

Derivatives assignment

Business



**ASSIGN
BUSTER**

Derivatives in Financial Market Development Rangarajan K. Sundaram New York University (contact:nyu. edu) (contact:) February

2013 Derivatives in Financial Market Development Rangarajan K. Sundaram Stern School of Business, New York University <http://pages.stern.nyu.edu/rsundara> 13 September 2012 Contents Executive Summary ii 1 Introduction

2 2 The World Derivatives Market 2 2. 1 Basic Derivative

Instruments 2 2. 2 Market Size and

Growth 4 2. 3 Emerging Markets versus

Advanced Economies 7 3 Uses of Derivatives 9 4 The

Potential Risks in Derivatives Usage 14 4. 1 Barings Bank

. 15 4. 2 Metallgesellschaft

. 16 4. 3 Amaranth

. . 16 4. 4 Aracruz Cellulose 17 4. 5

AIG 18 4. 6 Heeding the

Lessons? 19 5 Derivatives in the

Indian Context: Some Comments 20 6 Regulation and its Challenges 26 A

Derivatives Instruments 30 A. 1

Forwards 30 A. 2

Futures 31 A. 3

Swaps 32 A. 4

Options 32 A. 5 Credit

Derivatives 33 1 Executive

Summary Derivatives are ? nancial instruments whose payo? s derive from other, more primitive ? nancial variables such as a stock price, a commodity price, an index level, an interest rate, or an exchange rate. The world market for derivatives is an immense one.

<https://assignbuster.com/derivatives-assignment/>

The notion amount outstanding in the over-the-counter (OTC) derivatives market worldwide exceeds \$640 trillion, with a collective gross market value of over \$27 trillion. The exchange-traded market has another \$60 trillion in outstanding notional. The growth of derivatives usage over the last two decades has been rapid in both advanced economies and emerging markets; in both OTC contracts and those that are exchange-traded; and across all underlying classes, including interest-rate, currency, equity, and the most recent addition, credit. Derivatives are enormously useful instruments in the management of risk.

They can be used to hedge an existing market exposure (forwards and futures), to obtain downside protection to an exposure even while retaining upside potential (options), to transform the nature of an exposure (swaps), and to obtain insurance against events such as default (credit derivatives). For corporations and financial institutions looking to manage exchange-rate risk, input costs, financing costs, or credit exposures, these are invaluable features, and explain to a considerable extent the rapid growth of the derivatives market as globalization and global interlinkages have grown.

Derivatives are also highly levered instruments, and this has its own implications. On the one hand, the leverage makes derivatives attractive to speculators (those who wish to bet on price direction). In itself, this is not a bad thing, since speculators add considerable liquidity to the market and, by taking the opposite side, facilitate the positions hedgers want to take.

However, leverage magnifies the effect of price moves, so sharp unfavorable price moves can easily spell disaster to the derivatives portfolio and thence to the larger business entity. Indeed, the annals of financial

history are littered with stories of corporations and financial institutions which collapsed when a deterioration in market conditions led to massive losses in the derivatives portfolio??? occasionally, even in cases where the derivatives were being used to hedge existing exposures. The potentially lethal cocktail of leverage and volatility makes it vital that users understand fully the risks of the instruments, and regulators the systemic impact of volatility spikes. India's derivatives markets, both OTC and exchange-traded, have seen rapid growth over the last decade, and with relatively few sputters.

The successes are visible and real??? several Indian exchanges rank among the world's top exchanges in terms of number of derivatives contracts traded (though the figures are exaggerated by the small size of Indian contracts compared to the major international exchanges); and there have been no large scale derivatives disasters of the sort that have roiled the advanced economies. But problems lurk not far beneath the surface. Many underlying markets are illiquid and lack depth, simultaneously increasing the need for alternative risk-management tools and hampering the development of the corresponding derivatives markets.

Anecdotal evidence suggests too that Indian exchanges may be losing volumes to overseas competitors because of regulatory burdens. The challenge in this environment is to find a way to sustain the growth and deepen the market, making tools of risk-management more widely available to corporates and banks, even while avoiding speculative excesses. In this context, the recent Dodd-Frank reforms in the US offer a useful framework for thinking about issues. The Dodd-Frank Act has as its objectives the

<https://assignbuster.com/derivatives-assignment/>

minimization of systemic risk from derivatives use and increasing the transparency of the OTC derivatives market.

Towards these ends, the Act has mandated, among other things, that those OTC derivatives that are sufficiently standardized to move to trading on “swap exchange facilities,” essentially exchanges. On the one hand, this will bring in exchange-like transparency and reduction of counterparty risk; on the other hand, the exchanges created in this fashion will truly be too big to fail, making the monitoring of the exchange a key regulatory challenge. The Act also contains provisions??? the Lincoln Rule and the Volcker Rule??? designed to discourage banks from speculative derivatives trading.

Again, this provision cuts both ways. In principle, it could make banks safer. On the other hand, it could also result in the banks’ trading operations being spun off into separate entities, meaning that derivatives trading would move from regulated entities to unregulated ones. There are, unfortunately, no simple answers.

1 1 Introduction This note discusses the role of derivatives in financial markets and their development. The presentation is in several parts. Section 2 lays the basis. It describes the size, composition, and evolution of the world’s derivative markets; and discusses the key differences between derivatives markets in advanced economies and those in emerging markets. For those unfamiliar with derivative securities, Appendix A defines the instruments and their characteristics in some detail. Sections 3 and 4 build on this foundation in two directions. The former looks at the positive side of derivatives, at the ways in which derivatives may be used by individuals, corporations and other entities to mitigate or manage risk. In

essence, it addresses the question: what (good) can we do with derivatives that would be impossible in the absence of derivatives?

Section 4 looks at the flip side of these benefits, the risks that come with derivatives use, particularly the potentially lethal leverage-volatility combination that accompanies derivatives. Several important case studies are presented that highlight these risks. Section 5 discusses derivatives markets in the Indian context, and offers some comments on the developments here, positive and negative. Section 6 concludes with a look at regulatory challenges and recent developments, with a particular focus on the Dodd-Frank Act in the US.

2 The World Derivatives Market

A derivative security is a financial security whose payoff depends on (or derives from) a more fundamental underlying financial variable such as a commodity price, a stock price, an exchange rate, an interest rate, an index level, or even the price of another derivative security. Derivatives have become ubiquitous in today's financial world with thriving exchanges in nearly every major country and a huge over-the-counter market. In this introductory segment, we describe the major classes of derivatives, and present data on the size and growth of the market and its constituent parts.

1 Basic Derivative Instruments

The three basic kinds of derivative securities are forwards and futures; swaps; and options. We begin with brief descriptions of each of these, as also of the relatively recent innovation of credit derivatives, particularly credit default swaps. A more detailed description of these instruments and their characteristics may be found in Appendix A.

Forwards

A forward contract is one in which two parties

(referred to as the “counterparties” to the transaction) commit to the terms

of a specified trade to be carried out on a specified date in the future.

Forward contracts are bilateral or “over the counter” (OTC) contracts, i. e. , they are negotiated directly between buyer and seller. On the positive side, this means they are customizable in terms of the maturity date, the specific quality (grade) to be delivered, etc. On the other hand, each party also takes on the risk of the other counterparty’s default. Futures A futures contract is, in essence, a forward contract that is traded on an organized exchange rather than negotiated bilaterally.

Futures contracts grew out of forward contracts in the mid-19th century.

Futures contract terms (maturity dates, deliverable grade of the underlying, etc.) are standardized, and the exchange guarantees performance on the contract. Participants in futures markets are required to post “margin,” which is essentially collateral against default. Swaps Swaps, like forwards, are over-the-counter contracts. In a forward, the two counterparties commit to a single trade or single exchange of cash flows. In a swap, the counterparties commit to multiple exchanges of cash flows over several dates in the future. 1 Swaps are most common in the interest-rate derivatives market, where the typical contract has the parties exchanging one interest index for another computed on a given notional principal amount. (For example, one counterparty in the swap may make floating-rate payments indexed to Libor, while the other makes fixed-rate payments on the same principal amount.) They are also popular in the currency market, where the swap involves an exchange of principal and currency in one exchange for principal and currency in another. Options An option is a financial security that gives the holder the right, but not the obligation, to take part in a specific

ed trade. There are two basic kinds of options (and a great many variants on these structures). In a call option, the holder of the option has the right, but not the obligation, to buy the specified underlying asset at a price specified in the contract (called the “strike price”). In a put option, the holder of the option has the right to sell the underlying asset at the specified strike price. The holder of the option is also variously referred to as the long position in the option or the buyer of the option.

The other counterparty in option trade??? who has an obligation to take part in the trade if the option buyer should decide to exercise his right??? is called the seller or writer of 1 Swaps may also sometimes involve just a single exchange of cash flows. For example, the natural gas swap contract cleared on the InterContinental Exchange’s ICE OTC is essentially a cash-settled futures contract. 3 the option or the short position in the option. In exchange for providing the option holder with optionality concerning the trade, the option writer receives an up-front fee called the option price or the option premium.

Options trade both on organized exchanges and in the over-the-counter (OTC) market. Exchange-traded options exist on equities, equity indices, currencies, and interest rates and bonds, among others. Exchange-traded options are standardized in terms of expiry dates and strike prices. OTC options are customizable and exhibit a great deal more variety. Credit Derivatives Credit derivatives are derivatives written on the credit risk of an underlying reference entity. By far the most popular form of credit derivative is the credit default swap or CDS. Akin to insurance against default, a CDS references a specified credit obligation issued by a specified entity (for <https://assignbuster.com/derivatives-assignment/>

example, a specific bond issued by Ford Motor Company). One counterparty in the CDS contract (the “buyer of protection”) makes a regular periodic payment to the other counterparty (the “seller of protection”); in exchange the protection seller agrees to pay the protection buyer any loss in value on the specified reference obligation if a “credit event” (e. g. , default) were to occur during the life of the CDS contract. CDS indices are indices created from CDS prices in a manner similar to the creation of equity indices out of equity prices.

There are two major families of credit indices, the iTraxx indices which cover Europe, and the CDX indices which cover North America and Asia. About three-quarters of the credit derivatives market is composed of trading in CDSs and the CDS indices. 2. 2 Market Size and Growth Tables 1-3 describe the size and growth of the world derivatives market. Tables 1 and 2 deal with over-the-counter derivatives market (derivatives that are negotiated bilaterally), while Table 3 looks at exchange-traded derivatives (i. e. , standardized derivatives traded on organized exchanges). Within each table, the information is further subdivided first by underlying and then by instrument-type. The data in all cases is from the Bank for International Settlements (BIS). Derivatives markets are immense in size. As of December 2011, the total notional outstanding 2. 2 Notional outstanding refers, loosely speaking, to the principal amount of the contracts. For example, if a forward contract calls for the delivery of 1, 000 oz of gold at a price of \$1, 800/oz, the notional outstanding in the contract is $$(1, 800 \times 1, 000) = \$1. 80 \text{ million}$. If an option gives the holder the right to buy 10, 000 shares of Google at \$500/share, the notional outstanding in the contract is $$(10, 000 \times 500) = \5

million. If a swap calls for the exchange of floating cash flows for fixed cash flows on a principal of \$100 million, the notional outstanding in the swap is \$100 million. And so on.

4 Table 1: The OTC Derivatives Market I: 2007-2011 Notional amounts outstanding Dec. 2007 Dec. 2009 Dec. 2011

	Total contracts	Gross market values	Dec. 2007	Dec. 2009	Dec. 2011
585, 932 603, 900 647, 762 15, 802 21, 542 27, 285	FX contracts	Forwards and forex swaps			
56, 238 29, 144 14, 347 12, 748 49, 181 23, 129 16, 509 9, 543 63, 349 30, 526 22, 791 10, 032 1, 807 675 817 15 2, 070 683 1, 043 344 2, 555 919 1, 318 318	Interest rate contracts	Forward rate agreements			
393, 138 26, 599 309, 588 56, 951 449, 875 51, 779 349, 288 48, 808 504, 098 50, 576 402, 611 50, 911 7, 177 41 6, 183 953 14, 020 80 12, 576 1, 364 20, 001 67 18, 046 1, 888	Equity-linked contracts	Forwards and swaps			
8, 469 2, 233 6, 236 5, 937 1, 652 4, 285 5, 982 1, 738 4, 244 1, 142 239 903 708 176 532 679 156 523	Commodity contracts	Gold Other commodities			
8, 455 595 7, 861 2, 944 423 2, 521 3, 091 521 2, 570 1, 898 70 1, 829 545 48 497 487 82 405 58, 244 32, 486 25, 757 32, 693 21, 917 10, 776 28, 633 16, 881 11, 752 2, 020 , 158 862 1, 801 1, 243 558 1, 586 962 624 61, 387 63, 270 42, 606 1, 759 2, 398 1, 977	Credit default swaps	Single-name instruments			
	Multi-name instruments	Unallocated			

All figures in USD billions. Source: The Bank for International Settlements, <http://www.bis.org>. in the OTC derivatives market was \$648 trillion, representing a gross market value³ of \$27 trillion. By way of comparison, total world equity market capitalization in December 2011 was of the order of around \$47 trillion, the world bond markets amounted to around \$95 trillion in face value, and world GDP in 2011 was estimated to be around \$65 trillion.

The tables reveal that interest-rate derivatives??? derivatives written on interest rates or on interest-rate sensitive securities such as bonds??? have throughout been by far the most dominant class of derivatives in the OTC market, accounting for over 70% of the total notional outstanding (over \$500 trillion by December 2011). Currency derivatives are the second largest chunk of the market measured by notional outstanding, accounting for over \$63 trillion in December 2011, while OTC equity derivatives had a notional outstanding of almost \$6 trillion, down from a high of nearly \$8. 50 trillion in December 2007.

Particularly noteworthy is the growth of the credit 3 Gross market value is defined as the sum of the absolute replacement value of all outstanding contracts. For example, consider a call option contract on Google that gives the holder the right to buy 10, 000 shares of Google at \$500 per share. If the market call premium (i. e. , the price of each call option in the market) is \$35, the market value of the contract is $(10,000 \times 35) = \$350,000$.

Table 2: The OTC Derivatives Market II: 1998-2011 Dec. 1998 Dec. 2001 Dec. 2004 Dec. 2007 Dec. 2008 Dec. 2009 Dec. 2010 Dec. 2011 Total contracts 80, 309 111, 178 258, 628 585, 932 598, 147 03, 900 601, 046 647, 762 FX Contracts Forwards/FX swaps Currency swaps Options 18, 011 12, 063 2, 253 3, 695 16, 748 10, 336 3, 942 2, 470 29, 289 14, 951 8, 223 6, 115 56, 238 29, 144 14, 347 12, 748 50, 042 24, 494 14, 941 10, 608 49, 181 23, 129 16, 509 9, 543 57, 796 28, 433 19, 271 10, 092 63, 349 30, 526 22, 791 10, 032 Interest rate contracts Forward rate agreements Interest rate swaps Options 50, 015 5, 756 36, 262 7, 997 77, 568 7, 737 58, 897 10, 933 190, 502 12, 789 150, 631 27, 082 393, 138 26, 599 309, 588 56, 951 432, 657

41, 561 341, 128 49, 968 449, 875 51, 779 349, 288 48, 808 465, 260 51,
587 364, 377 49, 295 504, 098 50, 576 402, 611 50, 911 Equity-linked
contracts

Forwards and swaps Options 1, 488 146 1, 342 1, 881 320 1, 561 4, 385 756
3, 629 8, 469 2, 233 6, 236 6, 471 1, 627 4, 844 5, 937 1, 652 4, 285 5, 635
1, 828 3, 807 5, 982 1, 738 4, 244 408 175 233 137 97 598 231 367 217 150
1, 443 369 1, 074 558 516 8, 455 595 7, 861 5, 085 2, 776 4, 427 395 4, 032
2, 471 1, 561 2, 944 423 2, 521 1, 675 846 2, 922 397 2, 525 1, 781 744 3,
091 521 2, 570 1, 745 825 6, 396 5, 117 1, 279 58, 244 32, 486 25, 757 41,
883 25, 740 16, 143 32, 693 21, 917 10, 776 29, 898 18, 145 11, 753 7, 476
28, 633 16, 881 11, 752 10, 466 26, 613 61, 387 62, 667 63, 270 39, 536 42,
606 Commodity contracts Gold Other commodities Forwards and swaps
Options Credit default swaps

Single-name instruments Multi-name instruments of which index products
Unallocated 10, 387 14, 384 Amounts in table refer to notional outstanding.
All figures in USD billions. Source: The Bank for International Settlements,
<http://www.bis.org/derivatives/segment>. Literally non-existent twenty years
ago, credit derivatives have a notional outstanding approaching \$30 trillion,
making them on that measure the third largest segment of the OTC
derivatives market today. Table 2 shows that the OTC derivatives market has
been growing very rapidly over the last decade and a half, slowing down only
with the onset of the financial crisis in 2007-08. The marketwide notional
outstanding in December 2011 was more than 8 times the amount in
December 1998, a compound annual growth rate exceeding 17%. Every
segment of the market experienced substantial growth over this period, with
<https://assignbuster.com/derivatives-assignment/>

interest rate derivatives growing tenfold, commodity derivatives eightfold, and equity derivatives fourfold. 4 Table 3 describes total notional outstanding on the world's derivatives exchanges. As of December 2011, the figure stood at \$58 trillion (\$23 trillion in futures and \$35 trillion in options), 4 Tables 1 and 2 do not fully reflect the diversity of the OTC derivatives market. Derivatives are today written on a range of once-exotic underlying variables including electricity prices, temperature levels, broadband, newsprint, and market volatility, among others. Many of these (e. g. , electricity derivatives) have become important niche products, allowing firms operating in that sector to hedge their risks. 6 Table 3: The Exchange-Traded Derivatives Market: 1998-2011 Dec. 1998 Futures Dec. 2001 Dec. 2004 Dec. 2007 Dec. 2008 Dec. 2009 Dec. 2010 Dec. 2011 8, 355 9, 675 18, 902 28, 051 19, 508 21, 738 22, 312 22, 930 Interest rate Currency

Equity index 8, 031 32 291 9, 270 73 332 18, 165 114 624 26, 770 180 1, 101 18, 732 125 651 20, 628 144 966 21, 013 170 1, 128 21, 724 221 985 North America Europe Asia and Pacific Other Markets 3, 527 2, 894 1, 677 257 5, 909 2, 437 1, 240 88 10, 459 5, 972 2, 290 181 14, 469 9, 013 3, 942 627 10, 138 6, 507 2, 466 397 10, 721 8, 054 2, 408 555 11, 864 6, 345 3, 169 935 13, 107 6, 534 2, 344 945 5, 620 14, 081 27, 619 51, 037 38, 236 51, 380 45, 635 35, 402 Interest rate Currency Equity index 4, 623 49 948 12, 493 27 1, 561 24, 604 61 2, 954 44, 282 133 6, 622 33, 979 129 4, 128 46, 429 147 4, 804 40, 930 144 4, 560 31, 581 88 3, 733 North America

Europe Asia and Pacific Other Markets 3, 868 1, 503 205 44 10, 278 3, 704 68 31 17, 073 10, 336 133 77 28, 024 21, 554 1, 021 438 19, 533 18, 116 219 368 23, 875 26, 323 310 872 24, 353 19, 247 383 1, 651 19, 786 14,

285 350 982 Options Amounts in table refer to notional outstanding. All figures in USD billions. Source: The Bank for International Settlements, <http://www.bis.org>. down from a peak of \$79 trillion in December 2007. 5 The notional outstanding figures in futures markets too are dominated by interest-rate derivatives, indeed even more so than OTC markets, accounting for around 90% of the total.

Equities constitute the second largest segment, with the currency market representing a relatively small share. As with OTC markets, derivatives growth on exchanges was rapid in the early years of the 2000s, with the market growing more than 7-fold in the years from 1998-2007. Despite the fall in the market size since then, the market shows a compound annual growth rate in the 1998-2011 period comfortably exceeding 11%. 2. 3 Emerging Markets versus Advanced Economies How does derivatives activity in emerging markets differ from that in the advanced economies? A 2010 study by the Bank for International Settlements⁶ provides an answer.

The study compares 5 The notional outstanding figures across OTC and exchange-traded markets are not comparable. In OTC markets, the risk in a contract is often laid off by opening another offsetting contract with a different counterparty, which increases the notional outstanding amount. In the exchange traded market, the original contract is closed out by taking the opposite position in the same contract, which leaves the notional outstanding the same or smaller. 6 Mihaljek, D. and F. Packer, “ Derivatives in Emerging Markets,” BIS Quarterly Review, Dec 2010, pp. 43-58. ... and of equitylinked derivatives in Korea 2010. Elsewhere, the FX derivatives turnover on exchanges in Mexico and Russia has doubled since 2007, while <https://assignbuster.com/derivatives-assignment/>

in India turnover of FX derivatives surged to \$4 billion per day in April 2010, within just a year or so of their launching on the local exchange. Several EMEs, above all Korea, also have very large turnover of equitylinked derivatives. With \$270 billion daily turnover of these derivatives in April 2010, the Korea Exchange was second globally only to the United States' CME Group ??? and trailing closely behind it.

Significant trading of equity-linked derivatives also takes place on exchanges in Brazil, Hong Kong, India and Figure 1: Emerging Markets Derivatives Turnover Singapore (\$12??? 16 billion daily in April 2010), as well as in China, Israel and The ? gure shows emerging market daily derivatives turnover in 2010. The ? gures are in USD billions. Source: Mihaljek and Packer (2010), BIS Quarterly Review, December Derivatives turnover in emerging markets in 2010¹ 2010. Daily average turnover in April, in billions of US dollars Exchange-traded derivatives

OTC derivatives 300 60 200 40 100 20 0 0 KR HK SG BR IN RU CN ZA IL MX TR TW PL TH BR = Brazil; CN = China; HK = Hong Kong SAR; IL = Israel; IN = India; KR = Korea; MX = Mexico; PL = Poland; RU = Russia; SG = Singapore; TH = Thailand; TR = Turkey; TW = Chinese Taipei; ZA = South Africa. 1 OTC derivatives are adjusted for local inter-dealer double-counting (ie “ net-gross” basis). OTC derivatives comprise FX derivatives and interest rate derivatives; exchange-traded derivatives comprise FX derivatives, interest rate derivatives and equity-linked derivatives.

OTC FX derivatives comprise outright forwards, FX swaps, currency swaps, currency options and other FX products. OTC interest rate

derivatives comprise forward rate agreements, interest rate swaps, interest rate options and other interest rate products. Exchange-traded derivatives comprise futures and options. derivatives turnover in emerging markets (EMs) and advanced economies (AEs) along several dimensions, including market Survey. and market composition. 8 This section summarizes the Graph 2 findings. Source: 2010 Triennial Central Bank size BIS Quarterly Review, December 2010 51 Size and Growth At \$1. trillion a day, derivatives turnover in EMs is an order of magnitude smaller than in AEs (\$13. 8 trillion). More pertinently, it is also substantially smaller as a fraction of GDP (6. 2% for EMs versus 36% for AEs). The EM market, however, grew a bit faster over the period 2001-10, registering a growth of 300%, compared to 250% for the AEs. Where does trading occur? 62% of the total derivatives turnover in AEs occurred on exchanges and 38% occurred in the OTC market. In EMs taken as a whole, the split was close to 50-50 meaning that OTC markets are, relatively speaking, more important in EMs.

But the OTC-exchange split varies considerably across EMs. Of the four largest centers for EM derivatives (Hong Kong, Singapore, Brazil, and Korea), OTC derivatives had an overwhelming market share in Hong Kong and Singapore, while exchanges dominate in Brazil and Korea. As Figure 1 indicates, it is only in a few countries (India, Israel, and to an extent China), that OTC and exchange markets are of roughly equal size. In every other case, one or the other dominates. 7 “ Turnover” refers to the aggregate gross notional amount of all transactions struck during the period of the survey.

Daily turnover figures are obtained by averaging the turnover figures for the entire period. 8 The study looks at interest-rate, currency, and equity, but not commodity or credit, derivatives. 8 What risks are traded? The risks traded via derivative contracts are sharply different in AEs and EMs. In AEs, 77% of the total derivatives turnover is accounted for by interest-rate derivatives. In EMs, around 50% of the total derivatives turnover is in currency derivatives, and another 30% in equity derivatives; interest rate derivatives are relatively unimportant. These numbers likely reflect the reality that exchange-rate risk is a major concern in emerging markets, 9 while EM bond markets are not nearly as well-developed as in AEs. What trades in EM OTC markets? OTC derivatives market turnover in EMs is almost completely dominated by currency derivatives (around 90%) with the remaining mostly taken up by interest-rate derivatives. (In contrast, OTC currency and interest-rate derivatives turnover in AEs are of roughly the same size.) Singapore and Hong Kong are the main OTC derivatives trading centers in EMs, accounting for over 60% of all OTC derivatives trading activity.

What trades on EM exchanges? Equity derivatives account for well over 50% of all exchange-traded derivatives turnover in EMs, but this average number obscures vast differences across markets. Brazil and South Korea have the most well-developed derivatives exchanges (accounting, indeed, for almost 90% of the total EM exchange turnover). In Brazil, the turnover predominantly consists of interest-rate derivatives, with currency derivatives a distant second, and equity derivatives trailing even further behind.

In South Korea, equity derivatives are a huge component of the exchange-traded market, with a turnover exceeding \$270 billion a day (nearly a fifth of <https://assignbuster.com/derivatives-assignment/>

all emerging market derivatives activity, and globally second only to the CME in equity-derivatives turnover). Other countries with active equity-derivatives markets and exchange turnovers exceeding \$10 billion a day include Brazil, Hong Kong, India, and Singapore. 3 Uses of Derivatives This section touches upon the broad uses of derivatives in managing risk, discussing the uses by instrument.

Section 4 complements the material presented here by discussing the risks in these instruments. Further details on the uses of derivatives may be found in, e. g. , Rangarajan K. Sundaram and Sanjiv R. Das, *Derivatives: Principles & Practice*, McGraw-Hill, 2010. Readers familiar with the common uses of derivatives??? hedging, insurance, speculation, etc. ??? can skip ahead to the next section. 9 Econometric analysis indeed shows that currency derivatives activity in EMs increases almost one-for-one with trade ? ows and more than one-for-one with economic growth. 9

Futures & Forwards A common motivation for entering into a forward or futures contract is to hedge an existing market exposure, that is, to reduce cash ? ow uncertainty from the exposure. Consider, for example, a soybean farmer anticipating a crop of 10 tons in three months' time. The farmer is exposed to ? uctuations in the price of soybean, in particular to the risk of falling soybean prices in three months. By entering into a three-month soybean forward contract as the seller, the farmer can lock-in a price for the anticipated crop, and so insulate revenues received in three months from price ? uctuations.

The buyer in the forward contract in this example may be a hedger with the opposite exposure, for example, an agribusiness using soybean as an input in its production that wishes to lock-in a price at which it purchases the soybean. Alternatively, the buyer may have no prior exposure to soybean prices and may be using the forward contract to speculate, i. e. , to look to profit from an increase in soybean prices relative to the price paid under the contract. Speculation is the other common motivation for entering into forwards or futures, and indeed speculators are an important component of the market, significantly enhancing its liquidity and making it possible for hedgers to find counterparties for their trades. Since forwards and futures involve a relatively small cash flow up-front??? collateral in the case of forwards, margin in the case of futures??? they provide investors with substantial leverage, a feature of particular interest for speculators (but one that, as we discuss in Section 4 also increases the riskiness of these instruments). The futures/forward market is a large and diverse one. Interest-rate forwards (or “ forward rate agreements”), which may be used by investors to lock-in an interest rate for borrowing or lending over a specified period in the future, had a total notional outstanding in December 2011 exceeded \$50 trillion (with another \$20+ trillion in notional outstanding in interest-rate futures). Currency forwards, which may be used to lock-in an exchange rate for future purchase or sale of a foreign currency, had a notional outstanding of over \$30 trillion in December 2011. Commodity forwards, instruments for locking-in prices for future sale or purchase of a commodity, had a notional outstanding in December 2011 of almost \$2 trillion.

Options While a forward contract is an instrument for hedging, an option provides a form of financial insurance. Consider, for example, an investor who is looking to buy gold in three months' time. Suppose the investor buys a call option with a strike of \$1,800/oz and an expiry date in three months. If the price of gold in three months is greater than \$1,800/oz (for example, it is \$1,840/oz), then the investor will exercise the right in the contract and buy the gold for the contract price of \$1,800. However, if the price in 3 months is less than \$1,800/oz (e. g. is \$1,780/oz), the investor can choose to opt out of the contract and, if necessary, buy the gold directly in the market at the cheaper price of \$1,780/oz. Thus, holding the call option provides the investor with protection ("insurance") against an increase in the price above the contract's strike, even while allowing her to take full advantage of price decreases. The writer of the call option who takes the opposite side of the contract is the provider of this insurance. Analogously, a put option on gold provides a potential seller of gold with insurance against a decrease in the price.

For instance, consider an investor who is planning to sell gold in three months, and who buys a put option on gold with a strike of \$1,800/oz expiring in three months. If the price of gold in three months is below \$1,800/oz, the investor can exercise the right in the put and sell the gold for \$1,800/oz, but if the price of gold rises to more than \$1,800/oz, then the investor can elect to let the put lapse and sell the gold at the higher market price. Holding the put insures the investor against a fall in the price below \$1,800/oz. Options offer an alternative to forwards for investors concerned about future price fluctuations. Unlike forwards, there is an up-front cost of

buying an option (viz. , the option premium) but, compensating for this, there is no compulsion to exercise if doing so would result in a loss. That is, there is never exercise-time regret in an option. Options may be combined into portfolios to create richer desired payoff patterns. For example, suppose an investor has a position in a stock and desires protection against a fall in the price of the stock even while profiting from price increases. This may be achieved by adding a put option with strike K to the portfolio. The combined portfolio, called a protective put, has the property that its value can never drop below K ??? the investor can always exercise the put and sell the stock for K ??? but it benefits fully from stock price increases. As a second example, consider an investor who is uncertain regarding the direction of the market but who expects considerable volatility (i. e. , large price moves) in either case.

By combining a call with strike K and maturity T with an otherwise identical put, the investor obtains a portfolio (called a straddle) that is neutral on direction??? the call makes money if prices increase, the put if prices decrease??? but that profits from volatility??? the larger the price move in either direction, the higher the payoff to the investor. An option typically costs a fraction of the value of the underlying and provides the holder with one-for-one exposure to price moves beyond the strike (calls to price increases above the strike, puts to price decreases below the strike).

As a consequence, options are also highly levered instruments. Calls are analogous to levered long positions in the underlying, puts to levered short positions. (Options are, however, more complex than just a simple levered long or short, since the nature and size of the implied leverage varies with <https://assignbuster.com/derivatives-assignment/>

the “moneyness” of the option, i. e. , how far from the strike is the current underlying price.) 11 Swaps Swaps enable transforming exposures to one stream of cash flows into exposure to a different stream. Interest-rate swaps can, for example, be used to transform fixed-rate cash flows into floating-rate cash flows. Currency swaps can be used to transform cash flows in one currency into cash flows in another currency. Equity swaps may be used to transform fixed-income cash flows into equity-lined cash flows (or vice versa). And so on. As an example, consider a corporation that has a floating-rate loan indexed to (say) LIBOR, and wishes to convert this to a fixed-rate exposure. A simple way to do this is to enter into a fixed-for-floating interest rate swap where the corporation pays a fixed rate to the swap counterparty and receives a floating-rate payment indexed to LIBOR in exchange.

The corporation’s net cash flow payment, as shown in the figure below, is now a fixed-rate payment: it pays floating on the borrowing, receives floating from the swap, and pays fixed in the swap. Pay Floa on Loan Pay Fixed on swap Corpora Receive Floa from swap As a second example, consider a corporation that has raised money in (say) Japanese yen but wishes to convert its exposure into US dollars. The company can enter into a USD-JPY currency swap in which it makes USD payments to the swap counterparty and receives JPY payments in return. Combined with the JPY borrowing, this results in a net cash outflow in USD. Payments on JPY borrowing Pay USD in Currency swap Corpora Receive JPY from currency swap A fundamental use of swaps is in financing. Swaps enable companies to raise money in the markets where it is cheapest and then to swap it into the kind of exposure they desire. For example, a large global company may find that there is

greater demand for its debt in Japan than in the US, but it may desire funding in dollars. In this case, the company can raise money in yen, and then use a currency swap to swap the loan into dollars as illustrated above. 2 An example of such a transaction is the \$10 billion 1996 swap between the European Investment Bank (EIB) and the Tennessee Valley Authority (TVA). While both were AAA-rated entities, the EIB was viewed by the markets as a very slightly better credit risk than the TVA. The EIB wanted funding in Deutsche Marks (DEM) and the TVA in US dollars, but the total borrowing costs were 3 basis points (bps) cheaper if each borrowed in the other's currency??? the EIB was able to borrow 7 basis points (bps) cheaper than the TVA in USD, but only 4 bps cheaper in DEM.

So each entity borrowed in the other's currency, and then a currency swap was used to convert the borrowings into the desired currencies. Swaps are versatile instruments with many other uses as well. For example, they provide companies with ? nancial ? exibility. A company that anticipates lower interest rates in the future can borrow ? oating now and swap this into ? xed if and when interest rates do decrease. And, of course, swaps can be used for speculation. An investor who anticipates higher interest rates in the future can enter into a pay-? xed/receive-? oating interest rate swap; if interest rates go up as anticipated, the ? ating cash receipts increase even as the ? xed cash payments stay the same, leading to a positive value for the swap. Credit Derivatives Credit default swaps (CDSs) enable investors to trade in the credit risk of an instrument separate from its other risks. Thus, for example, a bank can enter into a CDS with an investor in which the bank transfers the credit risk in a loan (or portfolio of loans) to the investor in

exchange for making the investor a steady stream of “premium” payments. From the bank’s standpoint, the CDS provides a means for trading in risks that are otherwise highly illiquid.

Effectively, the CDS provides the bank with a means of taking a short position in the credit but without moving the credit from the bank’s books, therefore without losing any voting or servicing rights that may come with it. This frees up bank capital for making further loans. In principle, it also enables better portfolio management, as well as management of internal and regulatory constraints. From the investor’s standpoint, the CDS provides a means of taking exposure to an entire asset class (e. g. , syndicated loans) to which no access would be available otherwise.

Since the investor is typically required to post a collateral that is only a fraction of the face value of the loan/bond, the CDS also provides the investor with substantial leverage in taking this exposure. Few instruments have enjoyed greater success upon their introduction than did credit derivatives in the first half of the 2000s. The market for these products grew from almost nothing in 2000 to a nearly \$60-trillion market by 2007 (Figure 2). The financial crisis has subsequently caused a halving of the market, but it remains a huge and very active one. 13 Figure 2: The Credit Derivative Market: Growth 0, 000 Total 50, 000 Single-??? Name Mul9-??? Name 40, 000 30, 000 20, 000 10, 000 -??? Source: Bank for International Settlements 4

The Potential Risks in Derivatives Usage The danger in derivatives usage comes from the interaction of three factors that form a potentially lethal cocktail if the risks are not properly understood and managed. The first is leverage. Derivatives are highly levered instruments. For example, futures

contracts in practice often have margin requirements of around 10% (or less) of the value of the contract, yet give one-for-one exposure to changes in the futures price, so provide 10% or more of leverage. Leverage creates the potential for large gains but also large losses if the market moves in the wrong direction. The second is volatility, Market volatility compounds the effect of leverage. As volatility in the price of the underlying increases and unexpectedly large price movements occur, the impact of leverage gets exacerbated leading to potentially larger losses on the downside. 14 The third is (il)liquidity. Periods of market turmoil are often accompanied by not only higher volatility but also liquidity drying up selectively.

This makes it harder to exit unprofitable strategies (or even to hedge the derivative with the underlying), increasing the risk of the derivatives position. Almost every major derivatives-related corporate debacle can be traced back to a combination of these factors. Here is a small sampling of some famous cases. All but one??? the exception is Metallgesellschaft??? involved speculative trading, and in all cases, a sharp unexpected market move led to losses that bankrupted the concerned entity. Further detail on the cases may be found in Sundaram and Das (2010, op. cit.). 4. 1 Barings Bank Barings, founded in 1762, was, in 1995, London's oldest merchant bank when a single individual, Nick Leeson, the sole trader in Barings' Singapore office, ran up huge losses that brought down the bank. The details are uncomplicated. Leeson built up massive positions in long futures and short straddles (i. e. , short calls and short puts) on the Nikkei 225. The total notional value of his derivatives positions exceeded \$33 billion, more than 50 times Barings' entire capital of around \$600 million.

When the Nikkei fell sharply following the Kobe earthquake in January 1995, Leeson's long futures and short put positions ran up losses exceeding \$1 billion, shuttering the bank. There are two important lessons from the Barings debacle. The first concerns operational risk. Barings had remarkably poor operational controls for a bank. Leeson was not only the trader in Singapore, he was also his own back office responsible for settling his trades; this was analogous to putting the cashier in charge of reporting daily cash flows. This arrangement enabled Leeson to hide the true nature of his exposures from his head office in London. (Indeed, Leeson's job responsibilities explicitly forbade him from taking on proprietary positions that exposed Barings to market risk, but he did so anyway). The second is the lethal leverage-volatility exposure Leeson created. The in-built leverage in derivatives contracts enabled Leeson to build up his massive exposures while committing relatively little capital. The effects of this leverage brought down the bank when volatility spiked and the Nikkei moved sharply down in January 1995. Absent access to derivatives it is doubtful if Leeson could have done this much harm.

15.2 Metallgesellschaft The Metallgesellschaft case is unique in the annals of derivatives disasters in that it involves not fraud or speculation, but a commonly-used hedging strategy. In the early 1990s, Metallgesellschaft AG was one of Germany's largest industrial conglomerates and had over 20,000 employees. Its American subsidiary Metallgesellschaft Refining and Marketing (MGRM) was set up in the early 1990s with the goal of capturing a share of the refined oil market in the US. MGRM used an aggressive marketing strategy that called for periodic (often monthly) supply of refined oil at fixed prices out several years in the future. The company quickly built up huge supply commitments amounting to more than 150

million barrels. The huge commitments left MGRM exposed to increases in the price of crude oil. To hedge this risk and lock-in a margin, the company took up massive long futures positions in crude oil on the New York Mercantile Exchange (NYMEX), and supplemented this with similar OTC arrangements. But futures contracts are marked-to-market every day, while on the forward commitments Metallgesellschaft would receive money only when it actually delivered the oil.

Unfortunately for MGRM, oil prices fell by over 25% in late 1993. The company faced a huge cash requirement to meet its futures losses and keep its hedge afloat. (To be sure, the forward positions were now worth more, but there was no cash coming in from these.) OTC counterparties, sensing trouble, too demanded increased collateral. Unable to meet the subsidiary's cash requirements, the parent company Metallgesellschaft AG closed down the hedge. The resulting massive losses exceeding \$1 billion put its parent company into bankruptcy, from which it eventually reemerged only in 2000.

The much-shrunken company is today part of the GEA Group. The details of Metallgesellschaft's hedging strategy have attracted much attention, with some commentators suggesting the company may have over-hedged its position. But the general strategy of hedging forward commitments with futures contracts is a commonplace one, and it is not hard to see that a cash crunch stemming from a sharp fall in oil prices was the most obvious and proximate risk that MGRM faced. Yet, when oil market volatility hit, the company was caught unprepared.

4. 3 Amaranth

A hedge fund initially trading mainly in convertibles, Amaranth had offices in Greenwich, Connecticut, as well as in Toronto, Singapore, and London, with an employee head-count in the hundreds. Amaranth got into energy (particularly natural gas) trading in 2002. The energy 16 group was spectacularly successful in 2005, with its directional bets using options paying off handsomely when Hurricane Katrina sent natural gas prices soaring that year. In early 2006, the fund again took a series of bets on the behavior of natural gas prices in 2006-07.

A simplified description of the bets was that that summer 2006 prices would fall relative to winter 2007 (“short summer, long winter”). The bets were implemented using futures contracts. Substantial leverage was involved. At its peak in 2006, Amaranth had \$50 billion in natural gas futures positions against the entire fund’s capital of under \$10 billion. And this in a market (natural gas) that was known to be a highly volatile one. Liquidity was??? or should have been??? another key consideration. Its massive futures positions had made Amaranth a significant fraction of the entire market. In mid-2006, e. g. , Amaranth held 52% of the open interest in Jan-07 futures, and 57% of the open interest in Nov-06 futures. By end-July, Amaranth held 40% of the total open interest in the winter months contracts. Amaranth’s strategy seemed profitable on a marked-to-market basis during the build-up and well into 2006, but this may have been illusory and just a consequence of Amaranth’s own trading. The fund’s huge futures transactions moved prices making its earlier trades in the same contract appear profitable. For example, its purchases of Jan-07 futures pushed that contract’s price higher making earlier purchases of that contract seem profitable.) Indeed, when

Amaranth tried to lock-in profits and exit some trades, it found it could not do so without moving prices significantly against it. In early fall 2006, prices started moving sharply against Amaranth, but the firm found it could not exit its huge positions without further moving prices unfavorably. In three weeks in September, Amaranth lost over 45% of its \$9.7 billion of capital. By the time the fund closed down a short time later, total losses had exceeded \$6 billion.

4 Aracruz Cellulose The first Brazilian company to be listed on the New York Stock Exchange, Aracruz Cellulose was the world's largest manufacturer of bleached eucalyptus pulp. It had 2007 earnings exceeding \$1.4 billion, and a mid-2008 market cap of around \$7 billion. The company derived more than 90% of its revenue in USD from exports, while its costs were entirely in the Brazilian real (BRL), so the company was exposed to changes in the BRL/USD exchange rate. As a routine matter, the company used currency derivatives (mainly forwards and futures) to offset this risk.

Effectively, the company locked-in a rate at which it could sell USD in the future for BRL, thus protecting its revenues in BRL. 17 Until 2008, the size of the company's derivatives positions was roughly equal to its anticipated revenues, so the derivatives were hedging the existing foreign-exchange risk. But in 2008, the company increased massively the size of its derivatives positions??? one study¹⁰ estimated the derivatives positions were nearly 6 times the company's exposure??? so the company was essentially speculating hugely on the USD falling against the BRL.

The instruments it used were correspondingly aggressive, for example, target forwards in which the loss the company would face if the dollar appreciated were twice the benefit it would reap if the dollar depreciated by

<https://assignbuster.com/derivatives-assignment/>

a like amount. From 2003 until mid-2008, the USD had indeed fallen steadily against the BRL, with the exchange rate going from around BRL 3.50/USD in 2003 to BRL 1.60/USD by mid-2008. But in September and October of 2008, this trend sharply reversed course, and the USD gained 25% against the BRL in a little over a month.

In October 2008, Aracruz disclosed losses of over \$2 billion on its derivatives position. Its stock price plunged as a result, eventually falling over 80%. The company was eventually acquired by its smaller competitor Votorantim, and the new merged company was renamed Fibria. 4. 5.5.1 Operating through its financial subsidiary, AIG Financial Products, the US giant American Insurance Group (AIG) sold around \$450 billion of credit default swap (CDS) protection on a variety of reference obligations including super-senior tranches of Collateralized Debt Obligations or CDOs.

The positions were left unhedged. Presumably the idea was that with low individual default probabilities and a well-diversified portfolio, defaults should not bunch together in such quantities as to cause catastrophic losses in the portfolio. In effect, AIG was short a put option on the US macroeconomy, that is, it was taking a bet that there would be no systemic crisis in the US economy causing all markets to fall at the same time.

Unfortunately, such a crisis did hit, and in times of economic crisis, defaults do tend to bunch and default correlations to increase generally, though it was not increased numbers of defaults that caused AIG's collapse. Rather, as the seller of CDS protection, AIG had been required to post collateral to protection buyers. When US real estate prices declined steeply in 2008, AIG

was required under accounting rules to mark down the value of its mortgage-backed securities portfolio. This reduced its capital reserves, in turn leading to a sharp downgrading of AIG by the major ratings agencies.

The down10 Rodrigo Zeidan and Bruno Rodrigues (2010) “ The Failure of Risk Management for Non-Financial Companies in the Context of the Financial Crisis: Lessons from Aracruz Celulose and Hedging with Derivatives,” Nottingham University Business School. The paper contains a detailed description and analysis of Aracruz’s hedging/speculation strategy. 18 grading resulted in counterparties to the CDS contracts demanding substantial extra collateral, over \$100 billion in all. This was money AIG