

MODERN COINAGE SYSTEMS

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Preface.

The subject of this paper covers a wide range of factors which influence the final decisions which must be made before a country can introduce a new series of coins, or even add a single new coin to the existing series. These new coinages have been necessitated for various reasons, such as the introduction of the Decimal System; the grant of Independence to a former colonial territory; the replacement of low valued currency notes by coins; and the steep increase in the price of silver during recent years, which has resulted in this metal now being almost completely abandoned for use in coinage.

Each country which is considering changes in its currency or coinage presents its own particular problems. One of the most important of these is the face value of the major coinage unit of the country concerned, and of the sub-divisions thereof. In countries where the value of the major unit is high—such as the U.S. Dollar or the S. African Rand, there is a wide choice of metals and alloys for the subsidiary units, as even the lowest coin will have some intrinsic value, but in other countries—notably in Latin America—the problem is complicated by the much lower value of the major unit, and, with the steep inflationary trend which persists in many of these countries, by the risk of the metal value of the subsidiary coins eventually exceeding their face value to an extent where they disappear from circulation to be melted for use in the local non-ferrous industry. New techniques have been evolved in recent years to deal with this important problem, as will be explained later in this paper.

Perhaps the most satisfactory manner in which to describe the evolution of a new coinage series would be to relate the events which led to this action being taken recently in two countries with widely different economies, and with both of which the author has been closely involved. These are S. Africa and Brazil—the former with a prosperous and stable economy, and with a high valued major unit (the Rand, worth 10/-), and the latter with a highly inflationary economy, a perpetual shortage of foreign exchange, and a major unit—the Cruzeiro—which 4 years ago was worth 5,000 to the Pound Sterling.

South Africa.

The author first visited this country in 1962, shortly after the original issue of the new decimal coins had been made, and he was horrified to find what had been done. Apart from having taken the sensible decision to adopt the Ten Shillings major unit—as against the lamentable British decision to retain the Pound in our own future decimal coinage—the choice of the sizes, compositions, and values of the new coins was almost unbelievably incorrect.

As regards size, the modern trend in coinage is to produce much smaller coins than those used in former years. With the greatly reduced purchasing power of money, no-one wishes to carry around large and heavy pieces of metal which are now worth around one-fifth of their value in 1914. It is also more economical from the production aspect to mint smaller coins. Although in Britain the Crown piece has now disappeared—except for occasional commemorative issues—we still retain at present a ridiculously unwieldy series of coins, of which the

worst examples are the Penny and the Half-penny. In its first issue of decimal coins, the S. African Government retained the existing sizes of the entire range of British coins—from the Half-Crown (25 Cents) to the Penny and the Half-penny, which became 1 Cent and $\frac{1}{2}$ Cent respectively.

As regards composition, all the white metal coins were issued in the binary alloy of 50% silver and 50% copper. This was a most unfortunate choice, as this alloy is entirely unsuitable for coinage, due to its natural colour being coppery. During the process of manufacture, the coin blanks are 'blanched' in an acid solution, which dissolves the copper from their surfaces, leaving a thin film of pure silver behind. The resulting coins have an excellent appearance when newly minted, but after being in circulation for a very few months, the silver coating wears off the high spots on the designs, and the natural colour of the alloy is revealed. Coins in this alloy were issued in Britain after the 1914–18 War, but their appearance soon became so unpleasant that they were replaced shortly afterwards by new coins in a quaternary alloy, containing 50% silver, 40% copper, and 5% each of nickel and zinc, which proved to be much more satisfactory.

In the values of the new S. African coins, a notable omission was the absence of a 50 Cents (5/-) piece, and the inclusion of both the 25 and 20 Cents (2/6d. and 2/-), which is redundant in the 'true' decimal series of coins. This consists of units of the values of 1, 2, 5, 10, 20, 50 and 100, and has been calculated to involve the minimum number of coins for any transaction. (It may not be generally known that when the British Florin was introduced 120 years ago, it was the first step towards the decimalisation of the Pound, and the intention was thereafter to withdraw the Half-Crown, but it was found that there was a demand for both coins, and these have remained in circulation until now. Production of the Half-Crown has now finally ceased, in readiness for the introduction of the new Decimal coins.)

Finally, the S. African Government retained even the former Three-penny piece, in the form of a $2\frac{1}{2}$ Cents coin. Not only has a coin of this denomination never proved to be successful, but it necessitates the production of an additional coin—the Half Cent—for change-giving purposes.

Such was the situation in 1962, and general dissatisfaction was already being expressed by the public over the new coins. Fortunately, the newly appointed Director of the Mint, Mr. Malan, was already determined to persuade his Government to abandon the entire series, and to replace them with smaller coins in the true decimal series, and of more suitable composition. After several meetings the new series was finalised during the next two years, and sets of the new coins were prepared for Government approval. This was obtained with commendable speed, and within four years of the issue of the first series of decimal coins, these were being withdrawn and replaced by the second series, which received instant approval from the public. It is unlikely that two such major coinage changes in so short a period can have been made by any country before.

As regards composition, pure nickel was selected for the four white metal coins—the 50, 20, 10 and 5 Cents pieces (of values equivalent to 5/-, 2/-, 1/- and 6d.). Silver was ruled out because it was evident that the price of that metal must rise steeply due to the rapid increase in its consumption for industrial purposes, which now greatly exceeds the increase in world production. (Most of the world's silver is obtained as a by-product from lead and zinc mines, which thus limits severely any substantial increases in production.) It was also appreciated that all present-day coins are in fact tokens, as it is no longer necessary—or even possible—to equate their metal values to their face values, as was the custom in past

years, when all higher-valued coins were struck in gold or silver. Provided that a metal or alloy satisfies the essential conditions for coinage use, its intrinsic value is immaterial. These conditions include good wear resistance, a pleasing appearance, and sufficient malleability and ductility to allow the cast ingot to be hot or cold rolled into thin strips of the required thickness, and for the coin blanks which are punched out from the strips to be soft enough—after having been annealed—to receive a sharp and clear image of the designs from the dies when they are passed through the coining presses.

For the two lowest valued coins—the 2 and 1 Cent pieces—bronze was chosen in preference to the aluminium-bronze alloy originally selected, as the latter appears to be white in artificial light, and the coins were apt to be mistaken for those of higher values.

As regards values, the 25, 2½ and ½ Cents coins were discarded, and two new coins—the 50 and 2 Cents—were introduced. The full new series thus consisted of the 50, 20, 10, 5, 2 and 1 Cents, with the 100 Cents unit (or 1 Rand) normally issued as a currency note, but also in the form of a silver coin for commemorative issues and for collectors' sets.

The sizes of the new coins were arrived at after deciding that there must be a minimum difference in diameter of 15% between each two coins, to enable them to be readily distinguishable from each other. The actual differences vary from 15% to 18%, and within these limits it was found possible to devise an attractively compact series of 6 coins, of which the largest—the 50 Cents piece, worth 5/-—is slightly smaller than the British Florin, and the smallest—the 5 Cents, worth 6d.—is appreciably larger than the former British silver Three-penny piece. The bronze 1 Cent coin is between the 5 and 10 Cents pieces in diameter, and the bronze 2 Cents is between the 10 and 20 Cents.

These very considerable reductions in size—and therefore in weight—could only be obtained by abandoning the long established British practice for our white metal coins, whereby the weight of each coin is directly proportionate to its value. This results in the Shilling being twice the weight of a Sixpence, and the Half-Crown being five times that weight. Under this system it is impossible to prevent the higher valued coins from becoming unduly large and bulky, and in fact the system is only of convenience to the banks, who can assess the value of bags of mixed coins by weight, instead of having first to sort them into individual denominations.

Finally, as regards the designs for the new coins. After having decided that a single design should be used for the obverse of the entire series—in this case the effigy of a former Boer leader—the individual designs for the reverse faces were selected from amongst the local fauna and flora, as is becoming increasingly used in modern coinages. Such designs are always pleasing to the eye, and they are an improvement on the earlier practice of filling the entire surface of the coin with intricate patterns. Not only were such designs less attractive artistically, but during the final minting process of stamping the blanks into coins, the fine lines of the designs tend to become clogged with powdered metal and dust, which necessitates stopping the presses at intervals in order to clean the dies.

Such then was the process of creating the new series of decimal coins in South Africa, and in the author's opinion these are the most convenient and attractive specimens that have been introduced in any country during the present century.

Brazil.

The situation in Brazil which necessitated the introduction of a new series of coins differed widely from that which obtained in South Africa. The major unit of Brazil's coinage—the

Cruzeiro—was formerly divided into 100 Centavos, and these in the usual multiples formed the coinage of the country. Due to successive waves of inflation during recent years, all the coins became worthless and disappeared from circulation, and by 1964 the Cruzeiro itself was worth around 5,000 to the Pound Sterling. The entire currency thus consisted of paper notes, and the lowest unit required for the most trifling purchase was 10 Cruzeiros. All the notes were identical in size irrespective of their values and were printed on expensive bank-note paper, so it will be appreciated that the cost of continually replacing the notes—particularly those of the lower values—was absurdly high. It was necessary to carry a brief-case filled with bundles of notes of different values in order to pay for normal daily expenditure, and the more expensive items of expenditure, such as a motor car, had to be expressed in millions of Cruzeiros.

The first essential in such a situation was obviously to re-value the Cruzeiro in order to give it a realistic value again, and thus enable a metallic coinage to be re-introduced once more in the form of Centavos. It was therefore suggested to the President of the newly formed Central Bank of Brazil that a 'New Cruzeiro' should be introduced, equal to 1,000 of the existing Cruzeiros, which would value it at approximately 50 U.S. Cents. This would be divided into 100 Centavos, thus making 1 Centavo equal to $\frac{1}{2}$ U.S. Cent.

Subject to a decision being taken in favour of this re-valuation, the next step must be to withdraw all the existing currency notes of values from 10 to 1,000 Cruzeiros, and to replace them with coins in the new values from 1 Centavo to 1 Cruzeiro. Although the initial cost of this operation would be considerable, as the cheapest coin is more expensive to produce than a note, this cost would be recovered in a very few years, after which for the rest of the life of the coins—probably 30 or 40 years—there would be no further expenditure on the continual issue of new notes. Furthermore, at the end of this period, when the coins have to be withdrawn due to wear, in most cases the metal can be re-melted for the manufacture of new coins, whereas nothing would have been left of the equivalent notes except burnt paper.

The logic of these arguments was appreciated, and in due course it was decided to re-value the Cruzeiro and to issue a new series of coins as had been recommended.

The problem then arose regarding the composition of the new coins, particularly those of the lower values, as the rate of inflation in Brazil was still very high when compared to that in more stable economies, and if these coins were struck in one of the cheaper conventional alloys—such as bronze—it was inevitable that within a very few years the metal value would exceed the face value, and the coins would disappear to be melted for use in the non-ferrous metal industries.

It was decided that this problem need only be considered for coins of value less than 10 Centavos (5d.), as an inflationary increase of some 300% would have to occur before this coin would be endangered. The widely used cupro-nickel alloy (75% Cu., 25% Ni.) was accordingly selected for the 10 and 20 Centavos coins, and pure nickel for the 50 Centavos and 1 Cruzeiro. This left the 1, 2 and 5 Centavos pieces for decision, and in order to avoid too great a variety of metals and alloys in the series, it was agreed that these 3 coins should all be of similar composition.

The first metal to be considered was aluminium. This has the advantage of being comparatively cheap and, due to its light weight, the intrinsic value of an aluminium coin is lower than that of a coin in any other coinage metal or alloy. But from the numismatic aspect aluminium is not an attractive metal and, although it is in use in the coinage of a number of countries, this has been done through necessity and not by choice, as there is no dignity in an aluminium coin.

The next alternative was to use 'clad' coins. Such coins have a central core of mild steel, which is clad on each face with nickel, cupro-nickel or copper—the depth of the cladding being from 5–10%. The coins are indistinguishable from solid coins in the cladding material, except on the edges, where the steel core is visible, and when in circulation they wear just as well as normal coins. Their great advantage in the more inflationary countries is that there is no industrial use for their metal content, and they will therefore remain in circulation even when their real value greatly exceeds their face value. (Argentina is an excellent example of this, as the *Peso*—now worth less than a *Farthing*, and about the size of a *Shilling*—was issued some years ago in nickel-clad steel and, although a single *Peso* will not now purchase anything, many millions of these coins are still in circulation, as there is no temptation to melt them down for other uses.)

Clad coins are, however, comparatively expensive to produce, particularly when used for the lowest valued denominations, and only a few fabricators in the world are able to manufacture the coin blanks, so in most cases the coins will cost more than their face values to mint and will thus be issued at a loss.

The final choice in Brazil for the new 1, 2 and 5 Centavos coins was in favour of stainless steel. This metal, although it is preferable to aluminium in many respects, is also not entirely suitable for coinage use. The two principal disadvantages are that the blanks remain unduly hard even after they are annealed, which shortens the life of the dies in the coining presses, and also—due to this excessive hardness—the relief of the designs on the coins has to be kept very low compared to that on coins struck in the more conventional alloys. Only two countries use stainless steel for their higher valued coins—Turkey and Italy—and in neither are these coins popular. Turkey, having at last completed the new Mint at Istanbul, is already starting to replace her stainless coins with cupro-nickel and pure nickel substitutes; and in Italy pure nickel had originally been selected for her new coins, but the Korean War intervened, nickel became in short supply, and she was forced to use stainless steel instead. However, in view of the particular conditions which obtain in Brazil, the choice of stainless steel for the lowest denominations was the best solution in the circumstances.

The example of South Africa was followed to a great extent in determining the sizes of the new coins, and decisions on the designs have been made since the author's last visit to Brazil a year ago. Orders have now been placed for the initial requirements of stainless steel and cupro-nickel blanks, but production of the two pure nickel coins may have to be deferred for a year or two until this metal is once more plentifully available.

Such, then, was the sequence of operations which led to the introduction of these two entirely new coinages. The remainder of this paper will be devoted to certain other aspects of coinage production.

Mints.

Most European countries possess their own Mints, which are generally equipped to undertake the complete processing of the conventional coinage alloys—such as silver, cupro-nickel and bronze—from virgin metals into finished coins. In some of the smaller countries, where the annual requirements of new coins is small, the possession of such an institution cannot really be justified, but they are still retained for prestige purposes. At the other extreme is Africa, where in the whole of this vast Continent there are only three fully equipped Mints—in S. Africa, the Sudan and Egypt. (Nigeria has recently bought her own coining presses, but

has no melting, rolling and blanking facilities, so she will import ready-made coin blanks from outside sources and will merely stamp these into coins locally.)

In Asia most of the major countries possess their own Mints, which vary greatly in size and efficiency. In India, for instance, the two major Mints at Bombay and Calcutta—each of which can produce up to 4 million coins daily—are fully equipped for the processing of all non-ferrous metals and alloys, including pure nickel. Due to its high melting point, nickel requires special equipment for being processed into coins, including such expensive items as electric melting furnaces, hot rolling mills, and bright annealing furnaces. Very few countries have installed such equipment in their Mints as yet, as they find it more convenient to purchase the blanks from fabricators who specialise in the processing of pure nickel.

At the other extreme is the Taiwan (Formosa) Mint, whose equipment is amongst the most primitive in the world, and which manages with difficulty to produce some 50,000 coins of indifferent quality each day.

Most of the Latin American countries also have their own Mints but, as the equipment is generally obsolescent, there is an increasing tendency towards abandoning the melting, rolling and blanking operations, and to use only the coining presses, which are fed with imported blanks. The growing use of clad steel coins and of pure nickel coins in these countries has accelerated this trend, as these could not be manufactured by any of the Latin American Mints.

Denominations, Values and Quantities.

Almost every country in the world has now adopted the decimal system of coinage, and Britain will shortly be following suit. The great advantage of this system is its simplicity for all arithmetical calculations as compared with our present type of coinage, which until recently was also used by most of our former colonies. Only one calculation is required for any sum instead of three, as are necessary for pounds, shillings and pence, and many of these can be undertaken without the use of pencil and paper. For instance, 10% of £17. 80 is at once seen to be £1.78 (or one pound and 78 cents), whereas to obtain 10% of £17-16-0 is a much more difficult calculation.

As was mentioned earlier, the 'true' decimal series consists of the unit values of 1, 2, 5, 10, 20, 50 and 100. Some countries omit the 2 unit from this series, and others use 25 instead of 20, but basically the same pattern is followed universally. It is, of course, very desirable that even the lowest unit should have some purchasing value, but this is often impossible, due to the reduced value of the coins, and quite frequently even the major unit has become worthless. In Europe, for instance, the Italian Lira is now at 1,500 to the Pound Sterling, so that 1 Lira is worth 1/6th of a penny. In Asia, the Japanese Yen is worth a Farthing, and the Indonesian Rupia—formerly worth 2/-—is nominally quoted at several thousands to the Pound. In Latin America, the Brazilian Cruzeiro was worthless until the recent re-valuation took place, and in the Argentine their Peso is only worth a Farthing. All these countries would be well advised to follow the example of Brazil—and in the last few years also that of France and Finland—and to re-value their major units to enable them to be worth at least a few shillings, and thus to restore some dignity to their currencies.

The quantities of coins currently in circulation in different countries per head of population vary widely, not only in the total amounts but in individual denominations. The factors which affect these requirements include the standard of living, the degree to which vending machines—and other coin-operated devices such as meters—are used, and even the extent of the tourist industry. As an instance of the latter, the Swiss Mint annually produces some 30

coins per head of population, as compared with 10 per head in Britain from the Royal Mint. This is because the numerous tourists who pass through Switzerland each year will at least have a meal on their way through, even if they are not staying there, and will receive a few Swiss coins in change after paying the bill. These coins are taken out of the country, and most of them never return again.

As an example of the demand for an individual coin, the U.S.A. provides an interesting instance. Their 1 Cent coin—currently worth 1d.—has virtually no purchasing power by itself, but an enormous variety of inexpensive goods are sold at prices such as 24, 49 or 99 Cents, instead of being rounded off to the next higher figure. (This practice is similar to that used in Britain, where an article is frequently priced at—say—19/11½ to make it appear cheaper than if it was sold for a £1.) There is now no 2 Cents coin in the U.S.A., so very large numbers of 1 Cent coin are required for change giving purposes, and even on more expensive purchases most States have imposed local Sales Taxes of 2 or 3 Cents per Dollar, and this still further increases the requirements of 1 Cent coins. The result is that on an average year the production of 1 Cent coins by the U.S. Mints amounts to around 70% of the total domestic output—or more than twice the combined quantity of the other 4 coins in the series, although the coins are individually almost valueless.

Coins Versus Currency Notes.

Finally, a problem which is often encountered all over the world is to decide the limit up to which the currency of a country should be issued in the form of coins, after which the next higher values will be in the form of currency notes. Most countries are now starting to realise that the continual re-printing of low valued currency notes is very much more costly over a period of years than their replacement by coins of equal value, for the reasons stated earlier in this paper. But there is obviously an upper limit beyond which it is not advisable to issue coins, and at which paper money will be preferable, particularly as virtually all coins are now struck in base metals. In India and Pakistan, for instance, where the manufacture of counterfeit coins is widespread, it would be dangerous to issue coins of value higher than One Rupee (or 1/-), as the temptation to counterfeit a 5 Rupee coin would be irresistible.

Another problem in this connection is that it is impossible to devise a range of circular coins consisting of more than 6 or 7 units without the size of the largest unit becoming excessive. This can, of course, be overcome by introducing coins which are non-circular in shape, such as our own 3d. piece, but in general such coins are unpopular, particularly in the higher values.

Depending on the conditions prevailing in any particular country, the present upper limit for the issue of ordinary production coins instead of notes varies between 1/- and 5/-. Hitherto, the now fast vanishing U.S. Dollar—currently worth 8/4—has been the highest valued production coin in the world since the minting of gold coins ceased after the 1914–18 War and, although no Dollar coins have in fact been minted since 1935, they were still plentifully available until the sharp rise in the price of silver during the past 4 years caused them to vanish from circulation. Recently, however, Eire introduced an attractive Ten Shilling coin in silver, and Britain is also proposing to issue a cupro-nickel coin of this value in the new Decimal Series, although silver or pure nickel would have been a more suitable choice for a prestige coin of this value. The life of a Ten Shilling note is less than 6 months, and even at this level it has been found more economical to replace the present Currency Note by a coin.

When any change of this nature is made, it is essential to make it complete, i.e. to replace the entire note issue by the equivalent coins. If this is not done, and both notes and coins of

the same value are in circulation together, the public will use the notes for preference, because of the convenience of being able to slip a number of these into their wallets, whereas an equivalent number of coins is uncomfortably weighty to be carried around. India provides an excellent example of this, as she had used the One Rupee coin for centuries, and the equivalent Currency Note was only issued as an emergency measure during the last War when all metals were in short supply. After the War, when the minting of Rupee coins was resumed on a small scale, the coins had to be forced on to the public, and as the printing of Rupee notes still continued, the coins rapidly found their way back to the Banks, as the public had become used to the greater convenience of the notes.

In this paper an attempt has been made to cover most of the problems involved in modern coinage systems and, to those who are not familiar with these problems, it is hoped that some clarification has been provided. New coins are constantly being produced throughout the world for the reasons given at the commencement of this article, and numismatists who are interested in such issues should still find plenty to add to their collections in the years to come.