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# WORLD SILVER SURVEY

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1950-1990



THE SILVER INSTITUTE

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1950 - 1990

THE SILVER INSTITUTE

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## Preface

The Silver Institute, a worldwide association of 57 member companies, including miners, refiners, fabricators, and manufacturers, is pleased to introduce the **World Silver Survey**. This report, and the annual reports that are planned for the future, are intended to provide all participants in the silver market with reliable, dependable information concerning the supply of and demand for silver.

The Silver Institute has undertaken this task to fill a void in the availability of reliable information. The need for such a report was reinforced when the U.S. Bureau of Mines suspended in 1987 publishing data concerning U.S. silver demand.

Since this report is the first in what is hoped will be a long series of reports, it reviews the course of the silver market over the past 40 years, providing a solid basis for understanding present silver market conditions. The report is divided into several sections.

- a. A summary.
- b. A review of silver's history since 1950.
- c. Detailed information on current market conditions.
- d. A discussion of some of the trends that may affect silver supply, demand, and price in the coming decade.
- e. A statistical appendix.

Following this initial review, the Silver Institute plans to issue annual updates on the silver market, during the first half of each year.

Commodity market analyses traditionally review supply and demand in the market economy nations, excluding all but net trade with the centrally planned economies, dominated by Communist governments, in Eastern Europe, Asia, and Cuba. This is because data on the use and production of metals in these countries is extremely hard to come by, and because the governments of these nations have insulated themselves from international markets. Conditions are changing in many of these countries. As they progress, it is hoped that future editions of the **World Silver Survey** will be able to integrate data from these nations with that of the rest of the world. In the interim, these countries still must be treated separately. Unless specifically noted, data in this report refers to statistics for all market economies. Centrally planned economies have been reviewed separately in this survey, with a special chapter. The term "centrally planned economies" has been replaced with the rubric "transitional economies."

In preparing the **World Silver Survey**, the Silver Institute has retained CPM Group, precious metals research analysts and consultants, to assist in this undertaking. Statistics and information have been collected from numerous sources around the world, in order to make the statistical portrait of the silver market presented here as accurate and complete as possible. Information on the use of silver in photography and the composition of this large segment of the market was provided by Peter Krause of Imaging Technologies/Markets Inc.

Two final points concerning the methodology of this review need to be made. The demand statistics here measure silver use in fabrication, not the ultimate sale of silver-bearing products. For example, if silver is used in the manufacture of an electronic switch in Germany, but the switch itself is used in the manufacture of a machine in France that ultimately is purchased by an American consumer, the use of silver would appear in this report as German demand. Second, the prices used in this report, for example in the various price charts in the historical review, are Handy & Harman quotes.

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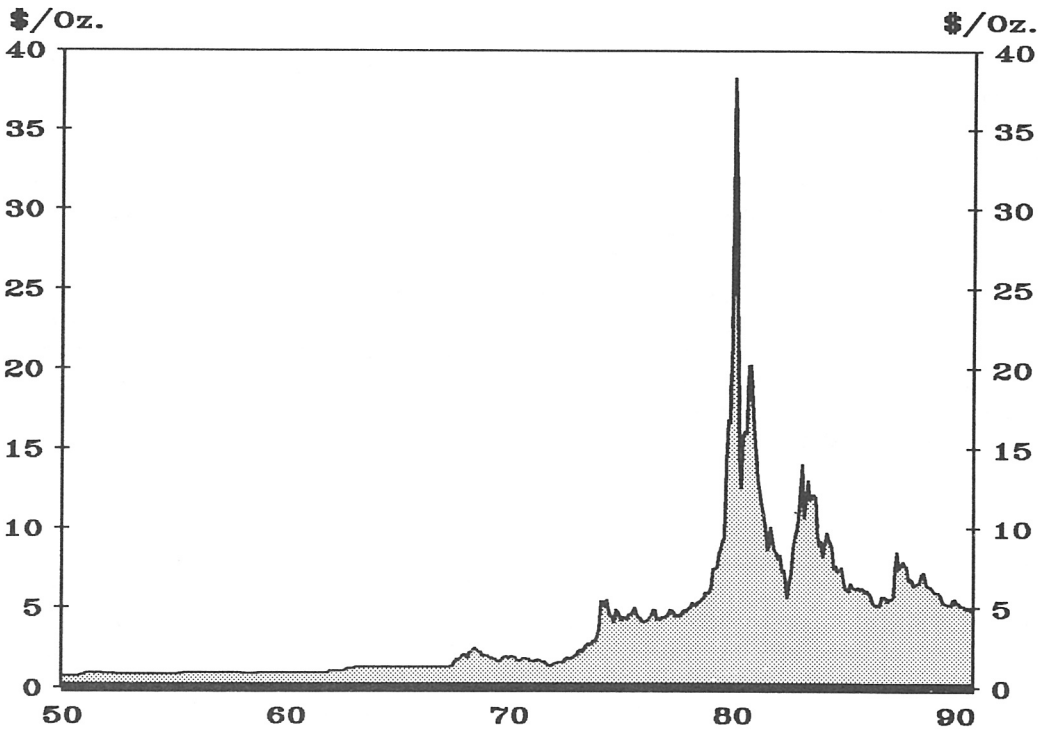


### Summary

1. Fabrication demand for silver totaled 495.5 million ounces in 1989. After rising 6.4% per annum over the past four years, it is estimated at 505.0 million ounces in 1990, a 1.9% increase from 1989.
2. Total new supply was 515.3 million ounces in 1989, and is expected to fall slightly to 514.0 million ounces in 1990. In the past five years total supply has expanded at a 1.4% annual rate. Mine production provides more than 70% of total supply, at 362.6 million ounces in 1989 and 374.0 million ounces in 1990. Secondary and other supply, including silver scrap recycling, totaled 152.7 million ounces in 1989, and is estimated at 140.0 million ounces in 1990.
3. Total supply is likely to rise around 2.0% per annum over the coming decade, while fabrication demand is expected to rise at a 3.3% annual pace.
4. The price of silver as of late September 1990 is below \$5.00 per ounce. More important, the annual average silver price this year may be around or below this level. At these levels the market is at risk of losing supplies from mines at which silver is the primary product and some secondary refiners, which together account for more than half of total supply. Also, silver has become extremely low priced for fabricators to use, a fact that has similarly important connotations for the market.
5. Since 1987 the amount of new supply available for investment (that is, the surplus of total new supply over silver use by fabricators) has steadily declined, to around 9.0 million ounces in 1990.

### Silver Prices

#### Monthly, January 1950 through September 1990



## **Supply**

6. Silver mine production accounts for more than 70% of total supply at present, and has been growing at a rate of 2.4% per annum since the mid-1980s. Primary silver mines produced at least 166 million ounces, or a minimum of 46% of total mine supply, in 1989. Silver recovered from secondary and other sources fell from 152.7 million ounces in 1989 to 140 million ounces in 1990.

7. An enormous amount of secondary silver, 320 million ounces in 1980, came into the market in response to the rise in silver prices at the time. However, that was an aberration, and secondary supply fell back to more typical levels as silver prices subsided over the next two years.

8. In the 1960s the U.S. Treasury supplied more than two billion ounces to the market. Today, U.S. government stocks are held by both the Treasury and in the National Defense Stockpile. Combined, these two stockpiles held 117.4 million ounces as of 1 October 1990, 5.7% of the peak level of government holdings. In the face of any future tight markets, there would be little scope for U.S. Treasury sales to compensate for a shortfall of new supply. As was the case in the 1970s, in such an event the market will have to turn to investor holdings for the additional metal. Long term investors will expect due compensation for the service of providing this metal to the market.

## **Demand**

9. The United States used a total of 120.0 million ounces in 1989, and is projected to use 123.0 million ounces in 1990. Japanese silver use totaled 102.2 million ounces in 1989, and should rise to 108.8 million ounces in 1990. European silver use is expected to rise from 170.9 million ounces in 1989 to 174.5 million ounces in 1990. An estimated 77.1 million ounces of silver will be used outside of these regions this year. India is an emerging large user of silver, using 27 million ounces of silver in 1989. The Indian silver market is isolated from the world market by import and export restrictions. This has led to a higher silver price in India than in the international market—\$10.60 per ounce in 1989, compared to \$5.50 elsewhere.

10. Photography continues to be the leading use of silver, with 1989 demand totaling 186 million ounces and 1990 demand expected to reach 194 million ounces. Photographic use of silver has grown 4.6% per annum since 1985, and seems set to continue expanding along these lines through the coming decade. This steady growth is the result of several trends, including continued expansion in the use of photographic products worldwide, and an increase in per-unit silver use in color film. Competition among photo companies has led to a marked rise in film speed during the 1980s, which has been achieved without loss of image quality through the use of more silver per frame of film.

11. Jewelry and silverware use is up 11% per annum since 1985, to 70.1 million ounces in 1989. Silver use in electronics and electrical equipment totaled 70.6 million ounces in 1989. Compounded growth in electronics silver use has been 2% for the last five years. Silver use in other industries and other countries outside of the United States, Japan, and Western Europe totaled 142.5 million ounces in 1989, having grown at an annual rate of 5.4% since 1985. Silver use in most major industries is likely to rise over the next decade.

## **Market Stocks**

12. The silver market has felt some negative sentiment over the past two years, based on a sharp increase in reported silver inventories in New York. Reported New York stocks have risen from 155 million ounces at the end of 1987 to around 260 million ounces as of September 1990. Most of this silver is not of sufficiently high purity to be of immediate use to the photographic and electronic industries, 60% of total demand. (The cost of upgrading the 99.9% silver in Comex stocks to the 99.99% purity needed by these industries, to say nothing of assuring certain impurities are not present

in the metal, is more than double the premium available for the higher purity silver over the Comex price. As long as this difference persists, it is not economical for companies to withdraw silver from New York bank vaults and upgraded it for physical delivery to fabricators.) Additionally, some 70 million ounces of New York silver stocks represent long-term investor holdings not even registered against futures market positions. Much of this metal was moved into New York bank vaults after a tax law change in mid-1989, and as such represents merely a shift in the location of these stocks from Delaware, where they had not been reported previously.

13. As a percent of annual silver demand, reported stock levels in 1990 are not much different from those of recent years. If anything, one would have expected them to be higher, given (a) the presence today of long-term investor inventories in New York and (b) a move by fabricators to shift inventories from their own stocks to dealer holdings.

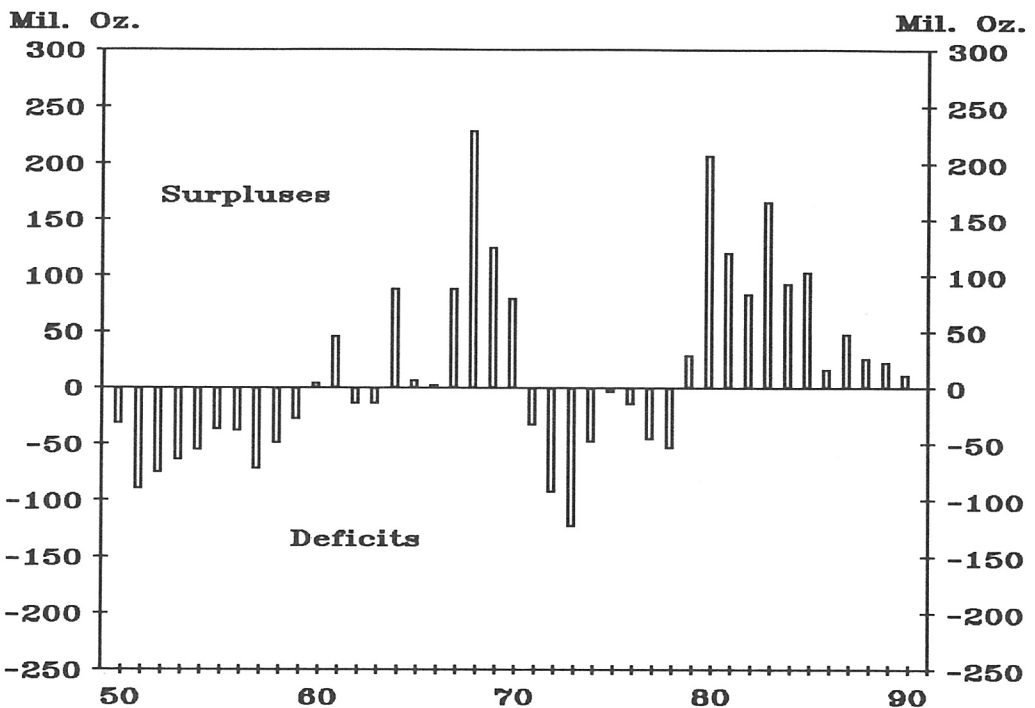
**The 1990s**

14. In recent years, demand has risen faster than supply. Current prices are limiting total silver supplies, and are likely to restrain supply for several years. At the same time, low real and relative silver prices should have a positive effect on industrial demand in the coming years.

15. Total supply, fabrication demand, and inventory levels are three of the four fundamental pillars of the silver market. The fourth is investment demand. During the late 1980s investors were not interested in silver to any large extent, partly because of more attractive returns in financial instruments, partly due to a relatively sanguine inflation outlook, and partly due to their views of silver's fundamentals. Investors traditionally have bought silver as protection against inflation and political uncertainties, or because they believed silver prices were likely to rise sharply for some fundamental reasons.

**Long Term Silver Supply/Fabrication Demand Balance**

**Annual Net Balance, 1950 through 1990**



**Silver Supply and Demand—Summary Table**

Million Troy Ounces, Annual Data

	1950	1960	1970	1980	1985	1986	1987	1988	1989	1990p	Annual Growth Rates	
											1950-1990	1985-1990
Mine Production . . . . .	169.5	201.8	258.5	264.6	336.0	322.3	340.4	344.5	362.6	374.0	2.0%	2.2%
Secondary and Other Supply . . . . .	NA	142.0	218.0	320.0	152.9	124.9	164.0	158.1	152.7	140.0	0.1%*	-1.7%
Total Supply . . . . .	—	343.8	476.5	584.6	488.9	447.2	504.4	502.6	515.3	514.0	1.4%*	1.0%
Fabrication Demand . . . . .	201.5	339.2	396.3	377.5	385.9	433.2	458.5	475.9	495.5	505.0	2.3%	5.5%
New Supply Available for Investment . . . . .	—	4.6	80.2	207.1	103.0	14.0	45.9	26.7	19.8	9.0		

Notes: NA—Either not available, or not applicable.

The compounded annual growth rates for secondary and other supply, and for total supply, are for 1960 through 1990, as 1950 scrap data is not available.

Source: CPM Group.

### Silver In the Last Forty Years

Silver prices have trended downward since 1980, when they rose sharply for a brief time. By 1990, prices were back to levels not seen since 1978. Meanwhile, during the second half of the 1980s fabrication demand for silver has been rising strongly. Total supply has risen at a much slower pace.

In order to fully understand how silver came to be where it is today, and where it might be going, it is wise to review silver market trends over the past 40 years. By looking at the larger trends that have swept silver supply, demand, and prices upward and downward over the past four decades, a much fuller understanding emerges of where silver stands today.

#### 1950 to 1960: Strong Demand Growth, Government Price Programs

From the end of World War II until the early 1960s fabrication demand for silver rose strongly. This period witnessed the rebuilding of Europe and Japan, and a tremendous push worldwide toward electrification, housing construction, and consumer durables. Many electrical appliances, as well as electrical generation and transmission systems, use silver, which was one of the major factors behind this extended boom in industrial silver usage. At least as important was the advent of mass market photographic products, which sharply increased the use of silver in photographic films and papers.

There was another reason why fabricators were eagerly turning to silver during this period. The U.S. Treasury had a silver inventory that, as of 1950, stood at 2 billion ounces. Furthermore, Treasury policy was to buy domestically mined silver at 90.5 cents per ounce and sell silver at 91 cents, effectively putting a cap on the United States market price of silver.

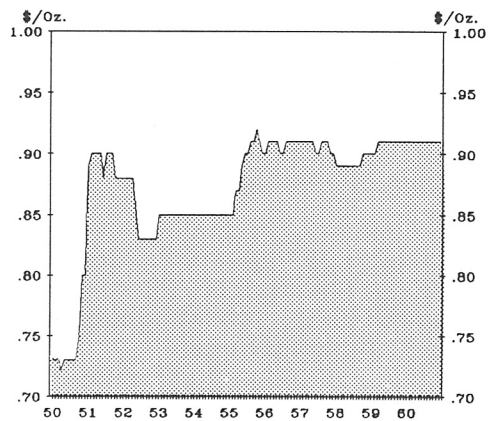
In this way, the U.S. Treasury was the buyer or seller of last resort in the silver market, by virtue of the Silver Purchase Act of 1934 (itself one of a series of such laws extending back to the 1870s). The 1934 law authorized the Treasury to buy silver either until (a) the market price reached \$1.29 (the monetary value of silver) or

(b) the monetary value of Treasury silver stocks reached one-third of the monetary value of the Treasury's gold stocks. This purchase program remained in effect, in essence, until 1961. During the intervening 28 years, the Treasury acquired 3.2 billion ounces of silver. About half was acquired in the first four years, from 1934 through 1937, and the other half between 1937 and 1955.

A good portion of this silver was acquired from U.S. mines: 880 million ounces, or nearly all domestic production from 1937 to 1955. About 110

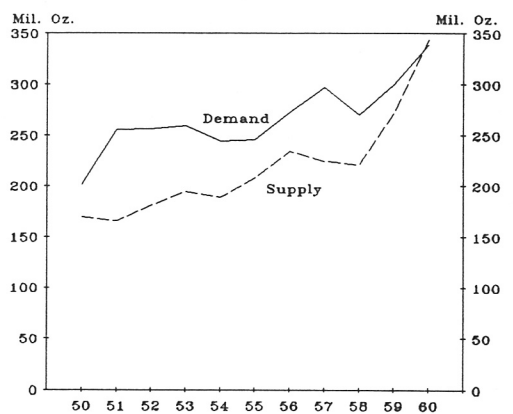
#### Silver Prices

##### Monthly, 1950 through 1960



#### Supply/Fabrication Demand Balance

##### Annual, 1950 through 1960



million ounces were purchased during the first three months following passage of this legislation in 1934. The law prohibited Americans from owning nonmonetary silver, and directed them to sell it to the Treasury. A great deal of silver also was imported. Between 1934 and 1939 nearly 2 billion ounces of silver came from other countries. Market prices ranged between 25 cents and the ceiling created by the Treasury's set price of 90.5 cents during these years, but spent most of the time below 75 cents. U.S. fabrication demand (excluding coinage), which totaled 1.8 billion ounces from 1935 through 1955, excluding coinage, was met by imported silver.

By 1955 the demand for silver was great enough to push market prices above the Treasury's 90.5 cents purchase price. Since the Treasury was a seller at 91 cents, the price remained around this level for several years more, as the Treasury's reserves were depleted. While the 1934 law directed the Treasury to buy silver with an eye on boosting the silver price to \$1.29, the Treasury's policy during the late 1950s was designed to keep silver prices below the point at which coins would be melted down, to allow time for the Treasury to extricate itself from the silver market.

Treasury reserves peaked in 1959, when the U.S. Treasury had 2,060,000,000 ounces on hand and another 1,331,000,000 ounces were outside the Treasury in circulating coinage, for a total of 3,391,000,000 ounces.

In summary, the post-war period saw silver demand rise sharply, while mine production and other supplies were relatively stable. The U.S. Treasury sold tremendous amounts of stockpiled silver during the years after 1955, in order to keep the price of silver below its "monetary value." Additionally, the actual growth of the overall economy increased the need for circulating coinage. One reason for the Treasury's sales was straightforward: If silver's market value rose above its monetary value, \$1.29 per ounce, holders of U.S. silver certificates, one form of currency in circulation at the time, could trade in these \$1, \$5, and \$10 bills in exchange for silver bullion. Also, there would be an enormous incentive for individuals to melt down the silver coins in circulation.

Had the Treasury not been present as a seller of silver, market supplies from other sources would

have been hard pressed to keep pace with the growth of fabrication demand, and the price of silver most likely would have risen sharply during the late 1950s and early 1960s.

### **1961 to 1965: The Transition Away From a Government Controlled Price**

For decades the Treasury had been a net buyer of silver. By 1960 it had become a net seller. In 1960 the Treasury sold 22 million ounces of silver in bullion form, and used another 46 million ounces in coinage. The next year the Treasury had to sell 63 million ounces of bullion and use another 56 million ounces to replace silver coins that had been taken out of circulation by investors. That year, 1961, the Treasury realized that it would run out of silver for use in coinage and as a reserve against silver certificates unless it took drastic measures to begin phasing silver out of currency. In 1961 the Treasury ordered \$5 and \$10 silver certificates out of circulation, freeing silver reserves held against these bills and reducing the public's call on Treasury silver. In November 1961 the government also suspended silver bullion sales by the Treasury at the formerly fixed price of 91 cents.

Once the Treasury stopped selling at that price, market quotes for silver quickly rose. In June 1963 the Treasury also replaced the \$1 silver certificate with Federal Reserve notes. By 1963 silver prices reached \$1.29, the monetary value of silver in coinage. At prices above this level holders of silver certificates would have been able to redeem them for more valuable silver, under the now-defunct silver certificate legislation. (The other trigger price the Treasury worried about was \$1.38, at which level it was profitable to recycle coinage for its silver content.)

During this transition period, the U.S. Treasury still had to keep the silver market well supplied, in order to keep the silver market relatively calm until it had completed the withdrawal of silver from currency. In late 1963 the Treasury resumed its silver bullion sales, as part of this effort. Over the six years between 1960 and 1965 the Treasury sold a total of 342 million ounces of silver bullion. It used another 814 million ounces of silver in coinage during this same time. In total, the Treasury used 1,156,000,000 ounces of its silver reserves. Much of this silver, espe-

cially the bulk of it used in coins, found its way quickly into the hands of investors. Government steps to remove silver from the currency led investors to conclude that the price of silver would rise sharply once the Treasury no longer was supplying the market with such large volumes of metal.

Fabrication demand continued to rise sharply. Industrial use, excluding coinage, rose at a 9% per annum pace, from 212.9 million ounces in 1959 to 355.8 million ounces in 1965. Including coinage, which grew rapidly during this time due to the investor run on coins, total fabrication demand rose 16% per annum. Mine production, in contrast, rose 1.9% per year from 195.6 million ounces in 1959 to 218.4 million ounces in 1965.

Secondary recovery of silver was starting to expand, in part spurred on by the realization that with the passing of Treasury silver sales and coinage programs the market would need to recover increasing amounts of silver from scrapped items. It was clear to market participants that silver prices had been restrained by the Treasury's willingness to fill the gap between market supplies and industrial demand, and that once the Treasury's silver was gone, additional supplies would have to be found elsewhere. Coin melt rose from 10 million ounces in 1960 to 30 million ounces in 1965. Silver recycling from other items rose from 40 million ounces in 1960 to 57 million ounces in 1965.

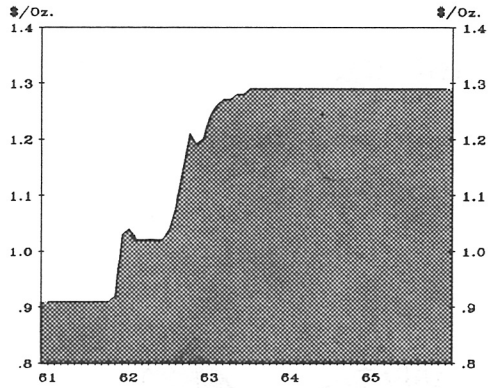
**1966 to 1970: The Beginnings of a Free Silver Market**

By 1966 the Treasury's program of eliminating silver from coinage was in place. The Treasury continued to use some silver in coins from then until 1969, but the annual average during these four years was 38.5 million ounces, down from 178 million ounces per year on average during the previous four years. Austria, France, and West Germany continued to use silver in some circulating coins until the late 1970s.

The U.S. government also continued to sell silver bullion. From 1966 through November 1970, 674 million ounces of bullion were sold. (In 1967 the bullion sales program was transferred from the Treasury to the General Services Administration. Ownership of the bulk of the remaining silver

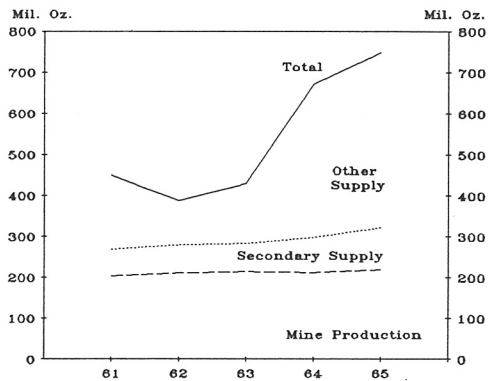
**Silver Prices**

**Monthly, 1961 through 1965**



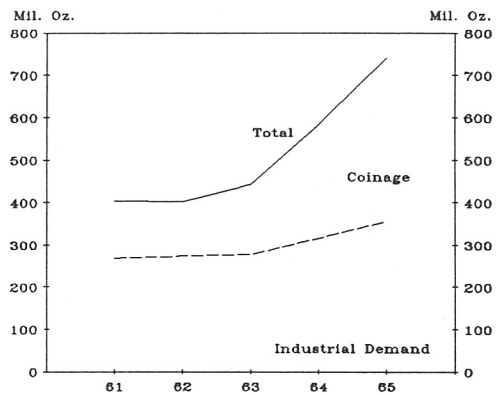
**Supply**

**Annual, 1961 through 1965**



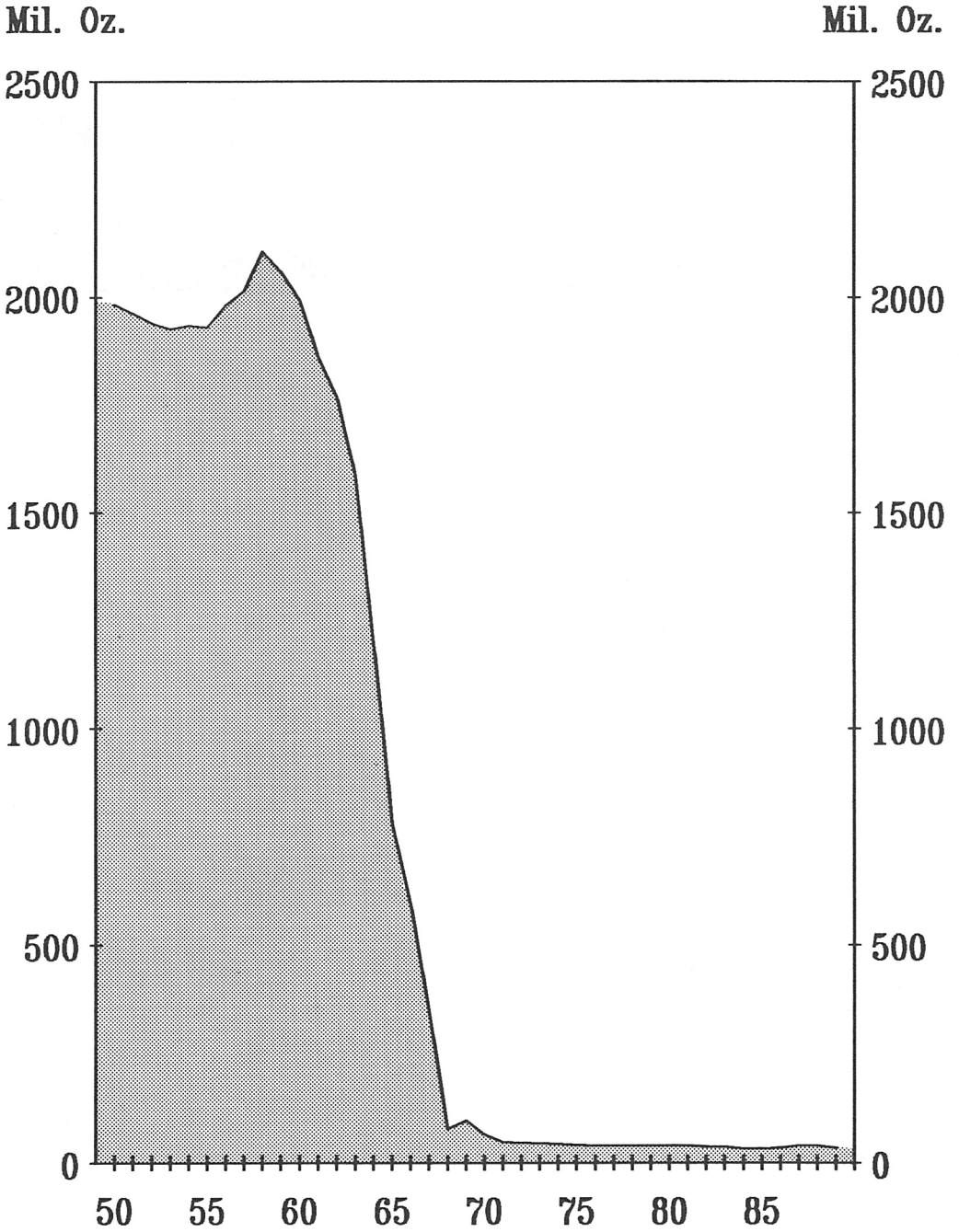
**Fabrication Demand**

**Annual, 1961 through 1965**



U.S. Treasury Stocks

Year-end, 1950 through 1989





inventories were transferred from Treasury stocks to the National Defense Stockpile.)

Industrial demand meanwhile remained strong, although there was a period of weakness in the mid-1960s. The higher silver prices had some limiting effect on use, although the major factor was slowing overall economic growth and a shift in the economy away from the manufacture of goods that used silver. Industrial use peaked in 1966 at 414.9 million ounces. It declined 10% over the next two years, before stabilizing between 372 and 387 million ounces on an annual basis in the late 1960s and early 1970s.

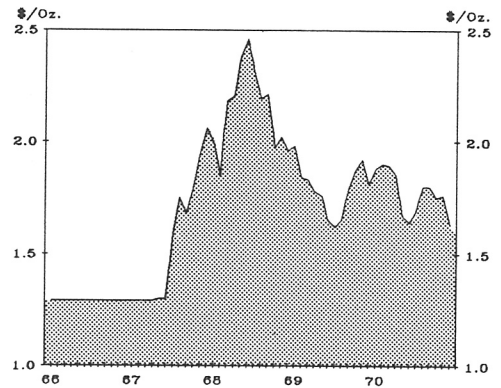
Investors remained keenly interested in silver, absorbing around 620.5 million ounces of silver from 1964 through 1970. Interestingly, the price of silver rose from \$1.29 to a peak of \$2.57 in 1968, before falling back. The rise and fall in silver prices was coincidental with the volume of these investor purchases: As investors increased their demand for silver from 1964 through 1968, prices rose. As investor demand decreased over the next three years, prices softened commensurately.

The weighted average price paid in these investor acquisitions, using annual average prices, was \$1.88 per ounce. This figure will be important in understanding the next phase of the silver market, from 1971 into 1979, when the new supply of silver fell short of industrial requirements and the resulting deficit was accommodated by investor selling.

While investor demand was strong and industrial demand remained at healthy levels, mine production rose at a 3.4% per annum rate, from 218.4 million ounces in 1965 to 258.5 million ounces in 1970. (Actually, mine output of silver was not as vibrant as these figures suggest, since 1965 was a year of stable output and 1970 represented a cyclical peak in silver production. Output fell back the following year, and did not regain its 1970 level until 1977.) Secondary supply also continued to expand, in part due to the rise in silver prices, which made this industry much more attractive. Bloating by continued U.S. government sales, total supply remained high throughout this period.

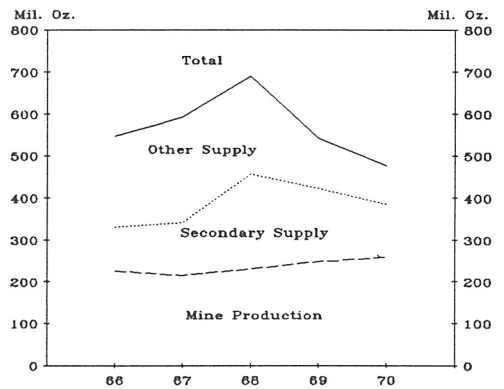
### Silver Prices

Monthly, 1966 through 1970



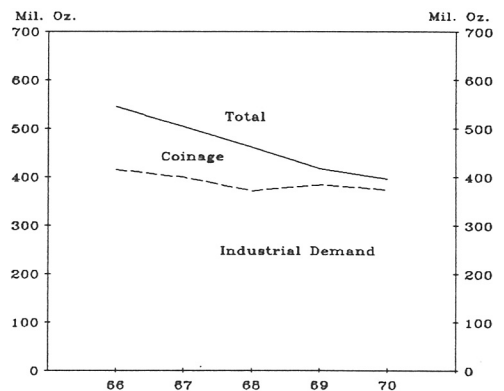
### Supply

Annual, 1966 through 1970



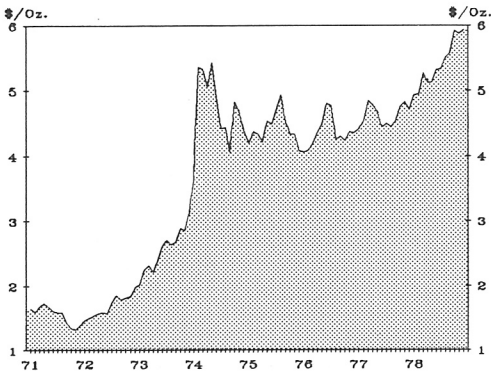
### Fabrication Demand

Annual, 1966 through 1970



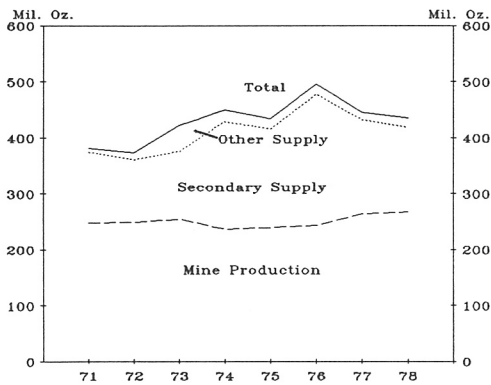
**Silver Prices**

Monthly, 1971 through 1978



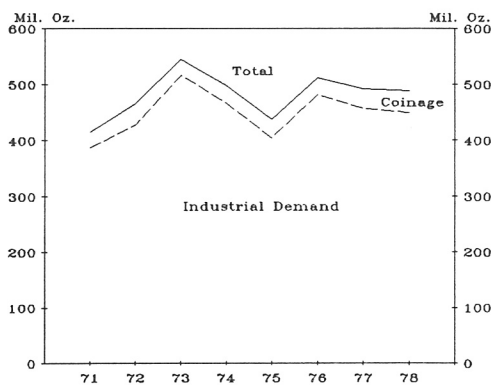
**Supply**

Annual, 1971 through 1978



**Fabrication Demand**

Annual, 1971 through 1978



**1971 to 1978: The Years of Silver Shortage**

By 1971 U.S. government stocks had fallen from their 1959 peak of 2.1 billion ounces to around 170 million ounces. The U.S. government had removed silver entirely from its currency, and ceased to intervene in the silver market. Total silver supplies had reached a record 747.4 million ounces in 1965, of which 54%, or 400 million ounces, came from the U.S. Treasury. From that point onward, the Treasury was backing out of the silver market, and total supply declined steadily, and never has approached that 1965 record again. In 1990 total supply is projected at 514.0 million ounces.

Total silver supplies had declined to 381.3 million ounces by 1971, their lowest level since 1960. New mine production accounted for 65% of this total, or 247.3 million ounces. Secondary and other supplies totaled 134.0 million ounces. Throughout the 1970s, mine production remained rather static, fluctuating between 236.6 million ounces in 1974 and 272.0 million ounces in 1979. Secondary supply rose from 1972 to 1974, in line with silver prices, and then fell back to 152.0 million ounces in 1978.

Fabrication demand rose sharply in the early 1970s, from 414.4 million ounces in 1971 to 545.0 million ounces in 1973. Demand then dropped for two years, as a worldwide recession reduced consumer demand for silver-using end products and as higher silver prices led to some reductions in silver use. Demand fell to 497.9 million ounces in 1974 and 437.9 million ounces in 1975. Use rebounded the next year, to 511.0 million ounces, before stabilizing between 488.6 million ounces and 491.3 million ounces in 1977 and 1978.

Total new silver supplies fell far short of meeting these requirements. From 1971 through 1978 there was a cumulative deficit of new supply over demand of 415.8 million ounces. The silver that filled this gap came from the 620.5 million ounces of silver inventories — many held by investors — built up during the previous seven years. By becoming net sellers of silver, investors replaced the U.S. Treasury as the source of silver to make up for a major, ongoing shortage of silver. The difference was that in the early 1960s the U.S. Treasury had sold at a fixed

price, because it was acting to restrain silver prices. In contrast, investors wanted increasingly higher prices for this service. The weighted average price of the investor silver sales from 1971 through 1978 was \$3.21, 71% higher than the price they had paid for this metal in the late 1960s. The average price of silver was \$1.55 in 1971. The annual average price rose to \$4.71 in 1974, and then spent the next four years between \$4.35 and \$5.40.

**1979 to 1980**

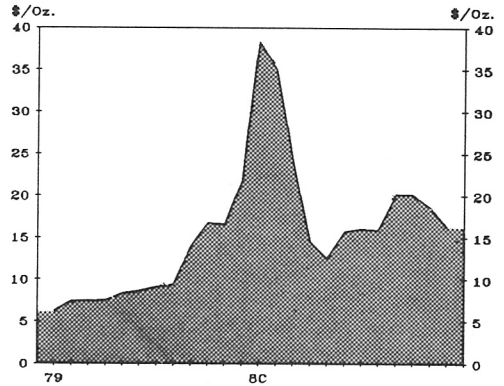
By 1979 investors, and other market participants, had come to the strong conviction that the silver market was facing a severe shortage of metal, and that prices were likely to rise sharply at some point. The market had been living off of investor selling for seven years. Prices had risen from the beginning of the decade, but there were serious questions as to how much longer investors would be willing and able to continue supplying silver to fabricators, at least at the prices seen in the mid-1970s.

World economic and political events also were coming to bear on the silver market, most notably in the form of a major cyclical upward surge in inflation throughout the industrialized world. Sensing that silver prices should be adjusting upward to compensate for these inflationary trends, many investors decided that silver prices between \$4.00 and \$5.50, which had prevailed during most of the late 1970s, were too low. Investors ceased selling their old silver holdings, and instead began adding to their holdings. This added further upward pressure to the price of silver. Simplistic retrospectives of the silver market in late 1979 tend to focus on the high-profile purchases of large amounts of silver and silver futures by various wealthy individuals; in reality, there was a tremendously broad-based rush to buy silver by investors worldwide at the time.

By the final quarter of 1979 silver prices had risen to levels between \$15.00 and \$25.00 per ounce. At these levels several physical market forces combined to act against higher prices. Additionally, the two major U.S. futures exchanges that traded silver at the time took steps to force those with long positions to liquidate their positions.

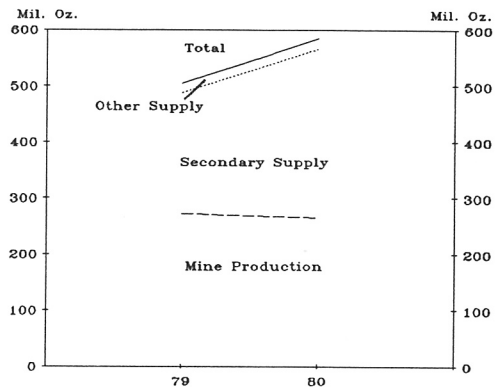
**Silver Prices**

Monthly, 1979 through 1980



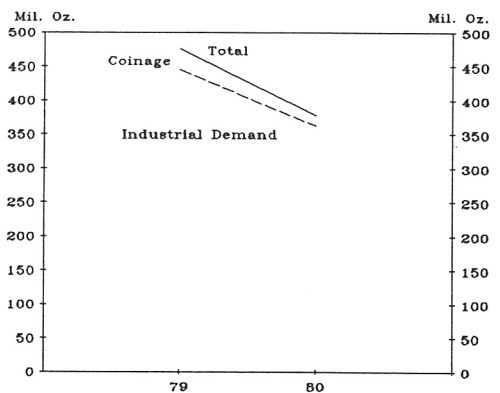
**Supply**

Annual, 1979 through 1980



**Fabrication Demand**

Annual, 1979 through 1980



As silver prices rose above \$15.00 in September 1979, fabrication demand began to be affected. On an annual average basis, industrial silver use fell a relatively mild 0.9% to 445.1 million ounces in 1979. Demand had held up reasonably well during the first three quarters of the year. However, a sharp cut-back in demand in the fourth quarter led to the overall annual decrease in silver use. By some estimates, industrial use of silver was 40% lower in the last quarter of 1979 than it had been in the first quarter of that year.

When silver prices rose sharply in 1973-1974, manufacturers began searching for ways to reduce their need to use silver. Several substitutes for silver and methods to reduce per-unit silver use were developed, but they were too expensive to implement as long as silver was around \$5.00 per ounce. When silver rose to \$15 and more, however, fabricators were able to introduce these measures rapidly. Demand also quickly declined for jewelry and sterlingware.

Investors began to sell large amounts of silver, especially old coins from the 1960s. Others sold large amounts of sterlingware and jewelry for its silver content.

A host of political events, including the continuing U.S. hostage crisis in Iran and the Soviet invasion of Afghanistan, motivated investment demand, helping to keep silver prices high and volatile throughout 1980. High inflation, high nominal interest rates, and negative real interest rates further stimulated investor interest in silver and other tangible assets. Prices dropped as low as \$10.80 in March, but rose back to \$25 in September, as the Iran-Iraq war erupted. By the end of 1980 silver prices had subsided once more, to around \$16.

These high silver prices meanwhile were having a dramatic effect on physical silver market conditions. Total supply rose from 434.8 million ounces in 1978 to 505.0 million ounces in 1979, and then to 584.6 million ounces in 1980. The bulk of this increase occurred in secondary recovery. Total secondary recycling of silver doubled, from 152.0 million ounces in 1978 to 302.0 million ounces in 1980. The recovery of silver from old coins, those holdings taken in by investors during the 1960s, increased from 21 million ounces in 1978 to 45 million ounces the next

year, and then to 94 million ounces in 1980. Refiners faced substantial backlogs, sometimes of 6-12 months, in processing these materials.

Mine production remained almost unchanged during this time, and actually was lower in 1980, at 264.6 million ounces, than it had been in 1978. (A U.S. copper industry strike, along with a strike at a major U.S. silver mine, were major factors behind the low output.) Mine developments have long lead times, and the increases in output that came about in response to the 1979-1980 jump in silver prices did not appear until the mid-1980s.

Prices also were having a dramatic effect on fabrication demand, compounded in 1980 by the onset of the deepest post-war recession. Industrial silver use fell from 449.1 million ounces in 1978 to 362.5 million ounces in 1980, a level fully 25% below the 1976 cyclical peak of 481.0 million ounces. The last countries using silver in circulating coinage, Austria, France, and West Germany, withdrew from that activity, reducing silver use in coinage on a worldwide basis from 39.5 million ounces in 1978 to 15.0 million ounces in 1980.

The combination of higher secondary recovery and lower fabrication demand brought an abrupt end to the eight years of silver market supply deficits. In 1978 new supply had fallen 53.8 million ounces short of fabrication requirements. In 1979 there was a 28.9 million ounce surplus.

In 1980 this surplus reached 207.1 million ounces, nearly as high as the 228.9 million ounce surplus that had resulted from the 1968 run-up in silver prices and the Treasury's sales programs. The increase in the recovery of silver from old coins accounted for nearly half of the surplus.

### **1981 to 1990: Renewed Surpluses**

By the beginning of 1981 the silver market was starting to adjust after the traumatic events of 1980. Industrial silver demand was declining, both because of the worldwide recession that had set in, and in reaction to higher silver prices. Investment demand for silver also fell sharply. Investors were aware of the reduced fabrication demand for silver, and of the amount of silver

backed up at refineries. Other investors had lost money in 1979-1980, and were wary of returning to the market. Still others were distracted from silver by more attractive financial markets.

Supply also fell, as the surge of old scrap and coin melt subsided. Total supply dropped 101.1 million ounces from 1980's level to 483.5 million ounces.

The worldwide recession persisted until late 1982, continuing to restrain fabrication demand and discourage investment absorption. Silver mine production, meanwhile, had begun to rise, as some output developed in reaction to the higher prices since 1979 came onstream. Much mine output of silver remained profitable even as silver prices subsided to around \$8.00 in the early 1980s, so that expanding existing operations and developing new mines remained an attractive proposition for many miners. Secondary recovery of silver, meanwhile, continued to decline.

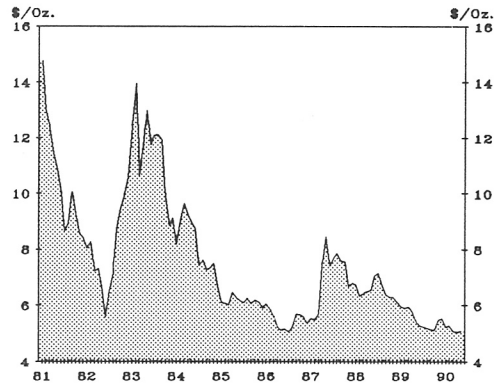
Silver prices reached a cyclical nadir of \$4.98 in June 1982, 10% of the \$48 peak just 30 months earlier. June 1982 also proved to be the trough of the recession in the United States. During 1982 serious problems erupted in the international debt market, in particular relating to the debt repayment problems of certain countries in Eastern Europe and Latin America.

In late 1982 investor interest in silver was rekindled by several forces, all of which emerged at roughly the same time. The international financial market panic led some investors to turn to silver. Others were attracted by what they saw as unsustainably low prices. Investment demand also was encouraged by a rapid easing of credit market conditions by monetary authorities in most industrialized nations; this easing led to an immediate revival of inflation fears. As a result of all of these forces coming to bear at once, investment demand picked up during the second half of 1982 and the first quarter of 1983. This influx of investor buying helped take silver prices from the June 1982 low of \$4.98 to a peak of \$14.72 in March 1983.

In March 1983, several trends came into play in reversing the rise in silver prices. First, the price had nearly tripled in nine months. Such a fast

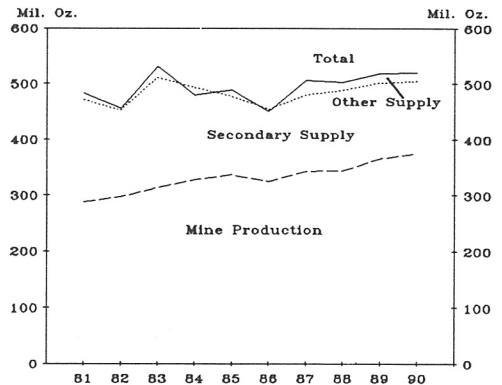
## Silver Prices

Monthly, 1981 through 1990



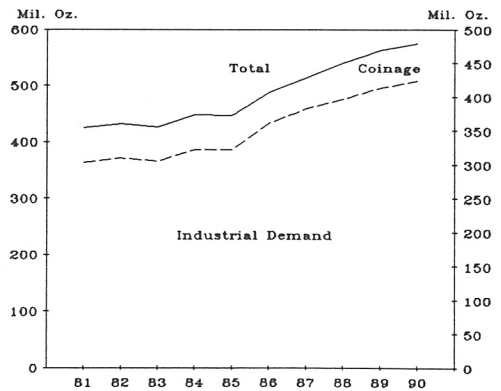
## Supply

Annual, 1981 through 1990



## Fabrication Demand

Annual, 1981 through 1990



ascent led to profit-taking by investors; it also constricted industrial use. On the supply side, secondary recovery of silver from scrap and coinage increased in response to the higher prices. OPEC lowered its official benchmark oil price, for the first time in the cartel's history. The sudden decline in petroleum prices quickly reduced inflation expectations. Silver prices had averaged \$13.96 in February 1983. In March they averaged \$10.62.

Prices recovered slightly during the summer months, but from 1983 until 1986 the trend in prices was downward. This downward trend served an important purpose in the physical market, in that it discouraged new developments of primary silver mines, except where high ore grades or other factors made for extremely efficient plants. It also served to reduce secondary recovery of silver. On the demand side of the market, relatively low silver prices removed the incentives to using less silver or substituting away from silver in products.

Total fabrication demand fell sharply at the beginning of the 1980s, in response to higher silver prices, and worldwide recession. Longer term demographic and technological trends had been pointing to a decline in use, which the price rise and recession accelerated.

For example, silver use in sterlingware in the United States actually had peaked in the early 1970s, and was clearly going through a secular loss of markets due to changing demographics and consumer tastes. By 1979 U.S. sterlingware use of silver had fallen 55% from its 1973 peak of 29.3 million ounces. The decline that followed 1979 was a continuation of this longer term trend, exacerbated by the rise in silver prices and the economic recession.

Other industries, including the important photographic and electronics uses for silver, were able to reduce their per-unit silver requirements in some instances, and in other cases to substitute other materials for silver. As silver prices subsided later in the 1980s, some of these trends reversed. In the color film photographic market, for example, competition and new technologies have led to an increase in per-unit silver use since the early 1980s, to levels higher than those seen in the late 1970s.

Fabrication demand, including coinage, reached a low of 363.1 million ounces in 1981, the lowest level since 1960. During the early 1980s, fabrication demand remained weak, but in 1984 it began rising once more, stimulated by low silver prices and strong growth in industrial activity. As stated at the outset of this report, in the past five years fabrication demand has risen at a compounded rate of 6.5%.

Silver supply has followed a more erratic pattern during the 1980s, which partly reflects the high degree of price responsiveness of secondary recovery. Total supply fell 101.1 million ounces from 1980 to 1981. This decline was entirely a function of the scaling back of secondary recovery, after the rush of material in late 1979 and 1980. Total supply continued to slump in 1982, falling to 455.1 million ounces. While this was happening, in late 1982, silver prices staged a rally from \$4.98 to nearly \$15.00. This surge in prices brought out significant quantities of scrap in 1983, which boosted total supply to 531.1 million ounces. As prices decreased from early 1983 into 1986, total supply once more fell back, to 449.7 million ounces in 1986. Mine production was restricted by the low prices at this time, with silver reaching a low for this period of \$4.85 in May 1986. Secondary recovery also was constricted by these low prices. Since 1986 total supply has risen once again, reaching 514.0 million ounces in 1990.

Since 1979 there has been a surplus of total silver supply over fabrication demand every year. On a cumulative basis, this surplus has totaled 927 million ounces from 1979 through 1990. Traditional commodity market analyses would attribute this surplus entirely to investors. Indeed, it appears that most of this surplus actually was bought by bona fide investors, individuals who have accumulated these silver positions in the expectation of being able to liquidate them at some later date at a profit. The crude model using annual surpluses and deficits can be refined, to account for changes in reported market inventories and investor coin purchases. Most of the silver coins produced in the past decade have been bullion coins, designed for investors and collectors and not intended by their mints for use as circulating currencies. Silver coinage since 1979 has totaled 241.6 million ounces.

Accounting for these factors, it still seems that investors have acquired around a billion ounces of silver since the late 1970s, one quarter of this in coins. The period of heaviest silver purchases occurred in 1980 and 1981. Simple logic bears this out: Strong investment demand was keeping prices high at this time. As investor buying waned later in the decade, prices slipped down. The weighted average acquisition cost of the silver added to investor inventories during the past decade is \$11.25 per ounce.

This is the average price paid by investors for the silver they now are holding, comparable to the \$1.88 average price investors paid for the

620.5 million ounces they bought between 1964 and 1970. It also can be compared to the \$3.21 average price investors received for the 415.8 million ounces sold from 1971 to 1978.

More important, this \$11.25 average price paid should be remembered with an eye to the future. Investors buy silver, and other assets, in the expectation that they will someday be able to sell them at a profit. This \$11.25 price may tell us something about the levels at which investors will be willing to come back into the silver market in the future, should the market ever require them to fill a shortfall of new supplies again.

**World Silver Supply and Fabrication Demand**

Million Troy Ounces

Year	Supply				Demand		
	Mine Output	Secondary	Other	Total	Industrial	Coinage	Total
1950	169.5	—	—	169.5	157.4	44.1	201.5
1951	165.5	—	—	165.5	164.6	90.5	255.1
1952	180.6	—	—	180.6	142.1	114.3	256.4
1953	184.7	—	—	184.7	168.3	90.8	259.1
1954	178.6	—	—	178.6	160.8	83.4	244.2
1955	187.7	—	10.3	198.0	192.8	52.6	245.4
1956	189.8	30.5	3.7	224.0	215.9	56.6	272.5
1957	195.6	25.0	3.8	224.4	212.6	84.2	296.8
1958	202.3	17.0	1.3	220.6	190.5	79.5	270.0
1959	195.6	33.4	42.0	271.0	212.9	86.4	299.3
1960	201.8	52.0	90.0	343.8	235.3	103.9	339.2
1961	203.9	65.0	181.0	449.9	267.7	136.0	403.7
1962	210.8	69.0	107.0	386.8	273.6	127.6	401.2
1963	214.0	68.0	147.0	429.0	277.1	166.4	443.5
1964	211.5	86.0	374.0	671.5	315.9	267.1	583.0
1965	218.4	103.0	426.0	747.4	355.8	385.1	740.9
1966	225.2	105.0	217.0	547.2	414.9	129.5	544.4
1967	214.7	126.0	252.0	592.7	399.0	105.3	504.3
1968	230.2	227.0	232.0	689.2	371.0	89.3	460.3
1969	248.7	174.0	119.0	541.7	383.8	32.7	416.5
1970	258.5	127.0	91.0	476.5	372.9	23.4	396.3
1971	247.3	127.0	7.0	381.3	386.6	27.8	414.4
1972	248.9	112.0	12.0	372.9	427.4	38.1	465.5
1973	254.0	122.0	46.0	422.0	516.5	28.5	545.0
1974	236.6	192.0	21.0	449.6	466.3	31.6	497.9
1975	239.0	177.0	18.0	434.0	404.5	33.4	437.9
1976	242.9	235.0	18.0	495.9	481.0	30.0	511.0
1977	263.3	169.0	13.0	445.3	456.8	34.5	491.3
1978	266.8	152.0	16.0	434.8	449.1	39.5	488.6
1979	272.0	216.0	17.0	505.0	445.1	31.0	476.1
1980	264.6	302.0	18.0	584.6	362.5	15.0	377.5
1981	287.5	184.0	12.0	483.5	353.6	9.5	363.1
1982	297.0	155.0	3.0	455.0	359.3	12.0	371.3
1983	313.6	197.5	20.0	531.1	355.2	10.2	365.4
1984	327.8	165.6	-14.0	479.4	372.7	13.7	386.4
1985	336.0	140.9	12.0	488.9	372.5	13.4	385.9
1986	322.3	129.3	-4.4	447.2	406.4	26.8	433.2
1987	340.4	137.9	26.1	504.4	428.1	30.4	458.5
1988	344.5	143.9	14.2	502.6	450.6	25.3	475.9
1989	362.6	136.2	16.5	515.3	469.2	26.3	495.5
1990p	374.0	125.0	15.0	514.0	480.0	25.0	505.0

Notes: Base year for real prices is 1950.

1990 price through September.

p — projections.

Sources: CPM Group, industry sources.



Surplus(+) Or Deficit (-)	Annual Prices Dollars per Ounce		Year
	Real (Base = 1950)	Nominal	
-32.0	0.74	0.74	1950
-89.6	0.83	0.89	1951
-75.8	0.77	0.85	1952
-74.4	0.77	0.85	1953
-65.6	0.76	0.85	1954
-47.4	0.80	0.89	1955
48.5	0.80	0.91	1956
-72.4	0.78	0.91	1957
-49.4	0.74	0.89	1958
-28.3	0.75	0.91	1959
4.6	0.74	0.91	1960
46.2	0.74	0.92	1961
-14.4	0.86	1.08	1962
-14.5	1.00	1.28	1963
88.5	1.00	1.29	1964
6.5	0.99	1.29	1965
2.8	0.96	1.29	1966
88.4	1.12	1.55	1967
228.9	1.48	2.15	1968
125.2	1.40	2.14	1969
80.2	1.10	1.77	1970
-33.1	0.92	1.55	1971
-92.6	0.97	1.68	1972
-123.0	1.39	2.56	1973
-48.3	2.30	4.71	1974
-3.9	1.97	4.42	1975
-15.1	1.84	4.35	1976
-46.0	1.84	4.62	1977
-53.8	1.99	5.40	1978
28.9	3.68	11.09	1979
207.1	8.58	29.40	1980
120.4	2.77	10.48	1981
83.7	1.98	7.95	1982
165.7	2.76	11.44	1983
93.0	1.89	8.14	1984
103.0	1.37	6.14	1985
14.0	1.20	5.47	1986
45.9	1.48	7.01	1987
26.7	1.33	6.53	1988
19.9	1.07	5.50	1989
9.0	0.94	5.03	1990p

**Handy & Harman Silver Prices**

Dollars per Ounce

	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
January .....	\$1.99	\$1.98	\$1.88	\$1.64	\$1.47	\$2.02	\$3.64	\$4.19
February .....	1.85	1.84	1.90	1.60	1.50	2.24	5.36	4.37
March .....	2.18	1.83	1.89	1.67	1.54	2.31	5.33	4.33
April .....	2.20	1.78	1.85	1.73	1.57	2.21	5.04	4.21
May .....	2.38	1.76	1.67	1.67	1.58	2.40	5.43	4.54
June .....	2.46	1.65	1.64	1.61	1.57	2.62	4.90	4.49
July .....	2.31	1.62	1.69	1.58	1.74	2.71	4.42	4.70
August .....	2.19	1.65	1.80	1.59	1.85	2.64	4.43	4.93
September .....	2.21	1.79	1.80	1.42	1.78	2.68	4.05	4.52
October .....	1.97	1.87	1.75	1.34	1.81	2.89	4.83	4.33
November .....	2.02	1.92	1.76	1.32	1.83	2.86	4.69	4.33
December .....	1.96	1.81	1.63	1.39	1.98	3.14	4.39	4.08
Annual .....	\$2.14	\$1.79	\$1.77	\$1.55	\$1.68	\$2.56	\$4.71	\$4.42
Percent Change ...	—	-16.5%	-1.1%	-12.7%	9.0%	51.8%	84.1%	-6.1%
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
January .....	\$4.06	\$4.41	\$4.93	\$6.25	\$38.26	\$14.75	\$8.03	\$12.40
February .....	4.09	4.54	4.94	7.42	35.09	13.02	8.27	13.96
March .....	4.19	4.84	5.27	7.45	24.13	12.34	7.21	10.62
April .....	4.36	4.78	5.12	7.49	14.50	11.44	7.31	11.69
May .....	4.49	4.69	5.12	8.37	12.53	10.85	6.67	12.98
June .....	4.81	4.44	5.32	8.59	15.75	10.00	5.58	11.75
July .....	4.77	4.50	5.33	9.14	16.06	8.63	6.50	12.09
August .....	4.24	4.44	5.50	9.33	15.90	8.93	7.14	12.10
September .....	4.30	4.54	5.57	13.96	20.14	10.04	8.73	11.92
October .....	4.23	4.76	5.92	16.78	20.18	9.25	9.46	9.84
November .....	4.37	4.83	5.87	16.60	18.68	8.55	9.89	8.84
December .....	4.35	4.71	5.93	21.79	16.39	8.43	10.58	9.12
Annual .....	\$4.35	\$4.62	\$5.40	\$11.10	\$20.63	\$10.52	\$7.95	\$11.44
Percent Change ...	-1.5%	6.2%	16.8%	105.5%	85.9%	-49.0%	-24.4%	44.0%
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	
January .....	\$8.18	\$6.10	\$6.05	\$5.53	\$6.73	\$5.97	\$5.24	
February .....	9.03	6.07	5.87	5.49	6.32	5.89	5.28	
March .....	9.65	6.01	5.64	5.68	6.41	5.93	5.06	
April .....	9.22	6.46	5.23	7.43	6.48	5.79	5.05	
May .....	8.97	6.28	5.11	8.44	6.54	5.45	5.07	
June .....	8.74	6.17	5.15	7.41	7.04	5.28	4.91	
July .....	7.42	6.10	5.05	7.68	7.15	5.24	4.86	
August .....	7.61	6.25	5.22	7.85	6.71	5.18	4.98	
September .....	7.26	6.06	5.68	7.59	6.36	5.13	4.79	
October .....	7.32	6.19	5.67	7.56	6.28	5.13		
November .....	7.49	6.13	5.60	6.66	6.28	5.47		
December .....	6.69	5.89	5.37	6.79	6.11	5.53		
Annual .....	\$8.13	\$6.14	\$5.47	\$7.01	\$6.53	\$5.50	\$5.03	
Percent Change ...	-28.9%	-24.5%	-10.9%	28.1%	-6.8%	-15.8%	-9.3%	

Note: Average monthly Handy &amp; Harman unfabricated metal prices.

Percent change for 1990 is percent change from average price through September from same 1989 period.

Source: Metals Week.

Supply

Defining Supply

"Total New Supply" is the amount of refined bullion entering the market at any given time, or the flow of 'new' metal into the market. Total new supply comes from various sources.

TOTAL NEW SUPPLY

- 1. Mine Production
- 2. Secondary Supply
  - Old Scrap
  - Coin Melt
  - Indian Scrap
- 3. Other Supply
  - Government Disposals
  - Transitional Economy Exports

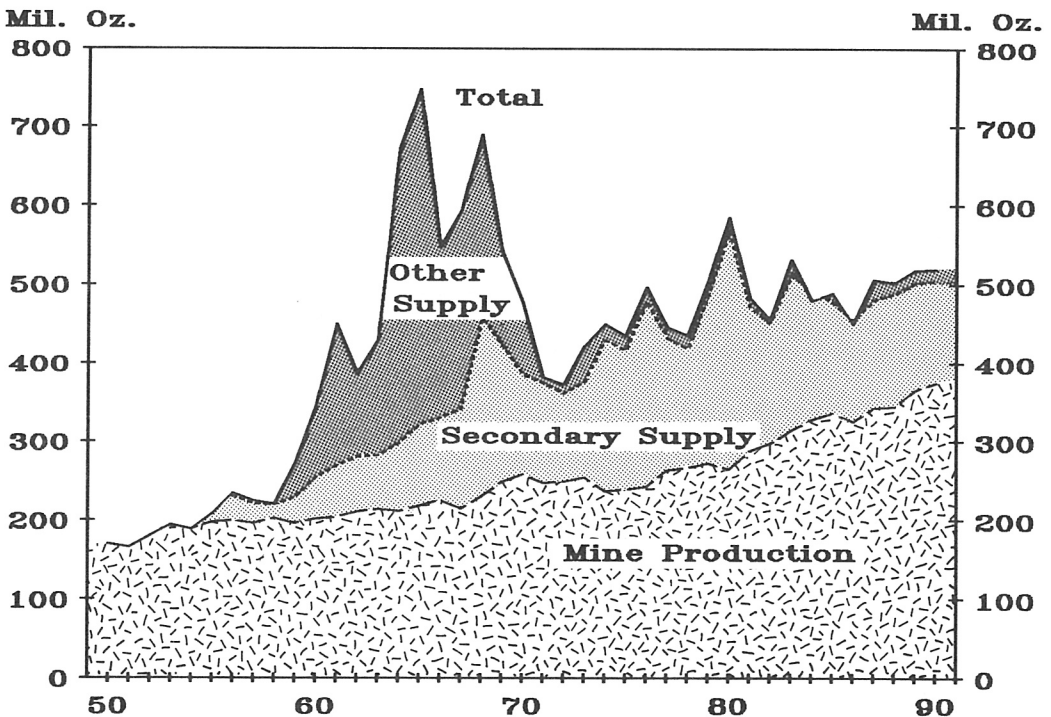
The definitions of these sources are important. Secondary and other supply share some characteristics, and sometimes are considered together. However, their division into secondary

and other supply reflects important distinctions between them. Secondary supplies typically have to be refined into deliverable bullion, whereas metal from the 'other' sources often already is in bullion form. Secondary supplies come from private individuals and corporations; the sources of 'other' silver are governments. There often are significant differences in the motivations, price sensitivities, and behavior patterns of private and governmental groups.

During the 1960s, U.S. Treasury coinage and refined bullion sales accounted for a large portion of total new supply. In the late 1970s, coin melt, that is, the recycling of the remnants of that earlier coinage program, represented a significant source of silver for two years. Between these two periods, silver sales by individuals in India were important. However, by 1989, coin melt, Indian scrap sales, and net exports by the transitional economies each accounted for only

Long Term Silver Supply by Sector

Annual, 1950 through 1990



1% of total supply, while withdrawals from government stocks, primarily for coins, supplied slightly less than 2%.

It is important to distinguish total new supply from the volume of market transactions and inventories. The volume of transactions, or the turnover of silver inside the market, has a much less dynamic effect on the price of silver. When turnover is low and the market is illiquid, changes in new supply or demand have a more dramatic impact on prices than when the transaction volume is high.

Silver held in inventories, especially those distant from the market or in the form of collectibles, has had virtually no impact on the market over the past several decades. U.S. futures exchange stocks, private stocks, government holdings, and other inventories usually do not figure into the supply/demand balance. The exception occurs when silver from the market is added to such stocks, or when silver comes out of such inventories and becomes a part of new supply.

Even bullion stocks that are not up to fabricator specifications can have a relatively limited effect on market conditions. For example, most of the silver registered against futures positions on the New York Comex and Chicago Board of Trade is 99.9% silver, what the market calls 'three nines' silver. In contrast, at least 60% of industrial silver use requires 99.99%, or 'four nines' silver, often with strict restrictions against particular impurities that cannot be assured by Comex delivery procedures. Because of this grade difference, even though futures market inventories may be high, the physical market can be pressed for stocks. As long as the premium for higher purity silver is below the cost of upgrading metal stored at bank vaults, such a dichotomy can persist.

There is a significant amount of silver in the form of investment products, coins, jewelry, decorative items, and sterlingware around the world. These items are not new supply, however. In most cases, they are not even in bullion form. Much of this metal is not likely to come back to the silver bullion market, even in the event of sharply higher prices.

Consider the fact that these silver inventories

existed prior to and throughout the 1970s. The presence of this silver did nothing to prevent silver prices from rising from \$1.88 at the beginning of that decade to \$48.70 in the first quarter of 1980—a 2,490% increase. Investors sold 415.3 million ounces of silver, and another 200 million ounces or so entered the market from scrapped coins and fabricated products (in excess of typical annual recycling patterns) during the 1970s. Less than 7% of the theoretically available silver came out in reaction to that price increase.

Most of the silver coming into the market during the 1970s was metal purchased within the previous 10 years. The vast majority of the silver believed to be held in old coins, jewelry, sterlingware, and decorative household items was not melted down for its silver content. If it did not come into the market during the 1970s and 1980s, it is unlikely to appear in the future.

### **Total New Supply**

Total new supply is projected at 514.0 million ounces in 1990. Many actual and potential market participants have cited the increase in supply seen over the past five years as a factor in silver's low prices. In fact, overall supply rose at a compounded annual growth rate of 1.4% between 1985 and 1989, far below the rate of expansion in fabrication demand. If current projections prove correct, total supply in 1990 will be slightly lower than 1989's estimated total of 515.3 million ounces. In no way can recent levels of supply be regarded as records: Total supply exceeded current levels in eight of the past 25 years. The record year for total supply was 1965, when nearly 750 million ounces of new silver supplies entered the market.

Breaking the past down into decades, an average 500 million ounces of silver entered the market each year during the 1980s, compared with an average 442 million ounces in the 1970s, and 540 million ounces in the 1960s.

In 1989, mine production accounted for 70.4% of total silver supply. The flow of silver from secondary recovery amounted to 26.4% of overall supply, while government disposals and net exports from transitional economies accounted for 3.2%.

**Mine Production**

Mine output has grown from 258.5 million ounces in 1970 to an estimated 362.6 million ounces in 1989, an increase of 40%. Silver mine production is recorded in 58 countries worldwide, as may be seen on the **Mine Production by Country** table in the Statistical Appendix. Additionally, small-scale silver production is known to occur in other countries for which statistics have not been available.

In many instances silver occurs in ores along with gold, copper, lead, zinc, and other metals. In many mines the primary product is one of these metals, with silver being a by-product. At other mines the silver is valuable enough that silver is either the main product or a co-product.

The classification of individual mines along such lines is difficult, in part due to variations in accounting procedures. One typical estimate is that 32% of world silver output comes from pri-

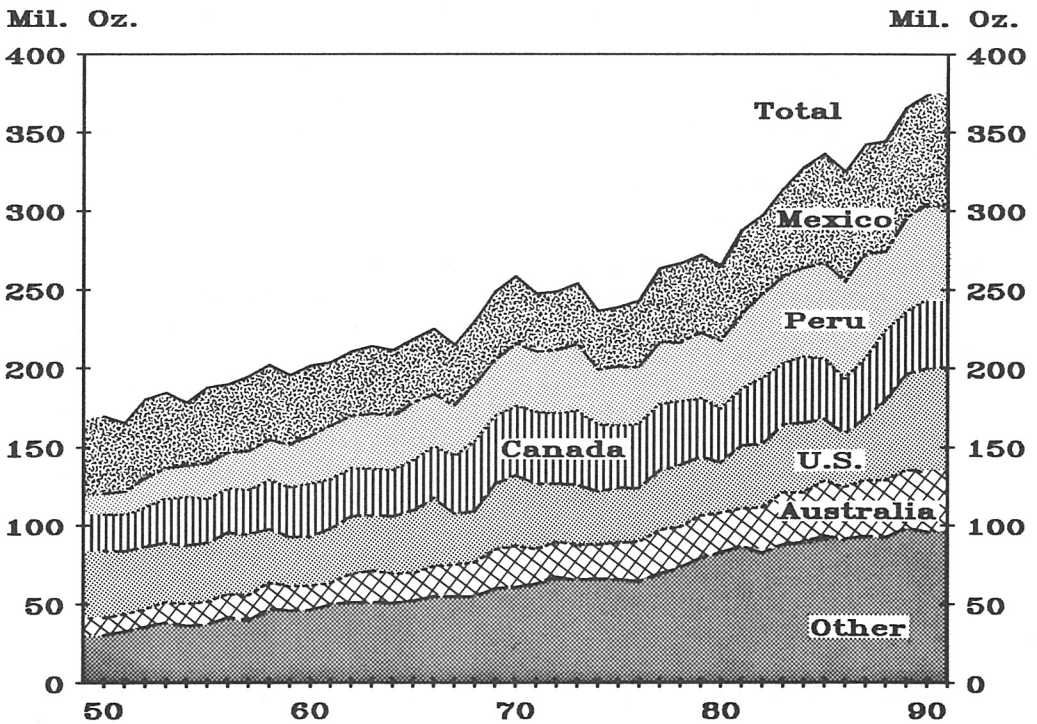
marily silver mines, with the remaining 68% produced as a by-product and/or co-product.

**Mexico** is the world's largest silver producer, with estimated output of 70 million ounces in 1989. Mexican production has increased more than 63% over the past 20 years, from 42.8 million ounces in 1970. Around 42% of Mexico's silver output is estimated to come from silver mines, with a significant portion of the remainder coming from co-product operations. Mexican production seems to have reached a plateau, and is expected to be level in 1990. Indeed, Mexican output has been largely unchanged since 1985.

The **United States** is not far behind Mexico in terms of silver output. The United States produced about 61 million ounces in 1989, up 36% from 45 million ounces in 1970. U.S. output is projected to rise a further 8% in 1990, to 66 million ounces. Around 41% of U.S. output comes from primary silver mines. Another 11% is

**Mine Production**

Annual, 1950 through 1990



mined at gold and silver co-product mines and placer operations. Roughly 19% of U.S. silver is a by-product of gold mining, while 29% comes from base metal mines.

**Peruvian** production has fluctuated sharply since 1987, as this country has been beset by labor disruptions, serious financial problems, and activity by "Shining Path" guerrillas. Peru's mine production rose steadily in the early 1980s, reaching a peak of 65.9 million ounces in 1987. Output then declined 24% to 40.1 million ounces in 1988, largely because of strikes that paralyzed the mining industry. Production rebounded to 59.2 million ounces in 1989 and is expected to be stable to down again in 1990. About 27% of Peru's silver output comes from primary silver mines. Most of the rest comes from lead and zinc operations, with some output also attributed to the country's major copper operations.

A decade ago, before its current bout of economic and political problems began, there were some 300 mining companies registered with the Peruvian government; today there are about 100 still open. Peru's economy remains in virtual tatters, and state mining and metal enterprises are perpetually short of cash for equipment. Miners continue to stage walkouts for higher wages. Guerrillas are keeping up their terrorist campaign, which includes stealing material from mine sites, kidnaping mine managers, harassing workers, and sabotaging power supplies. Sharp fluctuations in Peruvian silver production cannot be ruled out under these conditions.

**Canadian** silver mine production peaked in 1973 at 47.5 million ounces and has fluctuated between 34.4 and 44.1 million ounces since then. About 35% of Canada's silver is primary silver, with the rest coming from gold, copper, and lead and zinc mines. Canada mined 41.3 million ounces of silver in 1989, and is projected to produce 44.0 million ounces in 1990. Canada was the only one of the five major producing nations to show a decrease in mine output in the 1970-1989 period.

**Australia** produced an estimated 37.3 million ounces of silver in 1989, an increase of more than 43% from 26 million ounces in 1970. Virtually all of Australia's silver is by-product. Until the

1980s, most of it came from copper, lead, and zinc mines. Silver output from those operations was relatively stable, around 23.0-27.5 million ounces per year. Beginning in 1982, however, a gold rush of historic proportions emerged in Australia. As gold mines with by-product silver came onstream during the 1980s, Australia's silver production rose to last year's 37.3 million ounces. The Australian gold industry is facing the imposition of income taxes in the early 1990s, which may combine with other factors to produce a sharp reduction in gold mining activity, and consequently, some silver production.

**Total mine production** in market economy nations is estimated at 374.0 million ounces in 1990. So much silver, 50% to 70%, is mined as by-product or co-product of nonferrous metals and gold that silver price fluctuations have a relatively minor influence on production in the short run. Silver mine production is more affected by general economic conditions and demand for gold and base metals.

Copper and zinc producers, which account for most by-product silver output, have been maximizing their production since 1986 because of high prices for those metals. Gold producers also have been maximizing their output in recent years, and several large new gold mines with significant by-product silver have opened or are being developed. This mining activity has served to increase silver's insensitivity to its own price.

Silver prices do have an effect on production when extreme changes occur. Mine production costs at many primary silver mines today, in the United States, Canada, and Peru, are at levels close to current prices. In Mexico, lower input costs and higher ore grades allow many mines to operate profitably even at current prices. Thus, a significant portion of world silver output currently is produced unprofitably. If prices remain this low for an extended period, some mines will close. Primary silver mines, which now produce about 166 million ounces per year, are most vulnerable to low prices. In fact, a few mines already have stopped production in the past year.

The issue of production costs is complex. Accurate estimates are difficult to come by, and the

accounting formulae by which companies calculate production costs vary significantly. In most cases, production costs for silver are simply unavailable because of the metal's status as a by-product. Revenue from the silver from some nonferrous operations is categorized as a credit

to reduce the costs of the primary product. Some producers regard production costs on a full-cost basis, including capital costs, administrative expenses, and amortization expenses. Others keep track of cash, operating costs.

**Mine Production of Silver, 1950-1990p**

Million Troy Ounces

	<u>Australia</u>	<u>Canada</u>	<u>Mexico</u>	<u>Peru</u>	<u>United States</u>	<u>Other Market Economies</u>	<u>Total Market Economies</u>	<u>Soviet Union</u>	<u>Other Transitional Economies</u>	<u>Total</u>
1950 ....	10.7	23.2	49.1	13.4	42.5	30.6	169.5	24.0	10.0	203.5
1951 ....	10.8	23.1	43.8	15.0	39.8	33.0	165.5	24.0	10.0	199.5
1952 ....	11.1	25.2	50.4	18.4	39.8	35.7	180.6	24.0	11.0	215.6
1953 ....	12.4	28.3	47.9	19.7	37.6	38.8	184.7	25.0	12.0	221.7
1954 ....	13.8	31.1	39.9	20.4	36.9	36.5	178.6	25.0	12.0	215.6
1955 ....	14.6	28.0	48.0	22.9	37.2	37.0	187.7	25.0	12.0	224.7
1956 ....	14.6	28.4	43.1	23.0	38.9	41.8	189.8	25.0	11.0	225.8
1957 ....	15.7	28.8	47.1	24.8	38.2	40.0	194.6	25.0	10.0	229.6
1958 ....	16.3	31.2	47.6	25.9	34.1	47.2	202.3	25.0	9.0	236.3
1959 ....	15.2	31.9	44.1	27.2	31.2	46.0	195.6	25.0	9.0	229.6
1960 ....	15.2	34.0	44.5	30.8	30.8	46.5	201.8	25.0	8.5	235.3
1961 ....	13.1	31.4	40.3	34.2	34.8	50.1	203.9	25.0	8.0	236.9
1962 ....	17.6	30.7	41.2	33.1	36.8	51.4	210.8	27.0	8.0	245.8
1963 ....	19.6	29.8	42.8	35.2	35.2	51.4	214.0	28.0	8.0	250.0
1964 ....	18.4	29.9	41.7	34.4	36.3	50.8	211.5	29.0	8.0	248.5
1965 ....	17.3	32.3	40.3	36.5	39.8	52.2	218.4	31.0	8.0	257.4
1966 ....	18.9	32.8	42.0	32.8	43.7	55.0	225.2	33.0	8.5	266.7
1967 ....	19.8	37.2	38.3	32.1	32.3	55.0	214.7	35.0	8.5	258.2
1968 ....	21.3	45.0	40.0	36.4	32.7	54.8	230.2	35.0	9.5	274.7
1969 ....	24.5	43.5	42.9	35.9	41.9	60.0	248.7	37.0	10.0	295.7
1970 ....	26.0	44.3	42.8	39.8	45.0	60.6	258.5	41.8	12.1	312.4
1971 ....	21.8	46.0	36.7	38.4	41.6	62.8	247.3	43.3	13.1	303.7
1972 ....	21.9	44.8	37.5	40.2	37.2	67.3	248.9	44.8	16.3	310.0
1973 ....	22.7	47.5	38.8	42.0	37.8	65.2	254.0	46.4	17.2	317.6
1974 ....	21.5	42.8	37.5	34.9	33.8	66.1	236.6	48.0	19.1	303.7
1975 ....	23.3	39.7	38.0	37.5	34.9	65.6	239.0	49.8	21.1	309.9
1976 ....	25.0	41.2	42.6	35.6	34.3	64.2	242.9	49.8	25.3	318.0
1977 ....	27.5	42.2	47.0	39.1	38.2	69.3	263.3	49.8	28.0	341.1
1978 ....	26.1	40.7	50.8	37.0	39.4	72.8	266.8	49.8	31.4	348.0
1979 ....	26.7	36.9	49.4	41.9	37.9	79.2	272.0	49.8	30.5	352.3
1980 ....	25.0	34.4	47.3	43.0	32.3	82.6	264.6	49.8	32.3	346.7
1981 ....	23.9	36.3	53.2	46.9	40.7	86.5	287.5	50.5	28.1	366.1
1982 ....	29.2	42.2	49.8	53.4	40.2	82.3	297.0	51.0	28.4	376.4
1983 ....	33.2	38.7	55.0	55.6	43.4	87.7	313.6	51.4	29.2	394.2
1984 ....	31.3	42.0	63.9	56.5	44.6	89.5	327.8	51.4	32.1	411.3
1985 ....	34.9	38.5	69.2	60.9	39.4	93.1	336.0	52.1	35.1	423.2
1986 ....	32.9	35.0	69.4	61.9	34.2	88.9	322.3	52.4	35.5	410.2
1987 ....	35.9	38.1	69.8	65.9	39.8	90.9	340.4	52.5	35.4	428.3
1988 ....	35.8	44.1	70.0	50.1	51.5	93.0	344.5	53.0	43.2	440.7
1989 ....	37.3	41.3	70.0	61.0	60.8	92.2	362.6	54.0	43.5	460.0
1990p ...	38.0	44.0	70.0	60.0	66.0	96.0	374.0	54.0	39.0	466.9

Notes: Totals may not equal the sums of countries due to rounding.

p — projections.

Sources: CPM Group, industry sources.



**Secondary and Other Supply**

The flow of silver from secondary and other sources remains a key element in the supply picture, although their importance in the market has diminished over the past three decades.

Many of the sources of secondary silver supplies (old coin melt and Indian scrap sales) and 'other' supplies (notably government disposals) are mere shadows of their former volumes. Whereas each of these sectors has at some point in the past supplied large shares of total silver supplies, today each of them only accounts for around 1% or 2% of total supply. Furthermore, it is not at all clear that the flow of silver from these sources would increase even in the face of a future run up in silver prices. In the case of Indian and government sales, there are strong indications that even higher prices would not stimulate much if any increase.

In the 1960s, secondary and other supply accounted for an average of 62% of total new silver

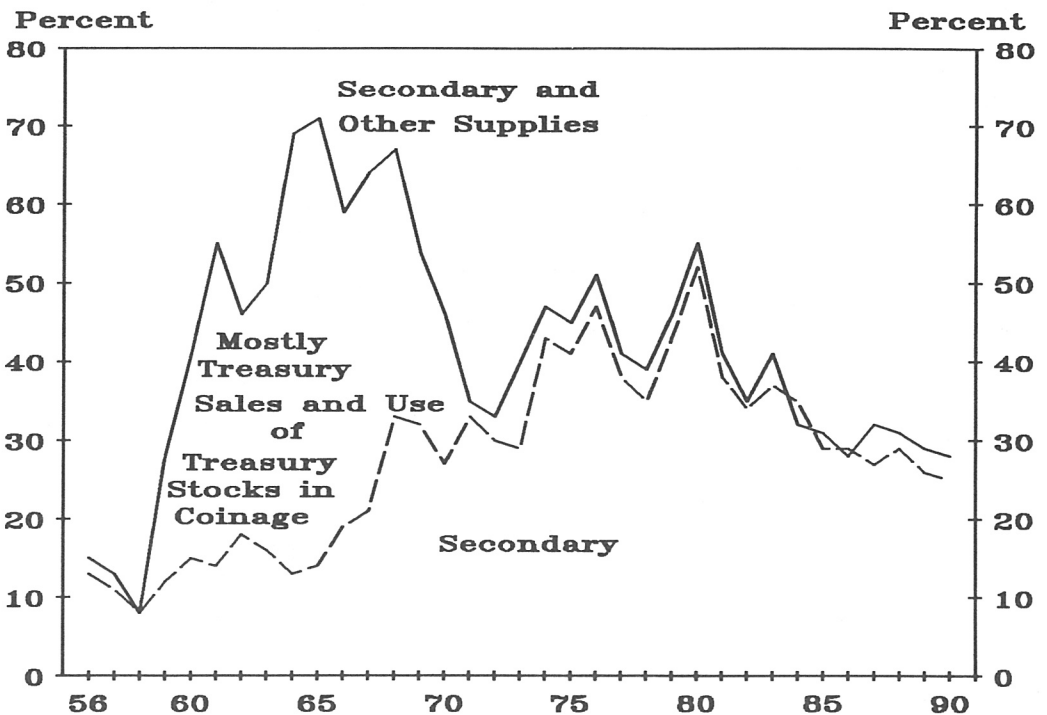
supply annually, due to huge sales of U. S. Treasury silver to silver fabricators. (Excluding the Treasury sales, secondary and other supply averaged 24% of total supply.) The percentage declined to an average of 42% in the 1970s, and to 36% in the 1980s.

Silver from secondary and other sources is estimated at 140.0 million ounces in 1990, after 152.7 million ounces in 1989. Overall, the share of total new silver supply that comes from secondary and other sources continued to slide throughout the 1980s, as the chart below illustrates.

Secondary supply includes the recovery of silver from old scrap and coins, and sales of silver-bearing items in India. Other supply, as defined at the beginning of this chapter, includes government disposals and net exports from the transitional economies. A special chapter discusses what is known about silver in the transitional economies.

**Secondary and Other Supply as a Percent of Total Supply**

**Annual, 1956 through 1990**



## Secondary Supply

### 1. *Old Scrap*

Old scrap has been the largest source of non-mine silver supply since the U.S. Treasury exited the market at the end of the 1960s. In 1971 old scrap silver recovery amounted to 68 million ounces, 51% of the silver from secondary and other sources that year and 18% of total supply. Since 1977, old scrap has supplied 24% of total supply on average.

Most old scrap is recovered from photographic materials, jewelry and silverware, and electronic and electrical equipment. Scrap recovery rates are much more price elastic than mine production: The flow of old scrap into the market rises in tandem with rising prices, and falls when prices decline.

The past few years have seen a change in this behavior. Despite a decline in silver prices since 1987, the recovery of silver from old scrap jumped 7.6% in 1988, to 121.9 million ounces from 113.3 million ounces, and rose a further 2.5% in 1989, to 125 million ounces. Strong manufacturing rates partly accounted for this anomaly. Also, photography is taking a larger share of the silver market now, and the increase in silver's use in photography has been mirrored in an increase in the recovery of silver from photo products.

Fabricators tend to continue scrap recovery programs even after prices decline. Additionally, manufacturers were selling silver from their stocks in late 1988 and early 1989. This practice appeared to have ended in mid-1989, and has not reappeared in the first 10 months of 1990. As a result, the flow of old scrap should fall 8% to around 115 million ounces in 1990.

### 2. *Coin Melt*

Coin melt has dwindled in importance as a source of silver. In most years up to the 1980s, coin melt totaled between 10 million and 35 million ounces. When silver prices rise sharply, the recovery of silver from old coins also has tended to rise.

The flow of old coins rose to 50 million ounces per year in 1968 and 1969, in response to the

rise in silver prices in 1968. Coin melt also rose to 72 million ounces in 1976, in what appears to have been a delayed response to the 1974 price rise. Then, in 1979, coin melt rose to 45 million ounces, from 21 million ounces in 1978. It doubled again in 1980, to 94 million ounces. As prices fell in 1981, coin melt declined to 18 million ounces.

Over the course of the late 1980s the flow of silver from old coins has dwindled, however. Last year, this source is estimated to have contributed only 6 million ounces to total supply in 1989.

The recovery of silver from demonetized coins historically has been highly price elastic. Since the mid-1980s the supply of old coins has stagnated, however, even in the event of rising prices. This could reflect the fact that the recent changes in silver prices have been minor from the perspective of those investors holding these coins, providing little economic incentive for them to sell.

Evidence suggests that those investors who still are holding silver coins have extremely long time horizons: Some have held silver in coin form since the late 1960s. These investors are not likely to sell their coin holdings today because the price rises 10% or so; they appear to have a much higher target price in mind.

### 3. *The Indian Silver Market*

Until the mid-1980s net sales of silver-bearing items by Indian individuals was a major source of silver to the market. Since then, the Indian market, isolated from the world market by import and export restrictions, has reversed this role. Whereas silver used to be smuggled out of India, smugglers now bring silver into India in order to meet fabrication requirements.

Throughout the 1970s and early 1980s, private individuals in India sold between 24 million and 75 million ounces of silver annually. This metal made its way to the numerous melt shops and refiners in Bombay and scattered throughout the country. Some of this silver ultimately was used domestically to satisfy Indian fabrication demand, but between 11 million ounces and 60 million ounces were smuggled out of India into the world market each year.

This pattern reversed in 1984, as Indians became reluctant to sell their holdings. Since 1986 Indian fabrication demand has exceeded domestic supply. Now Indian industry depends on smuggled imports to satisfy its silver requirements. In 1989, for example, Indian silver use totaled 27 million ounces. Only 5 million ounces of this was covered by domestic scrap, and around 1 million ounces from domestic mine production. India relied on smuggled imports of nearly 21 million ounces to meet its domestic requirements in 1989.

Given that India only produces small amounts of silver, about 1.3 million ounces per annum at present, the origin and very existence of the famed silver hoards of India sometimes are questioned. Most of India's silver was imported during British colonial rule, from 1886 to 1948. Colonial and Indian government records, along

with accurate market estimates of subsequent sales, support the conclusion that this metal remains in India. Even so, this silver is not available to the market. Most of it is in the form of jewelry and household decorations. These stocks once supplied a fair amount of silver to the market—up to 75 million ounces in a year—but this no longer is the case.

Prior to 1985, the Bombay price of silver was lower than international silver prices, drawing illegal exports. This trend has reversed since then. Over the past three years, the Bombay price of silver has been sharply higher than spot international prices on an annual basis—72% higher in 1987, at \$12.07; 66% higher in 1988, at \$10.84; and 93% higher in 1989, at \$10.60. These price differences encourage illegal imports of silver into India.

## Other Supply

### 1. *Transitional Economies' Net Trade*

Over the past 30 years the market often was supplied with 3 to 14 million ounces of silver annually from Eastern Europe, the Soviet Union, the People's Republic of China, North Korea, and the Indochinese nations. These countries, many of which now have removed their former Communist governments, were segregated from the world market by their governments.

Polish silver exports fell in the mid-1980s, as that country's copper mines were limited in output by various economic and political problems. At the same time, the Soviet Union and China increased their silver purchases in the market, apparently in part because they felt silver prices at the time, between \$5 and \$8, represented a long-term low price. (They also needed to compensate for lower Polish silver exports to them.) From 1983 through 1986, transitional economy net imports totaled 50.4 million ounces of silver.

Since 1987 these countries have returned to being net suppliers of silver to the market, at about 6 million ounces annually. The reindustrialization of these economies has the potential of sharply increasing domestic silver requirements, thereby reversing this sector's historic role in the silver market as a source of supply.

In an ideal report, the supply and demand for silver in these countries would be measurable, and these countries' statistics would be incorporated fully into world statistics. In reality, it is too early for this to be done accurately. Steps are being taken to develop reliable, accurate data on these countries' silver production and use, to

allow their inclusion in world statistics as soon as possible.

### 2. *Government Sales*

In the 1960s, silver from the U.S. Treasury accounted for as much as 76% of the annual flow from secondary and other supply. Today, nearly all silver disposals by the U.S. and other governments go directly to coin fabrication. (By law, the U.S. Silver Eagle must be minted from silver held by the government.) In fact, this has been the case since the early 1970s. However, there have been three exceptions.

1.) In 1981, 2 million ounces from the U.S. National Defense Stockpile were sold directly to the public.

2.) The Central Bank of Peru sold 9 million ounces in 1983, and 2 million ounces in 1984.

3.) The U.S. Treasury is nearing the end of a three-year, 7.5 million ounce disposal program, which is being administered by the Defense Logistics Agency. That program is due to be completed sometime in 1991.

Since the beginning of the 1980s the use of silver in various coin programs and the bullion sales mentioned above have sharply reduced U.S. government silver stocks. In 1981 the government's two largest silver stockpiles held a total of 178.3 million ounces of silver—139.5 million ounces in the National Defense Stockpile and 38.8 million ounces in U.S. Treasury reserves. By October 1990 these inventories had been reduced to 117.4 million ounces—90.2 million ounces in the strategic stockpile and 27.2 million ounces in Treasury holdings.

Secondary and Other Supplies

Million Troy Ounces

	Secondary				Other		Total Secondary and Other	U.S. Treasury Sales	U.S. Treasury Coinage	Total
	Old Scrap	Demone- tized Coin	Indian Scrap used Domestically	South Asian Exports	Government Disposals	Net Exports from T.E.				
1960 . . . .	40	10	2	0	12	10	74	22	46	142
1961 . . . .	43	20	2	0	7	55	127	63	56	246
1962 . . . .	47	20	2	0	4	25	98	1	77	176
1963 . . . .	50	15	3	0	10	0	78	25	112	215
1964 . . . .	54	20	12	0	20	0	106	151	203	460
1965 . . . .	57	30	16	0	17	9	129	80	320	529
1966 . . . .	61	28	16	0	10	10	125	143	54	322
1967 . . . .	59	35	15	17	5	8	139	195	44	378
1968 . . . .	75	50	16	86	15	0	242	180	37	459
1969 . . . .	80	50	16	28	0	11	185	89	19	293
1970 . . . .	55	25	16	31	10	13	150	67	1	218
1971 . . . .	68	20	16	23	5	0	132	0	2	134
1972 . . . .	73	15	13	11	10	0	122	0	2	124
1973 . . . .	72	15	13	22	45	0	167	0	1	168
1974 . . . .	82	35	15	60	20	0	212	0	1	213
1975 . . . .	90	20	13	54	12	3	192	0	3	195
1976 . . . .	92	72	18	53	10	7	252	0	1	253
1977 . . . .	93	33	18	25	5	8	182	0	0	182
1978 . . . .	82	21	21	28	9	7	168	0	0	168
1979 . . . .	130	45	23	18	3	14	233	0	0	233
1980 . . . .	164	94	23	21	5	13	320	0	0	320
1981 . . . .	125	18	27	14	4	8	196	0	0	196
1982 . . . .	111	7	23	14	1	0	156	0	2	158
1983 . . . .	133	20	23	21	19	-1	215	0	2	217
1984 . . . .	124	20	21	1	16	-30	152	0	2	154
1985 . . . .	102	18	21	0	13	-1	153	0	0	153
1986 . . . .	103	10	16	0	14	-18	125	0	0	125
1987 . . . .	113	10	15	0	20	6	164	0	0	164
1988 . . . .	122	9	13	0	8	6	158	0	0	158
1989 . . . .	125	6	5	0	10	6	152	0	0	152
1990p . . . .	115	6	4	0	9	6	140	0	0	140

Note: "Government Disposals" includes silver used in coins from stocks and bullion sales from governments other than the United States for the years through 1970. The U.S. Treasury bullion sales and the use of silver from the U.S. Treasury stocks in coins during the 1960s are separated. After 1970, U.S. government bullion sales and use of government stocks in coinage are included in the "Government Disposals" category.

Sources: U.S. Bureau of Mines; Handy & Harman; Samuel Montagu; Silver Institute; trade sources; CPM Group.

### Fabrication Demand

Fabrication demand for silver (excluding coinage) has doubled over the last 30 years, increasing from 235.0 million ounces in 1960 to 469.2 million ounces in 1989. Total silver use is projected at 480.0 million ounces in 1990.

This growth has not been constant, being influenced by economic cycles and technological changes. The major markets continue to be photography, jewelry and silverware, and electronics. However, photography has increased its share of the market throughout the past three decades.

As well as being responsive to overall economic well-being, silver use tends to be price elastic. Demand rises when prices fall, and vice versa. Silver is the least expensive precious metal; there are no cheaper alternatives in many applications that require the properties of a precious metal.

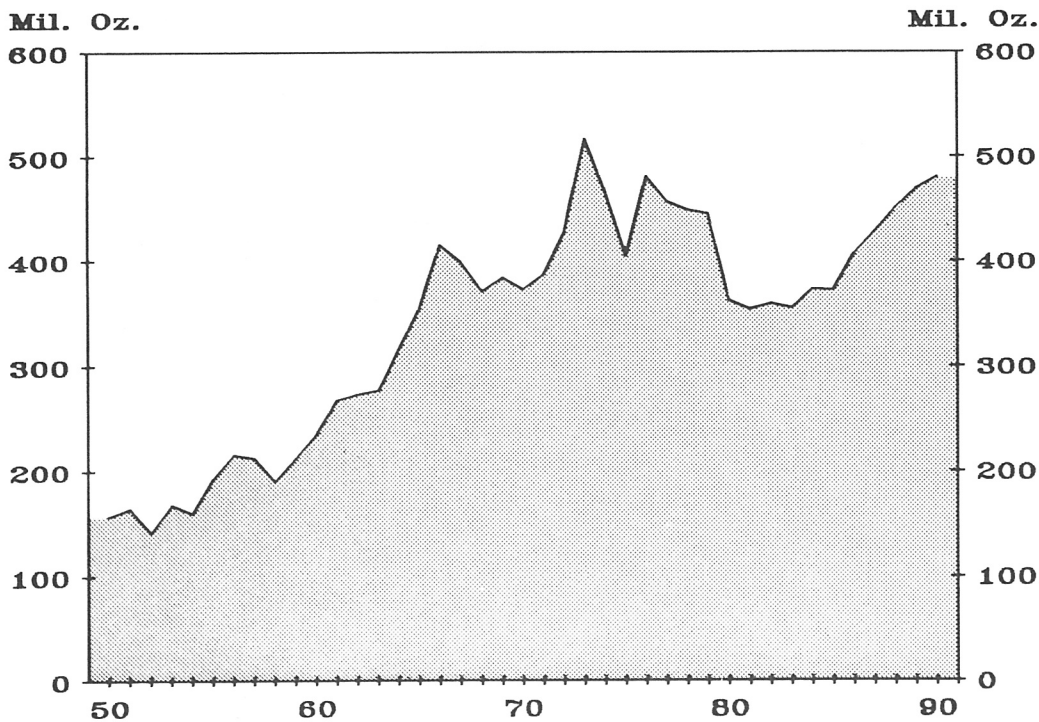
### Silver Use by Country and Region

The United States remains the largest single direct consuming nation of silver, as well as an important indirect consumer through its import of products containing silver. Its direct market share has fallen, from about 40% in the early 1960s to about 25% at present. Last year, U.S. consumption was estimated at 120 million ounces, compared with 102 million ounces in 1960. Silver demand in the United States peaked in 1973, when silver use reached 196 million ounces.

Japan has become the second largest consumer of silver, with demand reaching 104 million ounces in 1988 and 102 million ounces in 1989. Japan's share of the market has increased from about 7% in the early 1960s to 22% last year. West Germany had been the second

### Annual Total Demand

1950 through 1990



largest consumer until the early 1970s, when consumption peaked at 60 million ounces per year. West Germany's market share has fallen from 16% in the 1960s to 10% in the late 1980s. Total Western European consumption has risen from less than 100 million ounces in 1960 to more than 170 million ounces in 1989, more than a third of total demand.

As with supply, the world total figures in this chapter exclude silver use in the transitional economies of Eastern Europe, the Soviet Union, China, and the centrally planned economies of Asia.

**Photography**

Photographic industries in the United States, Japan, and Western Europe, together accounted for 40% of total silver demand last year. Demand was 186 million ounces in 1989, compared with an average of 146 million ounces per year, or about 33% of the market, in the late 1970s.

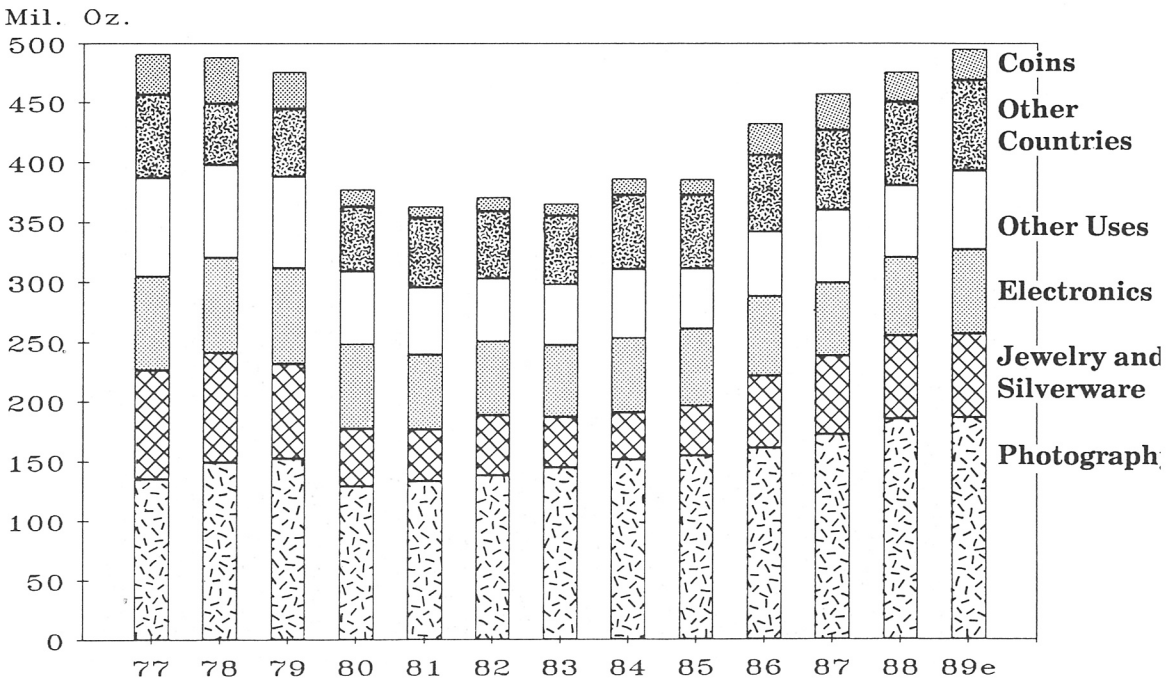
This year photography companies in the major three industrialized regions are expected to use around 194 million ounces. Additionally, there are photo product plants in Australia, Latin America, India, and other countries. Detailed data are not available for silver photo demand in these countries, but it could total 15-20 million ounces per year. India alone uses about 6.7 million ounces of silver in photographic products. Possibly 5%-10% of world photo demand for silver occurs in these regions.

The photographic industry consists of several sectors. There are basic films, such as the color and black-and-white films used by amateur and professional photographers (some marketing groups label this consumer photography). Additionally, there are x-rays, an industry that itself should be divided into three distinct categories: medical, dental, and industrial. Finally, there are photo products used in various graphic arts and printing applications.

Growth in world photographic consumption of

**Fabrication Demand by Sector**

Annual, 1977 through 1989



silver has continued almost uninterrupted for most of the past four decades, at 3%-4% per annum. The only significant break in this steady growth came in 1980.

*Consumer Photography*

Basic films and papers, those materials used by professional and amateur still and motion picture photographers, required 87 million ounces of silver last year, or about 47% of total photographic use. Silver use in these materials has been rising steadily since the early 1980s. Indeed, with the exception of a drop in 1980 related in part to the high silver prices at the time, silver use in consumer photography has been rising at a consistent pace since the 1950s.

Per unit use of silver is higher now than ever before. In the early 1980s new silver-halide technologies were introduced. Initially, they were commercialized in reaction to the sharp increase in silver prices, which raised the cost of film

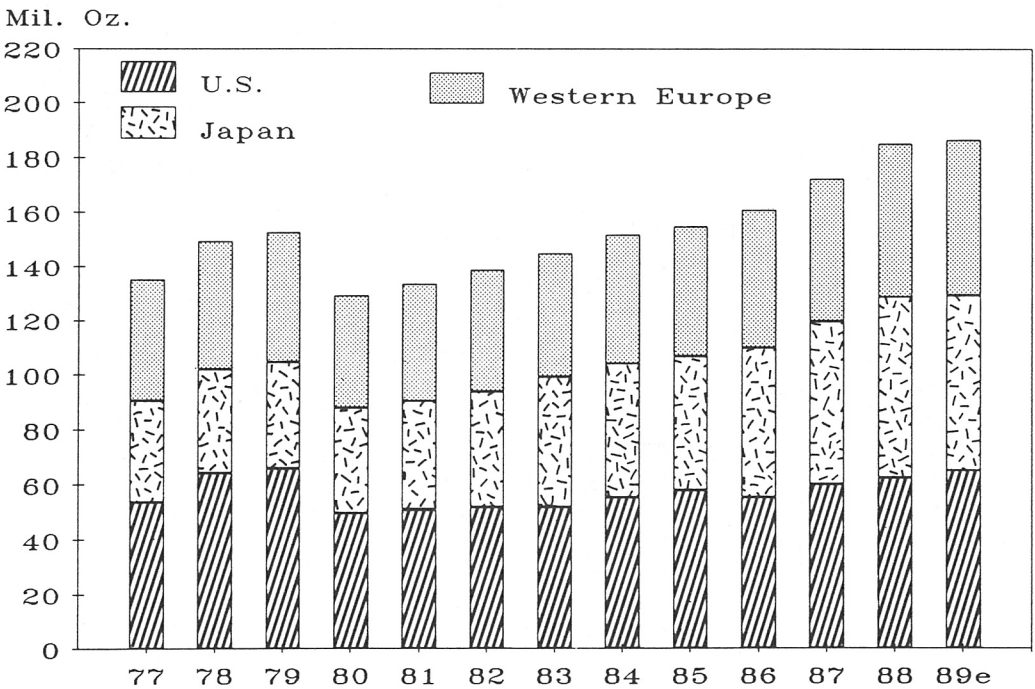
sharply. The introduction of these technologies allowed for less silver to be used per frame of film.

However, one also could use the same amount of silver, or more, and radically increase the "speed" of the film, the film's ability to imprint an image in less than perfect lighting. As the 1980s progressed, several trends stimulated a shift among photo manufacturers in this direction. First, the competition in this industry became very fierce. Film makers introduced several series of improved, higher speed films in an effort to beat their competition. Another factor was that silver prices remained relatively low and stable, reducing the film manufacturers' attention on keeping silver costs down, especially while waging a film-speed battle. As a result, by the late 1980s standard color film was using more silver per frame than at any time in recent history.

Black and white photography has been available since 1840, when Daguerre commercial-

**Photographic Demand for Silver**

**Annual, 1977 through 1989**





ized his processes. With the introduction of color photography in 1935, the use of black and white films and papers declined, especially in the amateur sector, and now is about one third of the basic photography market. In 1989, 29 million ounces are estimated to have been used by photographers utilizing black and white materials, including microfilm. The great majority of those photographers were either journalists or professionals, who use black and white more as an art form than a recording device.

Color photography, which may account for some 90% of all amateur photography, used an estimated 58 million ounces of silver in 1989. Cameras have become both less expensive and easier to use, and no other available technology can approach the use of silver-halide in terms of the cost and quality of the printed product. The waiting time for the finished product has been reduced in some cases to one hour by the proliferation of same-day developing labs.

One possible substitution for silver-halide based photography is electronic imaging, whereby a picture is stored on an erasable, non-silver magnetic medium. Electronic imaging requires a television for viewing, however, in contrast to portable snap-shots. The printers now available for getting hard prints from electronics systems are expensive, bulky, and yield prints with the quality of poor telefacsimile pages. Companies involved in these technologies hope to be able to match today's clarity in photography sometime in the next century. Finally, these systems are many times more expensive than standard cameras.

Amateur photographers clearly prefer a small, inexpensive, portable, easy-to-use product that produces a high quality printed product. Until electronic photography can meet these requirements, silver-halide photography will continue to dominate the amateur market. Such developments are not foreseen by any professionals involved in either photochemical or electronic imaging for at least another decade.

The amateur photography sector has enjoyed the fastest growth of all photographic uses of silver, and is likely to continue to do so. Picture taking rises along with world population, and is less responsive to economic cycles than con-

sumer demand for other silver bearing products. Past growth approaches 5% per year, a rate that should continue for some time.

One area of amateur use where silver consumption has fallen is home movies that utilize super-8 film. Today, most home movies are recorded on silver-free video tapes that can be played on a video cassette recorder. The advantages include cheaper tapes that hold more movies and can be reused, greater ease of playing as the VCR is already set up for playback, and no cost or wait to develop the tape. Silver demand for professional movies also has declined, initially due to television, but now also due to the increased use of magnetic tape.

Microfilm applications may have used 5 to 6 million ounces of silver last year. Increased record keeping requirements and the growing acceptance of microfilm as a preferred method of long-term document storage should lead to increased consumption in this photographic area.

#### *Silver Use in X-rays*

X-rays accounted for around 31% of total photographic silver use, or 58 million ounces, last year. Medical x-rays represent around 67% of the total x-ray market (39 million ounces). Within the medical area, there are several subdivisions. The major subdivision is between x-rays per se and x-ray print-outs from electronic medical diagnostic imaging. Electronic medical imaging includes sonograms, CATscans, and nuclear magnetic resonance technologies.

Electronic medical imaging originally was hailed as a possible replacement for standard x-rays. However, doctors insist on printed hard copies of the images produced in them. These hard copies presently use standard x-ray film, and account for some 20% of medical x-rays, or 4 million ounces. The end result of the introduction of these technologies has been a sharp increase in the use of x-ray film, as doctors have increased the number of images they take of a given patient. In the past a doctor might have had four x-rays taken of a patient; today he might have half a dozen sonogram images and a dozen NMR images produced.

The increased use of x-ray film has tended to offset the reduction in the amount of silver used in x-ray films and papers, which may be as little as 40% of what was used 10 years ago. Both trends are expected to continue in the near future. The overall growth of x-ray use is expected to be at least as high as it has been during the 1980s, and it may well be stronger. In contrast, the reduction in per-unit silver use is likely to slow. Thus, the net result is expected to be a 3%-4% per annum growth rate in medical x-ray use of silver.

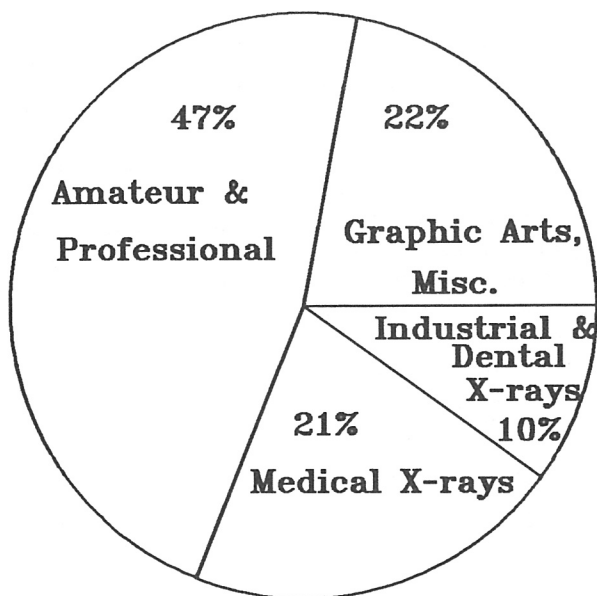
Dental and industrial x-ray films account for the remaining 33% of total x-ray demand, using about 19 million ounces of silver each year. Industry uses radiography for non-destructive testing, for example to inspect welded seams in power plants and pipelines. This application is subject to possible replacement by the very same electronic imaging technologies that are gaining in the medical field. The advantages include safer conditions for testing personnel, and in some cases better results and cost savings. Industrial use is more dependent on the level of general business activity than is medical use, and thus is a more cyclical consumer of silver.

Dental x-rays probably are less likely to be replaced by other diagnostic measures. Dentists generally have their own equipment in their offices, unlike doctors who either work in a hospital or are affiliated with one, and have access to a NMR or CATscan unit. Additionally, the need to produce images of soft tissues and organs is not as important in dental medicine.

As with basic photography, silver use in x-rays faces some risk of substitution. One of the more promising potential substitutes is a recently developed system aimed at replacing silver-halide based technology in some medical x-ray applications.

The technology uses carbon-based chemicals. The system will produce black and white transparencies of images produced on electronic medical diagnostic equipment. Sales of some units, capable of producing transparencies of 8 by 11 inches, are scheduled to begin in 1991. Units capable of producing larger transparencies (14 by 17 inches), which are more common in the medical profession, will not be marketed for a couple of years.

**Photographic Demand for Silver by Sector**



The impact of this technology, even if marketing efforts succeed, may be only moderate. The system is suitable only for that segment of the medical x-ray market comprised of hard copies of electronically generated images. That market segment used around 9.9 million ounces of silver in 1989, representing 5% of photographic use of silver and 2% of total silver fabrication demand.

#### *Silver Use in Graphic Arts*

Last year, around 41 million ounces of silver were used by the graphic arts industry. This represents about one fifth of the total photographic market, a slightly smaller share than in previous years, although actual usage rose by slightly more than 3% per year in the late 1980s. This is the area in which silver-based technologies are most susceptible to substitution. In fact, many silver-based graphic arts products already have been replaced, and the bulk of the reduction in silver use seems to be behind this market.

#### **Electronic and Electrical Equipment**

Last year an estimated 70 million ounces of silver were absorbed by electronic and electrical end uses, about 15% of total fabrication demand. This is down somewhat from consumption in the late 1970s, when about 80 million ounces were used annually. However, it is up from a 1983 nadir of 60.4 million ounces. Silver is used in several applications in electrical and electronic equipment.

The most important use is as a plating on connectors and contacts, where silver is employed to ensure good electrical conductivity. Silver connectors are used in automobiles, in electronic controllers on modern household appliances, and in some electronic machinery. Silver also is used in special application batteries, including many of the most common types of small button-shaped batteries used to power hearing aids, cameras, calculators, and other small electronic products. About 90% of the silver used in electronics and electrical equipment is used in contacts and connectors, with batteries accounting for the other 10%.

Since 1987 more silver has been used in electronics in Western Europe than elsewhere; earlier, the United States had been the major consumer in this area. A good deal of the electronics plating salts and pastes used in the manufacture of connectors that are manufactured in Europe appear to be exported for use in equipment manufactured elsewhere. Western Europe used nearly 34.8 million ounces of silver in electronics in 1989, about 44% of total electronics demand. The United States used 26.3 million ounces, or 33% of the total. Japan used 9.5 million ounces.

Industry trends towards the miniaturization of components, and greater efficiency in silver use, led to a sharp decline in silver demand from this sector in the late 1970s and early 1980s. These trends were accelerated by the run up in silver prices in 1979-1980. The resulting cutback in silver use was amplified by the recession of the early 1980s. The industry's consumption of silver declined 25% from 80.4 million ounces in 1979 to 60.4 million ounces in 1983.

Since that time, electronics' use of silver has regained some of this loss. During the 1980s, while silver was losing some markets to silver-coated copper and plain copper, it was gaining other markets as a substitute for gold and platinum. In the 1970s, the gold/silver ratio spent most of the time between 30:1 and 40:1. With the comparable cost of using silver instead of gold at these levels, many manufacturers were content to stay with gold.

When precious metals prices rose sharply at the turn of the last decade, some of these attitudes quickly changed. Additionally, since 1980 the ratio has risen fairly steadily, ranging between 70:1 and 80:1 in 1990. Similarly, platinum once was 20 times more expensive than silver; now it is 100 times more expensive. Given these wider price differentials, many electronics manufacturers have shifted from gold and platinum to silver over the past eight years.

Some electronics companies have been concerned for years about the long-term availability and price prospects for palladium. Considerable research has been conducted into substitutes, with the most obvious choice being silver. This concern was heightened when palladium prices rose in the first few months of 1989.

By the beginning of 1990 some Japanese manufacturers had begun using silver-based substitutes for thick film pastes. Coincidentally, some U.S. manufacturers were beginning to switch to palladium at the expense of silver. In the end, it appears likely that silver use in electronics may rise a few percent per year as a result of the shift in Japan, even after accounting for the move to palladium at other plants.

**Silverware and Jewelry**

In 1989, 70.1 million ounces of silver were used for jewelry and silverware in the United States, Japan, and Western Europe, almost 15% of total fabrication demand. Western Europe accounted for 82% of this market, using 58 million ounces. The United States used almost 9 million ounces, and Japan nearly 5 million ounces.

To understand these trends, readers need to remember the point made in the Preface, that the statistics in this report measure silver use,

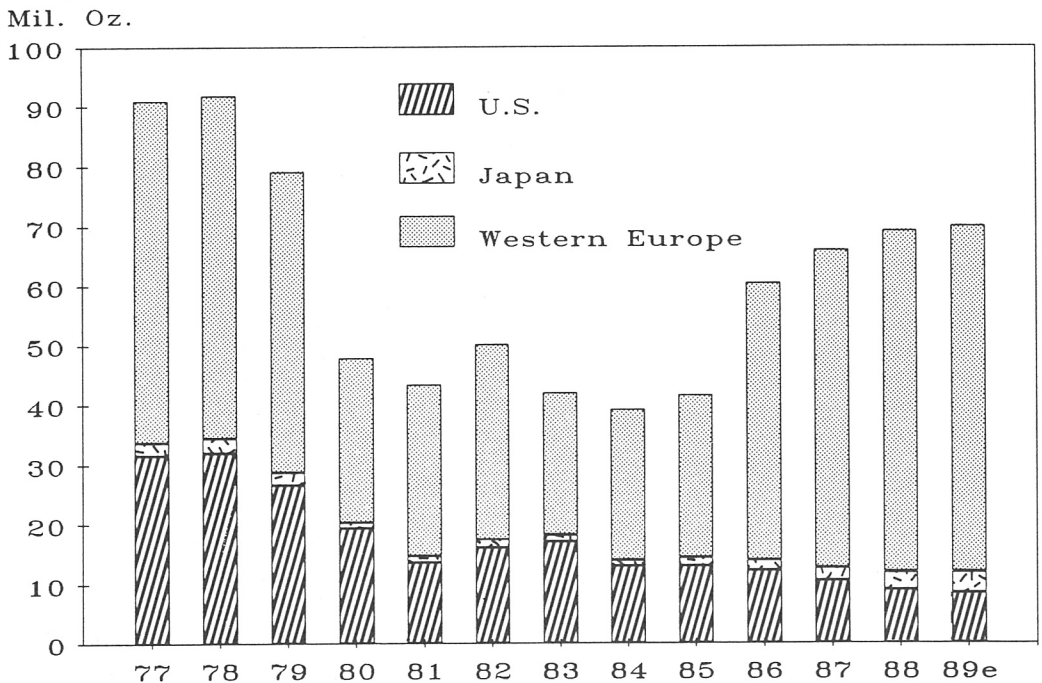
and not the consumer purchase of silver-bearing products. It is not that Americans necessarily were buying less silver jewelry or sterlingware; rather, manufacturing had shifted elsewhere, particularly to Italy.

In the late 1980s there was an increase in the manufacture of jewelry and sterlingware in Italy. In 1985, U.S. sterlingware makers and jewelers used 13.0 million ounces of silver, 31% of the total of 41.7 million ounces used in these applications that year. Western European jewelers and silversmiths used 27.2 million ounces, 65%. Italy accounted for 9 million ounces of that European figure. The following year Italian fabricators used 22.2 million ounces of silver in jewelry and silverware, boosting Europe's total to 46.5 million ounces, or 77% of this market.

U.S. silver use in jewelry and silverware has declined significantly in the past 15 years. From the mid-1970s to 1987, the consumption of silver in silver-plated flatware fell to about 6 million ounces, an annual average decline of 13%. U.S.

**Jewelry and Silverware Demand**

**Annual, 1977 through 1989**



jewelry demand fell about 8% per year during the same period, to 4 million ounces in 1987. Silver use in jewelry and sterlingware in the United States fell to 9 million ounces in 1988 and 8.5 million ounces in 1989.

It is a misconception that high silver prices in 1979 and 1980 started the decline of sterlingware use in the United States. In reality, demographics and fashion trends in the mid-1970s were behind the decline. By 1979 the trend away from sterlingware was well established. Rising silver prices did accelerate the transition. Marketing and pricing missteps by silversmiths also contributed to the decline in demand for sterlingware in the 1980s. Sterlingware manufacturers, not understanding the changing markets, engaged in price cutting, curtailed advertising programs, and failed to reposition their products quickly.

The manufacture of sterlingware in Europe has risen in recent years, partially offsetting the decline in the United States. In the early to mid 1980s, somewhere between 25 and 30 million ounces of silver were consumed on an annual basis in Europe. Demand has risen steadily since 1983, and is now almost double that level. As mentioned earlier, some of this silver went into jewelry and sterlingware that was exported. The Japanese market is expanding as well, but this is a small market, currently using on the order of about 3 to 4 million ounces of silver per year.

In 1988 Silver Trust International was created by a group of silver mining companies. Silver Trust International is charged with promoting the use of silver in sterlingware, jewelry, and investment products. In its early years it has concentrated on the jewelry and sterlingware markets in the United States, with good initial results.

**Annual Silver Use**

Million Troy Ounces

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<b>Photography</b>						
United States .....	53.7	64.3	66.0	49.8	51.0	51.8
Japan .....	37.0	37.9	38.8	38.2	39.5	42.1
Western Europe .....	<u>44.7</u>	<u>47.2</u>	<u>47.9</u>	<u>41.4</u>	<u>43.2</u>	<u>44.9</u>
Subtotal .....	135.4	149.4	152.7	129.4	133.7	138.8
% of Total .....	29.6%	33.3%	34.3%	35.7%	37.8%	38.6%
% Change Year Ago ..	—	10.3	2.2	(15.3)	3.3	3.8
<b>Jewelry and Silverware</b>						
United States .....	31.6	32.0	26.6	19.4	13.7	16.2
Japan .....	2.2	2.5	2.2	1.0	1.1	1.3
Western Europe .....	<u>57.2</u>	<u>57.4</u>	<u>50.3</u>	<u>27.5</u>	<u>28.7</u>	<u>32.7</u>
Subtotal .....	91.0	91.9	79.1	47.9	43.5	50.2
% of Total .....	19.9%	20.5%	17.8%	13.2%	12.3%	14.0%
% Change Year Ago ..	—	1.0	(13.9)	(39.4)	(9.2)	15.4
<b>Electronics</b>						
United States .....	37.1	36.8	38.1	33.8	30.2	31.9
Japan .....	6.9	7.0	8.9	7.6	6.4	6.6
Western Europe .....	<u>34.7</u>	<u>35.5</u>	<u>33.4</u>	<u>29.8</u>	<u>25.6</u>	<u>23.2</u>
Subtotal .....	78.7	79.3	80.4	71.2	62.2	61.7
% of Total .....	17.2%	17.7%	18.1%	19.6%	17.6%	17.2%
% Change Year Ago ..	—	0.8	1.4	(11.4)	(12.6)	(0.8)
<b>Other Uses</b>						
United States .....	31.2	27.1	26.6	21.8	21.8	19.1
Japan .....	17.1	17.5	18.9	14.7	12.6	13.2
Western Europe .....	<u>33.4</u>	<u>32.9</u>	<u>30.4</u>	<u>24.5</u>	<u>21.8</u>	<u>20.3</u>
Subtotal .....	81.7	77.5	75.9	61.0	56.2	52.6
% of Total .....	17.9%	17.3%	17.1%	16.8%	15.9%	14.6%
% Change Year Ago ..	—	(5.1)	(2.1)	(19.6)	(7.9)	(6.4)
<b>Other Countries</b> .....	70.0	51.0	57.0	53.0	58.0	56.0
% of Total .....	15.3%	11.4%	12.8%	14.6%	16.4%	15.6%
% Change Year Ago ..	—	(27.1)	11.8	(7.0)	9.4	(3.4)
<b>Total</b> .....	456.8	449.1	445.1	362.5	353.6	359.3
% Change Year Ago ..	—	-1.7%	-0.9%	-18.6%	-2.5%	1.6%

Notes: Totals may not equal the sums of the categories due to rounding.

Excludes transitional economies. Excludes coins.

p — projections.

Source: CPM Group.

<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990p</u>
51.8	55.3	57.9	55.4	60.2	62.5	65.2	68.0
47.6	48.9	49.0	54.6	59.6	66.3	63.7	68.0
<u>45.6</u>	<u>47.6</u>	<u>48.1</u>	<u>51.1</u>	<u>52.6</u>	<u>57.0</u>	<u>57.1</u>	<u>58.0</u>
145.0	151.8	155.0	161.1	172.4	185.8	186.0	194.0
40.8%	40.7%	41.6%	39.6%	40.3%	41.2%	39.7%	40.4%
4.5	4.7	2.1	3.9	7.0	7.8	0.1	4.3
17.1	13.0	13.0	12.3	10.5	9.0	8.5	6.2
1.1	1.0	1.4	1.7	2.2	3.0	3.5	4.4
<u>23.9</u>	<u>25.3</u>	<u>27.3</u>	<u>46.5</u>	<u>53.3</u>	<u>57.3</u>	<u>58.1</u>	<u>60.0</u>
42.1	39.3	41.7	60.5	66.0	69.3	70.1	70.6
11.9%	10.5%	11.2%	14.9%	15.4%	15.4%	14.9%	14.7%
(16.1)	(6.7)	6.1	45.2	9.1	5.0	1.1	0.8
28.9	28.3	30.0	31.1	25.2	25.5	26.3	25.8
7.7	7.8	7.5	6.8	7.0	8.4	9.5	10.1
<u>23.8</u>	<u>26.2</u>	<u>27.2</u>	<u>28.5</u>	<u>28.9</u>	<u>31.5</u>	<u>34.8</u>	<u>35.2</u>
60.4	62.3	64.7	66.4	61.1	65.3	70.6	71.1
17.0%	16.7%	17.4%	16.4%	14.3%	14.5%	15.0%	14.8%
(2.1)	3.1	3.9	2.7	-8.0	6.9	8.0	0.7
18.5	18.3	17.7	20.1	19.4	15.0	20.0	23.0
15.7	21.1	14.7	15.5	23.4	26.2	25.5	26.3
<u>16.5</u>	<u>18.3</u>	<u>17.8</u>	<u>18.4</u>	<u>17.7</u>	<u>19.1</u>	<u>20.9</u>	<u>20.0</u>
50.7	57.7	50.2	54.0	60.5	60.3	66.4	69.3
14.3%	15.5%	13.5%	13.3%	14.1%	13.4%	14.1%	14.4%
(3.6)	13.8	(13.0)	7.6	12.0	-0.3	10.1	4.4
57.0	61.6	60.9	64.3	68.1	69.9	76.1	75.0
16.0%	16.5%	16.3%	15.8%	15.9%	15.5%	16.2%	15.6%
1.8	8.1	(1.1)	5.6	5.9	2.6	8.9	-1.4
355.2	372.7	372.5	406.4	428.1	450.6	469.2	480.0
-1.1%	4.9%	-0.1%	9.1%	5.3%	5.3%	4.1%	2.3%

Silver In The Transitional Economies

A Changing World

Commodity analyses traditionally have focused on the market economy nations, excluding the centrally planned economies that developed under Communist rule in Eastern Europe, Asia, and Cuba.

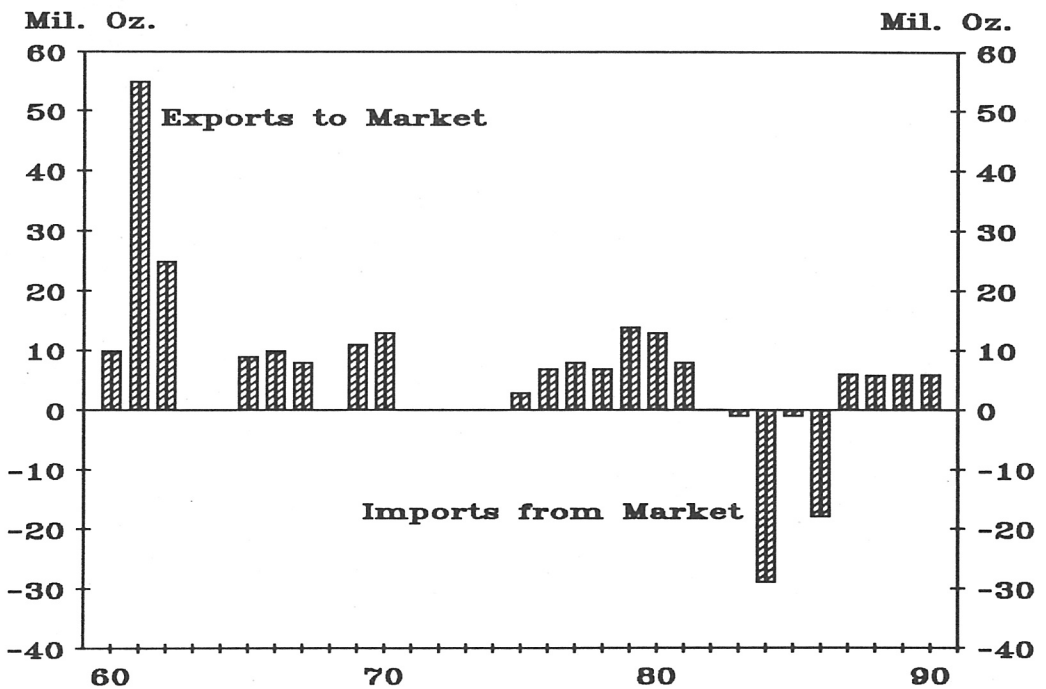
The monumental political, social, and economic changes spreading throughout these countries will influence the precious metals markets. It is too early to try to integrate these countries into world statistics: Not enough is known, and conditions still are changing rapidly. Also, the inclusion of these countries into international statistics preferably would include data for past years, so that the continuity of the international data base is maintained. Even if the new governments begin reporting supply and demand henceforth, there is no guarantee that statistics for past years will be forthcoming.

The lack of reliable statistics bolsters the argument for separating these countries from the larger international economy. Even so, the term "centrally planned economies" clearly has become anachronistic. With a few notable exceptions, communist nations in Europe and Asia are moving in the direction of market economy structures, albeit with varying degrees of speed and enthusiasm. The appellation "transitional economies" appears more suitable.

Additionally, events in the Peoples' Republic of China, one of the two most important economies in this group, have led to a retrenchment. While the governments of Eastern Europe and the Soviet Union welcome the name change to "transitional economies," the government of the Peoples' Republic of China will be quick to point out that, in its official view, China is not considered to be in such a transitional state.

Transitional Economies Net Trade

Annual, 1960 to 1990





For all of the limitations and secrecy, there are things that can be said about silver supply and demand in these countries. For decades a few private organizations and government agencies in the market economies have monitored the metals industries in these countries, collecting whatever data is available through the general and trade presses. Additionally, some of the industries' structures have become known, or at least partially defined, through their interaction with their counterparts in the market economies. The export of Polish by-product silver, and the trade in silver-bearing manufactured goods, provides some insights into conditions relating to silver in these nations. Finally, estimates of hypothetical supply and demand levels can be mathematically constructed.

### Mine Production

While statistics remain sketchy, it is clear that the Soviet Union is a major producer of newly mined silver. Data released by the Bank for Foreign Trade in early 1988 showed Soviet silver output rising from 41.8 million ounces in 1970 to 49.8 million ounces in 1975. Production increases have slowed since then. By 1980 production still was around 49.8 million ounces, rising slowly to 52.1 million ounces in 1985. Soviet mine production is estimated to have averaged 53 million ounces per year in 1986-1989. This output is almost entirely a by-product of numerous base metal mining operations.

Annual mine production in other transitional economies, excluding the Soviet Union, rose from around 30 million ounces per year in the early 1980s to around 43.5 million ounces in 1989.

Poland is the largest producer of this group after the Soviet Union, with by-product output of about 34 million ounces. East Germany produced an estimated 1.3 million ounces; Czechoslovakia 1.1 million ounces; Bulgaria, 799,000 ounces; Romania, 671,000 ounces; and Hungary, 25,000 ounces. North Korea may have produced 1.6 million ounces. Silver output in the Peoples' Republic of China is roughly estimated at 4 million ounces in 1989.

Because of the lack of concrete statistics from these countries, all of these figures should be used with some degree of caution.

### Secondary Recovery

Information on scrap recovery of silver in these countries is virtually nonexistent. It is known that some secondary recycling occurs, but that recycling is not as developed as it is in the market economies. Articles in the Soviet metallurgical press throughout the 1980s have extolled metals processing industries to improve their recycling efforts. Government representatives have toured recycling facilities in the market economies, interested in the technology that might be available. Additionally, with the changing of governments in Eastern Europe in late 1989, there has been an explosion of information concerning overall environmental problems throughout this region, including the dumping of industrial wastes and the lack of recycling.

The flow of silver from scrap in the Soviet Union and Eastern Europe could be as much as 20 million ounces per year, and is believed to be mostly from photographic scrap. The Soviet Union may recover up to 10 million ounces of silver alone, primarily at the state refinery. A small number of Eastern European companies also recover precious metals from scrap.

New secondary capacity is in the planning stages in Eastern Europe, with a joint-venture recovery plant slated for construction in Hungary, and possible facilities being discussed for Czechoslovakia and Poland.

The Peoples' Republic of China meets most of its domestic silver requirements from secondary supply. Prior to the introduction of Communism, China had a silver-based currency. As a result, there was a tremendous amount of silver in coins spread throughout the country earlier this century. When the People's Republic of China was established in the late 1940s, the government called in this coinage. China has substantial stocks of old silver coin and other 'scrap' in government and private hands. The Chinese government has inventories of silver, but the actual figure is considered a state secret and is not published.

### Fabrication Demand

Information also is sparse regarding industrial use of silver in the transitional economies. Based

on what is available, a broad idea emerges of the shape and breadth of such demand in the Soviet Union and Eastern Europe. The Soviet Union may consume around 70 million ounces annually, while Eastern Europe may consume as much as 100 million ounces per year in total.

Photography is estimated to be the largest end use. Sojuzchinfoto produces photographic products in the Soviet Union. There are other photoproduct manufacturers in East Germany, Hungary, Poland, Czechoslovakia, and Romania. As is the case in many industries in these countries, Soviet and Eastern European manufacturing procedures appear to use more silver per unit than do their market economy counterparts.

Historically, substitution of more readily available materials for silver has been stressed where possible, with copper used in electronic applications, non-silver brazing alloys and solders employed, and steel sometimes used in dental applications.

Several joint ventures have been launched, both in the Soviet Union and in East European countries, to sell film, camera equipment, and photographic supplies from market economy manufacturers. To date those programs that have been announced involve the sale of photographic products made in the market economies, rather than joint-ventures to make the films and papers within the transitional economies. Thus, these operations will not increase silver use in these countries per se. Instead, the actual silver use will appear in the market economies, at least initially.

The Peoples' Republic of China also has burgeoning photographic demand. Several major photographic manufacturers have sold film manufacturing plants to China, under turn-key arrangements. This ultimately should produce a net increase in silver use.

### Net Trade with Market Economies

Until now, the only aspect of silver in these countries that had been important to the market was their interaction with the market, specifically the flow of silver into and out of the market from these nations. The transitional economies have

been sporadic net suppliers of silver to the market economies over the past 30 years. However, in the last 10 years they have been net importers.

### Conclusions

Models of the silver market within these countries (backed by market information) suggest that from 1960 through 1977 the Soviet Union and its East European allies basically were able to meet their fabrication requirements from domestic sources. During this period they may have had surpluses of total silver supply over their fabrication requirements of 1 to 7 million ounces annually—a cumulative surplus of about 70 million ounces.

Some of this material was exported, with the rest presumably stockpiled. (Consumption may have been higher than the model suggests.) Regardless, this silver seems to have been used by the mid-1980s. The Soviet Union today does not appear able to meet its fabrication needs entirely from domestic sources: It has imported between 1.6 million ounces and 18.4 million ounces from market economies annually since 1982. In other years it has imported silver from Eastern Europe, particularly Poland. Several East European countries apparently also must fill their fabrication needs elsewhere, and have been net importers of silver produced by market economy countries.

This deficit in supply has been reflected in the net trade between these countries and market economies. From 1977 through 1989, net exports averaged 1.8 million ounces annually, compared with 8.9 million ounces in the 1960-1976 period. This included a four-year period, from 1983 through 1986, in which the transitional economies were net importers of 50.4 million ounces. Since 1987, net exports have stabilized at 6 million ounces per annum.

Taking a snapshot of the supply and demand balance in the transitional economies last year highlights this deficit in supply. Mine production in 1989 is estimated at 97.5 million ounces. Another 20 million ounces may have been recovered from scrap, bringing transitional economy supply to 117.5 million ounces. Silver use is **calculated** at approximately 170 million ounces, with another 6 million ounces exported out of the

region. This leaves an unexplained shortfall of about 70 million ounces in 1989 — a mathematically derived figure that emphasizes how much is still to be learned about the supply of, and demand for, silver in these nations.

**Transitional Economy Exports and Imports of Silver**

Million Troy Ounces

<b>Exports</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
East Germany .....	10.5	6.4	9.0	9.3	14.5	7.0	4.3
North Korea .....	6.4	2.3	1.4	1.4	1.6	1.9	1.1
Soviet Union .....	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Poland .....	6.0	4.2	5.3	10.4	8.9	9.2	10.9
China .....	0.0	0.1	0.1	0.2	0.1	0.0	0.3
Other .....	0.3	0.5	0.2	0.4	0.2	0.2	0.2
Total .....	23.2	13.5	16.0	21.7	25.3	18.3	16.9
<b>Imports</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>
East Germany .....	14.6	9.7	14.1	15.5	18.6	9.2	9.2
North Korea .....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Soviet Union .....	8.4	2.8	18.4	6.4	7.3	1.6	1.6
Poland .....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China .....	0.0	1.4	12.8	0.1	17.5	0.2	0.1
Other .....	0.2	1.0	0.7	0.7	0.3	1.2	0.0
Total .....	23.2	14.9	46.0	22.7	43.7	12.2	10.9
<b>Net Imports(-)/Exports</b>	0.0	-1.4	-30.0	-1.0	-18.4	6.1	5.9

Notes: Totals may not equal the sums of countries because of rounding.

The 1983 net trade figure here is slightly different from figures used elsewhere in this report.

Source: CPM Group.

**Mine Production in the Transitional Economies**

Thousand Troy Ounces

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Bulgaria .....	805	773	741	805	805	837
China .....	1,928	1,928	2,091	2,252	2,300	2,800
Czechoslovakia .....	1,126	1,126	1,126	1,062	964	1,030
East Germany .....	1,543	1,511	1,447	1,447	1,382	1,318
Hungary .....	34	34	31	30	30	25
North Korea .....	1,543	1,447	1,286	965	1,100	1,600
Poland .....	22,569	24,628	20,577	21,058	21,800	26,717
Romania .....	965	901	805	805	805	805
Soviet Union .....	49,834	49,834	50,500	51,000	51,441	51,441
Total .....	76,513	78,348	78,604	79,424	80,627	87,216
	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	
Bulgaria .....	837	837	837	799	799	
China .....	2,600	3,214	3,214	3,500	4,000	
Czechoslovakia .....	1,029	1,062	1,100	1,126	1,100	
East Germany .....	1,286	1,318	1,318	1,286	1,298	
Hungary .....	25	25	25	25	25	
North Korea .....	1,600	1,600	1,600	1,600	1,600	
Poland .....	23,900	26,652	26,717	34,176	34,000	
Romania .....	773	741	642	691	671	
Soviet Union .....	52,084	52,400	52,500	53,000	54,000	
Total .....	83,491	87,850	87,953	96,203	97,493	

Sources: U.S. Bureau of Mines; American Bureau of Metals Statistics; Statistics Canada; Chamber of Mines of South Africa; Gold Institute; Central Intelligence Agency; other government and industry sources; CPM Group.

## Investment Demand

The flow of silver into and out of investor hands has been a major factor in the direction of silver prices throughout the past three decades. Investors tend to be the marginal buyers and sellers in the market. This gives them a pivotal influence on the silver price, because their participation in the market is completely discretionary. In contrast to producers, refiners, and fabricators, investors do not have to buy or sell at any given time.

There is little quantitative information relating to investors. Traditional commodity analyses simply assume that in the years when there is a surplus of total silver supplies over fabrication demand, investors absorb this surplus. In the years when a deficit in supply develops, so this thinking goes, investors compensate for the shortfall by selling into the market. In short, the physical market's surplus or deficit is used as a surrogate for investment demand.

There are several pitfalls to this indirect approach to measuring investor activity. One is that other groups will hold physical silver stocks from time to time, including mining companies, refineries, trading companies, and fabricators. Traders are willing to absorb silver when they can cover the cost of holding these stocks through various hedging strategies in the futures and options markets.

In addition to holding bullion, since 1980 almost all coins sold have gone to investors, so that over the past decade at least a part of investor buying has been observable.

Finally, investor interest can be gauged to some extent by keeping an eye on trading volume on the various futures exchanges—particularly on the New York Commodity Exchange, or Comex. This measure also brings its own share of imprecision, since industrial users, mining companies, and trading companies are active participants in the futures markets.

### A Short History

No reliable data is readily available on investment demand up to 1960. Since that time investment demand has gone through three phases.

First, investors began buying a great deal of silver in the early 1960s, as it became clear that booming fabrication demand was drawing down U.S. Treasury stocks and would soon force an end to the government's price stabilization program. From 1960 to 1971, investors bought several hundred million ounces of silver.

In the second phase, investors began selling this silver. From 1971 to 1979 they sold a net 400 million ounces of silver, which helped restrain silver prices during this decade, as well as making up for the shortfall of new supply relative to fabrication demand.

In the third and most recent phase, investors since 1979 once more have been net buyers of silver. Using the market balance measurement, it appears that most of the surplus of 927 million ounces that built up from 1979 through 1990 was purchased by investors. Indeed, investors may have bought even more silver.

The model using annual physical market surpluses and deficits can be refined to account for reported changes in market inventories. Also, most of the 241.6 million ounces of silver coinage flowing into the market since 1979 has been bought by investors.

### The Issue of Investor Holdings

The point that silver investors are interested in profits is important when confronting the fears of some silver market participants that an enormous amount of silver will suddenly flow into the market following any sharp increase in prices.

Any investor metal held prior to 1979 that was not sold when prices rose to \$50 in early 1980 is not market sensitive, and should not be expected to come into the market. Only the metal that investors have added to their holdings since 1979 needs to be considered in discussing silver market conditions and prices, except in the extreme.

The average price at which this silver was acquired, \$11.25, may be viewed as the minimum selling price (assuming investors would be willing to forego any attempt to make up lost interest income). Investors have proven that they are willing to hold silver for extended periods of time.

**Silver Coinage**

Million Troy Ounces

	<u>United States</u>	<u>Canada</u>	<u>Austria</u>	<u>France</u>	<u>West Germany</u>	<u>Mexico</u>	<u>Other</u>	<u>Total</u>
1960 .....	46.0	7.5	-i-	12.2	-i-	-i-	38.2	103.9
1961 .....	56.0	5.1	-i-	23.8	-i-	-i-	51.1	136.0
1962 .....	78.0	10.9	-i-	13.7	-i-	-i-	25.0	127.6
1963 .....	112.0	13.0	-i-	12.2	-i-	-i-	29.2	166.4
1964 .....	203.0	13.7	-i-	10.7	-i-	-i-	39.7	267.1
1965 .....	320.3	24.4	2.7	7.2	2.7	-i-	27.8	385.1
1966 .....	53.6	15.5	3.3	8.7	2.9	-i-	45.5	129.5
1967 .....	43.8	8.8	3.2	9.6	3.1	-i-	36.8	105.3
1968 .....	36.8	7.4	2.2	2.9	4.2	-i-	35.8	89.3
1969 .....	19.6	0.0	1.9	0.7	2.9	-i-	7.6	32.7
1970 .....	0.7	0.0	4.0	3.5	7.4	-i-	7.8	23.4
1971 .....	2.5	0.2	3.2	0.4	19.2	-i-	2.3	27.8
1972 .....	2.3	0.1	5.8	0.3	22.6	-i-	7.0	38.1
1973 .....	0.9	6.6	6.3	0.1	7.0	-i-	7.6	28.5
1974 .....	1.0	9.0	5.7	3.6	7.6	-i-	4.7	31.6
1975 .....	2.7	10.4	9.1	1.8	5.4	-i-	4.0	33.4
1976 .....	1.3	8.4	6.9	6.2	1.8	-i-	5.4	30.0
1977 .....	0.1	0.5	8.9	7.1	4.6	4.2	9.1	34.5
1978 .....	0.0	1.0	9.6	9.0	3.6	6.6	9.7	39.5
1979 .....	0.2	0.8	4.0	10.6	3.7	5.0	6.7	31.0
1980 .....	0.1	0.2	2.3	0.1	0.0	6.1	6.2	15.0
1981 .....	0.2	0.3	3.1	0.1	0.5	0.0	5.3	9.5
1982 .....	1.8	0.3	4.5	1.4	0.3	0.0	3.7	12.0
1983 .....	2.1	0.4	1.8	2.2	0.0	0.0	3.7	10.2
1984 .....	2.0	0.3	2.4	3.9	0.0	2.5	2.6	13.7
1985 .....	0.4	0.3	4.6	2.2	0.0	3.5	2.4	13.4
1986 .....	10.3	1.3	1.1	2.2	0.0	2.0	9.9	26.8
1987 .....	12.2	1.2	3.1	2.2	3.2	2.3	6.2	30.4
1988 .....	7.9	1.1	2.0	2.2	3.2	2.0	6.9	25.3
1989 .....	6.8	3.3	2.1	2.2	3.2	1.7	7.0	26.3

Notes: Excludes transitional economies, where silver coins generally are not made.

i — included in Other.

Sources: U.S. Bureau of Mines; Energy, Mines, and Resources Canada; Silver Institute; Handy &amp; Harman; Bank of Mexico; trade sources; CPM Group.

## Markets

Silver is traded on several organized futures and options exchanges around the globe. The largest by far is the New York Commodity Exchange (Comex). In addition to these exchanges, physical silver is traded in an international marketplace which includes bullion banks and commodity trading companies. These companies—perhaps three dozen major participants and a host of smaller operations—buy silver from miners and refiners, and sell to users and the brokerage companies that serve investors. They also provide a range of tailored metal-based financial services, including inventory management strategies, sales and purchase programs using options, hedging programs, and metals leasing arrangements.

These dealers and bankers also trade metal amongst themselves, in what is loosely termed the interbank or interdealer international physical silver market. This market is tied together by a network of telephones, telefaxes, and telexes. It surfaces in several places around the world, most notably in New York, London, Zurich, Tokyo, and Hong Kong. However, traders in any given geographical location often are involved in transactions based in other major market centers. "Loco" trading allows physical silver transactions in specific locations anywhere in the world. For example, a bank in Hong Kong and a London dealer might execute a trade "loco New York," that is, for delivery in the New York market.

New York is the home to the largest physical and futures markets in silver. It is here that the tone of the international silver market is set. Important physical markets exist in Tokyo, London, and Zurich, with smaller markets operating in Paris, Frankfurt, and Milan. There also is a silver market in Bombay, but it is isolated from the rest of the world because of India's restrictions on silver imports and exports.

Aside from the Comex, both the Chicago Board of Trade and the Tokyo Commodity Exchange have futures contracts in silver. Options are traded on the Comex, the Chicago Board of Trade, the European Options Exchange in Amsterdam, and in Montreal, Vancouver, and Sydney (as adjuncts to the EOE).

These other markets tend to follow the direction of the New York market. There are occasions when the European and Asian markets react to news or events occurring after the New York market has closed. Such information has been absorbed by the time New York opens, and the New York market responds instead of leading.

### Physical Markets

Physical markets are principal to principal, and size and delivery terms are flexible. Mining companies, refiners, industrial users, and trading companies tend to be the major participants in the physical markets.

The London dealer, or physical, market dates back to the 17th century, and was the market pacesetter until the late 1960s. The London Bullion Market Association is comprised of 13 market making members and 50 ordinary members. A smaller group of three—Sharps Pixley, Samuel Montague & Co., and Mocatta & Goldsmid—actually is involved in the daily price fix itself. Representatives of each of these firms meet daily at 12:15 London time, at the offices of one of the three fixing members. The chairman of the fixing announces an opening price, then adjusts the price based on buy and sell orders. Each representative then is asked to declare the volume of his orders, and further adjustments are made. The price usually rises if buy orders exceed sell orders, and vice versa. Market making members, meanwhile, quote prices throughout the business day for spot and forward delivery.

Good delivery silver in the London market is a minimum 99.9%, or three nines, purity. Typically, 100,000 ounce units are traded in the London market.

The New York market has overshadowed London as the world's leading physical market for around 20 years. Here, too, activity is dominated by silver suppliers, industrial consumers, and dealers. The benchmark of the New York market is not a dealer fix, as in London, but the Handy & Harman quote for fabricated silver, which the refiner makes public at noon, New York time.



The London fix and the Handy & Harman noon price are simply efforts to fix the price in the market at a given time. Metal changes hands all day in both markets, with the price fluctuating before and after the "official" quoting times. The fix and the Handy & Harman quote used in many contracts, however. Like the London fix and Comex futures quotes, the Handy & Harman price is for 99.9% silver. Zurich established a dealer fix in 1985, but its influence remains small in comparison to New York and London.

A loco Tokyo market was created by Sumitomo, Nissho Iwai, and Tokuriki Honten in the mid-1980s. This market is of growing importance, because of the surge in Japanese industrial use.

**Futures and Options Markets**

The physical silver market counts suppliers, fabricators, and traders as key participants—plus private investors worldwide, private banks, and a full array of institutional investors. The Commodity Futures Trading Commission releases

statistics on the commitments of traders on a monthly basis. This report breaks out the long and short open interest, in percentage terms, of large hedgers, large speculators, and small traders, as defined by the CFTC.

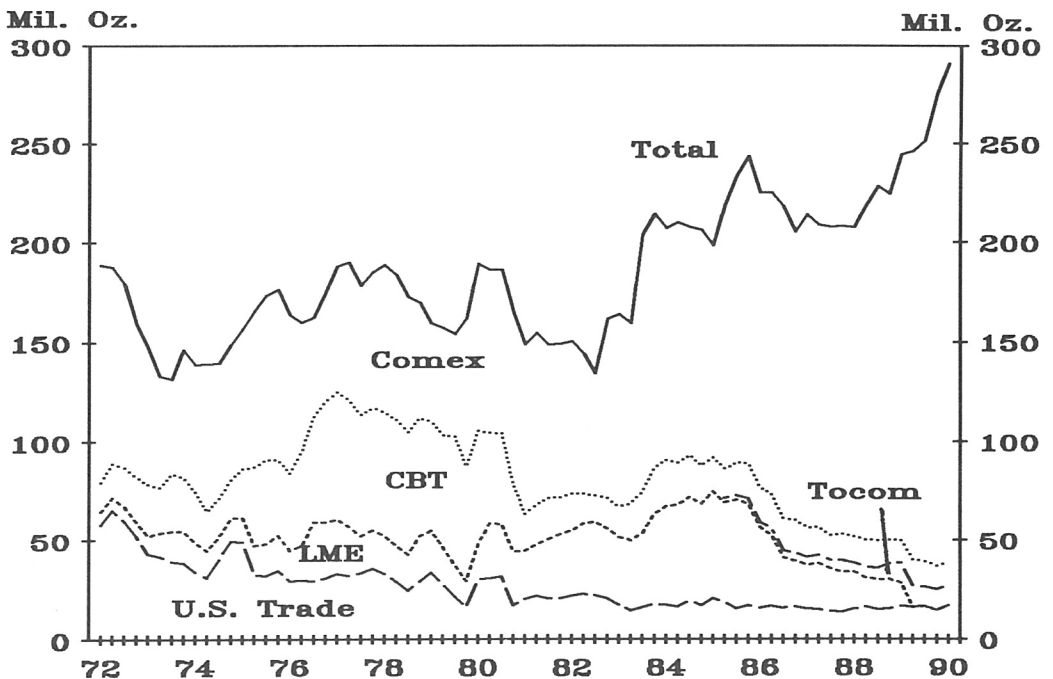
The futures market allows participants to avoid some of the complexities and costs of holding the physical metal—arranging for delivery, storage and insurance, and possible re-assays of material when it is resold. The futures market has another feature: The ability to enter the market at a fraction of the cost of the actual commodity.

Silver futures trading began on the National Metals Exchange in New York in June 1931. Two years later, in 1933, that exchange merged into the New York Comex. The following year the U.S. government nationalized silver, passing legislation that prevented the trading of silver futures contracts.

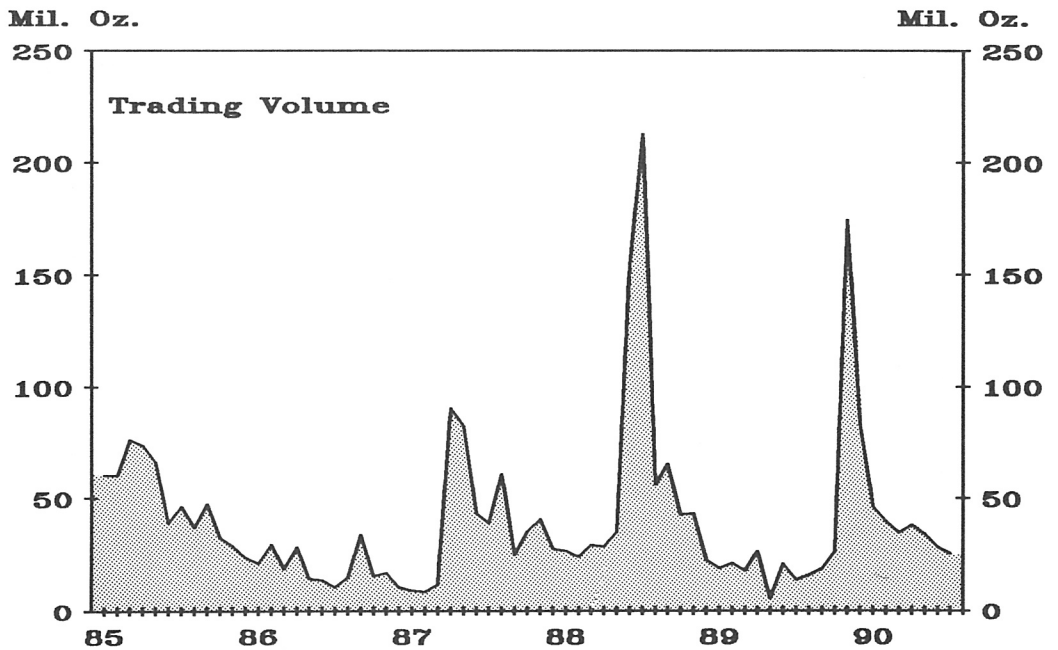
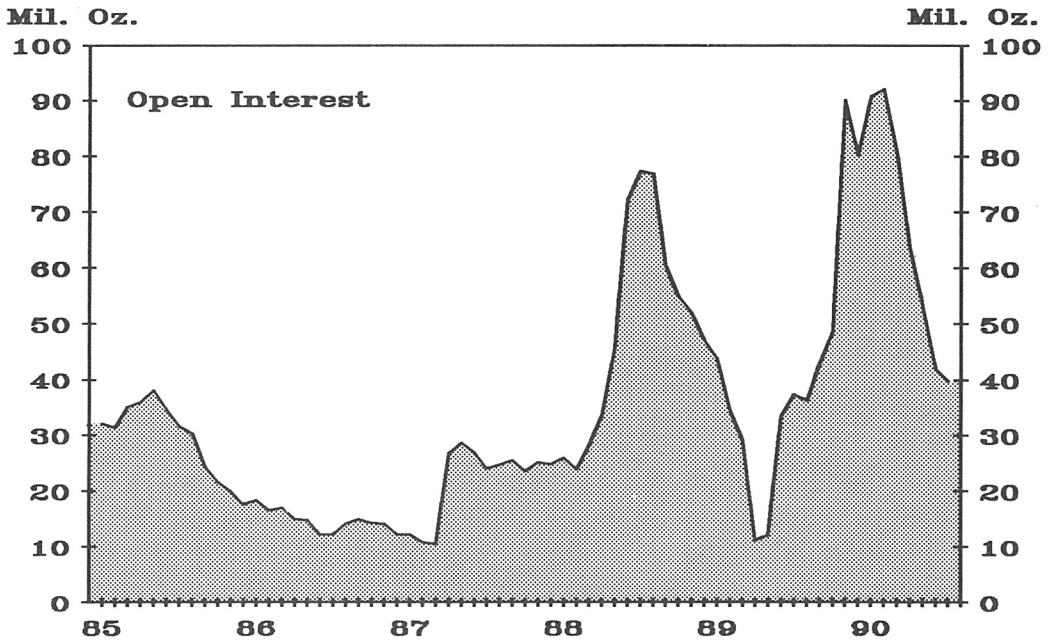
The Comex re-started silver trading in 1963, after the repeal of the Silver Purchase Acts, and now is the dominant exchange for silver futures.

**Market Inventories**

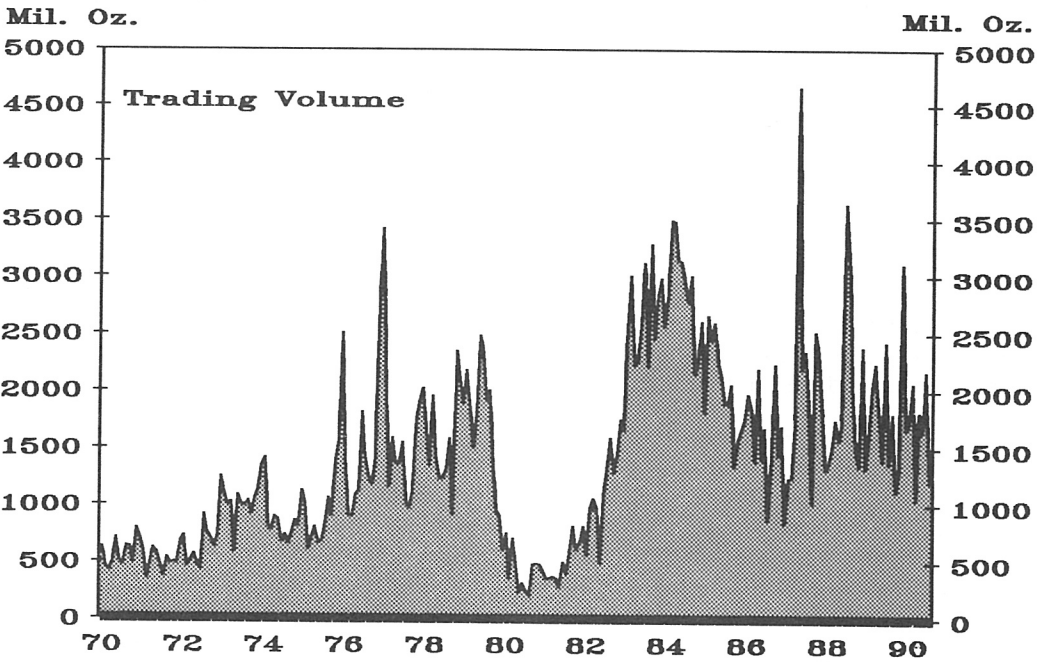
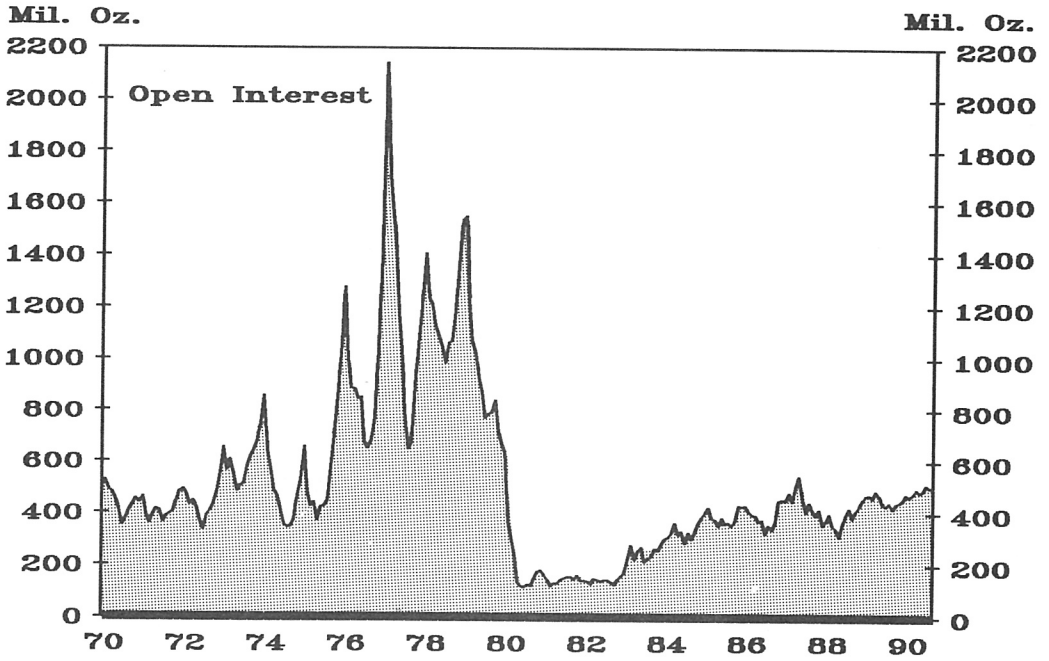
Quarterly, through First Quarter 1990



Tokyo Commodity Exchange Activity



Comex Exchange Activity



This was not always the case: In 1973 and 1974, trading volume on the Chicago Board of Trade exceeded that on the Comex. From 1975 through 1989, however, the Comex has taken an increasingly larger percentage of trading volume. In 1989, the Comex accounted for 97% of total silver futures market trading volume, or 21,833 million ounces. Each Comex contract represents 5,000 ounces of at least 99.9% silver.

On an annual total basis, Comex trading volume peaked at 33,713 million ounces in 1984. Since then it has ranged between 19,248 million ounce and 25,278 million ounces. Open interest peaked at 2,139 million ounces at the end of December 1976. In the past five years open interest has ranged between a low of 311 million ounces and a high of 544 million ounces at any given time.

It is impossible to separate trading in the futures markets between investment activity, and hedging by miners, refiners, fabricators and traders. If a fabricator has a hedging program utilizing Comex futures, for example, its trading activity would show up under the listing of one of the clearing house members.

What can be said is that, as in London and Tokyo, only a small number of Comex clearing members account for most of the trading volume on the exchange. In a recent active trading month, less than one fifth (less than 10 firms) of Comex clearing members accounted for 84% of trading volume; this share has been known to swell to 95%. Despite this apparent concentration of trading activity, the fact is that a good deal of these market makers' trades are not trades made at their own discretion, but rather are trades representing a host of buyers and sellers, including mining companies, fabricators, institutional investors, and individual investors.

The Tokyo Commodity Exchange, TOCOM, was formed in November 1984, with the merger of the Tokyo Gold Exchange, the Tokyo Rubber Exchange, and the Tokyo Textile Commodities Exchange. Recent efforts have been made to open membership to overseas participants in order to expand trading volume.

Japan's position as the second largest industrial consumer of silver in the world has enabled TOCOM to displace the Chicago Board of Trade

as the second largest silver futures market. Last year, trading volume on the exchange totaled 420.8 million ounces. It trades a 30 kilogram contract of 99.99% purity silver.

The CBOT lists a 5,000 ounce and a 1,000 ounce contract; both are 99.9% purity silver. The Mid-America Commodities Exchange, an affiliate of the CBOT, lists a 1,000 ounce contract, which has insignificant trading volume.

The London Metal Exchange suspended its 10,000 and 2,000 ounce silver contracts in June 1989. Turnover had fallen from a peak of 1,501 million ounces in 1985 to 100 million ounces in 1988.

The only major options market is on the Comex, although options contracts are listed on the CBOT, the European Options Exchange in Amsterdam, and the Montreal, Vancouver, and Sydney exchanges.

### **Market Stocks**

Reported market stocks include inventories held in New York bank vaults registered to serve as Comex depositories. Market stocks also include inventories held against CBOT and TOCOM positions; until the LME ceased trading in 1989, LME-registered stocks also were reported.

From 1972 to around 1983, total **reported** market stocks ranged between 130 million ounces and 190 million ounces. In late 1983, total reported stocks moved above this range, rising to about 260 million ounces by September 1990. Given the nature of these stocks, it seems safe to say that market stocks are likely to remain above 140-150 million ounces, barring some dramatic, unforeseen change in the nature of the silver market.

Comex contract specifications call for delivery of silver grading a minimum of 99.9%, and most of the silver in Comex-approved vaults is three nines quality. The Comex contract does not mention impurities. As photographic and electronics manufacturers require four nines quality silver, a minimum of 60% of fabrication demand cannot be met from Comex stocks.

In the past 10 years, fabricators have changed the way in which they manage their inventories.

They try to limit their own inventories as much as possible, and in the process shift stocks to dealer hands. Thus, while unreported fabricator inventories have been shrinking, reported market stocks have been rising.

Additionally, while the Comex makes public a figure representing total stocks in Comex-approved bank vaults, not all of this metal is registered for delivery under Comex contracts. The Comex total actually is broken into two categories: "registered", and "eligible" (but not registered) stocks. About 70 million ounces falls un-

der the eligible category. This silver appears to belong to investors.

The balance—180 million ounces—is registered with the Comex. Of this, about 20 million ounces seems to be in transit; around 110 million is owned by trading companies; and about 50 million ounces is estimated to be held by investors.

While these are estimates, not official figures, they paint a reasonably clear picture of Comex stocks. Stepping back from this picture, the Comex inventory situation seems somewhat less onerous.

## Silver In the 1990s

As interesting and enlightening as the history of silver may be, most companies and investors involved in silver seek guidance as to what may be in store for them in the future.

This chapter discusses what can be said with some certainty about silver market conditions in the coming decade. It is not designed to lay out one scenario as to how the silver market may evolve, but rather to outline those points that can be known today concerning silver's future.

The early 1990s may be a turning point for silver, after a period of protracted weakness. Total supply has risen about 30 million ounces over the past five years. This expansion may continue for another year, but then supply could flatten out, and possibly decline. The annual silver mining survey by the Silver Institute shows that producers expect the annual rate of production increases to decline from 5% in 1990 to 4% in 1991 and 1992, and then to zero in 1993. Fabrication demand meanwhile is likely to continue rising, albeit not at the rate seen in the late 1980s. The combination of these developments in the early 1990s could lead to a reversal of the steady decline in silver prices of the 1980s.

### Supply

In total, silver supplies may rise at a relatively faster pace over the next few years, but then slow considerably later in the decade. For the 1990s as a whole, it is quite possible that total silver supply will rise only about 2.0% per year.

#### 1. Mine Production

The market has focused on the rise in by-product silver output in the past few years. Conventional wisdom is that this trend will persist for several years to come. Mine developments have long lead times, however, which allows for some foresight in measuring when such projects will come onstream. An analysis of those new mines and expansions that have been announced up to now shows that this trend will indeed continue in the future, but not along the lines often described in the metals trade press. Several large new projects came onstream in 1989 and 1990. A few more are due on-line in 1991, which

should add around 14 million ounces of annual silver mining **capacity**, if not production. Most of these mines are primarily gold mines. Meanwhile, some of the mines started up during 1989-1991 are likely to experience declining silver recovery, following an initial period of high output. Thus, by 1992 this trend may be reversing, a likelihood supported by the Silver Institute's survey.

#### 2. Secondary Supply

The recovery of silver from non-photographic scrap is in the midst of a long-term decline, due to the reduction in per-unit use of silver in electronic and other applications. Silver content has reached such a low point that often it is no longer economically viable to recover the silver from scrapped items. This has been compounded in some instances by the inclusion in electronic equipment of materials such as beryllium, which precludes feeding these materials into existing secondary refineries.

#### 3. Other Supply

The flow of silver bullion from other sources may decline sharply during the 1990s. The use of silver from government stockpiles in coins and bullion sales should diminish. In recent years U.S. coinage and bullion sales have constituted almost all of the metal coming into the market from government stock disposals. U.S. stocks, held both by the Treasury and in the National Defense Stockpile have fallen from 178.3 million ounces in 1981 to 117.4 million ounces in October 1990, due to these coin programs and bullion sales.

The second source of metal included in the 'other supply' category is net exports by the transitional economies. In this area, too, the flow of silver may decline over the coming decade. As these countries undertake the long process of re-industrialization, there are reasons to expect that their domestic silver requirements may increase, at least over the long term. Given that the transitional economies are only marginal suppliers of silver to the international market at present, there may not be much silver exported from these countries to the broader international market in the future.

## Fabrication Demand

Overall economic growth, silver prices, and technological innovations are likely to be the major forces determining trends in silver use in the 1990s. The potential for rising living standards in the less developed countries, accompanied by increased medical and dental services, and the spread of electrification, also will play an important role. In addition, demand for silver jewelry and sterlingware also will be influenced significantly by fashion trends and the intensity of marketing programs.

Considerations of the affordability of using silver depend not only on the nominal price, but on several other measures as well. These include silver's inflation-adjusted, or real, price, the price of silver in the currency of the manufacturer, and silver's price relative to the cost of using substitute materials. The price of silver has declined to low levels in all of these terms, helping to fuel the strong growth in overall fabrication demand for silver over the past few years. The current slowdown in manufacturing rates in the United States and other industrialized countries has begun to counter this increased demand. Even so, silver's lower relative cost should encourage increased usage whenever general economic conditions turn more positive.

Technological innovations also seem likely to favor silver use during the coming decade.

Individual silver-using industries will be affected differently by these trends, as well as other developments. In total it is possible that silver use will grow by 3%-4% per annum over the coming decade.

### 1. Photography

Consumer photography is expected to grow at about a 5% per annum rate over the coming decade, and silver per-unit use in these materials may be relatively stable. The efforts to reduce per-unit silver use in photography of the early 1980s were reversed during the late 1980s. Having undergone these swings in per unit silver use, this sector of photography may experience a relatively stable silver use pattern during the 1990s. Electronic imaging is not expected to have any significant impact on consumer photography either during the coming decade.

X-rays, the next largest silver-using photographic sector, also is expected to be somewhat more stable during the 1990s than it was in the 1980s. In the early 1980s new technologies allowed for a massive reduction in per unit silver requirements in most x-ray applications. In some instances silver use per frame of x-ray film decreased 60%. However, there has been very strong, long-term growth in the use of x-rays. While per-unit silver use fell, the overall growth in x-ray use more than offset this decline. The technological innovations that allowed for reductions in silver use per frame now are in place. There may be some further advances in the coming decade, notably in medical storage and industrial x-rays, but they are expected to be relatively small.

### 2. Electronics

In electronic and electrical equipment, silver use also seems most likely to rise over the course of the 1990s, albeit paced by economic conditions. The moves away from silver and toward miniaturization of electronic components during the 1970s and 1980s have slowed considerably in recent years. Future technological changes may lead to some further reductions, but any such cutbacks are expected to be limited.

Meanwhile, low silver prices in recent years have reduced the impetus for manufacturers to pursue these efforts. In fact, low silver prices have encouraged electronics manufacturers to study silver more intensely, seeing it as a cost-effective substitute for other metals.

As a result of these trends, silver's present electronic and electrical applications appear to be relatively secure. In the battery sector new technologies are offering substitutes for silver batteries, but in the past few years the introduction of these alternatives has encountered technical problems and strong consumer resistance.

There also may be an increase in silver use in electronics and electrical applications due to the introduction of new applications.

Silver has been used for years in automotive rear window defogging and defrosting systems, but recently there has been a move towards silver-coated windshields. First introduced in the United States in 1986, they are available as op-

tions on some models and as a standard feature on others. Powered silver-coated windshields are expected to be introduced shortly in Japan. The U.S. automotive market alone eventually could use 5 - 8 million ounces of silver per year.

Superconductors, complex materials that conduct electricity with little resistance, are another technology that may require silver in the future. Superconductor technology still is in the research stage, however, and any major commercialization is at least a decade away. Should superconductors become a viable technology, they most likely will require silver contacts and connectors, as silver is one of only a few metals that can be used in contact with superconductive materials. If the technology moves into commercial use, silver consumption in this sector could range from 3 to 30 million ounces per year.

### 3. *Jewelry and Sterlingware*

Silver use in jewelry and sterlingware in the 1990s will depend on several factors: Overall economic conditions, disposable income levels, and silver prices among them. In addition, fashion trends will be important. In the past several years silver jewelry has benefited from a high degree of attention from those designers, retailers, and others who influence fashion trends. Sterlingware, in contrast, has suffered from a lack of such attention in the United States. While the manufacture of sterlingware in the United States has fallen sharply over the past two decades, final sales of sterlingware to U.S. consumers has not fallen as sharply because part of the U.S. market has shifted to imported sterlingware. Also, recently there has been some growth in silver-plated tableware, especially among younger U.S. consumers. Sterlingware has done well in Italy, where a wave of consumer interest in sterlingware appeared in the late 1980s. Italian use of silver in the fabrication of sterlingware rose sharply in the late 1980s, partly to meet increased domestic Italian consumer demand for these products and partly as Italian manufacturers captured U.S. market share.

One of the key questions facing this market in the 1990s will be whether the level of interest in silver jewelry can be maintained. To some extent, this will depend on the intensity of market-

ing efforts, both by the silver industry in general and by individual jewelers. Of particular note has been the promotional efforts of the Silver Trust International, which has been undertaking a marketing and advertising program for silver jewelry and sterlingware in the United States since 1988. Silver Trust International's cooperative advertising efforts with individual jewelers and retailers have met with notable success in increasing sales of silver jewelry and sterlingware.

### 4. *Coinage*

Prior to the 1980s, silver use in coinage primarily was for commemoratives and circulating coins in Europe. In the late 1980s several national mints started silver bullion coin programs, aimed at investors. The largest efforts to date have been by the U.S. Mint, the Royal Canadian Mint, and the Mexican Mint. These programs have succeeded in attracting investor interest. Silver use in coinage fell to a low of 9.5 million ounces in 1981. With the introduction of these new programs, coin use of silver rose back to 30.4 million ounces in 1987, and since then has held above 25.0 million ounces per year.

The use of silver in coinage in the coming decade will depend almost entirely on the level of investor interest in silver. National mints will not produce silver bullion coins if there is no investor demand for them. If, however, investor interest in silver revives during the 1990s, the use of silver in coins will rise commensurately.

### **Price Outlook**

These factors provide useful insights concerning where silver prices may go in the next 10 years. It is important to make a distinction between the nominal price and the real price, which is the nominal price adjusted for inflation.

In the past few years, real silver prices have fallen to levels not seen since the early 1970s. It is this low real price that makes silver an attractive industrial commodity compared to alternative metals and other materials.

The current price is low not only from a historical perspective, but also relative to other metals.

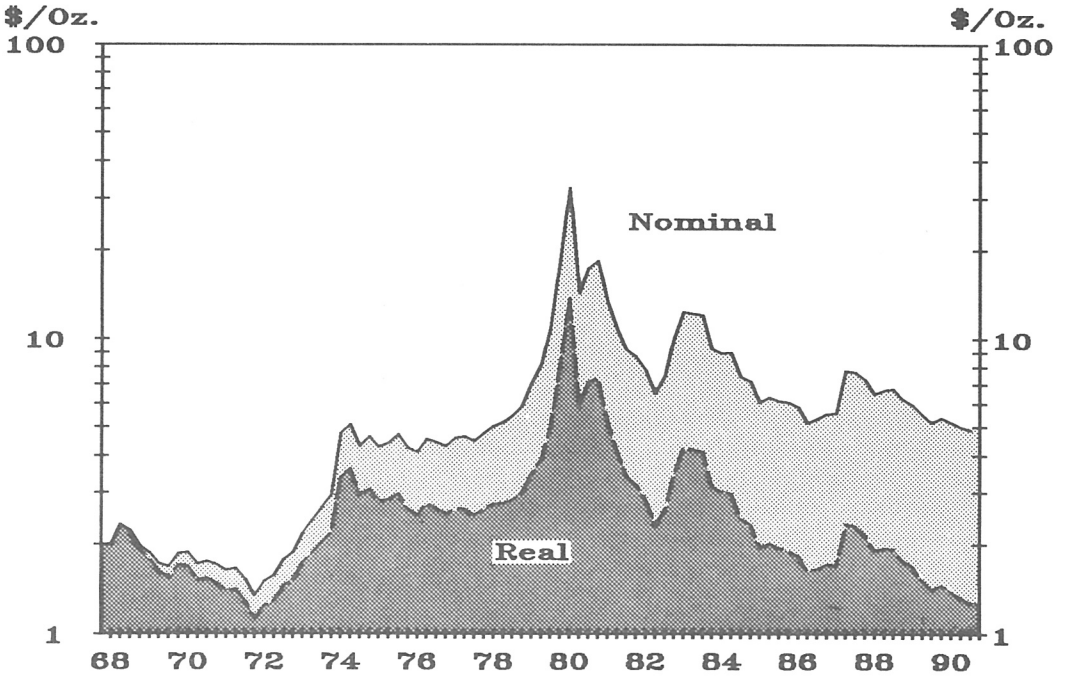


Gold competes with silver both as an industrial commodity and an investment. Gold now is over 70 times more expensive than silver, compared to 30 to 40 times more expensive in the 1970s. Palladium competes with silver in some electronic and catalytic applications. Palladium is more than 20 times the price of silver, up from 8 to 10 times more expensive in the early 1980s. Recent efforts to minimize the use of palladium

in the electronics sector are expected to continue throughout the decade.

Silver's low real price and low relative price ensure that little substitution away from silver to other metals will occur in the 1990s. If substitutions are made, whenever possible fabricators probably will switch to using more silver and less of the more expensive precious metals.

**Real and Nominal Silver Prices**  
Quarterly, through Second Quarter 1990





**Statistical Appendix**

Mine Production by Country  
Changes in U.S. Government Silver Stocks

Fabrication Demand by Country  
Annual U.S. Fabrication Demand  
Japanese Fabrication Demand  
European Fabrication Demand  
West German Fabrication Demand  
Italian Fabrication Demand  
United Kingdom Fabrication Demand  
French Fabrication Demand

Comex Open Interest  
Comex Trading Volume  
Tokyo Commodity Exchange Statistics  
Silver Futures Exchange Activity  
Reported and Inferred Silver Holdings  
Reported Silver Inventories

**Mine Production By Country**

Thousand Troy Ounces

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>Africa</b>											
Algeria .....	100	100	110	110	120	120	120	120	120	120	120
Ghana .....	20	18	17	17	14	14	14	20	25	25	25
Morocco .....	3,283	3,154	2,120	2,640	2,850	2,409	2,733	1,566	4,300	7,273	8,300
Namibia .....	3,617	3,365	3,456	3,150	3,532	3,255	3,400	3,981	3,331	3,472	4,437
South Africa .....	3,238	7,458	7,569	6,943	6,513	6,997	6,721	7,143	7,201	5,760	5,720
Tunisia .....	231	233	85	117	90	85	26	30	30	30	30
Zaire .....	3,420	2,535	2,575	1,905	1,288	1,499	1,520	1,499	1,400	1,400	1,499
Zambia .....	914	764	715	887	933	794	625	842	962	942	890
Zimbabwe .....	978	948	858	919	938	892	800	843	817	895	774
Total .....	15,801	18,575	17,505	16,688	16,278	16,065	15,959	16,044	18,186	19,917	21,795
<b>Asia</b>											
Burma .....	340	430	450	526	558	575	569	443	400	378	321
India .....	370	366	556	466	508	933	822	1,135	1,122	1,318	1,286
Indonesia .....	793	700	828	1,032	1,047	1,122	1,175	1,371	1,531	1,986	2,012
Japan .....	8,932	8,195	9,279	9,042	9,877	10,403	10,914	11,307	9,032	8,102	5,008
Malaysia .....	433	437	473	522	481	470	522	452	497	641	641
Philippines .....	1,838	1,951	2,021	1,983	1,823	1,574	1,743	1,689	1,638	1,759	1,852
South Korea .....	2,823	2,293	3,147	3,523	3,366	3,759	3,990	2,584	2,823	1,571	2,762
Taiwan .....	84	96	216	505	344	364	366	405	373	268	268
Turkey .....	250	200	200	220	219	219	224	286	283	513	513
Total .....	15,863	14,668	17,170	17,819	18,223	19,419	20,325	19,672	17,699	16,536	14,663
<b>Europe</b>											
Finland .....	1,028	1,430	1,215	1,190	980	1,123	1,566	1,193	1,415	997	997
France .....	2,409	2,374	1,706	986	688	769	866	825	831	678	627
Greece .....	1,752	1,671	1,945	1,581	1,797	1,799	1,630	1,726	1,668	1,977	1,668
Greenland .....	763	771	720	758	607	335	425	385	402	458	470
Ireland .....	1,058	773	595	352	318	280	277	262	232	177	231
Italy .....	1,065	1,365	1,779	1,791	2,362	1,560	513	577	449	513	510
Portugal .....	35	29	23	23	32	29	108	175	120	120	120
Spain .....	3,168	5,711	6,186	3,789	5,938	5,000	6,405	5,562	6,880	7,298	7,088
Sweden .....	5,650	5,337	5,171	5,396	5,491	7,677	8,038	7,554	8,520	7,201	6,099
West Germany .....	1,042	1,213	1,263	1,286	1,167	1,225	1,102	884	994	642	700
Yugoslavia .....	5,214	4,789	4,422	3,342	3,987	4,051	5,017	5,702	4,859	4,468	4,276
Total .....	23,184	25,463	25,025	20,494	23,367	23,848	25,947	24,845	26,370	24,529	22,786

Continued on following page

**Mine Production By Country—Continued**

Thousand Troy Ounces

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>North &amp; Central America</b>											
Canada	36,874	34,390	36,311	42,234	38,692	42,001	38,485	34,980	38,118	44,100	41,310
Costa Rica	2	2	2	2	2	2	2	2	2	2	2
Dominican Republic	2,268	1,642	2,062	2,112	1,270	1,222	1,609	1,318	1,149	1,400	700
El Salvador	152	146	137	86	23	22	20	17	17	17	17
Guatemala	10	10	8	8	3	0	0	0	0	0	0
Honduras	2,186	1,721	1,665	2,050	2,587	2,698	2,765	1,747	741	796	796
Mexico	49,408	47,344	53,204	49,841	55,000	63,900	69,200	69,400	69,800	70,000	70,000
Nicaragua	388	163	82	76	63	50	52	26	29	23	23
United States	37,896	32,329	40,683	40,248	43,431	44,592	39,357	34,221	39,790	51,500	60,797
Total	129,184	117,747	134,154	136,657	141,071	154,487	151,490	141,711	149,646	167,838	173,645
<b>Oceania</b>											
Australia	26,749	24,981	23,920	29,161	33,212	31,250	34,916	32,890	35,912	35,815	37,295
Fiji	9	9	9	19	12	13	15	15	0	0	0
New Zealand	2	1	1	1	0	0	41	41	0	59	156
Papua New Guinea	1,434	1,187	1,365	1,394	1,531	1,426	1,487	1,802	2,004	2,100	1,966
Total	28,194	26,178	25,295	30,575	34,755	32,689	36,459	34,748	37,916	37,974	39,417
<b>South America</b>											
Argentina	2,209	2,357	2,518	2,684	2,502	1,983	2,170	2,135	1,899	1,608	1,547
Bolivia	5,742	6,099	6,394	5,472	6,024	4,559	3,614	3,057	4,565	7,234	7,718
Brazil	1,065	737	765	748	750	2,275	2,301	1,913	1,966	2,252	2,056
Chile	8,740	9,596	11,608	12,288	14,955	15,776	16,642	16,080	16,068	16,301	17,701
Colombia	99	146	134	137	134	128	155	187	167	211	220
Ecuador	70	70	32	9	3	3	2	2	2	2	2
Peru	41,900	42,957	46,940	53,402	55,557	56,523	60,925	61,918	65,908	50,133	61,000
Total	59,825	61,962	68,391	74,740	79,925	81,247	85,809	85,292	90,575	77,741	90,244
Subtotal	272,051	264,593	287,540	296,973	313,619	327,755	335,989	322,312	340,392	344,535	362,550
<b>Transitional Economies</b>											
Bulgaria	805	773	741	805	805	837	837	837	837	799	799
China	1,928	1,928	2,091	2,252	2,300	2,600	2,800	3,214	3,214	3,500	4,000
Czechoslovakia	1,126	1,126	1,126	1,062	964	1,029	1,030	1,062	1,100	1,126	1,100
East Germany	1,543	1,511	1,447	1,447	1,382	1,286	1,318	1,318	1,318	1,286	1,298
Hungary	34	34	31	30	30	25	25	25	25	25	25
North Korea	1,543	1,447	1,286	965	1,100	1,600	1,600	1,600	1,600	1,600	1,600
Poland	22,569	24,628	20,577	21,058	21,800	23,900	26,717	26,652	26,717	34,176	34,000
Romania	965	901	805	805	805	773	805	741	642	691	671
Soviet Union	49,834	49,834	50,500	51,000	51,441	51,441	52,084	52,400	52,500	53,000	54,000
Total	80,347	82,182	78,604	79,424	80,627	83,491	87,216	87,850	87,953	96,203	97,493
WORLD TOTAL	352,398	346,775	366,144	376,397	394,246	411,246	423,205	410,161	428,345	440,738	460,043

Sources: U.S. Bureau of Mines; American Bureau of Metals Statistics; Statistics Canada; Chamber of Mines of South Africa; Gold Institute; Central Intelligence Agency; other government and industry sources; CPM Group.

**Changes in U.S. Government Silver Stocks, 1981 - 1990**

Troy Ounces

	<u>National Defense Stockpile</u>	<u>Treasury Reserves</u>	<u>Total</u>
Balance on Sept. 30, 1981 .....	139,500,000	38,768,563	178,268,563
Coin Programs			
Bicentennial 76 Coins .....	—	240,016	240,016
George Washington Coins .....	—	2,569,698	2,569,698
Olympic 83/84 Silver Coins .....	—	3,459,177	3,459,177
Liberty Silver Coins .....	5,521,454	—	5,521,454
Libert Gold Coins .....	8,051	—	8,051
Constitution Silver Coins .....	2,474,229	—	2,474,229
Constitution Gold Coins .....	8,373	—	8,373
Olympic 88 Silver Coins .....	1,199,493	—	1,199,493
Olympic 88 Gold Coins .....	3,886	—	3,886
Congress Silver Coins .....	692,897	—	692,897
Congress Gold Coins .....	2,378	—	2,378
Eisenhower Silver Coins .....	928,200	—	928,200
American Eagle Uncirculated Silver Coins .....	31,097,000	—	31,097,000
American Eagle Proof Silver Coins .....	3,858,097	—	3,858,097
American Eagle Uncirculated Gold Coins .....	—	143,538	143,538
American Eagle Proof Gold Coins .....	—	33,631	33,631
Total Coinage .....	45,794,058	6,446,060	52,240,119
Miscellaneous Mint Adjustments .....	—	140,127	140,127
Public Auctions .....	2,000,000	5,014,742	7,014,742
On Loan to Defense Department .....	1,500,000	—	1,500,000
Total Disposals .....	49,294,058	11,600,929	60,894,988
Balance as of October 1, 1990 .....	90,205,942	27,167,633	117,373,575

Note: Silver is used as an alloy in gold coinage issue by the U.S. Mint.

Source: The Silver Institute.



**Fabrication Demand by Country, 1950-1989**

Million Troy Ounces

	<u>U.S.</u>	<u>Canada</u>	<u>Mexico</u>	<u>U.K.</u>	<u>France</u>	<u>West Germany</u>
1950 .....	120.0	5.2	2.4	12.4	1.3	7.6
1951 .....	110.0	4.4	-i	16.6	10.0	10.0
1952 .....	95.0	3.8	-i	9.1	10.5	10.4
1953 .....	105.0	4.7	-i	11.9	14.5	11.9
1954 .....	85.0	3.9	-i	12.6	15.0	24.2
1955 .....	100.0	4.6	-i	14.2	15.7	28.1
1956 .....	100.0	3.8	3.9	13.8	15.9	33.1
1957 .....	95.0	5.8	3.9	14.7	17.9	31.5
1958 .....	85.0	4.6	4.4	14.8	14.1	31.1
1959 .....	103.0	4.5	5.4	17.5	10.6	33.3
1960 .....	102.0	4.3	4.3	16.5	13.0	40.2
1961 .....	105.5	3.4	3.4	20.0	14.0	43.5
1962 .....	110.4	3.3	3.3	20.0	13.5	41.8
1963 .....	110.0	3.2	3.2	20.0	13.9	40.5
1964 .....	123.0	4.1	4.1	23.0	14.8	46.3
1965 .....	137.0	5.7	4.7	25.0	14.0	54.6
1966 .....	183.7	5.8	3.9	25.0	14.7	48.2
1967 .....	171.0	5.8	5.0	24.0	14.7	48.2
1968 .....	145.3	6.2	5.0	23.0	18.0	50.0
1969 .....	141.5	5.7	4.4	24.5	19.3	50.0
1970 .....	128.4	6.0	5.4	25.0	15.5	48.2
1971 .....	129.1	6.8	5.1	25.0	15.6	59.9
1972 .....	151.7	8.3	7.0	27.0	16.5	60.0
1973 .....	196.4	10.4	10.5	31.5	22.5	60.0
1974 .....	176.0	10.3	6.5	33.0	21.0	55.0
1975 .....	157.7	10.3	5.6	28.0	21.0	38.9
1976 .....	170.6	9.3	6.5	27.6	31.8	52.9
1977 .....	153.6	9.1	5.5	29.4	32.6	48.1
1978 .....	160.2	9.6	5.8	29.0	24.6	42.0
1979 .....	157.3	7.3	5.5	27.6	24.1	39.8
1980 .....	124.7	8.7	3.1	19.5	19.8	31.9
1981 .....	116.7	8.5	3.2	18.4	18.9	29.3
1982 .....	118.8	9.0	3.6	18.1	17.1	32.7
1983 .....	116.3	8.9	2.2	17.7	16.5	30.3
1984 .....	114.8	9.0	3.5	19.2	17.1	32.2
1985 .....	118.6	9.1	5.1	19.1	16.9	34.6
1986 .....	118.9	9.6	4.9	19.1	17.0	36.8
1987 .....	115.3	10.4	4.4	21.1	17.6	39.1
1988 .....	112.0	11.0	4.5	22.7	21.3	44.6
1989 .....	120.0	12.0	4.5	24.5	22.1	47.3

Notes: Excludes transitional economies. Excludes silver use in coinage. Totals may not equal the sums of countries due to rounding.

i—included in "other".

Sources: CPM Group, industry sources.



<u>Italy</u>	<u>Japan</u>	<u>India</u>	<u>Other</u>	<u>Total</u>	
-i-	-i-	-i-	8.5	157.4	1950
-i-	3.5	-i-	10.1	164.6	1951
-i-	3.5	-i-	9.8	142.1	1952
-i-	5.6	4.0	10.7	168.3	1953
-i-	5.8	3.0	11.3	160.8	1954
-i-	6.2	3.0	21.0	192.8	1955
-i-	7.9	17.5	20.0	215.9	1956
-i-	8.8	15.0	20.0	212.6	1957
-i-	8.2	3.3	25.0	190.5	1958
-i-	13.6	2.0	23.0	212.9	1959
-i-	21.6	1.5	31.9	235.3	1960
20.0	19.1	1.5	37.3	267.7	1961
22.0	19.6	1.5	38.2	273.6	1962
25.0	20.0	2.5	38.8	277.1	1963
25.0	20.0	12.0	43.6	315.9	1964
25.0	25.8	16.0	48.0	355.8	1965
30.0	31.5	16.0	56.1	414.9	1966
28.2	33.2	15.0	53.9	399.0	1967
22.5	35.0	16.0	50.0	371.0	1968
29.0	41.5	16.0	51.9	383.8	1969
32.0	46.0	16.0	50.4	372.9	1970
30.5	46.5	16.0	52.1	386.6	1971
32.0	54.3	13.0	57.6	427.4	1972
33.5	69.0	13.0	69.7	516.5	1973
30.0	57.7	14.0	62.8	466.3	1974
28.9	46.4	13.0	54.7	404.5	1975
38.5	60.8	18.0	65.0	481.0	1976
36.3	63.2	17.6	61.4	456.8	1977
31.0	64.9	21.0	61.0	449.1	1978
33.3	68.8	22.5	58.9	445.1	1979
21.8	61.5	22.5	49.0	362.5	1980
21.5	59.6	26.5	51.0	353.6	1981
20.8	63.2	23.0	53.0	359.3	1982
15.0	72.1	22.5	53.7	355.2	1983
17.4	78.8	20.9	59.8	372.7	1984
18.1	72.6	21.0	57.4	372.5	1985
32.8	78.6	19.3	69.4	406.4	1986
38.6	92.2	20.1	69.3	428.1	1987
37.9	103.9	22.5	70.2	450.6	1988
37.3	102.2	27.0	72.3	469.2	1989

**Annual U.S. Fabrication Demand, 1973-1980**

Thousand Troy Ounces

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Photography .....	51,979	49,579	46,074	55,530	53,679	64,299	65,978	49,825
Electrical Contacts and Conductors .....	40,209	31,305	27,211	32,329	31,316	30,756	33,506	27,796
Brazing Alloys and Solders .....	17,736	14,514	13,582	11,198	12,362	10,987	10,912	8,508
Sterling Ware .....	29,386	22,147	23,717	19,815	16,690	17,908	13,088	9,082
Jewelry .....	5,778	5,102	12,734	10,995	8,059	6,766	5,358	5,893
Batteries .....	4,155	4,195	4,253	3,490	5,783	6,029	4,583	5,976
Electroplated Ware .....	14,542	13,177	8,717	9,534	6,844	7,274	8,065	4,350
Catalysts .....	5,988	7,293	8,785	12,267	8,883	8,197	5,637	3,035
Coins, Medallions, and Commemorative Objects .....	20,108	21,432	7,186	8,240	4,252	2,727	4,676	4,693
Dental and Medical Supplies .....	3,022	2,401	1,503	1,942	2,232	2,033	2,295	2,212
Mirrors .....	2,579	3,947	3,150	4,622	2,131	1,862	1,850	672
Bearings .....	375	416	458	273	523	373	332	649
Miscellaneous .....	529	519	281	324	859	954	978	2,005
Total Industrial .....	196,386	176,027	157,651	170,559	153,613	160,165	157,258	124,696
Official Coinage .....	920	1,017	2,740	1,315	91	45	168	72
Total Fabrication .....	197,306	177,044	160,391	171,874	153,704	160,210	157,426	124,768

Notes: Totals may not equal the sums of components due to rounding. For 1988 projections jewelry and electroplated ware are included with sterling ware. Other categories marked with dashes are included in miscellaneous. p—projections.

Sources: U.S. Bureau of Mines, trade sources, CPM Group.

**Annual U.S. Fabrication Demand, 1981-1990p**

Thousand Troy Ounces

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990p
Photography .....	51,025	51,769	51,826	55,322	57,895	55,448	60,166	62.5	65.2	68.0
Electrical Contacts										
and Conductors .....	26,411	27,730	26,298	25,633	27,509	27,406	22,727	23.0	23.5	22.8
Brazing Alloys and Solders ...	7,718	7,384	5,837	5,889	5,593	6,432	5,602	—	—	—
Sterling Ware .....	4,407	6,579	7,022	3,638	3,527	3,935	3,809	9.0	8.5	6.2
Jewelry .....	5,368	6,260	6,885	5,773	5,779	4,621	4,249	—	—	—
Batteries .....	3,803	4,167	2,637	2,671	2,470	3,722	2,443	2.5	2.8	3.0
Electroplated Ware .....	3,904	3,254	3,154	3,542	3,660	3,724	2,469	—	—	—
Catalysts .....	3,830	2,418	2,414	2,448	2,409	2,313	2,436	—	—	—
Coins, Medallions, and Commemorative Objects ....	2,622	1,832	2,979	2,564	2,514	3,957	4,219	—	—	—
Dental and Medical Supplies ..	1,709	1,688	1,532	1,569	1,480	1,474	1,287	—	—	—
Mirrors .....	581	970	970	970	970	970	1,027	—	—	—
Bearings .....	297	228	170	260	190	375	317	—	—	—
Miscellaneous .....	4,995	4,562	4,567	4,562	4,559	4,562	4,519	15.0	20.0	23.0
Total Industrial .....	116,670	118,841	116,291	114,841	118,555	118,939	115,270	112.0	120.0	123.0
Official Coinage .....	179	1,846	2,128	2,665	355	10,300	12,200	7.9	6.8	—
Total Fabrication .....	116,849	120,687	118,419	117,506	118,910	129,239	127,470	119.9	126.8	—

**Japanese Fabrication Demand**

Million Troy Ounces

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Photography .....	25.0	22.6	23.0	27.3	31.2	31.4
Electrical Contacts .....	11.1	9.2	5.6	6.8	6.9	7.0
Caustic Silver .....	4.4	2.9	2.6	4.7	5.8	6.5
Brazing Alloys and Solders .....	7.3	5.9	2.9	4.7	4.3	4.7
Tube, Sheet, and Bar .....	6.5	4.8	3.5	5.9	5.6	5.1
Electroplating .....	4.3	2.8	2.3	3.4	2.8	2.9
Jewelry and Silverware .....	3.9	1.8	1.4	2.0	2.2	2.5
Miscellaneous .....	6.5	7.7	5.1	6.0	4.4	4.8
Total .....	69.0	57.7	46.4	60.8	63.2	64.9
% Change Year Ago .....	—	-16.4%	-19.6%	31.0%	3.9%	2.7%

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Photography .....	32.2	32.6	33.9	36.6	40.9	41.3
Electrical Contacts .....	8.9	7.6	6.4	6.6	7.7	7.8
Caustic Silver .....	6.6	5.6	5.6	5.5	6.7	7.6
Brazing Alloys and Solders .....	5.3	3.5	3.1	3.3	3.2	3.9
Tube, Sheet, and Bar .....	4.9	3.2	3.0	3.6	3.2	3.9
Electroplating .....	2.8	2.5	2.4	2.3	2.8	3.7
Jewelry and Silverware .....	2.2	1.0	1.1	1.3	1.1	1.0
Miscellaneous .....	5.9	5.5	4.1	4.0	6.5	9.6
Total .....	68.8	61.5	59.6	63.2	72.1	78.8
% Change Year Ago .....	6.0%	-10.6%	-3.1%	6.0%	14.1%	9.3%

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990p</u>
Photography .....	42.2	47.0	51.3	56.8	54.8	59.0
Electrical Contacts .....	7.5	6.8	7.0	8.4	9.5	10.1
Caustic Silver .....	6.8	7.6	8.3	9.5	8.9	9.0
Brazing Alloys and Solders .....	3.7	3.7	3.7	4.3	4.5	4.6
Tube, Sheet, and Bar .....	3.6	4.1	5.3	5.6	6.7	6.7
Electroplating .....	3.2	3.2	4.9	5.6	3.8	4.5
Jewelry and Silverware .....	1.4	1.7	2.2	3.0	3.5	4.4
Miscellaneous .....	4.2	4.4	9.4	10.6	10.5	10.5
Total .....	72.6	78.6	92.2	103.9	102.2	108.8
% Change Year Ago .....	-7.8%	8.2%	17.4%	12.6%	-1.6%	6.5%

Totals may not equal the sums of components due to rounding.

p—projections.

Japanese trade sources, CPM Group.

**European Fabrication Demand**

Million Troy Ounces

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	
Jewelry/Silverware .....	50.3	27.5	28.7	32.7	23.9	
Photography .....	47.9	41.4	43.2	44.9	45.6	
Electronics .....	33.4	29.8	25.6	23.2	23.8	
Brazing Alloys/Solders .....	20.8	15.2	13.0	12.0	9.9	
Dental .....	1.3	1.6	1.3	1.2	1.1	
Mirrors .....	2.3	2.5	2.6	2.2	1.9	
Miscellaneous .....	6.6	5.3	4.8	4.9	3.6	
Total .....	162.0	123.2	119.3	121.1	109.8	
% Change Year Ago .....	—	-24.0%	-3.2%	1.5%	-9.3%	
Coinage .....	22.6	5.8	7.0	8.5	5.8	
Total Including Coinage .....	184.6	129.0	126.3	129.6	115.6	
% Change Year Ago .....	—	-30.1%	-2.1%	2.6%	-10.8%	
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jewelry/Silverware .....	25.3	27.3	46.5	53.3	57.3	58.1
Photography .....	47.6	48.1	51.1	52.6	57.0	57.1
Electronics .....	26.2	27.2	28.5	29.0	31.5	34.8
Brazing Alloys/Solders .....	10.5	10.4	10.9	11.0	11.4	13.0
Dental .....	1.1	1.1	1.1	1.1	1.2	1.1
Mirrors .....	1.9	1.8	1.8	1.4	1.5	1.5
Miscellaneous .....	4.8	4.4	4.7	4.0	5.1	5.3
Total .....	117.4	120.4	144.5	152.5	164.8	170.9
% Change Year Ago .....	6.9%	2.5%	20.1%	5.5%	8.1%	3.7%
Coinage .....	7.8	8.1	5.3	11.1	10.2	9.0
Total Including Coinage .....	125.2	128.5	149.8	163.5	175.1	179.8
% Change Year Ago .....	8.3%	2.6%	16.6%	9.2%	7.0%	2.7%

Notes: Totals may not equal the sums of categories due to rounding.

Sources: European trade sources, CPM Group.

**West German Fabrication Demand**

Million Troy Ounces

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	
Jewelry/Silverware .....	11.8	7.6	6.9	8.7	6.1	
Photography .....	8.7	7.3	7.8	8.9	9.2	
Electronics .....	9.6	8.7	7.4	6.7	8.6	
Brazing Alloys/Solders .....	6.7	5.3	4.5	4.7	3.9	
Dental .....	0.5	0.7	0.5	0.5	0.4	
Mirrors .....	0.5	0.5	0.5	0.5	0.5	
Miscellaneous .....	<u>2.0</u>	<u>1.8</u>	<u>1.8</u>	<u>2.9</u>	<u>1.9</u>	
Total .....	39.8	31.9	29.3	32.7	30.3	
% Change Year Ago .....	—	-19.8%	-8.2%	11.6%	-7.3%	
Coinage .....	<u>3.7</u>	<u>—</u>	<u>0.5</u>	<u>0.3</u>	<u>—</u>	
Total Including Coinage .....	43.5	31.9	29.8	33.0	30.3	
% Change Year Ago .....	—	-26.7%	-6.6%	10.7%	-8.2%	
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jewelry/Silverware .....	5.9	6.4	8.5	11.2	12.7	12.7
Photography .....	9.2	10.6	10.4	10.5	12.1	12.5
Electronics .....	9.7	10.1	10.6	10.9	12.3	13.8
Brazing Alloys/Solders .....	4.0	4.2	4.0	4.1	4.2	4.8
Dental .....	0.3	0.3	0.4	0.3	0.3	0.3
Mirrors .....	0.5	0.5	0.5	0.5	0.5	0.5
Miscellaneous .....	<u>2.6</u>	<u>2.5</u>	<u>2.4</u>	<u>1.6</u>	<u>2.4</u>	<u>2.6</u>
Total .....	32.2	34.6	36.8	39.1	44.6	47.3
% Change Year Ago .....	6.2%	7.5%	6.3%	6.3%	14.1%	6.1%
Coinage .....	<u>—</u>	<u>—</u>	<u>—</u>	<u>3.2</u>	<u>3.2</u>	<u>—</u>
Total Including Coinage .....	32.2	34.6	36.8	42.3	47.8	47.3
% Change Year Ago .....	6.2%	7.5%	6.3%	15.1%	13.0%	-1.1%

Notes: Totals may not equal the sums of categories due to rounding.

Sources: European trade sources, CPM Group.

**Italian Fabrication Demand**

Million Troy Ounces

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	
Jewelry/Silverware .....	16.5	7.9	9.7	10.6	7.2	
Photography .....	4.2	4.0	3.5	3.2	2.6	
Electronics .....	8.0	6.4	5.5	4.5	3.2	
Brazing Alloys/Solders .....	2.7	2.3	1.5	1.2	1.0	
Dental .....	—	—	—	—	—	
Mirrors .....	0.6	0.6	0.5	0.5	0.3	
Miscellaneous .....	1.3	0.5	0.8	0.8	0.6	
Total .....	33.3	21.8	21.5	20.8	15.0	
% Change Year Ago .....	—	-34.5%	-1.4%	-3.3%	-27.9%	
Coinage .....	1.6	0.3	0.3	0.4	0.6	
Total Including Coinage .....	34.9	22.1	21.7	21.3	15.6	
% Change Year Ago .....	—	-36.7%	-1.8%	-1.8%	-26.8%	
	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Jewelry/Silverware .....	8.3	9.0	22.2	28.6	29.0	28.6
Photography .....	3.2	3.2	4.2	3.5	1.9	1.6
Electronics .....	3.7	3.7	4.2	4.2	4.5	4.5
Brazing Alloys/Solders .....	1.0	1.0	1.1	1.1	1.2	1.3
Dental .....	—	—	—	—	—	—
Mirrors .....	0.3	0.3	0.3	0.3	0.3	0.3
Miscellaneous .....	0.9	0.9	0.9	0.9	1.0	1.1
Total .....	17.4	18.1	32.8	38.6	37.9	37.3
% Change Year Ago .....	16.0%	4.2%	80.9%	17.7%	-1.8%	-1.4%
Coinage .....	0.2	0.5	0.2	0.2	0.2	0.2
Total Including Coinage .....	17.6	18.6	33.0	38.8	38.0	37.6
% Change Year Ago .....	12.7%	5.8%	77.2%	17.6%	-1.9%	-1.3%

Notes: Totals may not equal the sums of categories due to rounding.  
Consumption of silver in semi-fabricated form is excluded.

Sources: European trade sources, CPM Group.

**United Kingdom Fabrication Demand**

Million Troy Ounces

	<b>1979</b>	<b>1980</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>	
Jewelry/Silverware .....	4.9	2.1	2.3	2.2	1.5	
Photography .....	10.2	6.7	6.9	6.8	7.7	
Electronics .....	7.3	6.4	5.4	5.5	5.3	
Brazing Alloys/Solders .....	3.9	3.0	2.6	2.6	2.0	
Dental .....	0.3	0.4	0.4	0.4	0.3	
Mirrors .....	0.5	0.4	0.4	0.4	0.4	
Miscellaneous .....	0.5	0.5	0.4	0.3	0.3	
Total .....	27.6	19.5	18.4	18.1	17.7	
% Change Year Ago .....	—	-29.3%	-5.6%	-1.6%	-2.2%	
Coinage .....	2.0	2.1	2.2	0.9	0.6	
Total Including Coinage .....	29.6	21.6	20.6	19.1	18.3	
% Change Year Ago .....	—	-27.0%	-4.6%	-7.3%	-4.2%	
	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Jewelry/Silverware .....	1.4	1.8	1.7	2.0	2.0	2.2
Photography .....	8.6	8.3	8.1	10.4	12.3	13.0
Electronics .....	5.9	5.9	5.8	5.5	5.4	5.9
Brazing Alloys/Solders .....	2.2	2.1	2.3	2.0	1.9	2.3
Dental .....	0.3	0.3	0.4	0.5	0.5	0.5
Mirrors .....	0.4	0.4	0.4	0.4	0.4	0.4
Miscellaneous .....	0.3	0.3	0.3	0.3	0.3	0.3
Total .....	19.2	19.1	19.1	21.1	22.7	24.5
% Change Year Ago .....	8.3%	-0.5%	0.2%	10.5%	7.7%	7.9%
Coinage .....	0.3	0.4	0.8	1.3	1.6	1.6
Total Including Coinage .....	19.5	19.5	19.8	22.4	24.3	26.1
% Change Year Ago .....	6.4%	-0.1%	1.8%	13.1%	8.7%	7.4%

Notes: Totals may not equal the sums of categories due to rounding.

Sources: European trade sources, CPM Group.



**French Fabrication Demand**

Million Troy Ounces

	<b>1979</b>	<b>1980</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>	
Jewelry/Silverware .....	4.7	3.2	3.0	2.8	2.4	
Photography .....	8.5	7.9	7.7	7.5	7.9	
Electronics .....	5.6	5.3	4.9	4.1	3.9	
Brazing Alloys/Solders .....	3.4	2.0	2.0	1.8	1.5	
Dental .....	—	—	—	*	0.1	
Mirrors .....	0.4	0.4	0.4	0.4	0.3	
Miscellaneous .....	1.4	1.0	0.8	0.5	0.4	
Total .....	24.1	19.8	18.9	17.1	16.5	
% Change Year Ago .....	—	-17.8%	-4.5%	-9.5%	-3.5%	
Coinage .....	10.6	0.1	0.1	1.4	2.2	
Total Including Coinage .....	34.7	19.9	19.0	18.5	18.7	
% Change Year Ago .....	—	-42.7%	-4.5%	-2.6%	1.1%	
	<b>1984</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>
Jewelry/Silverware .....	2.6	2.8	2.8	2.3	2.5	2.7
Photography .....	8.1	7.6	7.7	8.4	11.2	10.8
Electronics .....	3.9	4.4	4.4	4.8	5.5	6.4
Brazing Alloys/Solders .....	1.8	1.6	1.6	1.5	1.5	1.6
Dental .....	0.1	0.1	0.1	0.1	0.1	0.1
Mirrors .....	0.3	0.2	0.2	0.2	0.2	0.2
Miscellaneous .....	0.3	0.3	0.3	0.3	0.3	0.3
Total .....	17.1	16.9	17.0	17.6	21.3	22.1
% Change Year Ago .....	3.7%	-0.9%	0.4%	3.4%	20.9%	3.9%
Coinage .....	3.9	2.2	2.2	2.2	2.2	2.2
Total Including Coinage .....	21.0	19.1	19.2	19.8	23.4	24.3
% Change Year Ago .....	12.3%	-8.9%	0.3%	3.0%	18.5%	3.6%

Notes: Totals may not equal the sums of categories due to rounding.

Asterisks indicate that consumption in individual industries totaled less than 100,000 ounces.

Sources: European trade sources, CPM Group.

**Comex Open Interest**

Thousand Ounces

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
January .....	475,905	995,275	1,705,165	1,236,140	1,226,220	365,205
February .....	426,820	886,325	1,560,845	1,208,870	1,067,780	318,680
March .....	443,215	883,435	1,413,210	1,127,325	1,018,345	243,685
April .....	372,680	844,265	1,175,485	1,091,580	928,155	136,080
May .....	425,065	849,795	1,035,510	1,043,645	871,710	119,275
June .....	427,075	676,175	792,900	985,085	771,940	114,845
July .....	447,710	652,680	650,945	1,059,995	785,475	125,395
August .....	578,225	684,615	675,750	1,067,020	789,760	121,190
September .....	698,145	771,720	895,200	1,184,620	838,615	149,920
October .....	880,275	1,035,445	1,053,655	1,394,035	712,765	174,300
November .....	1,055,395	1,399,210	1,204,240	1,536,055	670,490	180,660
December .....	1,276,405	2,138,745	1,404,875	1,548,985	636,765	166,160
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
January .....	142,830	136,765	221,475	308,785	421,865	409,745
February .....	119,310	127,025	276,220	326,170	383,330	395,040
March .....	129,055	146,315	221,295	364,160	376,670	392,030
April .....	129,650	142,810	255,600	321,500	352,650	369,340
May .....	143,370	136,755	269,870	332,050	382,365	376,080
June .....	149,690	141,355	214,205	286,280	359,550	322,390
July .....	156,200	141,575	223,320	326,660	364,700	356,190
August .....	154,930	135,575	234,185	299,945	352,415	338,690
September .....	145,315	126,370	263,985	323,620	369,640	369,475
October .....	158,600	145,060	257,130	359,480	428,955	449,990
November .....	140,845	156,335	281,440	385,260	426,830	454,760
December .....	140,005	169,040	301,670	401,500	430,700	449,110
	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>		
January .....	478,360	397,350	470,890	464,460		
February .....	447,190	355,010	459,550	476,570		
March .....	503,755	343,540	486,585	493,760		
April .....	544,410	311,780	469,245	482,715		
May .....	469,015	355,415	435,830	487,845		
June .....	403,725	397,155	428,945	511,780		
July .....	441,385	419,795	441,760	500,960		
August .....	411,800	384,350	420,060	467,520		
September .....	392,865	409,515	440,555	459,035		
October .....	414,900	430,450	443,810			
November .....	355,845	455,520	452,395			
December .....	371,165	469,950	474,215			

Notes: End-of-month data.

Source: New York Commodity Exchange.

**Comex Trading Volume**

Thousand Ounces

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
January .....	1,277,415	1,414,390	1,927,810	1,650,015	2,299,675	838,665
February .....	777,410	912,215	1,191,535	1,353,430	1,941,390	380,785
March .....	897,705	904,350	1,593,455	1,954,990	1,522,985	717,365
April .....	1,118,530	1,092,145	1,371,570	1,437,350	1,836,625	469,865
May .....	809,070	1,129,005	1,367,295	1,224,720	2,587,495	233,090
June .....	825,540	1,814,445	1,545,700	1,236,180	2,402,495	316,300
July .....	1,024,830	1,426,260	1,010,710	1,270,555	1,919,265	228,240
August .....	1,322,000	1,229,505	970,615	1,580,935	2,020,290	208,930
September .....	987,705	1,175,930	1,114,725	960,045	1,465,965	504,555
October .....	1,393,015	1,403,615	1,671,705	2,345,235	958,500	464,595
November .....	1,573,875	2,792,515	1,899,965	2,189,865	892,995	478,115
December .....	2,504,480	3,415,165	2,035,150	1,907,105	555,415	453,165
Total .....	14,511,575	18,709,540	17,700,235	19,110,425	20,403,095	5,293,670
	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
January .....	353,450	563,915	2,554,445	2,853,930	2,659,165	1,970,040
February .....	355,225	969,410	3,007,130	3,493,840	2,439,950	1,844,575
March .....	374,555	1,057,695	2,233,185	3,478,740	2,592,200	1,387,955
April .....	363,075	964,700	2,264,275	3,149,325	2,248,800	2,194,000
May .....	290,245	498,490	2,580,325	3,133,730	2,123,830	1,400,655
June .....	486,960	1,086,795	3,118,505	2,936,830	1,889,500	1,680,350
July .....	386,770	1,315,360	2,726,465	2,773,345	1,888,405	939,480
August .....	580,055	1,586,215	3,282,270	3,007,745	1,942,655	1,588,995
September .....	859,335	1,290,145	2,460,115	2,156,285	1,338,265	2,273,190
October .....	607,240	1,444,480	2,844,905	2,246,105	1,569,820	1,433,400
November .....	682,895	1,753,185	2,984,705	2,671,160	1,663,850	1,694,670
December .....	863,795	1,657,705	2,563,585	1,811,505	1,749,590	841,125
Total .....	6,203,600	14,188,095	32,619,910	33,712,540	24,106,030	19,248,435
	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>		
January .....	1,236,730	1,370,490	1,585,760	1,715,875		
February .....	1,239,790	1,505,595	2,042,425	2,066,435		
March .....	1,715,890	1,744,525	2,236,615	1,050,965		
April .....	4,663,655	1,569,635	1,771,175	1,820,275		
May .....	2,193,070	1,705,725	1,392,480	1,644,520		
June .....	2,432,050	3,634,300	2,423,555	2,169,240		
July .....	1,893,700	3,194,670	1,361,270	1,211,440		
August .....	2,513,645	2,058,325	1,801,905	2,624,075		
September .....	1,951,330	1,499,290	1,124,630	1,006,365		
October .....	2,340,320	1,341,915	1,305,510			
November .....	1,779,465	2,376,870	3,110,615			
December .....	1,318,615	1,321,935	1,727,115			
Total .....	25,278,260	23,323,275	21,883,055	15,309,190		

Notes: Monthly total.

Source: New York Commodity Exchange.

**Tokyo Commodity Exchange Statistics**

Thousand Troy Ounces

	<b>Trading Volume</b>					
	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
January .....	60,287	21,080	8,997	26,654	18,755	46,351
February .....	60,308	29,469	8,553	24,096	21,235	39,883
March .....	76,384	18,465	11,568	29,009	17,754	34,587
April .....	73,794	28,215	90,571	28,551	26,398	38,128
May .....	66,243	14,395	82,387	34,931	5,208	34,139
June .....	38,716	13,697	43,302	154,434	20,843	28,381
July .....	46,170	10,392	38,845	212,471	13,688	25,326
August .....	36,881	14,802	60,997	56,233	15,669	39,002
September .....	47,415	33,814	24,700	65,511	18,566	35,046
October .....	32,279	15,460	35,049	42,711	26,164	
November .....	28,872	16,901	40,719	43,175	174,388	
December .....	23,739	10,440	27,509	22,473	83,680	
Annual Total .....	591,087	227,130	473,199	740,247	442,347	320,844

	<b>Open Interest</b>					
	<b>1985</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>
January .....	32,081	18,424	12,141	25,931	43,845	90,795
February .....	31,384	16,535	10,851	23,938	34,474	92,016
March .....	35,193	17,039	10,489	28,131	28,894	80,726
April .....	35,981	14,962	26,807	33,494	11,208	63,777
May .....	38,086	14,879	28,590	45,741	12,048	53,238
June .....	34,687	12,147	26,846	72,179	33,433	42,022
July .....	31,613	12,156	23,987	77,375	37,394	39,830
August .....	30,309	14,148	24,707	76,950	36,279	40,426
September .....	24,405	14,980	25,512	60,474	42,976	35,808
October .....	21,588	14,268	23,596	54,930	48,627	
November .....	19,989	14,148	25,181	52,071	90,100	
December .....	17,612	12,154	24,757	47,181	80,200	

Notes: Trading volume is monthly total, open interest is month-end.

Source: Tokyo Commodity Exchange.

**Tokyo Commodity Exchange**

Thousand Troy Ounces

**Tocom Warehouse Stocks**

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
January .....	—	2,663	3,980	4,448	7,740	10,431
February .....	—	2,966	4,204	4,410	9,757	10,303
March .....	—	2,939	4,165	4,386	9,838	10,279
April .....	1,781	3,631	4,177	4,517	10,920	10,808
May .....	1,790	3,551	4,218	4,511	10,735	10,756
June .....	2,094	3,259	4,176	5,300	10,788	11,214
July .....	2,160	3,224	4,166	5,162	10,396	11,131
August .....	2,551	3,616	4,621	5,912	10,074	11,477
September .....	2,428	3,606	4,393	5,816	9,737	
October .....	2,421	3,847	4,589	7,204	9,564	
November .....	2,383	3,780	4,551	6,770	10,622	
December .....	2,650	3,994	4,507	7,967	10,481	

Note: Stocks as of month end.

Source: Tokyo Commodity Exchange.

**Silver Futures Exchange Activity**

Million Troy Ounces

	<u>Trading Volume</u>				<u>Open Interest</u>			
	<u>Annual Totals</u>				<u>Year-end</u>			
	<u>Comex</u>	<u>CBT</u>	<u>Tocom</u>	<u>Total</u>	<u>Comex</u>	<u>CBT</u>	<u>Tocom</u>	<u>Total</u>
1970 .....	3,468.5	1,813.1	—	5,281.6	230.9	191.2	—	422.1
1971 .....	3,081.2	2,520.5	—	5,601.7	245.5	366.7	—	612.2
1972 .....	4,074.5	3,770.2	—	7,844.7	327.8	544.7	—	872.5
1973 .....	6,189.3	8,153.0	—	14,342.3	428.0	981.6	—	1,409.6
1974 .....	6,829.6	7,314.0	—	14,143.6	658.4	623.5	—	1,281.9
1975 .....	14,511.6	9,763.5	—	24,275.1	1,276.4	864.5	—	2,140.9
1976 .....	18,709.5	10,055.2	—	28,764.7	2,138.7	680.3	—	2,819.0
1977 .....	17,700.2	11,285.3	—	28,985.5	1,404.9	1,409.8	—	2,814.7
1978 .....	19,110.4	13,289.2	—	32,399.6	1,549.0	1,343.9	—	2,892.9
1979 .....	20,403.1	13,602.9	—	34,006.0	636.8	468.7	—	1,105.5
1980 .....	5,293.7	1,705.2	—	6,998.9	166.2	143.1	—	309.3
1981 .....	6,203.6	1,257.3	—	7,460.9	140.0	56.3	—	196.3
1982 .....	14,188.1	1,163.6	—	15,351.7	169.0	34.8	—	203.8
1983 .....	32,619.9	2,750.5	—	35,370.4	301.7	32.4	—	334.1
1984 .....	33,712.5	1,887.3	—	35,599.8	401.5	26.8	—	428.3
1985 .....	24,106.0	1,034.8	591.1	25,731.9	430.7	18.5	17.6	466.8
1986 .....	19,248.4	511.2	227.1	19,986.7	449.1	12.7	12.3	474.1
1987 .....	25,278.3	597.0	473.2	26,348.5	371.2	11.2	24.8	407.2
1988 .....	23,323.3	502.4	740.2	24,565.8	470.0	13.5	47.2	530.7
1989 .....	21,833.1	266.7	420.8	22,520.6	474.2	9.7	80.2	564.1
1990 Y-T-D ....	15,309.1	149.5	320.8	15,779.4	459.0	7.3	35.8	502.1

Notes: Trading volume is the total for the year. Open interest is end-December. Year-to-date through September 1990.

Sources: New York Commodity Exchange, Chicago Board of Trade, Tokyo Commodity Exchange.

**Reported and Inferred Silver Holdings**

Million Troy Ounces

	Reported Stock Levels				Year-to-Year Changes		
	Government	Exchange	Dealer	Total	In Market Stocks	In Inferred Stocks	Total
1970 .....	357.7	135.0	82.2	574.9	NA	NA	NA
1971 .....	311.9	135.7	57.1	504.7	-24.4	-8.7	-33.1
1972 .....	333.6	107.9	51.9	493.4	-33.0	-59.6	-92.6
1973 .....	277.2	108.0	38.4	423.6	-13.4	-109.6	-123.0
1974 .....	319.2	99.5	49.3	468.0	2.4	-50.7	-48.3
1975 .....	250.8	142.0	34.6	427.4	27.8	-31.7	-3.9
1976 .....	257.0	144.3	30.6	431.9	-1.7	-13.4	-15.1
1977 .....	319.0	149.8	35.6	504.4	10.5	-56.5	-46.0
1978 .....	318.8	141.1	29.0	488.9	-15.3	-38.5	-53.8
1979 .....	314.6	146.2	16.1	476.9	-7.8	36.7	28.9
1980 .....	326.5	148.1	17.0	491.6	2.8	204.3	207.1
1981 .....	322.5	128.7	20.7	471.9	-15.7	136.1	120.4
1982 .....	321.5	141.4	20.7	483.6	12.7	71.0	83.7
1983 .....	302.5	196.6	17.7	516.8	52.2	113.5	165.7
1984 .....	286.5	189.2	17.1	492.8	-8.0	101.0	93.0
1985 .....	273.5	227.0	17.1	517.6	37.8	65.2	103.0
1986 .....	259.5	189.2	16.3	465.0	-38.6	52.6	14.0
1987 .....	239.5	193.3	15.0	447.8	2.8	43.1	45.9
1988 .....	231.6	209.4	15.2	456.2	16.3	10.4	26.7
1989 .....	221.4	261.1	14.6	497.1	51.1	-31.3	19.8
1990 .....	212.4	274.9	17.6	504.9	16.8	-7.8	9.0

Notes: Market stocks include reported U.S. dealer inventories and exchange registered stocks. New York Commodity Exchange inventories also include eligible stocks. Changes in inferred stocks is the change in the surplus/deficit adjusted for changes in reported inventories. End of year data; 1990 are end-second quarter.

Sources: U.S. Bureau of the Mint; U.S. Bureau of Mines; New York Commodity Exchange; London Metal Exchange; Chicago Board of Trade; Tokyo Commodity Exchange; CPM Group.

**Reported Silver Inventories**

Million Troy Ounces, End of Quarter

	<u>Comex</u>	<u>CBT</u>	<u>LME</u>	<u>Tocom</u>	<u>Industry</u>	<u>Total</u>
1972 1st Qtr. ....	109.1	15.0	6.7	—	58.0	188.8
2nd Qtr. ....	98.6	17.3	6.4	—	65.4	187.7
3rd Qtr. ....	92.8	19.9	7.7	—	59.4	179.8
4th Qtr. ....	77.6	22.8	7.5	—	51.9	159.8
1973 1st Qtr. ....	69.1	26.5	9.1	—	42.9	147.6
2nd Qtr. ....	56.1	23.1	12.3	—	41.5	133.0
3rd Qtr. ....	47.5	29.4	15.4	—	39.1	131.4
4th Qtr. ....	64.3	27.4	16.3	—	38.4	146.4
1974 1st Qtr. ....	64.4	25.9	14.8	—	33.9	139.0
2nd Qtr. ....	74.3	20.3	13.5	—	31.0	139.1
3rd Qtr. ....	68.2	20.0	11.5	—	40.0	139.7
4th Qtr. ....	68.0	19.5	12.0	—	49.3	148.8
1975 1st Qtr. ....	70.3	25.0	12.2	—	49.1	156.6
2nd Qtr. ....	78.3	40.3	14.6	—	32.4	165.6
3rd Qtr. ....	82.6	42.8	16.4	—	31.8	173.6
4th Qtr. ....	85.7	38.5	17.8	—	34.6	176.6
1976 1st Qtr. ....	79.8	39.4	15.3	—	29.3	163.8
2nd Qtr. ....	65.2	47.9	17.5	—	29.5	160.1
3rd Qtr. ....	50.0	53.6	29.8	—	29.2	162.6
4th Qtr. ....	54.8	61.0	28.5	—	30.6	174.9
1977 1st Qtr. ....	63.2	64.4	27.5	—	33.0	188.1
2nd Qtr. ....	69.4	63.9	25.1	—	31.8	190.2
3rd Qtr. ....	64.8	61.3	18.8	—	33.4	178.3
4th Qtr. ....	68.4	62.2	19.2	—	35.6	185.4
1978 1st Qtr. ....	74.1	62.5	19.2	—	33.0	188.8
2nd Qtr. ....	72.8	64.0	18.0	—	29.0	183.8
3rd Qtr. ....	67.8	62.2	18.2	—	24.6	172.8
4th Qtr. ....	58.2	59.9	23.0	—	29.0	170.1
1979 1st Qtr. ....	49.6	55.3	21.3	—	33.5	159.7
2nd Qtr. ....	54.1	56.8	18.8	—	27.7	157.4
3rd Qtr. ....	51.5	65.3	15.9	—	21.5	154.2
4th Qtr. ....	74.8	58.3	13.1	—	16.1	162.3
1980 1st Qtr. ....	83.6	57.8	17.8	—	30.1	189.3
2nd Qtr. ....	82.0	45.8	28.0	—	30.6	186.4
3rd Qtr. ....	82.1	46.1	26.6	—	31.6	186.4
4th Qtr. ....	86.6	34.2	27.3	—	17.0	165.1
1981 1st Qtr. ....	85.4	18.9	24.5	—	20.1	148.9
2nd Qtr. ....	86.7	20.4	25.8	—	22.0	154.9
3rd Qtr. ....	77.4	21.2	29.7	—	20.6	148.9
4th Qtr. ....	77.6	18.9	32.2	—	20.7	149.4
1982 1st Qtr. ....	77.1	18.6	33.2	—	21.8	150.7
2nd Qtr. ....	70.8	15.2	35.7	—	22.7	144.4
3rd Qtr. ....	61.5	13.5	36.9	—	22.3	134.2
4th Qtr. ....	90.7	15.5	35.2	—	20.7	162.1
1983 1st Qtr. ....	97.2	15.5	34.1	—	17.4	164.2
2nd Qtr. ....	90.9	19.0	35.4	—	14.4	159.7
3rd Qtr. ....	129.3	21.1	37.7	—	16.0	204.1
4th Qtr. ....	127.4	23.8	45.4	—	17.7	214.3
1984 1st Qtr. ....	116.8	23.4	50.0	—	17.2	207.4
2nd Qtr. ....	120.9	21.3	51.7	—	16.3	210.2
3rd Qtr. ....	115.0	21.2	52.6	—	19.2	208.0
4th Qtr. ....	118.5	19.1	51.6	—	17.1	206.3



		<u>Comex</u>	<u>CBT</u>	<u>LME</u>	<u>Tocom</u>	<u>Industry</u>	<u>Total</u>
1985	1st Qtr. ....	106.6	17.4	54.1	—	20.5	198.6
	2nd Qtr. ....	132.4	14.9	50.5	2.1	18.7	218.6
	3rd Qtr. ....	144.0	16.6	55.0	2.4	15.5	233.5
	4th Qtr. ....	155.3	17.8	51.2	2.7	17.1	244.1
1986	1st Qtr. ....	148.2	17.6	40.8	2.9	15.6	225.1
	2nd Qtr. ....	151.9	17.5	35.8	3.3	16.6	225.1
	3rd Qtr. ....	157.2	16.5	25.2	3.6	15.8	218.3
	4th Qtr. ....	145.4	16.7	23.1	4.0	16.3	205.5
1987	1st Qtr. ....	157.9	15.0	21.8	4.2	15.3	214.2
	2nd Qtr. ....	152.5	14.0	23.1	4.2	15.1	208.9
	3rd Qtr. ....	155.7	12.6	21.1	4.4	14.2	208.0
	4th Qtr. ....	155.3	13.5	20.1	4.5	15.0	208.4
1988	1st Qtr. ....	155.8	13.5	18.7	4.4	15.2	207.6
	2nd Qtr. ....	168.2	13.8	14.8	5.3	16.2	218.3
	3rd Qtr. ....	178.8	13.8	15.1	5.8	15.0	228.5
	4th Qtr. ....	174.4	12.0	15.0	8.0	15.2	224.6
1989	1st Qtr. ....	194.8	11.4	11.8	9.8	16.7	244.5
	2nd Qtr. ....	206.1	13.2	—	10.8	16.2	246.3
	3rd Qtr. ....	212.3	12.7	—	9.8	16.6	251.4
	4th Qtr. ....	238.8	11.8	—	10.5	14.6	275.7
1990	1st Qtr. ....	252.1	11.9	—	10.3	17.0	291.3
	2nd Qtr. ....	251.6	12.1	—	11.2	17.6	292.5
	3rd Qtr. ....						
	4th Qtr. ....						

Notes: Industry stocks include dealer, importer, and refiner stocks in the United States. The London Metal Exchange ceased its silver contract in June 1989. Stocks formerly registered against the contract now are held in private hands.

Sources: New York Commodity Exchange, Chicago Board of Trade, Tokyo Commodity Exchange, London Metal Exchange, U.S. Bureau of Mines.





