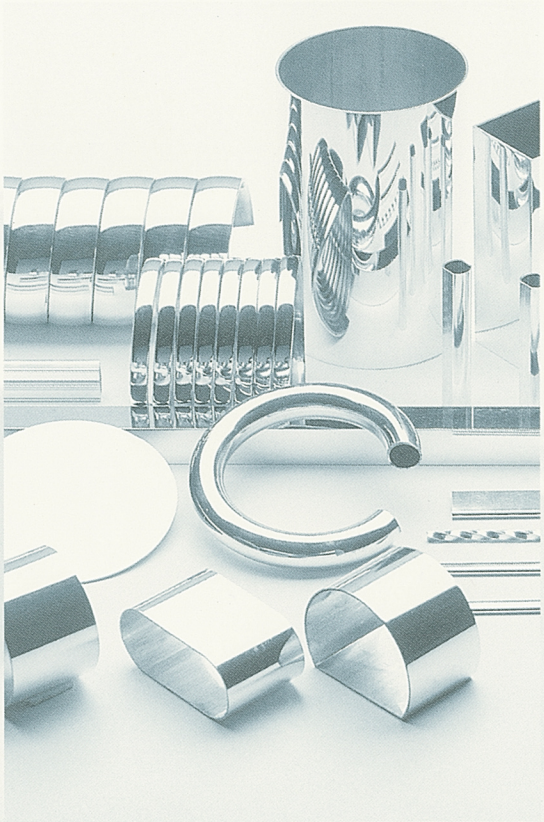
WORLD

SILVER SURVEY

1997



THE SILVER INSTITUTE

World Silver Survey 1997

Produced for The Silver Institute
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PREFACE

The World Silver Survey has been published annually by The Silver Institute since 1990. Copies of previous editions can be obtained by contacting The Silver Institute at the address and telephone number on the front inside cover.

Cover photograph courtesy of Cookson Precious Metals UK. The inset photograph shows various forms of semi-manufactures used in the jewelry and silversmithing industries.

ISSN 1059-6992

ISBN 1-880936-05-4

The data on which this report is based have been obtained by The Silver Institute and Gold Fields Mineral Services from sources which are generally believed to be reliable. However, this does not guarantee complete accuracy in the information presented here. It is in the nature of the precious metals markets that estimates for a number of components must be made on the basis of incomplete information. The opinions expressed here represent those of the authors of the report at the time of writing.

Contents

This is the third survey of the world silver market to be produced for The Silver Institute by Gold Fields Mineral Services (GFMS), which is best known for its annual Gold Survey, now in its 30th year. As with the work on gold, the information contained here is based in part on the analysis of the GFMS database of international trade statistics, company report data and other public-domain information. More importantly, it is also based on a series of interviews with the industry's main players, carried out every year by the GFMS team of analysts and consultants, which provide the essential data to allow the compilation of reliable estimates for world supply and demand.

GFMS is grateful to the many miners, refiners, bullion dealers, bankers and fabricators throughout the world who have contributed their time and information to ensuring that the picture of the industry described in this Survey is as complete and accurate as possible.

The vertical lines in the main tables of this Survey represent a break in the statistical series between the post-1989 data researched by GFMS for the 1995, 1996 and 1997 editions and that available in pre-1995 editions for the years prior to 1990. For this reason, the "Other Western World" category in Tables 3, 4 and 5 contains unclassified components of supply and demand for the period before 1990 which have been derived from earlier versions of the Survey.

May, 1997

Gold Fields Mineral Services Ltd

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Units used:
supply and demand data are given in units of million troy ounces (Moz)
1 Moz = 31.103 t (metric tonnes)
1 tonne = 32,151 troy ounces
1 tonne = 1,000,000 grams (g)

Terminology:
"-" = not available or not applicable
0.00 = zero or less than 0.005
"dollar" refers to the US dollar unless otherwise stated

Prices:
Unless otherwise stated US dollar prices are for the PM fix of the London Silver Market.

Table Rounding:
Throughout the tables, totals may not add due to independent rounding.

1. Summary and Outlook

The main question for the silver market continues to be the rate at which the above-ground stocks of bullion and coins are being eroded by the continued excess of fabrication demand over the combined total of mine production and scrap.

In 1996, the resulting gap widened substantially, to 160 Moz (or nearly 5,000 t) but this was still below the record of 180 Moz (5,600 t) set in 1993. The increase in the gap last year was not due to any decline in supply from mine production or scrap recycling, both of which rose modestly, but was, instead, a result of the 4.5% increase in fabrication demand.

A summary of how the gap resulted from the interplay of the various supply/demand components is given in Table 1 and described on page 7. But perhaps more important than the origin of the gap is the matter of how it was filled. The data in Table 1 show that the main components of the above-ground stocks which bridged the gap were private disinvestment of 149 Moz (4,600 t) and official sector sales of 23 Moz (715 t). Figures 1 and 2 show the widening associated decline in bullion stocks corresponding to the supply/demand gap over the past six years.

While the above developments point to an improvement in silver's fundamentals last year, there was little evidence from the price to suggest that investors were returning to the silver market. If anything, after the transitory revival in investment and speculator involvement in the market in mid-1995, there was a feeling of disillusionment about the silver price, which resulted in some longer-term holders (as well as more recent investors) liquidating their positions.

But although the price in dollar terms ended the year with a fall of 7% from its opening level, this was a somewhat distorted picture of what was happening in the world's silver markets last year. In fact, the average price in many countries and currencies actually improved year-on-year, in some cases quite significantly. It was thus in part a reflection of the dollar's strength that the average "world" price (in dollars per ounce) as quoted on the markets in London and New York, saw virtually no change in 1996 compared with the 1995 average.

The dramatic decline in the price after the rally in the first two months of 1996 cannot, however, be

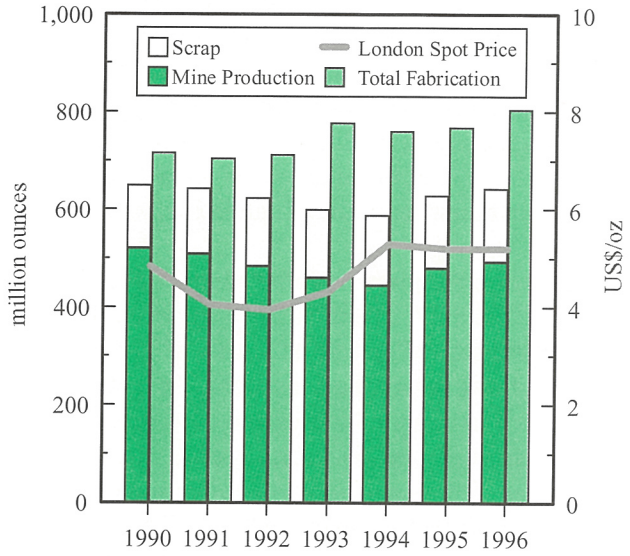
Table 1
World Silver Supply and Demand
(Million ounces)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Supply										
Mine Production	439.0	454.1	469.1	520.3	508.0	482.8	459.4	443.7	478.9	**492.6**
Net Official Sector Sales	20.0	8.3	10.0	4.7	-	-	15.0	27.9	34.6	**23.0**
Old Silver Scrap	151.1	157.8	149.2	128.1	134.3	140.5	140.6	144.2	148.9	**150.8**
Hedging	-	-	-	15.2	19.0	1.3	26.7	-	5.5	**-**
Implied Disinvestment	-	-	2.2	47.2	46.9	99.4	134.9	153.2	100.9	**148.5**
Total Supply	610.1	620.2	630.5	715.6	708.2	724.0	776.6	769.0	768.8	**814.9**
Demand										
Fabrication										
Industrial	279.7	302.5	308.0	278.4	268.9	257.4	268.4	280.4	293.6	**293.4**
Photography	172.1	185.1	185.9	221.6	216.9	211.9	211.8	215.5	223.0	**226.2**
Jewelry and Silverware	88.6	93.0	118.1	183.8	189.2	209.4	255.9	221.0	227.1	**262.9**
Official Coins	27.8	17.8	18.5	31.8	28.5	32.8	40.5	42.9	25.1	**20.8**
Total Fabrication	568.3	598.5	630.5	715.6	703.5	711.4	776.6	759.9	768.8	**803.3**
Net Official Sector Purchases	-	-	-	-	4.7	12.6	-	-	-	**-**
Hedging	-	-	-	-	-	-	-	9.1	-	**11.6**
Implied Investment	41.9	21.8	-	-	-	-	-	-	-	**-**
Total Demand	610.1	620.2	630.5	715.6	708.2	724.0	776.6	769.0	768.8	**814.9**
Silver Price (London, US$/oz)	7.016	6.532	5.500	4.832	4.057	3.946	4.313	5.285	5.197	**5.199**

Note: The vertical lines in the main tables of this Survey represent a break in the statistical series between the post-1989 data researched for the 1995, 1996 and 1997 editions and that available in pre-1995 editions for the years prior to 1990.

Figure 1

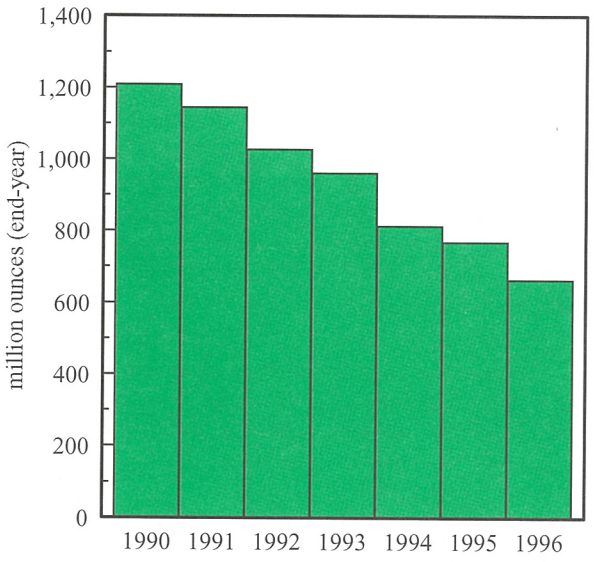
World Silver Market



The physical gap (between fabrication and mine production plus scrap) has grown over the past seven years. The gap has been filled primarily by the disposal of private sector bullion stocks with a more modest contribution from official sector sales and, occasionally, supply from increased producer hedging.

Figure 2

Total Identifiable Silver Bullion Stocks



Total identifiable stocks of bullion have fallen by 540 Moz (17,000 t) since the end of 1990. This compares with the cumulative supply/demand gap for the period 1991-96 (see Figure 1) of 800 Moz (24,800 t), suggesting that two-thirds of the gap has been filled from a run-down of identifiable stocks, with the rest coming from a decline in the unreported stocks held by private investors.

explained simply on the basis of a strengthening dollar. But neither can silver's fundamentals be blamed for the negative trend last year. A major factor contributing to the decline was the widespread view among investors, and in particular investment funds, that the "action" was to be found in other commodity markets or, even more so, in the stock market. For much of the year, precious metals were thus effectively side-lined as far as the investment community was concerned. Worse still, what activity there was in precious metals tended to consist of short-selling in the gold market. Thus, perhaps the biggest problem for silver last year was the collateral damage it suffered from being associated, in investors' minds at least, with gold. The gold price was forced steadily downwards for much of the year by a combination of actual central bank sales, fears of further official sector disposals, producer hedging (especially via the options market) and the impact of short sales from the New York funds. So in spite of the fundamental differences between the two markets, investors seemed to treat them equally. And, with silver's customary tendency to show a wide trading range, it fell even faster than gold during the course of the year.

In brief, the result was that while there was virtually no change in the annual average silver price last year, which at $5.20 was almost indistinguishable from the 1995 equivalent, the fall in the price to $4.80 by the end of the year represented a substantial $0.37 per ounce fall during the year. Although silver did finally part company from gold in the first months of 1997, putting on a sudden spurt which took the price from $4.65 to $5.31, but this proved to be a short-lived phenomenon, with the price slipping back to the $4.70 level by the second week of April.

Given that the decline in the identifiable stocks of bullion has been in progress throughout the 1990s, without any very obvious effect on prices so far, this raises the question of whether there are additional (and large) stocks of near-market silver, in either coin or bullion form, which can continue to fill the gap for some time to come. The analysis described in Chapter 5 of this Survey suggests that there are, indeed, other stocks of silver, which may be quite substantial, but that these are more distant from the market (in the sense that a higher price will be needed to mobilize them than has been seen in recent years).

But the whole point about the stocks issue is not

that bullion stocks have to reach zero, or even close to it, before the market can start to move higher. In this context, the concept of a "pinch-point" is perhaps a useful one to consider. This is the point at which the decline in stocks begins to make a noticeable difference to the availability of metal to the market. When this point is reached, shortages of physical metal begin to be more obvious to market participants, with silver being found to be unavailable in the quantities, qualities and locations required.

The question is, of course, when such a point might be reached. It is not possible to give a precise answer to this question, because of the lack of information on the true level of unreported stocks. For instance, there are still substantial stocks, not only of hundred-ounce bars held by private investors, but also of coins such as the Maria Theresia Taler (the history of which is described in Chapter 6), located in many parts of the Middle East and the Indian sub-continent. But then again, the silver in these hoards is performing a function - protecting wealth and acting as a hedge against the vagaries of economic life. It would be folly to suggest that all such holdings of silver had to be returned, for instance, to European refineries, converted into market-acceptable bars and transformed into, say, electrical contacts before a tightening of the silver market could become apparent.

The evidence from the statistics in this Survey suggests that the market is moving in the direction of a genuine tightening, with identifiable stocks now approximately equal to four years of the supply/demand gap recorded in 1996. But it would be simplistic to forecast either, on the one hand, that four years from now, the silver market will run out of stocks with a resulting price boom or, on the other hand, that all stocks of "near-market" material will have to be converted into fabricated products before there can be any significant movement in the silver price.

What is abundantly clear is that stocks of silver bullion are being steadily transformed into fabricated products and that if the existing holders of the remaining stocks of bullion should choose to maintain, rather than dispose of their holdings (or perhaps even increase them), then the only way that the market will achieve a balance between the other components of fabrication, mine production, scrap and official sector sales is via a significant increase in the silver price.

Supply/Demand in 1996

Last year's 14 Moz (420 t) increase in mine production was shared almost equally between primary and by-product producers. The nearly 7 Moz (210 t) rise in primary silver production to 83 Moz (2,580 t) still left the sector well below the high of 111 Moz achieved in 1990. An interesting aspect of primary production in recent years is the way it has responded in a classic, lagged fashion to changes in the silver price. But silver mine production is overwhelmingly of a by-product nature with only 17% of output last year coming from primary mines. By-product output, which shows little dependence on the silver price, increased last year from 403 Moz (12,530 t) to 410 Moz (12,740 t).

Given the fact that the silver price in London and New York was virtually flat year-on-year, it may seem surprising that the recycling of old silver products showed any increase. The main reason was the continued growth in the recycling of photographic materials.

Despite the continued liquidation of Russian stockpiles, official sector sales fell back last year because of a much lower level of disposals by the US Defense Logistics Agency.

There was a massive increase, however, in sales from private sector silver stocks. Augmented by the liquidation of long positions that had been established the year before, net disinvestment climbed to nearly 149 Moz (4,620 t).

By contrast, producer hedging, which had made a small contribution to supply in 1995, switched to the demand side as a result of the significant decline in outstanding forward selling positions during the year. Thus, newly-produced silver was paid back to lenders, rather than being delivered to the market.

The increase in fabrication demand last year owed something to higher photographic offtake, implying that the threat to silver use from digital imaging may be exaggerated. However, there is no doubt that the main impetus to fabrication came from the jewelry and silverware sector of one country, namely India, where offtake leapt in the second half in response to the co-incidence of good harvests in the main silver-consuming area and a steep fall in the local silver price.

Offtake from the industrial sector, which over recent years has shown the greatest growth, stagnated in 1996. The main reason for this was the poor performance of many European economies, where fiscal measures to ensure compliance with the criteria for European Monetary Union have slowed economic growth to a snail's pace in many countries.

Finally, an indication of the generally depressed state of investment in silver could be seen in terms of coin demand which, in spite of having slumped by nearly a quarter in 1995, fell a further 17% last year.

2. Silver Prices

For a few weeks in the early part of 1996, it looked as if the silver price might be headed back to the $6 level which it had briefly regained in May, 1995. However, after a five-week rally, which took the price to $5.8275 per ounce on 2nd February, a rise of almost 13% from its opening level, the market went into a steady and almost uninterrupted decline. By 3rd December, when the year's low of $4.7100 was reached, the price had fallen 19% from the February peak. In spite of these gyrations, the average price for 1996 was barely distinguishable from the equivalent price in 1995. A curious result of the similarities in the average prices for these two years was that while the average London spot price rose marginally (by 0.05% to $5.1995) on Comex it fell (by 0.13% to $5.1783). The price volatility of daily trading dropped back sharply last year from the relatively high levels seen in 1995 and the trading range in 1996 of $1.12 (21% of the average price) was also narrow by historical standards.

More than in any recent year, silver was under the influence of the gold market in 1996 and it was only after the December low that it managed to break free from the negative sentiment affecting the gold price. Silver then put on the kind of rally for which it is renowned - though the ensuing rise of 13% to the $5.30 level was a rather subdued affair relative to the rally seen in the first weeks of 1996.

In 1996, changing exchange rates against the dollar caused prices in many consuming countries to deviate quite sharply from the trend in the dollar price, as can be seen in Figure 3. This was, in general, due to the strength of the dollar, which continued to recover on foreign exchange markets from the low point it had reached in early 1995. A number of major currencies, of course, moved much more sharply than the average, the best example being the yen. The result was that there were a number of very significant increases in local silver prices between 1995 and 1996, while the contrasts between the course of the dollar price compared with some others *during* the year were also notable, as illustrated below.

Silver Prices and Changes, 1995-96

	Average		Yr-on-yr change	Change* during year
	1995	1996	(%)	(%)
US$/oz	5.20	5.20	-	-7.1
DM/kg	239	252	+5.4	+2.5
yen/g	157	182	+15.9	+5.3
rupees/kg	6,864	7,291	+6.2	-4.2

* measured from 2nd January to 31st December

Figure 4 shows the movements in the silver and gold prices last year, when the silver price was often determined by developments in the gold market.

Figure 3

London Silver Market: Spot Price, Weekly Averages

US$/oz; other currencies reindexed to 2nd January 1996 = 100

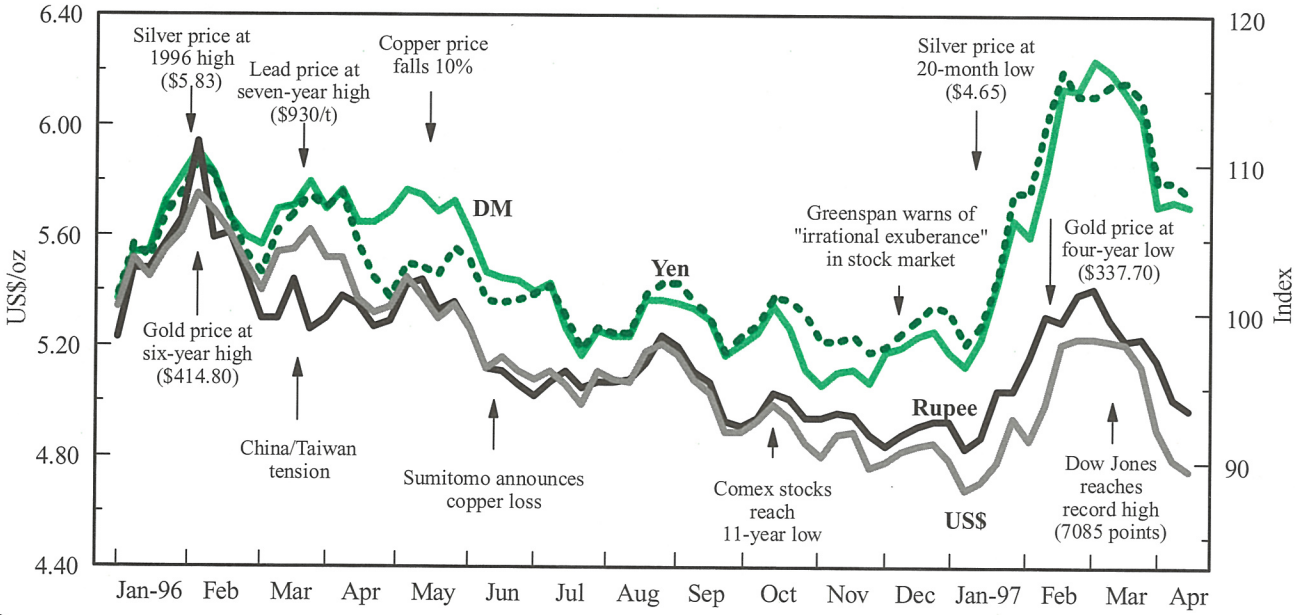


Figure 4

London Prices for Silver and Gold

Gold price rebased

After the range-bound trading which had been the main feature of the silver market in the second half of 1995, the price suddenly took off in the first week of 1996. The year began with silver at $5.16 per ounce in London, fractionally below the 1995 average, but already on the second trading day of January, the price leapt by 4%, with the London market taking its lead from Comex, where US investment funds had re-entered the market in some force the previous day. Within the first week of trading, the price had risen by almost 7%, to the $5.50 level. Subsequently, after meeting some resistance at this level, short covering pushed the price higher, with silver matching, and eventually surpassing, the rises seen in the gold market. The main factor underlying investors' re-awakened interest in both metals was the belief that US share prices were looking a little over-stretched after the 35% appreciation in the Dow Jones index during 1995. By 2nd February, the London price had been pushed up to $5.8275 but by this time, confidence in the equities market was returning and relatively few funds took positions in precious metals. Thus the gold price was beginning to look exposed and, as the gold price started to fall in early February under the weight of central bank sales and producer forward selling, silver was brought down with it. Initially, silver resisted the downward pressure more successfully than did gold but within a month, the silver price had given up most of the gains achieved since the end of 1995 and was back below the $5.40 level.

The second half of March saw a modest rally, helped by the breakdown in the Middle Eastern peace process and to some extent by the tension preceding the Taiwanese presidential election. But with the election over, speculative interest in silver disappeared and the price lost further ground before finding support at above $5.25 in late April.

For the remainder of the year, silver fell into a pattern of irregular 20 cent rallies and 30 cent declines, each cycle lasting from one to three weeks, as dealers and speculative funds looked but failed to find the major breakout from the downward-trending range. An interesting development was seen in mid-June when, following a period of turmoil on the copper market, Sumitomo Corporation announced major losses in copper trading on 14th June. The resulting heavy liquidation of Japanese positions in the silver market brought about a day of frantic trading in London, with the price first collapsing by more than 3%, forcing the London price briefly below $5, and then recovering by an even greater amount the next day. The volatile trading also owed much to the activities of option dealers. By contrast, the daily spot settlement price on Comex reflects none of this excitement, the excursion having been contained within the London trading day.

Speculative funds came back into the market on several occasions, perhaps indicating a willingness to believe that US inflation might be returning or that the stock market would succumb to the long-awaited correction, but interest was never maintained for long enough to inspire a breakout. Late August saw something approaching a sustained rally, to the $5.25 level, after the market had tested support at $5 earlier in the month. However in the following month, in spite of good physical demand, fund selling and liquidation pushed the price down substantially below what had been seen as strong support at that level.

October and November saw the cycles of speculative interest becoming shorter and of more limited amplitude so that although overall the price continued to trend lower, it was notable that silver was no longer slavishly following the gold price, which was under increasing pressure from official and producer selling. This was illustrated by the fact that after both metals reached their lows for the year on 2nd December, of $4.71 for silver, gold remained close to its low for the remainder of the year, while the silver price bounced quite sharply in the following four weeks, reaching $4.88 before the month-end. The

now well-known remarks by the Chairman of the US Federal Reserve on 5th December about the dangers of "irrational exuberance" producing excessive optimism about share prices was initially thought to benefit gold, so it was ironic that it was silver which rallied in the following weeks.

Somewhat similarly, although early January saw the gold price plummeting, silver suffered a more modest setback, though this still took the price to a new low of $4.65 by the middle of the month. The decisive break with gold, however, took place over the next two months, as investors realized that the fundamentals of the two metals are, after all, quite distinct. Thus, not for the first time, strong physical demand provided a foundation for a significant rally in silver, the first in more than a year. Fund buying helped to take the price up to $5.31 by early March but the market proved incapable of sustaining this level and the price fell back, precipitously in early April, to below $5 again.

For 1996 as a whole, silver has once again demonstrated a much wider trading range than for gold (21% versus 12% of their average prices respectively) though the difference between the two metals' trading ranges was much less pronounced than in 1995, when the corresponding figures were 31% and 6%. During the period between the 1996 highs and lows (which fell on virtually the same days for both metals) silver fell by 23.7% while for gold, the equivalent figure was around half of this at 12.9%.

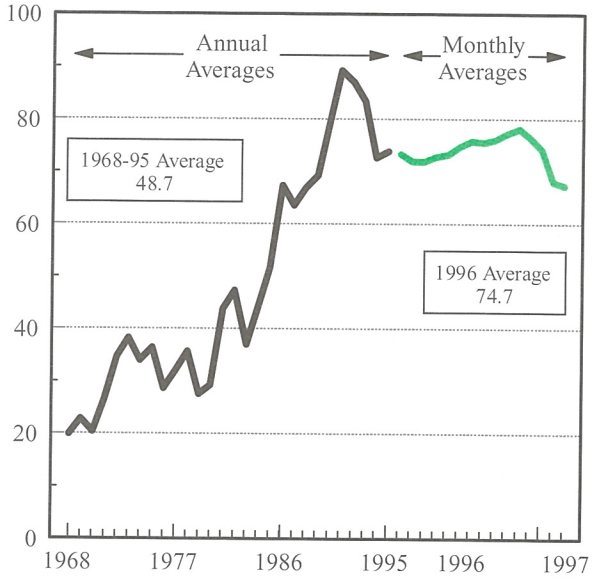
Gold/Silver Price Ratio

The ratio of the gold to the silver price has at times been a closely followed indicator of the relative trends in the two markets and in the past has been used by investors as signals for buying, selling or exchanging gold and silver. A high value of the ratio, of course, indicates that silver is cheap relative to gold. On a daily basis, the highest value ever reached was 100.8, on 25th February, 1991. For much of the past year, the ratio, like the metals themselves, was on the sidelines as far as many investors were concerned. With the two metals moving in essentially the same direction, at least until the final month of 1996, there was little movement in the ratio. However, things began to change towards the year-end and especially in the first months of this year.

As can be seen in Figure 5, the ratio opened the year at just under 73, very close to the 1993-94 averages but well below the record levels of the 1991-92 period.

Figure 5

The Gold/Silver Price Ratio



During the course of the year, however, the ratio gradually moved up, a reflection of the silver price falling faster than gold. By November, the monthly average reached more than 78, still below the 1991 average of 89.3. Then, as silver started to recover while gold slipped back further, the ratio dropped very sharply in the early months of this year, in the process setting off a wave of ratio trading, principally among the US funds.

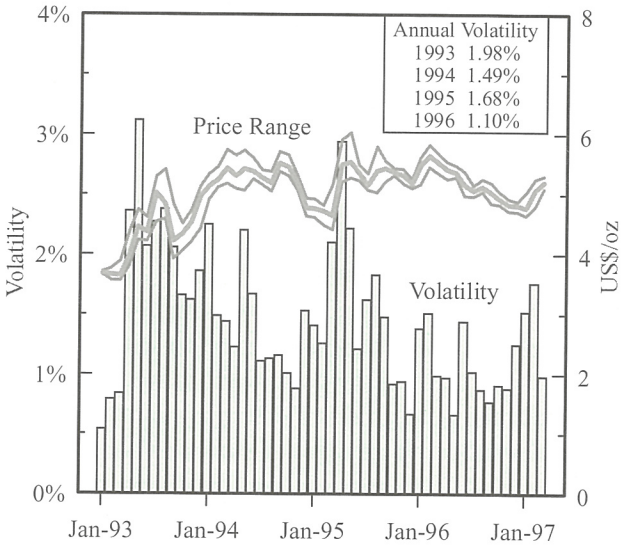
Price Volatility and Trading Ranges

As can be seen in Figure 6, even during the active trading in the early part of last year, volatility was

Figure 6

Silver Price Volatility

Based on London daily spot fixings



significantly lower than in many of the months in the preceding three years.

During the past year, daily volatility calculated this way was at a much reduced level of 1.10% compared with the equivalent 1995 figure of 1.68%. In other words, the price tended to deviate each day by just over 1% from its trend. Here again, the comparison with gold is revealing, with silver generally behaving in a much more volatile manner.

Price Volatility (%)
(Based on daily fixings)

	1992	1993	1994	1995	1996
Silver	1.01	1.98	1.49	1.68	1.10
Gold	0.52	0.85	0.57	0.41	0.39

From the above, it is clear that the price of silver has been much more volatile than that of gold over the past five years. For instance, taking the ratio of these two volatilities in 1996 gives a figure of 2.8, indicating that silver prices tended to show a daily movement of almost three times as much as gold in that year. Corresponding ratios for the period since 1968, when the gold market was freed from the control of the central banks, are shown in Figure 7.

This shows that on average, over the period silver prices have been considerably more volatile than gold and that there have been only three years in the period since 1968 (1973, 1978 and 1990) when the volatility of silver was not significantly above that of gold (ie, a ratio of the volatilities greater than 1). Looking at the most recent of these, in 1990, the explanation was that gold volatility was extremely high in the second half of the year as a result of the Iraqi invasion of Kuwait.

The same figure also shows the results of an analysis of how often gold and silver prices move in the same direction on a daily basis. In 1996, this happened on 80% of the trading days (when comparing the London AM gold fix with the spot silver price). This is known as the percentage correlation for which a figure of 100% would mean that the two metals moved in the same direction every day. It is interesting to observe that until the early 1970s, the correlation was less than 50%, meaning that the metals were more likely to move in opposite directions than the same one. But during the 1970s, the degree of correlation gradually increased, reaching a peak of 88% in 1980, remaining at a high level since then, except for the low figure in 1990.

Finally Figure 8 compares the trading ranges of the two metals since 1968 (this being defined as the difference between the annual high and low expressed as a percentage of the annual average). It can be seen that while in the late 1970s, gold's trading range quite often exceeded that of silver, since 1980 silver has generally deserved its reputation as the "restless metal", as indicated by the rising ratio of the two metals' trading ranges (to a remarkable level of almost 5 in 1995).

Figure 7
Silver and Gold Prices
Comparison of Volatility and Price Correlation

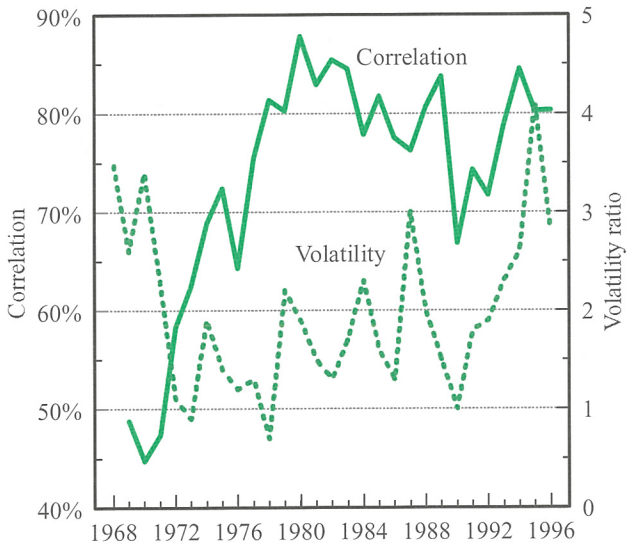
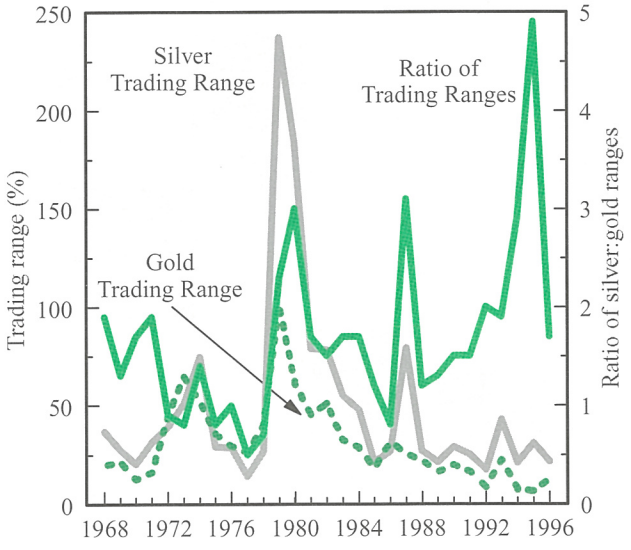


Figure 8
Trading Ranges
(as percentage of annual average prices)



3. Silver Bullion Trade

As never before, regional trade in bullion was dominated by demand from India last year. Although there was a further increase in the proportion of India's bullion demand supplied directly from Europe, traders in Dubai and Singapore were by no means sidelined, with both entrepôts continuing to send large quantities of silver to the main distribution centers of Delhi, Ahmadabad and Bombay. However, Singapore's role as the conduit to Thailand's large silver industry declined further last year.

Europe

Silver bullion trade in Europe is dominated by a handful of countries, each having one or more large refineries, including Switzerland, the United Kingdom, Belgium, Germany and France, with Italy hitherto important solely on the import side. Unlike in the gold market, where Switzerland remains the largest supplier of physical metal, in the case of silver, London and Zurich have traditionally been far more equally matched. But in 1995, the United Kingdom surged ahead due to a massive increase in imports from the United States (as shown in Figure 9). Last year, although this flow diminished somewhat, it remained at a historically high level. The UK also imports silver from Kazakhstan and Mexico.

Figure 10 shows the trend in US bullion exports over the past two years. After the huge shipments in the third quarter of 1995, exports to the United Kingdom dropped back last year apart from the high levels recorded in June and July. In the second half, Switzerland clearly displaced the United Kingdom as the principal destination for US exports. One reason for this was the growth in offtake in a number of the regional markets (especially India) increasingly served by Swiss dealers and refiners, who consequently required additional feedstock as demand surged in response to the lower silver price. In many cases, however, shipments of bullion which were officially destined for Switzerland (and for that matter the United Kingdom) ended up being diverted en-route to markets such as Dubai, in addition to supplies sent "direct" to the Gulf.

Figure 9

UK Bullion Imports

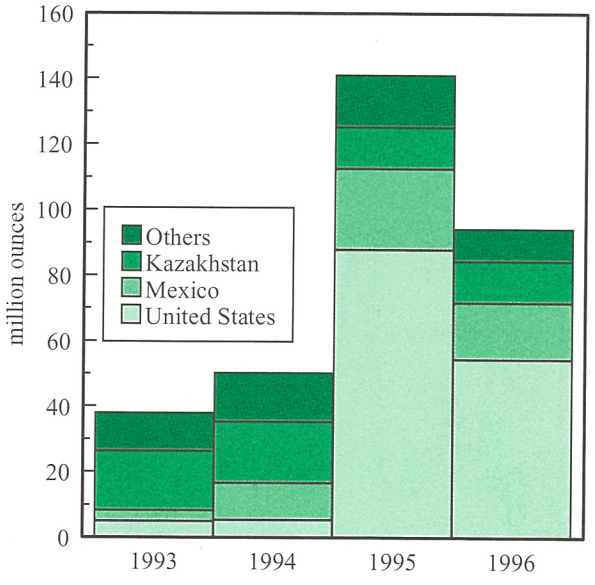
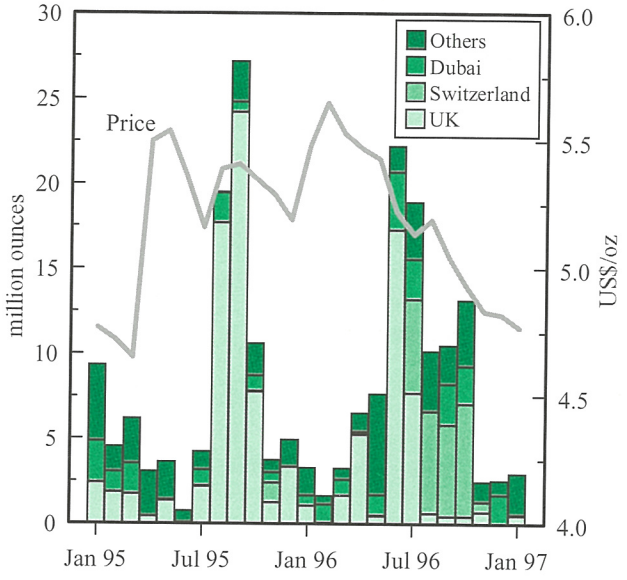


Figure 10

US Bullion Exports



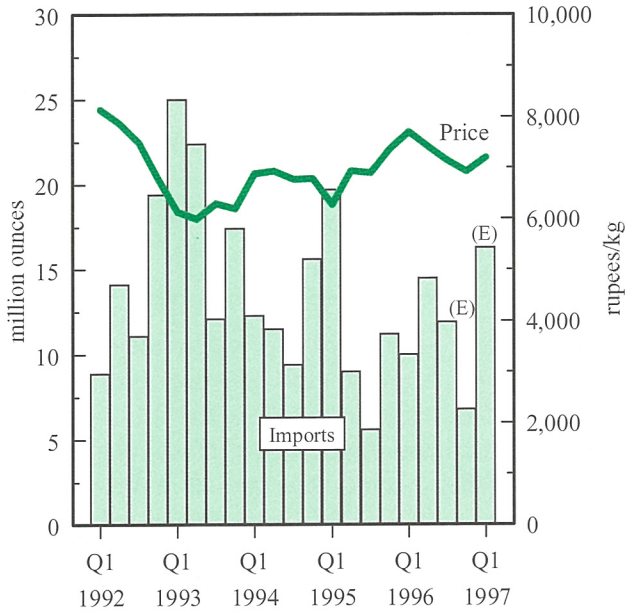
Middle East

Although Dubai provides a modest amount of silver to a number of Gulf countries, its imports of bullion are, to all intents and purposes, for the Indian sub-continent. A handful of large dealers continue to import silver from a wide range of source countries, with the material arriving by sea in containers to be broken up into smaller packages for shipment by air to a relatively small number of distribution centers in Pakistan and the north of India.

When legal imports of silver into India were permitted in 1993, many observers had expected this to signal the end of Dubai's long-established role as the key entrepôt for the sub-continent. The romantic concept of smuggling silver by dhow across the

Figure 11

Dubai Bullion Imports (and Bombay Price)



Arabian Sea rapidly became a thing of the past but the silver dealers in Dubai, with their close personal, and often family, contacts with the sub-continent, have since demonstrated a determination not to be marginalized. Figure 11 shows that Dubai's imports have fallen but certainly not collapsed since 1993, with the estimate for the first quarter of 1997 being particularly strong.

Virtually all of India's supply now arrives by plane so that air freight capacity and rates are thus key factors in determining the pattern of inflow, especially as the Indian market is concentrated in the north with only three importing centers being involved in the business on any kind of scale.

Dubai - Bullion Imports

Million ounces

1992	1993	1994	1995	1996(E)
53.4	76.8	48.9	45.5	43.1

Dubai's main sources of supply have changed dramatically during the past three years. There has been a steady decline in the share held by the main Western European suppliers, which together supplied 81% of Dubai's imports in 1994. By 1996, their share had fallen to an estimated 45%, to a large extent reflecting the increase in direct shipments from Zurich and London to India, replacing the use of Dubai as an intermediary. The gap in Dubai's imports has been partly filled by the United States, which provided slightly more than half of Dubai's imports in 1996.

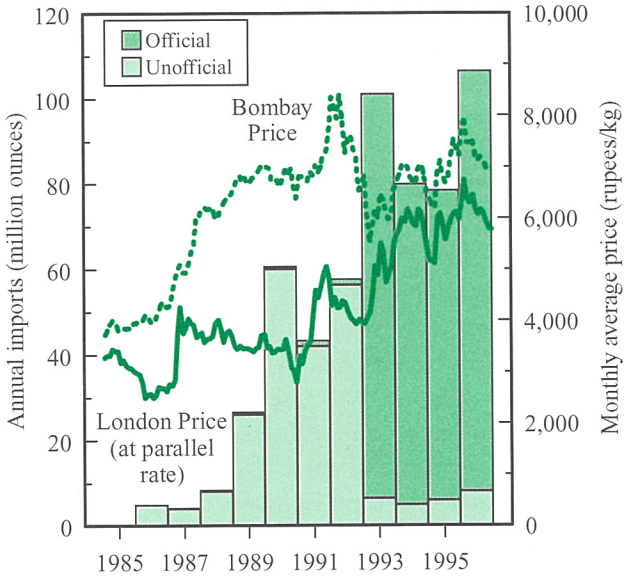
Other flows of silver to the Middle East have tended to become more official in recent years. This has certainly been the case with both Turkey and Egypt, in spite of the fact that customs duties and other taxes on the sale of silver products still encourage an element of unofficial supply.

Turning now to India, 1996 saw an extraordinary surge of bullion imports in the last four months of the year which took annual imports to a new record level, nearly 10% above the previous record set in 1993, as shown in Figure 12. This also emphasizes the shift from unofficial to official imports in the past four years and the resultant narrowing of the gap between the local price in Bombay and the London price converted at the parallel exchange rate. The parallel (or unofficial) rate is used since it is not possible to export domestic currency at the official rate to pay for the imports (or for the import duty, in the case of official imports).

The early months of last year gave no sign of what was to follow. In fact, import demand in the first quarter was very subdued as a result of the combination of a rise in international prices plus a fall in the value of the rupee. This led to the local price in Bombay rising to a peak in February of some 35% above the average of February 1995. Official bullion imports in the first quarter were 416 t (13 Moz) well under half the 1995 equivalent. But the price fell back steadily in the ensuing months, falling below the psychologically important level of 7,000 rupees per

Figure 12

Indian Bullion Imports



kilogram at the end of September. Together with the seasonal surge in offtake which traditionally accompanies the start of the festival and marriage seasons in October, the result was an astonishing increase in imports, which easily reached a new record level in the fourth quarter.

Since the introduction of the Non-Resident Indian (NRI) and Special Import Licence (SIL) arrangements in 1993 and 1994, the vast bulk of the flows of silver bullion have been brought into the country via these official channels, together with a small quantity brought in using the older system for replenishing the working stocks of jewelry exporters.

However, a careful analysis of the exports to India from Europe, Dubai and Singapore indicates a significantly greater inflow last year than the officially recorded total.

Indian Silver Bullion Imports

Million ounces

	1992	1993	1994	1995	1996
NRI	0	93.4	43.6	10.7	1.1
SIL	0	0	30.4	63.6	102.5
Replenishment	1.4	1.5	1.1	0.9	1.8
Sub-total Official	1.4	94.9	75.1	75.2	105.4
Unofficial	53.1	7.7	5.0	5.9	8.0
Total	54.5	102.6	80.2	81.2	113.5

As can be seen above, the picture of Indian bullion imports simplified further in the past year. Unofficial imports increased slightly, though it is not clear whether some of this represents understatement of the official imports as opposed to smuggling pure and simple. The most significant feature however, was the continued growth in the use of the SIL route, which rose to represent 93% of all imports. By contrast, the NRI system was used for only an insubstantial quantity of around 1% of the total. Imports under the export replenishment schemes more than doubled, reflecting the success of manufacturers in exporting jewelry and silverware.

One of the factors responsible for the surge in imports last year was the fall in domestic sales of confiscated silver to only just over a quarter of the very high level seen in 1995. Nevertheless, in relation to the increased imports described above, the reduction in supply due to the fall in confiscated sales was minimal, at 7% of total imports.

The makeup of importers has also changed dramatically in the past three years. Thus, in 1993, the first year of the NRI scheme, Dubai (and to a lesser extent, Singapore) supplied essentially all of India's silver. In 1996, by contrast, well over half the total came directly from Western Europe.

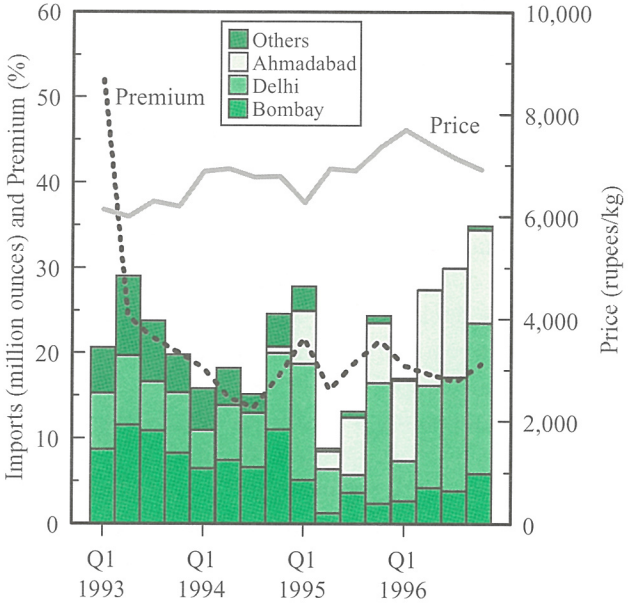
Direct Shipments to India from Europe

	1993	1994	1995	1996
Million ounces	0.2	20.3	36.2	62.5
Share of total (%)	0	25	45	55

Turning next to the question of where the silver arrives, there has been an increasing degree of concentration on three centers since the SIL scheme became the dominant import route. This is also shown graphically in the special focus section in this year's Survey (see page 55). GFMS estimates of bullion imports into these centers are shown in Figure 13, together with the local silver price and the Bombay premium over the London price. Looking first at the aggregate imports, the negative impact on imports of the price rises in the first quarters of 1994 and 1996 and in the second quarter of 1995 can be clearly seen. The first of these falls was exaggerated by the preceding surge in imports during 1993, the first year of liberalization, which led to something of an overhang in the following year. The graph also highlights the steep rise in imports during the latter part of 1996, linked to the falling price after the first quarter.

Figure 13

Estimated Indian Bullion Imports by Port



But in relation to the rivalry between India's main distribution centers, the graph shows how Bombay was almost eliminated from the silver trade in 1995. This was the result of the Bombay municipality imposing an *octroi* (a local import duty) of 2% on precious metals arriving in the city. The result was an immediate loss of a large part of Bombay's market to Delhi and more importantly Ahmadabad. Although the *octroi* was subsequently reduced to 0.5% in April 1996, it can be seen that Bombay has not yet recovered its former position.

The Special Import Licence System

It is often overlooked that the SIL scheme is intimately related to the import of gold and particularly silver. Although an extensive range of goods can theoretically be brought in using SILs, especially after the list was widened in early 1996, a large majority of the licences issued are used for gold and silver imports. Although the quantities of gold brought in under SIL represent only a small part of Indian imports, in value terms they are approximately equal to those for silver. But the important aspect of the SIL scheme in relation to silver is that virtually all silver comes in under the scheme. As a result, there is a close relationship between the SIL premium (the price at which the SILs are traded in the local market) and the Bombay silver market premium over the London price. The reason for this is that the total cost of importing under the SIL scheme includes the cost of transport (essentially fixed) and the SIL premium, or cost of purchasing the licence. The latter is the premium over the value of goods which can be imported and this has moved in rather a volatile manner over the past year.

When the premium reaches high levels, such as 12%, as it did in late April, 1996 and again in February this year, the silver price premium must also increase correspondingly (as it will when there is a high demand for silver in the local market) or silver will be "out of parity" and imports under SIL will not be economically possible and will not therefore happen. The supply of SILs is limited, being determined (by definition) by the export values of a number of designated trading companies. High volumes of silver imports can therefore push up demand for SILs and hence their premium, which in turn can eventually limit silver imports, until this also pushes up the silver premium by enough to bring silver back into parity.

The importance of the above apparently arcane discussion lies in the decision made by the Ministry of Commerce earlier this year to expand the number of trading companies whose exports can be used as a basis for SIL issues. The new system took effect on 1st April, 1997, and allows any trading house with an FOB value of more than 20 million rupees to apply for an allocation of SILs (in contrast to the previous situation which allowed only the largest companies to apply). This is estimated to increase the total volume of SILs for the current financial year by 20%. The result should mean a decrease in the SIL premium and a corresponding decrease in the cost of SILs and hence the price of silver in the local market. Given the price elasticity of silver demand to price in India, this development could have a significant impact on demand in the coming year.

Far East

Although the silver industry in **Thailand** is moving slowly towards the use of more official material shipped in directly (ie, rather than via the traditional entrepôt market of Singapore) more rapid change has been hampered by two main factors.

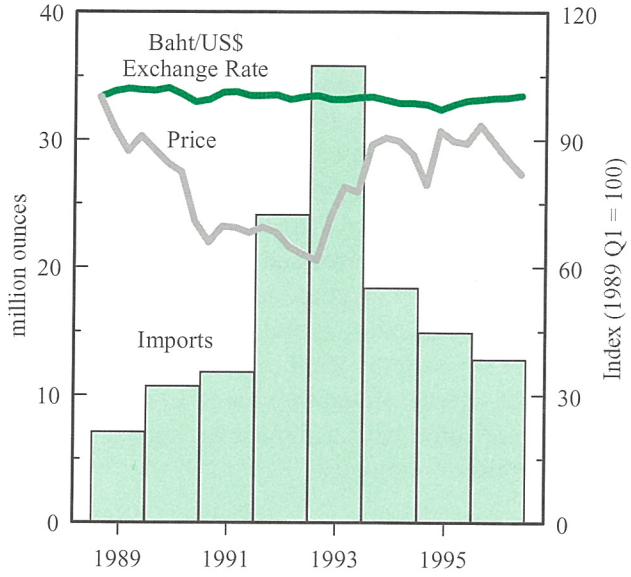
The first of these concerns refunds of Value Added Tax (VAT) on silver brought into the country for fabrication and export. The problem is that the processing of VAT refunds have been taking up to 6 months, with no interest being paid on the claims in the pipeline. This adds significantly to fabricators' costs and increases the attractiveness of unofficial silver. Although the VAT refund problem is avoided by those operating through Board of Investment bonded warehouses, most fabrication for export occurs outside of these facilities. However, even without delays in the refunding of VAT, some fabricators would still use unofficial silver as this enables them to avoid corporation and turnover taxes.

The second factor concerns the well-developed infrastructure which has evolved around unofficial imports. The efficiency of the unofficial channels of supply is reflected in a surprisingly low premium over the international price.

Singapore is a major transhipment point, and is an especially important supplier of both official and unofficial silver to Thailand, although this trade has declined in recent years. As shown in Figure 14 overleaf, official bullion bar imports into Singapore fell by around 67 t (2.2 Moz) in 1996, although an increase in grain imports more than offset this fall.

Figure 14

Singapore Bullion Bar Imports



With exports to Thailand falling, most of the increase in Singapore's imports was accounted for by the rise in Indian demand.

Many of the developments in the **Hong Kong** silver market in recent years have been influenced by activities on the mainland. Two of the most important influences have been the flows of unofficial silver from China to Hong Kong and the reverse flows of bullion, grain and semi-fabricated products from Hong Kong, primarily for use in the many joint ventures established on the mainland. At times in recent years, the outward flow from China accounted for close to 50% of the supply to Hong Kong. However, the increase in the People's Bank of China's purchasing price for silver in 1994 quickly stemmed this flow of unofficial silver. In relation to the flow from Hong Kong to China, growing mainland self-sufficiency and manufacturing capacity have reduced the need for both imported silver bullion and low added-value semi-manufactured products in recent years. But last year, imports of semi-manufactured products increased by around 40%, driven in part by demand from the joint ventures for high-quality silver products.

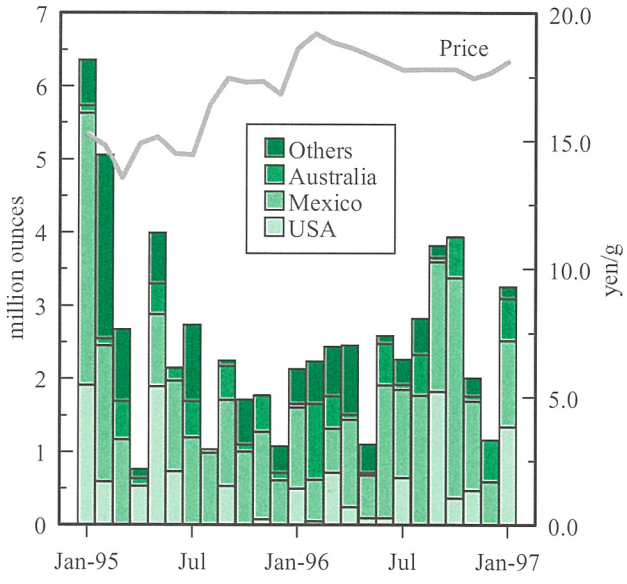
In contrast to 1995, when imports into **Japan** were heavily skewed towards the beginning of the year and nearly 40% of imports were accounted for in the first two months, imports in 1996 showed a less distinct pattern (as can be seen in Figure 15) which was consistent with the stable production of silver based on imported lead, zinc and copper concentrates through the year. Fears about the competitiveness of the smelters in early 1995, as the yen strengthened considerably against the dollar, had led to some stock-building of silver at the beginning of that year. To a large extent these fears dissipated in 1996 as the yen weakened, restoring some of the smelters' lost competitiveness.

The surprising strength of **Taiwanese** offtake, in the light of a weaker economy in 1996 and the difficulties in the electronics industry, was reflected in an 11% rise in silver imports. One of the reasons behind the rise was the decline in the scrap market over recent years due to more onerous environmental controls and the restrictions on transboundary transportation of scrap and wastes under the Basel Convention. However, most of the growth has been attributable to industrial demand, primarily from the electronics and electrical sectors.

The rise in **Korean** bullion imports, which amounted to 12% in 1996, compensated for falls in both production from imported concentrates and imports from North Korea. In fact, total supplies to the Korean market were the same as in 1995, but an 85% rise in exports meant that an overall deficit in the market had to be met through stock depletion.

Figure 15

Japanese Bullion Imports



4. Mine Supply

Global silver mine production increased for the second consecutive year in 1996, to 493 Moz (15,320 t), but this was still some way below the record level set in 1990. Primary silver mines generated almost 17% of total production in 1996, slightly more than in 1995, while more silver was also produced as a by-product of gold mining.

The almost 3% increase in world silver production in 1996 took output to a five-year high. Although last year's increase seems rather modest, compared to the almost 8% growth in output in 1995, it did serve to consolidate the recovery in world production after an extended period of falling output in the early 1990s.

There were few changes in the ranking of the principal producing countries last year. Mexico was once again the leading silver producer, accounting for almost 17% of global mine production. In 1996, 87% of the world's silver production was generated by the ten countries listed below.

Top Ten Silver Producing Countries in 1996
Million ounces
(1995 figures in brackets)

1	(1)	Mexico	81.27	(74.73)
2	(2)	Peru	63.31	(61.35)
3	(3)	United States	50.34	(49.83)
4	(4)	CIS	47.93	(46.62)
5	(5)	Canada	42.04	(41.28)
6	(6)	Chile	36.79	(33.49)
7	(8)	Australia	32.79	(31.57)
8	(7)	Poland	32.25	(31.64)
9	(9)	China	28.66	(27.15)
10	(10)	Bolivia	10.94	(13.76)

With the exception of Bolivia, each of the top producing countries recorded increased production last year. Although it currently has no primary silver mines, Australia moved up one place in the list of top silver producers, output having benefited from robust performances in the gold, lead/zinc and copper sectors, with Poland moving down to eighth position, in spite of a 2% increase in output.

Compiling the list of top producing companies was complicated this year by the delayed publication of production data for KGHM, which topped the list in 1995, due to the privatization of the company which is currently underway. However, it seems fairly certain that Peñoles has replaced the Polish mining company as the world's largest producer of silver in 1996.

Among the top producers, Cominco, RTZ-CRA and Prime Resources recorded the biggest increases in production, while output declined at Centromin, Noranda and Frisco.

Top Ten Silver Producing Companies in 1996
Million ounces

	Company	Country	1995	1996
1	Peñoles	Mexico	29.7	33.0
2	KGHM	Poland	31.0	31.6
3	Centromin	Peru	14.7	14.7
4	Noranda	Canada	15.7	13.6
5	Cominco	Canada	7.0	12.8
6	MIM Holdings	Australia	11.8	12.6
7	RTZ-CRA	UK	9.8	12.2
8	Prime Resources	Canada	9.9	12.1
9	IMMSA	Mexico	10.8	11.2
10	Buenaventura	Peru	9.1	9.8

It is interesting to note that few of the companies on the top producers list would regard themselves, first and foremost, as silver producers.

As in the past, primary mines were not the principal source of new silver coming onto the market. Rather, it was a wide group of base metal and gold mining operations, where silver is generated as a by-product or co-product, which produced over 83% of the total in 1996. As shown in Figure 16, however, primary silver mining is gradually increasing in importance as

Figure 16
World Silver Mine Production

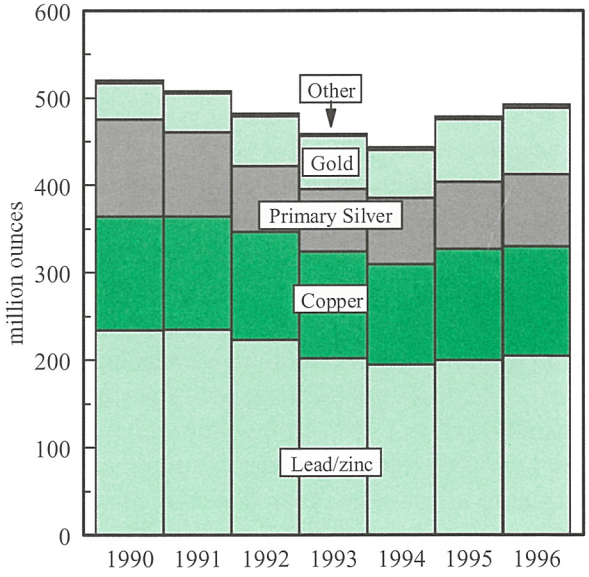
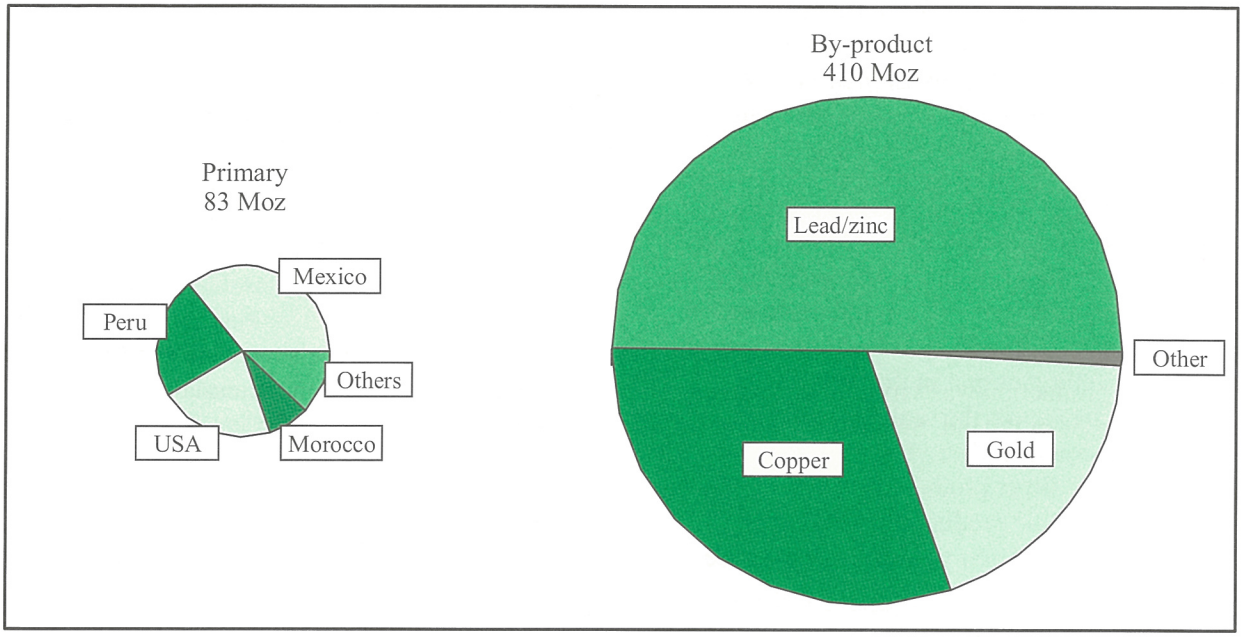


Figure 17
Primary and By-product Silver Production in 1996



a source of silver. Another longer-term development which is shown in the graph is the increasing proportion of gold by-product in silver supply.

Figure 17 sets out the contributions of the various primary silver producers to primary mine supply, and illustrates the dominance of by-product silver production in total mine supply. In 1996 lead and zinc mining produced 41% of the world's silver, copper mining 25% and gold mining almost 16%.

A number of revisions have been made to production figures published in 1996, necessitated by the late reporting, particularly by base metal producers, of silver production from concentrates. Although in a number of cases figures were revised downwards, the overall impact was a higher production number for 1995.

North America

Mexico increased its silver output by almost 9% to 81 Moz (2,528 t) in 1996. The growth in mine supply was fueled mainly by lead/zinc and primary silver mines, which added over 5 Moz to the previous year's production levels. However, silver produced as a by-product of gold mining is becoming increasingly prominent. Mexico's gold mining sector performed exceptionally well in 1996, with gold production rising by over 20% during the year, resulting in a commensurate increase in silver from this source.

There is a large degree of concentration in silver production in Mexico: 37% of total output is generated by only two mines, Fresnillo and Real de Angeles, both of which recorded increased production in 1996 due to higher silver grades; geographically, production is concentrated in the states of Zacatecas, Durango and Chihuahua, where 66% of production originates; and on a corporate level, almost 74% of Mexico's silver is generated by only four producers, namely Peñoles, Grupo Mexico, Luismin and Frisco.

In the **United States**, where total output increased modestly in 1996 to 50 Moz (1565 t), a strong rise in production from primary silver mines was almost completely cancelled out by falling by-product silver output from gold mines such as McCoy Cove, where silver production fell by almost 5 Moz due to the lower silver content of the section which was mined during the year. On the other hand, primary silver mines Candelaria, Sunshine and Lucky Friday all increased output, contributing to a total increase of more than 2 Moz from the primary sector. The Coeur and Galena mines, resurrected by Silver Valley Resources in May last year and now operated as a single unit, produced close to 1.7 Moz in the remaining seven months of the year. The Greens Creek polymetallic mine in Alaska, which was reopened in 1996 after a two-year closure, produced almost 3 Moz, and is expected to become the largest silver producer in the country once it reaches design capacity.

Silver production in **Canada** increased for a second consecutive year in 1996, reaching 42 Moz (1,307 t). However, compared with the 74% increase in output in 1995, the rise in 1996 was small at less than 2% . Production at the country's largest silver producing mine, Eskay Creek, reached over 12 Moz, exceeding expectations due to the very high silver grades mined. This increase more than compensated for the fall at the country's other major silver producer, the lead/zinc Brunswick mine, where ground control problems resulted in production falling by 40%.

Europe

European silver production was virtually unchanged in 1996, with increases in Poland, Spain and Finland being offset by falling production in Sweden, Romania, Greece and Bulgaria.

In **Poland**, where almost 60% of Europe's silver is produced, output was slightly higher due to increased production at KGHM Polska Miedz, located in a large copper mining complex in the Legnica/Glogow region. Exact levels of production can only be estimated at this stage, as KGHM are in the process of being privatized, resulting in delayed publication of production data. It would appear, however, that production in 1996 was around 2% higher than in 1995, to reach 32 Moz (983 t). A marginal quantity of silver is also produced by the country's numerous lead/zinc mines.

In **Sweden**, total output declined by more than 4%, and has now fallen back to levels last seen in 1990. Boliden, which accounts for 90% of the country's silver production, recorded lower average silver grades at their various operations in the Skelleftefield and elsewhere, resulting in a 5% decline in silver output from its copper and polymetallic mines.

Silver production in **Spain** increased by around 3%, as a result of a strong performance by the copper mining sector. During 1996, operations ceased at Boliden's Aznalcollar copper mine near Seville, although overall production levels should not be affected by the closure as the new Los Frailes zinc mine commenced operations around the same time, and is expected to produce similar quantities of silver.

Silver production in **Greece** was affected by the temporary scaling down of operations at Stratoni in the Kassandra lead/zinc mining complex when new owners, TVX, undertook major refurbishment work during 1996. A substantial decline in copper mine production in **Bulgaria** resulted in a 21% decline in silver output from the Pirdop refinery, although silver produced in lead and zinc concentrates at Plovdiv was virtually unchanged from 1995.

Central and South America

Silver production from this region increased by almost 2% in 1996, fueled by strong performances in Chile and Peru. The countries of South and Central America contribute 23% of the world's primary silver production. The revival in the gold mining industries of many of these countries is also having a positive effect on silver production, leading to an almost three-fold increase in output levels over the last five years.

In **Peru**, silver production increased by slightly more than 3%, to 63 Moz (1,969 t). Growth was generated mainly by primary producers, including Buenaventura, Arcata and Hochschild, which resulted in primary output increasing by almost 6%. Small mining companies also improved output significantly, reflecting efforts made by the government to support this sector of the industry. There is still a high level of foreign interest in the country, and feasibility studies are currently being done on a large number of copper

Figure 18

Silver Mining in South America

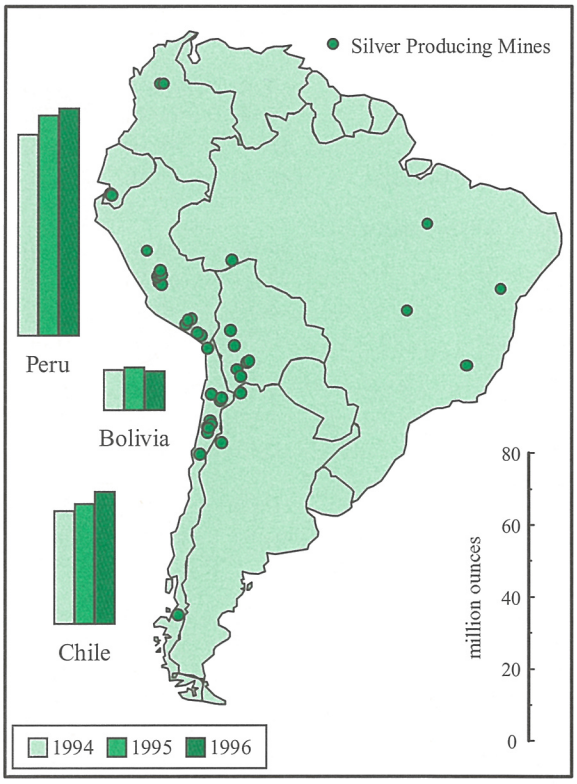


Table 2
World Silver Mine Production
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Poland	26.72	34.18	34.00	26.75	28.90	25.66	29.42	27.62	31.64	**32.25**
Sweden	8.52	7.20	6.10	7.19	8.13	9.06	8.92	8.10	8.04	**7.70**
Spain	6.88	7.30	7.09	7.40	7.50	7.50	5.88	5.63	5.59	**5.79**
Romania	0.64	0.69	0.67	1.93	1.61	1.54	1.45	1,35	1.43	**1.40**
Greece	1.67	1.98	1.67	2.01	2.26	1.96	1.90	1.44	1.45	**1.29**
Bulgaria	2.48	2.73	3.05	3.40	1.90	2.70	3.10	1.80	1.40	**1.12**
Serbia	4.86	4.47	4.28	3.39	2.96	2.57	0.81	0.90	1.00	**1.09**
Finland	1.42	1.00	1.00	0.93	0.96	0.87	0.94	0.84	0.87	**1.09**
Portugal	0.12	0.12	0.12	1.36	1.37	1.23	1.16	1.02	1.24	**1.08**
Ireland	0.23	0.18	0.23	0.29	0.36	0.42	0.42	0.56	0.44	**0.47**
Italy	0.45	0.51	0.51	0.45	0.44	0.39	0.16	0.45	0.44	**0.44**
Czech & Slovak Republics	1.10	1.13	1.10	0.84	0.90	0.64	0.50	0.40	0.30	**0.24**
Norway	-	-	-	0.27	0.30	0.33	0.22	0.24	0.17	**0.12**
France	0.83	0.68	0.63	0.67	0.89	0.43	0.38	0.09	0.11	**0.09**
Germany	2.31	1.93	2.00	0.26	0.23	0.06	0.06	0.06	0.06	**0.05**
Denmark	0.40	0.46	0.47	0.31	0.00	0.00	0.00	0.00	0.00	**0.00**
Other	-	-	-	0.10	0.03	0.00	0.00	0.00	0.00	**0.00**
Total Europe	58.64	64.53	62.95	57.62	58.84	55.36	55.34	50.48	54.23	**54.22**
North America										
Mexico	69.80	70.00	70.00	78.86	73.43	67.44	68.66	71.20	74.73	**81.27**
United States	39.80	53.40	60.80	68.32	59.38	58.00	52.89	47.58	49.83	**50.34**
Canada	38.10	44.10	41.30	44.41	40.55	37.58	28.27	23.80	41.28	**42.04**
Total North America	147.70	167.48	172.11	191.56	173.39	163.04	149.82	142.59	165.80	**173.66**
Central & South America										
Peru	63.60	47.70	56.80	61.97	67.08	53.62	53.72	56.00	61.35	**63.31**
Chile	16.07	16.30	17.70	21.05	21.74	32.95	31.19	31.60	33.49	**36.79**
Bolivia	4.57	7.23	7.72	11.46	12.08	10.14	10.70	11.32	13.76	**10.94**
Honduras	0.74	0.80	0.80	0.99	1.38	1.14	0.78	0.87	0.97	**1.16**
Argentina	1.90	1.61	1.55	2.66	2.25	1.46	1.37	1.22	1.29	**1.00**
Dominican Republic	1.15	1.40	0.70	0.74	0.70	0.43	0.54	0.30	0.67	**0.55**
Brazil	1.97	2.25	2.06	1.10	1.00	0.68	0.67	0.58	0.47	**0.44**
Colombia	0.17	0.21	0.22	0.21	0.26	0.27	0.24	0.19	0.16	**0.13**
Ecuador	-	-	-	0.02	0.02	0.15	0.19	0.94	0.02	**0.03**
Other	0.06	0.06	0.06	0.06	0.10	0.10	0.10	0.13	0.13	**0.12**
Total Central & S.America	90.22	77.58	87.64	100.31	106.58	100.89	99.44	103.17	112.32	**114.47**
Asia										
Indonesia	1.53	1.99	2.01	2.12	2.51	3.22	2.89	3.11	7.63	**8.39**
Turkey	0.28	0.51	0.51	0.90	1.30	2.51	2.31	2.15	2.08	**2.90**
Japan	9.03	8.10	5.01	4.82	5.49	5.50	4.40	4.29	3.22	**2.87**
Papua New Guinea	2.00	2.10	1.97	3.42	4.00	3.07	3.09	2.50	2.12	**1.93**
India	1.22	1.32	1.29	1.13	1.11	0.85	1.66	1.62	1.22	**1.14**
Philippines	1.64	1.76	1.85	1.45	1.15	0.91	1.04	0.97	1.05	**0.77**
Saudi Arabia	-	-	-	0.48	0.46	0.49	0.53	0.53	0.55	**0.52**
Malaysia	0.50	0.64	0.64	0.40	0.43	0.49	0.45	0.43	0.36	**0.30**
Thailand	-	-	-	0.46	0.55	0.17	0.09	0.12	0.23	**0.24**
South Korea	2.82	1.57	2.76	0.53	0.10	0.15	0.09	0.06	0.03	**0.03**
Other	0.77	0.64	0.58	1.67	1.86	2.31	1.86	2.48	2.57	**2.44**
Total Asia	19.81	18.65	16.65	17.36	18.87	19.64	18.42	18.23	21.06	**21.54**

Table 2
World Silver Mine Production
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Africa										
Morocco	4.30	7.27	8.30	5.92	6.62	4.69	7.59	8.33	7.88	**7.78**
South Africa	6.47	6.21	5.83	5.07	5.43	5.77	6.18	6.11	5.66	**5.44**
Namibia	3.33	3.47	4.44	2.99	2.96	2.88	2.31	2.07	2.23	**2.03**
Zimbabwe	0.82	0.90	0.77	0.68	0.62	0.54	0.39	0.35	0.37	**0.45**
Zambia	0.96	0.94	0.89	0.60	0.46	0.59	0.58	0.35	0.25	**0.24**
Zaire	1.40	1.40	1.50	2.70	1.89	0.95	0.35	0.03	0.03	**0.03**
Other	0.19	0.19	0.19	0.29	0.39	0.35	0.32	0.35	0.35	**0.36**
Total Africa	17.52	20.42	21.96	18.29	18.33	15.79	17.75	17.55	16.77	**16.32**
Oceania										
Australia	35.91	35.82	37.30	37.71	37.94	39.16	37.04	33.59	31.57	**32.79**
New Zealand	-	0.06	0.16	0.28	0.36	0.73	0.84	0.76	0.95	**1.00**
Fiji	-	-	0.03	0.03	0.02	0.03	0.04	0.05	0.06	**0.06**
Total Oceania	35.91	35.88	37.49	38.03	38.29	39.93	37.91	34.37	32.60	**33.85**
Western World Total	369.80	384.53	398.80	423.18	414.30	394.65	378.68	366.39	402.78	**414.06**
Other Countries										
Soviet Union/CIS	64.40	64.50	64.70	71.99	66.81	60.94	53.15	48.19	46.62	**47.93**
China	3.21	3.50	4.00	22.64	24.63	24.63	24.91	26.52	27.15	**28.66**
North Korea	1.60	1.60	1.60	1.60	1.60	1.70	1.80	1.70	1.70	**1.28**
Mongolia	-	-	-	0.90	0.67	0.76	0.84	0.88	0.61	**0.63**
Total Other Countries	69.22	69.61	70.28	97.16	93.69	88.09	80.70	77.29	76.09	**78.49**
World Total	439.03	454.14	469.09	520.34	507.99	482.75	459.38	443.69	478.87	**492.56**

as well as polymetallic projects.

In **Chile**, silver output increased substantially to 37 Moz (1,144 t). This increase was fueled by growth in the gold mining sector, as 50% of Chile's silver is produced as a by-product of gold. Increased output from gold mines such as Fachinal and Refugio added to increased silver output. By contrast, primary silver production declined markedly during the year, but as this constitutes less than 1% of the country's total silver production, it had no significant effect on total output. Codelco, the state mining giant, produced 8.4 Moz (260 t) in 1996, but is declining in relative importance with the growth of private companies in recent years.

In **Bolivia**, where silver is derived from lead/zinc and, to a lesser extent, gold mining, the biggest producers in the country recorded lower output in 1996, as a result of lower silver grades. Informal miners, who are particularly active in the Cerro Rico region, still produce around half of Bolivian silver. The government recently indicated that it would like to develop this area in a more co-ordinated manner. A new mining code, aimed at encouraging foreign investment, is likely to be approved during 1997.

Silver production from **Argentina** declined by an estimated 22% in 1996, as a result of lower output from the Aguilar zinc mine, where silver grades are declining while zinc grades are improving. Lower output was also recorded at the Farellon Negro gold mine. Argentina's silver output is expected to be boosted significantly once the Cerro Vanguardia copper/gold project is commissioned towards the end of this year, while further potential has been identified at the Pirquitas mine, historically a large producer of silver and tin.

A small amount of silver is produced as a by-product of gold and copper mining in **Brazil**, and a marginally bigger quantity is derived from lead mining. Output from the country is declining as lead and copper mines are scaling down operations or closing, while gold output has stabilized around current levels. Large quantities of silver are produced at the country's copper smelters, but most of the concentrates processed are in fact imported .

In the **Dominican Republic**, silver is derived mainly as by-product from the Pueblo Viejo gold mine, where silver production dropped by 19% in 1996 to below 0.5 Moz. The Mochito mine in

Honduras, on the other hand, increased output by 20% to reach 1.1 Moz. Elsewhere in Central America, gold mining generates only small quantities of silver as a by-product.

Asia

Excluding China and the CIS, Asia produces less than 5% of the world's silver, and few primary silver mines are operated in the region. Silver production is therefore largely determined by developments in base metals mining. The exception is **Turkey**: the 100th Anniversary mine at Kutahya, a primary silver mine, produced more than 2 Moz in 1996, with production returning to normal levels during the year after the problems experienced in 1995. Some silver is also produced in Turkey as by-product from the country's copper and zinc mining sectors.

Copper mining in **Indonesia**, on the other hand, made a significant contribution to the almost 10% increase in silver production in this country, with continued expansions at the Grasberg copper mining complex resulting in higher quantities of silver by-product. Gold mining is a further important source of silver in Indonesia. The Mount Muro gold mine approached full capacity in 1996, having started up in 1995, and silver production increased accordingly, while higher silver by-product was also recorded at the Kelian gold mine. Silver output from gold mining is set to increase further once the Way Linggo underground mine commences operations in 1997, and Batu Hijau should provide further supplies of silver when it starts up towards the end of the century.

In **Japan**, 95% of silver is produced at lead and zinc mines such as Toyoha and Kamioka, with a marginal quantity being derived as by-product from the country's largest gold mine, Hishikari. Lower lead and zinc production in Japan during 1996 resulted in a decline in silver output of more than 10%.

In **Malaysia**, copper production at Mamut has been declining as the mine matures, which led to a 15% decline in silver production last year. Failing an improvement in copper prices, the mine may be forced to close down entirely, which would reduce silver production in Malaysia to negligible quantities. Copper production in the **Philippines** was affected by suspension of operations at Marcopper's San Antonio mine following a tailings dam spillage during March last year. Despite a moderate increase in output from the country's gold mines, many of which also generate silver, total silver production declined by over 27% .

Higher silver production was widely expected from **Pakistan**, following the commissioning of the Saindak copper mine in 1996. However, cash shortages led to closure of the smelter shortly after start-up in January, with the concentrator following some months later.

China

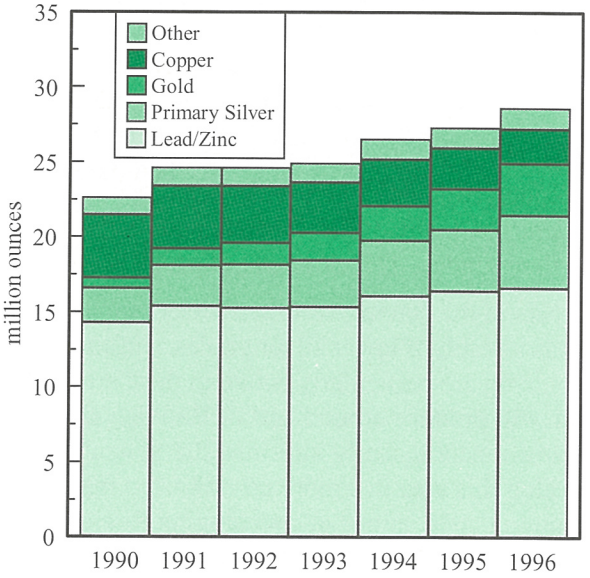
Both the volume of Chinese silver mine output and its composition have changed significantly over the past 10 years. China has gone from being an importer of silver in the 1980s to a position of self-sufficiency in the mid-1990s - a period during which local demand for silver probably more than doubled.

Production in 1996 totaled around 29 Moz (891 t), up almost 6% on 1995. This increase occurred in the face of declining, or at best flat, base metal production. Effectively all of the increase in silver production in 1996 was thus attributable to rising output from primary mines as well as from gold mining.

The growing importance of primary silver mining in China should be seen in the context of the shortages in local silver supply in the 1980s, when the Chinese authorities ordered stepped-up exploration and development of domestic silver resources in order to reduce dependence on imported silver. Favorable policies were instituted to encourage exploration and development, and as a result many primary silver resources were identified and several new mines were developed.

Figure 19

Chinese Silver Mine Production



The industry was expected to benefit further from the introduction of incentives to foreign investment in the new Mineral Resources Law, passed by the People's Congress Standing Committee in August last year. However, the perception is that the law fails to clarify the position of mining companies in respect of the transferability of mining rights. Although the new law allows for transfers of such rights, it states specifically that they should not be for profit.

CIS

Production in the CIS increased by almost 3% during 1996, although current production levels of around 48 Moz (1,491 t) are still well below those of 1990.

Silver output in **Kazakhstan** grew by 2% to reach an estimated 21 Moz (653 t). Kazakhstan's silver is derived as by-product from lead and, to a lesser extent, zinc and copper mining. During 1996, lead production was virtually unchanged from 1995, and zinc mines recorded a modest increase in production of around 6%, while copper production declined modestly.

Russia hosts one of the largest primary silver deposits in the world, at the Dukat mine in Magadan. Production at Dukat has been hampered by a lack of funds, prompting the Russian government to invite foreign companies to tender for the right to acquire an interest in the mine, with a commensurate obligation to upgrade facilities and relieve the large burden of debt. The tender was recently awarded to Pan American Silver Corporation of Vancouver, which plans to increase output significantly over the next four years. Another new venture which should add to Russia's silver output in 1997 is the Kubaka gold mine, opened in February this year by Amax Gold.

Despite political and economic risks in Russia still being perceived to be fairly high, foreign interest runs at high levels, and a number of projects are being considered for development in the remaining years of the decade. Although interest has been focused on gold deposits, many of these also contain unusually high silver grades. Development of projects such as Julietta in the Russian Far East and the Verkhne Menkeche silver/lead/zinc deposit in Yakutia, where silver grades are estimated to range from 425 to 434 grams per tonne, could significantly boost silver production in the country around the turn of the century.

Most of the silver produced in **Uzbekistan** is derived from copper mining, although silver is also associated with gold in some of the larger deposits. Output increased by around 4% in 1996, to reach an estimated 2.7 Moz (83 t).

Africa

Silver production in Africa declined for the third consecutive year, to reach 16 Moz (508 t), almost 3% below the 1995 level. The only country which recorded a rise in production was **Zimbabwe**, where production recovered modestly after seven years of almost uninterrupted decline. The sources of silver in Zimbabwe are gold mines, which constitute around one third of silver by-product production, and copper mines. Gold output in the country increased by almost 2% in 1996, while copper production was over 15% higher than in 1995, resulting in an almost 26% increase in Zimbabwean silver production to 0.5 Moz (14 t).

Morocco hosts the continent's only major primary silver mines, the largest of which is the Guemassa mine near Marrakech. A small quantity of silver is also produced as a by-product of cobalt mining at Tifnout-Tiranimine. The available evidence suggests that Moroccan silver output dropped slightly in 1996, to 7.8 Moz (243 t). Silver mines are currently still state-owned, but have been scheduled for privatization in two years, along with a large number of other enterprises. Little foreign interest appears to have been shown in the mines thus far.

Namibian silver production is derived from copper and lead/zinc mining. Copper and lead output was hampered by industrial action at the Tsumeb copper operation, which affected smelter operations in mid-year. As a result, silver production dropped by almost 9%, to reach 2 Moz (63 t).

In **South Africa**, silver by-product from copper, lead and zinc mining was virtually unchanged in 1996, but the continued decline in gold production, coupled with lower average silver grades in gold ore, led to a 10% decline in silver production from this source. In total, South African silver production was almost 4% lower than in 1995 at 5 Moz (169 t).

Oceania

Output in **Australia** increased by close to 4% in 1996, to reach 33 Moz (1,020 t). In Australia, silver is associated with zinc and lead, and, to a far lesser extent, gold and copper. Although the biggest silver producer in the country, MIM's Mount Isa mine, has copper as its primary product, silver is extracted from

an underground lead/zinc/silver deposit. Mount Isa produced nearly 13 Moz last year, despite industrial action which disrupted operations during the first half. At the new McArthur River mine, where operations commenced towards the end of 1995, production increased substantially during the second half of 1996, after problems had initially been experienced with the commissioning of the underground crusher.

Silver production from Australia is expected to increase dramatically once the Cannington mine commences operations. Cannington, which will produce lead, zinc and silver from the end of 1997, has the capacity to produce 24 Moz (750 t) of silver per year, which, if achieved, would make it the single biggest silver mine in the world. Silver production could be further boosted if the Century Zinc project, currently on hold due to stalled negotiations relating to native title claims over much of the property, is developed. Further significant potential has been identified in the silver-rich Elizabeth Hill and Nimbus Deeps deposits, although development decisions have yet to be taken on these projects.

In Fiji and New Zealand, all silver is produced as by-product of gold mining, and silver output tends to fluctuate in accordance with levels of gold production. Higher output at Martha Hill and Macraes mines resulted in a 5% increase in silver output from **New Zealand**, bringing total production up to 1 Moz (31 t).

Production Costs

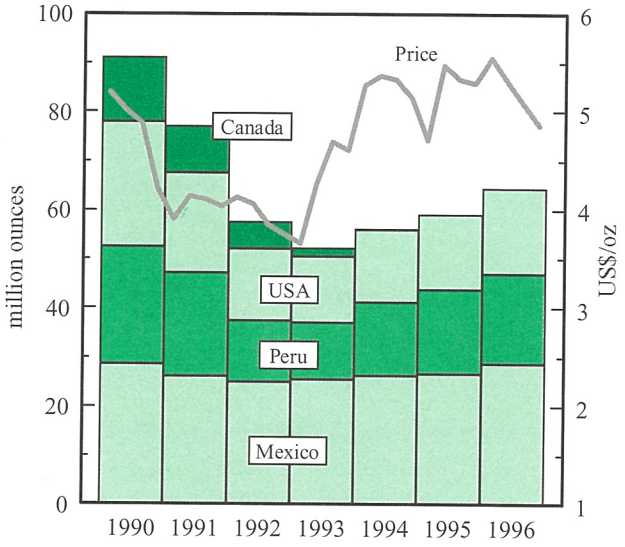
An analysis of silver production costs must, in practice, be confined to consideration of the production costs of primary producers. Companies which produce silver as a by-product tend to calculate costs on, for example, a gold-equivalent basis, so that it becomes virtually impossible to isolate the costs of silver production. Moreover, fluctuations in silver prices are unlikely to affect silver production levels at these companies, as operational decisions would tend to be based on developments in the production costs and price of the principal product.

Primary silver mining, on the other hand, tends to be highly price-sensitive, as is shown in Figure 20. Lower prices, such as those seen in the early 1990s, resulted in several mines being forced to scale down operations, including the Real de Angeles mine in Mexico and the Coeur and Galena mines in Idaho. However, mining was resumed at these operations after the subsequent recovery in prices from 1993 onwards.

Figure 20

Primary Silver Mine Production

(North America and Peru)

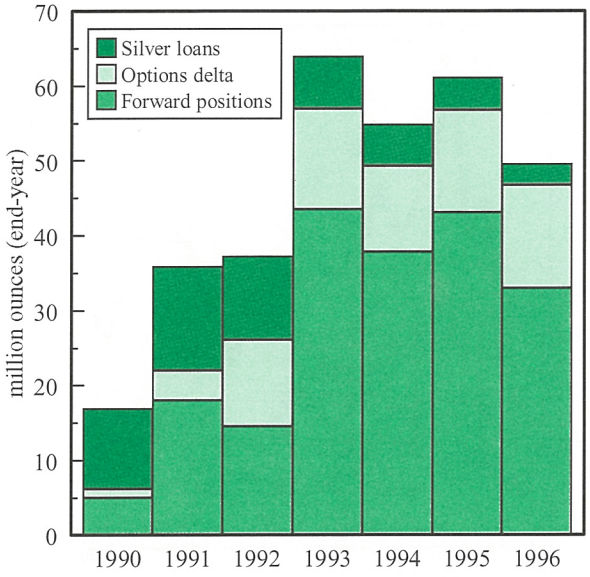


Hedging

During 1996, there was a marked decline in hedge positions among those companies which are monitored on an ongoing basis for the purposes of this Survey. As shown in Figure 21, the biggest decline occurred in outstanding forward sales positions. During the first quarter of the year, high spot prices combined with a healthy contango resulted in forward prices earning an attractive premium over spot deliveries; however, surprisingly little activity was reported for this period, with producers apparently anticipating further increases in spot prices. From the second quarter onwards, and particularly after May, most producers allowed existing positions to run down, resulting in an estimated 10% decline in outstanding positions by the end of 1996. The exception was Barrick Gold, which increased its hedged position by 3 Moz in the fourth quarter, leaving it fully hedged in terms of expected production for 1997.

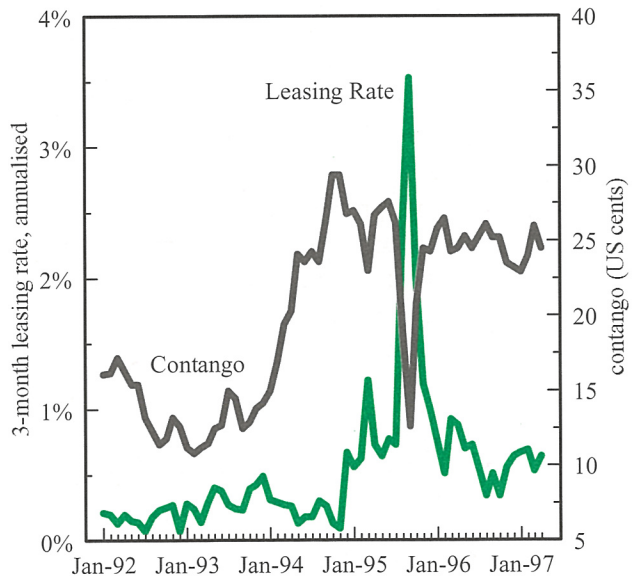
Although poor spot prices did not encourage forward trading, contangos were attractive for the greater part of 1996. Figure 22 shows the silver contango expressed in absolute terms (ie, the premiums available in the forward market in cents per ounce) and the annualized 3-month silver leasing rate. The contango was depressed in the 1992-93 period, initially by the collapse of the silver price to below the $4 level and, thereafter, by the US$ Libor rate spending an extended period at under 3.5%. Conversely, the rise in the contango in 1994 was due

Figure 21
World Silver Hedging: Outstanding Positions



to the silver price recovering to over $5 and, especially, the 3% rise in US$ Libor during the course of the year. Since then, the one-year contango has generally remained at around 25 cents per ounce due to the relative strength of silver prices and, in particular, dollar interest rates. Generally over the last few years there has been a tendency for silver leasing rates to rise, reflecting a slight tightening in supply and stronger demand from industrial users.

Figure 22
Silver Contango and Leasing Rate



Nevertheless, only from August to October 1995 has the cost of borrowing silver increased sufficiently to bring about a decline in the contango. At that time, the spike in the 3-month silver leasing rate to over 3% temporarily pushed the contango back down to the 15 cent level.

Silver volatilities were perceived to be attractive for the greater part of the year, which encouraged relatively high levels of options trading. Producers used the opportunity to generate revenue, particularly through the selling of call options. However, by the end of the year, the effective change in the delta-hedged portion of options was less than 1% from end-1995 levels. To the extent that a number of producers are believed to engage in silver options trading, often on a shorter-term basis, without reporting these transactions, the volumes of options positions suggested in Figure 22 may be somewhat conservative. This may be particularly true for producers which sell silver call options to cross-subsidize the buying of, for example, gold put options. However, although these transactions may not be included in the options figures, they would in fact be incorporated into the total supply-demand balance through inclusion in the implied disinvestment figure.

By-product Analysis

As was pointed out above, only 17% of silver produced in 1996 was derived from primary sources. This is, in part, a consequence of the scarcity of large silver deposits which can be economically exploited at prevailing silver prices. However, the dominance of by-product or co-product silver in total mine supply also testifies to the fact that silver often occurs naturally with a variety of other metals. Silver is typically found in the oxidized zones of ore deposits, or in the hydrothermal veins associated with sulphide ores. This natural association with lead and zinc (which often occur together), gold and copper, results in significant quantities of silver being produced at operations where it is not the primary target of exploitation or the principal earner of revenue - in fact, in many cases silver is regarded as a "bonus" of base metal or gold mining.

In the table below, silver mine production is divided into the various categories of source metal. The "Other" category includes silver production derived from nickel, cobalt and platinum mining.

World Mine Production of Silver by Source
Million ounces

	1992	1993	1994	1995	**1996**
Primary	75.4	71.6	76.0	76.2	**82.8**
Lead/Zinc	222.6	201.9	194.5	199.3	**204.3**
Copper	123.9	122.1	114.8	127.9	**125.3**
Gold	57.4	60.5	55.0	72.1	**76.4**
Other	3.6	3.3	3.3	3.5	**3.8**
Total	482.8	459.4	443.7	478.9	**492.5**

Primary silver production increased by almost 9% last year, continuing a trend which began in 1993, in response to the improvement in silver prices since then. Whereas primary production is largely responsive to price movements, by-product and co-product silver supply tend to be correlated with the production of the relevant source metals. With the exception of lead, there was an increase in production last year for each of the source metals normally associated with silver.

World Mine Production of Source Metals
thousand tonnes

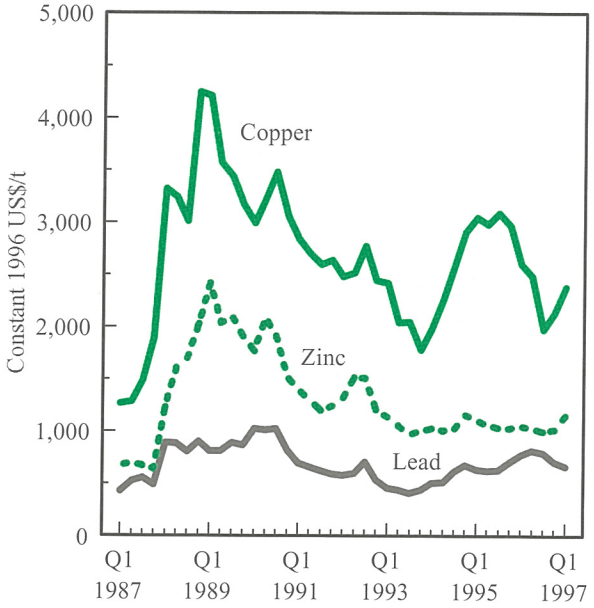
	1992	1993	1994	1995	**1996**
Lead	3,076	2,796	2,702	2,804	**2,773**
Zinc	7,186	6,767	6,829	7,089	**7,189**
Copper	9,418	9,426	9,418	10,090	**10,725**
Gold	2.232	2.289	2.278	2.269	**2.346**

Source: WBMS; GFMS

Variations in average grades can, of course, affect the correlation. Thus, for example, higher copper production would not automatically lead to increased silver output, as the silver content of the copper mined may have declined.

Nonetheless, trends within the base metals and gold markets have tended to impact noticeably on overall silver production. Silver derived from zinc and lead mining, for instance, declined between 1992 and 1995, as production of these metals was negatively affected by low prices, environmental pressures on lead, overcapacity of zinc mines (built up in the high-price late-1980s), an overhang of stocks in the zinc market and the increase in recycling. Long-term trends in base metals prices, illustrated in Figure 23, have also played a significant role in determining production levels.

Figure 23
Base Metal Prices (Real)



By-product output from lead and zinc mining is the largest source of silver owing to the high silver contents typically found in these ores. However, quantities of silver derived from gold mining have increased significantly in the 1990s. Only a small proportion of this increase is attributable to the total quantity of gold produced; rather, it is due to sub-trends within the sector. In particular, silver-poor South African production has fallen almost continuously over the course of the decade. At the same time, various silver-rich gold mines, such as Eskay Creek in Canada, Mount Muro and Kelian in Indonesia, and particularly the new mines of Chile have been commissioned. Overall, the average by-product recovery ratio of silver from gold has risen sharply over the past few years, as appears from the table below.

By-product Silver Recovery
average ounces of silver per tonne of source metal

	1992	1993	1994	1995	**1996**
Lead/Zinc	21.7	21.1	20.4	20.1	**20.5**
Copper	13.2	13.0	12.2	12.7	**11.7**
Gold (000's)	25.7	26.4	24.2	31.8	**32.6**

As for future supply, apart from any increases in primary output which are likely to accompany any increase in silver prices, growth rates will also be

Sources of Silver Mine Production (Million ounces)

Country	Mine Type	1992	1993	1994	1995	1996
Argentina	Gold	0.25	0.25	0.30	0.30	0.10
	Lead/Zinc	1.21	1.12	0.92	0.99	0.90
Australia	Gold	1.60	1.63	1.68	1.77	1.84
	Copper	1.30	1.62	0.74	1.51	1.57
	Lead/Zinc	36.26	33.79	31.17	28.29	29.38
Bolivia	Gold	0.35	1.49	1.43	1.32	0.91
	Lead/Zinc	9.79	9.21	9.89	12.44	10.03
Brazil	Gold	0.17	0.16	0.16	0.15	0.14
	Copper	0.39	0.37	0.29	0.20	0.19
	Lead/Zinc	0.13	0.13	0.13	0.12	0.11
Canada	Primary	5.45	1.70	0.07	0.00	0.00
	Gold	2.22	1.34	1.45	12.74	14.41
	Copper	13.31	12.30	10.36	13.16	12.17
	Lead/Zinc	14.76	11.06	10.20	13.53	13.36
	Other	1.86	1.87	1.72	1.85	2.08
Chile	Primary	0.57	0.42	0.84	0.55	0.27
	Gold	18.19	16.40	14.58	14.77	18.33
	Copper	14.09	14.28	16.06	18.05	18.06
	Lead/Zinc	0.10	0.09	0.12	0.11	0.12
Dom Rep	Gold	0.43	0.54	0.30	0.67	0.55
Fiji	Gold	0.03	0.04	0.05	0.06	0.06
Finland	Copper	0.87	0.94	0.84	0.87	1.09
Honduras	Lead/Zinc	1.14	0.78	0.87	0.97	1.16
India	Gold	0.27	0.27	0.43	0.45	0.42
	Copper	0.50	0.54	0.54	0.34	0.32
	Lead/Zinc	0.08	0.85	0.65	0.43	0.40
Indonesia	Gold	1.57	1.35	1.81	5.33	5.63
	Copper	1.64	1.54	1.31	2.30	2.76
Ireland	Lead/Zinc	0.42	0.42	0.56	0.44	0.47
Italy	Lead/Zinc	0.39	0.16	0.44	0.44	0.44
Japan	Gold	0.28	0.22	0.21	0.16	0.14
	Lead/Zinc	5.23	4.18	4.07	3.05	2.74
Malaysia	Gold	0.01	0.01	0.01	0.01	0.01
	Copper	0.49	0.44	0.42	0.35	0.29
Mexico	Primary	24.88	25.35	26.14	26.50	28.70
	Gold	4.28	6.18	6.19	6.30	7.56
	Copper	2.57	3.12	3.30	3.40	3.24
	Lead/Zinc	35.71	34.01	35.57	38.53	41.77
Morocco	Primary	3.50	6.50	6.66	6.31	6.23
	Copper	0.60	0.55	0.83	0.79	0.78
	Lead/Zinc	0.60	0.55	0.83	0.78	0.77
Namibia	Gold	0.01	0.00	0.00	0.00	0.00
	Lead/Zinc	1.44	1.15	1.03	1.12	1.00
	Copper	1.44	1.15	1.03	1.12	1.03
New Zealand	Gold	0.73	0.84	0.76	0.95	1.00
Norway	Copper	0.02	0.01	0.01	0.01	0.02
	Lead/Zinc	0.31	0.21	0.23	0.16	0.11
PNG	Gold	2.13	2.19	1.52	1.21	1.22
	Copper	0.94	0.90	0.98	0.91	0.71
Peru	Primary	12.45	11.64	15.00	17.28	18.24
	Gold	0.00	0.45	0.56	0.61	0.66
	Copper	4.93	5.65	5.57	6.71	5.73
	Lead/Zinc	36.24	35.98	34.88	36.75	38.68
Philippines	Gold	0.15	0.18	0.18	0.19	0.20
	Copper	0.76	0.86	0.79	0.86	0.57
Poland	Copper	25.14	28.83	26.99	30.99	31.60
	Lead/Zinc	0.51	0.59	0.64	0.64	0.65
Portugal	Copper	1.23	1.16	1.02	1.24	1.08
Romania	Copper	0.31	0.29	0.27	0.29	0.28
	Lead/zinc	1.23	1.16	1.08	1.14	1.12
Saudi Arabia	Gold	0.49	0.53	0.53	0.55	0.52
South Africa	Gold	1.97	1.92	1.78	1.64	1.48
	Copper	1.02	1.08	1.09	1.10	1.02
	Lead/Zinc	2.55	3.18	3.23	2.87	2.87
	Other	0.23	0.00	0.01	0.05	0.06
Spain	Gold	0.14	0.09	0.07	0.07	0.06
	Copper	7.36	5.79	5.56	5.52	5.72
Sweden	Gold	0.00	0.00	0.00	0.00	0.00
	Copper	1.77	1.63	1.51	1.61	1.54
	Lead/Zinc	7.29	7.29	6.59	6.43	6.16
Turkey	Primary	2.48	2.28	2.04	1.54	2.25
	Copper	0.03	0.03	0.06	0.33	0.28
	Lead/Zinc	0.00	0.00	0.05	0.21	0.37
United States	Primary	14.80	13.46	14.80	15.25	17.47
	Gold	17.74	19.91	16.36	17.58	15.20
	Copper	15.47	14.58	13.07	13.58	14.25
	Lead/Zinc	9.99	4.94	3.35	3.42	3.41
Zambia	Copper	0.59	0.58	0.35	0.25	0.24
Other Countries	Primary	11.22	10.28	10.44	8.76	9.65
	Gold	4.38	4.48	4.69	5.11	5.97
	Copper	27.10	23.90	21.85	22.38	20.71
	Lead/Zinc	57.08	50.92	47.95	46.36	45.88
	Other	1.46	1.42	1.53	1.57	1.63
World Totals	Primary	75.37	71.62	75.99	76.20	82.81
	Gold	57.36	60.47	55.04	72.12	76.42
	Copper	123.85	122.14	114.83	127.87	125.25
	Lead/Zinc	222.62	201.86	194.57	199.26	204.25
	Other	3.55	3.29	3.26	3.47	3.77

determined by developments in the gold, zinc, lead and copper markets. Increased gold production, especially in Latin America, is likely to have a positive effect on silver production from the region. Considerable new copper capacity is also planned to come on stream in the near future. Although a number of these mines are rich in silver, by-product recovery from copper mining constitutes only 25% of total production and hence the total effect will be diluted. Silver derived from copper production is, nevertheless, set to increase its share of total silver mine supply.

5. Supply from Above-ground Stocks

Since the early 1990s, the statistical deficit between supply in the form of mine production and scrap and fabrication demand has grown substantially (see Figure 1 on page 6). This "gap" has been filled by the drawing down of bullion stocks. In 1996, 160 Moz (4,970 t) were required. The location, form, rate of decline, present level and availability of the remaining silver stocks are all matters of great interest. Therefore, most of this Chapter is devoted to an analysis of these important issues. In addition, however, it also looks at the supply of silver from the recycling of scrapped fabricated products which last year amounted to 151 Moz (4,700 t).

The above-ground stock of silver is found in three different forms: bullion, coin and fabricated products. If none of the silver had been lost, the stock would be equal to cumulative historical mine production which is estimated to have reached 37,500 Moz (1.17 million tonnes) by the end of last year. Of course, in reality, a substantial part of the fabricated products has been lost over time, for example, by abrasion (in the case of coins and jewelry) or by being washed down drains. Spent photographic fixer solutions have not always been subject to the near universal recycling that now characterizes the industry; in the past, these were often simply discarded. Furthermore, some fabricated products contain silver in such small quantities that recycling is either impractical or unprofitable at any conceivable silver price level. Thus the calculation of a realistic figure for the above-ground stock requires an estimation of the amount which has been "lost" (or otherwise irretrievably dissipated). Needless to say, opinion differs as to how much mined silver has been lost. The assumptions made, however, have a considerable impact on estimates for the outstanding stock of fabricated products and bullion.

In spite of the uncertainty surrounding the amount of lost silver, there is little doubt that the largest part of the above-ground stock is in the form of fabricated products mainly consisting of jewelry and silverware. The reasons for this are twofold. Firstly, jewelry and silverware has historically been the largest component of fabrication demand, its pre-eminence only being challenged in the second half of the twentieth century. Secondly, jewelry and silverware articles are far less likely to have become lost than say electrical contacts which (especially in the past) have usually ended-up in landfill when discarded or remain incorporated in products still in use. But the greater availability of the stock of jewelry and silverware also complicates the task of estimating its true size. For instance, it is difficult to gauge how much jewelry and silverware was melted for its silver content during the period of very high prices from 1979-84. It is quite probable that the historical data seriously understate the true level of scrap recycling at the time. If so, this would tend to mean that the above-ground stock of bullion is correspondingly larger and that of fabricated products smaller.

Silver in bullion and coin form is the part of the above-ground stock which is closest to the market. Here it is the silver content which determines the article's price, rather than other considerations such as workmanship, sentiment or antique value. This is especially so for bullion bars which represent the most liquid part of the world's silver stock. The stock of bullion bars is more widely dispersed than some are inclined to believe. For example, from the late 1970s through to the mid-1980s, well over 300 Moz (9,300 t) of hundred-ounce bars were made in North America, most of them being sold to private investors. Although some of these bars have subsequently been sold back onto the market (and ultimately manufactured into silver products), a large quantity remains in circulation. Gradually, though, this stock is being whittled away, especially during periods of stronger silver prices. An indication of this is that dealers report the discount on such bars to have fallen

Figure 24

Identifiable Bullion Stocks

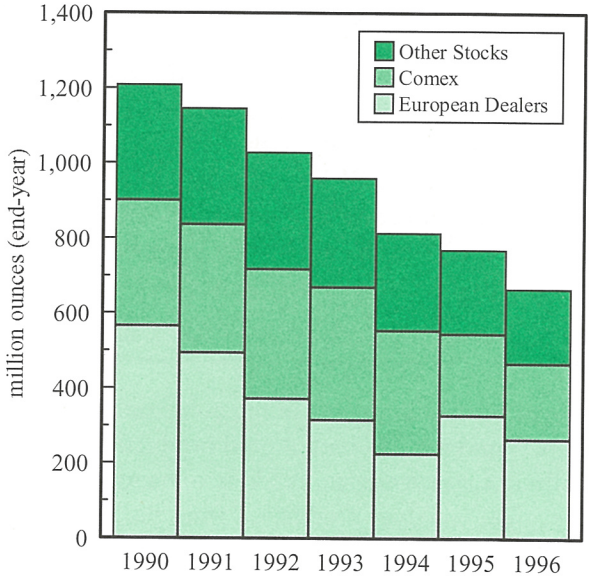
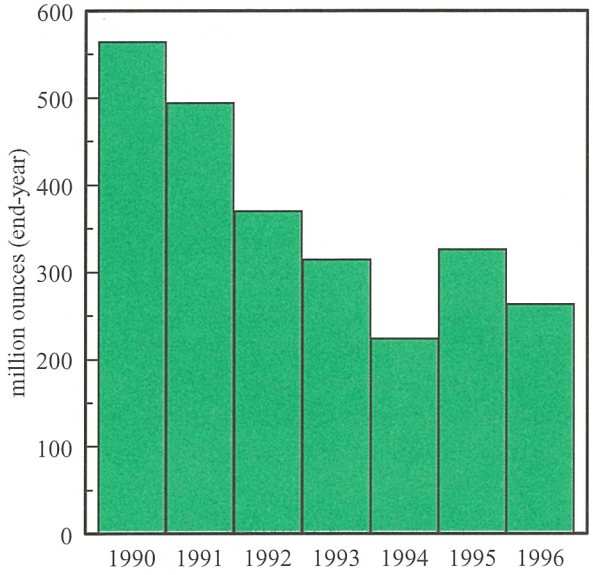


Figure 25
Bullion Stocks in Dealers' Vaults in Europe



slightly over the past few years. However, it is impossible to gauge how many of them still exist. Despite there being a few specialized depositories where these bars are concentrated, in most cases they are held by individuals or private companies. A good analogy would be the gold kilobar stock in France which is mostly dispersed among many households rather than being held on account in dealers' vaults.

In addition to these hundred-ounce bars, there are other unreported stocks of small bars held mainly by individuals in both North America and Europe. The size of such holdings is unlikely though to be as significant as the outstanding US stock of hundred-ounce bars.

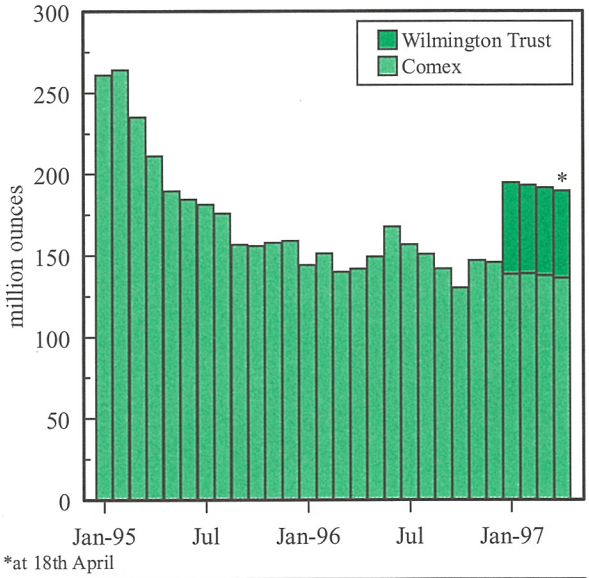
However, the most important component of the bullion stock takes the form of the holdings of large investment bars, typically weighing 1,000 ounces, which are, almost by definition, the most liquid and closest to the market of all silver stocks. They are generally located at recognized depositories operated on behalf of futures exchanges, or by European dealers. In this case, stocks tend to be more concentrated and thus potentially more "visible" than those consisting of smaller bullion bars. A number of governments also have stocks of silver in the form of large bars but such holdings are often in less marketable forms.

But not all stocks of large bars are readily identifiable. These less visible stocks are highly fragmented and held outside the well-known silver depositories in Europe and North America by banks, funds, trading companies, refiners, dealers, scrap collectors, armored carriers and private individuals. It is impossible to measure such inventories of large bars accurately but it is reasonable to assume that they would collectively amount to rather less than the total identifiable bullion stocks.

Figure 24 shows how, in aggregate, the identifiable stocks have declined sharply over the period since 1990. The largest component of these stocks is represented by the bullion holdings in European dealers' vaults (which are shown in Figure 25). Held on behalf of bullion banks, other traders and investors, these stocks totalled over 560 Moz (17,400 t) at the end of 1990, and fell steadily to just under 220 Moz (6,800 t) at the end of 1994. A massive transfer of bullion from the United States to Europe then led to an increase in dealers' stocks in 1995 but last year there was a renewed fall (in spite of a continued, but reduced, flow from the United States) with stocks falling during the year by more than 60 Moz (1,900 t).

Most of the increase in European dealers' stocks in 1995 resulted from a similarly sized drawdown in Comex inventories, which is shown in Figure 26. The fall, of 99.5 Moz (3,095 t), represented 38% of the exchange's stocks at the end of 1994. The withdrawal of these stocks from Comex warehouses was designed

Figure 26
Comex Warehouse Stocks



*at 18th April

From the beginning of January, 1997, Wilmington Trust's stocks of Comex eligible and registered silver have been reported and are now included in the stock figures published by Comex.

to create an illusion of shortage and thereby force up the silver price. In the wake of the failure of this attempt, the silver was physically moved (a lot of it by air) as the liquidation of long positions on the exchange made it profitable to make a direct arbitrage with the London market.

In 1996, there was more two-way movement in Comex stocks. For example, during the second quarter, they increased by nearly 28 Moz (870 t) to end the first half above the 167 Moz (5,200 t) level. They finished December, however, at just under 146 Moz (4,500 t), a decline of over 13 Moz (400 t) year-on-year. But unlike 1995, the fall in stocks last year seems to have owed more to real demand both from the local and overseas markets. Thus, for instance, although there continued to be a substantial, though smaller, export of bullion from the United States to Europe, last year most of the silver ended up being re-exported to markets such as Dubai and India rather than adding to European stocks.

Turning now to the issue of government holdings, although extremely difficult to pin down in the case of some countries, the available evidence suggests that these amounted to no less than 175 Moz (5,400 t) at the end of 1995. Figure 27 shows that there were some large changes in government stocks between 1990 and 1996. In the early part of this period, government stocks rose despite heavy sales from the United States. The increases in other countries' holdings in 1991 and 1992 were largely due to Indian customs seizures from smugglers and the building of inventories from unsold mine production in some of the successor states of the Soviet Union. Subsequent sales from these inventories made an important contribution to the decline in government stocks in the period 1993-96.

In 1996, liquidation of inventories by the Defense Logistics Agency in the United States came to only 3.6 Moz (111 t), a low figure by historical standards. There were much larger disposals from Russian stockpiles which were heavily run-down for the second year in succession. In India, after the exceptionally heavy sales of 347 tonnes (11 Moz) of confiscated silver stocks in 1995, last year saw a much lower level of sales, amounting to 94 tonnes (3 Moz).

The final element of the identifiable above-ground stocks consists of the inventories held by the Tokyo Commodity Exchange (Tocom), the Chicago Board of Trade (CBOT) and Japanese trade stocks, the level of which is regularly reported to the Ministry of International Trade and Industry (MITI). Together this group held nearly 50 Moz (1,600 t) in 1990. By the end of last year, however, their combined stocks had fallen to just over 21 Moz (650 t).

The CBOT stocks were officially revised last year, so the data for the 1994-95 period has had to be partially estimated. However, it is clear that the silver which it holds has fallen in line with the decline in silver futures trading on the exchange. There is a similar reason behind the decline which has been seen in Tocom stocks. Japanese trade stocks are included in the identifiable category because they are held in

Figure 27

Changes in Government Stocks

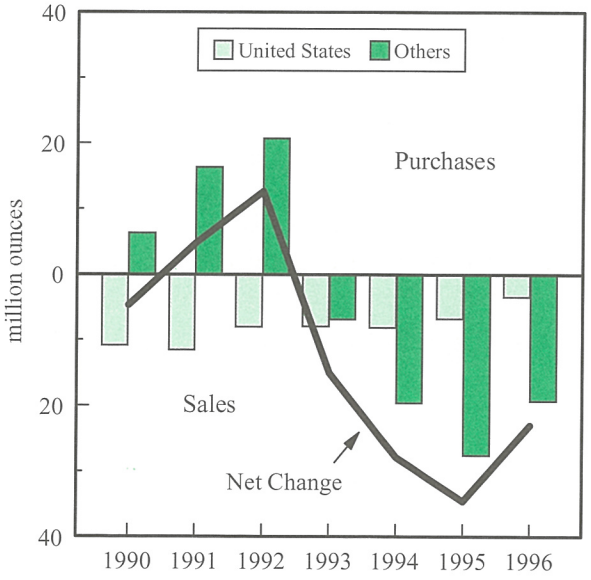
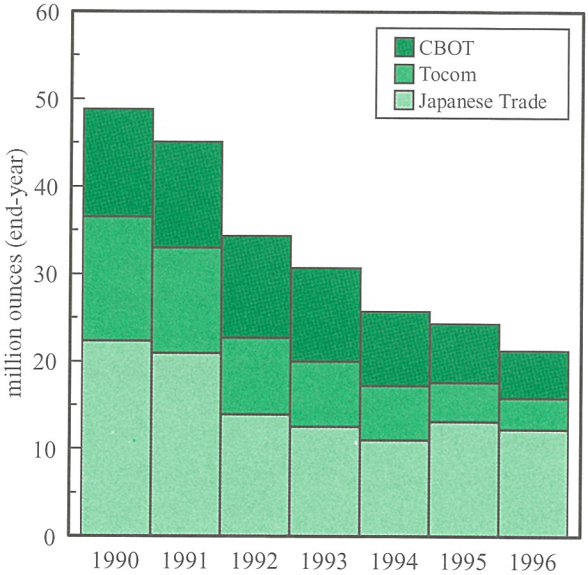


Figure 28

Other Identifiable Stocks



liquid form by the principal dealers and thus more readily available to the market than ordinary commercial inventories which are more akin to manufacturers' working stocks.

Scrap

The data series for scrap supply in the **United States** has been revised upwards in the light of new information on the recycling of photographic wastes and spent catalysts. Photographic scrap is estimated to have generated close to 32 Moz (1,000 t) of silver last year. The larger part of this was won from spent fixer solutions but a significant quantity also came from solid wastes including X-ray and, to a lesser extent, graphic arts film, "wool" from solution tanks and a far smaller amount directly from color film negatives.

The other revision has been made to the numbers for recycled catalysts. Nearly all the silver which goes into formaldehyde and ethylene oxide catalysts is recycled, with typical losses being no more than 2%. Often catalysts are scrapped on an annual basis. The worldwide recycling of spent catalysts is dominated by just a handful of specialized companies in Europe and the United States. The amount of silver recovered from catalysts has turned out to be greater than previously estimated. Although to some extent offset by correspondingly higher fabrication, the result has been for a net increase in the estimate for scrap from this source.

In **Germany**, as in other countries which have a high consumption of photographic products, most recycled silver comes from liquid and solid photographic wastes. But in addition, Germany is a major player in the international silver scrap trade, importing more silver in the form of scrapped products and wastes than it generates domestically. This is a characteristic shared with the **United Kingdom**, and especially, **Canada** and **Belgium**, the latter two countries, in particular, having excellent facilities for the reprocessing of low grade materials.

In **France**, the amount of scrap recovered from photographic waste has declined with the average age of radiographic film treated, with a corresponding fall in the contained silver. To some extent this decline has been offset by an increase in the recycling of old telecommunications equipment.

Much of the scrap arising in **India** consists of old jewelry of variable purity which can either be used directly for the fabrication of new ornaments or in the case of lower grade material, after refining, often by tiny, back-street operations. A small number of the more industrial-scale operations also treat battery and catalytic scrap and return new products to their customers, generally with only a small amount of "top-up" with new silver.

The main refiners reported volumes of old silver at double normal levels during the first months of the year, with much of this material consisting of silverware of low silver content, averaging around 50%. Although recycling rates dropped back towards more normal levels in the following months, they were boosted again in the second half by the liquidation of trade stocks during the period of tight money known as the "money crunch". After the hectic level of activity seen early in the year, the refining business tended to gravitate back to the informal back-street operations, which provide the bulk of the country's refining capacity.

In the Middle East, the main point of interest in recent years has been the quantity of scrap, mostly in the form of old silver coins, flowing out of the **Yemen**, firstly to Saudi Arabia, with this material being in part re-exported to other countries. Last year, however, the flow of Maria Theresia coins fell back somewhat with the fall in the silver price and although the outflow was augmented by the scrapping of heavy-weight jewelry, the total quantity left little surplus for export, particularly with the growth in Saudi silver fabrication in recent years.

In **Egypt**, the flow of old silver jewelry from the south of the country, much of it displaying fine workmanship and suitable for resale as antiques, has steadily declined in the last few years, forcing the local industry to use an increasing proportion of imported bullion.

Although the quantities involved are small, it is noticeable that the recovery of silver from fixer solutions goes hand-in-hand with photographic processing shops in even the smallest centers throughout the Middle East.

Official figures for scrap recovery in **Japan** cannot be used directly to calculate figures for the total market for a number of reasons. Firstly, official data includes process scrap which for the purposes of this Survey is not included since this would lead to the danger of double counting. Official MITI data for silver production includes two headings, "Scraps" and "Remelt". These consist essentially of scrap but both include a high proportion of process scrap, which is generally excluded from the scrap statistics in this

Table 3
Supply of Silver from the Recycling of Old Silver Scrap
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Germany	-	-	-	16.08	16.08	16.08	15.75	15.43	14.79	**14.79**
UK & Ireland	-	-	-	7.23	7.23	7.23	7.33	7.88	7.43	**7.59**
France	-	-	-	3.10	3.80	5.34	4.00	4.18	4.66	**4.50**
Italy	-	-	-	2.73	2.73	2.73	2.73	2.80	3.22	**3.54**
Austria	-	-	-	1.93	1.93	1.93	1.93	1.93	2.03	**1.80**
Switzerland	-	-	-	0.55	0.55	0.55	1.41	0.48	1.51	**1.54**
Netherlands	-	-	-	1.13	1.13	1.17	1.13	1.24	1.13	**1.25**
Sweden	-	-	-	1.10	1.10	1.10	1.10	1.10	1.10	**1.09**
Norway	-	-	-	0.76	0.76	0.76	0.76	0.76	0.76	**0.96**
Czech & Slovak Republics	-	-	-	0.64	0.84	0.96	0.77	0.71	0.74	**0.90**
Belgium	-	-	-	0.64	0.64	0.64	0.64	0.64	0.64	**0.64**
Denmark	-	-	-	0.68	0.63	0.63	0.63	0.63	0.61	**0.61**
Spain	-	-	-	0.39	0.35	0.32	0.32	0.32	0.39	**0.45**
Portugal	-	-	-	0.40	0.40	0.40	0.40	0.40	0.40	**0.42**
Romania	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Other	-	-	-	1.35	1.41	1.48	1.51	1.54	1.48	**1.54**
Total Europe	-	-	-	38.77	39.67	41.41	40.51	40.16	40.96	**41.73**
North America										
United States	-	-	-	39.13	36.91	36.49	37.42	39.61	40.48	**42.12**
Mexico	-	-	-	2.25	2.25	2.25	2.25	2.25	2.60	**2.41**
Canada	-	-	-	1.32	1.32	1.32	1.32	1.32	1.68	**1.77**
Total North America	-	-	-	42.70	40.48	40.06	40.99	43.18	44.75	**46.30**
Central & South America										
Brazil	-	-	-	1.93	1.93	1.93	1.93	1.93	1.93	**1.93**
Argentina	-	-	-	0.64	0.64	0.64	0.64	0.64	0.64	**0.64**
Chile	-	-	-	0.45	0.45	0.45	0.45	0.45	0.45	**0.45**
Other	-	-	-	0.84	0.84	0.84	0.80	0.74	0.74	**0.74**
Total Central & South America	-	-	-	3.86	3.86	3.86	3.83	3.76	3.76	**3.76**
Middle East										
Turkey	-	-	-	1.77	1.86	1.93	2.03	2.25	2.32	**2.41**
Saudi Arabia & Yemen	-	-	-	0.06	0.08	0.61	0.81	1.87	3.02	**1.93**
Egypt	-	-	-	1.12	1.00	0.64	1.02	0.89	0.82	**0.69**
Other	-	-	-	0.16	0.16	0.16	0.23	0.23	0.23	**0.23**
Total Middle East	-	-	-	3.12	3.09	3.34	4.08	5.24	6.37	**5.25**
India	15.00	13.00	5.02	3.99	9.65	7.23	4.50	4.50	5.79	**6.43**
Far East										
Japan	-	-	-	15.66	18.94	24.18	26.24	26.88	27.33	**27.07**
South Korea	-	-	-	1.20	1.20	1.35	1.45	1.61	1.93	**1.93**
Taiwan	-	-	-	0.96	0.96	0.80	0.71	0.64	0.64	**0.64**
Vietnam	-	-	-	0.26	0.26	0.26	0.23	0.32	0.35	**0.36**
Thailand	-	-	-	0.32	0.32	0.32	0.32	0.32	0.32	**0.35**
Indonesia	-	-	-	0.13	0.17	0.21	0.23	0.29	0.32	**0.34**
Singapore	-	-	-	0.29	0.29	0.29	0.29	0.39	0.39	**0.29**
Hong Kong	-	-	-	0.26	0.26	0.26	0.26	0.26	0.29	**0.29**
Philippines	-	-	-	0.13	0.14	0.16	0.16	0.16	0.16	**0.19**
Malaysia	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Total Far East	-	-	-	19.29	22.60	27.94	29.96	30.96	31.82	**31.58**

Table 3
Supply of Silver from the Recycling of Old Silver Scrap
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Africa										
South Africa	-	-	-	0.14	0.14	0.11	0.13	0.14	0.13	**0.13**
Other	-	-	-	0.64	0.61	0.68	0.71	0.64	0.77	**0.58**
Total Africa	-	-	-	0.77	0.74	0.77	0.84	0.77	0.90	**0.70**
Australia	-	-	-	2.28	2.28	2.28	2.41	2.51	2.51	**2.31**
Other Western World	123.40	130.70	131.40	-	-	-	-	-	-	**-**
Western World Total	138.41	143.68	136.42	114.78	122.37	126.90	127.13	131.08	136.86	**138.07**
Other Countries	12.70	14.10	12.80	13.34	11.93	13.63	13.44	13.15	11.99	**12.70**
World Total	151.11	157.80	149.21	128.12	134.30	140.53	140.57	144.23	148.85	**150.77**

Survey. A third category, "Others", contains some scrap along with other material.

Secondly, significant amounts of silver scrap recovery, primarily photographic, are not recorded in the official statistics but estimates of such flows are included in the data for Japan shown in Table 3.

The MITI figures suggest a fall of 5% in 1996 in the two principal scrap categories and a sharper fall of 11% in the "Others" category. These movements are consistent with developments in the market as a whole, and are mainly attributable to a decline in photographic recovery, among other reasons due to higher exports and lower film loadings.

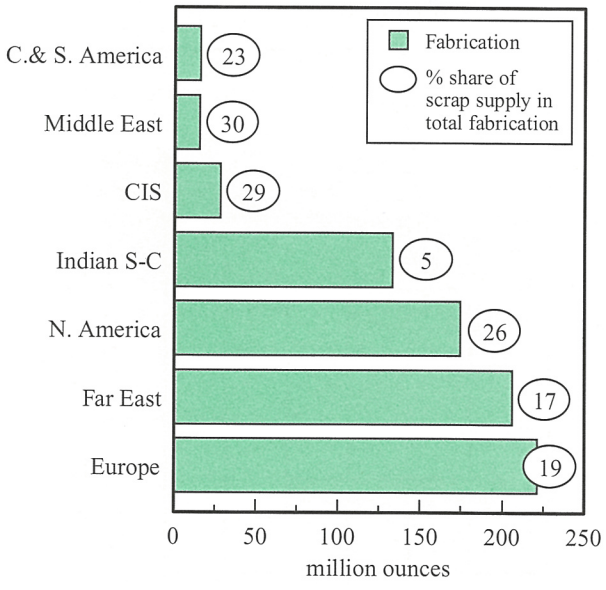
The preparation of reliable statistics on silver scrap recovery in **China** is still difficult due to the dearth of information. However, based on a number of visits to the country over the last few years, as well as on contacts with traders in Hong Kong, it has been possible to compile a statistical series which reflects the size of the scrap market with reasonable accuracy.

Indications are that scrap represents around 10-15% of total fabrication, and that it has grown in recent years due to a rapid increase in the photographic market. Most silver scrap recovery in China is unofficial because the People's Bank of China, which is the only officially sanctioned purchaser of scrap, buys it at below the prevailing market price.

Scrap recovery in **Korea** is dominated by a few players who purchase silver from numerous collectors of photographic and silverware scrap. Although the overall size of the market remains quite small in absolute terms, there was a slight increase last year on the 1995 level, primarily as a result of increased volumes of photographic and silverware scrap.

Considering the size of its fabrication market, scrap recovery in **Thailand** may appear at first sight to be very low at only 0.3 Moz (11 t). The explanation is firstly, that most of the silver fabricated is exported to markets in Europe and North America in the form of jewelry and so is not available for local recovery. Secondly, much of the locally generated scrap in both the jewelry and electronics industry is *process* scrap and is thus not counted in this Survey.

Figure 29
World Fabrication and Scrap Supply in 1996



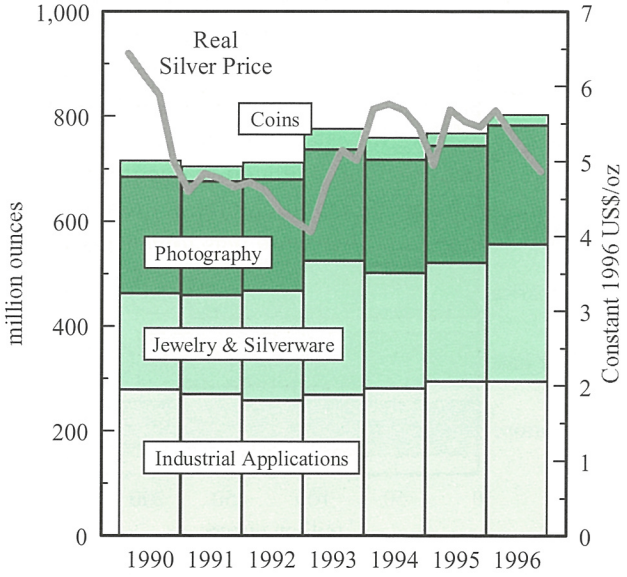
6. Fabrication Demand

The robust 4.5% increase in demand in 1996 which raised fabrication to 803 Moz (25,000 t) owed almost nothing, on a net basis, to developments in the industrial world. Offtake fell back marginally in both Europe and Japan, while in the United States, the increase of 2% was the lowest since 1992. The picture in Europe was by no means static, however, with many quite substantial changes being seen in the main fabricating countries, but the rises were just exceeded by falls, leaving European fabrication at 221 Moz, almost 1% less than in 1995, and virtually identical to the 1990 level. By contrast, over the 1990-96 period, offtake in the United States rose by 15%, while in Japan, it has not yet regained the record level set in 1990. Thus, it was the developing world that provided the main impetus for last year's growth, though here, too, there was no general improvement. Rather, the overall increase in offtake could be accounted for essentially by the jewelry and silverware of just two countries, India and Mexico, with a somewhat smaller contribution from industrial uses in China.

Figure 30 shows how the main sectors of demand have performed since 1990. Looking first at the largest of them, industrial applications, this showed no growth in 1996, in sharp contrast to the rises of 6 to 9% seen in the previous three years. While there was no single factor responsible for the stagnation last year, perhaps the main culprit was the decline in the European Union (EU) where many of the larger economies have been suffering from governmental actions aimed at reducing public debt to ensure qualification for European Monetary Union.

Figure 30

World Silver Fabrication



With by far the largest contribution to the aggregate increase coming from India, where jewelry and silverware continue to dominate the demand picture, it was not surprising that the increase in world offtake in this sector also accounted for the main increase in world demand. This sector is also the one which is most sensitive to price levels and although there was no year-on-year change in the average dollar price of silver last year, the falling price *during* the year led to a price-elastic response in the form of higher demand, especially in India.

Considering the frequently expressed fear about the threat to silver halide based photography from digital imaging, it was interesting to note that its use of silver actually increased quite significantly last year. Shifts in demand for photographic silver nitrate also led to substantial gains and losses in the market shares held by the principal European centers.

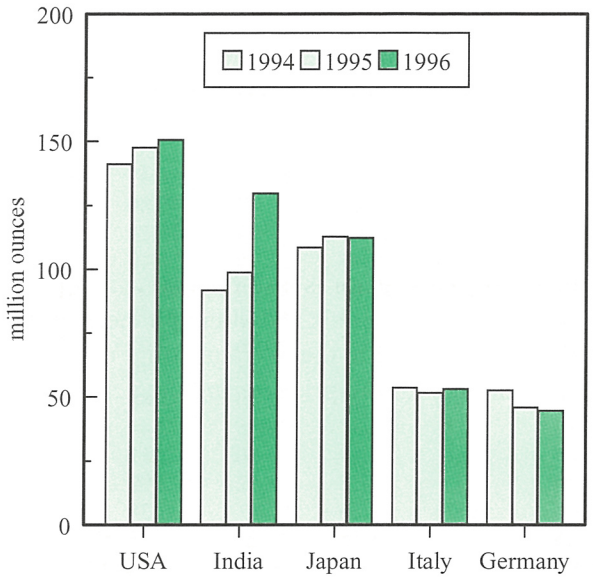
Finally, looking at the smallest sector, coins and medals, this was, once again, the worst performing area of fabrication, though the loss was much lower than in the previous year.

The trends in the five largest fabricating countries is shown in Figure 31. While the United States remained the largest user of silver last year, on account of its leading position in industrial, photographic and coin fabrication, there was a switch between the second and third positions, with India moving above Japan, the result of near stagnation in Japanese demand in contrast to the leap in Indian jewelry and silverware fabrication. Looking at the fourth and fifth largest players, just three years ago, Germany was on a par with Italy but a substantial gap has now opened up between them. Thus, while Italian jewelry and silverware fabrication recovered last year (though not to anything like the record levels recorded in 1992) German industrial fabrication has continued to weaken.

Between them, these five countries accounted for as much as 61% of world fabrication last year, marginally up on the 1995 level. The next largest group consists of all the other countries with an offtake of 20 Moz or above. These include China and the CIS, each consuming around 30 Moz per year; three essentially industrial fabricators in Western

Figure 31

Top Five Silver Fabricating Countries



Europe: the United Kingdom; France and Belgium (with the latter being in this group essentially because of its specialization on the production of silver nitrate for the photographic industry); and finally Mexico and Thailand, both of whose fabrication is dominated by jewelry and silverware.

Industrial Applications

The varied group of uses for silver classified as "industrial" in this Survey include all applications not shown under the other main headings in this Chapter, namely photographic; jewelry and silverware; and coins and medals. A description of the principal uses of silver and the properties on which they are based is given on page 38. After a decade of continuous growth, industrial demand was slightly lower at 293 Moz (9,100 t) last year, mainly because of a fall in European offtake and in spite of a further rise in the United States to yet another record level. Japan was another weak spot with demand falling back again after the modest recovery in 1995. In the former communist bloc, a gain in China was balanced by a near identical fall in the CIS.

Europe

Last year, European demand for silver in industrial applications fell by 1.6% to 66.5 Moz (2,070 t). This was the first decline in offtake since 1993. As was also the case in that year, demand in 1996 was driven lower by developments in Germany and France.

In **Germany**, the industrial sector used nearly 8% less silver last year. This outcome was hardly surprising, given that there was barely any growth in German industrial production in 1996. Besides this, in some applications, there has been economization in raw material use and in others, eg, amalgam, all supplies are now imported.

The electrical and electronics industries used just under 3% less silver, partly because of a poor economic environment in this sector but also due to manufacturers bringing out new contact designs which use marginally less raw material.

Fabrication of brazing alloys and solders was also lower, in this case by no less than 18%. Offtake of silver has fallen steadily over recent years, with the 1996 total of 2.9 Moz at only 54% of the level prevailing in 1990. To some extent, this decline reflects German manufacturers moving away from the production of standard silver-cadmium alloys to concentrate instead on the manufacture of more specialized alloys such as silver-tin.

Silver demand for other uses was generally lower last year. For example, the fabrication of silver potassium cyanide has continued to fall in line with the decline in electroplating.

The level of **Italian** fabrication was unchanged in 1996. On the electrical and electronic side, however, there was a 20% increase due to the growing use of silver contacts by the domestic consumer appliance industry.

By contrast, brazing alloys demand was lower last year because of weaker domestic offtake. The fall was partially offset by a higher level of exports. Around 58% of Italian brazing alloy production is now exported, mostly to other EU countries.

Overall fabrication of anodes and silver potassium cyanide for the plating industry also fell last year. Over 90% of electroplating is related to decorative end-uses, in particular the manufacture of silverware and jewelry. Plating of silverware was lower last year, whereas it increased on the jewelry side due to buoyant demand for silver chain. Solid silver chains are thinly electroplated to give them a uniform color.

In recent years, the **United Kingdom** has experienced steady growth in the use of silver in industrial applications. Last year was no different with offtake rising by 2.9% to over 11.4 Moz (360 t).

The electrical and electronics sector experienced steady growth. Much of this was related to

Table 4
World Silver Fabrication
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Italy	38.80	38.23	43.48	51.61	56.92	61.37	57.66	53.42	51.47	**52.94**
Germany	42.30	47.20	49.90	54.05	57.66	54.63	48.26	52.77	45.84	**44.72**
UK & Ireland	21.23	22.94	24.74	24.70	25.34	27.02	28.62	32.20	33.24	**35.38**
Belgium	17.90	19.20	19.20	19.90	20.18	20.22	20.65	21.06	23.40	**25.24**
France	19.80	23.50	24.30	26.04	28.17	30.45	29.64	27.54	30.37	**25.11**
Spain	-	-	-	15.16	17.43	6.62	6.14	10.71	9.93	**9.26**
Switzerland	-	-	-	5.72	7.36	6.53	6.07	6.96	7.09	**7.47**
Greece	-	-	-	3.22	3.38	3.54	3.71	3.86	3.79	**4.34**
Poland	-	-	-	5.11	3.88	2.06	2.25	2.56	2.88	**3.37**
Portugal	-	-	-	2.49	2.32	2.50	2.47	2.05	2.44	**2.81**
Netherlands	2.40	1.20	1.20	2.76	2.19	2.12	2.09	2.60	3.15	**2.15**
Austria	1.30	1.30	1.30	1.94	2.10	2.00	1.93	1.82	2.00	**1.75**
Sweden	-	-	-	1.52	1.94	1.65	1.56	1.51	1.39	**1.49**
Norway	-	-	-	0.68	1.66	2.13	1.55	1.25	1.25	**1.09**
Denmark	-	-	-	1.07	0.96	1.06	0.96	0.96	1.05	**1.00**
Finland	-	-	-	1.38	1.49	1.28	0.89	0.99	0.86	**0.96**
Czech & Slovak Republics	-	-	-	1.74	1.50	0.99	0.68	0.59	0.78	**0.74**
Cyprus & Malta	-	-	-	0.23	0.23	0.26	0.27	0.35	0.39	**0.42**
Romania	-	-	-	0.74	0.61	0.51	0.45	0.42	0.29	**0.39**
Bulgaria	-	-	-	0.16	0.16	0.23	0.32	0.18	0.22	**0.21**
Hungary	-	-	-	0.64	0.60	0.61	0.59	0.35	0.36	**0.18**
Other	11.30	11.50	12.00	0.17	0.16	0.16	0.18	0.16	0.36	**0.16**
Total Europe	155.03	165.06	176.02	221.05	236.24	227.96	216.96	224.16	222.55	**221.16**
North America										
United States	127.30	125.40	132.80	131.01	128.24	128.59	131.68	141.27	147.72	**150.66**
Mexico	9.20	9.10	8.90	14.09	15.06	23.47	32.67	28.33	18.26	**21.53**
Canada	11.60	12.10	15.30	6.53	4.67	2.33	2.83	3.09	2.65	**2.67**
Total North America	148.10	146.60	157.00	151.63	147.98	154.39	167.18	172.69	168.62	**174.86**
Central & South America										
Brazil	-	-	-	6.98	6.69	6.62	6.92	8.29	9.37	**8.42**
Argentina	-	-	-	4.05	4.05	4.05	4.05	4.05	3.92	**3.79**
Peru	-	-	2.60	1.54	1.19	0.92	0.84	0.90	1.00	**1.10**
Colombia	-	-	-	1.06	1.06	1.08	1.06	1.06	1.06	**1.04**
Ecuador	-	-	-	0.37	0.37	0.37	0.53	0.66	0.66	**0.67**
Chile	-	-	-	0.48	0.48	0.48	0.48	0.51	0.55	**0.51**
Dominican Republic	-	-	-	0.03	0.00	0.00	0.03	0.00	0.06	**0.23**
Other	-	-	-	0.59	0.55	0.52	0.53	0.48	0.51	**0.51**
Total Central & South America	-	-	2.60	14.92	14.41	14.05	14.45	15.93	17.08	**16.27**
Middle East										
Turkey	-	-	-	5.76	4.90	5.76	6.24	5.76	6.17	**6.30**
Israel	-	-	-	2.11	2.33	2.56	2.80	3.06	3.32	**3.73**
Egypt	-	-	-	1.60	1.73	2.33	1.90	2.53	2.13	**2.24**
Saudi Arabia	-	-	-	0.21	0.28	0.36	0.37	0.34	0.41	**0.48**
Other	-	-	-	1.59	2.06	2.46	2.16	2.54	2.65	**2.78**
Total Middle East	-	-	-	10.67	11.33	13.46	13.50	14.24	14.68	**15.54**

Table 4
World Silver Fabrication
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Indian Sub-Continent										
India	20.10	22.40	25.56	46.81	44.86	58.12	109.87	91.76	98.74	**129.60**
Other	-	-	-	2.57	3.28	4.08	4.82	4.02	4.82	**3.86**
Total Indian Sub-Continent	20.10	22.40	25.56	49.35	48.10	62.21	114.75	95.78	103.56	**133.46**
Far East										
Japan	90.90	100.40	100.80	115.77	108.76	104.90	107.91	108.43	112.66	**112.11**
Thailand	7.30	8.20	11.20	24.12	20.09	31.64	38.75	29.10	27.72	**27.61**
South Korea	-	-	5.30	6.78	9.32	9.00	15.56	16.40	18.62	**18.49**
Taiwan	-	-	-	4.50	3.56	4.30	4.80	5.26	5.74	**6.36**
Indonesia	-	-	-	1.54	1.85	2.10	2.00	2.85	3.35	**3.58**
Hong Kong	3.20	2.90	3.10	2.38	1.96	1.86	2.28	2.89	2.85	**3.09**
Myanmar, Laos & Cambodia	-	-	-	1.00	1.00	1.00	1.00	1.00	1.06	**1.09**
Vietnam	-	-	-	0.30	0.30	0.30	0.40	0.50	0.64	**0.68**
Malaysia	-	-	-	0.32	0.35	0.39	0.45	0.35	0.39	**0.40**
Philippines	-	-	-	0.15	0.15	0.15	0.16	0.17	0.19	**0.21**
Singapore	-	-	-	0.29	0.25	0.99	0.23	0.17	0.13	**0.11**
Other	9.30	9.60	14.30	0.02	0.00	0.00	0.00	0.00	0.00	**0.00**
Total Far East	110.70	121.10	134.65	158.04	147.59	156.61	173.54	167.18	173.34	**173.72**
Africa										
Morocco	-	-	-	0.45	0.48	0.48	0.45	0.45	0.55	**0.58**
South Africa	-	-	-	0.53	0.32	0.29	0.57	0.38	0.45	**0.29**
Algeria	-	-	-	0.38	0.35	0.32	0.29	0.29	0.29	**0.27**
Tunisia	-	-	-	0.19	0.19	0.19	0.23	0.25	0.26	**0.26**
Libya	-	-	-	0.34	0.35	0.32	0.29	0.27	0.26	**0.19**
Other	-	-	-	0.23	0.23	0.23	0.23	0.23	0.23	**0.23**
Total Africa	-	-	-	2.13	1.94	1.83	2.04	1.91	2.03	**1.81**
Australia	-	-	-	5.17	5.26	6.88	6.97	6.28	5.47	**5.27**
Other Western World	25.90	25.10	15.64	-	-	-	-	-	-	**-**
Western World Total	460.19	480.65	511.78	612.95	612.82	637.40	709.38	698.17	707.37	**742.11**
Other Countries										
China	-	-	-	22.03	23.46	23.88	25.60	29.48	30.64	**32.57**
Soviet Union/CIS	-	-	-	80.64	67.20	50.12	41.35	32.22	30.78	**28.59**
North Korea	-	-	-	-	0.05	-	0.22	-	-	**-**
Other	108.10	117.80	118.70	-	-	-	-	-	-	**-**
Total Other Countries	108.10	117.80	118.70	102.64	90.70	74.03	67.18	61.70	61.41	**61.15**
World Total	568.28	598.46	630.48	715.59	703.53	711.42	776.56	759.87	768.78	**803.26**

telecommunications, eg, the use of electrical contacts for mobile phones. Fabrication of electrical fuses was also reported to have risen steadily. In addition, it was a good year for exports, at least until the fourth quarter when they were hit by a rise in the value of the pound.

Demand for silver in brazing alloys and solders was basically unchanged in 1996 from the previous year's level. In some applications silver brazes are being replaced by other cheaper materials.

In aggregate, silver offtake in all other applications was stable, with lower use in catalysts compensated by growing demand in other areas.

After the strong performance in 1995, demand in **France** last year fell back by over 3% to 11.4 Moz (350 t). This was in spite of a solid 5% increase in the use of silver in the large electrical and electronics area,

The Main Uses of Silver

Silver has a number of unique properties including its strength, malleability and ductility, its electrical and thermal conductivity, its sensitivity to and high reflectance of light and the ability to endure extreme temperature ranges. Silver's unique properties restrict its substitution in most applications.

Electrical

Silver is the best conductor of all metals and is hence used in many electrical applications, particularly in conductors, switches, contacts and fuses. Contacts, a junction between two conductors that can be separated and through which a current can flow, account for the largest proportion of electrical demand.

Electronics

In electronics, silver is also widely used. Uses include silk-screened circuit paths, membrane switches (used extensively in all electronic keypads - including computer keyboards), electrically heated automobile windows, and conductive adhesives.

Electroplating

The ease of electrodeposition of silver accounts for silver's widespread use in coating. The plating thickness of some items, such as fuse caps, is less than one micron although the silver then tarnishes more easily. Coatings of two to seven microns are normal for heavy duty electrical equipment.

Batteries

Many batteries, both rechargeable and non-rechargeable, are manufactured with silver alloys as the cathode. Although expensive, silver cells have superior power-to-weight characteristics than their competitors. The most common of these batteries is the small button shaped silver oxide cell (approximately 35% silver by weight) used in watches, cameras and similar electrical products.

Brazing and Soldering Alloys

Silver facilitates the joining of materials (called brazing when done at temperatures above 600 degrees Celsius and soldering when below) and produces naturally smooth, leak-tight and corrosion-resistant joints. Silver brazing alloys are used widely in applications ranging from air-conditioning and refrigeration equipment to power distribution equipment in the electrical engineering sector. It is also used in the automobile and aerospace industries.

Catalysts

Silver, usually in the form of mesh screens but also as crystals, is used as a catalyst in numerous chemical reactions. Silver catalysts are particularly important in the production of formaldehyde which is used in the manufacture of housings for television sets, computers and electrical switch boxes.

Mirrors and Other Coatings

Silver's unique optical reflectivity, and its property of being virtually 100 % reflective after polishing, allows it to be used both in mirrors and in coatings for glass, cellophane or metals.

Water Purification

Silver is employed as a bactericide and algaecide in an ever increasing number of water purification systems in hospitals, remote communities and, more recently, domestic households.

Bearings

Steel bearings electroplated with high purity silver have greater fatigue strength and load carrying capacity than any other type and are hence used in various hi-tech and heavy-duty applications.

Photography

The photographic process is based on the presence of silver halide crystals suspended on an unexposed film, which, when exposed to light, are set in such a way that they are selectively reducible to metallic silver by agents called developers. Approximately 5,000 color photographs can be taken using one ounce of silver.

Jewelry and Silverware

Silver possesses working qualities similar to gold but enjoys greater reflectivity and can achieve the most brilliant polish of any metal. To make it durable for jewelry, however, pure silver (999 fineness) is often alloyed with small quantities of copper. In many countries, Sterling Silver (925 fineness) is the standard for silverware and has been since the 14th century.

Coins

Until the late 19th century most nations were on a silver standard with silver coins forming the main circulating currency - silver being in greater supply and of less value than gold, thus being more practical for everyday payments. As gold became more plentiful, however, silver was slowly replaced although it is still used in some circulating coins as well as in bullion coins for investors

which accounts for over half of the silver required in the French industrial sector. Electrotechnical end-uses predominate with most silver being consumed in contacts used in switches and connectors. Many of these contacts are exported, mainly to other European countries but increasingly manufacturers are also finding new markets in Asia and South America.

The quantity of silver used in brazing alloys increased last year by 5%. This was in spite of the gradual tendency, especially in the domestic market, for these alloys to be substituted by other materials and production techniques. This process has gone furthest in the automobile industry which was once a major consumer of silver brazing alloys. Nevertheless, higher exports not just to France's main markets of Germany and Italy but also, increasingly, to other parts of the world, meant that in 1996 there was still some growth in output.

Collectively, other uses of silver fell sharply last year. Exports of plating salts slumped. The amount of silver required for the manufacture of nuclear power station control rods likewise fell sharply. Finally, the use of silver and silver/gold thread by the embroidery industry continued to decline.

Industrial applications in **Switzerland** needed over 4% more silver last year. Output rose to 6.9 Moz (215 t) partly due to strong growth in exports to other European countries and the Far East. The major silver-consuming industrial sector in Switzerland is the electrical industry which manufactures products such as wires, extruded strips and powders which are used, in turn, for the fabrication of contacts. This sector experienced particularly good growth in 1996. By contrast, Swiss output of solders, which are mainly exported, fell by 7%. There was an increase, however, in the fabrication of salts and anodes, mainly used for decorative electroplating. Once again, most of this production was for export.

North America

In 1996, for the fifth year in succession, there was an increase in the use of silver for industrial applications in the **United States**. However, as can be seen in Figure 32, the increase in the industrial sector lagged behind the improvement in photographic demand (which is described in the next section). This long period of sustained growth resulted from the continued expansion of the US economy and from the more intensive use of silver by specific industries such as, for example, the electronics sector.

The estimates in this Survey have been revised upwards in the light of new information on the amount of silver used in electrical and electronics products and for catalysts. They show that overall demand in the industrial applications category came to 57.7 Moz (1,800 t) in 1996, a rise of 1.5% over the previous year's level.

Electrical and electronic uses accounted for just over 54% of the silver used in industrial applications. At 31.0 Moz (960 t) it was barely up on 1995's revised level. This was in spite of good growth in the amount of silver going into electrical contacts. Although in terms of silver use, demand is greatest for the larger contacts required for heavy-duty industrial applications, last year's increased demand originated mainly in the automotive and construction sectors. In the latter case, contact demand for household circuit breakers was particularly strong in the first half of the year.

Contact demand is growing in the automotive sector, too, but there is some evidence that eventually, electronic relays will substitute for electromechanical devices in low voltage applications, especially in automobiles where a multiplicity of electronic systems is already incorporated. On the other hand, the higher voltages encountered in, for example, most household goods, will complicate any move to solid-state technology.

Substitution of silver-cadmium alloys by silver-tin is only taking place very slowly. In fact, only about

Figure 32

US Silver Fabrication

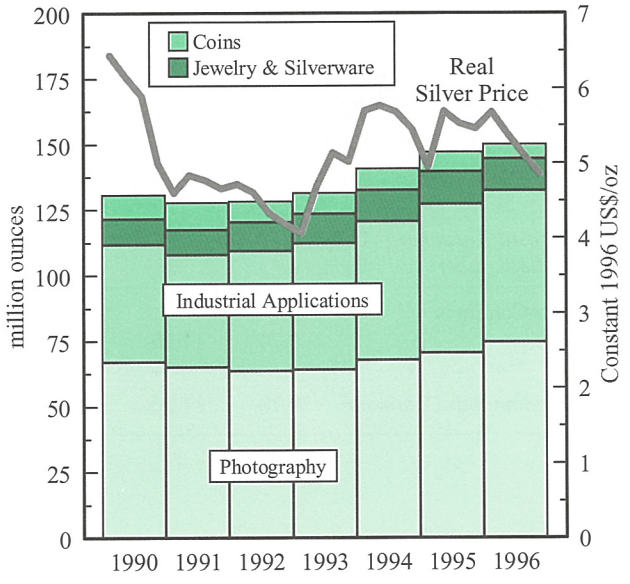


Table 5
Silver Fabrication: Industrial Applications
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Germany	17.40	19.20	21.50	22.35	21.09	20.00	18.65	18.00	18.49	**17.04**
Italy	6.90	7.49	7.69	9.90	10.29	10.74	11.29	11.77	12.25	**12.22**
UK & Ireland	8.70	8.50	9.40	9.68	9.97	10.26	10.58	10.87	11.12	**11.45**
France	6.90	7.60	8.60	9.97	10.96	12.64	11.29	11.35	11.80	**11.41**
Switzerland	-	-	-	5.11	5.69	6.04	5.59	6.53	6.62	**6.91**
Spain	-	-	-	1.90	1.90	1.83	1.83	1.74	1.77	**1.96**
Netherlands	0.70	0.70	0.70	1.74	1.74	1.74	1.74	1.74	1.74	**1.74**
Austria	0.50	0.50	0.60	1.00	1.00	1.00	1.00	0.96	1.06	**0.93**
Poland	-	-	-	0.61	0.45	0.48	0.61	0.77	0.84	**0.90**
Czech & Slovak Republics	-	-	-	0.77	0.68	0.55	0.51	0.42	0.51	**0.55**
Belgium	0.51	0.39	0.39	0.32	0.32	0.32	0.32	0.32	0.32	**0.32**
Sweden	-	-	-	0.32	0.32	0.32	0.32	0.32	0.32	**0.32**
Portugal	-	-	-	0.16	0.16	0.16	0.16	0.16	0.16	**0.16**
Romania	-	-	-	0.19	0.16	0.13	0.13	0.16	0.16	**0.16**
Bulgaria	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Denmark	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Hungary	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Finland	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	**0.03**
Norway	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	**0.03**
Other	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.10**
Total Europe	41.60	44.30	48.77	64.46	65.17	66.65	64.46	65.56	67.61	**66.51**
North America										
United States	42.66	48.60	55.00	44.79	42.76	45.75	48.16	52.76	56.84	**57.71**
Mexico	1.00	1.00	1.10	2.57	2.57	2.57	2.57	2.77	2.54	**2.60**
Canada	10.40	11.00	12.00	0.71	0.71	0.71	0.74	0.64	0.74	**0.64**
Total North America	54.05	60.61	68.10	48.07	46.04	49.03	51.47	56.17	60.12	**60.96**
Central & South America										
Brazil	-	-	-	2.41	2.41	2.41	2.51	3.22	3.47	**3.28**
Argentina	-	-	-	1.29	1.29	1.29	1.29	1.29	1.22	**1.16**
Colombia	-	-	-	0.29	0.29	0.29	0.29	0.29	0.29	**0.27**
Chile	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	**0.13**
Ecuador	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.05**
Peru	-	-	0.19	0.06	0.06	0.06	0.06	0.06	0.06	**0.06**
Other	-	-	-	0.23	0.23	0.23	0.23	0.23	0.23	**0.23**
Total Central & South America	-	-	0.19	4.44	4.44	4.44	4.53	5.24	5.43	**5.18**
Middle East										
Turkey	-	-	-	1.03	0.98	1.14	1.24	1.11	1.21	**1.22**
Israel	-	-	-	0.42	0.58	0.68	0.84	0.90	0.97	**1.04**
Egypt	-	-	-	0.06	0.10	0.13	0.10	0.10	0.10	**0.11**
Total Middle East	-	-	-	1.51	1.65	1.95	2.18	2.11	2.27	**2.38**
Indian Sub-Continent										
India	9.70	11.20	9.86	18.13	19.77	19.42	28.94	31.67	34.14	**35.04**
Other	-	-	-	1.13	1.35	1.67	1.93	1.61	1.61	**1.61**
Total Indian Sub-Continent	9.70	11.20	9.86	19.26	21.12	21.09	30.87	33.28	35.75	**36.65**

Table 5
Silver Fabrication: Industrial Applications
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Far East										
Japan	37.40	40.60	42.50	46.57	47.50	44.08	45.82	51.14	53.60	**52.15**
South Korea	-	-	1.00	2.28	4.02	4.02	8.36	10.00	11.86	**11.90**
Taiwan	-	-	-	3.02	3.08	3.69	4.22	4.69	5.23	**5.83**
Hong Kong	2.30	2.10	2.20	2.38	1.00	0.90	1.31	1.93	1.95	**2.16**
Indonesia	-	-	-	0.39	0.58	0.71	0.39	0.35	0.39	**0.40**
Thailand	0.71	0.80	1.09	-	-	-	-	-	-	**-**
Total Far East	40.38	43.50	46.75	54.64	56.17	53.40	60.10	68.11	73.02	**72.44**
Africa										
Morocco	-	-	-	0.06	0.06	0.06	0.06	0.06	0.16	**0.23**
South Africa	-	-	-	0.48	0.29	0.23	0.53	0.32	0.32	**0.17**
Algeria	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.06**
Libya	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.06**
Tunisia	-	-	-	0.03	0.03	0.03	0.03	0.03	0.03	**0.03**
Other	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.07**
Total Africa	-	-	-	0.77	0.58	0.51	0.82	0.61	0.70	**0.62**
Australia	-	-	-	1.97	1.94	1.96	2.04	2.16	2.45	**2.25**
Other Western World	25.90	25.10	15.64	-	-	-	-	-	-	**-**
Western World Total	171.64	184.73	189.32	195.11	197.10	199.03	216.45	233.23	247.36	**246.99**
Other Countries										
China	-	-	-	17.29	17.66	18.80	20.10	23.21	24.27	**25.40**
Soviet Union/CIS	-	-	-	66.04	54.14	39.55	31.89	23.98	21.93	**21.06**
Other	108.09	117.80	118.70	-	-	-	-	-	-	**-**
Total Other Countries	108.09	117.80	118.70	83.30	71.79	58.35	51.99	47.20	46.20	**46.46**
World Total	279.73	302.53	308.02	278.41	268.90	257.38	268.44	280.42	293.56	**293.44**

1% of the power control market uses silver-tin alloys. However, where silver-tin is used, its higher price compared to silver-cadmium alloy leads to designers trying to economize on raw material use.

Contrasting with the higher use of silver for contacts last year, electronics demand declined sharply in 1996, after several years of rapid growth. This resulted from the build-up of inventories in 1995 and the relative weakness of the computer electronics sector. Given the softness in the computer market in the first half of 1996, it took the best part of the year to work off the inventory which had been built in 1995. More recently, however, fabrication for this sector has recovered.

Furthermore, those parts of the industry which were less geared to the computer industry fared reasonably well last year. For example, the number of electronics components incorporated into vehicles continued to rise and, as mentioned above, the automotive industry had a good year. In addition, new uses for silver have been found. Battery testers, for instance, represent a market which did not exist a few years ago: a growing amount of silver in the form of powder or flake is used by manufacturers of the small testing strips which are now found on many consumer batteries.

Silver demand in brazing alloys and solders was stronger last year because of higher production of "white goods". Besides the traditional use of brazing alloys in, for example, consumer goods, there is a growing niche market for ultra-high purity alloys which perform particularly well under high temperatures. These brazing alloys are commonly used in products such as aeroengines, vacuum devices, mining tools and medical machinery.

The two main groups of industrial applications, electronics and electrical, and brazing alloys and

solders, together account for less than 70% of the overall category. The balance consists of two elements. The first of these includes the use of silver in dental alloys, medicines and foodstuffs. The second element comprises silver use in many other industrial applications, including catalysts, batteries, electroplating, water purification, mirrors, bearings, and musical instruments.

As mentioned above, the statistical series for the industrial applications category has been revised upwards because of new information pointing to higher silver use in electrical and electronics and also catalysts. Most catalysts are frequently recycled, often once per year, as their operating efficiency declines over time. Very little silver is lost when the catalysts are recycled. Therefore, most catalyst fabrication represents recycling rather than demand. As the United States is host to the three largest producers of catalysts, it accounts for most of the world's fabrication and catalytic scrap recovery. The data series for both scrap and new fabrication have been raised but it may be that both numbers are still too low and therefore could be increased in the light of further research. However, this new information does not affect the estimates for the use of new silver in catalysts.

Besides catalysts, other uses were marginally up year-on-year. There was an increase in decorative electroplating and also, again due to the strong growth in construction, silver electroplating for electrical end-uses (and also solid contacts). By contrast, the hoped-for increase in silver demand from the battery industry failed to materialize as sales of the new-style silver-containing rechargeable batteries turned out to be extremely disappointing.

India

The industrial sector in India consumed only slightly more silver in 1996, with parts of the industry being affected by a severe credit squeeze in the latter part of the year. Lower defense spending also reduced the fabrication of battery components. However, engineering uses such as contacts and brazing alloys benefited from the priority which electrification has received at both government and state level. The estimates under the industrial heading for India include a number of large silver-using sectors with a uniquely Indian flavor, at least in terms of their size and the uses to which their products are put. These include the manufacture of *jari* thread, which declined again last year, and the use of silver foil in the tobacco and sweetmeats industry, which, by contrast, rose strongly.

Far East

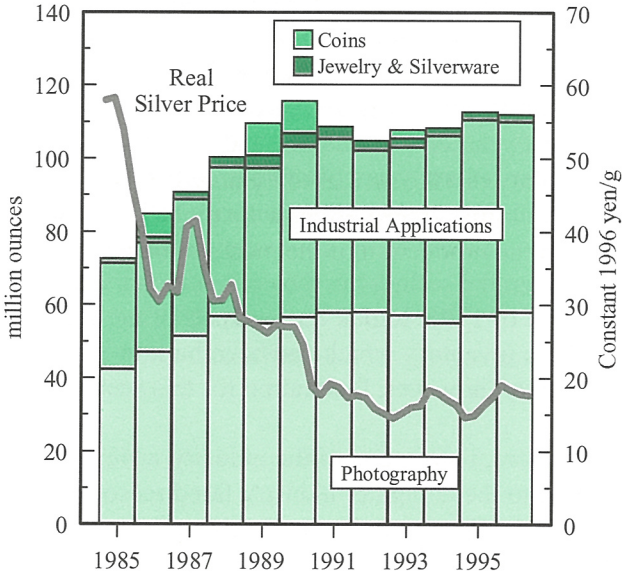
Total industrial demand in **Japan** fell from the revised 1995 figure of 53.6 Moz (1667 t) to 52.2 Moz (1622 t). As Figure 33 shows, this was the first decline in silver use for industrial applications since 1992. The small fall in 1996 fabrication demand was perhaps to be expected, in the light of a rather varied economic performance over the year. On the currency side, it remains to be seen whether the weaker yen will encourage manufacturers to return to Japan after years of moving fabrication facilities offshore, increasing silver offtake as a result. There was no evidence of this process having started last year.

Nitrate production for non-photographic uses fell by around 9% in 1996, in part because of weaker demand from certain sub-sectors of the electronics industry. For instance, paste for use in computer games was down by close to 10% in 1996. In addition to this, the trend towards greater self-sufficiency in countries that have traditionally imported their nitrate needs from Japan also led to a decline in Japanese fabrication.

Contact production fell around 6% in 1996, from a revised figure of 9.3 Moz (290 t) in 1995 to 8.7 Moz (270 t) in 1996. The weakest component of the contacts market was in the construction industry (mainly in switches and circuit breakers) where demand

Figure 33

Japanese Silver Fabrication



fell quite sharply. A 4% decline in motor vehicle production contributed further to decreased demand for contacts. The overall decline in contact production would have been greater had it not been for increased demand from vending machine manufacturers (which is a substantial market for contacts in Japan).

Although contact manufacture in Japan has been quite stable in absolute terms over the past few years (with the maximum variation since 1990 being around 10% from the average), there have been important changes in terms of the quality and types of contacts produced. For instance, rising costs have led to the poorer quality and lower-priced contacts increasingly being manufactured offshore (with the resulting products being sold in Japan as well as in foreign markets). This has been the case especially in those countries where Japanese manufacturers have set up factories (such as China) which consume contacts which were formerly provided by Japan.

In contrast to falling contact fabrication, the production of brazing alloys and solders increased in 1996 (by over 6% from 4.8 Moz (150 t) to 5.1 Moz (160 t)). Very little of this was accounted for by the motor vehicle industry (which has been using ever decreasing amounts of brazing alloys over recent years). Most of the increase was instead due to rising production of air-conditioning and refrigeration units, although there was also increased demand for highly specialized alloys from the electronics industry.

The use of electroplating solutions, mainly in the form of silver potassium cyanide and silver cyanide, rose by around 10% to 3.5 Moz (110 t), reflecting increased offtake for electrical and electronics uses (in which most of these silver salts are used). It is important to note that the increase in silver salts fabrication was related primarily to improved end-use demand outside of Japan in countries like Singapore and Malaysia.

Dental alloy offtake increased by nearly 3% to 2.3 Moz (72 t). Initial estimates show that there was a fall last year in the production of the most popular dental alloy in Japan, *Kinpara 12* (which contains 50% silver in addition to palladium and gold) but production of other silver-containing alloys increased by more than enough to compensate for this fall.

Chinese silver fabrication ranks just below the top five industrial users of silver, though it should be noted that it has not yet been possible to separate out jewelry and silverware from industrial uses. Although total industrial fabrication demand increased by a healthy 4.5%, demand growth appeared to have been held back by the quality problems which still plague much of Chinese manufacturing.

This is seen most clearly in the case of contacts. Production increased by 3% in 1996, but most of this increase came from the production of cheap, lower-quality contacts (notwithstanding that some of the increase is due to the fact that coating thicknesses in Chinese-owned and managed factories have tended to be thicker than would be the case in many other countries). So, although consumption of high-quality contacts in China is substantial, these are mainly imported from countries like Japan and the United States for use in assembly plants in China, and do not count as Chinese fabrication.

In contrast to contacts, brazing alloy fabrication tends not to be constrained by quality issues to the same extent. As a consequence, brazing alloy fabrication rose by 7% in 1996, to 6.4 Moz (200 t). Growth has been especially strong in the air-conditioning market.

Plating in non-electrical and electronics applications again rose year-on-year, consistent with the fact that platers in Hong Kong, Taiwan and South Korea continue to move their fabrication facilities to the mainland where labor costs are lower and environmental constraints are less onerous.

Korean fabrication demand has been inhibited by a variety of factors, in particular a much weaker economy in 1996. In addition, silver offtake growth has been limited due to competition from countries that used to be markets for Korean silver products.

Much of the economic weakness in 1996 can be attributed to the collapse in the prices of certain electronics products, although Korea's problems are clearly not the result of this alone.

Interestingly, the weakness in electronics prices *did not* impact negatively on the absolute levels of silver offtake in this sector, and indeed it appears that the use of silver offtake for the electronics industry (as opposed to electrical uses such as contacts) actually rose slightly in 1996. For instance, the production of plating salts and silver pastes for electronics use grew by around 3% in 1996. Thus, the fall in industrial silver fabrication last year was due to lower contact production, stemming from a decline in demand from the electrical engineering industry, rather than from any weakness in the electronics sector.

In the contact industry, Korean producers have been losing out to competition, mainly from mainland

Electrical and Electronics

The use of silver in this sector is divided between electrical engineering, principally in the form of contact points, and electronics, where silver-containing plating solutions, powders and pastes represent the main areas of demand. Considering the publicity that surrounded the collapse in semiconductor prices in 1996, it is worth noting that the use of silver in this industry was not too seriously affected by this development. This was because the problems of the semiconductor industry, in particular, last year related to overcapacity in certain specialized areas, and it was the slump in growth rates that caught people by surprise, forcing down prices but not the levels of physical production.

Thus, as Table 5a shows, total offtake for electrical and electronics uses actually rose in 1996, albeit by a rather modest 1.6%, compared to the much more buoyant growth rates seen in recent years.

Table 5a
Silver Fabrication: Electrical and Electronics
(including the use of scrap)
Million ounces

	1990	1991	1992	1993	1994	1995	**1996**
United States	23.31	21.16	23.05	24.66	28.16	30.99	**31.32**
Japan	16.87	17.30	15.42	16.32	17.13	18.33	**17.61**
Germany	13.47	12.73	12.07	11.25	10.93	11.90	**11.57**
China	7.59	7.76	8.20	8.60	10.61	10.93	**11.25**
South Korea	4.25	4.44	3.70	4.51	5.27	6.43	**6.40**
France	4.82	5.30	6.37	4.92	5.40	5.56	**5.82**
UK & Ireland	4.24	4.44	4.47	4.53	4.60	4.66	**4.98**
Taiwan	2.22	2.24	2.73	2.87	3.26	3.64	**4.18**
Italy	3.38	3.44	3.47	3.63	3.54	3.54	**4.12**
Switzerland	1.29	1.93	2.57	2.76	3.47	3.76	**4.08**
India	2.35	2.44	2.44	2.44	2.57	2.96	**3.22**
Brazil	1.00	1.00	1.00	1.03	1.48	1.58	**1.45**
Turkey	1.03	0.98	1.14	1.24	1.11	1.21	**1.22**
Mexico	1.16	1.16	1.16	1.16	1.22	1.09	**1.09**
Spain	0.84	0.90	0.90	0.96	0.90	0.90	**0.90**
Hong Kong	0.55	0.48	0.32	0.48	0.71	0.74	**0.84**
Netherlands	0.64	0.64	0.64	0.64	0.64	0.64	**0.64**
Australia	0.42	0.42	0.42	0.44	0.47	0.55	**0.51**
Austria	0.23	0.23	0.23	0.23	0.23	0.24	**0.23**
Egypt	0.06	0.09	0.12	0.09	0.09	0.11	**0.11**
Romania	0.13	0.10	0.10	0.10	0.10	0.10	**0.10**
Total	89.85	89.18	90.52	92.86	101.89	109.86	**111.64**

Brazing Alloys and Solders

Although extensively used in electrical engineering, one of the main uses of silver brazing alloys and certainly the one where growth was most often reported last year was in the field of air-conditioning and refrigeration equipment. Here, the alloys used mostly contain small amounts of silver but the rapid growth of the consuming industry has more than compensated for some decline in unit use over recent years.

On a country-by-country analysis, many of the changes noted in Table 5b reflect shifts in manufacturing facilities or gains and losses of market shares in export markets, for instance the fall in Swiss fabrication last year, rather than changes in local consumption of these products. There were some real declines, as in Germany.

Fabrication of solders held up relatively well, with the bulk of these alloys being used in the electronics field.

Table 5b
Silver Fabrication: Brazing Alloys and Solders
(including the use of scrap)
Million ounces

	1990	1991	1992	1993	1994	1995	**1996**
United States	5.79	5.59	6.49	7.20	7.68	7.99	**8.20**
China	3.99	4.50	5.00	5.20	5.50	6.00	**6.43**
Japan	4.51	4.77	4.19	3.84	4.73	4.80	**5.14**
Germany	5.40	5.09	4.83	4.50	4.02	3.54	**2.89**
Italy	1.77	1.93	2.09	2.25	2.41	2.73	**2.67**
UK & Ireland	2.25	2.25	2.25	2.28	2.31	2.31	**2.31**
India	1.09	1.45	1.45	1.45	1.61	1.93	**2.09**
Switzerland	2.41	2.57	2.41	1.77	1.80	1.80	**1.67**
France	1.77	2.09	2.38	1.77	1.45	1.29	**1.35**
South Korea	0.13	0.20	0.30	0.80	0.96	1.22	**1.16**
Taiwan	0.51	0.52	0.64	0.74	0.81	1.04	**1.11**
Mexico	0.90	0.90	0.90	0.90	1.00	0.87	**0.87**
Brazil	0.55	0.55	0.55	0.58	0.84	0.87	**0.87**
Australia	0.58	0.58	0.59	0.61	0.65	0.75	**0.68**
Spain	0.64	0.58	0.48	0.35	0.29	0.29	**0.58**
Canada	0.42	0.41	0.41	0.41	0.41	0.51	**0.42**
Netherlands	0.26	0.26	0.26	0.26	0.26	0.26	**0.26**
Austria	0.16	0.16	0.16	0.16	0.13	0.11	**0.10**
Israel	0.03	0.03	0.03	0.06	0.07	0.07	**0.08**
Total	33.16	34.43	35.41	35.13	36.93	38.38	**38.88**

China, in the production of the simpler contacts. Korean contact production fell by around 2% in 1996 from 5.6 Moz (175 t) to 5.5 Moz (172 t). In addition, a slight fall in brazing alloy and solder production in 1996, for essentially the same reasons, contributed to the overall fall shown in Table 5.

Ironically, part of this increased competition is the result of Korean industrial groups transferring part of their consumer durable manufacturing capacity to countries such as China and Mexico. Thus, where previously the alloys (for use in the production of items like refrigerators and air-conditioners) came from Korea, they are now being sourced locally.

Overall **Taiwanese** industrial fabrication rose by 11% in 1996 from a revised 1995 figure of 5.2 Moz (163 t) to 5.8 Moz (181 t). This may appear surprising at first sight, not least because of a relatively poor economic performance in 1996 and the price slump affecting many of the electronics industry's products. However physical shipment levels of many such products actually increased in 1996, and this was certainly the case in Taiwan.

For instance, contact and plating demand from the electronics industry increased by around 15% in 1996 as a result of volume growth in the Taiwanese computer industry. The size and scale of this industry is put in context by noting that it produces eight out of ten of the circuit boards found in the world's personal computers and half of the keyboards plugged into them. On a world basis, personal computer production rose by around 16% in 1996. A 30% rise in laptop computer production in Taiwan in 1996 (to 4 million units) provided an additional boost to silver offtake.

Coupled to these developments, there was a slowdown in the transfer of production facilities from Taiwan to China because of the tensions between the two countries in early 1996. Thus, for instance, in the first nine months of 1996, Taiwan companies signed investment contracts for 2,400 projects on the mainland, down 21% from the previous year. This helped to maintain silver demand in Taiwan that might otherwise have been transferred to Chinese companies.

Total **Hong Kong** industrial fabrication rose by over 11% in 1996 to 2.2 Moz (68 t). This was attributable to increased production of silver potassium cyanide for use in a variety of applications including jewelry and electronics in Hong Kong itself and in a number of its export markets.

Silver Quality and Price

Although 999 is the standard quoted on both the Comex and the London silver market, many fabricators require metal of higher purity for their production processes. This applies to the electronics and, especially, the photographic industries which usually need 9999 material. Additionally, in a minority of cases and for certain specialized electronics end-uses, there has been a growing demand for 99999 silver. Besides the high fineness of silver needed by some fabricators there is often also a requirement that certain commonly encountered trace elements be absent from the raw material. This requirement consequently makes most mine production and virtually all scrap silver unusable for a significant group of fabricators. As a result, the growth in world-wide electronics and photographic fabrication is placing increased demand on a relatively small pool of mined silver which meets the required standards. Because of this, small premia have appeared (typically of up to 4c/oz) usually on a number of sought after 9999 "brands". Although these premia do fluctuate, there is an underlying tendency for the market in high-quality silver to tighten.

Photography

The amount of silver used in photographic products rose by 1.4% last year to reach 226 Moz (7,030 t). Most of the growth was due to increased demand for amateur color film and, especially, paper. Production of X-ray film was marginally higher but output of graphic arts materials has shown a slight tendency to decline. Other smaller end-uses are estimated to have increased modestly, for example, due to the higher output of motion picture films.

The market for photographic products can be divided into four main sectors: consumer, radiography, graphic arts, and others.

Consumer photography incorporates both amateur and professional users. Their combined use of film and paper recorded good growth last year. However, continued (marginal) economization in silver use reduced the impact of this growth on silver offtake. For instance, in some extreme cases, manufacturers of color film have brought out new films containing 20-25% less silver than in older products.

In terms of demand for color films last year, there was a marginal increase in Europe with a somewhat stronger rise in North America. But the growth in color film was driven principally by higher sales to developing country markets. Figure 34 shows,

however, that consumption of films in countries such as India and China remains very low in absolute and, especially, per capita terms. These markets are, however, growing at double-digit rates. As personal income and therefore camera ownership rise from current very low levels, per capita film sales are bound to grow in much of the developing world.

Last year, once again, consumption of color paper increased more rapidly than that of color film. Besides higher shipments to developing countries, growth in demand also came from the mature markets of Europe and North America, where consumers are increasingly asking for larger prints and multiple copies.

The most important development last year on the consumer side was the launch in April of the Advanced Photo System (APS). APS is based on a new film format, known as IX240, which incorporates a number of revolutionary new features designed to simplify and improve photography for the amateur user. Manufacturers are hoping that APS will, in particular, boost growth rates in camera, film and paper sales in the mature markets. Regarding silver demand, however, IX240 film contains about one-third less silver than a standard 35mm film. On the other hand, in the short term at least, consumers will tend to use their new APS cameras more intensively. And in the longer run, the new format has an in-built tendency to promote higher paper demand. It is probable, therefore, that APS will further encourage the existing tendency for paper to grow faster than film.

Most of the industry has been positive about the future of APS, although a small minority of commentators have suggested that it will eventually go the way of Disc and 110 Film (two other innovative products which failed to catch on), especially if digital systems become more popular (see box on page 48). Last year a shortage of cameras helped to limit the impact of APS on film use, with, for example, IX240 film capturing no more than 1-2% of the US market. However, expectations are that this share could double in 1997. By contrast, APS has already won a much larger share of the Japanese market. This has owed a lot to good demand for single-use IX240 cameras which in 1996 accounted for one-third of all single-use sales in Japan. In Europe, though, APS is making much slower headway. During the first half of 1996, APS products were in short supply and this caused delays in launches and advertising campaigns. Consumer acceptance of APS has also been held back by a lack of photofinishing facilities. For example, even by the end of 1996 there were no minilabs in Europe (which handle 35% of photofinishing in the region) which could handle APS, with all film having to be sent instead to large central processing laboratories.

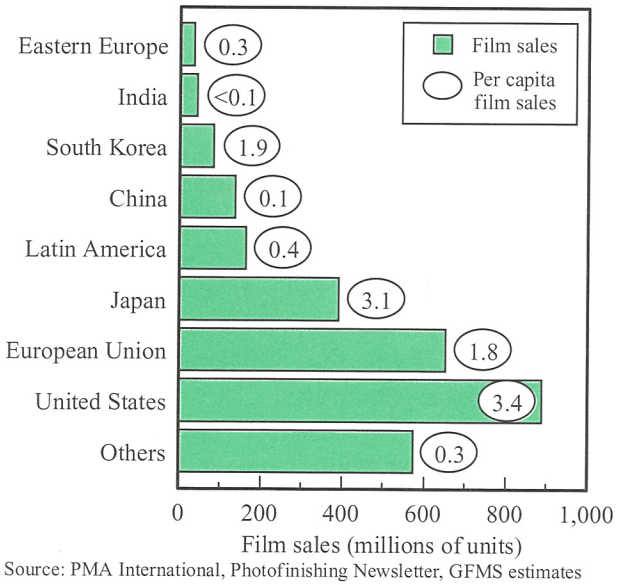
The market for **radiographic** film is slowly increasing due to the aging population in Europe and North America and growth in sales to developing countries. This is compensating for the gradual reduction in average silver loadings of radiographic film and the slow encroachment of digital systems. Looking first at the decline in loadings, this is, in any case, nowadays slight compared to the reduction which occurred in the 1970s and 1980s. A good indication of this comes from data on X-ray scrap recovery. Scrapped film originating prior to the late 1970s typically had silver contents of as much as 12-14 parts per thousand. The yield, however, fell to 8.5-9.3 for films made in 1989-90 with the latest generation containing only 7-8 parts per thousand.

When it comes to competition from digital imaging, the high cost of these systems is slowing their introduction. Furthermore, when they are purchased they do not in general replace but rather complement the traditional silver halide based technology which, due to its combination of lower cost and high image quality, is better suited to many diagnostic tasks.

The amount of silver used for **graphic arts** products is much lower than that used in the radiographic and

Figure 34

World Film Sales, 1996



Source: PMA International, Photofinishing Newsletter, GFMS estimates

Table 6
Silver Fabrication: Photographic Use
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Belgium	17.39	18.81	18.81	18.97	19.36	19.74	20.13	20.58	22.76	**24.76**
UK & Ireland	10.40	12.30	13.00	12.57	13.05	14.05	14.63	17.68	18.42	**19.97**
Germany	10.50	12.10	12.50	16.08	16.56	15.75	15.43	16.08	14.79	**13.83**
France	8.40	11.20	10.80	12.54	13.41	14.31	14.73	13.66	15.91	**11.93**
Poland	-	-	-	2.89	2.25	0.48	0.48	0.48	0.64	**0.80**
Romania	-	-	-	0.48	0.39	0.32	0.26	0.19	0.06	**0.19**
Hungary	-	-	-	0.39	0.35	0.32	0.26	0.19	0.16	**0.00**
Spain	-	-	-	1.61	1.45	0.64	0.35	0.19	0.10	**0.00**
Czech & Slovak Republics	-	-	-	0.64	0.48	0.16	0.00	0.00	0.00	**0.00**
Italy	3.50	1.90	1.61	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Other	2.41	0.71	0.39	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total Europe	52.60	57.00	57.10	66.17	67.29	65.78	66.26	69.06	72.85	**71.47**
North America										
United States	60.20	62.50	65.20	67.00	65.01	63.50	64.01	67.81	70.31	**74.40**
Mexico	3.90	4.00	4.00	2.25	2.25	3.22	3.86	3.86	4.12	**4.21**
Canada	-	-	-	2.89	1.93	0.00	0.00	0.00	0.00	**0.00**
Total North America	64.08	66.49	69.19	72.15	69.19	66.71	67.87	71.67	74.43	**78.61**
Central & South America										
Brazil	-	-	-	2.57	2.57	2.57	2.64	3.22	3.95	**3.38**
Argentina	-	-	-	1.80	1.80	1.80	1.80	1.80	1.80	**1.80**
Total Central & S. America	-	-	-	4.37	4.37	4.37	4.44	5.02	5.76	**5.18**
India	4.10	4.80	4.80	5.63	2.57	2.57	2.25	1.61	0.64	**0.64**
Far East										
Japan	51.30	56.80	54.80	56.50	57.80	58.02	57.20	55.07	56.91	**57.87**
Indonesia	-	-	-	0.10	0.13	0.16	0.18	0.21	0.23	**0.23**
Taiwan	-	-	-	0.10	0.10	0.10	0.10	0.10	0.03	**0.03**
Total Far East	51.31	56.81	54.79	56.68	57.98	58.28	57.49	55.39	57.16	**58.13**
Australia	-	-	-	2.25	2.25	2.25	2.09	1.93	1.61	**1.58**
Western World Total	172.11	185.09	185.87	207.25	203.66	199.97	200.40	204.67	212.46	**215.61**
Other Countries										
China	-	-	-	4.34	4.43	4.68	5.10	5.60	5.60	**5.79**
Soviet Union/CIS	-	-	-	10.00	8.81	7.20	6.27	5.24	4.95	**4.82**
Total Other Countries	-	-	-	14.34	13.25	11.90	11.38	10.83	10.55	**10.61**
World Total	172.11	185.09	185.87	221.58	216.91	211.86	211.78	215.50	223.00	**226.22**

consumer sectors. Graphic arts demand for silver is slowly declining because of the impact of digital imaging. This is not so much through the introduction of "computer to plate" systems (which are very expensive). Rather, it is through the elimination of wasteful "trial runs" (and thereby multiple sheets of film) as graphic designers increasingly make use of hybrid technology to transfer images to computers where they can easily be retouched without the need for more shots to be taken. However, in spite of these developments, the general growth in the advertising market is limiting the effect on silver demand of new technologies.

The fourth, much smaller, segment of the market described as **others**, encompasses a host of other uses including: motion picture, micro, aerial and display

films. Motion picture films have, in particular, been growing strongly due to more multiple copies of current release films being made.

Geographically, the **United States** accounts for over 28% of world-wide consumer sales. An increasing share of this market has been taken by single-use cameras (see Figure 35). In 1996, single-use camera sales leapt to nearly 65 million units, equivalent to over 7% of total US film sales of a little under 900 million units.

On the fabrication side, output increased by just under 6% last year. The largest contribution came from higher production of color paper for the consumer market. But quite apart from the growth in local consumption and exports, US fabrication demand was also boosted by the increased amount of locally produced silver nitrate required by those Japanese manufacturers which have established modern facilities in the United States.

Geographical shifts in production are also affecting manufacturers in the EU. Most of the changes in individual countries' recorded demand over recent years can be accounted for by customers switching their orders between different suppliers of silver nitrate located in the **United Kingdom**, **France**, **Belgium** and **Germany** (see Table 6). Besides the countries listed above, a large amount of imported silver nitrate is also consumed by photographic facilities in **Italy** and the **Netherlands**. A fairly significant proportion of the photographic products manufactured in the EU is exported but the larger part is consumed internally. When it comes to the "domestic" European market, however, it is interesting to note the relatively low per capita demand for consumer films, especially when compared to the United States and Japan.

Japanese fabrication in 1996 rose by 1.7% to 57.9 Moz (1,800 t), mainly as a result of higher exports,

Digital Imaging

There is little doubt that digital imaging will continue to encroach on the traditional silver-based photographic market, with electronic systems gradually replacing silver halide for the capture, processing and storage of visual information. The important questions are, of course, how far and how fast will this process take place. Certainly, fears of the imminent demise of silver halide are exaggerated, as shown by the growing use of silver in photographic uses over recent years. There are good grounds for confidence in the future of this century old technology.

First, the capability and power of digital cameras have not advanced at the rate that many have come to expect from the electronics industry. Take for example a comparison of the Kodak DCS 100 circa 1991 and the Kodak DCS 420 circa 1996, cameras with similar pixel (picture point) resolutions of 1024x1280 and 1012x1524 respectively. Prices have fallen substantially in this period but based on their list prices at the time of their launches, the DCS 100 "cost" $0.018 per pixel while the equivalent cost for the DCS 420 was $0.008, an approximate doubling of the pixels per dollar. Although this may appear impressive, it should be noted that these are high resolution cameras (by digital standards) and that the DCS 420 has a price similar to that of a small automobile while providing images that, controlling for lens quality, are of a comparable standard to even cheap single use cameras.

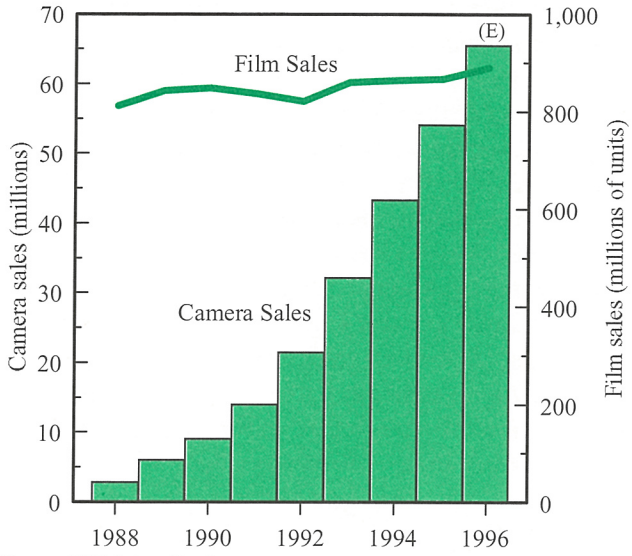
This leads to the second issue, the price/quality trade-off. The high cost (and even the poor resolution) of digital cameras may not matter to some professionals such as photo-journalists, whose main concern is to be able to send a picture back to base electronically and instantaneously, with price being very much a secondary consideration. Serious and amateur photographers alike are, however, unlikely to be willing to the pay such a price for so poor a quality. Thus, although the price of entry level cameras has declined and some camera manufacturers have embarked on marketing campaigns in 1997 based on "affordable" digital cameras, the average quality on offer (a resolution rarely better than 480x640 or around 300,000 pixels) remains far lower than that offered by silver halide (silver halide offers resolutions of around 20 million pixels).

Another factor that may limit uptake of digital cameras is the additional investment in computer equipment to enable users fully to exploit digital photography. The associated expenditure is another reason for the slow growth in digital imaging so far. In other words, apart from professionals who can really take advantage of the electronic transmission aspect mentioned above, only a relatively small number of "techno-buffs" have been won over so far.

Finally, the area with the greatest unexploited potential for amateur photography in the next decade is likely to be Asia. There must be some doubt about whether digital photography, with all its setup costs and poor quality, will appeal to more than a small proportion of future camera users. So even if the consumption of conventional silver-containing film in industrial countries is affected as a result of advances in digital technology, this may be outweighed by growth in the market for silver halide in these new areas.

Figure 35

US Single-use Camera and Total Film Sales



Source: PMA International

especially of amateur film, to markets in the Far East. Most notable among these was China but increasing volumes are also being exported to Indochina. The proliferation of Japanese photofinishing laboratories in the cities of Vietnam, Cambodia and elsewhere in the region and the amount of Japanese film visibly on sale in China, bear witness to the aggressive targeting of these markets by Japanese film producers.

Unlike the consumer market, the output of other photographic sectors was little changed year-on-year. Production of X-ray film was stable in 1996. A fall in local market offtake associated with the increasing use of digital imaging was compensated by increased exports to other countries in the Far East.

Graphic arts fabrication was also stable year-on-year but for different reasons. Although the market share of digital technology continues to rise, there was sufficient growth in the total graphic arts market to ensure that the use of traditional technologies did not decline in absolute terms.

The Japanese single use camera market has now reached maturity and, correspondingly, the related offtake of silver was steady year-on-year. In contrast to 1995, the production of APS film did not have any significant impact on overall silver fabrication levels. This was in spite of certain manufacturers intensively marketing the APS format single use cameras and the stockbuilding associated with this.

The size of the local market and the degree of import penetration are sensitive issues in Japan, not least because of the claims by foreign film manufacturers about protectionism, in contravention of World Trade Organisation (WTO) trade rules. This dispute has been a long-running one and, in April 1997, the US and Japanese governments presented evidence to the WTO panel investigating the allegations. An interim report is due by August 1997 with a final ruling likely in October. At this stage, it is not possible to anticipate the outcome of their deliberations and consequently the possible impact on the Japanese photographic industry.

Last year's small 0.16 Moz (5 t) increase in **Chinese** photographic fabrication was primarily accounted for by growth in X-ray and industrial film production as local consumer film continues to struggle against competition from imported products. Because officially imported film attracts high duties, most of it enters the country unofficially. It is estimated that up to 90% of local Chinese demand for amateur film is now fed via unofficial imports, primarily from Hong Kong.

Jewelry and Silverware

Much of the growth in overall fabrication last year was due to higher production of jewelry and silverware. This sector used nearly 17% more silver in 1996, its output rising to just under263 Moz (8,180 t). The manufacture of jewelry and silverware is dominated by India and Italy, with more than half of the world's fabrication between them. The near 50% rise last year in Indian offtake was the result of both wealth and price effects in the local market. Italian fabrication recovered somewhat due to a better export performance.

Europe

After four years of declining volumes, in 1996, European fabrication of jewelry and silverware increased by just over 4% to 73.4 Moz (2,280 t).

In 1996, the trend of declining silverware and rising jewelry fabrication continued in **Italy**. Silverware fell by nearly 5% last year to 19.3 Moz (600 t). The most important reason for the decline has been the lower output of cutlery and heavy silverware, demand for which has slumped to about a third of its former level. This development has come about because of the general political and economic malaise affecting Italy over recent years. Output of other smaller objects has, however, increased. In particular, production of silver frames has grown to the point where they absorb up to

200 tonnes per annum. Also, Italian silverware manufacturers are putting more effort into exports, which presently account for only 15% of production. In 1996, exports rose by 5% with, in particular, increases to Greece, the United Kingdom, France and Saudi Arabia. The United States remains, however, the leading export market for Italian silverware.

Jewelry fabrication on the other hand surged by over 13% to 21.2 Moz (660 t) due to the continued growth in exports as shown in Figure 36. Around 80% of exports are in the form of machine-made chain. Sales to the United States, which takes nearly half Italy's exports, were up by nearly 30% last year. There was equally good growth in shipments to other markets such as Greece, the United Kingdom, Panama, Hong Kong and Poland.

Italy is renowned as the world's premier producer of gold jewelry. Its profile in the world market for silver jewelry and silverware is, however, much lower. One reason for this is that slightly less than 50% of all jewelry and silverware is exported against 70% for gold jewelry. Another cause might be that compared to gold, the fashion and design "content" of silver jewelry is lower (even though it is rising). Finally, the value of jewelry and silverware production is tiny compared to gold jewelry even if in volume terms the former is close to three times as big as the latter.

Jewelry accounted for approximately one-third of the 10 Moz (310 t) of silver required for jewelry and silverware fabrication in **Germany**. Production of silver jewelry for subsequent electroplating with gold has increased. The use of silver in cutlery and flatware has shown signs of stabilizing after several years of decline. In the cutlery industry, for example, this is because much of the changeover to electroplated wares has already occurred.

In **Spain**, heavy silver tableware and cutlery is no longer fashionable and this has been reflected in the collapse of silverware fabrication from over 9.6 Moz (300 t) in the early 1990s to its current level of under 3.1 Moz (100 t). Production is now geared to much lighter, industrially-made articles such as photographic frames and gift items. Last year higher output of these goods for the home and export markets compensated for a further decline in the production of heavy traditional silverware. Finally, Spanish silver jewelry fabrication increased sharply last year driven by growth in exports, especially to the US market. Most of the jewelry exported is in the form of silver chain.

Greek fabrication of jewelry and silverware rose by over 14% in 1996 to 4.3 Moz (130 t), nearly three-quarters of this quantity being used in silverware. In Greece, silver gifts have always been much in vogue but last year, in addition to the strength of local consumption, output was boosted by growth in exports.

Since its nadir in 1991, jewelry and silverware fabrication in the **United Kingdom** has risen by over 75% to reach 3.3 Moz (100 t) in 1996. The rate of increase has been spectacular because not only has the number of articles increased by nearly 40% over this period but also their average fine weight has climbed from 20g to 25g. From a low base, growth in imports has been even more spectacular: a threefold rise from 8.8 to 25.8 tonnes in the 1991-96 period.

North America

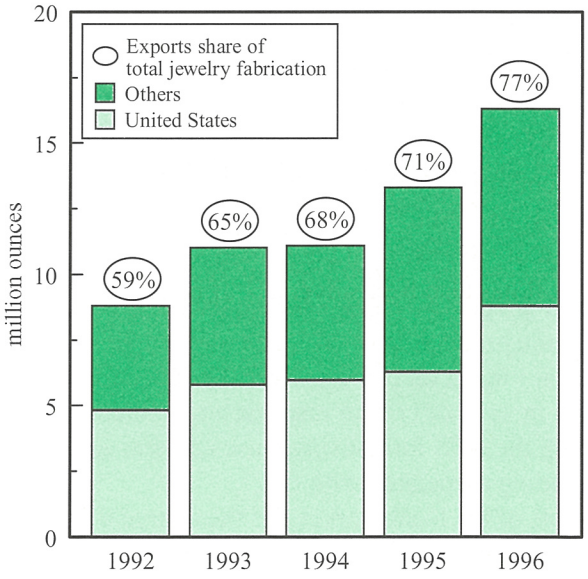
Jewelry and silverware fabrication in North America registered another double-digit increase in 1996 to reach a record 28 Moz (870 t). The difference last year was that nearly all the growth came from Mexico, with US fabrication declining slightly for the first time since 1991.

In **Mexico** production increased by nearly 29% in 1996 to reach 14.2 Moz (440 t) allowing it to surpass the United States as North America's largest manufacturer of jewelry and silverware.

Taking into account the strong growth also recorded in 1995, the cumulative rise in Mexican jewelry and

Figure 36

Official Italian Jewelry Exports



silverware fabrication over the past two years amounts to 5.5 Moz (170 t). This increase has stemmed from higher domestic and foreign sales.

In the local market, a combination of sharply reduced spending power and increased personal insecurity has caused a switch away from karat gold to both silver and gold-plated costume jewelry.

The decline in the value of the peso has hit domestic purchasing power but at the same time it has resulted in an increase in tourist arrivals. Many of these visitors purchase locally made silver jewelry. Tourist sales have therefore made an important contribution to the growth in output. In addition, direct exports of Mexican jewelry have grown, especially to the country's main market, the United States. By no means all of these exports would feature in official US import statistics.

Some of the growth in jewelry and silverware production can also be explained by supply-side developments. Since the peso devaluation in late 1994, manufacturers of gold jewelry have experienced a collapse in local gold jewelry demand and many have therefore switched to producing silver jewelry. An associated reason for companies moving from gold to silver fabrication has been the far lower raw material costs and hence financing charges.

Fabrication demand in the **United States** declined slightly in 1996 to 12.4 Moz (390 t). Jewelry accounted for just under 52% of this total and was marginally higher year-on-year. This has come after several years of strong jewelry production growth and the explanation for last year's relatively weak performance appears to be a much slower increase in domestic consumption plus a strong rise in imports. Figure 37 shows that official US jewelry imports reached over 16.5 Moz (520 t) in 1996 with noticeably strong growth in deliveries from Mexico and, especially, Italy. Imports have also grown from a host of other countries, including China, India and the Dominican Republic.

Output of silverware in the United States was down in 1996. It has also been adversely affected by imports, particularly in certain product categories where US manufacturers are less competitive than lower cost foreign producers.

Middle East

Although remaining the Middle East's largest fabricator of silver, the situation of the industry in **Turkey** was not encouraging last year. The modest rise in fabrication was in large part due to the increased use of silver in 14 karat gold jewelry. In the silver sector itself, the use of silver declined, mainly because of the difficulty in competing both domestically and in world markets with silverware from Italy and (a much less important factor) imports of jewelry from Thailand. Sales to tourists started the season at high levels but then fell back as the more affluent early visitors were replaced by lower-spending, younger tourists later in the year. Over recent years, the formerly important domestic market for heavy silverware in Anatolia has significantly declined.

In **Israel** last year, fabrication demand continued the good growth of recent years, in large part based on exports of silverware, especially to the United States. Jewelry fabrication, also mostly intended for export, has increased following investment in new production facilities.

The rise in demand seen in **Egypt** last year was mainly due to higher sales in both the tourist sector, which is estimated to account for 60% of sales, mostly in the form of silverware and in the local market, where corporate purchases for gifts and incentives rose due to the better performance of the economy. There was an increase in the number of "quality" tourists and even the low-spending, and mostly younger visitors could afford to buy silver. On the local side, demand was split almost evenly between silverware, comprising heavy tea-sets (for which there are only a

Figure 37

US Silver Jewelry Imports

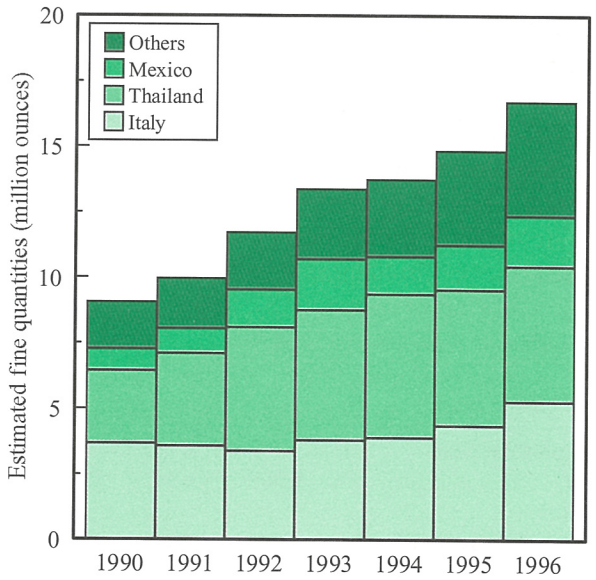


Table 7
Silver Fabrication: Jewelry and Silverware
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Italy	28.23	28.61	33.92	41.48	46.30	50.41	46.17	41.41	38.97	**40.51**
Germany	11.20	12.70	12.70	13.21	14.50	13.50	11.57	11.57	10.29	**9.97**
Spain	-	-	-	11.25	12.96	3.70	3.70	4.02	4.08	**4.50**
Greece	-	-	-	3.22	3.38	3.54	3.70	3.86	3.79	**4.34**
UK & Ireland	2.00	2.00	2.20	2.03	1.90	2.23	2.72	2.87	2.96	**3.34**
Portugal	-	-	-	2.22	2.15	2.22	2.06	1.51	1.74	**1.86**
Poland	-	-	-	1.35	0.96	1.00	1.03	1.13	1.29	**1.61**
France	2.30	2.50	2.70	1.45	1.45	1.41	1.54	1.51	1.48	**1.48**
Sweden	-	-	-	1.16	1.58	1.29	1.16	1.19	1.03	**1.13**
Norway	-	-	-	0.64	1.15	1.15	1.18	1.20	1.20	**1.06**
Denmark	-	-	-	0.87	0.87	0.87	0.87	0.87	0.87	**0.90**
Finland	-	-	-	1.20	1.28	1.04	0.85	0.86	0.73	**0.84**
Cyprus & Malta	-	-	-	0.23	0.23	0.26	0.26	0.35	0.38	**0.42**
Austria	0.20	0.20	0.20	0.48	0.48	0.48	0.48	0.38	0.39	**0.39**
Switzerland	-	-	-	0.42	0.32	0.29	0.32	0.29	0.32	**0.26**
Netherlands	0.50	0.50	0.50	0.35	0.39	0.39	0.32	0.29	0.29	**0.26**
Belgium	-	-	-	0.16	0.16	0.16	0.16	0.16	0.16	**0.16**
Czech & Slovak Republics	-	-	-	0.23	0.23	0.19	0.16	0.16	0.16	**0.16**
Bulgaria	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.06**
Hungary	-	-	-	0.10	0.10	0.10	0.06	0.06	0.06	**0.03**
Romania	-	-	-	0.06	0.06	0.06	0.06	0.06	0.06	**0.03**
Other	8.91	10.80	11.61	0.06	0.06	0.06	0.06	0.06	0.06	**0.06**
Total Europe	53.34	57.33	63.82	82.21	90.57	84.40	78.51	73.88	70.38	**73.37**
North America										
Mexico	2.00	2.10	2.10	8.04	8.68	9.00	9.16	8.68	11.03	**14.21**
United States	8.00	6.40	5.80	9.81	9.71	10.90	11.29	11.99	12.50	**12.44**
Canada	-	-	-	0.99	1.15	0.86	0.88	0.95	1.21	**1.32**
Total North America	10.00	8.49	7.91	18.84	19.55	20.77	21.32	21.64	24.76	**27.97**
Central & South America										
Brazil	-	-	-	1.80	1.70	1.61	1.77	1.83	1.93	**1.77**
Peru	-	-	2.38	1.48	1.13	0.74	0.77	0.84	0.93	**1.03**
Argentina	-	-	-	0.96	0.96	0.96	0.96	0.96	0.90	**0.84**
Colombia	-	-	-	0.77	0.77	0.77	0.77	0.77	0.77	**0.77**
Ecuador	-	-	-	0.32	0.32	0.32	0.48	0.61	0.61	**0.61**
Chile	-	-	-	0.39	0.39	0.39	0.39	0.39	0.39	**0.39**
Dominican Republic	-	-	-	0.03	0.00	0.00	0.03	0.00	0.06	**0.23**
Other	-	-	-	0.26	0.26	0.26	0.26	0.26	0.26	**0.26**
Total Central & South America	-	-	2.38	6.01	5.53	5.05	5.43	5.66	5.85	**5.88**
Middle East										
Turkey	-	-	-	4.12	3.91	4.61	5.00	4.64	4.95	**5.06**
Israel	-	-	-	1.67	1.74	1.83	1.96	2.12	2.31	**2.64**
Egypt	-	-	-	1.51	1.64	2.19	1.80	1.77	2.05	**2.12**
Saudi Arabia	-	-	-	0.21	0.28	0.36	0.37	0.34	0.41	**0.48**
Other	-	-	-	1.59	2.06	2.46	2.16	2.54	2.65	**2.78**
Total Middle East	-	-	-	9.11	9.65	11.43	11.32	11.45	12.36	**13.07**
Indian Sub-Continent										
India	6.30	6.40	10.90	23.03	22.50	36.13	78.70	58.48	63.95	**93.91**
Other	-	-	-	1.45	1.93	2.41	2.89	2.41	3.22	**2.25**
Total Indian Sub-Continent	6.30	6.40	10.90	24.47	24.40	38.55	81.63	60.89	67.16	**96.16**

Table 7
Silver Fabrication: Jewelry and Silverware
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Far East										
Thailand	6.60	7.40	10.10	24.10	20.05	31.57	38.54	28.90	27.40	**27.14**
South Korea	-	-	4.30	4.50	5.30	5.00	7.20	6.40	6.75	**6.59**
Indonesia	-	-	-	1.07	1.13	1.22	1.45	2.30	2.74	**2.95**
Japan	2.20	3.00	3.50	3.80	3.50	2.80	2.49	2.22	2.15	**2.09**
Myanmar, Laos & Cambodia	-	-	-	1.00	1.00	1.00	1.00	1.00	1.05	**1.09**
Hong Kong	0.90	0.80	0.90	0.90	0.96	0.96	0.96	0.96	0.90	**0.93**
Vietnam	-	-	-	0.30	0.30	0.30	0.40	0.50	0.64	**0.68**
Taiwan	-	-	-	0.40	0.40	0.50	0.48	0.48	0.48	**0.50**
Malaysia	-	-	-	0.30	0.35	0.39	0.45	0.35	0.39	**0.40**
Philippines	-	-	-	0.15	0.15	0.15	0.16	0.17	0.19	**0.21**
Singapore	-	-	-	0.20	0.20	0.10	0.10	0.03	0.03	**0.03**
Other	9.29	9.61	14.31	-	-	-	-	-	-	**-**
Total Far East	18.97	20.80	33.12	36.68	33.34	43.98	53.21	43.34	42.73	**42.60**
Africa										
Morocco	-	-	-	0.38	0.42	0.42	0.39	0.39	0.39	**0.35**
Tunisia	-	-	-	0.16	0.16	0.16	0.20	0.22	0.23	**0.23**
Algeria	-	-	-	0.32	0.29	0.26	0.23	0.23	0.23	**0.21**
Libya	-	-	-	0.28	0.29	0.26	0.23	0.21	0.20	**0.13**
South Africa	-	-	-	0.05	0.04	0.04	0.03	0.06	0.12	**0.10**
Other	-	-	-	0.16	0.16	0.16	0.16	0.16	0.16	**0.17**
Total Africa	-	-	-	1.35	1.35	1.29	1.22	1.29	1.31	**1.18**
Australia	-	-	-	0.54	0.54	0.54	0.57	0.60	0.60	**0.51**
Western World Total	88.61	93.01	118.12	179.23	184.94	206.01	253.23	218.76	225.15	**260.76**
Other Countries	-	-	-	4.60	4.24	3.38	2.64	2.25	1.96	**2.09**
World Total	88.61	93.01	118.12	183.82	189.18	209.38	255.86	221.01	227.11	**262.85**

small number of buyers) and a large number of smaller pieces of gift items and jewelry. The past year has also seen an increase in exports of high quality silverware, though from a very small base.

In **Saudi Arabia,** there has been a steady increase in local silver demand in the form of jewelry in recent years with one of the main manufacturers shifting a large part of its production capacity from gold to silver. The sale of gold-plated, 925 fineness, silver jewelry is becoming something of a Saudi speciality, illustrated by the rapid growth of souks in Jeddah and Riyadh focusing entirely on silver, both plain and gold-plated. In addition, outlets selling plain silver have started to appear in the main jewelry souks, though these areas remain overwhelmingly concentrated on gold. Export sales to the US and other markets are also being developed. The rise in silver sales appears to be based in part on purchases from young people and poorer sections of society. Thus schoolgirls buy plain silver because they are not allowed to wear gold in their classrooms while on the contrary, poorer expatriates, who cannot afford gold jewelry, buy gold-plated items.

Elsewhere in the Gulf area, the market for silver jewelry continues to rise, in part based on local manufacture, especially in Sharjah and Dubai in the **United Arab Emirates**. Examples of the growth in retail demand can be seen in the New Gold Souk buildings in Bahrain, Sharjah and Dubai: in the former, there are more silver than gold outlets, while in the latter, the ground floor now contains almost equal numbers of gold and silver shops. Sales to

locals have risen, firstly because many women like to buy silver jewelry "for fun" and secondly, because some men have been buying items such as heavy bracelets, with the wearing of such items being permitted, despite Islamic strictures on men wearing jewelry, as long as the wearer believes that they are beneficial to their health.

Indian Sub-Continent

There is no doubt that the surge in demand from **India** during the second half of 1996 represented the most dramatic increase throughout the world's silver market last year. The increase was the combination of a number of factors. First and foremost was the good harvest, particularly in the northern tribal belt, where heavyweight silver jewelry remains the favored vehicle for farmers' investments.

The rising level of consumer demand for silverware (due to growing prosperity in the cities) also helped, although this was affected in the second half of the year by the "money crunch" in the form of high interest rates engineered to keep inflation in check. This also had an impact on industrial consumption of silver, which remained rather subdued last year.

Notably, the rise in demand last year was not a simple, price-related phenomenon. In fact, the average price rose by 6% compared with the 1995 level. There is no doubt, however, that the falling price of silver *during the course of* the year contributed to the accelerating pace of purchases in the second half.

In the larger cities, it appeared that jewelry and silverware demand was 10-20% down in the second half of 1995, and there was a similarly poor start to 1996, with demand affected by the sharp increase in the price in the first weeks of the year and by uncertainty surrounding the general election in the following months. But the situation began to change with the monsoon which provided good, but not excessive, rains, above all in the important northern tribal belt which extends from the Sind province of south-east Pakistan, through Rajastan and into Madyha Pradesh. More than anything, it was the prosperity in these rural areas following a good harvest last summer which pushed Indian demand to record levels. Demand in parts of the south of India suffered from a less benign pattern of rainfall, with some regions receiving insufficient (eg, Kerala in the south west) while others (in particular Andhra Pradesh) suffered crop-devastating deluges. For silver in 1996, it was thus the overlapping of the most favorable rainfall pattern with that of heavy silver consumption which produced the remarkable rise in demand.

There has been an increasing demand in the past two years for some form of improved quality control or standardization of fineness for domestic silverware. The disappearance of official controls with the ending of silver control in 1990 resulted in a tendency for the silver content of products to decline, particularly since, unlike gold, there is no generally accepted fineness, such as sterling silver, in India. Although most reputable retailers still sell silverware with a purity in the range 85-95%, many cases of under-title products are being discovered, usually at the stage of these being recycled.

Far East

In **Thailand** the overriding opinion amongst fabricators in 1995 was that the silver market was down on 1994, due in part to increased competition from lower cost manufacturers as well as to a decline in demand in the major export markets of the United States and Europe. No such consensus existed for 1996, the lack of a clear view being a good indicator that the various sectors of the Thai market experienced quite different levels of demand in 1996.

To understand what happened, it is necessary to analyze the market on the basis of its three distinct groups of fabricators. The first of these is made up of mainstream fabricators producing bulk quantities of average quality jewelry mainly for the European and North American markets. The second consists of a group of medium volume fabricators who do most of their work (usually over 70%) in-house, and who produce higher quality jewelry, aimed mainly at the more demanding European market. The third group consists of small workshops who do sub-contracting work as well as some unofficial production themselves, primarily for the hand-carried market.

For the bulk producers, production was at best flat year-on-year, and in the case of markets such as the United States, exports at the lower end fell as competition from within the US market increased. By contrast, middle sized fabricators found that demand for higher quality jewelry, especially in the European markets, increased in 1996. The sub-contractors servicing these two groups had an especially difficult year for a number of reasons.

India

India has become easily the world's largest importer of silver because, for many of its population, the metal plays a central role in the social, cultural and economic pattern of life.

The use of silver as a portable store of wealth, and an outward expression of it, goes back to Roman times, when India imported precious metals from Europe in exchange for commodities such as spices. But history shows that India will not be a buyer of silver at any price, particularly if wealth levels are low. For instance, in the period 1974-85, with silver above $8 per ounce, India exported 311 Moz (almost 10,000 t) as holders took advantage of high prices and the stock of silver built up by previous generations. But the flow reversed in the mid-1980s and then the 1990s saw an unprecedented surge in imports. This was due to several factors: rising prosperity after 1990 (when the Congress government initiated its economic reforms); a series of good harvests from 1987 onwards; and finally, the fall in world and local silver prices. Since the liberalization of imports began in 1993, demand has been galvanized by the move from unofficial supplies (priced at premia of up to 100% above world prices) to legal imports at a premium of "only" around 20%. Since 1990, total imports have amounted to 520 Moz (16,200 t). Until 1993, Dubai was the principal conduit for the supply to India, with silver being transported across the Arabian Sea to Bombay, the long-established capital of India's precious metals business. Today by contrast, airfreight has replaced the dhows which used to ply this trade, allowing two inland centers to rival and even surpass Bombay, namely Delhi and Ahmadabad. This is partly thanks to their proximity to the "Tribal Belt ", where much of the country's demand is concentrated, and partly because of the tax burden under which the trade in Bombay has suffered in recent years.

The agricultural sector remains the mainspring of Indian silver demand. Increased government subsidies for fertilizers, use of better-yielding crop varieties and the digging of wells for irrigation have helped to keep farmers' income rising, with some of the resulting wealth inevitably being converted into silver. In rural areas, banks are still not trusted or even accessible but every village has one or more silversmiths who provide the market with liquidity by both buying and selling silver in the form of "ornaments".

Demand in India is by no means homogeneous. Thus, industrial fabrication is limited to Bombay, Delhi, Udaipur and Calcutta, whereas in the Tribal Belt, the bulk of consumption is in the form of simple heavyweight jewellery, usually of high silver content and involving very low making charges - investment jewelry pure and simple. The leg-rings or kadia worn by women in these areas represent their wealth, perhaps their only wealth. In the other main area of demand, the South East, jewelry is lighter in style but there is a greater use of silver utensils - both utilitarian, such as vases, bowls, plates and goblets; and decorative, such as oil lamps and a range of religious artifacts. In fact, religion has had a major role in shaping Indian demand. Almost no Hindu girl would wear a payal or ankle chain in anything but silver, while Moslems happily wear these made from gold. Furthermore, the Koran forbids the use of precious metals for serving food and also the wearing of jewelry by men. Hindu communities, by contrast, make great show of the use of silver utensils and, especially in the Tribal Belt, men are likely to wear as much silver as women.

There are also several applications which are uniquely Indian: eg, the foil manufactured in Delhi used for embellishing confectionery and "improving" chewing tobacco; the glittering gold-plated silver thread known as jari, produced almost exclusively in Surat, used for weaving into "special occasion" sarees; and finally, the enamelware produced in Nathdwara, which requires the use of pure silver to ensure the translucence for which it is famed.

Figure 38

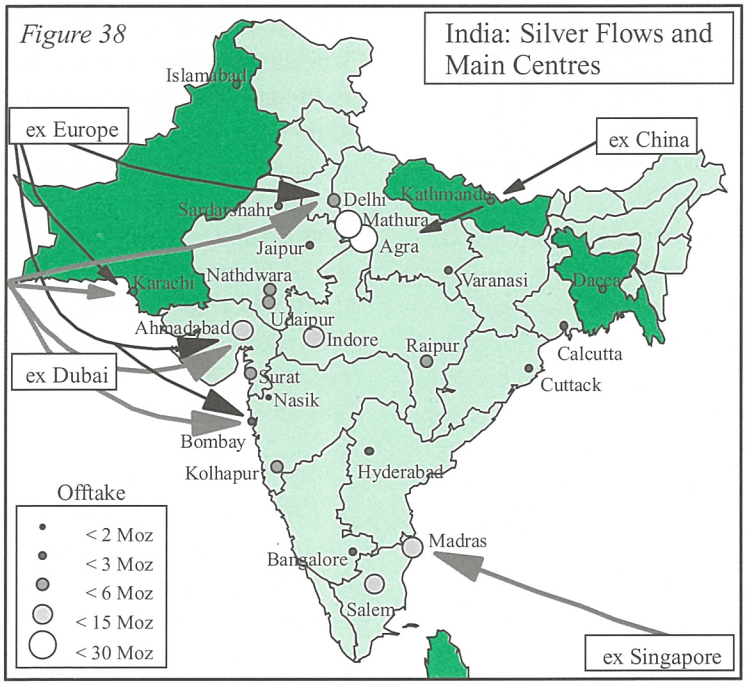
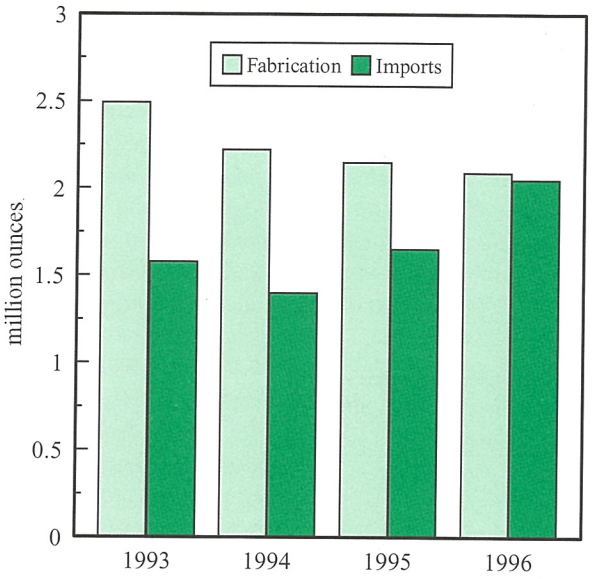


Figure 39
Japanese Jewelry Market



Firstly, the bulk fabricators sub-contracted less as they saw their own orders fall and secondly, middle sized fabricators reduced the amount of their sub-contracting significantly. Underlying this change has been the fact that most sub-contractors are not able to produce high enough quality work (be this in casting, finishing or stamping) for the demanding European market. As a consequence, much of the work that was at one time going to them has now been taken back in-house.

Turning to the question of overall silver offtake, at least some of the increased demand from the European market reported by the second tier fabricators was partly price-related and partly quantity-related, ie, the baht unit values of their exports increased as well as their physical volumes. Consequently, the impact of this increased demand on physical offtake was limited and did not in fact compensate for falling offtake from other fabricators, resulting in total demand for silver falling by close to 1% or 0.26 Moz (8 t).

Total **Korean** jewelry and silverware demand fell by 2.4% year-on-year, but this obscures the fact that jewelry demand was flat while silverware fell by 4%.

The silverware market suffered from further market stagnation in the face of a difficult year economically as well as from a clampdown on corruption. Several bankruptcies during the year hinted at the difficulties that fabricators were facing, and some suppliers of silver withdrew in 1996 due to the credit risks involved.

Indonesian fabrication demand, which is still concentrated in Bali, grew by close to 7% in 1996 to 2.9 Moz (90 t). One of the primary reasons for this was an increase in exports, with Indonesia having continued to encroach on Thailand's export markets in 1996 (this having become more pronounced over the past few years as Thai costs have increased). Exports to the United States have increased by over 200% since 1990, and there can be little doubt that at least some of this growth was at the expense of Thai fabrication.

Over and above the export market, Indonesian tourism grew by close to 5% in 1996, boosting offtake in the traditional tourist areas such as Bali and Lombok. Although most of the jewelry sold in Lombok is fabricated in Bali, there have been some subtle changes in recent years as indigenous fabrication facilities have sprung up there to service the tourists who are increasingly by-passing Bali.

Silver offtake for jewelry in **Japan** fell by 3% to 2 Moz (62 t). There was a parallel drop in hallmarking, the Mint reporting a 17% decline in the number of items received in 1996. Lower local silver jewelry fabrication was compensated by a rise in imports, and Figure 39 shows the contrasting trends between imports and fabrication.

Coins and Medals

After the near halving of coin fabrication in 1995, last year proved to be no more encouraging. Curiously enough, several of the major mints increased their production in 1996 but a sharp fall in US minting and declines in many of the other smaller countries left total silver use at 20.8 Moz (647 t) a fall of 17% year-on-year. Apart from purely local factors, the decline in fabrication last year owed much to the lack of investment demand for silver. This was exacerbated by a general tendency for, particularly younger people, to show less interest in bullion and commemorative coins. However, despite these negative factors continuing to exert an influence on the level of demand, world coin fabrication is expected to rise in 1997 due to the planned Japanese coin issue for the 1998 Winter Olympics which is expected to consume over 6.0 Moz (187 t).

With little change in either Mexico or Canada in 1996, coin fabrication in North America was dominated by developments in the **United States**, where production fell by almost 25% after four years when

Table 8
Silver Fabrication: Coins and Medals
(including the use of scrap)
Million ounces

	1987	1988	1989	1990	1991	1992	1993	1994	1995	**1996**
Europe										
Germany	3.20	3.20	3.20	2.44	5.51	5.38	2.62	6.96	2.27	**3.89**
Spain	-	-	-	0.40	1.13	0.45	0.25	4.76	3.99	**2.80**
Portugal	-	-	-	0.11	0.01	0.12	0.25	0.38	0.54	**0.79**
UK & Ireland	0.54	0.59	0.59	0.42	0.42	0.50	0.68	0.78	0.74	**0.63**
Austria	0.60	0.60	0.40	0.46	0.62	0.52	0.45	0.47	0.55	**0.43**
Switzerland	-	-	-	0.19	1.35	0.19	0.15	0.14	0.14	**0.30**
France	2.20	2.20	2.20	2.09	2.36	2.09	2.09	1.02	1.18	**0.29**
Italy	0.20	0.24	0.29	0.23	0.34	0.22	0.21	0.24	0.26	**0.22**
Netherlands	1.20	-	-	0.67	0.06	0.00	0.03	0.58	1.13	**0.16**
Finland	-	-	-	0.16	0.17	0.21	0.02	0.09	0.09	**0.09**
Poland	-	-	-	0.26	0.22	0.10	0.13	0.18	0.11	**0.05**
Bulgaria	-	-	-	-	-	0.07	0.16	0.02	0.06	**0.05**
Hungary	-	-	-	0.06	0.06	0.10	0.18	0.00	0.05	**0.05**
Sweden	-	-	-	0.04	0.04	0.04	0.08	0.00	0.04	**0.04**
Belgium	-	-	-	0.45	0.35	0.00	0.05	0.00	0.16	**0.00**
Norway	-	-	-	0.00	0.47	0.94	0.32	0.03	0.03	**0.00**
Other	-	-	-	0.21	0.12	0.19	0.04	0.01	0.39	**0.03**
Total Europe	7.94	6.83	6.67	8.20	13.21	11.13	7.72	15.66	11.71	**9.81**
North America										
United States	16.40	7.90	6.80	9.41	10.76	8.44	8.22	8.71	8.05	**6.11**
Canada	1.20	1.10	3.30	1.93	0.88	0.76	1.22	1.48	0.69	**0.71**
Mexico	2.30	2.00	1.70	1.23	1.55	8.68	17.08	13.02	0.57	**0.51**
Total North America	19.90	11.00	11.80	12.57	13.20	17.88	26.52	23.22	9.31	**7.32**
Central & South America										
Peru	-	-	-	-	-	0.11	0.00	0.00	0.00	**0.01**
Brazil	-	-	-	0.00	0.00	0.02	0.00	0.01	0.01	**0.00**
Colombia	-	-	-	0.00	0.00	0.02	0.00	0.00	0.00	**0.00**
Other	-	-	-	0.10	0.07	0.04	0.05	0.00	0.03	**0.03**
Total Central & S. America	-	-	-	0.10	0.07	0.19	0.05	0.01	0.04	**0.04**
Middle East	-	-	-	0.04	0.03	0.08	0.01	0.68	0.05	**0.08**
Far East										
Thailand	-	-	-	0.02	0.04	0.07	0.20	0.20	0.33	**0.47**
Singapore	-	-	-	0.09	0.05	0.89	0.13	0.14	0.10	**0.08**
Japan	-	-	-	8.92	0.00	0.00	2.41	0.00	0.00	**0.00**
Other	-	-	-	1.02	0.00	0.00	0.00	0.00	0.00	**0.00**
Total Far East	-	-	-	10.04	0.09	0.96	2.74	0.34	0.43	**0.56**
South Africa	-	-	-	0.01	0.01	0.03	0.01	0.01	0.01	**0.02**
Australia	-	-	-	0.41	0.52	2.13	2.27	1.60	0.82	**0.93**
Western World Total	27.84	17.82	18.47	31.37	27.12	32.39	39.30	41.51	22.40	**18.76**
Other Countries										
China	-	-	-	0.40	1.37	0.40	0.40	0.67	0.76	**1.38**
Soviet Union/CIS	-	-	-	-	-	-	0.55	0.74	1.94	**0.61**
North Korea	-	-	-	-	0.05	0.00	0.22	0.00	0.00	**0.00**
Total Other Countries	-	-	-	0.40	1.42	0.40	1.17	1.42	2.71	**1.99**
World Total	27.84	17.82	18.47	31.77	28.54	32.79	40.47	42.93	25.11	**20.75**

annual output had been maintained at just over 8 Moz (250 t). Last year's total offtake of 6.1 Moz (190 t) was the lowest level recorded since 1985 but the United States remained easily the world's largest producer of silver coins, its output nearly double that of Germany, the second placed country. Production of the Eagle bullion coin was down 25% due to diminished local interest. The amount of silver used in commemorative coins also fell, largely as a result of disappointing sales of the special Olympic issue.

Mexican coin production was essentially unchanged at 0.51 Moz (16 t) in 1996. Fabrication has plummeted since the 1992-94 period when nearly 30 Moz (930 t) of legal tender silver coins were minted. The devaluation of the Mexican peso has called into question the continued existence of these coins whether in circulation or in central bank stocks.

In **Germany**, there were two main issues of silver coins last year, each consisting of almost 6.5 million pieces, which together used 3.89 Moz (120 t) of silver. This level of offtake was significantly higher than in 1995 when only one coin was produced, although (somewhat confusingly) in 1994 a third issue had been minted and dated "1995".

The increase in German coin fabrication was offset by an equivalent decline in **Spain** where production of the Pta2000 legal tender coin fell by 36% to 2.8 Moz (87 t). Since its launch in 1994, over 10 Moz (310 t) of silver have been used in these coins with the result that the market in Spain has, to some extent, become saturated. Consequently, mintage was reduced last year although production is expected to rise in 1997.

In **Portugal**, silver used in the production of commemorative coins, including the "Golden Era of Portuguese Discoveries" series, rose to 0.79 Moz (25 tonnes) in 1996.

Elsewhere, **China** registered an 80% increase in coin mintage last year. Fabrication, which includes the popular 1-ounce and 12-ounce Panda coins, rose to 1.38 Moz (43 tonnes). Most of the increase was attributed to higher sales in the domestic market, a trend which is expected to continue this year.

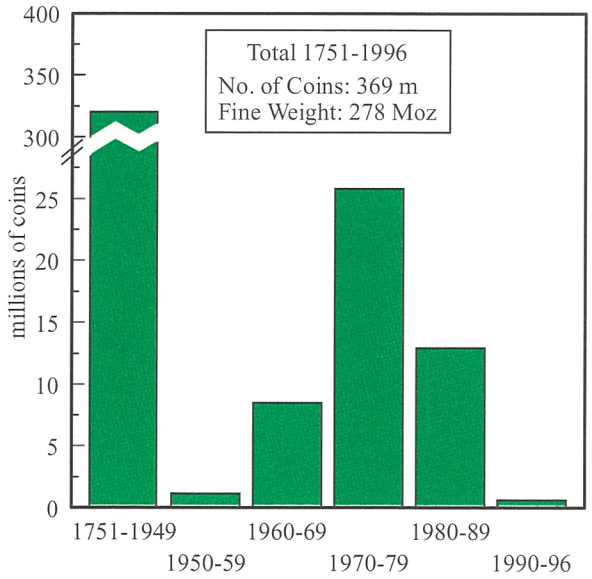
Maria Theresia Taler

The Maria Theresia Taler is a coin with a rich heritage, dating back over two hundred years. The first Talers bearing the effigy of the Austrian Empress Maria Theresia were first minted in 1741 but the coin was only standardized in its present form following her death in 1780. Weighing 28g (gross weight) with a fineness of 833/1000, the Taler's obverse shows a portrait of the Empress while the reverse depicts the double headed eagle with the imperial crown and a four times divided escutcheon bearing the coat of arms of Hungary, Bohemia, Burgundy and Burgau.

The coin was so successful that it was eventually minted across the Austro-Hungarian empire, eg, in the cities of Milan, Venice and Prague. During the 20th century, besides the continued production of the coin by the Austrian Mint, a huge quantity of Talers were minted by other countries including Italy, the United Kingdom, France, Belgium and India. As Figure 40 shows, since 1751, around 369 million Talers have been minted (excluding the post-war non-Austrian coins). The historical success of the Taler has been due to its widespread acceptance as a medium of exchange, something which continues up until this day in the Yemen and parts of Africa. However, even in these parts the coin has become increasingly "de-monetized" and a large number are finding their way back into the silver market in the form of scrap, especially in the Middle East.

Figure 40

Fabrication of Maria Theresia Taler Coins



7. Investment

Net private disinvestment of 149 Moz (4,620 t) last year accounted for more than 18% of total silver supply. It also brought the accumulated sales for the 1990-96 period to 731 Moz (22,700 t). Although the 1996 figure was exceeded by the 153 Moz (4,760 t) of net sales in 1994 it was well up on 1995's 101 Moz (3,140 t). In 1996, disinvestment came from a variety of sources including: the liquidation of long positions on the world's futures exchanges and in the over-the-counter market, direct physical selling of bullion bars and coins by the public and unrecorded sales out of other inventories.

Comex

It is significant that silver futures trading started on Comex in 1963, with the addition of a gold contract only eleven years later in 1974. Given the tremendous historical attachment to silver in the United States, the relative narrowness of the market (at least compared to gold) and the greater volatility of the silver price, it is no surprise that Comex is considered to exert more influence on the silver than on the gold market. Thus the fact that the total number of futures contracts traded on Comex dropped last year to its lowest level since 1992 (see the table on page 60) sums up the recent decline in speculative interest in silver which had, by contrast, been such a feature on the exchange during the 1994-95 period.

At 19,328 contracts, average daily futures turnover in 1996 was down 6.8% year-on-year. Figure 41 shows that activity last year was at its height in February, April and June: in all three months, average daily turnover exceeded 26,000 contracts. However, in general, there were few very active trading periods last year, as speculative interest tended to desert the market, especially in the second half. One measure of this was that the number of days on which turnover exceeded twice the daily average (taken as 20,000 contracts) came to 15 in 1996 against 20 in 1995.

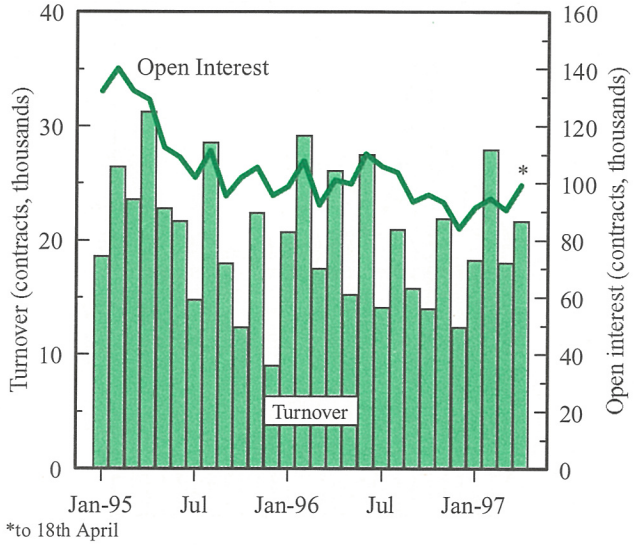
The trend in open interest last year was also indicative of declining speculative activity. During the first half of 1996, there were signs that the previous year's fall in open interest might have been reversed with it rising to a peak of 114,890 on 19th June. But thereafter, open interest began a renewed decline reaching its low point for the year of 81,946 on 26th December.

The sharp fluctuations of investor interest in silver is even more apparent from an analysis of the weekly change in non-commercial net positions on Comex from January, 1995 to 11th April, 1997 (see Figure 42). Non-commercial net open interest is a reasonably good proxy for investor/speculator positions on the exchange. The data clearly show that very large open long positions were held on Comex by investors/speculators throughout 1995 and the first four months of 1996. From April to June last year these positions were liquidated, causing the Comex settlement price to fall sharply. The subsequent

Figure 41

Comex Silver Futures

Average Daily Turnover and Open Interest

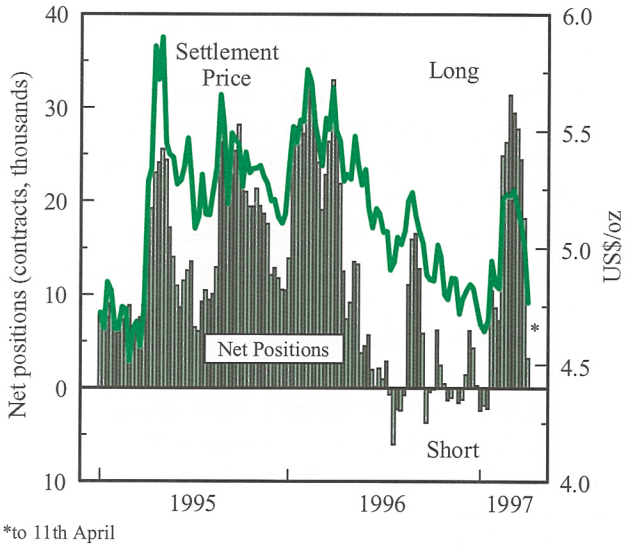


*to 18th April

Figure 42

Comex: Non-commercial Net Open Interest

Weekly Net Positions and Settlement Price



*to 11th April

Futures Turnover

	Number of Contracts					Total Silver Equivalent (million ounces)		
Contract size	Comex 5000 oz	Tocom*	CBOT 1000 oz	CBOT 5000 oz	MidAmerica 1000 oz	Comex + Tocom	Others	Total
1986	3,849,687	706,326	511,239	0	9,981	19,476	521	19,997
1987	5,055,652	1,471,815	509,965	12,092	9,578	25,751	580	26,331
1988	4,664,655	2,302,428	481,566	4,165	12,063	24,064	514	24,578
1989	4,376,611	2,687,686	254,713	2,397	13,562	22,325	280	22,606
1990	3,913,609	504,332	178,801	2,256	11,005	20,054	201	20,256
1991	4,154,704	1,057,598	114,268	640	13,106	21,794	131	21,924
1992	3,016,339	231,864	52,658	472	8,888	15,305	64	15,369
1993	4,855,924	661,452	89,141	1,022	10,986	24,918	105	25,023
1994	5,994,345	1,042,185	88,663	10,278	17,170	30,977	157	31,134
1995	5,183,236	1,440,297	76,667	8,617	13,320	27,305	133	27,438
1996	4,870,808	752,995	41,575	110	8,398	25,080	51	25,131

*10-kilogram contracts up to June 1989, thereafter 30-kilogram contracts

declining trend in the price was only briefly interrupted by the rally in late August and early September, when new long positions were established. But the spike in the price was short-lived as was the renewed speculative interest on the long side. Yet it is nevertheless interesting to note that the data on non-commercial net positions points to there having been very little short selling of silver last year via the Comex, quite unlike what occurred in the gold market.

In early 1997, with silver looking cheap at around the $4.75 level, speculators re-entered the market on the long side before liquidating most of these positions by the middle of April.

Comex options turnover in 1996 showed much the same pattern as the underlying futures. However, at 17%, the year-on-year decline in activity was far sharper. The explanation for this is that from March to May 1995, options turnover had been at extraordinary levels due to the tremendous speculative interest in silver which had emerged both prior to and after one New York trader exercised 5,000 out-of-the-money call options in mid-April.

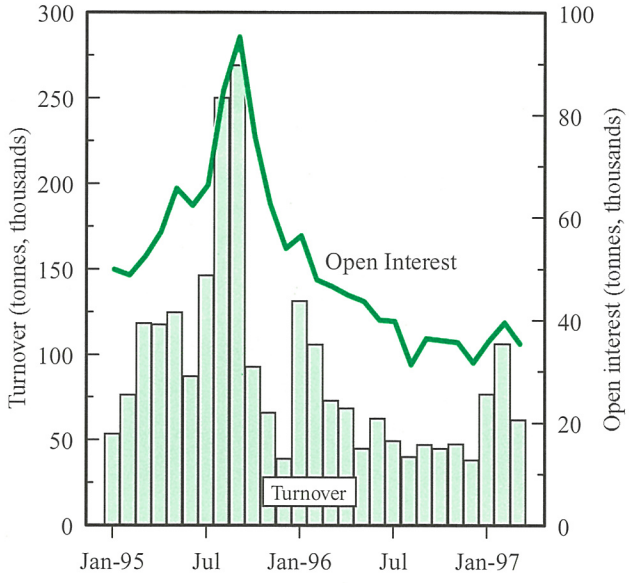
During the course of 1996, Comex stocks fell by 13.3 Moz (414 t). This figure excludes movements in Wilmington Trust's Comex eligible and registered stocks. Wilmington Trust, which has substantial storage facilities in Delaware, formally became a Comex depository on 2nd January 1997. At the beginning of 1997, including Wilmington Trust's reported stocks of 58.2 Moz (1,810 t), Comex stocks totalled 204.1 Moz (6,345 t).

Tocom

Activity on the Tocom was subdued throughout 1996, especially compared to the growth in turnover and open interest in 1995 (see Figure 43). To understand why, it is important to recognize that trading activity on the Tocom is driven as much by anticipated changes in the yen-dollar exchange rate as it is by expected movements in the silver price itself. Thus the driving force behind the build-up in open interest and the rise in turnover in the first half of 1995 was the market's expectation of a yen depreciation. When, in August 1995, the exchange rate fell through

Figure 43

Tocom Silver Futures



the 90 yen/$ level, speculators liquidated their by now profitable long positions, in the process forcing down open interest on Tocom. Open interest briefly rose again in early 1996 as the silver price rallied. But after the price peaked in February, the widely held view that the yen was unlikely to depreciate much further against the dollar in 1996 resulted in a substantial fall in turnover and open interest.

OTC Market

The worlds' futures exchanges, especially Comex, provide an important marketplace for speculators and investors alike. However, options and forwards turnover in the over-the-counter (OTC) market is considerably greater. Yet the difference in size between the OTC and futures markets is probably smaller in the case of silver than in gold. Also, it seems likely that in silver, a greater proportion of OTC market activity would be related to trades on the futures exchanges and vice versa. Finally, in terms of its share of investor activity, the relative size of the OTC market may be smaller in silver because fewer funds speculate in silver than in gold.

OTC market activity last year followed the same pattern as that which was visible on the Comex, namely, the initial maintenance of previously established long positions followed by their liquidation once it became clear that there was little prospect of a bull market for silver developing in the short term. These liquidations were dominated by relatively few big sell orders which, when they were executed, triggered further stop-loss sales from other holders of long positions. For example, in July a very large position was sold. This bullion seems to have consisted of a substantial part of the silver which had been taken out of Comex depositories in 1995 and transferred to Europe later the same year.

Physical Investment

Last year's liquidation of long positions which had been held on Comex and through the OTC market clearly had a physical impact on the silver market, even if this was indirectly achieved. But, in addition, there were other substantial net sales by numerous small investors, especially in the United States. For the most part, this "retail" disinvestment was in the form of hundred-ounce bars, kilobars and coins, generally coming out of long-held stocks. Such disinvestment was particularly heavy in the first few months of the year due to the higher silver price. Over the rest of 1996, sales continued, albeit at a much reduced rate. In total last year, this form of physical disinvestment probably fell short of 1995's level when, for example, small investors in North America disposed of an estimated 30 Moz (930 t).

Finally in 1996, besides the disinvestment referred to above, an additional, smaller quantity appears to have come into the market as a result of the sale and lease-back of inventory by one large North American company.

Options Turnover

	Number of Contracts					Total Silver Equivalent (million ounces)		
Contract size	Comex 5000 oz	Comex 5 day 5000 oz	CBOT 1000 oz	Toronto 100 oz	European Options Exchange*	Comex	Others	Total
1986	579,427	0	3,081	23,132	9,038	2,897	8	2,905
1987	918,064	0	10,009	34,664	31,750	4,590	21	4,612
1988	872,106	0	8,303	7,188	10,290	4,361	12	4,372
1989	752,645	0	8,346	5,325	4,511	3,763	10	3,773
1990	747,499	0	1,398	965	918	3,737	2	3,740
1991	1,019,093	798	2,804	1,276	0	5,099	3	5,102
1992	676,543	9,606	20,105	331	0	3,431	20	3,451
1993	1,094,702	1,262	12,423	4,583	0	5,480	13	5,493
1994	1,316,650	368	5,952	8,300	5,100	6,585	12	6,597
1995	1,146,513	221	1,476	656	5,704	5,734	7	5,741
1996	949,239	96	515	0	7,799	4,747	8	4,755

*250-ounce contracts up to June 1990, thereafter 1000-ounce contracts

Appendix I
Silver Prices in 1996 in US dollars per ounce

1. London Prices

	London Silver Market - Spot			London Silver Market - 3-Months		
	High	Low	Average	High	Low	Average
January	5.6160	5.1650	5.4798	5.6770	5.2250	5.5443
February	5.8275	5.4625	5.6500	5.8925	5.5295	5.7162
March	5.6875	5.3500	5.5299	5.7380	5.4155	5.5906
April	5.5450	5.2540	5.4105	5.6065	5.3100	5.4718
May	5.4825	5.2850	5.3659	5.5485	5.3430	5.4290
June	5.3835	4.9775	5.1613	5.4490	5.0355	5.2226
July	5.1515	4.9725	5.0640	5.2175	5.0340	5.1271
August	5.2550	5.0400	5.1297	5.3215	5.1040	5.1949
September	5.1975	4.8475	5.0365	5.2625	4.9090	5.0996
October	5.0400	4.8250	4.9276	5.1045	4.8840	4.9903
November	4.9300	4.7275	4.8315	4.9910	4.7855	4.8901
December	4.8875	4.7100	4.8225	4.9470	4.7665	4.8806
Average	5.8275	4.7100	5.1995	5.8925	4.7665	5.2618

	London Silver Market - 6-Months			London Silver Market - 12-Months		
	High	Low	Average	High	Low	Average
January	5.7350	5.2845	5.6051	5.8585	5.4000	5.7261
February	5.9525	5.5895	5.7762	6.0775	5.7020	5.8946
March	5.8045	5.4760	5.6521	5.9255	5.5940	5.7770
April	5.6690	5.3690	5.5355	5.8035	5.4935	5.6651
May	5.6155	5.4080	5.4943	5.7510	5.5395	5.6273
June	5.5135	5.0965	5.2877	5.6510	5.2300	5.4236
July	5.2865	5.0985	5.1927	5.4310	5.2370	5.3320
August	5.3885	5.1675	5.2604	5.5290	5.3030	5.3979
September	5.3290	4.9675	5.1632	5.4690	5.0955	5.2991
October	5.1675	4.9440	5.0514	5.2980	5.0670	5.1800
November	5.0515	4.8435	4.9481	5.1775	4.9625	5.0719
December	5.0075	4.8255	4.9408	5.1330	4.9440	5.0621
Average	5.9525	4.8255	5.3244	6.0775	4.9440	5.4535

2. US Prices

	Comex Spot Settlement			Handy & Harman		
	High	Low	Average	High	Low	Average
January	5.5780	5.3380	5.4777	5.5800	5.2350	5.4709
February	5.8190	5.4520	5.6312	5.7900	5.4250	5.6250
March	5.6820	5.3480	5.5253	5.7000	5.3600	5.5198
April	5.5500	5.2120	5.3861	5.5700	5.2450	5.4014
May	5.4730	5.2420	5.3523	5.4750	5.2600	5.3634
June	5.3580	4.9790	5.1225	5.3650	5.0250	5.1358
July	5.1240	4.9030	5.0235	5.0950	4.9400	5.0304
August	5.2500	5.0130	5.1167	5.2200	5.0000	5.1005
September	5.1530	4.8090	4.9793	5.1750	4.8550	5.0098
October	5.0220	4.7880	4.9023	5.0500	4.8200	4.9280
November	4.9400	4.6990	4.8207	4.9350	4.7100	4.8276
December	4.8790	4.6760	4.7988	4.8700	4.6700	4.7903
Average	5.8190	4.6760	5.1783	5.7900	4.6700	5.1885

Appendix II
Silver Prices, 1976-96, in US dollars per ounce

1. London Prices

	London Silver Market - Spot			London Silver Market Averages		
	High	Low	Average	3-Month	6-Month	12-Month
1976	5.0840	3.8300	4.3532	4.4065	4.4720	4.6178
1977	4.9750	4.3130	4.6333	4.6956	4.7764	4.9355
1978	6.2640	4.8180	5.4218	5.5190	5.6269	5.8559
1979	32.2000	5.9350	11.0679	11.3306	11.5396	11.9393
1980	49.4500	10.8900	20.9837	21.4906	21.9717	22.8673
1981	16.3030	8.0300	10.4869	10.9114	11.3460	12.1741
1982	11.1100	4.9010	7.9219	8.1590	8.4065	8.9233
1983	14.6680	8.3700	11.4301	11.6935	11.9697	12.5365
1984	10.1100	6.2200	8.1446	8.3564	8.5877	9.0810
1985	6.7500	5.4500	6.1319	6.2519	6.3815	6.6681
1986	6.3100	4.8530	5.4645	5.5515	5.6417	5.8253
1987	10.9250	5.3600	7.0156	7.1405	7.2674	7.5325
1988	7.8215	6.0500	6.5324	6.6611	6.7952	7.0762
1989	6.2100	5.0450	5.4999	5.6273	5.7554	6.0152
1990	5.3560	3.9500	4.8316	4.9307	5.0308	5.2493
1991	4.5710	3.5475	4.0566	4.1115	4.1719	4.3023
1992	4.3350	3.6475	3.9464	3.9821	4.0200	4.1070
1993	5.4200	3.5600	4.3130	4.3449	4.3805	4.4593
1994	5.7475	4.6400	5.2851	5.3435	5.4077	5.5607
1995	6.0375	4.4160	5.1971	5.2574	5.3241	5.4688
1996	5.8275	4.7100	5.1995	5.2618	5.3244	5.4535

2. US Prices

	Comex Spot Settlement			Handy & Harman		
	High	Low	Average	High	Low	Average
1976	5.1370	3.8340	4.3506	5.1000	3.8150	4.3535
1977	4.9760	4.2850	4.6235	4.9600	4.3000	4.6230
1978	6.3170	4.8110	5.4068	6.2960	4.8290	5.4009
1979	34.4500	5.9230	11.1135	28.0000	5.9610	11.0938
1980	48.7000	10.8000	20.6568	48.0000	10.8000	20.6316
1981	16.2900	7.9850	10.5014	16.4500	7.9500	10.5116
1982	11.2100	4.9800	7.9311	11.2100	4.8850	7.9473
1983	14.7150	8.4000	11.4340	14.7450	8.3400	11.4413
1984	10.0640	6.2950	8.1585	10.0350	6.2600	8.1407
1985	6.8350	5.5250	6.1459	6.7350	5.5700	6.1454
1986	6.2850	4.8540	5.4653	6.1950	4.8700	5.4679
1987	9.6600	5.3790	7.0198	10.2000	5.3600	7.0192
1988	7.8270	5.9980	6.5335	7.9900	6.0100	6.5369
1989	6.1940	5.0300	5.4931	6.1700	5.0150	5.4940
1990	5.3320	3.9370	4.8174	5.3900	3.9300	4.8182
1991	4.5450	3.5080	4.0355	4.5300	3.5800	4.0407
1992	4.3180	3.6400	3.9334	4.3150	3.6300	3.9366
1993	5.4430	3.5230	4.3026	5.3700	3.5450	4.3018
1994	5.7810	4.5730	5.2808	5.7550	4.6250	5.2873
1995	6.1020	4.3750	5.1850	6.0100	4.2500	5.1872
1996	5.8190	4.6760	5.1783	5.7900	4.6700	5.1885

Appendix III
Silver Prices, 1976-96
The Effects of Exchange Rates and Inflation

1. Actual Prices * (money of the day)

	London US$/oz	India * Rupee/kg	Thailand Baht/oz	Japan Yen/10g	Korea Won/10g	Italy Lire/g	Germany DM/kg	Mexico Peso/oz
1976	4.353	1,217	88.81	415	677	116	352	0.07
1977	4.633	1,120	94.52	400	721	131	346	0.10
1978	5.422	1,393	110.26	367	844	148	350	0.12
1979	11.068	1,896	225.99	780	1,722	296	652	0.25
1980	20.984	2,783	429.67	1,530	4,098	578	1,226	0.48
1981	10.487	2,650	228.83	744	2,296	383	762	0.26
1982	7.922	2,675	182.20	634	1,862	344	618	0.45
1983	11.430	3,435	262.89	873	2,851	558	938	1.37
1984	8.145	3,514	192.53	622	2,111	460	745	1.37
1985	6.132	3,880	166.53	470	1,715	376	580	1.58
1986	5.465	4,105	143.71	296	1,549	262	382	3.34
1987	7.016	5,124	180.46	326	1,855	292	405	9.67
1988	6.532	6,231	165.23	269	1,536	273	369	14.85
1989	5.500	6,803	141.34	244	1,187	243	332	13.54
1990	4.832	6,779	123.62	225	1,099	186	251	13.59
1991	4.057	6,993	103.51	176	956	162	216	12.24
1992	3.946	7,580	100.24	161	991	156	198	12.21
1993	4.313	6,163	109.15	154	1,110	214	229	13.44
1994	5.285	6,846	132.92	174	1,365	274	276	17.84
1995	5.197	6,864	129.09	157	1,289	272	239	33.36
1996	5.199	7,291	131.79	182	1,345	258	252	39.52

* Prices are calculated from the London price and the average exchange rate for the year.
In the case of India, the price shown is the one actually quoted in the Bombay market.

2. Real Prices **(Constant 1996 money)

	London US$/oz	India Rupee/kg	Thailand Baht/oz	Japan Yen/10g	Korea Won/oz	Italy Lire/g	Germany DM/kg	Mexico Peso/oz
1976	12.001	6,598	275.75	687	3,415	727	635	67.26
1977	11.986	5,605	272.84	612	3,274	693	600	78.80
1978	13.036	6,804	294.98	538	3,347	695	592	93.02
1979	23.920	8,718	550.12	1,103	5,774	1,211	1,059	151.91
1980	39.945	11,481	873.75	2,009	10,674	1,951	1,889	207.53
1981	18.086	9,668	412.97	931	4,932	1,084	1,104	96.67
1982	12.874	9,042	312.44	773	3,729	836	851	96.06
1983	17.998	10,385	434.50	1,043	5,520	1,182	1,251	153.04
1984	12.297	9,808	315.53	727	3,996	879	970	91.41
1985	8.941	10,260	266.37	539	3,169	659	739	66.78
1986	7.817	9,981	225.74	337	2,793	433	487	75.66
1987	9.684	11,454	276.68	371	3,237	461	516	94.80
1988	8.665	12,731	243.92	304	2,502	411	464	67.93
1989	6.958	13,092	198.02	269	1,829	343	406	51.58
1990	5.799	11,974	163.48	241	1,560	247	299	40.90
1991	4.672	10,844	129.53	182	1,240	202	249	30.04
1992	4.412	10,517	120.42	164	1,210	186	219	25.94
1993	4.683	8,040	126.62	155	1,294	244	244	26.01
1994	5.591	8,104	146.40	174	1,497	300	284	32.29
1995	5.347	7,372	135.04	157	1,353	283	243	44.73
1996	5.199	7,291	131.79	182	1,345	258	252	39.52

** Derived from the actual prices shown above using consumer price indices.

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