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The Sale of Part of the UK Gold Reserves

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
HC 86 Session 2000-2001: 12 January 2001

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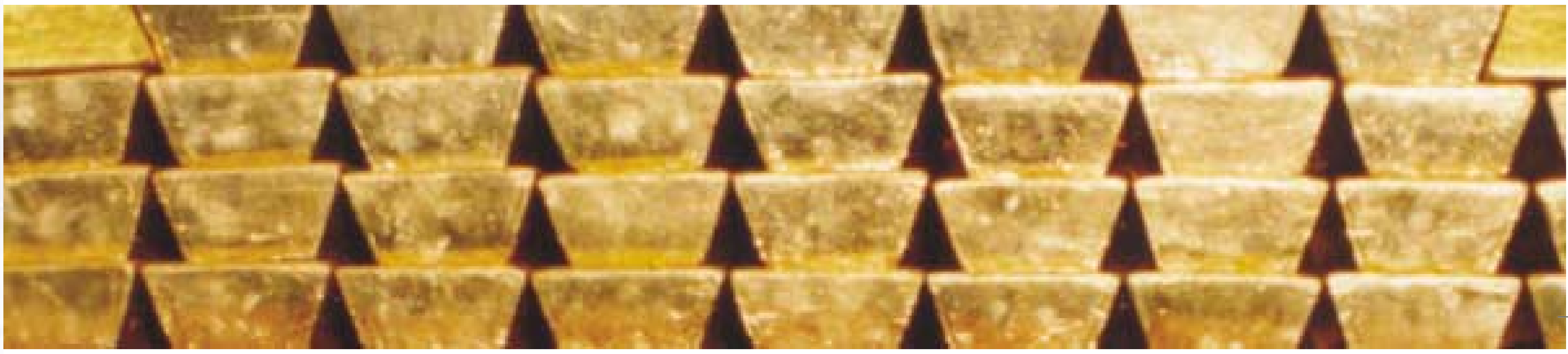
The Sale of Part of the UK Gold Reserves



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John Bourn	**National Audit Office**
Comptroller and Auditor General	**22 December 2000**

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For further information about the National Audit Office please contact:

National Audit Office
Press Office
157-197 Buckingham Palace Road
Victoria
London
SW1W 9SP

Tel: 020 7798 7400

Email: enquiries@nao.gsi.gov.uk
Website address: www.nao.gov.uk

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executive summary

In this chapter

1 On 7 May 1999 the Government announced that it would sell around 415 tonnes (approximately 60 per cent) of UK gold reserves over the medium term - a three-year period based on the current frequency of sales. This is a report about the implementation of the first nine sales in that programme, the degree of success achieved and the lessons that might be learned for future sales.

2 The overall aim of the gold sale programme is to 'restructure the UK's reserve holdings to achieve a better balance in the portfolio by increasing the proportion held in currency'. The decision was taken against a background of a decreasing market value of gold, which over the last twenty years has fallen from a high of $850 per ounce in January 1980 to an average annual price of under $300 per ounce since the start of 1998[1] (see **Figure 1 overleaf** for average yearly prices). Since the announcement to sell gold, market prices have fluctuated widely from a low of $252 per ounce shortly after the first auction on 6 July 1999 to a price spike of $325.50 in October 1999, following an agreement by European central banks to limit gold sales, and dropping back to $269.95 on 28 November 2000. The auctions were conducted in, and proceeds were received in, US$. Between July 1999 and November 2000 the Treasury had generated revenues of $1,990 million (£1,357 million at the 18 December 2000 US$1.467/£ exchange rate prevailing when this report was finalised) which has been re-invested in a spread of foreign currency investments - US Dollars (40 per cent), Euros (40 per cent) and Yen (20 per cent).

3 This report does not question the merits of the decision to sell, which is a policy matter outside the remit of the National Audit Office. It addresses three key questions about the conduct of the gold sale programme:

- Have the sales undertaken so far achieved good prices?
- Has the Treasury met the Government's sale objective?
- Are there any ways in which future sales might be improved?

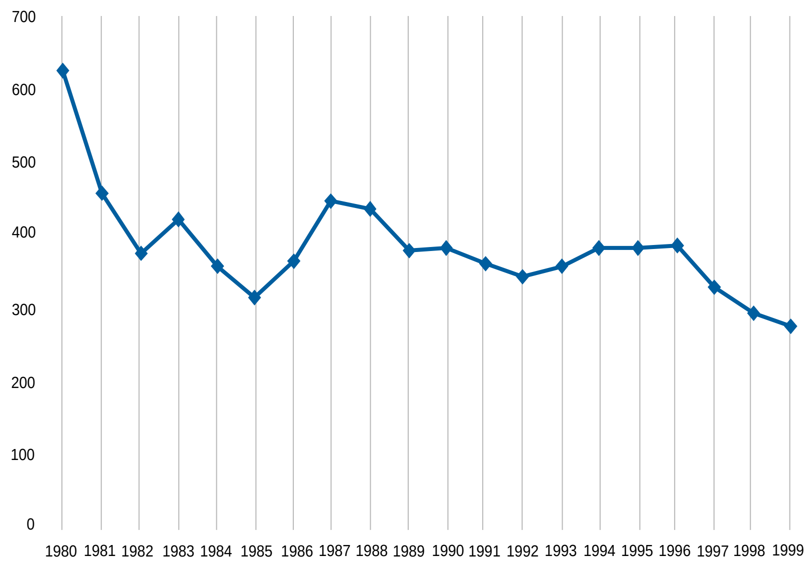
1 *Gold is conventionally traded in US Dollars per 'troy' ounce. Prices are shown in the money of the day.*

Have the sales undertaken so far achieved good prices?

4 In acting as an agent for the Treasury, the Bank of England has held nine auctions for a total of 225 tonnes of gold at two-month intervals, starting on 6 July 1999 with the most recent one on 7 November 2000. Eligible bidders include the Members of the London Bullion Market Association*, (62 at the start of the auction programme, 53 in November 2000) and also central banks and other international monetary institutions. We analysed the prices and proceeds achieved in relation to available benchmarks, in particular the London Gold Fix*. This is a well-established mechanism for selling gold, widely recognised in the UK and around the world as providing the best available benchmark for gold **(Figure 2)**.

1 The average yearly price for gold over the last twenty years

The price of gold has fallen over the last twenty years



Source: National Audit Office

2 The London Gold Fix

Buyers and sellers at the London Gold Fix relay their bids to the five Fix members and agree a 'clearing' price for all the bids.

The London Gold Fix is a long-established system that enables buyers and sellers of gold around the world to trade twice daily with one another.

The Fix takes place at 1030 and 1500 each day. It is run by five Fix members from different trading houses who, from a dedicated Fixing room in NM Rothschild, relay bids from their own organisation along with the numerous traders they represent (at a commission). Each session begins by the chairman suggesting an opening price, to which each member indicates if they are a seller or buyer at that price. The price is then moved up or down until quantities offered and required are matched. Gold is then traded at a common 'clearing' price. It was first established in 1919 and had earned an international reputation as a competitive market place for gold and recognised as offering a daily 'benchmark' for gold prices.

Source: National Audit Office

* *See Glossary*

5 We compared the prices achieved against:

i) The London Gold Fix price on the day of sale (for each auction).

ii) The average London Gold Fix price from the date of the first auction (6 July 1999) to the date of the last auction on 7 November 2000 to provide additional context to the comparison in (i) above.

iii) The average London Gold Fix price over the period 10 May 1999 to 9 November 2000, as the Bank of England would have been able to start the sale programme in May 1999 if the Treasury had chosen to sell through the Gold Fix. In this comparison average prices over an 18 month period are used to take account of auctions taking place every two months.

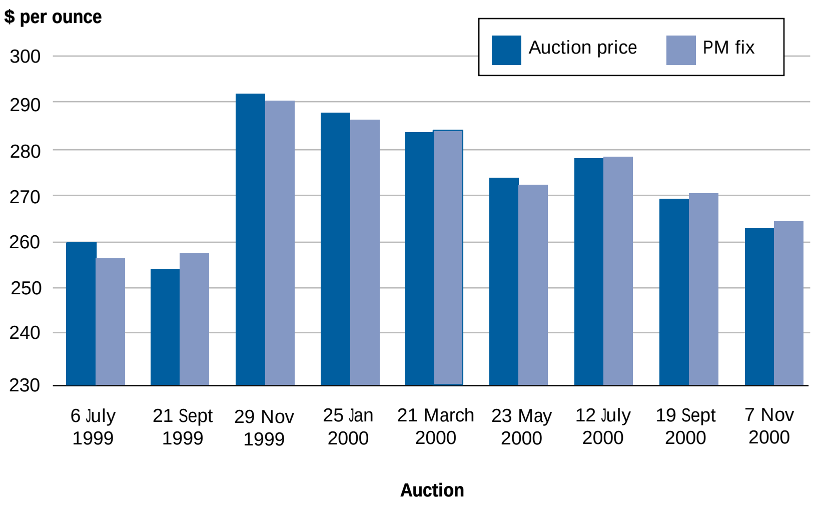
iv) The prices typically achieved in nine recent foreign central bank sales (themselves benchmarked against the London Gold Fix).

6 In this section we are using the Gold Fix as the best available price benchmark. As described in Figure 2, the Gold Fix price is set to balance the demand and supply of gold sold through that mechanism - it is not set to balance the total demand and total supply of gold. If 225 tonnes of gold had been sold through the Gold Fix instead of through auctions, and demand at the Gold Fix had been unchanged, this extra supply, even if spread evenly over the period, would have been likely to lead to lower Gold Fix prices than were actually observed. It is of course possible that all demand from the auctions would have appeared at the Gold Fix and, in those circumstances the Gold Fix prices would have been unchanged from those observed. This is by no means certain so the Gold Fix, although the best available benchmark, is not perfect.

7 The prices achieved at each of the nine auctions held to date as compared to the afternoon London Gold Fix on the same day are shown in **Figure 3**. This comparison illustrates that the prices achieved were well in line with the price benchmark and therefore with prevailing market prices. The average auction price achieved was 21 cents (0.1 per cent) above the average of the London Gold Fix prices on the days of the nine auctions (a variation would have to be some

3 Comparison of prices achieved at each of the auctions to the afternoon London Gold Fix price on the same day

The prices achieved at each of the auctions have been in line with prevailing market prices



Source: National Audit Office analysis of auction results

1 per cent to be statistically significant[2]). Small variations between the price achieved in an auction and the Gold Fix price are to be expected as prices routinely fluctuate in the course of a day as markets open and close around the world.

8 We also compared the prices achieved at the UK auctions to the average afternoon London Gold Fix price over the period from the date of the first auction on 6 July 1999 to the most recent auction on 7 November 2000 to put the prices achieved in a wider context. The average sale price of $275.01 achieved at the first nine auctions is 1.6 per cent less than the average afternoon Gold Fix price over the period of $279.56. A variation of 4.2 per cent or above would be needed to suggest that the difference in prices had any statistical significance. The difference does not therefore raise concerns about the success of the UK programme of sales. Much of this difference reflects the volatility in the prices that was seen in October 1999 after the announcement of the European central banks' agreement (see **Figure 6**). If the Gold Fix prices in October 1999 are excluded from the comparison, then the average fix price is $277.50, a price difference of 0.9 per cent.

9 If the Treasury had decided to sell through the Gold Fix it would have been able to start the sale programme earlier than 6 July 1999. We therefore compared the average auction price achieved of $275.01 against the average price over the 18 month period starting 10 May 1999 to 9 November 2000. An 18 month period has been used in this example to take into account the 9 auctions held every two months. The average Gold Fix price over the period was $278.08 - a price difference of 1.1 per cent. Again this variation is not statistically significant. If Gold Fix prices in October 1999 are excluded then the average Gold Fix price is $276.18 - a price difference of 0.4 per cent.

10 With the assistance of the consultants to this study - Gold Fields Mineral Services, who are leading analysts in the gold market sector - our examination also drew on comparisons with recent gold reserve sales from the central banks of nine countries:

- Argentina (125 tonnes; 1994-95)
- Australia (167 tonnes; 1997)
- Austria (258 tonnes; 1989-2000)
- Belgium (1,034 tonnes; 1987-1999)
- Canada (634 tonnes; 1980-1999)
- Czech Republic (56 tonnes; 1997)
- Malaysia (36 tonnes; 1999)
- Netherlands (813 tonnes; 1992 - February 2000)
- Switzerland (160 tonnes; to end November 2000).

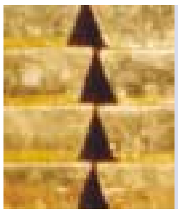
11 This analysis shows that in most cases foreign gold sales have, like the UK auctions, achieved prices in line with the London Gold Fix price benchmark. The reserve sales undertaken by the central bank of Argentina were carried out fully through the use of options*, entered into when the price of gold was higher than when the options were exercised. Sales by the Czech Republic were undertaken partly through options. Although this resulted in significantly higher prices than market prices at the time the sales were completed, the prices prevailing at the time the options were entered into were up to $14 per ounce higher than the average price eventually achieved. If prices had risen instead of fallen over the period between the option agreements and exercise of the options then the countries would have received poor prices compared to market prices at the time the options were exercised.

2 See Appendix 2

** See Glossary*

Has the Treasury met the Government's sale objectives ?

12 Underpinning the Government's aim to restructure the reserve holdings has been a more specific objective implemented by the Treasury:



The objective for the gold sale programme is to sell around 415 tonnes of gold in a transparent manner, over the medium term, fairly and with a view to obtaining value for money for the taxpayer

13 The requirement to sell **transparently** has meant that the gold sales needed to be pre-announced to the gold market and that many of the details of the programme, for example the mechanism of sale, had to be made publicly available. This contrasts with practice adopted in recent gold sales by other foreign central banks. With the exception of sales by the United States and the International Monetary Fund* in the 1970s and more recent sales by the Dutch and Swiss National Banks, gold reserve sales by overseas central banks have been carried out in secret. The UK Government's decision to sell in a transparent manner reflects an emerging but growing commitment amongst leading central banks to provide more timely and open disclosure of reserve fund movements. Moreover the Treasury believes that there is an a priori case that revenue from sales will be increased through predictability and transparency as a result of the reduction in the risk premium priced into bidders' valuations.

14 In terms of **fairness**, the Government's sale objective meant that gold market participants had to be given an equal opportunity to participate in the sales and information released afterwards had to be openly and fairly reported. This aspect of the policy objective effectively excluded using alternatives such as private sales.

15 On **value for money**, the Treasury needed to select an approach that would attract a good price and therefore a good return at each round of sales. Achieving a good price depends on a number of factors including the method of sale, the timing of sales, the sentiment of the market and the technical running of the programme.

The Treasury's decision to sell through a series of bi-monthly auctions met the policy criteria very well

16 The Treasury's decision to sell through a series of bi-monthly auctions met the policy criteria very well and in overall terms should mean that all 415 tonnes will have been sold in three years if the current pace of sales is maintained. An auction approach is a very visible and transparent mechanism of sale. It is demonstrably fair in that all members of the London Bullion Market Association, central banks and other international monetary institutions can participate freely. As illustrated by our analysis of the prices achieved in the nine auctions held to date, it provides for a competitive market place and delivers prices that are in line with the industry benchmark. Of the main alternative methods of sale (shown in **Figure 4 overleaf**), an auction approach, and specifically a 'Uniform Price Auction'*, scores highly on transparency, fairness and value for money. In Uniform Price Auctions all successful bidders pay a single (Uniform) price rather than paying the price bid. Research commissioned for this examination has suggested that Uniform Price Auctions may have a slight advantage over Multiple Price Auctions* in that a greater number of potential bidders may be encouraged to participate (see Appendix 3).

* *See Glossary*

The alternative that fits the objectives next best after an auction - the London Gold Fix - which could still be used for future sales, has only five direct participants and offers slightly less transparency in that information on the volume of sales is not made available. The Gold Fix is used indirectly by nearly all members of the gold market internationally as a benchmark from which to price purchases and sales. Some central banks have used the Gold Fix to sell their holdings.

4 **A comparison of different methods of sale in terms of transparency, value for money and fairness**

Treating all of the policy requirements with equal importance, auctions and the London Gold Fix are the most suitable methods of sale

Method of sale	Degree of Transparency	Value for Money	Fairness
Auction	High	Medium/High	Very
London Gold Fix	Medium	Medium/High	Medium/High
Derivatives	Medium/Low	Medium/High	Not Very
Private Sale	Medium/Low	Medium/High	Not Very

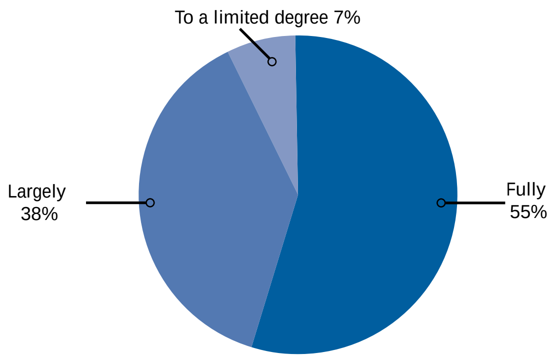
Source: National Audit Office

Of the available methods of sale, an auction methodology scores highly against the sale objective

17 On the technical implementation of the sales, the Treasury's and the Bank of England's handling of the auctions has been very good. To build an understanding of how the gold market reacted to the auctions we distributed a survey to all the members of the London Bullion Market Association asking about the quality of the information provided to them and the technical management of the auctions. The results of this survey showed that the market had been pleased with the implementation of the sales programme. When asked whether advance information on the Government's intentions were sufficiently clear 93 per cent of respondents agreed that they were well-informed (**Figure 5 opposite**).

5 **To what extent was advance information on the 'Government's intentions in the short term' made sufficiently clear and detailed?**

The vast majority of respondents were content with the clarity and detail of advance information on the Government's short term intentions.

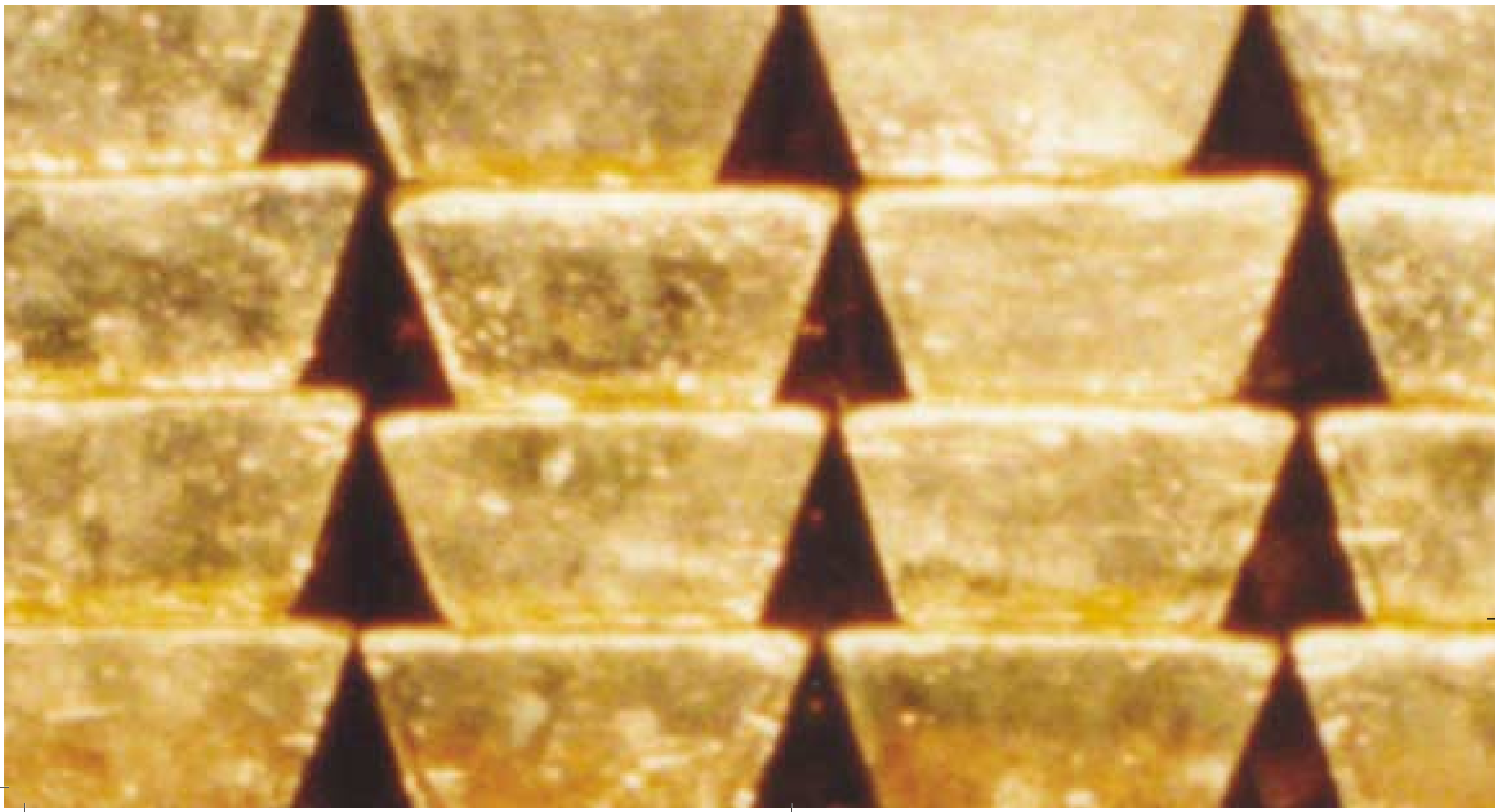


Source: National Audit Office survey

18 Similarly, over 90 per cent of respondents who had bid experienced no difficulties with the technical handling of the auctions. The messages emerging from the survey were supported by individual interviews held with key market members and representatives of our expert panel.

Are there any ways in which future sales might be improved ?

19 While this examination has demonstrated that the gold sales programme has been well run and that individual auctions have attracted competitive prices, the Treasury will continue to monitor, review and make revisions to the programme if necessary, in the light of experience. We recommend that the Treasury undertakes a mid point review of the programme now that 225 tonnes have been sold and takes the opportunity to consider four aspects of the programme.



20 The Treasury has been concerned to approach the gold market carefully and to take steps to provide clear and predictable arrangements for the timing and quantity of gold to be sold. Transparency and predictability in the sales process should have a beneficial impact on proceeds. The market is now familiar with the sales programme and the European central banks agreement **(Figure 6)** entered into in September 1999, provides a stable context for the sales. We explored with the Treasury and the Bank of England, therefore, whether there might be benefits in retaining a small amount of flexibility in the volumes to be sold and the timings of individual tranches.

21 The second UK auction took place on 21 September 1999, shortly before the European central banks' announcement. Within two weeks of the auction the price of gold rose by 25 per cent. We explored with the Treasury whether it would have been possible to postpone the auction until after the announcement. In the Treasury's view to have postponed the planned auction to take advantage of a possible but uncertain strengthening in the market would have created very considerable uncertainty in the gold market with a potential detrimental effect both on the gold price, and on the market's confidence in the fairness of the auction programme, putting at risk the prospect of achieving the policy objectives of the programme. It was also not certain on 21 September that such an announcement would have been made.

6 **The European central banks' agreement of 26 September 1999**

Details of the European central banks' agreement

On 26 September 1999 11 Eurozone members, the European Central Bank, Switzerland, Sweden and the UK made the following statement:

- Gold will remain an important element of global monetary reserves
- The above institutions will not enter the market as sellers, with the exception of already decided sales
- The gold sales already decided will be achieved through a concerted programme of sales over the next five years. Total annual sales will not exceed 400 tonnes and total sales over this period will not exceed 2,000 tonnes
- The signatories to this agreement have agreed not to expand their gold leasings and their use of gold futures and options

This was a major announcement that helped to steady concerns over the rising trend of central bank sales. While sales of 400 tonnes of gold per year represented an increase in the average level of sales during the 1990s, the announcement helped to stabilise the gold prices. More widely the announcement contributed to a growing recognition of a need for central banks to disclose publicly movements on gold reserves.

Source: National Audit Office

22 Although there are various forms of flexibility that can be employed during an auction process, each entails retaining an option against bidders and should, therefore, impact on bid prices and result in lower revenues to the seller. The evidence from our comparative analysis of international gold sales does not allow statistically valid conclusions to be made as to whether there may be price benefits from selling on a more flexible basis although in the judgement of our consultant, Gold Fields Mineral Services, there may be such benefits. The Treasury does not think that it could outguess the market successfully nor that it should or could trade on the basis of private information and so considers

* *See Glossary*

that greater flexibility could not be expected to lead to better revenues than the current market expectation.

23 Professor Binmore suggested that there could be benefits from the Treasury publishing a supply curve prior to each auction, varying the amount of gold available at each auction, and specifying the maximum that would be sold at a particular price or above. The lower the price bid on the day the less gold would be sold. He noted, however, that the market might criticise use of an untested methodology. The Treasury are concerned that this could lead to strategic game playing by dominant bidders and that, as bidders would have a good idea how much the Treasury wished to sell, there would be little incentive for any bidder to bid above the corresponding reserve price. A potential benefit of this approach is that it would reduce the risk of demand in an auction not covering supply.

Further thought could be given to using the London Gold Fix

24 We examined the option of using the London Gold Fix as an alternative method of selling gold. The London Gold Fix has advantages and disadvantages compared to an auction approach. It is less transparent in that total amounts sold are not disclosed but it offers the opportunity to vary the volume of gold sold and the precise timing of sales on a daily basis. There is support in the London Gold market for using the Gold Fix. The majority of the market consider this method of sale to be fair and agree that selling smaller amounts of gold more regularly would be less disruptive to the market. As part of a review after the fourth auction the Bank of England recognised the strengths of the London Gold Fix but found no compelling reasons to recommend a change. This is an alternative that the Treasury could consider again in consultation with the gold market.

Considering whether there is scope to improve the quality of post-auction information

25 During the course of this investigation, our survey of London Bullion Market Association members showed that the large majority were happy with the amount of information available. Some of them were concerned, however, about the quality of post-auction information, in particular the value of the 'bid cover'* ratio which shows the extent to which the volume bid exceeds the volume on offer at each auction (for example 100 tonnes bid at a 25 tonnes auction would have a bid cover of 4:1). It is difficult to interpret the information available on bid cover because the 'true' level of market demand can be manipulated through the submission of lower, less serious bids that can artificially inflate the bid cover. Our analysis of bidding patterns for this study has not revealed any evidence to suggest that this has occurred. A number of survey respondents suggested that disclosing the volumes bid in particular price ranges, for example $5 ranges, would provide them with more useful information.

26 The Treasury and the Bank of England consider that the bid cover ratio is of some limited use but that in uniform price auctions, disclosure on bidding distribution does not provide much useful information. This is because in the same way as the cover ratio can be manipulated so too is there scope for manipulating other information published after an auction - such as on volumes bid in particular ranges. They agree, however, that it would be worthwhile discussing the potential advantages and disadvantages of disclosing more information with the market.

The Treasury should actively manage risks to the sales programme

27 To be able to judge the success of a sales programme and to anticipate the need for changes, a seller should put in place performance indicators and monitor actively changes to the exposure to risk on different elements of the programme. The evidence collected from this examination has pointed towards success in the implementation of the gold reserve sales policy. Gold selling prices at individual auctions have been in line with prevailing market prices; the needs of the market have been carefully handled and in most cases fully met; the requirements of the policy objective to sell transparently, fairly and with a view to achieving value for money have also been well served. As the programme continues, however, different risks are likely to affect the programme. For example, market analysts consider that volumes traded in the market are now thinner than when the programme was initiated and that 25 tonnes is now harder for the market to digest. The 'bid cover ratio' for the programme has varied from a high of 8:1 in September 1999 to a low of 1.3:1 in July 2000. It would be good practice for the Treasury to keep reviewing 'trigger' points for bid cover and price variations against the London Gold Fix which would initiate a review of the prospects for demand in the auction and prices respectively to consider whether existing arrangements remain satisfactory or whether alternatives might be more suitable.

Conclusion

28 In designing and implementing the sales programme so far the Treasury has met successfully its objective to sell in a transparent and fair manner while achieving value for money. The prices achieved at each of the nine auctions have been competitive and well in line with the prices achieved in similar gold sales by overseas central banks. The Treasury's agent, the Bank of England, has worked hard to keep the gold market well informed and to secure a technically successful sales programme that has been applauded by almost all of the gold market participants interviewed and surveyed for this examination. As the programme progresses, the Treasury will continue to review developments. In this context the National Audit Office considers that the Treasury should include in its review the advantages and disadvantages of adapting the existing sales methodology, for example, by changes to the auction design or even to using the London Gold Fix as an alternative or additional means of selling gold.

Part 1

Introduction

1.1 This is a report about the implementation of the Government's programme to sell around 415 tonnes (approximately 60 per cent) of UK gold reserves and re-invest the proceeds in foreign currency reserve assets. The report is structured in three main Parts:

- The prices achieved in the auctions (Part 2)
- The extent to which the programme has satisfied the Government's sale objectives (Part 3)
- The scope for improving the conduct of future gold sales (Part 4).

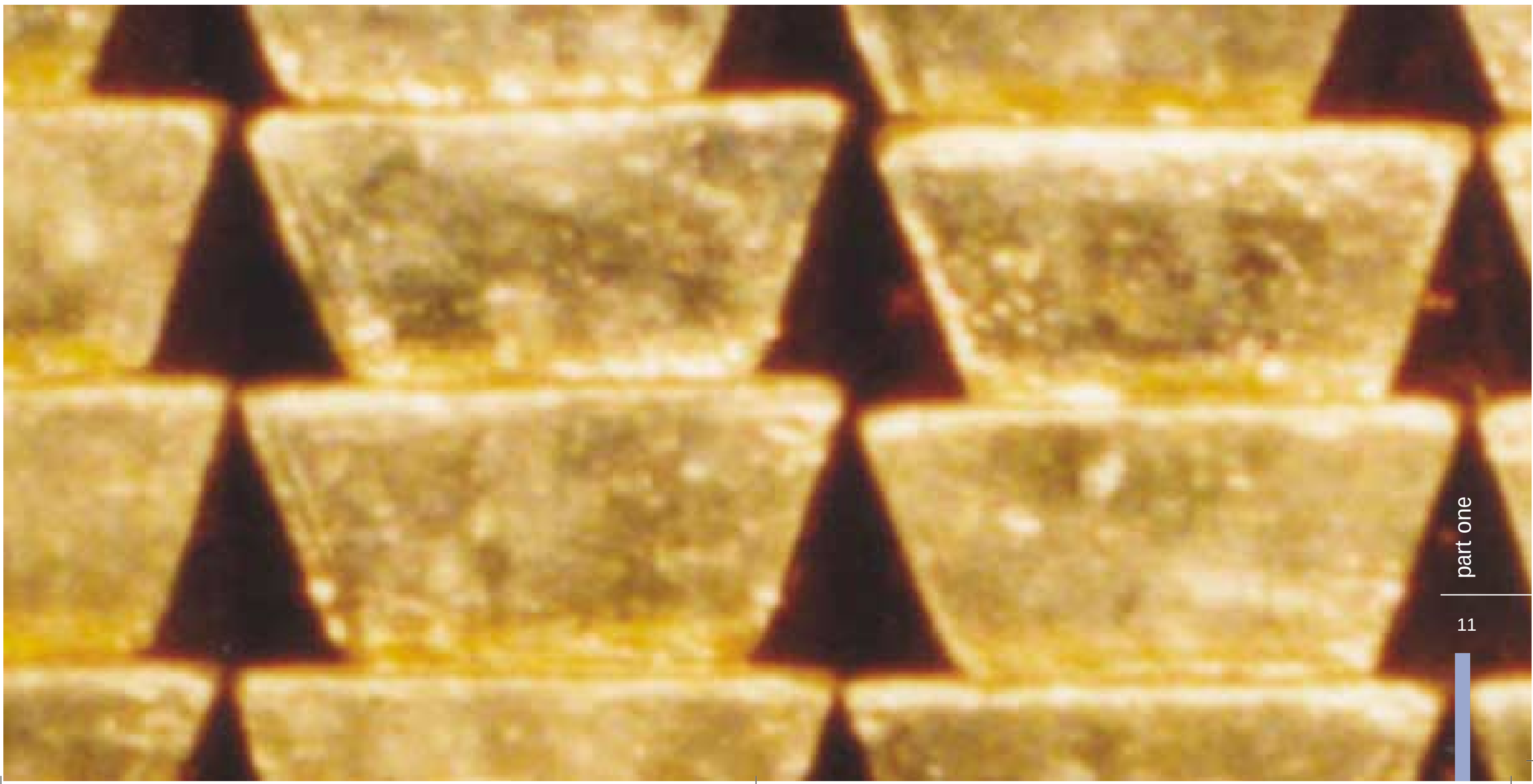
1.2 It has not been the objective of this examination to question the merits of the policy decision as this is outside the remit of the National Audit Office. The focus of the examination has been on the way in which the Treasury has handled the risks to the programme to secure a successful outcome.

Putting gold reserves in context

1.3 Historically, gold has been accepted as a universal means of exchange due in part to its durability its beauty and its rarity. Under the development of the Gold Standard* in the 19th century, gold formed the bulk of international reserves held by central banks. With the growth of international trade and the development of financial markets gold's importance gradually reduced. In spite of the decline in the status of gold it is still a key reserve asset and a store of value, and the vast majority of central banks still hold significant official gold reserves.

1.4 The latest figures show that world stocks of gold are around 140,000 tonnes, of which some 33,500 tonnes are official holdings held by central banks and international financial institutions. Annual gold mine production is on an upward trend partly as a result of technological improvements to mining practices and in 1999 approached 2,600 tonnes.

* *See Glossary*

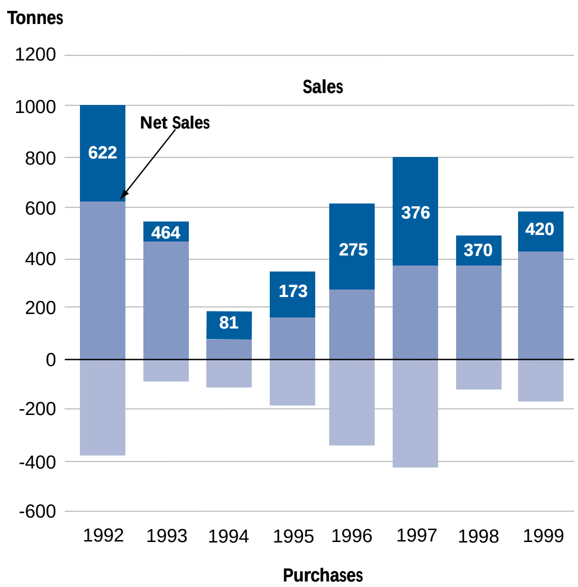


1.5 There has been a gradual change over the last ten years in the attitude of many central banks towards reserves and gold holdings. As a consequence of the steadily declining market value of gold, there has been increased emphasis placed on the opportunity cost of holding assets in the form of gold reserves, and a number of central banks have become net sellers of gold. Over the last eight years average net annual gold sales by central banks came to some 275 tonnes. Over this period, gross annual sales totalled 500 tonnes with annual purchases of some 225 tonnes (**Figure 7**).

1.6 In May 1999 715 tonnes of gold, valued at some £4 billion, were held in the UK reserves, representing approximately 17.5 per cent of the total gross UK reserve assets and nearly 50 per cent of net reserve assets that is gross reserves less borrowed reserves. The responsibility for reserve assets lies with the Treasury who instructs the Bank of England, as its agent, to manage the reserves. The Bank of England has therefore provided guidance and technical expertise throughout the UK gold sales programme. **Figure 8 opposite** sets out the key relationships between organisations with an interest in UK sales and the gold market.

7 **World sales and purchases of gold by central banks**

Over recent years central banks have continued to be net sellers

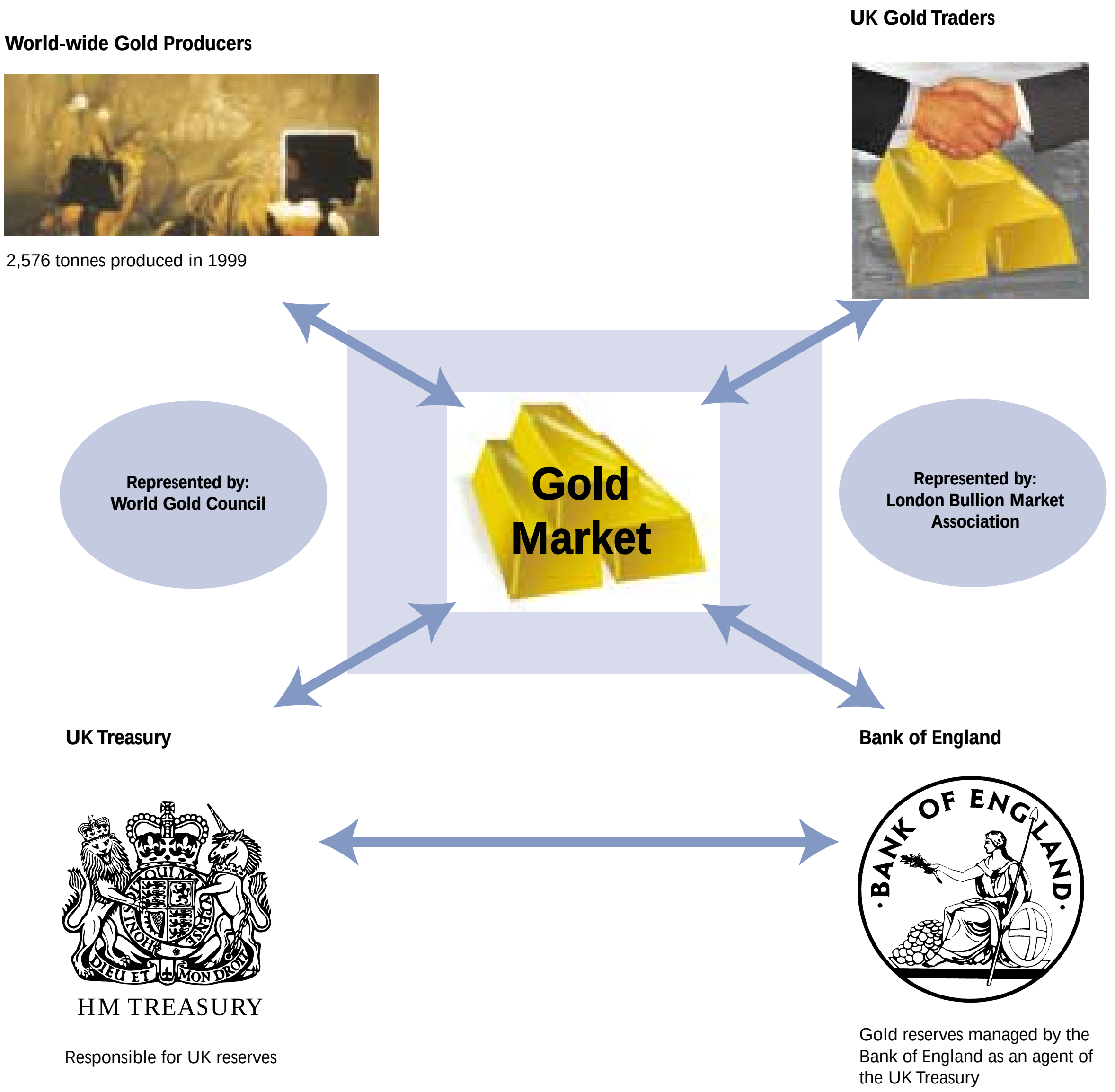


Source: Gold Fields Mineral Services

part one

8 **Key organisations involved in the UK Gold Market**

This illustrates the key organisations involved in the UK gold market.



Source: National Audit Office

The reasons for undertaking this examination

1.7 We decided to conduct an examination of the implementation of the decision to sell a proportion of the gold reserves for a number of reasons. First of all, total proceeds that will be retained within the reserves could well exceed £2.3 billion. Secondly, the programme is likely to continue for a further 14 months, if the current rate of sales is continued, after the publication of the report, over which time the Treasury will need to draw in lessons from earlier sales to ensure the success of the programme. This report is intended to be forward-looking and offer practical recommendations which may help the programme. Thirdly, the Government's announcement on 7 May 1999 that it was to sell some of the UK's gold reserves has attracted a lot of media and Parliamentary attention (Appendix 1) and one of the aims of this examination has been to respond to the interest expressed and to present the material gathered in an impartial manner. Our Report also fits with the Government's wider objectives to provide greater transparency in the disclosure of movements to the UK's reserves.

The methodology employed

1.8 In order to evaluate the prices achieved in the gold auctions, to assess the extent to which policy objectives were met and determine the scope for learning lessons for future sales, we undertook a number of key exercises explained briefly below (and in more depth in Appendix 2):

- Benchmarking of the prices achieved at each auction and over the course of the programme: *to determine whether the auction sales achieved competitive prices*
- International comparisons with nine countries which have recently been involved in official gold sales, involving major consultancy input from leading gold market analysts - **Gold Fields Mineral Services**: *to draw in examples of good practice and make price comparisons*
- A survey of the members of the **London Bullion Market Association**: *to elicit market views on the technical implementation of the auctions and the scope for learning lessons*
- An academic analysis of auction methodology and the implications of increased transparency, involving major consultancy input from **Professor Ken Binmore of the Economic and Social Research Council's Centre for Economic Learning and Social Evolution**: *to build a picture of the strengths and weaknesses of different aspects of the sale programme*
- We carried out statistical significance testing (at the 5 per cent level) of difference in average prices using t-tests.

1.9 To test and refine the design of this examination and the emerging findings we formed a panel of experts representing gold traders, analysts, consultants and academia. A full list of expert panel members is included in Appendix 2.

1.10 While efforts have been made to keep technical terms to a minimum, a glossary is provided at the end of this report.

Part 2

The first nine gold auctions achieved competitive prices

2.1 This part of the Report examines the prices achieved at each of the gold auctions undertaken so far and assesses how the proceeds from these sales have been re-invested. In particular this part of the report sets out:

i) the policy decision to sell UK gold reserves

ii) the background against which the decision was made

iii) the prices and proceeds achieved

iv) an analysis of the results

v) international comparisons

vi) how the proceeds have been invested.

The gold sales formed part of a technical restructuring of the UK reserves

2.2 The Treasury concluded in the late 1990s that at nearly 50 per cent of the net reserves, the amount of gold held was unnecessarily high. It considered that this represented too great an exposure to an individual asset, particularly given that the gold price had been declining for many years, the price of gold was volatile and, unlike foreign currency assets, there is virtually no return on gold holdings.

2.3 The Treasury had, at the same time, considered the prospect of restructuring the reserve portfolio. In light of the downward trend in the gold price and a growing awareness of the benefits of managing risks to the portfolio more actively, the Treasury had conducted a number of small exercises looking at the possibility of selling gold. In early 1999 the Bank of England provided the Treasury with advice on the practicalities of selling gold, setting out a range of possible routes and the likely impact of different strategies on the prices obtainable.

2.4 The culmination of this activity was the announcement on 7 May 1999 of the Government's decision to sell around 415 tonnes of the gold reserves over the medium term in a programme of gold auctions **(Figure 9)**. The top level objective of this programme, as set out in this announcement, was to achieve a better balance in the reserve portfolio by increasing the proportion held in foreign currency assets. The announcement set out the detailed arrangements for the programme with the aim of initially selling 125 tonnes of gold at five auctions, to be followed by further sales of 290 tonnes over the medium term. The auctions were to be conducted by the Bank of England and the proceeds from the gold sales were to be invested in foreign currency assets and retained in the reserves.

9 **HM Treasury announcement of gold sales**

7 May 1999

Restructuring UK Reserve Holdings

The Treasury today announced a restructuring of the UK's reserve holdings to achieve a better balance in the portfolio by increasing the proportion held in currency. This will involve a programme of auctions of gold from the Exchange Equalisation Account, which holds the UK's official reserves of foreign currency and gold, with the proceeds being invested instead in foreign currency assets and retained in the reserves.

The Treasury intends to sell 125 tonnes of gold, 3 per cent of the total reserves, during 1999-2000, with the Bank of England conducting five auctions on the Treasury's behalf. Auctions will be held every other month starting in July.

$6.5bn of the UK's reserves is held in gold (715 tonnes). Over the medium term the Treasury is planning to reduce its gold holdings to around 300 tonnes. Detailed plans for auctions in 2000-01 and later years will be announced nearer the time, but arrangements are likely to be similar to those announced today.

2.5 Ministers set the Treasury the sales objective to sell 415 tonnes of gold 'in a transparent manner, over the medium term, fairly and with a view to obtaining value for money for the taxpayer'. This provided a guide for the Treasury in its implementation of the programme. The Treasury considers that there is strong academic evidence that transparency gives the market confidence in the Government's actions, can stabilise markets and increase proceeds.

The price of gold had steadily fallen since 1980 hitting a twenty-year low shortly after the first auction

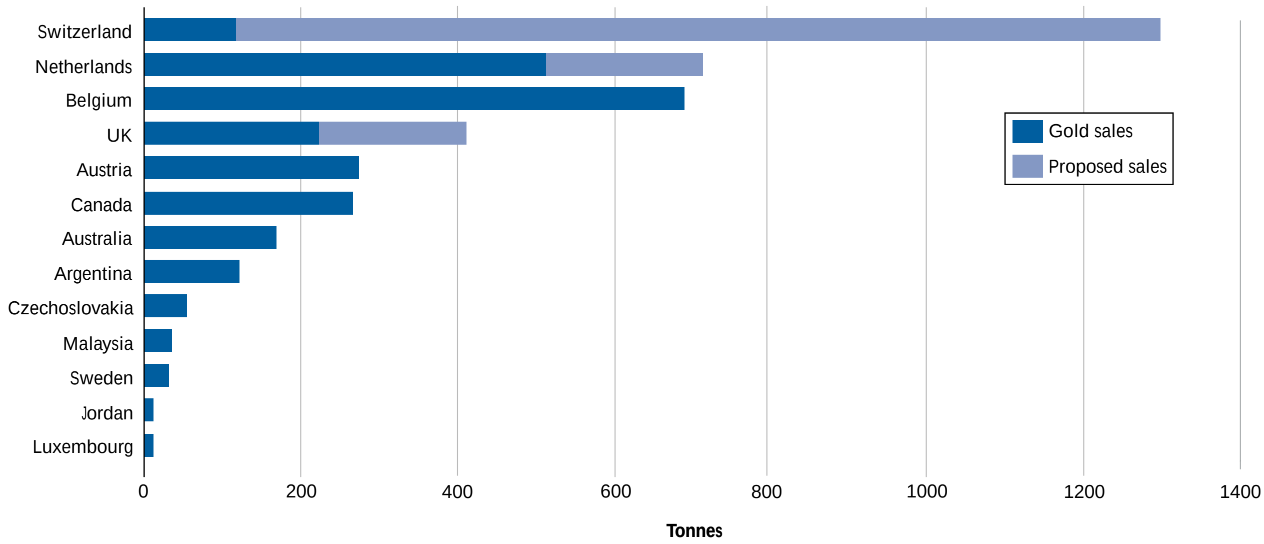
2.6 The decision to sell some of UK's gold reserves was made against a background of increased net sales by some central banks around the world and reducing gold market prices. The level of net gold sales by central banks over the last eight years averaged 275 tonnes with 420 tonnes of gold being sold in 1999. This increasing trend to sell gold reserves is demonstrated by the fact that thirteen central banks (shown in **Figure 10**), in the last eight years, have sold or have proposed to sell nearly 3,000 tonnes of gold. The reasons why these countries have sold some of their gold reserves varies, ranging from reserve management decisions following re-assessments of the opportunity costs of holding gold (Australia) to the consequences of maintaining a fixed parity between local currency and the US dollar (Argentina). Three of these countries, Switzerland, the Netherlands and the UK are in the process of selling some 2,015 tonnes of gold of which, in November 2000, around 1,550 tonnes of gold remained to be sold.

2.7 Over the last twenty years the market price of gold has fallen. In 1980, when the economic conditions were markedly different from today (high inflation and rising oil prices), gold hit a high price of over $850 an ounce (**Figure 11 opposite**). By 1999 the average price had fallen to $294 an ounce, almost a third of the 1980 price. Gold Fields Mineral Services (leading analysts of the gold market) commissioned for this examination hold the view that, apart from occasional price spikes, gold prices are now likely to remain below $300 per ounce level for the foreseeable future.

2.8 Since the UK announcement to sell gold, market prices have fluctuated widely from a low of $252 per ounce shortly after the first auction on 6 July 1999 to a price spike of $325.50 in October 1999 following the important agreement of European central banks to limit gold sales over the next five years (Figure 6 in the Executive Summary). The European central banks agreement helped to steady prices and re-assure the market that the acceleration of official gold sales, that had recently taken place would not continue to gather pace and depress prices. Since then prices at the afternoon Gold Fix have fluctuated between $312.70 an ounce on 7 February 2000 and $263.80 on 27 October 2000.

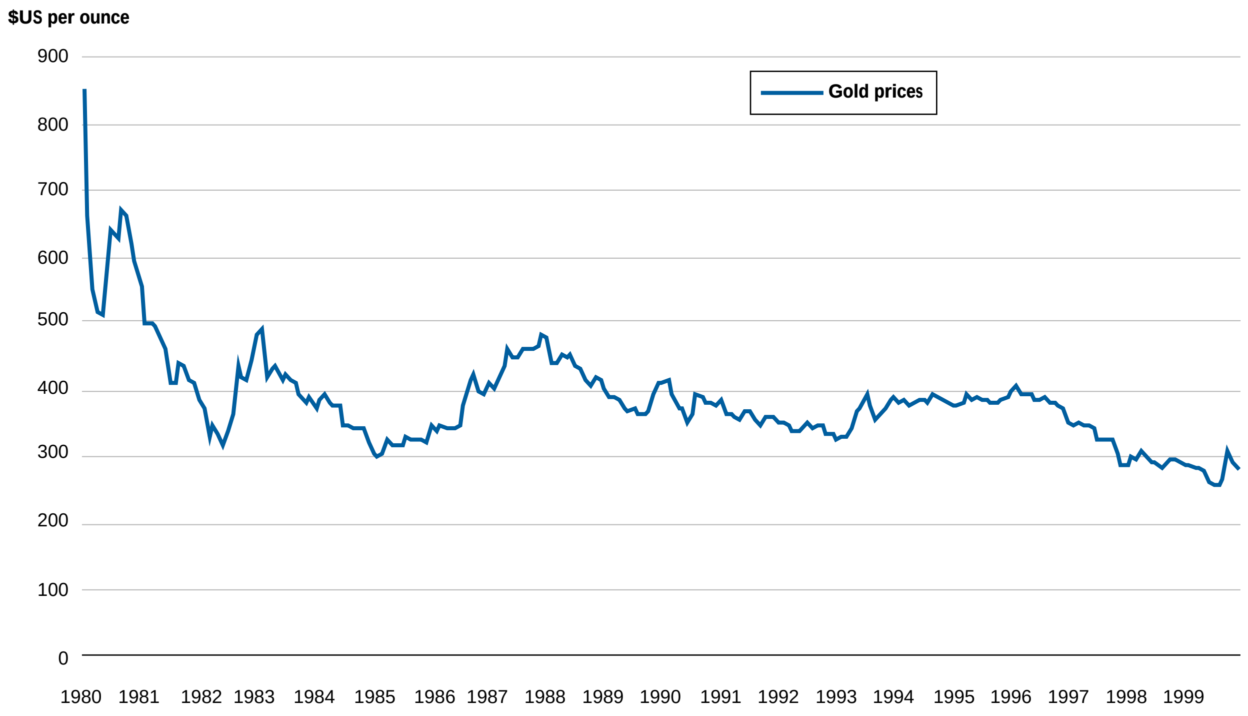
10 Gold sales by central banks

This shows that 13 central banks have sold nearly 3,000 tonnes of gold and that three of them are in the process of selling some 2,015 tonnes, of which 1,550 tonnes remain to be sold.



Source: National Audit Office

11 **London Gold Fix prices 1980 to 1999**



Source: National Audit Office using London Bullion Market Association - Historical London fix data

The prices achieved at the first nine auctions were in line with prevailing gold market prices

The prices and proceeds achieved

2.9 225 tonnes of gold have been sold in nine auctions, held every other month, starting on 6 July 1999. The auctions are conducted in, and proceeds are received in, US$. Total revenue of $1,990 million (£1,357 million at the US$/£ exchange rate prevailing at 18 December 2000 when this report was finalised) have been raised from the nine auctions - see **Figure 12 overleaf**. The auctions were conducted by the Bank of England as agents of the Treasury. Bids at these gold auctions could be submitted by members of the London Bullion Market Association and by central banks and other international monetary institutions holding gold accounts at the Bank of England. The auctions were conducted on a uniform price basis which means that all successful bidders pay the same price determined by the lowest accepted bid (see Part 3 for bidding procedure).

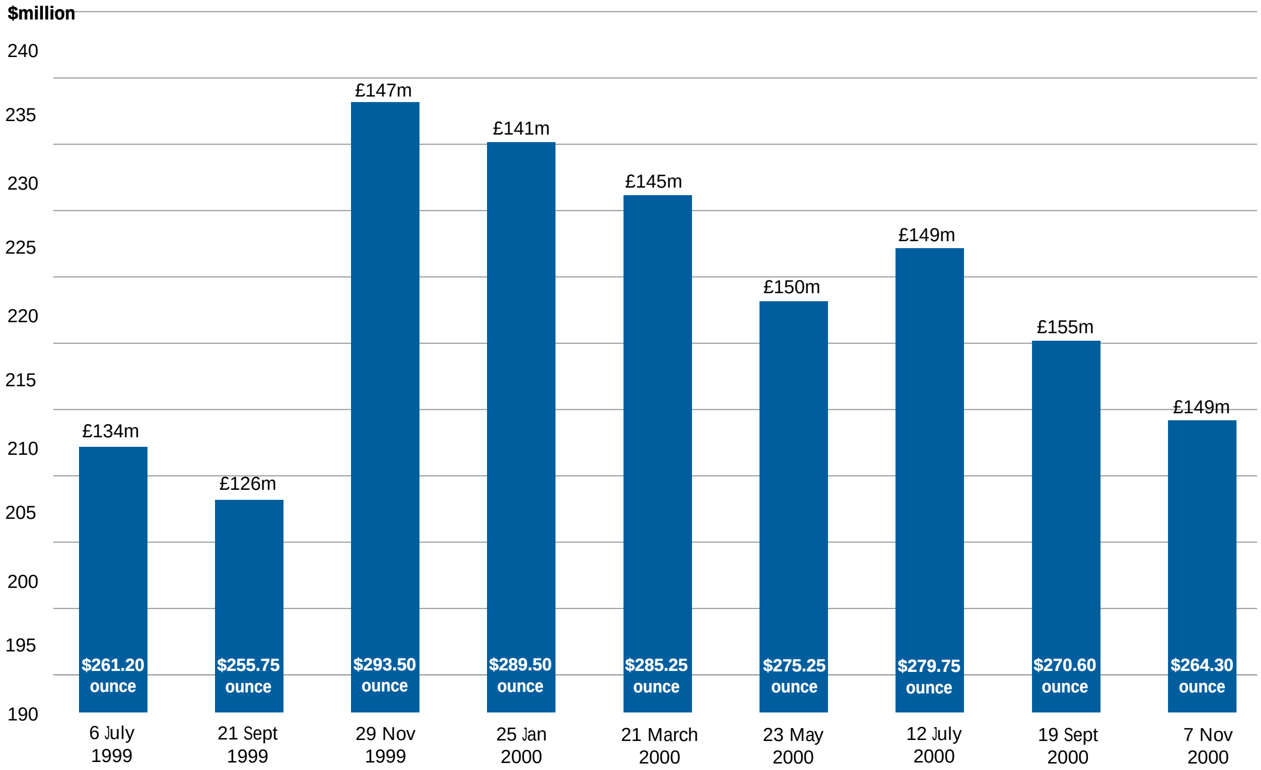
2.10 The results of the first nine auctions are summarised in **Figure 13 overleaf**. Some 26 firms have bid over the nine auctions including all eleven of the market making members of the London Bullion Market Association, who trade in gold on a daily basis. Interest has also been shown by some mining companies, with Goldfields Limited and Anglogold both announcing they had bought gold through the intermediaries, accounting for a total 12 ½ tonnes (16 per cent of the gold on offer) at the first three auctions. Some members of the market speculated that gold producers purchased gold in the first auctions to avoid the risk of an unsuccessful (and uncovered) sale which could have had a negative price impact.

Analysis of the results of the auctions

2.11 In analysing the results of the auctions we compared the prices achieved over the course of the programme against a number of benchmarks - none of the comparisons are perfect but when looked at together they provide a rounded view of the prices achieved. The most widely used indicator of prices is the London Gold Fix (see Figure 2 in Executive Summary) which offers a twice daily mechanism for buying and selling gold and publishes a 'clearing' price for gold traded each morning and afternoon. The London Gold Fix has operated for more than 80 years and is the best available indicator of prevailing market prices. Bullion dealers, international monetary institutions, gold market analysts and central banks around the world all routinely utilise London Gold Fix prices to help determine the market value of gold. In a review of the first four auctions in February 2000 the Bank of England used the London Gold Fix price benchmark to evaluate the success of the programme.

12 **Revenues arising from the first nine auctions (showing the equivalent sterling amounts)**

The nine auctions have generated $1,990 million (£1,357 million) in revenue



Note: The US$ exchange rates on the date of each auction have been used to calculate the individual equivalent sterling amounts. At the current exchange rate $1.467 = £1 (18 December 2000) the total sterling equivalent is £1,357 million.

Source: National Audit Office analysis of auction results

13 **Summarised results of the first nine UK auctions**

Analysis of the results of the first nine UK gold auctions

Method of sale	6 July 1999	21 Sept 1999	29 Nov 1999	25 Jan 2000	21 Mar 2000	23 May 2000	12 July 2000	19 Sept 2000	7 Nov 2000
Price	$261.20	$255.75	$293.50	$289.50	$285.25	$275.25	$279.75	$270.60	$264.30
Proceeds	$210m	$206m	$236m	$233m	$229m	$221m	$225m	$218m	$212m
Bid Cover Ratio 1	5.2	8.0	2.1	4.3	3.0	2.7	1.3	2.6	3.3

Note: 1 The bid cover ratio is routinely released after each auction. It shows the extent to which the volume of gold bid exceeded the volume offered. For example, a bid ratio of 2:1 would mean that 50 tonnes of gold were bid at an auction where 25 tonnes were on offer. A ratio of less than 1:1 would mean that there was insufficient demand for the amount on offer.

Source: National Audit Office

2.12 For the purposes of this examination we undertook key comparisons between:

- The UK auction prices and, as the auctions take place after the morning Gold Fix, with the afternoon London Gold Fix prices on the same day. The afternoon Gold Fix price is most often used when prices are referred to as, although volume information is not available, volumes traded are considered by the market to be greater than in the morning.
- The average UK auction price and the average London Gold Fix price over the period of the sales.

In this section we use the Gold Fix as the best available price benchmark. As explained earlier, it is important to note that the Gold Fix is by no means perfect as a benchmark, and that the prices observed at the Gold Fix could have been lower if the gold had been sold through it.

2.13 **Figure 14** illustrates that, apart from small price variations, the prices achieved at each of the auctions were in line with the London Gold Fix price benchmark on the same day. The difference between the average auction price and the average London Gold Fix price[3] was 21 cents (0.1 per cent) above the fix, which is not a statistically significant figure. Average price variations would need to be at least +/- $2.50 (1 per cent) to be significant.

2.14 If gold prices had risen markedly after each of the auctions, this could have been an indication that the auctions had temporarily deflated the market. **Figure 15 overleaf** shows that gold prices have tended not to rise after the auctions. The increase in price following the second auction is as a result of the European central banks' agreement (see Figure 6 in the Executive Summary).

2.15 A similar picture is found when comparing the average prices achieved over the nine auctions to the average of the afternoon London Gold Fix prices from the first auction on 6 July 1999 and the most recent auction on 7 November 2000 (**Figure 16 overleaf**). This was undertaken to show the price achieved in the auction against the best available estimate of the gold price over the period of the auctions. The average Gold Fix price over this period was $279.56 - a price difference of 1.6 per cent. Excluding October 1999 because of the volatility in the gold market seen that month gives an average Gold Fix price of $277.50 - a price difference of 0.9 per cent.

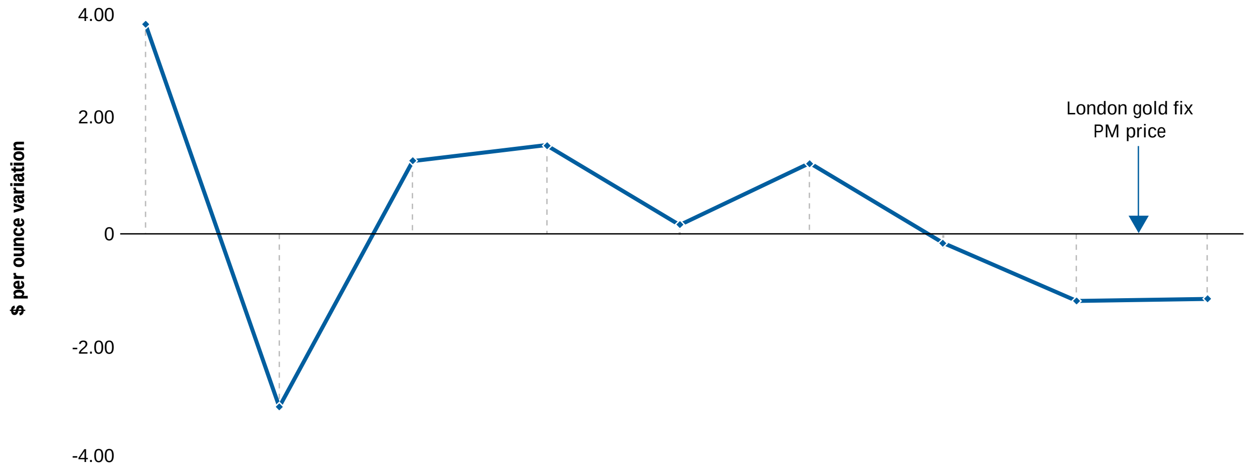
2.16 If the Treasury had decided to sell through the Gold Fix it would have been able to start the sale programme earlier. We therefore also compared the average auction price achieved of $275.01 against the average price over the 18 month period starting 10 May 1999. An 18 month period was chosen on the basis of there being an auction held every two months. The average Gold Fix price over this period was $278.08 - a price difference of 1.1 per cent. Excluding October 1999 because of the volatility in the gold market seen that month, the average Gold Fix price is $276.18 - a price difference of 0.4 per cent. The price variations of 1.6 per cent and 1.1 per cent shown in Figure 16 are not statistically significant and on this basis it can be concluded that the auction prices were in line with prevailing market prices. Given the small number of data points variations would need to have been in the order of 4.2 per cent or above (greater than $291.50 or less than $268 per ounce) to suggest with any statistical significance that the auctions had performed better or worse than the market.

Recent gold reserves sales undertaken in other countries have typically achieved similarly competitive prices

2.17 To provide another indication of the success of the UK auctions we commissioned consultants Gold Fields Mineral Services to establish the selling practices adopted in nine[4] other central bank gold reserve sales and to estimate how well they performed in relation to London Gold Fix prices at the time. This was a difficult

14 Price variations from the London Gold Fix Price (PM) on the day of each Auction

The prices achieved at the auctions have been in line with London Gold Fix prices on afternoon of the same day



Auction	1	2	3	4	5	6	7	8	9
$ per ounce variation	3.60	-3.10	1.25	1.50	0.10	1.20	-0.20	-1.25	-1.20

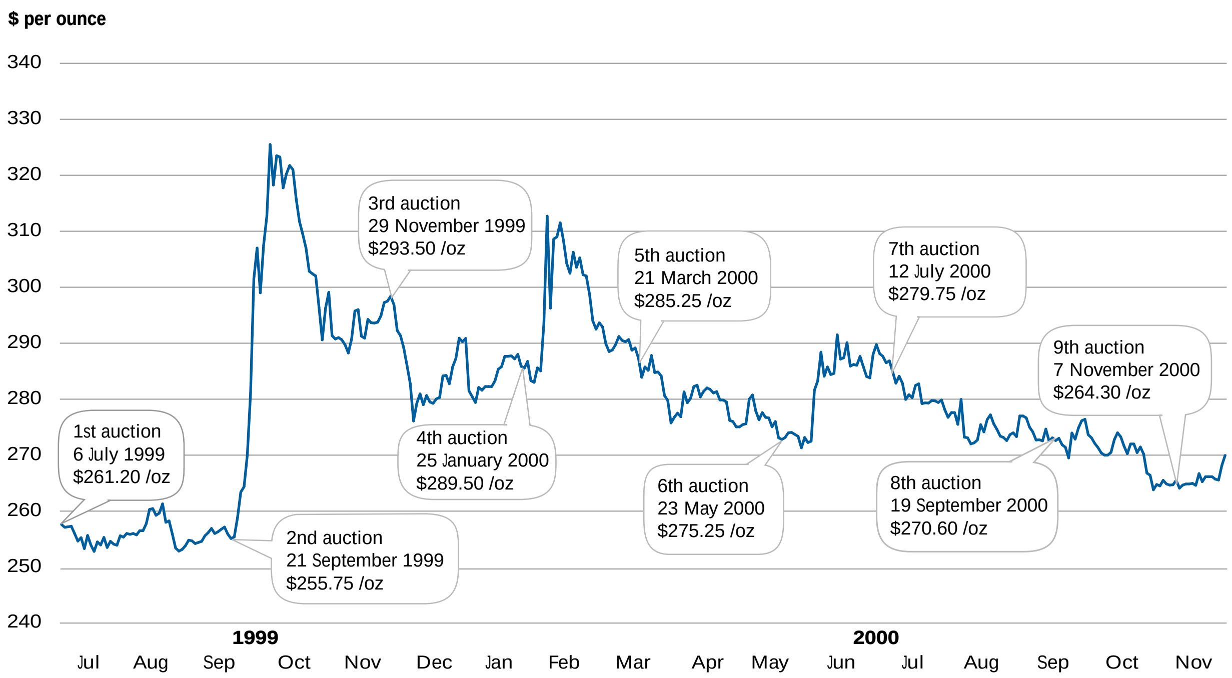
Source: National Audit Office

3 *This is not the afternoon London Gold Fix price over the 18 month period of the auctions. It is the average of the nine London Gold Fix prices on the day of each auction.*

4 *The nine countries examined had been selected for comparison because they had all sold gold reserves during the past five years*

15 **Variations in London Gold Fix prices following each of the UK auctions**

The prices achieved at the auctions have been in line with London Gold Fix prices on the afternoon of the same day



Source: National Audit Office

16 **A comparison of the average gold price for the nine auctions to the average afternoon London Gold Fix**

The prices achieved over the first nine auctions has been in line with the afternoon London Gold Fix

Average London Gold Fix Price	Average Auction Price	Variation ($)	Variation (%)
$279.56[1]	$275.01	-$4.55	1.6%
$278.08[2]	$275.01	-$3.07	1.1%

Notes 1. From the first auction on 6 July 1999 to 7 November 2000 the last auction before this report was finalised.

2. 18 months from 10 May 1999 when sales through the Gold Fix could have commenced, if this method had been used

Source: National Audit Office

exercise to undertake mainly because most central banks do not typically publish the gold prices achieved in individual sales and are often unwilling to disclose this kind of information. In some cases Gold Fields Mineral Services had to rely on estimates based on expert knowledge of market conditions at the time and discussions held with the seller prior to, and during, this examination. We also accompanied Gold Fields Mineral Services during their visits to three of the countries examined (Switzerland, Austria and the Czech Republic) to provide added assurance on the information obtained. While the analysis that follows therefore provides a strong indication of the prices achieved in overseas gold sales, and has been agreed with the countries concerned, we have not been able to audit the figures.

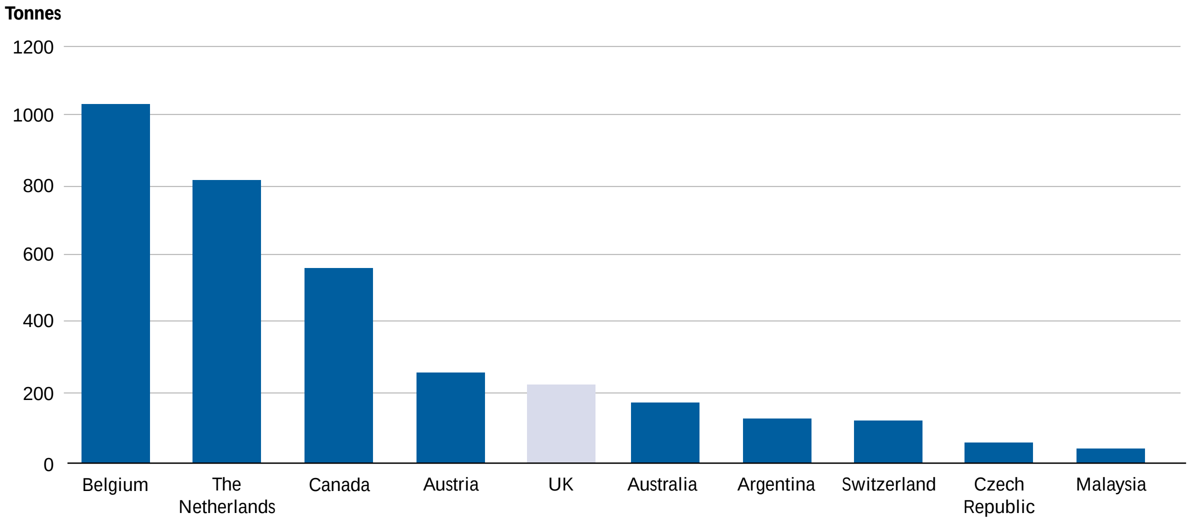
2.18 The nine countries were chosen because they had sold gold in the last five years. **Figure 17 opposite** illustrates how much gold each country has sold compared to the UK, covering the period from 1987 when some of the sales first started. Whereas some countries such as Austria, Belgium and Canada have sold fairly regularly during this period (in some cases every year), other countries such as Argentina, Australia, the Czech Republic, Malaysia, Netherlands and Switzerland have only entered the market as sellers occasionally. Other countries, such as Austria who were keen to avoid the impression that they had, in any way, been forced to sell gold (and sold via minted gold coins), have adopted a more low key and incremental sales strategy. The different motives in selling gold in the countries examined has had an influence on how they have sold gold (see Appendix 4).

2.19 The prices achieved in gold sales in most other countries have been within 4 per cent ($10 per ounce) of the London Gold Fix afternoon price at the time[5]. While this variation may, for some countries, appear quite large (particularly after it is multiplied by the quantity sold), the prices achieved are not statistically different from the price benchmark - the London Gold Fix. In the cases of

5 *or with the average London Gold Fix price over the period of a country's gold sales*

17 The volume of gold sold by countries (since 1987) included in NAO international comparison

The nine countries whose gold sales were compared with the UK sales



Source: National Audit Office

Argentina and the Czech Republic, both countries have sold discreetly and without prior announcement through derivative sales. The sales of both countries involved the use of 'Put Options' and the writing of 'Call Options' which, in effect, give the seller the opportunity to sell at an agreed price at an agreed point in the future. This strategy was risky in that it provided the potential for significant gains if the gold price fell before the option was exercised but there was also the risk of significant losses if the gold price had increased. In both cases the market price of gold fell and both countries achieved a higher price than that prevailing at the time when the sales were completed. But this was because in effect they had sold a few years earlier. Such an outcome cannot be guaranteed as price fluctuations can often work against a seller. There is no evidence that Malaysia, which also used options, achieved a price better than the benchmark.

2.20 The comparisons undertaken for this analysis show that where countries have combined derivative sales with flexibility in the timing and quantities sold, small price advantages have sometimes been won (for example the case of Canada described in paragraph 4.12). This will certainly not always be the case - Belgium for example, had such an approach and did not achieve a higher price (paragraph 4.13). As noted above, the difference in price achieved is not statistically significant.

2.21 Secondly, the evidence taken from comparisons of foreign central bank sales suggests that sales undertaken discreetly and without prior announcement (which accounts for the vast majority of non-UK gold reserve sales) can sometimes give rise to a small price advantage - as can be seen, for example, in the case of the Australian sales, or a small price disadvantage, for example, in the case of the Belgium sales - Appendix 4. (In both examples the price difference was not statistically significant). This might be because if buyers are not informed in advance of an increase in supply, they cannot change their buying behaviour accordingly. In contrast where an increase in supply from a reserve holder is made public and the demand for gold has not increased, buyers will usually (but not always) attribute a lower value to gold. Professor Binmore, on behalf of the Economic and Social Research Council's Centre for Economic Learning and Social Evolution, argues in Appendix 3 that the advantages of selling gold discreetly have to be balanced against the disadvantages of potentially creating the impression that more gold is to be sold than is actually planned, and that the balance lies with transparency on this front. Separately, the requirements of the International Monetary Fund's Special Data Dissemination Standard* now means that total secrecy is only an option for a maximum of one month. The merits of transparency are also discussed in Part 4 of this Report.

* *See Glossary*

The investment of sales proceeds in foreign currency securities has generated additional revenue

2.22 Over the medium-term, as a result of the gold sales programme, the share of gold in the net reserves will fall from around 50 per cent to around 20 per cent. The proceeds of the gold sales programme were received in US dollars and were re-invested in foreign currency interest bearing assets - the currency split being 40 per cent US dollars, 40 per cent Euros and 20 per cent yen, which is consistent with the currency split of the net reserves. To establish the extent to which these changes have altered the return, risk and liquidity characteristics of the portfolio, it is necessary to compare the portfolio that will arise as a result of the gold sales programme with the portfolio that would have arisen had the programme not taken place.

2.23 Although it would be possible to calculate the implications of the gold sales programme over any time period, in the Treasury's view a meaningful value for money assessment of the financial benefits to sell gold could only be undertaken over the medium to long-term, since a misleading impression of the benefit, or otherwise, of the restructuring may arise if too short a period is used for the calculation. Over the short-term, temporary fluctuations in asset prices may tend to impact unduly on the calculation and mask the benefits of diversification and risk reduction. With a sufficiently large run of data, however, the longer-term trends in returns and risk can be more reasonably demonstrated.

2.24 At Appendix 5 the Treasury describes how it would evaluate the impact of the restructuring programme on the risk and return of the UK net foreign currency reserves. The proceeds generated from the first nine auctions of some $1,990 million (£1,357 million based on the US$1.467/£ exchange rate at 18 December 2000 shortly before this report was finalised) have been re-invested as shown in **Figure 18**.

2.25 In revenue terms, this re-investment generated an additional return to the taxpayer of US$28 million[6] (£19 million) over the year to 6 July 2000, and this has increased to US$52 million (£35.5 million) by 7 November 2000. This would not have been generated had all 225 tonnes remained in the reserves as gold. The returns will, of course, continue to increase as more of the gold is sold and re-invested.

2.26 Since the auction process began, the difference in value between the portfolio of assets bought with the proceeds of the gold auctions and the portfolio that would have existed if no gold had been sold, has fluctuated widely. These fluctuations have been due to changes in the gold price, exchange rates and short-term interest rates. Snapshot figures we have calculated show that the change in the value of the reserves, as a result of the sales, has varied widely over the period. At 18 December 2000, when this report was finalised, there was a gain of US $34 million (or around £23 million).

2.27 The sales programme also has an impact on the "riskiness" of the reserves as a whole. The riskiness of different portfolios needs to be considered. Three factors need to be taken into account:

- the weighting of the individual assets held in the net reserves (e.g. US$, Euro and yen interest bearing assets, and gold)
- the volatility of the return on the individual assets held
- the correlation between the returns on the individual assets held.

2.28 The riskiness of a portfolio of financial assets is usually measured in terms of its "value at risk[7]" which is a concept which captures these three factors. Estimates for the value at risk of a portfolio where gold represents 20 per cent of the portfolio (with the remaining 80 per cent of the portfolio being invested in dollars, euro and yen, split 40:40:20) are around 25 per cent lower than for a portfolio where gold represents 50 per cent of the value of the portfolio (where 50 per cent of the portfolio would be invested in dollars, euro and yen).

2.29 The returns on the two portfolios should only be compared in conjunction with their impact on the riskiness of the net reserves as a whole. The fact that the return on the portfolio containing 50 per cent gold might be higher or lower than that of the portfolio containing 20 per cent gold is not meaningful in itself. If the return on one portfolio is higher than that on the other and the risk is lower then this portfolio is clearly preferable to the other. If the return is higher and the risk is also higher or if the risk is lower and the return is also lower then which of these two portfolios is "better" will depend on the risk/reward preferences of the investor.

18 The Investment of Sale Proceeds from the First Nine Gold Auctions in Foreign Currency Securities

The proceeds from the first nine auctions have been invested in a spread of foreign currency reserves.

Currency	Percentage	Total of local currency acquired after each auction	Sterling value of local currency at 18 December 2000
US$	40%	$796.1 million	£542.7 million
Euros	40%	€835.7 million	£510.3 million
Yen	20%	¥42,842.9 million	£260.7 million

Source: *Bank of England*

6 *Using US$1.467/£*

7 *Value at risk measures the maximum potential change in the value of a portfolio with a given probability over a given time horizon - for example 99% of the time, losses over a 10 day period will not exceed £x million, where "x" will vary depending on the portfolio being examined.*

Part 3

The chosen means of selling gold satisfied the objectives and worked well

3.1 The decision to sell a proportion of the gold reserves followed a long period of stability in the volume of gold held. The Treasury therefore had not previously implemented a major programme of gold sales. In the months leading up to the first auction the Treasury worked with its agent - the Bank of England - to identify the options available and to select the most appropriate route.

3.2 This section of the Report focuses on the thinking behind the Treasury's selection of an auction methodology and the steps that it took to ensure a smooth and technically successful auction programme. In particular this part of the Report sets out:

(i) the implications of the Government's objectives

(ii) the merits of different forms of sale

(iii) the technical implementation of the auction programme

(iv) the mechanisms in place to evaluate the programme.

The evidence used for this analysis is drawn from a variety of sources including professional input from the study's expert panel (see Appendix 2), consultancy work undertaken by Gold Fields Mineral Services looking at recent overseas central bank sales, academic input from Professor Binmore and a detailed survey of the members of the London Bullion Market Association.

The Government's objectives

3.3 The objectives for the sale programme were to - **'sell around 415 tonnes of gold in a transparent manner, over the medium term, fairly and with a view to obtaining value for money for the taxpayer'**. The following section considers each element of the objectives and how they impacted upon the form of sale selected.

Transparency and predictability

3.4 Much of the analysis undertaken by the Treasury was driven by the requirement to sell gold in a 'transparent manner' which the Government views as generally enhancing value for money in the long run. Internationally, particularly in the United States and the International Monetary Fund, there has been increasing emphasis on transparency of intentions towards gold sales.

3.5 The Treasury was very much influenced by its experience in selling government bonds. During the mid-1990s, the UK government switched its method of sale of government bonds from a mainly short-term flexible approach to a more transparent one, based largely on auctions, which the Treasury considers would have a positive impact on revenues[8]. The move was driven by the following factors, which are explained in greater detail at Appendix 6:

- transparency reduces the risk premium priced into government bond yields
- the authorities are unable to outguess the market on its processing of information
- participation in bond auctions should increase with predictability
- increasing competition for global capital means that issuers cannot rely on captive investors.

8 *See Report of the Debt Management Review, 1995 and Treasury evidence to the Treasury Select Committee's Report, Government's Debt and Cash Management, May 2000.*

3.6 These factors apply with less force in the gold market. The UK is not the monopoly supplier of gold (unlike in government bonds) and the sales process is limited to three years rather than being long-lived. The UK authorities are not perceived to have inside information about the future price of gold other than relating to their own investment intentions. Nevertheless, the Treasury considers that the above factors still point to the desirability of transparency and predictability in any gold sales process, be it an auction or secondary market sale. In particular the Treasury took account of:

- **Absence of information on the future price of gold in the short-to-medium term.** While the UK's portfolio decision to sell over half of its gold reserves was motivated by long-term risk and return considerations, there is no reason to believe that the Treasury or the Bank of England will know better than the gold market whether the future price of gold will be higher or lower than its current level. They therefore expect revenue from selling on a pre-announced basis to be at least the same as that from a more flexible approach.

- **A predictable auction schedule reduces the risk premium in the gold price during the sales process.** If the UK were known to be a seller over a period, but had discretion over when to sell, the gold price would be depressed not only by the additional supply but also by the strong likelihood that any temporary rally in the price would be used as an opportunity to sell by the UK. Hence, the speculative demand for gold would, other things being equal, be limited by the capping of likely capital gains, so depressing the level of the gold price during the sales process.

- **A predictable auction schedule encourages participation.** By pre-announcing auction dates and quantities in advance, the UK gold auctions should encourage participation by gold traders and investors wishing to transact in quantities that would incur significant transaction costs in normal market conditions. Hence, an auction process can attract demand that may not have been manifested if sales had been discretionary and opaque.

Value for Money

3.7 Assessing which sales strategy will achieve the best price is inevitably speculative and difficult to do, not least because the short term price of gold tends to be volatile (**Figure 19**). Moreover it is typically difficult to obtain authorative information on the prices achieved through different mechanisms of sale. It is also often difficult to infer from ostensibly 'successful' sales (or for that matter 'unsuccessful' sales), whether the price achieved can be attributed to the method used or to other contemporaneous factors. The Treasury took the view that given the requirement to sell transparently, there would be little, if any, difference between available 'transparent' mechanisms of sale in terms of the price achievable (discussed in paragraph 3.18).

Fairness

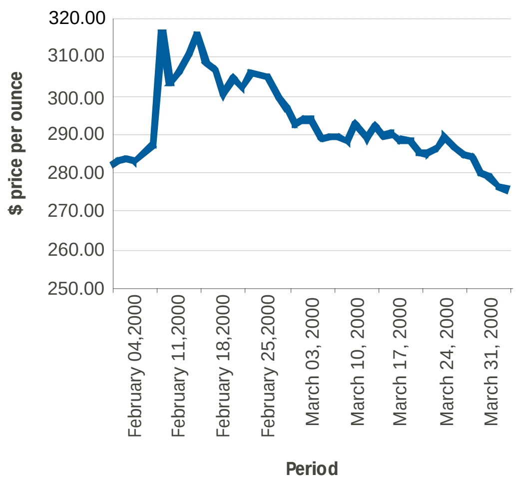
3.8 The requirement for the sales to be conducted 'fairly' meant that potential buyers needed to have an equal opportunity to participate in the sales programme. This meant that in formulating a sales strategy the Treasury needed to pay attention to providing clear and widely available information, to addressing enquiries in an even handed manner, and offering a form of sale that provided equal access to interested parties.

The merits of different forms of sale

3.9 There are many ways in which gold can be sold. **Figure 20 opposite** highlights some of the main approaches that are used by major buyers and sellers. The remainder of this section describes the key characteristics of each.

3.10 Perhaps the most familiar method of sale, certainly to the UK gold market, is the London Gold Fix, which allows gold to be traded twice daily through a dedicated 'Fixing' room at NM Rothschilds. As well as providing a market place for gold trading, the London Gold Fix is recognised internationally as providing a daily benchmark price for gold and is the best available indicator of the 'market rate' for gold at any one time. A description of the London Gold Fix is provided in Figure 2 in the Executive Summary. The London Gold Fix can be thought of as a flexible mechanism for selling gold as it allows sellers to determine, on a daily basis, the quantity of gold they would like to place on the market. Traders can also react to the conditions of the market very quickly through use of the twice-daily Gold Fix sessions. Unlike an auction approach, information is not made available on the total

19 **An illustration of short term price volatility**



Source: National Audit Office

quantity of gold traded through the Gold Fix. The Gold Fix is a competitive market place and allows a wide range of interested parties to participate in purchases and sales whether directly (as a Gold Fix member) or indirectly through representatives.

3.11 Private sales, that is sales between two parties off the market, is another means of selling larger quantities of gold. Private sales can either be arranged directly with a buyer (perhaps another central bank) or through an agent such as the Bank for International Settlements. The Bank for International Settlements was created in 1930 as a non-political central bank, and has widely been used by central banks to buy and sell gold discreetly on their behalf. Many of the gold sales undertaken by central banks have been undertaken through such arrangements either in the form of direct sales or through derivatives (explained in paragraph 3.16).

3.12 The merits of private sales lie in the short-term benefits of selling discreetly. Private sales are usually conducted without sellers making their intentions known to the wider market. Whilst this may contribute to a climate of uncertainty for gold traders (in that traders may have to second-guess the actions of major buyers and sellers) the short term effect is to minimise disruption to the market and avoid driving the price downward. This potential advantage of private sales, however, has to be balanced against the potential disadvantage of creating the impression that more gold is to be sold than is actually planned, which could potentially depress the gold price. In the case of large sales, when the market realises what has happened, the price may move downward as it adjusts to the new information. According to one of our expert panel members, in the case of the Belgium sales in 1995 and Dutch sales in 1998, the gold price rallied after the sales were formally announced, because so much gold had been sold and the price had not been unduly depressed.

3.13 Another option examined by the Treasury was sale through an auction. Gold sales using an auction method had not been used since the US Treasury and International Monetary Fund sales of the 1970s. Between June 1976 and May 1980 the US Treasury and the International Monetary Fund sold 1,310 tonnes of gold reserves using a variety of different auction methods. These included the 'Multiple Price Auction' where successful bidders pay for gold at the price bid, and the 'Uniform Price Auction' (the model adopted by the UK Treasury) where successful bidders pay a single price that represents the lowest bid in the range of successful bids. An illustration of how the selling price is determined in a Uniform Price Auction is shown in **Figure 21 overleaf**.

20 The main methods used for selling gold and their advantages and disadvantages

There are many ways in which gold can be sold

Date	Key Advantages	Key Disadvantages
The London Gold Fix	well established method flexible method of sale provides daily price 'benchmark'	less suitable for large volumes not entirely transparent bidding patterns are not disclosed
Private sales e.g. through agents such as the Bank for International Settlements	widely used by central banks minimises short-term market disruption can assist 'quick' sales	not very transparent method may not always find buyers may lead to later market disruption because of lack of transparency
Auctions:		
Uniform price	transparent and encourages participation reduces the winner's curse* selling price is disclosed	less flexible method of sale initially unfamiliar to the gold market high profile
Discriminatory	transparent selling price is disclosed initially unfamiliar to the gold	less flexible method of sale relatively resistant to collusion market high profile
Vickrey*	buyers bid true demand demonstrably competitive most resistant to collusion	less flexible method of sale unfamiliar and untested method high profile
Derivatives:		
Selling forward	established approach in gold market minimises short-term market disruption can be managed flexibly	not very transparent method less suitable for selling large amounts may lead to later market disruption because of lack of transparency
Option contracts	flexible method of sales familiar to the gold market immediate impact on spot market may be less	not transparent costly complex risks to manage

Source: National Audit Office

* *See Glossary*

3.14 During the US sales of the 1970s these methodologies were tested and evaluated, giving rise to a strong body of literature on the relative merits of different auctioning strategies. The UK Treasury, in its assessment of alternative methods of sale, drew on this research in selecting the Uniform Price Auction approach used for all of the UK gold reserve sales to date.

3.15 Auctions have at least two inherent advantages. First of all, auctions provide a demonstrably competitive market place for gold buyers. Buyers, as members of the London Bullion Market Association, have an equal opportunity to submit bids and to purchase gold providing they bid above the clearing price (see **Figure 21 below** for explanation of Uniform Price Auctions). Secondly, auctions can be used to provide information to the market such as the selling price. They are by nature very transparent.

3.16 A final well-established and typically discreet method of sale assessed by the Treasury and the Bank of England is the use of 'derivatives'. A derivative is a generic term for a range of financial instruments that include 'selling forward' and 'options'. Selling forward, for example, involves a legally binding contract for the delivery of a specified quantity of a commodity, in this case gold, at a specified time in the future, and at an agreed price. 'Options' give the purchaser the option, rather than a legal obligation, to buy or sell at the date agreed in the future. Options may also be costly to purchase. Derivatives can help to spread the risks associated with buying and selling gold, and options can offer the prospect (but not a certainty) of rising in value beyond the 'agreed price'. Derivatives, however, are rarely used in a transparent manner and involve potential downside as well as upside risk.

3.17 The Treasury undertook two formal assessments of the options available to it in order to sell gold - the first was completed some three months before the first auction, and the second appraisal (the first progress review) was undertaken in February 2000 between the fourth and fifth UK gold auctions. In undertaking these assessments the Treasury received technical advice from the Bank of England as its agent, and looked towards the experiences in other securities sales and gold sales in other countries to learn lessons. **Figure 22** describes the methods used in recent sales in other countries. The Treasury's assessment concluded that the most appropriate way to sell gold was by selling 25 tonnes of gold once every two months using a Uniform Price Auction. The second assessment confirmed the case for a continuation of this approach.

21 A simplified illustration of how the selling price is determined in a Uniform Price Auction

The Uniform Price Auction operates so that successful bidders pay a single price which is usually lower than their bid price.

Assumptions: i) 13 tonnes of gold are on offer
ii) Bids received are arranged in descending order

Company1	Quantity Bid	Price Bid	Cumulative Quantity Bid	Uniform Price of
A bids for	2 tonnes at	$280	2 tonnes	$277
A bids for	3 tonnes at	$279	5 tonnes	$277
B bids for	1 tonnes at	$279	6 tonnes	$277
C bids for	5 tonnes at	$278	11 tonnes	$277
D bids for	2 tonnes at	$\boxed{\$277}$	$\boxed{13\ tonnes}$	$277
E bids for	3 tonnes at	**$276**	16 tonnes	n/a

Note: 1. It is possible for a bidder to put in more than one bid. The cut-off points for bids is 13 tonnes. Companies A, B, C and D are the successful bidders having offered the highest prices for the quantity on offer. Each pay a single price of $277 per tonne of gold - which represents the lowest of the successful bids.

Source: National Audit Office

22 The methods of sale adopted by other central banks selling gold in the last 5 years

Country	Quantity Sold in tonnes	Period of Sale	Method of Sale
Argentina	125	Jan - Jul 1997	Derivative - Option sale
Australia	167	Jun 1997- Sep 1997	Derivative - Forward sales
Austria	258	1989 - 2000	Gold Coins
Belgium	1,034	1987 - 1998	a) Bank for International Settlements b) Private sale*
Canada	634	1980 - 1999	a) Spot Sales** b) Derivative - Forward sales
Czech Republic	56	Sep 1997 - 1998	a) Derivative - Forward sales b) Derivative - Option sales
Malaysia	36	Aug 1999	a) Derivative - Option sales
Netherlands	813	Jan 1993- Feb 2000 on-going sales programme	a) Unnamed counterparties b) Derivative - Option sales c) Bank for International Settlements
Switzerland	160	May - Dec 2000 on-going sales programme	Bank for International Settlements

* These may have been direct sales to other central banks via intermediaries

** Sales directly into the gold market through mechanisms such as the London Gold Fix

Note: This table shows that most other gold sales undertaken by central banks in recent years have been undertaken discreetly through the Bank for International Settlements or using Derivatives (explained in paragraph 3.16)

Source: Gold Fields Mineral Services Ltd

3.18 Figure 4 in the Executive Summary sets out how well different forms of sale compare in terms of transparency, value for money and fairness. An auction methodology clearly meets the policy objective very well - typically providing a strong degree of transparency, providing a forum that is likely to offer competitive prices and is demonstrably fair. The particular form of auction adopted - the Uniform Price Auction - may have a slight advantage over the next best alternative - the Multiple Price Auction - in that it may encourage more bidders to participate. This is because bidders who are unsure of the true valuation of the gold being sold, and concerned in case they find the bid price out of line with market prices, are encouraged to participate because the risk of paying an inflated price ("the winner's curse") is reduced. While the arguments between uniform and multiple price auctions are finely balanced, the Treasury's decision to sell through a Uniform Price Auction was well-informed.

The technical implementation of the auction programme

3.19 The Government's decision to sell gold reserves and the auction method of sale to be adopted were made known to the gold market for the first time on 7 May 1999. In the lead up to the first auction on 6 July 1999, the Treasury and the Bank of England needed to take steps to ensure that:

- the gold market understood the intentions of the UK Government
- the gold market understood the procedures for buying gold
- the auction format was sufficiently well tested
- technical difficulties associated with the auction were kept to a minimum.

3.20 In considering how well the auction process was managed we undertook a survey of members of the London Bullion Market Association - those eligible to bid in the auction. The following section outlines the main findings of this analysis.

Understanding the Government's intentions

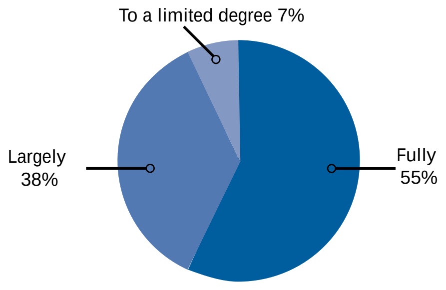
3.21 As referred to earlier in this report, one of the principal objectives of the gold sale programme was to undertake sales in a 'transparent manner' so that the gold market would be clear about the intentions of the Government. This is important because it helps to remove uncertainty from the sales process and should help to encourage potential bidders to participate. It also contributes to a wider objective, that a Government, as a responsible gold holder, should be as open as possible in its dealings with the market.

3.22 Our survey of London Bullion Market Association members showed that all respondents felt that 'the communication of policy objectives 'was sufficiently clear and detailed', and the vast majority of respondents (93 per cent) were equally content with the information provided on 'the Government's intentions in the short-term' **(Figure 23)**. The discussions that we held with key market participants throughout the course of this investigation confirmed the view that the market had been well-informed following the decision to sell part of the gold reserves.

3.23 This high level of success is partly explained by the efforts the Bank of England took in holding formal and informal discussions with key participants throughout the process. We asked members of the London Bullion Market Association whether they thought they should have been consulted more on the best way to sell gold. As illustrated in **Figure 24** just over half of those who expressed an opinion thought that members should have been consulted more, while 48 per cent thought

23 **To what extent was advance information on the 'Government's intentions in the short term' made sufficiently clear and detailed?**

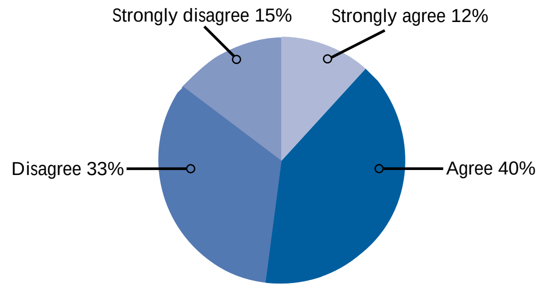
The vast majority of respondents were content with the clarity and detail of advance information on the Government's short term intentions.



Source: National Audit Office survey

24 **Members of the London Bullion Market Association should have been consulted on the best way to sell gold**

More than half of respondents agreed that members of the London Bullion Market Association should have been consulted on the best way to sell gold.



Source: National Audit Office survey

they should not have been. Bullion market players clearly have a great deal of practical knowledge of potential mechanisms of sale (although as auctions were an unfamiliar method of selling gold in the UK this would have been unlikely to have included information on this mechanism) and may well have been able to assist the Treasury and the Bank of England in their enquiries.

Understanding how to participate in the auctions

3.24 Until the first tranche of sales on 6 July 1999, auctions had not been previously used in the UK as a mechanism for selling gold. This meant that to maximise participation from potential bidders and increase the prospect of a technically successful process, the market had to be educated in the operation of the auctions. The Treasury's selection of the uniform price auction meant that particular attention had to be paid to clarifying the distinctive features of this approach, i.e. successful bidders might not have to pay the price they bid.

3.25 The Bank of England released information to the market through a combination of courier, post, fax and the internet. Contacts were set up between the Bank and firms who expressed interest in bidding and a constant dialogue was established for technical enquiries. Direct assistance was also provided to firms that needed help in setting up the electronic messaging network called SWIFT.

3.26 Our survey results indicated that all respondents felt that the procedures for buying gold had been made sufficiently clear and detailed. And all respondents expressed the view that the auction instructions provided in advance were either 'completely' clear or 'largely' clear in their explanation of the process. Furthermore as **Figure 25** illustrates, most respondents (89 per cent) felt they had been given sufficient opportunity to raise questions or concerns about the running of the auctions.

3.27 Overall the responses from the members of the London Bullion Market Association demonstrate that sufficient clarity and help had been provided in enabling the market to understand the auction process.

Testing the auction format

3.28 With the participation of regular, and some less regular, market members, the Bank of England held two trial auctions on 24 June and 29 June in advance of the first 'live' auction on 6 July 1999. The trials tested the systems and administrative arrangements, from receiving bids through to gold bar allocation to 'successful' bidders. A full 45 minute 'dummy' auction was also held to test any outstanding concerns. Care was taken to simulate the conditions of real auctions by encouraging bidders to participate actively and offer a realistic volume of bids for processing. The trials allowed bidders to use either the electronic messaging system called SWIFT or faxed bids as a surrogate for paper bids.

3.29 The trials went very well, raising only minor technical difficulties. Some bidders, for example, found it easier to use paper bids rather than the SWIFT system. This generated a notable degree of confidence in the auction process. Survey responses have supported this view with only a few minor concerns about the SWIFT system:

'paper has worked well although several problems with SWIFT - now rectified'

'there have been some technical problems with SWIFT in the last few minutes of the bid process'.

Minimising technical difficulties with the auctions

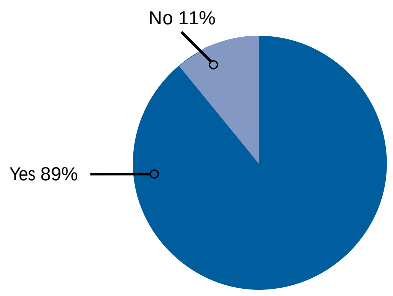
3.30 In following-up the technical success of the auctions our survey sought to identify the range and nature of problems, if any, that were encountered. While the overwhelming view of the survey respondents was that the auctions had worked well, our questions focused on three main areas:

- the bidding arrangements
- the settlement and payment arrangements
- the release of information after the auctions had closed.

3.31 On bidding arrangements, the majority of respondents (83 per cent) who had bid at least at one of the Bank of

25 Were you given sufficient opportunity to raise questions or concerns about the auction process?

Most respondents felt they had been given sufficient opportunity to raise concerns about the auction process.



Source: National Audit Office survey

England auctions were satisfied with the administrative arrangements in place (bids via SWIFT or paper-based). While our questionnaire offered three possible timeslots for the close of an auction, most respondents (72 per cent) felt that having a cut-off point at 11.30 am on the day (the current arrangement) was satisfactory and was not likely to have a significant negative impact on participants relaying bids from elsewhere in the world (potentially in different time zones).

3.32 On settlement and payment arrangements the vast majority of bidders, who voiced a view (95 per cent) felt that such arrangements had worked well. Only one bidder identified difficulties with settlement, in that after settlement 'the gold sometimes arrives late, after normal vaulting hours'. That bidder in an interview told us that when gold settlement took place after the gold market had closed it posed significant logistical problems and a potential for embarrassment to clients. This was, however, an isolated criticism.

3.33 On the release of information after the auction had closed, the majority of respondents (92 per cent) felt that the amount of information was sufficient (see **Figure 26**). Strong views were, however, given about the usefulness of the 'bid cover' statistic. This statistic shows, as a ratio, the demand bid at a single auction in relation to the volume on offer. For example, if the combined demand for gold at an auction was 50 tonnes (bids would of course be made for quantities at different price levels), and there was 25 tonnes on offer, the bid cover would be 2:1. While this ratio helps to give an indication of the interest expressed, it is potentially misleading in that it may include less 'serious', and usually lower, bids which render the statistic less meaningful. This opinion was held by a number of the survey respondents:

'the coverage ratio… is confusing at best. It would be more meaningful for the market to know at what prices total volumes were bid for'

'coverage is very misleading i.e. the Bank will only sell approx 25 tonnes, therefore the market is left open to manipulation by big bidders showing a string of bids that will translate into a substantial oversubscription'

'the 'times covered' figure is meaningless and gives ammunition to the press - should either have the average bid price included or scrap the figure altogether'

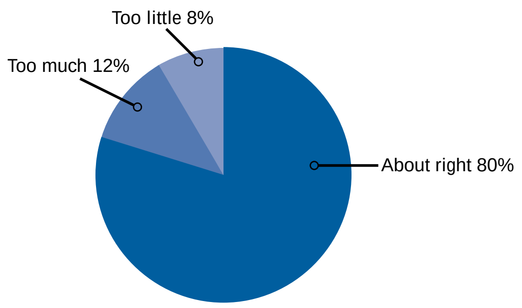
'the median bid should be disclosed and the volume bid for two standard deviations of the allotment price'

'it would be more helpful to see the full range of prices for bids e.g. in a range of $5 from auction on how much was bid for'.

The case for the Treasury providing more post-auction information is discussed in Part 4.

26 **Is the information that is released about the details of each auction (after the auction has closed) sufficient?**

Most respondents felt that sufficiently detailed information is made available after the close of each auction.



Source: National Audit Office survey

The mechanisms in place to evaluate the programme

3.34 The policy objective for the gold sale programme was expressed in terms that allowed the Treasury the freedom to interpret the relative importance of 'transparency', 'value for money' and 'fairness'. This afforded the Treasury the opportunity to draw from its own experience of similar reserve and debt sales and the Bank of England's immense experience in handling gold transactions, and to innovate where appropriate. This approach fits well with the objectives of the Modernising Government White Paper March 1999, which set a challenge for departments to innovate and take well thought-through risks:

'The Government is determined to encourage innovation and share good practice' and in the same sense auditors are encouraged to 'support innovation and risk taking when it is well thought through'.

The Treasury's actions in the implementation of the gold sale programme have been well thought through and in the widest sense the risks it has taken with reserves worth up to £2.3 billion of taxpayers' money have been well managed from selection of methods through to implementation.

3.35 The Modernising Government Agenda also tasks departments with an increased responsibility to evaluate and learn from the implementation of policies. This places an expectation on Departments to identify suitable mechanisms for evaluation at the outset of programmes and to compare performance continually against these benchmarks. In this way Departments can clearly identify the success of policies and feed lessons back into the process. In the case of the gold sales this is particularly important because the programme may continue for up to three years.

'Government should regard policy making as a continuous, learning process, not as a series of one-off initiatives. We will improve our use of evidence and research so that we understand better the problems we are trying to address. We must make more use of pilot schemes to encourage innovations and test whether they work. We will ensure that all policies and programmes are clearly specified and evaluated, and the lessons of success and failure are communicated and acted upon' ***Modernising Government White Paper March 1999***

'within a continuous cycle of policy development, evaluation is a key input to the appraisal of new policies' ***Adding It Up, Cabinet Office January 2000***

'Evaluation might be of a project, programme or policy… the rationale, aims, objectives and outputs should be clear… objectives and outputs should be defined and quantified as precisely as possible… ' ***(Appraisal and Evaluation in Central Government - The Green Book - Treasury Guidance July 1997).***

3.36 The Treasury considered the options open to it carefully and part way through the programme (after the fourth auction) commissioned a review of progress by the Bank of England. The policy objective gave a useful guide to evaluating the success of the sales and the Treasury did not establish formal evaluative mechanisms at the outset such as acceptable price levels, the level of subscription or the price reaction. We recommend that the Treasury consider establishing for future sales a formal basis for evaluating the success of the remainder of the programme.

Part 4

There may be opportunities to strengthen further the handling of future gold sales

4.1 The analysis undertaken for this Report has demonstrated that the gold sale programme has been well managed and, in meeting the Government's objectives, has helped to generate over $1,990 million (£1,357 million at the US$/£ exchange rate on 18 December 2000, when this report was finalised) in sale proceeds which have been invested in foreign currency reserves. This part of the Report examines the possibilities for strengthening further what has been thus far a successful programme.

4.2 It considers three main issues:

- Whether there might be any benefit from retaining more flexibility in the timing and quantities of gold to be sold.
- Whether market concerns can be alleviated.
- How the success of the programme is evaluated.

Retaining more flexibility

4.3 The auction programme has followed a pre-determined and regular timetable, and the volume of gold made available at each bi-monthly auction has remained the same at 25 tonnes of gold. The Bank of England's review undertaken between the fourth and fifth auctions considered the possibility of varying the quantities on offer at each auction in the light of bids received but recommended that gold should continue to be sold in a non-discretionary manner. Separately, the review highlighted some support from the gold market for a change in the frequency and size of individual tranches - typically favouring more, smaller auctions. Furthermore, many market participants favoured using the London Gold Fix which they saw as a logical extension of many, smaller sales.

4.4 Belief that transparency and predictability in the sales process would increase proceeds, which is supported by the analysis of our consultant Professor Ken Binmore at Appendix 3 on the auctioning methodology, meant that the Treasury and the Bank of England attached priority to announcing in advance the timing of the auctions and minimising their discretion to vary the terms. Retaining flexibility in the auction process (also referred to as discretionary behaviour) entails retaining an option against bidders and market-makers which might result in lower bids and lower revenues to the seller. This is because bidders would be likely to reduce their bids to take account of the possible reduction in rewards for participating successfully at the auction and some potential bidders might decide not to participate. The Treasury and the Bank of England therefore consider that the retention of greater flexibility would be likely to lead to either the same or worse value for money.

4.5 We identified some of the key forms of flexibility that could be retained and the potential implications. Professor Binmore's analysis includes a discussion of the implications of flexibility on transparency and value for money. Our other consultant, Gold Fields Mineral Services, who was retained to undertake comparisons with gold sales in other countries also carried out an analysis of the possible price benefits associated with selling on a more flexible basis. This comparative analysis is at Appendix 4. The conclusions we have drawn from these analyses and the views of the Treasury and Bank of England are set out below.

4.6 **Deciding on the size of the auction only shortly beforehand.** The size of bond auctions are usually fixed some days beforehand to enable issuers to take account of their developing financing needs. In the case of the gold sales a fixed amount is being sold and a lower quantity sold now would entail bigger auctions in the future. Other things being equal this would tend to depress forward prices. On the same basis higher quantities sold now would tend to have an upward impact on forward prices. Hence, changing the auction quantities in these circumstances may not lead to higher expected revenues from the programme as a whole.

4.7 **Announcing a range for the amount to be sold and/or deciding on the amount when allocating to bids/publishing a supply schedule in advance.** The Treasury could allow itself the flexibility to announce the amount to be made available at an auction as a range, such as 'between 20 and 30 tonnes' and/or it could retain the discretion to decide the size of the auction once it had seen the bids - selling more when there was high demand and vice versa. A variant on this has been suggested by Professor Binmore. He suggested as an example that consideration could be given to publishing a supply curve* prior to each auction allowing the Treasury to vary the amount of gold sold at each auction. The supply curve would specify the maximum amount of gold that would be sold at a given price or above. As a result the lower the bid price on the day, the less gold would be sold. This would also have the benefit of reducing the risk of demand in an auction not covering supply. He noted, however, that this approach might be criticised for the use of untested methodology.

4.8 These forms of flexibility would have the effect of stabilising after-auction price volatility as supply is adapted to revealed demand. They might not lead to a higher expected return because, as referred to in paragraph 4.4 above, the Treasury's discretion acts as an option against bidders who successfully predict the outcome of the auction. For instance, a bidder who bids high in an auction with high demand or who goes short into a poor auction will find the post-auction gains tend to be reduced by more or less supply. As a result the rewards to informed bidding may be reduced, leading market makers to make less effort to pre-place the sale or to research bidding strategies.

4.9 The Treasury considers that pre-publication of a supply schedule as suggested by Professor Binmore might lead to strategic game playing by dominant bidders. Given that bidders would have a good idea of how much the Treasury wished to dispose of through the auction process, there would be little incentive for any bidder to bid above the corresponding reserve price in the auction itself. Dominant bidders would also find it easier under this system to signal to others, if they were so minded, their intention to bid at the pre-announced reserve price, with a possible impact on the clearing price. The Treasury also attaches weight to the possibility that announcing that some of the gold on offer had not been sold might weigh on the gold price and thereby reduce the proceeds at a future auction. It considers that it cannot expect to achieve better revenues than the current market expectation and that use of any of the various forms of flexibility that can be employed during an auction process would be expected to result in it achieving the same or lower revenues.

4.10 Professor Binmore agrees with the Treasury that having the ability to vary the amount of gold at an auction would introduce some uncertainty into the market, and that all uncertainties are likely to lower the average price at which gold is sold in the market. One can ensure that no extra uncertainty is introduced into the market at an auction by keeping the reserve price so low that all the gold offered is almost certain to be sold. The cost of following this strategy would, however, be that one could no longer use the reserve price as an instrument in seeking the best value for the gold sold. Effectively doing without this instrument would therefore risk losing some revenue at the auction. There is room for differences of opinion on the relative impact of the effect of being able to vary the amount sold.

4.11 Gold Fields Mineral Services concluded that there may be price benefits associated with selling on a more flexible basis, a view supported by some of the gold market members of our expert panel. This is a judgement as the evidence, although the best that can be obtained, does not allow statistically valid conclusions. The gold sales by the Bank of Canada (on behalf of the Canadian Department of Finance) provide one example of agility in the timing of sales leading to a small, though not statistically significant, benefit in prices achieved (paragraph 4.12). Sales by other central banks on a flexible basis, for example Belgium (paragraph 4.13), did not bring price benefits. The overall analysis can, however, also be used to demonstrate that flexibility in the sales process may sometimes give rise to a small price disadvantage. The judgment of the Treasury is that on average there would be no price advantage in using flexibility.

4.12 Between 1987 and 1999 the Bank of Canada sold 557.2 tonnes of gold, representing some 80 per cent of the country's official reserves. Over this period the Bank of Canada used a mixture of sales methods including spot sales, forward sales and other derivatives. Sales varied between 8-121 tonnes from year to year but averaged at just under 43 tonnes a year. The Bank sought to take advantage of periods of higher prices and, at times, withdrew from the market when gold was under pressure. The methods of sales that were selected helped to offer the Bank flexibility in the volume and timing of individual sales so as to maximise prices. The analysis undertaken for this report by Gold Fields Mineral Services suggests that Canadian gold sales were sold at an average of $385 per ounce, some $3 per ounce above the London Gold Fix industry benchmark. Over the period of the lifetime of the programme, this gain is equivalent to $53.6 million (less than 1 per cent of total proceeds).

4.13 Between 1987 and 1999 the National Bank of Belgium sold 1,034 tonnes of gold, representing some 72 per cent of the country's official reserves. The central bank adopted a number of different sales methods, including sales via the Bank for International Settlements; sales via other central banks; some forward

* *See Glossary*

sales and supply of gold to manufacture gold coins. The analysis undertaken by Gold Fields Mineral Services suggests that the Belgium gold sales were on average $15 an ounce below the London Gold Fix benchmark.

4.14 **Deciding not to allocate to bids for price reasons.** In bond markets the issuer retains the right not to allocate to some or all of the bids on a discretionary basis, even if this entails not selling some of the quantity on offer. The price at which the seller would not allot is not published since it is likely to depress the auction price to that level. This discretion is exercised rarely because of the likely impact on future auctions. On occasion, when an issuer is prepared to allot to a low bidder, this demonstrates the value to bidders of participating in an auction if only to put in low bids. This then encourages bidding in the future, leading to greater certainty of demand. In the case of the gold auctions the Bank of England has the discretion not to allot all the gold offered and the right to re-offer the surplus gold at a subsequent auction. This discretion has not to date been used.

4.15 **Announcement of auction dates.** At a less fundamental level we also consider that the Treasury should consider not specifying precise auction dates so far in advance. Some auctions have been announced up to four months in advance of the auction date. This limits the Treasury's ability to respond to major, visible changes in the gold market and increases the possibility of the auctions being awkwardly timed in relation to other events. More recently the Treasury have announced the auction one in advance.

The Treasury should consider whether it can alleviate market concerns

4.16 During the course of this study we took steps to develop an understanding of how well the needs of the gold market had been met throughout the gold sale programme. This involved discussions with key market members and the expert panel (see Appendix 2), and a survey of members of the London Bullion Market Association. The findings of this, outlined in Part 3 of the Report, show that overall the market has been very satisfied with the way in which the sales have been handled.

4.17 As the sales programme continues the Treasury has the opportunity to adapt its approach to minimise potential disturbance to the market. The analysis conducted for this Report highlights two areas for consideration:

- the method of sale
- release of information after sales.

Needs of the market: Method of sale

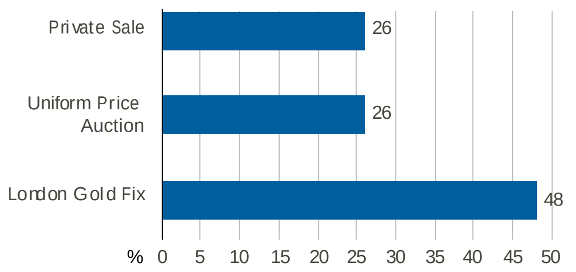
4.18 The views held by the gold market on the most appropriate way to sell gold are mixed. The survey undertaken for this examination gave respondents the opportunity to indicate, in light of the Government's policy objective, which of the forms of sale (as shown in the box below) they preferred.

Forms of sale

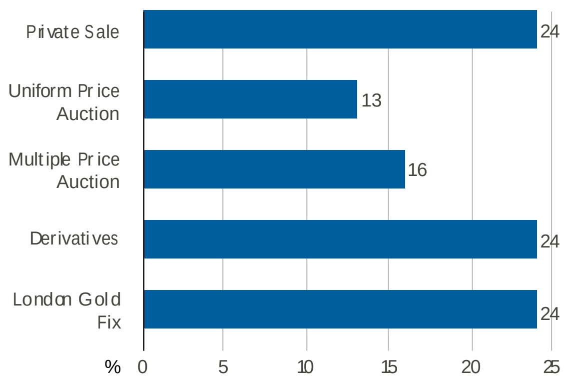
- Uniform Price Auction
- Multiple Price Auction
- London Gold Fix
- Derivative sales e.g. selling Forward, Options etc.
- Private or BIS sales
- Gold-linked bonds
- Other.

4.19 While there was not a clear majority view in favour of any of the options offered, the London Gold Fix was the most popular option, followed by a Uniform Price Auction (in other words the method currently used). **Figures 27 and 28** illustrate the range of survey responses.

27 Respondents' first choice of method of sale



28 Respondents' second choice of method of sale



4.20 The London Gold Fix has advantages and disadvantages compared to an auction approach. The main disadvantage of the London Gold Fix is that it is less transparent than an auction approach. As referred to in paragraph 3.10, total amounts sold are not available. The volume of gold sold and the precise timing of sales, however, can be varied on a daily basis. Using the London Gold Fix would also allow smaller amounts of gold to be sold more frequently, perhaps enabling the market to absorb the gold sold more easily. Market analysts have told us that since the auction programme began, volumes traded have become lower, making 25 tonnes a relatively larger amount to absorb. Auctions take time and resources to set up, advertise and run. They also carry costs for market participants. Although the costs are not great, they may make the prospect of very frequent auctions untenable. By contrast, the London Gold Fix is available twice daily for buyers and sellers to use. The majority of the London gold market considers the London Gold Fix to be fair, as shown by the responses to our survey in **Figure 29**, and agrees that selling smaller amounts of gold more regularly would be less disruptive to the market **(Figure 30)**. Some market analysts have told us, anecdotally, that they are concerned that in the week before an auction, volumes traded are lower than usual as participants look ahead to the auction.

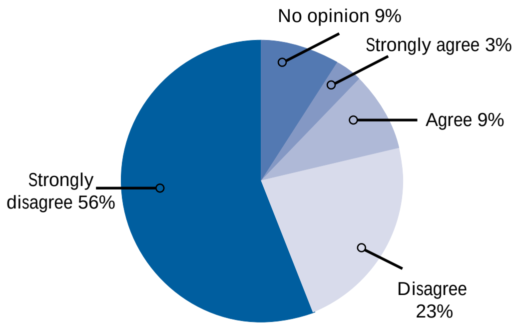
4.21 In light of the analysis undertaken for this Report, there would be support in the market for a programme of gold sales through the London Gold Fix. The Gold Fix is regarded as a fair market place and selling smaller amounts more regularly is seen as less disruptive to the gold market than the current approach. It would reduce the profile of the sales. If it chose to adopt this approach, the Treasury could, within the overall commitment to sell 415 tonnes of gold in the medium term, pre-announce its intention to sell a pre-determined volume of gold over, say, each six month period - thereby selling 'transparently'. Selling through the London Gold Fix could be managed in such a way as to satisfy partially the Government's policy objective while meeting the preferences of the gold market (although as noted in paragraphs 2.13 to 2.16, the difference in price achievable is not statistically significant). At the review after the fourth auction the Bank of England recognised the strengths of the London Gold Fix but found no compelling reasons to recommend a change in approach.

Needs of the market: Release of information

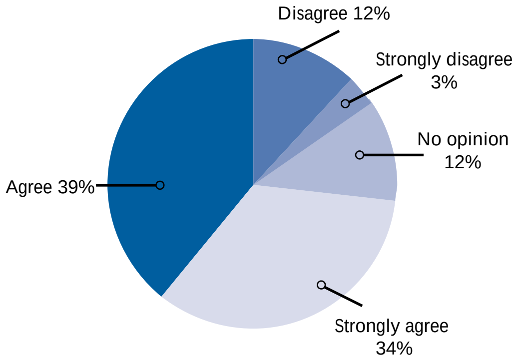
4.22 In Part 3 of the Report, the findings of the London Bullion Market Association survey highlighted some strong views about the usefulness of the post-auction 'bid cover' statistic (showing the total bid demand for gold in relation to the volume on supply at each auction). Many respondents argued that it could give a misleading picture of the 'true' level of demand and that

Most survey respondents regard the London Gold Fix as a competitive and open market place and believe that smaller, more frequent sales would be less disruptive

29 **Responses to the survey assertion 'The London Gold Fix is not a competitive or open market place'**



30 **Responses to the survey asserting 'selling smaller amounts of gold more regularly would be less disruptive to the market'**



it was susceptible to manipulation by less serious, low bids in order to artificially inflate the cover ratio. Although our analysis of bidding patterns has not found support for this viewpoint, the Treasury has agreed that it would be worthwhile to discuss with the market the advantages and disadvantages of disclosing greater information. The potential additional information that might be disclosed includes:

- the average bid price
- the median bid price
- the numbers of bidders and volumes bid in each bid range e.g each $5 range
- the volumes bid for different standard deviations from the final clearing price.

Evaluation of the success of the gold sale programme can be strengthened

4.23 The design of the policy objective has afforded the Treasury a degree of interpretative freedom to select an approach that meets the requirement to sell transparently, fairly and with a view to achieving value for money. While this examination has concluded that the sales strategy adopted by the Treasury has met the terms of the policy, the analysis undertaken for this Report has highlighted a need for the Treasury to consider formally the relative importance of each of the components of the policy. This is important because in examining alternative sales strategies, different approaches can score differently on each of the policy criteria. Taking private sales as an example, if the Treasury could have found a private buyer, such as another central bank, willing to pay above the market rate for a large quantity of gold, this would have made the choice between value for money (high), transparency (low) and fairness (low) difficult. Indicative (if not explicit) criteria weightings would have made this kind of judgement easier to make and offered a clear audit and accountability trail for the final decision. The Treasury considers that there may not necessarily be a trade-off between the different objectives as, for example, they believe that transparency can enhance value for money.

4.24 Part 3 also noted how the Treasury might establish benchmarks for establishing the success of the auctions; perhaps giving advance thought to an acceptable price reaction in the gold market, or estimating what a good 'bid cover' would be. This would encourage the seller to focus on the outcomes of the sales rather than the processes involved. As the sales programme continues the Treasury should consider putting in place more sophisticated measures and indicators of success not only as a benchmark against which performance can be assessed, but as a mechanism for triggering reviews of the method, the timing or the quantities made available. Evaluation should also involve an assessment of the risks to a programme at the outset, followed by staged reviews of changes to the exposure to risk. Whilst the programme continues to be successful, key risks to elements of the programme will change.

4.25 Putting specific trigger points in place, for example, in setting 'safe' and 'risky' bid cover levels or prices achieved which prompt a review of the method, timing or volume made available, might be warranted. Such arrangements could be introduced without placing a demand on resources or costs within the Treasury, and would position the Treasury as a more informed and pro-active manager of the programme.

4.26 The suggestions here are not intended to take away from the current success of the programme, but may add to the future successes whatever methods or strategies are adopted. The main National Audit Office messages are summarised below

Key messages for future gold sales:

- **Flexibility:** Greater flexibility in the timing of sales and the volumes made available may provide some benefits. Further thought could be given to using the London Gold Fix as an alternative or additional means of selling gold
- **Transparency:** It would be worthwhile discussing with the market the potential advantages and disadvantages of disclosing more post-auction information as a means of providing more transparency to the gold market
- **Measuring Success:** To assist in the continued success of the sale programme, success indicators should be established and risks should be pro-actively managed

Appendix 1 Examples of press cuttings

Gold sell-off attacked as price slumps

South African delegation seeks to stop gold sales

By Alasdair Murray, economics correspondent

A HIGH-POWERED delegation of South African politicians and union and business leaders arrives in London today in a last-ditch effort to persuade Britain to half its gold reserve sales.

The delegation, led by Phumzile Mlambo-Ngucka, Minerals and Energy Minister, and with the support of James Motlatsi, president of the National Union of Mineworkers, will hold meetings with the Treasury and the Bank of England to discuss the damage done by the sales, before travelling to other European capitals.

The talks come as opposition builds up in the US to International Monetary Fund plans to sell ten million ounces of gold to fund debt relief in developing countries.

A cross-party group from the US Congress - including

Sell-off pushes gold to 20-year low

MARKETS REPORT
By Paul Solman

Gold prices fell to a new 20-year low yesterday as the Bank of England's first auction of bullion reserves took its toll on market sentiment.

The price fixed in London at $261.30 in the morning, 10 cents above the price at which the 25 tonnes of gold were sold. However, by the afternoon it had slipped, fixing at $256.60,k its lowest since May 1979.

Political conventions have replaced the base metal of economic management

Was Gordon Brown a profligate fool to sell 25 tonnes of Britain's gold reserves last week at the lowest price seen in a 20-year bear market - and to insist that he will go on selling, regardless of market prices, until he has depleted 415 tonnes of the 715 tonnes of gold that the Exchequer has accumulated since the time of William the Conqueror?

Or will the Bank of England's gold auction last Tuesday turn out to be a canny investment move, unloading an unprofitable asset that is destined to fall much further once the market is hit by much bigger sales from the International Monetary Fund, the Swiss National Bank, the Australian Treasury and other official bodies around the world?

Maude calls for probe into UK gold sale

by BILL JAMIESON

FRANCIS Maude, shadow chancellor, is calling on Sir John Bourn, bomptroller and Auditor General, to mount a National Audit Office investigation into the Treasury's handling of UK gold sales.

The first auction last week of 25 tonnes from the UK official reserves at $261.20 took place amid mounting criticism over the May 7 pre-announcement of the planned sale of 415 tonnes.

The $26 price plunge to a 20-year low has wiped about £450m off the value of the UK's reserves, and the fall has continued, with the price closing at $256.45 on Friday compared with almost $290 ahead of the announcement.

Maude said in his letter to the CAG: "I hope you will agree with me that an investigation would be appropriate given the scale of the loss which is emerging.

"It is not clear who was consulted, what advice was taken and what other options were considered. People throughout the country want to know why he [the chancellor] has decided to wap the gold reserves for paper money, and why he has done it so incompetently. That is why I am asking the National Audit Office to conduct an investigation into the affair."

The next UK gold auction is due on September 21, three days ahead of an IMF meeting in 'Washington to consider the sale of 10m ounces.

All black members of the US House of Representatives have written to President Clinton protesting at the planned sale which may now be blocked by Congress in the light of last week's debacle.

Protests continue in London this week with a delegation from South Africa urging a halt to the sales.

Last week saw the closure of East Rand Proprietary mines. About 40 per cent of South African gold production is thought to be unprofitable at the current price. A further petition will be presented from the World Gold Council with 15,000 names.

And Kim Rose, the Southampton jeweller, goes to the High Court this week to seek an injunction blocking further UK gold sales.

All that glisters

For thousands of years, gold has been an integral part of the world's monetary system. At first it was the stuff from which money was made. Then, it backed up the value of paper money and formed the basis of global monetary systems. More recently, it has been held by central banks as a hedge against inflation and a fallback in times of emergency. Now, though, its role is looking increasingly anachronistic.

Yesterday, the Bank of England held the first in a series of gold auctions that will eventually halve Britain's gold holdings. The acution itself went smoothly, but the political fallout has been tumultuous. Gordon Brown, the British chancellor, has been accused of mismanaging the announcement of the sale; of masterminding an underhand attempt to get Britain into the euro; and of participating in a worldwide conspiracy to undermine the value of gold. The truth is less exciting. Gold is simply not a good investment prospect for central banks. Its price has been in the doldrums for two decades now, and the return on holding it is low (it can be lent out, but at an unexciting interest rate). With more official sales looming from the International Monetary Fund and Switzerland, prospects remain poor. The main attraction of gold is that as a real asset, it provides a hedge against inflation. But with global inflation on a firmly downward trend, this property has become less useful.

Gold can be an important part of a balanced portfolio. And it remains the safest possible asset, its intrinsic value unaffected by the whims of the world's politicians and central bankers. But, as many countries have already realised, there is no reason why it should automatically form a high proportion of reserves.

Mr Brown's decision to give notice of the British gold sale was unusual; most countries that have disposed of gold have done so secretly. Although it gave the markets a shock, the transparency is to be welcomed. Secret sales benefit insiders and create uncertainty. The rapid price fall is partly a panic reactionk, given that the volume of the UK sales is fairly small relative to total gold production.

One implication of central bank gold sales is worth worrying about: the impact on developing countries. If prices fall much further, some may need help in diversifying their economies to reduce their reliance on gold.

Gold is still, as Alan Greenspan, the US Federal Reserve chairman, recently called it, "the ultimate form of payment in the world". But the cost of this security is high. Britain's decision to sell some of its gold reserves was sensible; but will others follow?

Appendix 2

Scope and methodology of our examination

Scope

1 We examined how well the gold auctions were managed and whether alternative methods of sales were actively considered. We did not assess the merits of the policy decision to sell gold reserves or the long-term implications of investing the proceeds in foreign currencies securities.

Methodology

2 The key elements of our Study Methodology are set out below.

Benchmarking of prices

- We benchmarked the prices achieved in the first nine auctions against the established London Gold Fix PM price and the average UK auction price and the London Gold Fix price over the period of the sales. We also compared the price achieved against selling the gold through the London Gold Fix immediately after the announcement of the sales. We carried out statistical significance testing (at the 5 per cent level) of differences in average prices using t-tests. The indicative figures for the magnitudes of differences which would be statistically significant were calculated assuming no changes in within-group variances.

International Benchmarking

- We undertook a literature research of other central bank gold sales.
- We commissioned Gold Fields Mineral Services to carry out an analysis of central bank sales in nine countries who had been involved in the last five years in selling some of their gold reserves. The countries were chosen where central banks had sold, or had made a commitment to sell, more than 25 tonnes of official gold in the last five years.
- Gold Fields Mineral Services were asked to gather data on:
  - When other countries have sold gold
  - The reasons for doing so
  - The volumes sold
  - The methods of sale used
  - The reasons for selecting methods of sale
  - The amount of revenue attracted and therefore the selling price (where available)
  - The view of central banks on the success of their selling strategy.
- We undertook, in conjunction with our consultants, in country meetings with three central bank comparators - Austria, The Czech Republic and Switzerland. These meetings were held to enable us to obtain a greater insight into their gold sales and to further supplement the benchmarking data obtained through the first two stages.

Survey of London Bullion Market Association members

- We undertook a postal survey of the London Bullion Market Association members to elicit their views on the running of the auctions, the level of market consultation and the lessons that might be learned for the future.
- The survey was sent to all 53 members of the London Bullion Market Association. The main purpose of the survey was to gain an understanding on how the market viewed the gold sale and whether technical aspects of the auctions created the right conditions to facilitate full participation.
- The survey sought London Bullion Market Association members' views on the following issues:
  - Whether the information provided in official Treasury/Bank of England releases met the information requirements of the market
  - Whether alternative methods of sale would have encouraged greater market participation
  - The extent to which the auction instructions were understood by the market
  - The quality of information provided to the market following each auction
  - The extent to which the auctions ran smoothly.
- The overall response rate from members of the London Bullion Market Association was 68 per cent. The response rate from members who had been involved in making bids at the first nine gold auctions was 96 per cent.

Auction theory analysis

- We commissioned Professor Ken Binmore of the Economic and Social Research Council's Centre for Economic Learning and Social Evolution (ELSE) to produce the following academic papers:
  - **Auction theory.** This paper assesses the effectiveness of the auctioning methodology. It provides information on the different auction designs, assesses the relative merits of discriminatory auctions (or multiprice auctions) and uniform auctions (as adopted in the UK auctions); and comments on the use of a Vickrey auction.
  - **Transparency.** This paper provided a summary assessment of the academic literature on the pros and cons of transparency.

Expert Panel

- We set up an Expert Panel to provide advice and guidance during the study and to test and validate the emerging findings. Membership of the panel comprises the following experts:

Martin Stokes - Vice President of Morgan Guaranty Trust of New York and Chairman of the London Bullion Market Association.

Timothy Green - Gold Market Consultant with over 20 years experience in the gold market. The author of "The World of Gold" and "The Gold Companion" essential reading for those involved in the gold market.

Stewart Murray - Chief Executive of the London Bullion Market Association.

Andy Smith - Commodities Analyst, Mitsui.

Michael Coulson - Precious Metals Analyst.

Peter Fava - Director, HSBC Bank Plc, ex-Chairman of the LBMA.

Kevin Crisp - Director, Precious Metals, Credit Suisse First Boston.

Professor Ken Binmore - Executive Director for the Centre for Economic Learning and Social Evolution (ELSE), an expert on auction theory.

Professor Paul Klemperer - Professor of Economics, Nuffield College Oxford University, the UK and European expert on auction theory and game theory.

Appendix 3 Auctions

A paper by Professor Ken Binmore

1 Introduction

In its recent sale of gold reserves, the British government sold a total of 225 tonnes of gold in a series of auctions between July 1999 and November 2000. Its basic aims were to manage the sale in a transparent manner and to obtain value for money. This paper assesses the effectiveness of the auctioning methodology.

2 Transparency

It is not part of our remit to comment on the extent to which the goal of open government militates in favour of transparency in the selling of public assets. We consider only the extent to which transparency is relevant to the aim of achieving value for money[1]. One can distinguish three levels at which transparency was relevant in the sale of British gold reserves:

1 The announcement that 415 tonnes of gold would eventually be sold;

2 The announcement of the auctioning mechanism;

3 The announcement that specific tranches of the total would be auctioned in predetermined months (shorter notice being given of the precise date and time).

Of these, the first item is clearly the most significant and so we deal briefly with it here, although it would be equally relevant if the gold had not been sold by auction. The other items are discussed while considering the various auction designs that might have been used.

Critics of the advance announcement of the amount of gold to be sold often overlook the fact that one cannot announce an increase in the supply of a durable commodity, now or in the future, without anticipating that the current market price will fall. The real question is whether the fall in price could have been lessened by avoiding an announcement. One then has to ask what the impact on the market would have been if the news had broken that the British government were secretly selling an indeterminate quantity of gold. The risk is then that the market would overestimate the quantity of gold to be supplied by the British and other governments. Since nobody with a choice will buy gold if they anticipate that the price will be significantly cheaper in the future, the price will then plunge below the level that would follow an upfront commitment to supplying a limited quantity of gold[2].

In brief, the advantages of sneaking gold onto the market have to be balanced against the potential disadvantages of creating the impression that more gold is to be sold than is actually planned. We think the balance lies with transparency on this front, since total secrecy seems not to have been a viable option.

These considerations allow for the very real possibility that traders in the gold market may not always monitor events as closely as they might, nor use what evidence they have to form fully rational expectations about future movements in the market. However, even if traders fully exploited the available information, it would still be true that the creation of artificial uncertainty would be likely to affect the trading price adversely, especially when the potential buyers are significantly risk averse. Auctioning avoids the creation of such uncertainty by committing the seller in advance as to how he will behave in all relevant contingencies.

3 Linkage Principle

The so-called linkage principle of Milgrom and Weber [4] provides a watertight case against avoidable secrecy in certain auctioning problems, provided that the potential buyers behave optimally. The principle does not always survive intact when attempts are made to generalize it beyond the domain in which it was originally established. In particular, the extension of the linkage principle from the sale of single objects to the simultaneous sale of many objects is not always valid[3]. However, it is fair to say that it remains a benchmark of good practice from which one would need very good reasons to depart in organizing a major auction.

The linkage principle does not always apply to the reservation price in an auction[4]. Indeed, a secret reservation price can sometimes increase the number of potential buyers who will find it worthwhile to bid in the

1 *A second ELSE paper has been commissioned that targets the transparency issue directly, and so the comments offered here will be kept to a minimum.*

2 *Recall that the market actually took alarm at government sales of gold, thinking that they would be followed by other unannounced sales. The consequent drop in price was stemmed only by the announcement of an international agreement that there would be no further sales of gold beyond those already announced.*

3 *See Perry and Reny [5].*

4 *The reservation price in an auction is the least price at which the seller commits himself to parting with units of the commodity that he is offering for sale. If nobody is willing to bid at the reservation price for some units, they are retained by the seller.*

auction[5]. Since the promotion of entry to the auction was one of the reasons that governed the choice of design, a value-for-money case can therefore be made for the use of a secret reservation price, although it would have been more transparent to announce the reservation price along with everything else.

4 Different Auction Designs

When an auctioneer irrevocably commits himself in advance to how he will respond to all contingencies that may arise in the auction, it is important that the set of rules he chooses for this purpose should be carefully thought out, lest his mechanism be exploitable by strategically minded bidders. On the other hand, he would be unwise to be too innovative in designing his auction - especially when adequate entry to the auction is an issue - because he would then face the risk of frightening off bidders who feel that they may get burned by participating in an unfamiliar process. In an auction with untried rules, who knows how the other bidders may behave? Such strategic uncertainty can be as damaging as more conventional sources of uncertainty.

The need to avoid experimental designs in the gold auction meant that the choice was effectively restricted to either a discriminatory-price auction or a uniform-price auction - although we discuss the potential merits of the Vickrey auction in the next section. Both discriminatory and uniform auctions are commonplace in government sales of Treasury bonds.

How do these different auctions work? In all three auction designs, each bidder simultaneously submits a demand curve. Such a demand curve consists of a statement of how much gold the bidder undertakes to buy at each possible price. For example, a demand curve bid into the auction might specify that the bidder is willing to pay a price of £ P per unit if allocated up to Q units of gold, and a price of £ p for each extra unit if he is allocated up to q further units.

The allocation procedure in each type of auction is also the same. If the demand curves bid into the auction cover the amount of gold being offered for sale[6], then the auctioneer finds the price at which the total demand for gold equals the amount supplied for sale. Each bidder is then allocated the quantity of gold that he demanded at this clearing price. The three auction types differ in the amount that bidders are required to pay for the gold they are allocated.

In a uniform-price auction, each bidder simply pays the clearing price for each unit of gold he is allocated. In a discriminatory-price auction, each bidder pays the most for each unit that he said that he was willing to pay when he submitted his demand curve. For this reason, a discriminatory auction is often called a pay-your-bid auction. In a Vickrey auction, each bidder pays the most for each unit that another bidder would be willing to pay if that bidder had the opportunity to add that unit to his allocation.

A layman naturally reacts to these payment arrangements by asking why a seller would ever think of using anything other than a discriminatory-price auction, since this seems to extract the maximum revenue from the bidders. However, this naïve analysis fails to take account of the fact that the bidders will not necessarily bid their true demand curves into the auction. They will choose the demand curves they submit to the auctioneer strategically. In practice, bidders demand less at each price than they could really be made to pay for at that price if the seller knew their true demand curve.

How much shading of a bidder's true demand is strategically optimal depends on the design of the auction. In particular, a bidder will shade his true demand back more in a discriminatory auction than in a uniform auction. It therefore does not follow that the seller will necessarily get more revenue from running a discriminatory auction than a uniform auction, because the bidders will submit flatter demand curves in the discriminatory case.

5 Discriminatory and Uniform Auctions

Should a seller seeking value for money prefer a discriminatory auction or a uniform auction? This question has been confused by a campaign led by the Nobel prize-winners, Merton Miller and Milton Friedman, in which they advocated the replacement of the traditional discriminatory auctions for the sale of Treasury bonds by uniform auctions.

Miller was reported in the New York Times of 15 September, 1991 as saying that the chief disadvantage of discriminatory auctions is that they induce buyers to shade their bids down, but that uniform auctions eliminate this problem. In a uniform auction, "You just bid what you think it's worth." Friedman was more explicit in the Wall Street Journal of 28 August, 1991. He explains that the difference between a discriminatory and a uniform auction is that

5 See Vincent [6]

6 Which means that the total demand at the reservation price is at least as large as the amount of gold offered for sale.

all successful bidders pay the same price in the latter: "An apparently minor change, yet it has the major consequences that no one is deterred from bidding by fear of being stuck with an excessively high price. You do not have to be a specialist. You need only know the maximum amount you are willing to pay for different quantities."

A Joint Report on the Government Securities Market of 1992 produced by the US Treasury, the Securities and Exchange Commission and the Federal Reserve Board concluded that: "Moving to a uniform-price award method permits bidding at the auctions to reflect the nature of investor preferences... In the case envisioned by Friedman, uniform-price awards would make the auction demand curve identical to the secondary market demand curve."

To an economist, it is embarrassing to have to admit that Friedman and Miller made a mistake in generalizing well-known auctioning results from the case when only a single unit is to be sold to the case when multiple units are to be sold. They thought that a discriminatory auction is the appropriate generalization of a first-price auction in the single-unit case to the multi-unit case, and that a uniform auction is the appropriate generalization of a second-price auction in the single-unit case to the multi-unit case[7]. However, the proper generalization of a second-price auction to the multi-unit case is not a uniform auction. It is a Vickrey auction. Miller and Friedman were therefore wrong to assert that it is optimal for bidders to submit their true demand curves in a uniform auction.

In general, bidders will normally shade back their true demand in a uniform auction - although not by as much as in a discriminatory auction. The seller's revenue is calculated differently in the two cases, and so the fact that bidders shade back their bids more in a discriminatory auction does not imply that the sell will necessarily make less money in the discriminatory case. Actually, Ausubel and Cramton [1] have shown that the consequences for the seller's revenue are ambiguous. In some cases the seller's expected revenue will be greater in the discriminatory case. In other cases it will be more in the uniform case. No knock-down theoretical argument therefore exists that favours one design over the other, since the seller will seldom have access to the information about the distribution of demand among the bidders necessary to decide between the two designs. However, there is empirical evidence - notably a series of experiments with uniform auctions conducted by the US Treasury in selling Treasury bonds.

The American experiments and the other empirical evidence is assessed in Binmore and Swierzbinski [2]. In brief, the empirical evidence is indecisive[8]. It certainly cannot be used to argue that it was a mistake to sell gold using a uniform auction rather than a discriminatory auction. Nor does the fact that Miller and Friedman went wrong in thinking that bidders will submit their true demands in a uniform auction necessarily invalidate their basic point about the advantages of uniform auctions, which is that they may serve to promote entry by bidders who might otherwise not choose to participate.

There are at least three reasons why it is sometimes argued that a uniform auction might promote entry to the auction. The first is that potential bidders sometimes share the naïve view that they will necessarily pay less than in a discriminatory auction. The second is that there is likely to be more uncertainty about the clearing price in a discriminatory auction, because the demand curves will be flatter. The third is that the bidders do not need to work so hard in thinking out what demand curve to bid into a uniform auction, because only the part of their demand curve that is relevant to determining the clearing price matters. By contrast, a bidder in a discriminatory auction needs to get his demand curve right over the entire range of his final allocation if he is not to find himself (very obviously) paying more for some units that he needed to.

In conclusion, Miller and Friedman's campaign has created a bias in favour of uniform auctions that lacks proper foundation. On the other hand, there seem no compelling theoretical or empirical reasons for preferring a discriminatory auction to a uniform auction to the context of the gold sales. Since market sentiment commonly favours the latter, the choice of a uniform auction would therefore seem justifiable.

6 Vickrey Auctions

As noted above, an unfamiliar design such as a Vickrey auction would not have been appropriate for the gold sales, although if ever Treasury bonds are sold directly over the internet to their final buyers, its virtues would need to be seriously considered. In particular, it is indeed optimal for potential buyers to bid their true demand curves into a Vickrey auction - as Friedman and Miller thought true of a uniform auction. In the absence of active collusion by market manipulators, nobody would therefore need any expertise in the operation of the market to participate in the auction. A bidder would

7 In a first-price auction, the object is sold to the highest bidder at the price he bids. In a second-price auction, the object is sold to the highest bidder at the price bid by the second highest bidder. Why should a seller ever contemplate a second-price auction? Because bidders shade their true demands back in the first price auction, have no reason to do so in a second-price auction.

8 Miller and Friedman's campaign seems to have created a bias that is not easily shaken. For example, the executive summary of Malvey and Archibald's [3] paper for the US Treasury on the evidence is markedly more positive about uniform auctions than is justified by the text.

** See Glossary*

only need to ask himself how much he would be willing to pay for each unit for sale, and then bid this information into the auction, without the need to fear that he would suffer for making such an honest revelation of his true position.

Given suitable governmental assurances, a small or inexperienced potential buyer might therefore be willing to bid into the auction, whereas he would be understandably sceptical of his chances of holding his own against the big guys if invited to participate in an institution like the Gold Fix.

7 Flexibility

The gold was not auctioned all at once, but in a sequence of tranches on dates fixed in advance. Economists usually advocate auctioning a number of objects for sale simultaneously when the demand for the objects is fixed, but new buyers and sellers for gold enter and leave the market continuously, and so there are hedging* and other reasons for spreading the sale of gold reserves over time. However, there has been much criticism of the fact that the use of auctions imposed an inflexibility on the sale that made it impossible to exploit fluctuations in the market price of gold. Three inflexibilities are particularly relevant:

1 A relatively large amount of gold was sold at each auction;

2 The timing of each auction was fixed in advance (and so independently of any information about the market price of gold at the time of the auction);

3 The amount of gold sold at each auction was fixed in advance (again independently of any information about the market price of gold at the time of the auction).

An alternative to running an auction would be to dribble the gold in small amounts onto the market (through the Gold Fix or otherwise), tailoring the times and amounts of each sale to take advantage of movements in the market price. In considering this criticism, one ought to separate issues of transparency from those of flexibility. One reason for dribbling the gold onto the market is the hope that such an addition to market supply from a source like the Bank of England would not be noticed, but the pros and cons of choosing not to be transparent about the total amount of gold to be sold need not be repeated here. We shall instead consider the flexibility issue on the assumption that there is no secrecy about the plan for selling gold.

The point to be made is that committing to an auction with transparent procedures does not necessarily force the seller to submit to all the inflexibilites listed above. There is not much one can do about item 1, because no potential bidder would think it worth undertaking the expense and effort of participating in a conventionally organized auction unless it were on a reasonably large scale. Practical considerations also suggest that one must also live with item 2. However, item 3 could be relaxed without abandoning transparency.

Instead of announcing that a fixed amount of gold is to be sold if it reaches its reservation price, the seller can announce in advance that he is committed to a specific supply curve in each auction. Such a supply curve can be thought of as a flexible reservation price. For each possible price, the supply curve would specify the maximum amount of gold that will be sold at that price or above. If market conditions on the day result in low bids, then less gold will therefore be sold. Prospective embarrassment about failures to cover the amount supplied at an auction at the reservation price would also disappear, since coverage would cease to be a meaningful concept.

In brief, transparency need not imply inflexibility, and the use of supply curves by the seller is one way of allowing him considerable flexibility without any sacrifice of transparency[9].

8 Conclusion

Our view is that the gold auctions were conducted according to current notions of best practice, and that these notions are consistent with the thinking of modern auction theorists. In particular, the use of a uniform-price auction makes sense.

We believe that a more flexible design could have been adopted without abandoning transparency or upsetting the bidders by requiring them to participate in a process they might regard as outlandish. However, if it had been implemented, the proposal on the use of supply curves we make would have been vulnerable to the criticism that it was untested and untried.

9 *It is appreciated that a secret reservation price would allow the seller considerable flexibility if he were free to use the instrument without constraint, but one cannot excuse the lack of transparency of the instrument on the grounds that it may promote entry if it is frequently used to generate less than 100% coverage. Potential buyers may be tempted to bid in the auction because they think that the secret reservation price might be low - not because they have evidence to think that it might be high.*

* *See Glossary*

References

[1] Ausubel, L. and P. Cramton (1998), "Demand reduction and inefficiency in multi-unit auctions", Economics Department, University of Maryland.

[2] Binmore, K. and J. Swierzbinski (2000), "Treasury auctions: Uniform or discriminatory", forthcoming in *Review of Economic Design* (preprint available from ELSE).

[3] Malvey, P. and C. Archibald (2000), "Uniform-price auctions: Update of the Treasury experience", Office of Market Finance, US Treasury.

[4] Milgrom, P. and R. Weber (1982), "A theory of auctions and competitive bidding", *Econometrica* 50: 1089-1122.

[5] Perry, M. and P. Reny (1999), "The failure of the linkage principle in multi-unit auctions", *Econometrica* 67: 895-900.

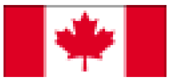
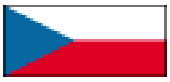
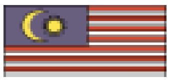
[6] Vincent, D (1995), "Bidding off the wall: Why reserve prices may be kept secret", *Journal of Economic Theory* 65: 575-584.

Appendix 4

Gold Sales - an International Comparison

	Argentina	Australia	Austria	Belgium
				
How much gold has been sold and when	124.8 tonnes of gold delivered between January and July 1997 against transactions entered into during 1994-95. Just under 92 per cent of their bullion reserves	167 tonnes delivery against forward sales between June and September 1997. Reduced gold holdings by around 67 per cent.	258 tonnes sold between 1989 and June 2000. Over this period Austria has reduced its gold holdings by 39 per cent.	1,034 tonnes of gold in five main transactions between 1987 and 1999. These sales reduced Belgium's gold holdings by some 72 per cent.
The reasons for selling	Driven by the consequences of maintaining a fixed parity between the Argentine peso and the US dollar	Decision to sell gold followed a review by the central bank of the costs and benefits of holding a significant part of its reserves in the form of gold.	A desire to reduce the share of gold on its balance sheet. Recognition of the opportunity cost of holding gold as a non-interest-bearing asset also prompted sales.	A desire to increase the proportion of foreign exchange in the central banks reserve and a need by the government to find additional means of reducing the public debt.
Transparency of sale	No prior announcement of the sale. Post sales announcement made on 3 December 1997 after the sale was complete	No information provided ahead of the sales programme. Gold sale post-announced in July 1997.	Not formally announced but the gold market was aware of Austria's gold coin/gold bar sales programme. Current sales announced.	There was no pre-announcement of any of the sales. Discretion was considered an important objective.
The method of sale adopted, and why	Argentina sold via an exercise of put options. It had earlier purchased put options through the sale of call options against its entire reserves	Sold through a private sector counterpart. Sales were made on a forward basis. Method chosen to maximise price achieved and limit transparency	The sales were linked to the supply of metal for the production and sale of gold coins and latterly gold bars by the Austrian Mint. Most recent sales were made by the BIS.	A number of different sales methods were adopted, including sales via BIS; sales via other central banks; some forward sales and supply to manufacture gold coins.
The level of revenue achieved	The sale generated $1,460 million.	At the estimated average price of $357.50/oz the gold sale programme would have generated $1,920 million. Increased re-investment earning of $280 million achieved in 1997/8	At the average price estimated at $360/oz the sales would have generated around $2,640 million in revenue. The recent sale of 30 tonnes would have generated an additional $280 million.	The five transactions would have generated over $11,000 million in revenue over the period 1987 to 1999.
The price achieved	The gold was sold at an average price of $370.22/oz. The London PM fix during January to July 1997 averaged $343.81/oz. The options were written/ purchased in 1994-95 during which time the gold fix averaged $384.18/oz	Average price achieved likely to have been between $355 and $360/oz. The Gold Fix price during December 1996 and June 1997 was $350/oz.	Average price achieved conservatively estimated at $360/oz for 1989-98. The average gold price between 1989 and 1998 was $361/oz.	The average price achieved is estimated at $352/oz. The average price of gold during the period 1987-1999 was $367/oz.
Impact on market	News of the sale in December 1997 added to the negative sentiment prevailing in the market at the time. Gold fell some $4/oz the following day.	The gold price trended downwards during the sale period. The news of the sale by a major gold producing country had a major negative impact on the gold price. The gold price fell some $8/oz the following day.	The sales had very little impact on the market and the gold price. This was mainly because the sales were very discreet, but also because the corresponding sale of gold coins created new demand.	The discreet nature of these sales was specifically aimed at avoiding any impact on prices in the gold market. Some impact is likely to have occurred because of the volume of gold absorbed by the market.

1 The Gold Fix prices in this appendix relates to the London PM Gold Fix price

Canada	Czech Republic	Malaysia	Netherland	Switzerland
				
The Bank of Canada sold 634 tonnes of gold between 1980 and 1999. Around 557 tonnes were sold over the years 1987-1999. By end of 1999 just under 94 per cent of Canada's gold holdings had been sold. A further 20 tonnes sold between January and end of October 2000.	56 tonnes of gold were sold in two transactions in September 1997 and September 1998. This represented 80 per cent of the gold holdings.	36 tonnes of gold was probably sold in July and August 1999. The sale represented 50 per cent of gold holdings.	813 tonnes of gold was sold in three main transactions in 1992, 1996 and 2000. The first two sales represented 41 per cent of gold holdings, the latter 10 per cent.	Switzerland plans to sell 1,300 tonnes over the next four years. By the end of October 2000 134.5 tonnes of gold had been sold. This represented 52 per cent of reserves. In December 2000 the central bank announced that it had sold 160 tonnes.
Gold represented 80 per cent of Canada's total reserves in 1979. A balancing of the reserves was the main factor underpinning the decision to sell gold. The poor return on gold and fiscal considerations also played a part.	Following an analysis of the historic return on gold holdings a decision was made to invest in higher yielding financial assets.	No official information is available. Likely reason is a desire to invest in a higher returning investment.	The central bank concluded that its reserve portfolio was "overweight" in gold. The return on gold was also considered to be lower than on foreign exchange assets.	The decision to sell gold initially evolved out of the requirement to modernise the central banks balance sheet and the country's domestic monetary arrangements.
None of the sales were pre-announced, although the gold sales policy has been a matter of public debate since the beginning of the programme.	None of the sales were announced in advance. Post announcement press releases were however made.	No announcement was made about the presumed gold sale either before or after the sale.	No advanced announcements were made of the first two sales. The third sale was announced in advance.	The intention to sell was signalled well in advance. A number of statements have been issued about the development of the sales. Further details will be regularly issued.
The central bank has sold directly into the market using a combination of spot and forward sales, and less frequently, derivative instruments.	Part of the gold holdings was sold forward in 1997. The remainder was sold as part of a call option and put option programme.	The sale was probably via options.	Three different sales methods were employed. ■ Via official & private sector counterparts ■ A forward basis sale ■ Via the BIS	The BIS was commissioned to sell the first tranche of 120 tonnes. The BIS have sold small amounts on a daily basis into the private market.
Total revenue generated for these sales is unlikely to have been less than $7,900 million.	Combined revenue of nearly $580 million was achieved.	If an average price of $256/oz was achieved, approximately $300 million was generated.	Based on the average prices achieved total revenue of around $9,000 million was generated.	Some $1,198 million has been generated by the sales to end October 2000.
An average price of around $385/oz would conservatively been achieved, although with the discretion allowed to the central bank prices were probably higher. The average gold price was $382/oz.	The average price of $327.34/oz and $320/oz was achieved. This represents an average of $323.28 for the two operations. The gold price in September 1997 averaged around $322/oz.	An average price of around $256/oz was likely to have been achieved. The gold fix price averaged $256/$257/oz at the time the sale was made.	The average prices achieved were $330, $394 and $291/oz. The average price achieved of $339/oz was below the average fix price of $344.27/oz for the period October 1992 to February 2000.	It is estimated that an average price of $277.00/oz has been achieved for the period up to end of October 2000. The fix price averaged $276.82/oz during this period.
The sales method chosen - spreading the sales over an extended period - minimised market impact and created few headlines.	The Czech sales are likely to have played some part in a weakened gold price. The price dropped around $3/oz at the time of the initial sales announced in March 1998.	The Malaysian transaction would have been a relatively minor factor in a lowering of the gold price during the sale period.	The gold sales had a negative impact on the market and on the gold price. It is difficult to estimate the size of the impact. Market sentiment played a part as this sale established a precedent for others to follow.	The Swiss sale has been described as a "watershed" for the gold market. The initial announcement helped drive down the gold price in 1997. The sale is proceeding smoothly in a way likely to minimise the impact on the gold market.

Appendix 5

Evaluating the impact of the restructuring programme on the risk and return of the UK net foreign currency reserves

The impact on return

The following describes how the Treasury would go about calculating the US dollar total return on the two portfolios[1]; the foreign currency interest-bearing assets portfolio being acquired with the proceeds from the gold sales and the counterfactual gold portfolio.

Portfolio of interest-bearing assets: The benchmark investment for this portfolio is money market instruments of one-month duration; 40 per cent in US dollars, 40 per cent in euros and 20 per cent in yen. The total return on this portfolio is the percentage change in the US dollar value of the portfolio at the end of the period compared with the US dollar value of the portfolio at the point of investment. The total return is made up of the interest earned on the money market instruments, including reinvested income, and the capital gain/loss resulting from changes in the US$/€[2] and US$/yen exchange rates.

On the US dollar element there is no currency exposure as the gold proceeds were received in US dollars, and the return is the compounded interest earned holding the money market instruments. For the euro holding, in addition to the interest earned from money market instruments, a capital gain/loss may result from movements in the US$/€ exchange rate. For example, consider US$100 invested in euros at the start of the period at 1 US$/€, giving €100. Assume that by the end of the period, the euro assets had increased in value to €125 as a result of the interest earned. If, over the period, the euro had appreciated to 1.1US$/€, the US dollar value of the investment would be US$135.3, giving a total return over the period in US$ of 35.3%. The method of calculation for the yen share of the portfolio is the same as for the euro.

Gold portfolio: There are again two elements to the total return calculation. First, changes in the gold price over the period will result in a capital gain/loss and secondly, interest may be earned through gold lending. The capital gain/loss plus the interest earned gives the total return on the gold portfolio over that period.

The impact on risk

Calculating the impact on risk of changing the asset allocation within the net reserves portfolio is slightly more complicated. This is because the volatility of return of a portfolio depends not only on the volatility of the return of the individual assets held within the portfolio but also on the correlation between the returns of the individual assets held. Extending this to the net reserves the "riskiness" of the net reserves as a whole depends on three factors;

i) the weighting of the individual assets held in the net reserves (e.g. US$, euro and yen interest bearing assets, and gold),

ii) the volatility of the return on the individual assets held, and

iii) the correlation between the returns on the individual assets held.

The interaction between the volatility of returns on different assets means that it is not possible to simply compare the riskiness of the gold portfolio with the riskiness of the money market portfolio that has replaced. It is necessary to consider the impact of each of these portfolios on the riskiness of the net reserves as a whole. It is worth noting that currency and gold prices have historically been riskier than interest rates. Therefore the risk on both portfolios is predominantly determined by currency and gold price risk.

A further important aspect of the risk of the net reserves is liquidity risk. This is measured as the time and/or cost of converting a security into cash. The estimate of the liquidity of a portfolio will depend on the assets held, the assumed length of time over which liquidation is expected to occur and the assumed market conditions under which liquidation is likely to occur.

The relationship between risk and return

The returns on the two portfolios should only be compared in conjunction with their impact on the riskiness of the net reserves as a whole. The fact that the return on the portfolio containing 50 per cent gold might be higher, or lower, than that of the portfolio containing 20 per cent gold tells us nothing in itself. If the return on one portfolio is higher than that on the other, and the risk is lower then this portfolio clearly dominates the other. However, if the return is higher (lower) and the risk is also higher (lower) then which of these two portfolios is "better" will depend on the risk/reward preferences of the investor.

1 Note that, for simplicity, the analysis, as outlined below, compares two steady state portfolios and does not cover the period of transition from one portfolio to the other.

2 The exchange rate terminology used in this note is as follows - US$/ refers to US dollars per euro and US$/Y refers to US$ per yen.

Appendix 6 Transparency and predictability

During the mid-1990s, the UK government switched its method of sale of government bonds from a mainly short-term flexible approach to one based largely on auctions[1] The auction programme is pre-announced well in advance in the annual Debt Management Report and updates are published quarterly by the Debt Management Office and when the fiscal forecast is changed at the time of the Budget and Pre-Budget Report. The move to a transparent approach to selling government bonds was driven by the following factors

- **Transparency reduces the risk premium priced into government bond yields**. In the mid-1990s, both the Treasury and the Bank of England were involved in the process of setting interest rates with monthly meetings between the Governor and the Chancellor. Any perception that government bonds were sold on the basis of inside information about the future course of interest rates was limited by pre-committing to what would be sold well in advance. This should reduce investors' concerns that the government was using privileged information to sell bonds at low yields hence lowering the long-term risk premium priced into bond yields.
- **The authorities are unable to outguess the market on its processing of information**. Numerous studies have found that financial markets are generally 'efficient' in their processing of information. This means that, unless one can trade on private information, one should not expect systematically to outperform the market's expectations. Hence, once the decision to sell a certain bond or commodity is taken, retaining discretion over timing should not mean that the expected receipts at the outset of the process would be higher.
- **Participation should increase with predictability**. Participation from market-makers and investors should be greater if the seller gives adequate notice. This allows market-makers to pre-sell the issue and investors to plan their strategies ahead of the sale. The sale itself also generates liquidity as traders can be more confident of filling short positions in the auction. Gilt auctions are announced on a quarterly calendar.
- **Increasing competition for global capital means that issuers cannot rely on captive investors**. With global bond markets becoming ever more open, issuers need to compete actively for investor interest to reduce the yields paid. An element in the competitive armoury of repeated issuers is to be as predictable and transparent as is practicable to ensure investors are confident that they will not be surprised by a supply shock after participating in an auction.

Together these factors mean that there is an a priori case that the revenue from auctions will be increased through a predictable and transparent auction process. To believe that revenue would be systematically increased through retaining significant discretion, one must believe that the value of private information that the authorities would thereby trade on would exceed the risk premium that would thereby be priced into investors' valuations.

1 *See Report of the Debt Management Review, 1995 and Treasury evidence to the Treasury Select Committee's Report, Government's Debt and Cash Management, May 2000.*

Glossary of terms

Terms	Definition
Bidding Cover	The extent to which bids received at an auction reach or exceeds the amount on offer.
BIS	The Bank for International Settlements is an international organisation which is responsible for fostering the co-operation of central banks and international financial institutions.
Futures	Involves a legally binding contract for the delivery of a specified quantity of a commodity at a specified time in the future at an agreed price.
Hedging	The strategy of price risk management by entering into contracts that provide protection from sudden price fluctuations.
Gold Standard	The monetary system in which gold had a fixed price and currency could be redeemed in gold. Elements of this system lasted until 1971.
IMF	The International Monetary Fund aims to foster international monetary co-operation through the stabilisation of exchange rates. Its major function is to lend support to countries in balance of payment difficulties.
LBMA	The London Bullion Market Association represents the interests of the participants in the wholesale bullion market.
London Gold Fixing	A system whereby the price of gold is "fixed" twice daily by five major bullion houses (see Figure 2 of the report).
Multiple-Price Auction	An auction in which all the successful bidders pay the price they bid. Also know as a Discriminatory price auction.
SDDS	IMF's Special Data Dissemination Standard - these standards require the monthly publication of detailed reserves data, including the level of gold holdings
Options	Gives the holder the right, but not an obligation, to buy or sell gold at a pre-determined price by an agreed date.
Supply curve auction	Auctions in which the seller announces variable prices according to volume on offer, for example larger quantities might be sold at a higher price than would be the case for a lower price
Uniform-Price Auction	Auctions in which all the successful bidders pay the same price i.e. the lowest accepted price. Also known as a single price auction.
Vickrey Auction	An auction in which each bidder pays the most for each unit than another bidder would be willing to pay if that bidder had the opportunity to add that unit to his allocation.
Winner's Curse	When the winner in an auction fails to take account of the fact that the low bids of his rival imply that his valuation of the object he has bought was probably based on over-optimistic estimates.
World Gold Council	An international organisation who represent the interests of gold producers. Its main aim is to increase the demand for gold.

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