk extend across institutions and national boundaries.

The development of derivative markets in emerging economies plays a special role in this context, given existing gaps in infrastructure, organization and regulation of trading. This paper discusses the recent development and future challenges of equity derivative markets in Emerging Asia and informs a critical debate about prudential supervision. In light of current efforts by national regulators in the region, such as the *Reserve Bank of India* (RBI), to implement comprehensive guidelines on derivatives and review short selling restrictions, the scope of this paper has topical appeal from the perspective of market participants and regulators.

Derivatives are financial contracts on a pre-determined payoff structure of securities, indices, commodities or any other assets of varied maturities. The economic rationale for derivatives assumes gains from efficient price discovery and risk shifting. Derivatives supplement cash markets as alternatives to trading underlying assets by providing hedging and low-cost arbitrage opportunities. Risk diversification improves the pricing and managing of risk, increases stability at all levels and enhances general welfare. In particular, it allows a variety of economic agents to raise capital more cheaply in capital markets. Derivatives also help “discover” the fair market price (spot and future) of certain assets or risks in instances of high transaction costs, poor liquidity due to the dispersion of markets, limited asset supply or the conglomeration of many risks into one whole asset. However, the effective use of derivative markets for risk transfer and price discovery depends critically on their liquidity as well as the efficient pricing and sufficient trading volume in underlying cash markets.

Equity derivatives convey benefits similar to other derivatives, but they also entail sizable risks to be managed. Derivatives on single stocks or equity indices reduce uncertainty about expected corporate performance, strengthen the liquidity and price discovery in equity markets, and lower the cost of equity listings for firms. However, as investors revise their expectations about the cash generating ability of one or more listed firms, small price moves in cash markets can have an outsized impact on the financial position of participants in these markets, because derivatives often imply substantial leverage.

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<sup>2</sup> However, greater risk diversification through derivatives intensifies aggregate moral hazard as hedging causes individuals to become less risk averse at a time when the credit cycle seems to have reversed and risk premia remain low.

## II. CURRENT SITUATION OF EQUITY DERIVATIVE MARKETS IN EMERGING ASIA

Global trading in futures and options on equity derivatives exchanges almost doubled over the last three years from about US\$56.0 trillion in 2002 to U.S.\$174.9 trillion in terms of notional amounts (on 7.3 billion contracts) by end-2006 (Figures 1 and 2) – by comparison the U.S. GDP was about U.S.\$13.3 trillion in 2006. Measured by notional value, global turnover in options and futures surged by 103.9 percent and 93.4 percent respectively since end-2004, while the combined figure for futures and options showed explosive growth at an annualized rate of more than 30 percent over the last five years. During the same time, options have become slightly more popular than futures, whose relative share in global trading declined from 50.9 to 46.1 percent.

Equity derivatives have flourished in a few markets in Asia. On Asia's exchanges, equity derivatives have witnessed the most rapid growth of all traded derivative products (foreign exchange, interest rate, equity, commodities and credit derivatives). Equity derivative trading in Emerging Asia, which mostly concentrates on options, has mushroomed from \$16.9 trillion in 2002 to \$54.2 trillion in 2006, and now represents 31.0 percent and 38.9 percent of worldwide equity derivatives turnover by notional value and number of trades respectively (Tables 1 and 3 as well as Figures 1 and 2).<sup>3</sup> This mainly represents very rapid growth in Korea, which hosts the world's most active equity derivatives market. In 2006, the average *daily* turnover of the Korea Futures Exchange (KOFEX) was \$194 billion, which is equivalent to more than 27 percent of trading worldwide (78.1 percent of trading in all of Asia) in terms of notional amounts. By comparison, the average daily turnover in all of the Americas, including the U.S. and Brazilian markets, was about \$251 billion or 38.2 percent of global trading in 2006 (Table 2).<sup>4</sup>

However, most of the growth of equity derivative markets is due to valuation effects caused by rising stock prices (which might have been even higher if equity yields would have experienced spread compression similar to fixed income instruments over the last two years). The worldwide rally in equity prices transpired into higher market values of equity derivatives. Although trading increased in notional terms, turnover measured by the number of contracts was sluggish, which largely explains the significantly larger contract sizes over the last years (Table 5). Rising stock prices worldwide have led to a doubling of average contract sizes worldwide since 2003, while global trading measured by the number of traded contracts has grown only marginally by less than 30 percent.

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<sup>3</sup> The aggregate size of equity derivative markets worldwide increased by 11 percent to U.S.\$5.0 trillion, whereas gross market values rose by one half to almost U.S.\$0.6 trillion. Equity derivatives are still mainly traded on organized exchanges rather than *over-the-counter* (OTC). While the total notional amount of outstanding OTC derivative contracts worldwide (which includes swaps, options and futures on equities, interest rates and foreign exchange) stood at about U.S.\$370 trillion at end-June 2006 according to the BIS's latest bi-annual survey (BIS, 2006b), the notional value of OTC contracts on Asian equities (excluding Japan) amounted to merely U.S.\$0.14 trillion (or 0.3 percent of ETD) at end-2005, an increase by more than 38 percent from 2004 (BIS, 2005 and 2006a). The gross market value of OTC equity derivatives was just U.S.\$28.3 billion until end-June 2006, of which U.S.\$24.3 billion were options.

<sup>4</sup> See also Micu and Upper (2006).

This valuation effect caused by the stock market boon has also extended to all of Asia, where disproportionately higher market capitalization has doubled the average notional amount per traded contract since 2004, with annual trading volumes hovering just below three trillion contracts (Table 3). The valuation effect of cash markets was so profound in Emerging Asia that higher equity prices resulted still in a larger increase of contract sizes than other regions, even though equity derivative trading in Emerging Asia also increased their share of global turnover in terms of traded contracts thanks to higher relative rates of growth.

The stagnation of global trading amid greater market values also hides substantial regional variations. Trading in India and Taiwan POC more than tripled since 2003, whereas trading in other regions in Emerging Asia was subdued. With the exception of Hong Kong, the notional amount of equity derivative contracts in Asia is still smaller than in the rest of the world, even though rising stock prices have outpaced the growth of the number of traded contracts. Although contract sizes in emerging Asian countries have more than doubled from U.S.\$8,300 in 2003 to U.S.\$19,200 in 2006, they still lag behind global averages – especially if Hong Kong with an average notional amount per trade of more than U.S.\$50,000 is disregarded (Table 5). Contract sizes of equity derivatives in countries like India (U.S.\$8,000) and Malaysia (U.S.\$12,200) are still far below the notional amount per trade in Emerging Asia (U.S.\$19,200) and less than a half of the notional amount per trade in the U.S. (U.S.\$25,200). Besides Hong Kong, only equity derivatives in Korea are traded at contract sizes (U.S.\$19,700) similar to mature market economies.

Since 2002, growth in overall derivative trading has outstripped cash market capitalization and equity trading only in Hong Kong, India, Korea and Taiwan (Tables 1 and 2).<sup>5</sup> These countries currently exhibit high trading volumes up to 36 times of outstanding stock, while average global turnover ratios between equity derivatives and stocks tend to converge to one (with the exception of Korea) (BIS, 2004 and WFE, 2005 and 2006). Since most of equity derivative contracts are traded in these countries, their high turnover ratio has kept aggregate equity derivative trading in Emerging Asia at more than 22 times of GDP, nearly 15 times of stock market capitalization and more than 10 times of stock trading. Although countries such as China, Indonesia, Malaysia, Thailand and the Philippines also boast strong cash market trading activity similar to that in countries with established derivative markets, trading in equity derivatives remains very limited.

Index options and futures are the most widely traded classes of equity derivatives in Emerging Asia at 82.8 and 15.4 percent, commanding shares of 51.0 percent and 10.5 percent of trading worldwide in 2006. Trading has grown from U.S.\$13.9 trillion and U.S.\$2.9 trillion in 2002 to U.S.\$44.9 trillion and U.S.\$8.4 trillion at end-October 2006 respectively. Korea is the regional heavy-weight of equity index option trading. The dominant size of Korea's equity derivative market is largely explained by the infrastructure of exchange-based trading and the composition of the investor base amid a favorable legal

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<sup>5</sup> Indonesia has just established the Jakarta Futures Exchange and introduced equity index futures at the Surabaya Stock Exchange, however, trading volumes are low due to a weak market infrastructure and investor interest. The Thailand Futures Exchange (TFEX), in operation since 2004, started trading its first stock index future only in April 2006. In the Philippines, equity derivatives have not been traded since the Manila Futures Exchange closed in 1997.

and regulatory framework. KOFEX offers relatively simple derivative products to retail investors at low transaction costs and margin requirements via an internet-based trading platform. Trading on KOSPI200 index futures and options is extremely popular among individual traders, who constitute anywhere between 50 and 60 percent of the investor base in this asset class followed by the institutional investors. The high share of retail investors is peculiar amid the preponderance of index derivative trading, which is usually more amenable to hedging rather than retail demand, whose mostly speculative characteristics cater to single stock derivatives. India has tried to emulate the Korean example of low-cost market access particularly in the area of equity derivatives. Thailand and India<sup>6</sup> have been particularly successful with equity index futures. After having recently overtaken Taiwan, whose derivative market still accounts for more than 6.5 percent of all trading of equity index futures in Emerging Asia, both countries now challenge Hong Kong for the second place in total equity derivative trading in the region.

Emerging Asia also boasts vibrant derivative trading in single stock futures, which is dominated by India. The explosive growth of the single stock futures market matches the four-fold increase of trading in equity index futures in the region since 2003. Similar to Korea's role in equity index options, India accounts for about half of global trading and almost all regional trading of single stock futures in 2006. However, the global significance of single stock futures and equity index options differs greatly. While the latter is the most frequently traded type of equity derivative worldwide (with a notional trading volume of U.S.\$88.1 trillion in 2006), single stock futures, the mainstay of India's equity derivative market, represented less than 0.5 percent (or U.S.\$1.3 trillion) of global derivative trading. Following the merger of three exchanges, the Malaysian Derivatives Exchange has successfully offered equity index futures for several years as one of the youngest derivative markets in Emerging Asia, with trading volume having grown to U.S.\$19.6 billion from U.S.\$3.2 billion five years ago. Equity options are least traded in emerging Asian economies, which claim only 0.2 percent of total equity derivative trading in all of Asia and 2.0 percent of global trading of this type of equity derivative.

Most equity derivatives in Emerging Asia are exchange-traded (ETD), as opposed to foreign exchange and interest rate derivatives, which are mostly traded over-the-counter (OTC). Countries with formalized and regulated exchanges are leading the growth in Asian derivative markets, which can be divided into three categories: (i) fully demutualized exchanges (Hong Kong and Singapore), which offer a wide range of derivative products; (ii) partially demutualized exchanges (Korea, India and Malaysia), which have specialized in equity futures and index products; and (iii) derivative markets with no or marginal exchange-based and limited OTC derivative trading (China, Indonesia, the Philippines and Thailand). In the latter group of countries equity derivatives markets are much less well-developed or do not exist at all.

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<sup>6</sup> Equity index futures contracts were the first exchange-traded equity derivatives in India (June 2000), before equity index options (June 2001), single stock options (July 2001) and single stock futures (November 2001) were subsequently introduced.

The strong development of equity derivatives in Korea and India reflects a robust operational and legal infrastructure (Fratzscher, 2006). For example, both countries have well-designed trading platforms, which provide access to both domestic and foreign institutional investors and reliable tax regimes that ensures the equitable treatment of cash and derivatives trades. Both countries also have laws and guidelines specifically dealing with equity derivatives. By comparison, countries that are lagging have weak trading infrastructures, shortcomings in relevant laws that create uncertainty about whether derivatives contracts can be enforced (or even whether trading derivatives is permitted), tax provisions that are unfriendly to derivatives, bans on short selling, and restrictions on investment by foreigners.

### **III. CHALLENGES TO THE FURTHER DEVELOPMENT OF EQUITY DERIVATIVE MARKETS IN EMERGING ASIA**

The impediments to the efficacy and further development of derivative markets in many economies in Emerging Asia include considerable shortcomings in cash market liquidity and trading infrastructure as well as inadequate legal and regulatory frameworks.

In general, equity derivative trading tends to be associated with high trading volumes in deep and wide cash markets, mainly because the development of derivatives necessitates liquid collateral (including pricing benchmarks) to ensure efficient price formation. Low liquidity in some Asian equity markets may reflect issues of transparency and corporate governance, which generate information asymmetries, and accordingly foster high bid-asked spreads and limited trading activity. While *de jure* transparency and corporate governance have improved over time, investor perceptions suggest gaps in the application of existing frameworks for improved governance and disclosure standards. Thin equity market turnover remains an economic constraint on the introduction of derivative products in the Philippines and the expansion of the investor base of small equity derivative markets in Indonesia and Thailand.

Transparent derivative markets governed by orderly market and trading rules are generally deeper, more liquid and more efficient in their price setting activities than unregulated markets, characterized by the absence of measures that guarantee collective interest in market stability. The emphasis on rule-based trading fits with the notion that the impact of shocks to financial stability are generally deemed most pronounced and wide-spread where market forces and participants are left to their own devices. Systemic risk is reduced when trading occurs in well-structured and formally regulated exchanges that impose appropriate margin requirements and position limits, administer centralized clearing and settlement, engage in vigilant market surveillance, and mutualize risks through loss-sharing arrangements, and enforce capital deposits and excess-of-loss insurance. In some Asian countries without formal derivative exchanges, such as Thailand and the Philippines, OTC derivatives enjoy growing popularity. Since OTC trading is decentralized, and regulated only indirectly through the national supervision of financial institutions (Schinasi et al., 2000), it entails greater emphasis on disclosure and transparency. Derivatives trading without central clearing counterparties and full disclosure requirements increases potential vulnerabilities and may trigger system-wide failures. Notwithstanding the lack of capital requirements, market rules and mechanisms of collective burden and loss sharing, OTC trading, however, can be augmented with transparency enhancing features normally found in exchange-based trading,

such as the installation of market makers and the adoption of generally agreed limits on transactions and positions (Box 1).

**Box 1: Over-the-counter (OTC) vs. exchange-traded derivatives (ETD) – the most salient differences**

Derivative markets are generally distinguished by the degree of contract flexibility and the organization of trading activity. While *exchange-traded derivatives* (ETD) are standardized products traded on the floor of organized exchanges, *over-the-counter* (OTC)-traded derivatives are privately negotiated, bilateral agreements transacted off organized exchanges. ETDs have rigid structures compared to OTC derivatives, which are subject to a lengthy and costly process of rigorous regulatory evaluation and approval. Conversely, OTC derivatives are customized to other financial transactions and can involve any underlying asset, index, and payoff structure.

All exchange-based trading of derivatives is governed by rules designed to ensure market stability and financial integrity for the purpose of safeguarding the collective interest of market participants. While orderly market rules and prudential measures govern conduct, mutualize risk, and impose limits on leverage and margining, formalized risk management regulations on the soundness, disclosure, and transparency of individual positions, limits and transactions promote investor protection and ensure market integrity against the threat of manipulation when supplies of underlying assets are limited (IMF, 2000).<sup>7</sup>

Centralized trading, clearing and settlement in exchange-based derivative markets increases efficiency and mitigates counterparty risk. As central clearing counterparties (CCP) confirm every transaction with a matched market position, they absorb all credit risk and create a high standard for credit rating on exposure in the market for trading and holding positions. They also reduce operational risk from incomplete or disputed trade through trade confirmation services and arbitration of contested settlement issues.

Clearinghouses also fulfill an important fiduciary function for burden and loss sharing by imposing prudential capital rules and collateral requirements on dealers and transactions respectively. Typically dealers provide a good faith deposit, or margin, when buying or selling a contract.<sup>8</sup> Since the collateral adjusted exposure to counterparty credit risk determines the need for capital, the combination of capital and collateral requirements provides incentives to economize on risk-taking by raising the cost of holding open positions.

<sup>7</sup> Note, however, that the risk of manipulation in OTC markets is limited by the extent to which contracts serve a price discovery role as do ETDs.

<sup>8</sup> Liquid collateral is essential to the efficient execution of margin requirements as demonstrated recently in the Brazilian domestic bond market. Before restrictions on foreign investment in domestic debt were lifted in February 2006 (Wheatley, 2006), many foreign investors in Brazil bought long-dated, local currency denominated inflation-linked NTN-B government bonds using foreign currency (dollar-DI) reverse swaps (with high margin requirements subject to daily mark-to-market adjustments) and other complicated structures. Foreign financial institutions' holdings of NTN-B bonds represented about 10 percent of the total issue by April 2006. When Brazilian asset went through a major sell-off at the end of May 2006 amid a general surge in asset volatility of emerging market investments and liquidity in the underlying local bond market dried up, investor who had not hedged themselves against interest rate risk found it difficult to meet margin calls on their derivative obligations. As investors rushed to bet against interest rates in the swap market, their inability to sell underlying positions amplified the sell-off, triggered margin calls on other emerging market investments, and eventually led to a market freeze before the Brazilian government intervened. Additionally, the sluggish execution of margin requirements further encumbered timely margin adjustment.



These exchange membership requirements protect investors, safeguard the resources of the clearinghouse and serve as buffers against individual financial failure by preventing liquidity or solvency problems of individual dealers from translating into systemic stress affecting other firms. Hence, they reduce externalities of risk-taking by lowering both the likelihood of default and the chances of market failure.

In contrast, OTC derivatives are traded in an informal network of bilateral relationships without (i) formal centralized limits on individual positions, leverage, or margining, (ii) collective risk- and burden sharing, and (iii) prudential rules or mechanisms to ensure market stability and integrity. The operational aspects trading, clearing and settlement are decentralized and credit risk management is located within individual institutions. Counterparties prefer to deal only with highly rated and well-capitalized intermediaries to minimize counterparty risk. The concentration of OTC derivatives in major financial institutions entails lower transaction cost and information asymmetries than ETD. Although OTC instruments are essentially unregulated, they are affected indirectly by national legal systems, regulations, banking supervision and market surveillance. Nonetheless, the absence of formal requirements of disclosure and limits on positions and trades does not bode well for the preservation of collective interest in times of stress.

*Prudential measures in OTC to curb risks to financial stability*

The flexibility of contract structures in OTC markets cuts both ways. While OTC trading can be efficiency enhancing as participants deliberately choose the upside potential of lower transaction cost over the downside risk of contract failure in bilateral transactions, it is also prone to induce financial instability given lightly and only indirectly regulated trading. Derivatives trading without central clearing counterparties, the mutualization of risk and full disclosure requirements of participants increase potential vulnerabilities and may trigger system-wide failures. That said, the benefit of OTC depends on how market participants manage some of the most acute risks from unregulated trading to market stability, such as (i) difficulties in the complete elimination of confirmation backlogs, (ii) deficient post-default settlement protocols and automated trade processing, and (iii) the prospect of market risk from multiple defaults that could overwhelm the existing settlement infrastructure and undermine the efficacy of risk transfer in general.

There are practical means to curb concerns about vulnerabilities in OTC markets. The implementation of centralized mechanisms for the mitigation of counterparty risk as well as collective burden and loss sharing are the most ostensible remedies to the potential of higher systemic risk caused by insufficient self-insurance of trading parties. Additional regulatory measures and prudential standards would improve the stability of OTC markets by preventing manipulation and coordination failure, such as (i) the introduction of the widely accepted ETD market practice of “circuit breakers” and price limits for trading in order to foster market liquidity and protect financial systems from disruptions caused by short-term surges in volatility, and (ii) the requirement of OTC dealers to act as market makers by maintaining binding bid and offer quotes throughout the day to prevent dealers from withdrawing from the market at times of stress.

Price discovery in derivative markets is most efficient if trading is motivated by both speculation and institutional hedging. Some Asian derivative markets<sup>9</sup> are actively sponsoring more domestic retail participation in order to compensate for the lack of genuine hedging demand of institutional investors.<sup>10</sup> For instance, equity index options have become very popular in India and Korea owing to considerable retail demand. Index options and futures are usually among the first products to be developed before options on individual assets are introduced as typical retail product in evolving derivative markets. While single stock products, such as stock options and futures, are viewed more speculative in character, index products mainly serve as risk management tool. However, a retail-dominated investor base could compromise the sound development of derivative market and erode market stability at times of stress. Retail demand is mostly speculative in nature and could raise latent vulnerabilities unless sufficient investment by securities firms and other institutional investors limits the possibility of excessive speculation.

Reaping the full benefits of equity derivatives in emerging economies by fostering their wider development also requires the judicious combination of regulatory, legal and operational provisions for a safe and efficient infrastructure (Box 2). Prudential regulation and supervisory oversight through monitoring systems promote sound risk management that ensures the balanced growth of equity derivative markets. Good regulations and security laws are as important as the derivative markets they are designed to govern. They encourage the use of these markets for risk management and discourage their misuse. Appropriate regulation and supervision of institutions active in equity markets are essential for the sound functioning of equity derivative trading and remain vital to minimize potential threats to financial stability. Equally important is a firm's understanding and strong management of equity exposures among financial institutions, so that equity-market volatility does not engender broader financial spillovers.

**Box 2: Requirements for the development of well-functioning and stable derivative markets**

Derivatives are financial contracts, whose value derives from underlying reference assets, such as securities, commodities, market indices, interest rates or foreign exchange rates. Derivatives offer gains from risk transfer at low transaction cost. They improve market liquidity and complete financial markets by facilitating the unbundling, transformation and diversification of financial risks, which can be customized to the risk preferences and tolerances of agents, improving the capacity of the financial system overall to bear risk and intermediate capital.

The viable use of derivatives as means to facilitate risk transfer and efficient price discovery hinges on transparent pricing in liquid cash markets and essential economic, infrastructural and regulatory conditions, whose consistent integration ensures systemic integrity and sound market practice. The rationale for derivatives originates from three main sources: (i) *economic* incentives, including the need to share and hedge risk as well as efficient price

<sup>9</sup>Korea and India have developed specific internet-based trading infrastructures for retail investors.

<sup>10</sup> After the merger with the *Korean Stock Exchange* in 2004, the *Korean Futures Exchange* (KOFEX) became the largest futures exchange in the world in terms of trading volume.

discovery; (ii) restrictions and constraints on financial activity, including regulation, investment restrictions (e.g. limited or prohibited short-selling), and taxation of financial transactions; as well as (iii) financial globalization and associated technological and methodological advances, which require more complex and comprehensive cross-border risk management strategies.

The trading of derivatives is governed by financial incentives and contractual covenants that ensure *demonstrable and unimpeded asset control*, a *reliable market and trading infrastructure*, and an *adequate and bankable legal and regulatory framework* for bankruptcy, tax, and corporate governance issues as well as investor protection. The feasibility of derivative markets also requires the establishment of sound market practices, which include a good credit culture, information transparency, investor sophistication, relative price competitiveness across different asset classes in capital markets, an infrastructure of arrangers, clearing agents, exchanges and market makers as well as professional credit rating agencies to establish standards for risk measurement. These aspects are critical to the functioning of sustainable derivative markets, where systemic vulnerabilities are likely to be found in financial innovation that is governed by incentive structures that encourage greater risk taking in a benign economic environment but entail more adverse consequences when stress occurs.

The growing role of derivative markets also puts a premium on *well-functioning market trading, clearing and settlement systems*. The main infrastructure-related challenges involve market practices conducive to market stability: (i) the implementation of a modern trading system, which executes clearing and settlement through a single central counterparty (CCP) and multilateral close-out netting (so that derivative positions can be considered jointly when assessing margin requirements for mark-to-market valuation and good faith deposits), (ii) surveillance systems to detect improvident behavior especially in areas that straddle the cash and derivative markets, (iii) sound risk management and centralized mechanisms for the mitigation of counterparty risk that prevents individual failures from creating systemic stress, and (iv) contract standardization consistent with ISDA documentation and contract sizes (which applies more to exchange-based trading of derivatives rather than OTC (see Box 1)).

From an investor base perspective, there is also a need for a *balanced mix of speculative trading and natural hedging demand* in order to sustain a sound development of derivative markets. Domestic retail demand may be speculative in nature and raises latent vulnerabilities unless long-term institutional investors support genuine hedging demand. Sizeable retail trading of derivatives may also entail significant knock-on effects on real sectors; for example, a market downturn that inflicted widespread losses on households could affect consumer confidence and spending.

Sophisticated derivative markets also feature *legal and regulatory frameworks* that stipulate prudential standards based on (i) solid accounting rules and the alignment of local accounting standards to IFRS, (ii) specific derivative laws, (iii) full balance sheet disclosure requirements and market supervision through *self-regulating organizations* (SROs)) (especially to ensure reliable dispute resolution for investor protection), (iv) capital rules on positions and transactions, as well as (v) a tax environment that creates a level playing field for all cash and derivatives trading. These rules help ascertain the exposure of systemically-

important financial institutions to derivatives markets and discourage market activity detrimental to financial integrity.

While derivative contracts in mature markets are structured under tried and tested norms of market practice and governed by a highly developed legal regime and close supervisory oversight (if exchange-traded), legal codes in many countries in Emerging Asia are silent on derivatives (Jobst, 2006). Statutory barriers and the absence of legal and accounting standards specific to derivatives seem to be lasting hindrances to further deepening of derivative markets. Only Hong Kong, Indonesia and Malaysia have local accounting standards that conform to IFRS. Some national laws either prohibit derivatives, fail to identify the regulatory jurisdiction over derivatives or make derivative contracts unenforceable by equating them to gambling, which is prohibited under Islamic law. Furthermore, a restrictive regulatory stance in many jurisdictions in Emerging Asia has engendered bans on short-selling (such as in India<sup>11</sup>, Malaysia, the Philippines) or limited securities lending (in China, Indonesia and Thailand) for fear of systemic risk of settlement failure.

A good understanding of all these issues is incumbent on market participants as well as country officials charged with safeguarding financial stability and the sound operation of derivative markets. Given the increasing sophistication of financial products, the diversity of financial institutions, as well as the growing interdependence of financial markets, the adequate supervision of this important segment of capital markets will depend on the expedient and tractable resolution of challenges arising from consistent credit risk management, risk mutualization, and prudential standards that guarantee market stability in crisis situations. At the same time, the development of viable equity derivatives markets also necessitates financial sector initiatives, whose scope and intensity might be enhanced by coordinated policy efforts to improve market rules and trading standards with a view to minimizing risks and enhance financial stability.

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<sup>11</sup> Note that India is in the process of devising new rules governing the registration requirements of foreign institutional investors, which also includes a review of the prohibition on short selling (Leahy, 2006).

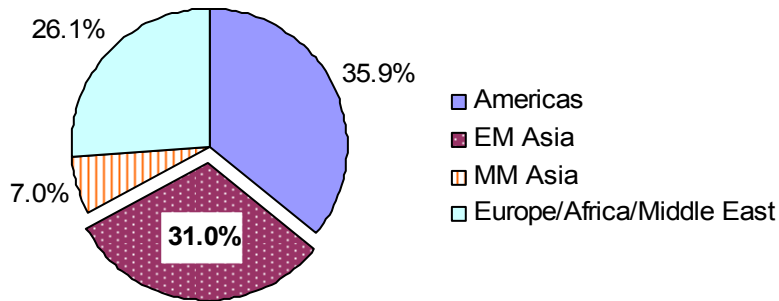
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V. APPENDIX

**Global Exchange-based Trading of Equity Derivatives  
(2006)**

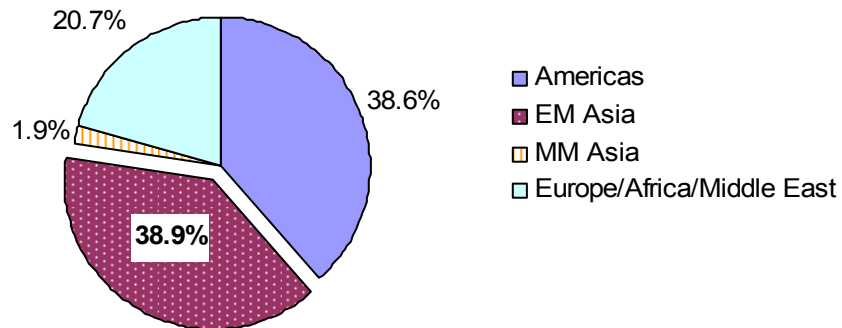
- by notional amount -  
Total U.S.\$ 174.9 trillion



**Appendix, Figure 1.** Global Exchange-based Trading of Equity Derivatives in 2006 (by notional amount): U.S.\$174.9 trillion.

**Global Exchange-based Trading of Equity Derivatives  
(2006)**

- by number of trades -  
7.3 billion contracts



**Appendix, Figure 2.** Global Exchange-based Trading of Equity Derivatives in 2006 (by number of trades): 7.3 billion contracts.

	(in U.S. Dollar billion)				(In percent of GDP) <sup>2</sup>				(In percent of domestic stock market capitalization) <sup>3</sup>						
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
<b>Total – Americas</b>	<b>21,350</b>	<b>25,021</b>	<b>31,983</b>	<b>43,872</b>	<b>62,730</b>	<b>172.0</b>	<b>190.8</b>	<b>225.8</b>	<b>285.6</b>	<b>408.4</b>	<b>179.9</b>	<b>161.5</b>	<b>177.6</b>	<b>228.5</b>	<b>174.8</b>
United States <sup>1</sup>	21,144	24,647	31,416	43,001	61,569	202.0	224.6	267.7	344.4	493.1	191.3	173.3	192.9	253.5	180.0
Brazil	116	256	366	506	701	25.2	50.7	60.7	63.9	88.4	95.3	113.2	110.9	106.7	253.9
<b>Total – Asia</b>	<b>19,822</b>	<b>28,661</b>	<b>34,759</b>	<b>48,719</b>	<b>66,446</b>	<b>323.1</b>	<b>424.9</b>	<b>466.8</b>	<b>625.5</b>	<b>853.1</b>	<b>507.0</b>	<b>506.5</b>	<b>501.8</b>	<b>557.4</b>	<b>612.2</b>
<b>Total – Emerging Asia</b>	<b>16,884</b>	<b>25,037</b>	<b>29,749</b>	<b>41,652</b>	<b>54,205</b>	<b>981.1</b>	<b>1,325.8</b>	<b>1,407.5</b>	<b>1,741.4</b>	<b>2,266.2</b>	<b>1,242.3</b>	<b>1,286.5</b>	<b>1,252.2</b>	<b>1,340.8</b>	<b>1,455.1</b>
India	72	310	581	891	1,565	14.6	53.8	87.3	114.9	201.8	29.7	111.2	150.5	161.1	244.7
Korea	15,470	22,986	26,543	37,636	48,471	2,828.4	3,779.8	3,905.2	4,745.6	6,111.8	11,864.2	7,821.9	6,815.0	5,241.7	3,618.2
Malaysia	3	5	12	13	20	3.3	4.3	10.2	10.1	15.0	0.7	2.8	6.7	7.3	25.9
Hong Kong, POC	420	635	1,074	1,334	2,255	256.4	400.5	647.8	750.6	1,268.8	194.2	88.8	124.7	126.4	270.9
Taiwan, POC	355	837	618	1,090	541	120.4	279.3	191.8	314.9	156.3	135.9	220.7	140.0	229.0	73.3
<b>Total – Europe/Africa/Middle East</b>	<b>14,794</b>	<b>15,666</b>	<b>21,177</b>	<b>27,878</b>	<b>45,711</b>	<b>182.8</b>	<b>158.0</b>	<b>186.7</b>	<b>236.0</b>	<b>387.0</b>	<b>233.8</b>	<b>178.5</b>	<b>196.6</b>	<b>237.4</b>	<b>210.5</b>
<b>Total</b>	<b>55,966</b>	<b>69,348</b>	<b>87,919</b>	<b>120,469</b>	<b>174,888</b>	-	-	-	-	-	-	-	-	-	-

**Table 1.** Global exchange-based trading of equity derivatives (2002-2006): Notional amount of traded contracts in absolute terms and in percent of GDP and stock market capitalization. 1/The notional amount of trading in stock index options in Chicago and stock index futures in New York have been estimated based on the growth rate from 2004 to 2005. 2/Based on GDP at year-end 2005. 3/The market capitalization of equity markets in Australia for October 2006 is based on the market capitalization reported for September. Market capitalization excludes investment funds. We only consider the stock market capitalization of countries that have an active futures and derivatives market. *Source:* Federation of Euro-Asian Exchanges (FEAS), World Federation of Exchanges (WFE) and Federation of European Stock Exchanges (FESE), IMF International Financial Statistics Yearbook 2006 and own calculations.

	(In percent of stock trading) <sup>2</sup>					(In percent of global trading)					(In percent of total Asia)				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
<b>Total – Americas</b>	<b>114.2</b>	<b>139.9</b>	<b>146.8</b>	<b>169.1</b>	<b>278.1</b>	<b>38.2</b>	<b>36.1</b>	<b>36.4</b>	<b>36.4</b>	<b>35.9</b>	-	-	-	-	-
United States <sup>1</sup>	116.1	142.3	149.8	173.3	314.6	37.8	35.5	35.7	35.7	35.3	-	-	-	-	-
Brazil	22.0	24.6	25.0	33.0	26.2	0.2	0.2	0.2	0.2	0.2	-	-	-	-	-
<b>Total – Asia</b>	<b>529.7</b>	<b>639.9</b>	<b>549.7</b>	<b>582.2</b>	<b>463.7</b>	<b>35.4</b>	<b>41.3</b>	<b>39.5</b>	<b>40.4</b>	<b>38.7</b>	<b>17.6</b>	<b>13.5</b>	<b>17.0</b>	<b>15.9</b>	<b>20.7</b>
<b>Total – Emerging Asia</b>	<b>995.8</b>	<b>1,396.0</b>	<b>1,271.3</b>	<b>1,445.6</b>	<b>1,060.2</b>	<b>30.2</b>	<b>36.1</b>	<b>33.8</b>	<b>34.6</b>	<b>31.8</b>	<b>82.4</b>	<b>86.5</b>	<b>83.0</b>	<b>84.1</b>	<b>79.3</b>
India	36.6	106.1	153.5	188.1	98.2	0.1	0.4	0.7	0.7	0.9	0.4	1.1	1.7	1.8	2.2
Korea	2,592.8	5,007.6	4,245.5	3,108.7	5,809.0	27.6	33.2	30.2	31.2	28.3	78.1	80.2	76.4	77.3	73.1
Malaysia	9.7	8.6	19.6	25.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong, POC	56.0	141.4	86.0	186.2	91.0	0.6	1.2	0.7	0.9	0.3	1.8	2.9	1.8	2.2	0.8
Taiwan, POC	1,367.1	259.0	791.3	720.0	966.4	1.0	0.4	1.0	0.6	1.1	2.8	0.9	2.7	1.4	2.7
<b>Total – Europe/Africa/Middle East</b>	<b>151.3</b>	<b>156.4</b>	<b>158.4</b>	<b>174.9</b>	<b>306.1</b>	<b>26.4</b>	<b>22.6</b>	<b>24.1</b>	<b>23.2</b>	<b>25.3</b>	-	-	-	-	-
<b>Total</b>	-	-	-	-	-	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

**Appendix, Table 2.** Global exchange-based trading of equity derivatives (2002-2006): Notional amount of traded contracts in percent of stock trading, global trading of equity derivatives and regional trading of equity derivatives in Asia. 1/The notional amount of trading in stock index options in Chicago, stock index futures in New York and stock options at all derivatives exchanges in the U.S. for 2006 have been estimated based on the growth rate from 2004 to 2005. 2/Trading figures include investment funds. *Source:* Federation of Euro-Asian Exchanges (FEAS), World Federation of Exchanges (WFE) and Federation of European Stock Exchanges (FESE), IMF International Financial Statistics Yearbook 2006 and own calculations.



<b>Equity Derivatives (number of contracts)</b>							
(in '000 of contracts)							
	2000	2001	2002	2003	2004	2005	2006
<b>Total – Americas</b>	<b>834,237</b>	<b>975,473</b>	<b>1,112,582</b>	<b>1,451,827</b>	<b>1,846,145</b>	<b>2,225,824</b>	<b>2,808,266</b>
United States <sup>1</sup>	797,438	893,265	1,001,662	1,202,588	1,498,709	1,846,473	2,447,613
Brazil	30,708	75,779	96,774	185,013	242,125	274,692	294,904
<b>Total – Asia</b>	<b>263,286</b>	<b>920,241</b>	<b>2,025,051</b>	<b>3,064,692</b>	<b>2,817,253</b>	<b>2,938,836</b>	<b>2,966,804</b>
<b>Total – Emerging Asia</b>	<b>233,171</b>	<b>878,813</b>	<b>1,975,619</b>	<b>3,004,396</b>	<b>2,748,221</b>	<b>2,851,866</b>	<b>2,829,801</b>
India	n.a.	n.a.	13,360	43,429	75,100	131,668	195,218
Korea	213,496	855,258	1,933,130	2,900,658	2,577,166	2,579,158	2,455,662
Malaysia	367	288	234	331	1,088	1,112	1,628
Hong Kong, POC	8,920	9,900	10,741	14,496	19,568	25,546	42,892
Taiwan, POC	8,461	9,021	11,776	35,529	60,663	104,277	114,528
<b>Total – Europe/Africa/Middle East</b>	<b>234,835</b>	<b>831,803</b>	<b>1,053,851</b>	<b>1,089,165</b>	<b>1,185,834</b>	<b>1,291,918</b>	<b>1,506,727</b>
<b>Total</b>	<b>1,332,358</b>	<b>2,727,517</b>	<b>4,191,484</b>	<b>5,605,684</b>	<b>5,849,232</b>	<b>6,456,578</b>	<b>7,281,797</b>

**Appendix, Table 3.** Global exchange-based trading of equity derivatives (2002-2006): Number of traded contracts. 1/The number of traded contracts on stock index options in Chicago and stock index futures in New York have been estimated for 2006 based on the growth rate from 2004 to 2005. We also estimated the trading volume measured by number of contracts for the CME in 2002. *Source:* Federation of Euro-Asian Exchanges (FEAS), World Federation of Exchanges (WFE) and Federation of European Stock Exchanges (FESE), IMF International Financial Statistics Yearbook 2006 and own calculations.

	(In percent of total)						(In percent of total Asia)						
	2000	2001	2002	2003	2004	2006	2000	2001	2002	2003	2004	2005	2006
<b>Total – Americas</b>	<b>62.6</b>	<b>35.8</b>	<b>26.5</b>	<b>25.9</b>	<b>31.6</b>	<b>38.6</b>	-	-	-	-	-	-	-
United States <sup>1</sup>	59.9	32.8	23.9	21.5	25.6	33.6	-	-	-	-	-	-	-
Brazil	0.5	0.2	0.2	0.1	0.2	0.2	-	-	-	-	-	-	-
<b>Total – Asia</b>	<b>19.8</b>	<b>33.7</b>	<b>48.3</b>	<b>54.7</b>	<b>48.2</b>	<b>40.7</b>	<b>12.2</b>	<b>5.0</b>	<b>2.8</b>	<b>2.3</b>	<b>3.0</b>	<b>3.3</b>	<b>3.0</b>
<b>Total – Emerging Asia</b>	<b>17.5</b>	<b>32.2</b>	<b>47.1</b>	<b>53.6</b>	<b>47.0</b>	<b>38.9</b>	<b>87.8</b>	<b>95.0</b>	<b>97.2</b>	<b>97.7</b>	<b>97.0</b>	<b>96.7</b>	<b>97.0</b>
India	n.a.	n.a.	0.3	0.8	1.3	2.7	n.a.	n.a.	0.7	1.4	2.7	4.5	2.7
Korea	16.0	31.4	46.1	51.7	44.1	33.7	81.1	92.9	95.5	94.6	91.5	87.8	91.5
Malaysia	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong, POC	0.7	0.4	0.3	0.3	0.3	0.6	3.4	1.1	0.5	0.5	0.7	0.9	0.7
Taiwan, POC	0.6	0.3	0.3	0.6	1.0	1.6	3.2	1.0	0.6	1.2	2.2	3.5	2.2
<b>Total – Europe/Africa/Middle East</b>	<b>17.6</b>	<b>30.5</b>	<b>25.1</b>	<b>19.4</b>	<b>20.3</b>	<b>20.7</b>	-	-	-	-	-	-	-
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

**Appendix, Table 4.** Global exchange-based trading of equity derivatives (2002-2006): Number of traded contracts in percent of stock trading, global trading of equity derivatives and regional trading of equity derivatives in Asia. 1/The number of traded contracts on stock index options in Chicago and stock index futures in New York have been estimated for 2006 based on the growth rate from 2004 to 2005. *Source:* Federation of Euro-Asian Exchanges (FEAS), World Federation of Exchanges (WFE) and Federation of European Stock Exchanges (FESE), IMF International Financial Statistics Yearbook 2006 and own calculations.

<b>Equity Derivatives (average notional amount per traded contract)</b>					
(in '000 U.S. Dollars)					
	2002	2003	2004	2005	2006
<b>Total - Americas</b>	<b>19.2</b>	<b>17.2</b>	<b>17.3</b>	<b>19.7</b>	<b>22.3</b>
United States	21.1	20.5	21.0	23.3	25.2
Brazil	1.2	1.4	1.5	1.8	2.4
<b>Total - Asia</b>	<b>9.8</b>	<b>9.4</b>	<b>12.3</b>	<b>16.6</b>	<b>22.4</b>
<b>Total - Emerging Asia</b>	<b>8.5</b>	<b>8.3</b>	<b>10.8</b>	<b>14.6</b>	<b>19.2</b>
India	5.4	7.1	7.7	6.8	8.0
Korea	8.0	7.9	10.3	14.6	19.7
Malaysia	13.6	13.6	11.1	11.9	12.0
Hong Kong, POC	39.1	43.8	54.9	52.2	52.6
Taiwan, POC	30.2	23.5	10.2	10.5	4.7
<b>Total - Europe/Africa/Middle East</b>	<b>14.0</b>	<b>14.4</b>	<b>17.9</b>	<b>21.6</b>	<b>30.3</b>
<b>Total</b>	<b>13.4</b>	<b>12.4</b>	<b>15.0</b>	<b>18.7</b>	<b>24.0</b>

**Table 5.** Global exchange-based trading of equity derivatives: Average notional amount per traded contract (2002-2006). *Source:* Own calculations.

*Notes (Tables 1 to 5):* The analysis covers data from the following equity derivative markets in Asia-Pacific: Australian Stock Exchange (ASX), the Sydney Futures Exchange (SFE), Shanghai Futures Exchange, Hong Kong Exchange, National Stock Exchange of India (NSE), Bombay Stock Exchange (BSE), Jakarta Futures Exchange (JFX), Surabaya Stock Exchange, Tokyo International Financial Futures Exchange (TIFFE), Tokyo Stock Exchange (TSE), Osaka Securities Exchange, Korea Stock Exchange (KSE), Korea Futures Exchange (KOFEX), Malaysia Derivatives Exchange, Singapore Stock Index Futures and Derivative Trading Exchange (SGX-DT), Thailand Futures Exchange (TFEX), and Taiwan Futures Exchange (TAIFEX). Other important derivative markets outside Asia in our sample include: American Stock Exchange, Chicago Board Options Exchange (CBOE), Chicago Board of Trade (CBOT), Chicago Mercantile Exchange (CME), International Securities Exchange (ISE), Options Clearing Corp., Pacific Stock Exchange, Philadelphia Stock Exchange (all U.S.), Athens Stock Exchange, BME (Spain), Borsa Italian, Budapest Stock Exchange, Eurex, Euronext/London International Financial Futures and Options Exchange (LIFFE), OMX AB (Optionsmarknaden) of the Helsinki Exchanges, the Copenhagen Stock Exchange, and the stock exchanges of Estonia, Latvia and Lithuania, Oslo Børs, RTS Stock Exchange (Russia), Tel Aviv Stock Exchange, Warsaw Stock Exchange, Wiener Börse (all Europe and Middle East), as well as the Johannesburg Stock Exchange (JSE)/South African Futures Exchange (SAFEX).