Today financial price risk not only can affect quarterly profits, but it can determine a firm's very survival. Unpredictable movements in exchange rates, interest rates, and commodity prices present risks that cannot be ignored. It is no longer enough to be the firm with the most advanced production technology, the cheapest labor supply, or the best marketing team. Price volatility can put even well-run firms out of business.

Changes in exchange rates can create stiff competition where none previously existed. Similarly, commodity price fluctuations result in changes in input prices that can make substitute products — products made from different inputs — more affordable to end-consumers. Changes in interest rates have an impact on a firm's costs; for firms whose sales are inversely related to interest rates, rising rates can lead directly to financial distress as borrowing costs skyrocket while sales dry up.

Not surprisingly, the financial markets have responded to this increased price volatility. The past decade and a half have witnessed the evolution of a range of financial instruments and strategies that can be used to manage the growing exposure to financial price risk.

Financial instruments now exist to permit the direct transfer of financial price risk to some third party more willing to accept that risk. For example, through foreign exchange futures contracts, a U.S. exporter can transfer its foreign exchange risk to a firm in the opposite risk position or to a firm in the business of managing foreign exchange risk, leaving the U.S. exporter free to focus on its core business.

Moreover, the financial markets have evolved to the point that the financial instruments can be combined with debt issuance to separate financial price risk from the other risks inherent in the underlying capital-raising activity. For example, by combining bond issues with swaps, the issuing firm is able to decouple interest rate risk from traditional credit risk.
The World Became a More Risky Place

Underlying the demand for risk management products and financial engineering is the simple fact that financial prices have become more volatile. At the outset it is useful to ask why this instability exists. For an answer, we must trace the beginnings of and changes in the long-term increase in general price volatility, and then we must seek insight into its causes. To understand why the world is different, we have to look back to discover how the environment has changed. This requires taking a long look back, not just peering over our shoulders to the last market crash or election.

Figure 1.1 provides some dramatic evidence of the change. This figure presents what must be regarded as a long price series: the price index for England from 1666 to the mid-1980s.

What is striking is that, from the seventeenth century until the late twentieth century, the price level in England was essentially stable. Prices did go up during wartime—the data series reflects conflicts such as the one the British had with the French person in the early nineteenth century—but fell back to pre-war levels once the conflict ended. However, the price history for the last half of the twentieth century indicates that the financial environment changed: for the first time, prices went up and stayed up. And this is not only an English phenomenon; a similar pattern for price levels in the United States (albeit, as our British colleagues point out, one with fewer data points) is illustrated in Figure 1.2.

Figure 1.1. Price Index for England (1850 = 100).
Alternatively, we can study recent financial history by looking at inflation rates rather than price levels. As presented in Figure 1-3, the increase in prices over the last three decades is not quite as steady as is sometimes believed. Indeed, inflation was modest before the mid-1960s. Something happened during the 1960s that changed the rate of inflation. In 1965 prices started going up, a direction that continued through the 1970s. In addition to the unprecedented volatility, it is important to remember that the price changes were unexpected. Neither government officials nor financial pundits predicted the full scale of the inflationary explosion that characterized the 1970s.

It was not only inflation rates that became more volatile; similar increases in foreign exchange rates, interest rates, and commodity prices soon followed. It is important to understand that changes in these economic variables are interrelated. We must be prepared for changes in one market to affect the others.

There have been many suggestions as to the cause of the inflationary environment of the 1970s, for example, many have pointed to the OPEC oil price shocks. However, a more compelling answer is that inflation was a result of national and international monetary policy actions, the most important of which was the breakdown of the international fixed-exchange-rate system known as the Bretton Woods agreement. This system fixed the prices of the world’s currencies in terms of the U.S. dollar and in terms of gold. Hence, the underpinning of the fixed-

![Figure 1.2. U.S. Price Index, 1800–1985 (1967 = 100).](image-url)
exchange-rate system—and of the stability it lent both to individual nations' domestic economies and to the global financial environment—was the fixed relation of the U.S. dollar to gold. The timing of the fluctuations in inflation presented in Figure 1.3 corresponds to the changing relation between the U.S. dollar and gold. The immediate cause of the breakdown of the system was the inability to maintain the fixed relation of the dollar to gold in the face of a worldwide glut of dollars. The first change to Breton Woods came in the mid-1960s (when the relationship was changed between paper dollars and the stock of gold in the United States); subsequent changes to the rules of the system were made in 1968 (one gold price was established for the market and another for governments) and in 1971 (the convertibility of the dollar to gold was suspended), with the final dissolution of fixed exchange rates occurring in 1973.

The price rules of Breton Woods, which once dictated monetary policy for the world’s major countries, were eliminated, leaving governments free to pursue divergent monetary policies. Before, governments had to adjust their inflation rates, interest rates, or other economic variables to maintain their currency’s gold/dollar price. Following the breakdown of Breton Woods, if it chose to do so, a government could
manipulate these economic variables to support its fiscal policies and let the exchange rate fluctuate to "take up the slack."

As uncertainty increased, prices in the United States went up and up, even as policymakers unveiled one anti-inflation plan after another. Then, just when everyone was sure that inflation was here to stay—and was consequently adjusting business and financial plans to allow for it—the recession arrived. High inflation disappeared, but uncertainty did not. The most important point about the experience with inflation is that the inflation was not anticipated, nor was the subsequent disinflation. The only certainty about inflation is that we must be more humble in forecasting its future path.

1. For a discussion of fixed exchange rates, monetary policy rules, and the gold standard, see D. Sykes Wilford and Ronald A. Kretzer, "Discretionary Monetary Policy and the Gold Standard," in The Monetary Approach to International Adjustment, ed. by站立Ford H. Painn and D. Sykes Wilford (New York: Praeger, 1989), pp. 258-306, (the point noted by most authors is that it is not clear that a new "Bretton Woods" system could be created, given the present financial structures, without a new gold standard and enforceable rules. Moreover, it is very unlikely that sufficient agreement could be obtained among the Group of Seven about which central bank would determine world policy. Each year the heads of state and financial policymakers of the seven largest Western economies (the United States, France, Japan, Germany, Britain, Italy, and Canada) meet to discuss policy. For six of these nations to agree to defer to the seventh, which would then be the only ruler of monetary policy, appears most unlikely. Only a major international crisis like World War II or the Great Depression could force such an agreement.

2. Anti-inflationary programs were the norm during the 1970s in the United States. Unfortunately, none of them worked. Unfairly, wage and price controls were tried. President Ford had a policy of "whip inflation now"—and even produced WIN buttons. Carter’s administration, which would watch over the worst of the inflationary period, expressed on how it was committed to anti-inflationary policy.

The financial environment had thus changed: in contrast to the stable price levels of the past, developed economies began to experience unexpected price changes (increases); the financial markets were confronted with increased price uncertainty. The increased uncertainty about inflation was soon followed by uncertainty about foreign exchange rates, interest rates, and commodity prices.

**Foreign Exchange Rates Became More Risky**

Figure 1-4 provides data for the monthly percentage change in the U.S. Dollar/Japanese yen exchange rate, 1950–1988. This figure provides a very clear indication that the foreign exchange market has become more risky. The reason for the increased volatility in foreign exchange rates during the early 1970s is evident: the breakdown of the Bretton Woods system of fixed exchange rates.

Under the system of Bretton Woods, importers knew what they would pay for goods in their domestic currency, and exporters knew how much they would receive in their local currency. If the importer could sell at
a profit to the consumer and the exporter's costs were below the export price, then gains from trade were had by all.

With the breakdown of Bretton Woods, the rules changed. Both sides to the transaction now faced exchange rate risk. Each party wanted to transact using home currency to avoid being "whipsawed" by the market. The importer's profit margin could, and often did, evaporate if the domestic currency weakened sharply, and the imported goods were priced in the exporter's currency.

Exchange rate volatility also affects domestic producers. Exchange rate risk occurs whenever the value of future cash flows is liable to change because of foreign exchange rate movements. With more volatile exchange rates, all market participants face greater risk.

In addition, the volatility of exchange rates affects the real return on domestic versus foreign financial assets. Adverse exchange rate movements may overshadow the interest payments or other income stream received on a foreign currency-denominated asset. Consequently, exchange rate volatility influences the currency distributions of global portfolios, as both borrowers and lenders try to diversify their foreign exchange risk by holding assets or liabilities in different currencies.

**Interest Rates Became More Risky**

Surprisingly, the increased volatility evident in the foreign exchange market did not initially spill over into the U.S. domestic money market. Indeed, vis-a-vis the late 1960s and early 1970s, interest rates actually stabilized in 1977 through 1979. As is shown in Figure 1-5, even though inflation rates went up and interest rates followed, interest rate volatility actually declined under then chairman of the Federal Reserve Board Bill Miller. (Some have argued he paid for stable domestic interest rates with higher inflation and a weaker dollar.)

Uncertainty finally hit U.S. interest rates on October 6, 1979, when the newly appointed chairman of the Federal Reserve Board, Paul Volcker, initiated money supply targeting and abandoned interest rate targeting. Interest rates became extremely volatile: 90-day treasury bill interest rate volatility in the two years following October 1979 was five times greater than that of the prior two years. In the bond market, the

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4. For exposition, Figure 1-5 is based on the monthly first difference in the rate rather than the percentage change or some other measure more closely related to volatility.
ratio was even higher. Unpredictability in bond prices, borrowing costs, and real returns became the norm.

The increase in interest rate risk had several major effects. First, financial institutions and their depositors became less willing to make long-term rate commitments. In the 1980s, savings banks in the United States were stuck with long-term, low-rate loans to homeowners that had to be financed with high-rate and volatile short-term funds. The savings banks experienced disintermediation as depositors put their funds into money markets through various new instruments. In response to interest rate volatility, passive attitudes toward investment disappeared, and investors moved to adjust to the new environment. Old rules were replaced with those geared for uncertainty. And as interest rate volatility appeared in conjunction with exchange rate volatility, it became more difficult for market participants with a multicurrency portfolio to assess the expected real return or cost of transactions.

Commodity Prices Became More Risky

Volatility also increased in the commodity markets. In this context, the first commodity that comes to mind is oil. As part (a) of Figure 1-6 indicates, the price of petroleum products did become more volatile in the 1970s, but the same kind of behavior shows up for most basic
Figure 1-6. Commodity Price Volatility. (a) Percent Change in Wholesale Petroleum Products Price Index. (b) Percent Change in Wholesale Metals Price Index.
commodities. Part (b) of Figure 1-6 presents data on monthly volatility for metals.

Figure 1-7 provides another way of looking at commodity prices by providing data on the relative prices of commodities. As this figure indicates, much of the increase in basic commodity prices in the 1970s was driven by inflation. The declining purchasing power of dollars increased the demand for commodities as assets, with the result that the prices of real goods were bid up relative to financial assets.

In the 1970s commodity-exporting countries experienced a windfall: wealth was being transferred from the industrialized West to commodity producers, especially producers of oil in the Middle East. Consequently, a commodity-exporting country could become wealthy by recycling "petrodollars"—borrowing dollars and repaying the loan with dollars that had depreciated relative to the country’s export prices. This simple scheme worked as long as the relative prices of commodities were kept high by unanticipated inflation.

However, when real interest rates rose sharply after the October 1979 shift in U.S. monetary policy, the opportunity cost of holding inventories of commodities also rose; consequently, the real value of commodities

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**Figure 1-7. Relative Prices of Commodities (Commodity Prices/Producer Price Index)**.
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felt. Wealth was once again shifted, this time from the commodity producers to those holding floating-rate loans against those commodity assets. As Figure 1-7 indicates, the relative prices of commodities have fallen dramatically from the peaks reached in 1974 and 1979.

The Financial Markets Responded

For the financial community, the last decade and a half were particularly important because of the impact of the increased volatility on the financial market and the demand for new financial instruments. The price environment is the key factor determining the success of a particular kind of financial instrument in the marketplace. Financial innovation is not the norm during periods of stable prices.

For example, in the late 1960s the most desirable financial instrument was the consol (a bond with a fixed interest rate but no maturity date; it lasted forever). Investors were quite happy to hold British government bonds with no maturity. Why? The bond paid a steady real rate of interest, British sovereign credit was good, and expected inflation was nil. Confidence in price level stability led to a stable interest rate environment and therefore to long-lived bonds.

Stability didn’t end with the nineteenth century. In the 1950s, price stability meant that banks were willing to lend on a fixed-rate basis. Until the 1970s, thirty-year fixed-rate mortgages (mortgages that were assumable with no prepayment penalty) were the norm. Floaters, CAPS, CMOs, etc.—the jargon of the mortgage business of the 1980s—were simply not needed. Indeed, because of the price history of Switzerland, long-term, fixed-rate mortgages are still the norm there.

Uncertainty in the global financial environment has caused many economic problems and disruptions, but it has also provided the impetus for financial innovation. Through financial innovation, the financial intermediaries were soon able to offer their customers products to manage or even exploit the new risk. Through this same innovation, financial institutions became better able to evaluate and manage their own asset and liability position.

The marketplace recognized early that the uncertainty about foreign exchange rates, interest rates, and commodity prices could not be eliminated by “better forecasting.” This recognition induced firms to begin

5. In some cases participants learned the futility of trying to forecast prices in efficient markets only through the expensive lessons provided by Benjamin Franklin’s “hard school.”
actively managing financial risk. The financial institutions—exchanges, commercial banks, and investment banks—have provided a range of new products to accomplish this risk management:

- In response to the increased foreign exchange rate risk, the market provided forward contracts on foreign exchange, foreign exchange futures (in 1972), currency swaps (in 1981), and options on foreign exchange (in 1982).
- For managing interest rate risk, futures contracts were the first to appear (in 1975), followed by interest rate swaps (in 1982), interest rate options (in 1982), and finally, interest rate forwards—called "forward rate agreements" (in 1983).
- In addition to the existing forward contracts for metals and long-term contracts for petroleum, the onset of increased price volatility in the late 1970s led to the appearance of futures contracts for commodities (for oil in 1978 and for metals in 1983). These were followed by commodity swaps (in 1986) and commodity options (in 1986).

The products themselves are not new at all: forward contracts first appeared at medieval trade fairs in the twelfth century, futures contracts first appeared in Japan (on rice) in the 1600s, and even options appeared in Amsterdam as early as the seventeenth century. However, in practice these markets are new; without price risk no one cared (the opportunity cost was too high) to use these "derivative products." It was not until prices became volatile that anyone felt the need to create modern versions of these contracting techniques.

**Some Cases of Financial Price Risk**

Financial price risk can be permanent or temporary; recognition of the difference is essential for choosing the proper risk management instrument. Temporary price exposures usually result from a particular

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7. Ibid.
transaction; for example, a corporation importing goods from Germany into the United States with the price denominated in deutsche marks has a temporary foreign exchange exposure. Foreign exchange forward markets have handled such problems for some time now. However, focusing only on the management of these familiar temporary exposures can obscure critical permanent economic exposures.

Permanent price exposures result from factors such as the location of manufacturing plants, the denomination of wages in one currency versus another, or regulations in a competitor’s home country. For example, American factory workers want to be paid in U.S. dollars, whether the goods are going to be sold in dollars or in Japanese yen. Or it may be that the manufacturer’s major competitor for U.S. sales is a Japanese corporation, whose prices in the United States are determined by movements in the yen/dollar rate. Thus, the firm faces a permanent price exposure to the yen/dollar exchange rate because its plant is located in the United States, and its competitor’s plant is in Japan. This example is typical of the permanent price exposures that accompany exchange rate volatility. With the variance in exchange rates doubling over the past ten years, exchange rate risk has arrived on the American doorstep.

Permanent price exposure can also result from dramatic movements in a company’s input/output prices: the more easily an asset (as a unit of output) can be replaced by other assets, the more volatile is its price in an unstable financial environment. Consider a gold mine. The value of the mine depends on the price of its output—gold. However, the prices of its inputs are not in gold. If labor is paid in dollars and the firm is leveraged with capital financed by floating-rate dollar debt, then the firm is extremely vulnerable to changes in the price of gold and in dollar interest rates. Unfortunately, gold prices may fall when interest rates rise, making the firm’s overall risk even greater.  

9. Gold prices tend to be inversely related to real interest rates. If today’s real interest rate equals today’s nominal rate minus expected inflation, and if gold is a “sterile” asset, a rise in the real interest rate implies an increased real opportunity cost for holding gold. As real rates go up over time, investors tend to decrease the stock of gold by either decreasing the quantities they hold or bidding price down. Since gold is non perishable and the stock adjusts slowly and predictably, the greatest adjustment may be expected to take place in the price. See D. Sykes Wilford and Ronald A. Krieger, “Discretionary Monetary Policy and the Gold Standard,” in The Monetary Approach to International Adjustment, ed. by BISinford N. Patnaik and D. Sykes Wilford (New York: Praeger, 1986), pp. 298–306.
The price of a commodity input can also introduce permanent price risk. A case in point is the aluminum industry. In addition to concerns such as exchange rates, bauxite prices, and smelting technology, the costs of producing aluminum also depend on the relative cost of energy. It is an energy-intensive business, so one would expect high energy prices to be a negative factor for profitability. This is not necessarily the case. Some smelters were set up as vehicles to "export energy." Companies set up operations in energy-rich areas to export the energy via the aluminum exports. (OPEC nations, for example, can utilize this as a way to manoeuvre around quotas.) Aluminum smelting can thus be a way of exporting excess, nontransportable geothermal energy. As a result, many aluminum firms have found their value to be positively rather than negatively related to energy prices: as energy prices rose, the value of the aluminum smelter in an energy-rich location rose. Since the global industry's production takes place in both energy-rich and energy-poor countries, rising oil prices require energy-poor countries to pass along the increased energy costs to the aluminum company. This action changes the relative price of the aluminum supplied, energy-rich producers find themselves with a higher market share and higher prices. Of course, when energy prices fell in the mid-to-late 1980s the reverse became true. Because of price risk, today's best investment can become tomorrow's "dog" if not managed.

A final example shows how easily financial risk can sneak up on the unsuspecting.

**Example**

The U.S. S&Ls and interest rate risk

In the late 1970s the U.S. Savings and Loans (S&Ls) seemed to be money machines. Today S&Ls are anything but that.

The reason for this switch from money machines to money pits is found in the asset-liability structure of a typical S&L. Liabilities were short-term deposits that were repriced daily, monthly, or at most semiannually; assets were long-term mortgages. Given the difference that existed between the yield on the FSLIC-insured deposit on the liability side and that on a long-term mortgage on the asset side, S&L managers were paid handsomely. Figure 1-8 provides a stylized example.
This core business, however, created an incredible interest rate exposure. As interest rates became highly variable in the early 1980s, short-term interest rates rose above long-term rates, presenting an inverted yield curve, something rarely seen during the 1960s. When the yield curve began to move significantly, these money machines turned into money pits, as shown in the stylized example in Figure 1-9. Although the core business risk was credit risk, changes in income resulted from interest rate risk.

Unfortunately, the interest rate risk left such firms bankrupt; jobs were lost, and investments became worthless. In 1977, when most of the mortgage portfolio still in place in 1981-82 was put on the books, who could have known that the overnight cost of funding would be more than 20% by the early 1980s? Or who would have guessed that the safe, below-market FSLIC-insured deposit

10. The interest rate exposure was additional to the credit risk the S&L accepted by making the mortgage loans, a risk that was not completely evident until the 1980s, when mortgage default led to a crisis in the S&L industry.
of the 1970s would be disintermediated by the creation of the money market mutual fund in the 1980s. Those years of S&Ls being "money machines" playing the funding gap (during a period of stable interest rates) came back to haunt them. From October 6, 1979, the day U.S. interest rate policy changed, interest rates would become highly volatile, turning old "safe" practices into new "dangerous" ones overnight.

Although the preceding examples of interest rate risk, foreign exchange risk, and commodity price risk have been general, real-world examples of these risks are all around us, both "living" and "no log"
living examples abound. In the savings and loan industry, the list of FSLIC bailouts, takeovers, forced mergers, and liquidations seems endless.

On the commodity side, many of the debt crisis difficulties of Peru, Chile, Argentina, and Venezuela are the result of simultaneous falling commodity prices and high interest rates. Consequently, stockholders of large U.S. banks have had to learn about these risks the hard way, through lower earnings. And consider the case of Kennicott Copper, once regarded as the most technically advanced copper producer in the world. Today Kennicott does not exist as an independent entity; fluctuations in the price of copper put Kennicott in financial distress.

During the mid-to-late 1980s, the reverse was true for countries such as Portugal. Falling commodity prices combined with lower dollar borrowing costs and higher export revenues (they export primarily to the EEC) to create new wealth for Portugal.11

On the foreign exchange side, examples can be taken daily from the newspaper. Examples of wealth shifts away from the "rust belt" to the service and high-tech industries in the United States in conjunction with the rise in the dollar in the mid-1980s are common; but examples of reversals due to the falling dollar in 1986 and 1987 are just as common. The list of firms hit by exchange rate risk in the early 1980s is long: Caterpillar, Ford, General Motors, U.S. Steel, Kodak, etc. The other side of the coin is witnessed in the 1987 earnings of International Paper, General Electric, the U.S. Chemical Industry, and the revival of Caterpillar and Kodak.

11. Considering that Portugal had difficulty raising new funds in the syndicated loan market during the early 1980's, the February 10, 1988 Eurocurrency issue at a borrowing cost similar to Italy's demonstrates that you can get lucky with financial risk (just as you can get lucky at a casino).