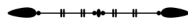


1



Introduction

[T]hese new financial instruments are an increasingly important vehicle for unbundling risks ... [They] enhance the ability to differentiate risk and allocate it to those investors most able and willing to take it ... a process that has undoubtedly improved national productivity growth and standards of living.

Alan Greenspan (1999)¹

I view derivatives as time bombs, both for the parties that deal in them and the economic system ... these instruments will almost certainly multiply in variety and number until some event makes their toxicity clear. Central banks and governments have so far found no effective way to control, or even monitor, the risks posed by these contracts. In my view, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.

Warren Buffett (2002)²

Derivatives in modern economics are like nuclear energy in modern science; a source of immense power, which can also be the cause of enormous destruction. Derivatives (albeit not by that name) have been in existence for a long time, with forward trading in rice in Japan in the seventeenth century, being the first documented example, but their economic significance has increased enormously in recent years.

As of June 2013, according to data from the Bank for International Settlements (BIS), the total notional amount outstanding on derivative contracts was \$762 trillion³, i.e., \$762,000 billion or 7.62×10^{14} (see Table 1.1). This includes ‘Over The Counter’ (OTC) contracts between two counterparties and contracts traded in recognized exchanges (‘Exchange Traded Derivatives’ or ETD). At \$52.5 trillion, the notional amount of derivatives contracts traded in recognized exchanges amounted to just over 8 per cent of the total with OTC contracts making up 92 per cent. However, the BIS data excludes exchange-traded futures and options on *commodities*, and on individual *shares* for which data on a reliable comparable basis was not available. This figure therefore substantially underestimates the total volume of derivatives trading.

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Table 1.1: Notional amounts of derivative contracts outstanding at year-end:
1995 to 2012 (selected years)

Type	Trillions of dollars of notional amounts outstanding							
	1995	2000	2005	2007	2008	2011	2012	2013
ETD	9.3	14.2	57.3	79.1	57.8	58.3	54.1	69.1
OTC:								
Foreign exchange options	–	15.7	31.4	56.2	50.0	63.4	67.4	73.1
Equity and commodity derivatives	–	2.6	11.2	16.9	10.9	9.1	8.8	9.3
Interest rate derivatives ⁴	17.7	64.7	212.0	393.1	432.7	504.1	489.7	561.3
Credit default swaps ⁵	–	0.9	13.9	58.2	41.9	28.6	25.1	24.3
Unallocated	–	12.3	30.8	61.4	62.7	42.6	41.6	24.9
Sub-total: OTC derivatives	17.7	96.1	299.3	585.9	598.1	647.8	632.6	692.9
Total	27.0	110.3	356.5	665.0	655.9	706.1	686.7	762.0

Source: BIS and Authors' calculations

As Figure 1.1 shows, global Gross Domestic Product (GDP, an approximation for national income) at current prices increased from approximately \$10 trillion in 1980 to \$72 trillion in 2012.

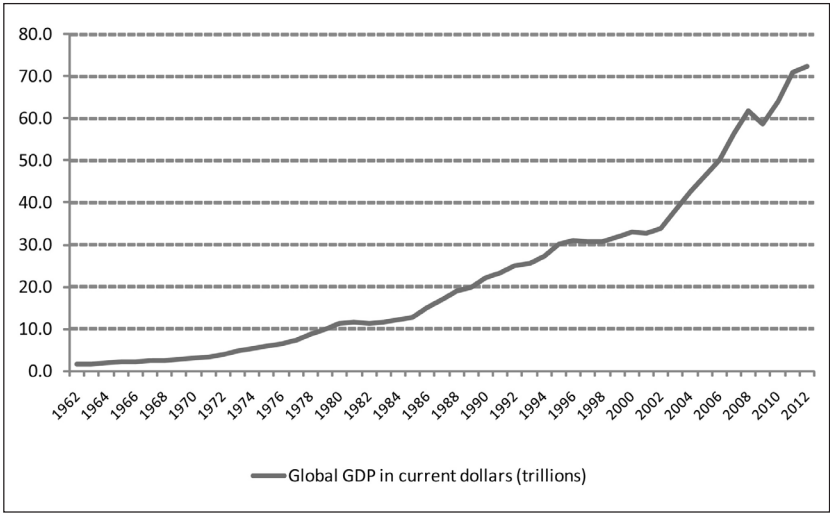


Figure 1.1: Global GDP 1962 to 2012

Source: World Bank Data Tables

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Because the figures are at ‘current’ prices (i.e., the prices prevailing at each point of time) this increase represents a combination of inflation and real growth. In 2012, as Table 1.1 shows, the outstanding notional value of derivatives contracts was \$686.7 trillion.⁶ Hence, the notional amount outstanding in derivative contracts is now over nine times the size of the global GDP. Figure 1.2 shows how this multiple has evolved between 1995 and 2012.

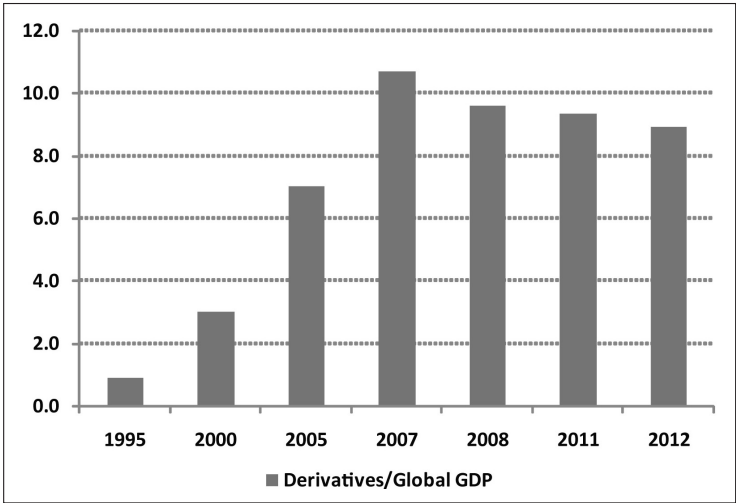
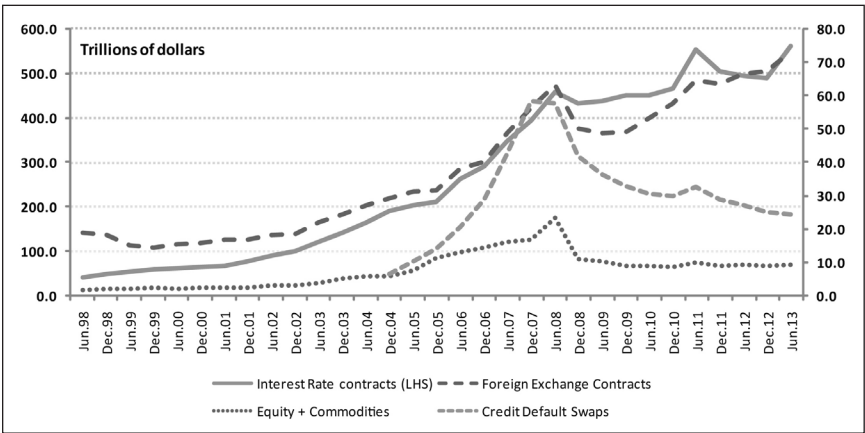


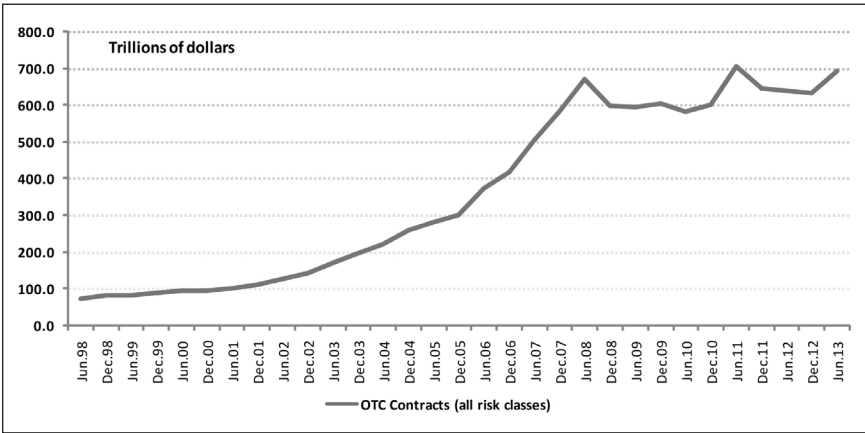
Figure 1.2: Notional value of derivative contracts at year end as a multiple of global GDP
Sources: BIS, ISDA and Angus Maddison Global GDP database

Figures 1.3 and 1.4 depict the changes in the notional value of different classes of OTC derivatives between 1998 and 2013. Foreign exchange and interest rate derivatives have continued to grow even after the financial crisis of 2008, while credit default swaps and equity and commodity OTC derivatives have declined.

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Note: Interest rate contracts are depicted on the left-hand scale and all others on the right-hand scale.



Figures 1.3 and 1.4: Trends in different classes of OTC contracts and total OTC volume (1998–2013)
Source: BIS

However, notional amounts are an exaggeration of the true value of the derivative contracts because many of these transactions cancel out (when the buyers’ position is offset against the sellers’) and, more importantly, because the actual amounts which are paid or received are far less than the notional value. (For instance, a futures contract can be entered into by putting up a small fraction of the notional value, typically 5 to 10 per cent, as margin.) Nevertheless, even

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if one makes the assumption that the market value is just a twentieth of the notional value, the resulting figure is now about half of the global GDP – an enormous sum. In 1995, the corresponding figure was about 4 per cent of global GDP. Derivatives markets have become so large over just two decades that they can no longer be ignored, or treated as a peripheral issue, by policy makers.

Aims and organization of the book

There are two broad streams of writing on derivatives. The first and larger stream (which can loosely be termed the ‘financial’ stream) is concerned with questions of *how the derivatives markets work*, with techniques for making profits or managing risks through derivatives and with methods for making the markets work better. The second and smaller stream (which can loosely be called the ‘economic’ stream) looks at the *contributions of derivatives to overall economic well-being*. Economists have contributed to the financial stream and non-economists have contributed to the economic stream. This book deals with the economic stream.

Within this economic stream, there are highly divergent opinions, as the quotations at the beginning of this chapter (from two of the ‘highest priests’ of finance) show. One school of thought holds that derivatives, by (*inter alia*) enabling the unbundling of risk and allocating it to those best able to bear it, make a major positive contribution to the economy. Another school of thought condemns derivatives as dangerous and unnecessary; some members of this school also opine that they are a source of price de-stabilization and even a cause of inflation.

There are few writings in the economic stream which attempt to take a wide-ranging look at *both* sides of the argument on the economic effects of derivatives and synthesize them. *This book is a modest attempt to do that*. It looks at the beneficial and adverse effects of derivatives trading from the point of view of economic theory and from the perspective of empirical evidence and recent economic history. The book aims to present the different points of view in a non-mathematical and simple, but not simplistic, manner with minimal jargon and then to present the authors’ own synthesis. While primarily based on the discipline of economics, it also draws economic insights from relevant work in other disciplines, particularly sociology and law. It does not present any original empirical evidence but does present some new theoretical ideas.

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The ultimate objective is to provide the reader a *basic conceptual framework from which to form his or her own informed judgment on whether, when and how derivatives are beneficial or harmful to the economy.*

The book does not contain a description of what the main derivative securities are, or how they work. It assumes that the reader has some elementary knowledge about how the simple derivatives (futures, options and swaps) are traded, but does not assume or require any detailed understanding of the workings of these markets.⁷

After this introductory chapter, Chapter 2 presents a definition and a typology of derivatives, which introduces readers to the different kinds of derivatives. Different derivatives have varying features and modes of classification and an understanding of the typology is useful especially from a regulatory perspective.

Chapter 3 discusses the extent to which derivatives markets perform socially useful economic functions. Chapter 4 continues this discussion with specific reference to the issue of ‘market completion’, which some economists regard as an important function of derivative markets.

Chapter 5 sets out the theoretical arguments and empirical evidence indicating that futures and other derivatives markets tend to have a price *stabilizing* effect on spot (cash) markets. Chapter 6 examines the arguments and evidence for the opposite view that derivatives have a *destabilizing* effect. Chapter 7 provides the authors’ synthesis and reconciliation between these contradictory strands of thinking.

Chapter 8 presents a brief historical perspective of the factors leading to the extraordinary increase in the volume of derivatives trading in recent decades and Chapter 9 examines the contribution of derivatives to the global financial crisis of 2008.

Chapter 10 outlines the issue of models and how they affect derivatives markets.

Chapters 11 and 12 examine (in two parts) the role of derivatives with reference to emerging markets in particular and developing countries in general. They deal not only with derivatives markets *in* emerging economies, but also with the use of derivative markets *by* emerging market entities, and the effects *on* emerging economies of derivatives which have emerging market risks as the ‘underlying’. They present case studies from Brazil, Chile, China, India, Mexico, Uruguay and Kazakhstan.

Chapter 13 deals with financial regulation in general, with particular reference

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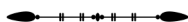
to derivatives. It looks at the economic arguments for and against regulation and de-regulation.

Chapter 14 assesses the role of derivatives, and finance more generally, in economic development.

Chapter 15 presents the authors' recommendations towards a pragmatic and practical approach for public policy makers.

Notes and References

- ¹ Speech on *Financial derivatives* before the Futures Industry Association, Boca Raton, Florida, 19 March 1999. Available at: <http://www.federalreserve.gov/boarddocs/speeches/1999/19990319.htm>. Accessed on 11 July 2014.
- ² Edited excerpts from the *Berkshire Hathaway Annual Report for 2002*. Available at: <http://www.fintools.com/docs/Warren%20Buffet%20on%20Derivatives.pdf>. Accessed on 11 July 2014.
- ³ Throughout this book, the \$ symbol, unless otherwise indicated, denotes US dollars.
- ⁴ 1995 figure includes foreign exchange derivatives.
- ⁵ 2000 figure is an estimate based on 2001 data.
- ⁶ Excluding exchange traded futures and options on commodities and individual shares – this figure is, therefore, an underestimate of the total volume of derivatives trading.
- ⁷ Readers interested in understanding the derivatives markets can turn to many titles available in the markets including *Derivatives (2nd Edition)*, T. V. Somanathan, V. Anantha Nageswaran and Harsh Gupta, McGraw Hill Education, New Delhi, forthcoming.



Definition and Typology

In chemistry, a derivative is defined ... as a 'substance related structurally to another substance and theoretically derivable from it' or 'a substance that can be made from another substance'. Derivatives in finance work on the same principle.

Rene M. Stulz¹

For all its current importance in finance, the term 'derivative' is of recent origin. Just a generation ago, readers may have assumed that the term related to mathematics (as in 'second derivative of a function') or chemistry (as in 'derivatives of carbon'). The acclaimed book *Inside the Financial Futures Markets* by Mark J. Powers and D. Vogel, published in 1984² and dealing exclusively with (what are now called) derivatives, did not use the word even once. This chapter looks at what derivatives are, how they may be classified and finally, what they are not.

Definition of derivative

A conventional and commonly used definition is as follows:

A derivative security is a contract designed in such a way that its price is *derived* from the price of an underlying asset.

Thus, a gold futures contract derives its price from the price of gold, which is the 'underlying' asset; an option on crude oil derives its price from the price of crude oil; a currency swap derives its value from the exchange rate of the currencies involved.

The first, and minor, problem with this definition is that the 'underlying' may not be an asset in the conventional sense: the underlying may be a liability (such as a bond) or an index (like the Standard & Poors or S&P 500 share index). However, this is a semantic issue. Mathematically, a liability is a negative asset. An index is the average value of a set of assets or liabilities. Whether something is an asset or liability also depends on whose perspective is involved.

The second and bigger problem is that certain instruments now widely

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considered as ‘derivatives’ are based on the occurrence of events (such as a debt default), which do not themselves have a ‘price’ in the common sense meaning of the term.

A more comprehensive version of this definition would run as follows:

A derivative security is a contract designed in such a way that its price is *derived* from the value of an underlying asset, liability, index or event. [‘Derivative security’ and ‘underlying asset, liability, index or event’ are usually shortened to simply ‘derivative’ and ‘underlying’ respectively.]

The main improvement here is the addition of the word ‘event’. This definition is not perfect, as will be discussed later in this chapter, but it forms a good starting point to understand the different kinds of derivatives.

The price of the derivative is linked to the value of the underlying in a predictable way. Because of this, transactions in derivatives can be used:

- as a *substitute* for a transaction in the underlying asset – an investor who seeks to speculate on share prices may, instead of buying a basket of shares, buy a stock index futures contract;
- to *offset the risk* of price or value changes in the underlying – a person who holds a commodity and wants to protect against the risk of that commodity falling in value may buy a call option on that commodity.

Typology

Derivatives can be classified on the basis of:

- type of contract;
- nature of underlying;
- manner of trading;
- possibility of delivery; and
- nature of price relationship.

These modes of classification are not mutually exclusive.

Type of contract

Derivatives can be divided into the following types:

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- Forwards: A forward contract is one where a buyer and seller agree *on a price now for the delivery of an asset at a predetermined future date*. The price remains constant regardless of fluctuations in the interim or the market price on that future date.
- Futures (a subset of forwards): A futures contract is a forward contract *traded on an organized exchange* rather than on a bilateral basis. Futures contracts are entered into and executed through a clearing house, which becomes the intermediary between the buyer and seller and guarantees performance of the contract by both parties.
- Options: Options are one-sided contracts where one party acquires the right, *but without the obligation*, to buy or sell the underlying asset at a predetermined price on a predetermined date; a premium is paid for acquiring this right. It is entirely the discretion of the option buyer whether or not to actually buy or sell on the predetermined date. A one-sided right to buy is called a call option, while a one-sided right to sell is called a put option.
- Swaps: Swaps are (in essence) transactions where two parties *exchange one stream of cash flows for another*. One party, which has an asset that earns a fixed rate of interest, may exchange this income stream with another party, which has an asset earning a floating rate of interest. Or, a party with an income stream in rupees may exchange this with another party having an income stream in dollars.
- Other derivatives, which may be called complex or exotic derivatives. These may:
 - (a) be a mix of the above types (for example a ‘swaption’, which is an option to enter into a swap);
 - (b) involve underlyings that are not simple or ‘real’ assets or liabilities but are indices or events – for example, the underlying on a weather forward contract may be the rainfall level at a particular place and the underlying on a credit default swap may be the event of a default by a particular borrower.

Nature of underlying (risk class)

Derivatives can be classified based on the nature of the underlying into: