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Session Two:

A London Vault's Approach to Weighing Large Gold Bars

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I. Bank of England role in the physical gold market

I shall be talking about the Bank of England's approach to weighing large gold bars, which are a fundamental unit of physical delivery in London.

This picture here is a typical vault at the Bank. We are not a member of the LBMA, but we continue to play a key role in the London market. We have observer status on the Management, Physical and Vault Committees. We are the largest custodian in London, and one of the largest in the world. At our premises at Threadneedle Street, London, we have approximately £200 billion worth of gold stored over 10 vaults. Gold is held on an allocated basis on behalf of our customers, who are Her Majesty's Treasury, central banks, and some LBMA members. We offer three services, which are storage – which is predominately long-term – physical deliveries in and out of the bank, and book entry transfers, which allow our central bank customers to trade with the London market.

II. Where Have we Come From?

Where have we come from? By, 'we', I mean the London market, and the Bank's approach to weighing gold. London has favoured the beam balance for decades. For those of you who are not familiar with this process, a gold bar is placed on one side of the scale, and using a combination of 16 stainless steel weights, which weigh between 0.025 and 400 ounces, we match the gross weight of the gold bar on the opposite side of the scale. These weigh to the nearest 0.025 of an ounce, and this sets the tolerance for the London Good Delivery standard. Staff at the Bank must pass a test, both practical and theory, before they are allowed to use the scales. As part of the theory test, staff learn how the scale operates also a little bit of background as to how gold bars are cast. At the Bank, it takes three members of staff to weigh one ton of gold: one team member to place the gold bar onto the scale, a second to weigh the gold and a third to remove it. This process takes about 40 minutes. There is a limited pool of support to service the beam balance, which, because of its fine sensitivities, requires frequent servicing.

III. How did we get to Electronic Scales?

In 1989, which was slightly before my time, the Physical Committee said that the Board of Currency of Singapore asked the LBMA if Sartorius electronic scales could be used for weighing gold and silver bars. The reply, at the time, was that only beam balances were acceptable.

Moving forward 15 years, the Management Committee decided to put together a working group to see if electronic scales could be used in London. In 2006 and 2007 some prototypes were trialled, but were deemed inconsistent.

There was a year where London was under huge pressure with physical gold coming in to the London market, so trialling slowed. In 2008 and 2009 Sartorius gave us an electronic scale, which seemed to improve on others that had previously been tested. Some observations that were made at the time were that the weight list in London was given in ounces, but the scale only gave output in grams. It was asked whether they could withstand the high volumes that London was sure to put through them. Sartorius made some improvements and obtained EU type approval so the gold scales could be used in London.

Between 2010 and 2012 London vaults at the time did extensive testing on the scales, and once deemed fit for purpose purchased 15 scales for use in London and five scales for use outside of London. The Bank has purchased two of these scales.

IV. Comments from London Vault Managers

We collated some comments from other London vault managers, which were all extremely positive. Testing was a combined effort from all the active London vaults at the time, and I estimate around 75,000 bars were weighed as part of this test. As well as volumes testing vaults weighed bars at different times of the day – which Mike mentioned earlier in his presentation – and indeed on different days, to ensure consistent results were achieved. Bars were weighed close to the London Good Delivery limits of 350-430 ounces to make sure that the scale was consistent across all weight ranges. We tried different platforms to see which was the most consistent; the Bank has since purchased two granite tables as these seemed most fit for purpose. Readings were also compared against those from the beam balance.

V. Sartorius Scale

Why is the Sartorius Scale so accurate? The weighing cell is made from one continuous cell of aluminium, which offers greater climatic stability and better repeatability. Earlier models were made of a combination of materials in the weighing cell, which meant it had different coefficients of thermal expansion, causing for weighing errors over a period of time. Sartorius now test for one million cycles prior to any launch of their scales.

VI. How do we Weigh Gold at the Bank?

We calibrate the scale in grams, and once content that the scale is weighing correctly we put each bar on the scale, wait until it is settled, and round the display in ounces down to the nearest 0.025. We check this against the customer weight list that we have been provided with. We repeat this process for the whole ton.

The gold price has risen by \$1,200 in the last 10 years. In our experience, newer bars coming in to London have been weighing closer to the multiple of 0.025. Understandably, refiners are trying to reduce the amount of giveaway. The scale also has the ability to export weights to Excel, which in turn can be transferred into internal recordkeeping systems. The Bank has

weighed approximately 400 tons over the last year on these scales, and has encountered no problems, and it has certainly reduced our processing time.

VII. Advantages and Drawbacks of Sartorius Scale

1. Advantages

I mentioned earlier that it takes our staff approximately 40 minutes to weigh one ton of gold. This has been cut to 20 minutes per ton, and we also only need two members of staff instead of three. This is because there is no technical skill in weighing the gold; therefore it does not require a separate person to do this. It is very easy and very little training was required. The electronic scales do not require frequent servicing like the beam balance. When they are serviced there is a wide pool of support offered by Sartorius. As I have just mentioned, the scale has the ability to export data to Excel. They are also a lot smaller than the beam balance.

2. Drawbacks

There is no recognition that the bar weight has saved, and scales are not configured to round to the nearest 0.025. These are very minor points, which are truly to its credit, because it is a very useful piece of equipment.

The third point is not a drawback, and it actually contradicts my earlier point, but it almost de-skills our staff. For decades, weighing has been seen as a skill acquired by those working in the vaults, and as we move forward with the times and use technology to weigh gold, not as much skill is needed to weigh gold.

VIII. Operational and Policy Issues

As a central bank, we are naturally cautious about the pace of change, especially when it comes to important matters such as gold, where there are long established practices.

The move to weighing gold to a dead weight or a reduced tolerance compared to the current 0.025 margin will create a number of operational and policy issues for the Bank and its customers. Careful consideration would have to be given before contemplating such a change. We will take our lead from the LBMA and its members as to when, if ever, it will be the appropriate time to discuss this matter in detail. The Bank of course will engage proactively with the market at this time.

Thank you for listening, and I hope you have gained something from this presentation.