Mughal Coin Hoards of Uttar Pradesh: A Note on the Methodology of their Statistical Evaluation

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For ages, old coins have drawn the attention of antiquarians, museums as well as private collectors as valuable objects endowed by historic, aesthetic and — especially in the case of gold and silver — metallic value. Since the 19th century coins have been systematically used as an important source for determining regnal years, establishing relative or absolute chronologies and compiling dynastic tables. All these purposes were served well by well-preserved and easily legible specimens of coins datable on the basis of either their own internal (dates on coins) or external (circumstances of their finds) evidence. The structure of coin collections of most museums (including the Indian ones) reflects this attitude: until recently museums have contented themselves mostly with keeping only a few specimens of each coin type, disposing of the rest of a hoard by sale, exchange, etc. In many countries, however, hoards were registered and more or less detailed inventories of their content made before their dispersal.

It is only relatively recently that such reports began to be appreciated as valuable sources of their own, offering economic and monetary historians new possibilities of interpretation. This widening range of interest has led in the last fifty years to the preparation and publication of coin hoard inventories covering territories of many European and other countries. The aim of the present article is to draw attention to some methodological problems involved in evaluating hoard evidence for the purpose of economic history. Concrete examples that will serve as illustrations of the points made below are drawn from the published inventory of coin hoards of Uttar Pradesh, published by the State Museum in Lucknow, India. Statistical processing is limited to hoards of Mughal period (ca. 1560-1760), during which the area of the U. P. constituted the heart of Mughal empire.

Coin Hoards, Treasure Troves and Hoard Inventories

To avoid possible terminological misunderstandings, it seems appropriate to explain at this point the sense in which the term hoard is used in this work. The Oxford English Dictionary defines hoard as "an accumulation or collection of anything valuable hidden away or laid by for preservation or future use; a stock, store, esp. of money; a treasure." It appears from this definition that hoards are looked upon as results of conscious activity, as intentional accumulations hidden with

some purpose. In English (and also Indian English) numismatic terminology, however, the term hoard is often used for any discovered accumulation of valuables, intentional or not. This usage is reflected in the titles of published inventories: e.g. Inventory of British Coin Hoards, Coin Hoards of Uttar Pradesh, which contain, apart from genuine hoards, also unintentional losses, stray coins, etc. It is in this broader sense that the term hoard is used in this study. The alternative term “treasure trove”, stressing the aspect of hoard as something hidden and subsequently discovered, is a fixed collocation that cannot be easily modified to designate specifically finds of coins; in this sense, the term “coin finds” is more explicit but may be taken as designating finds of single coins or coins unrelated to each other. In view of the fact that it is often difficult or impossible to discern intentional accumulations from unintentional, the term coin hoard in its more general sense seems to be in no way less appropriate than the other alternatives.

Like coins, hoards too can be studied either as single units or in a wider series of finds belonging to certain period and place. Studied as single units, hoards are classified as intentional or unintentional, stray finds, hoards proper, excavation finds, etc. Information of this kind can be obtained from find reports but is, in the Indian case, lacking in the published inventories. Finds that are physically available for inspection can be further studied from the point of view of metrology, average metallic content of coins, etc. Needless to say, these procedures are more or less regularly applied only to recently discovered (and therefore not yet dispersed) finds; their results usually do not find their way into published inventories.

Statistical methods form an integral part of these investigations; it is when hoards are studied in series, however, that the role of statistics becomes especially prominent. In this field attention paid to methodological aspects of data processing and interpretation is, as far as I am aware, not as thorough and detailed as these problems would deserve. In this study I shall focus my attention primarily on two sets of questions which hoards may possibly answer: the first concerns hoards as sources for study of the hoarding behaviour of a given population in a given area and its changes in time, the second the much more intricate problem of the relationship between the number and structure of hoards on the one hand, and the quantity and structure of currency circulating in a given period of time on the other.

One should be very careful in drawing direct conclusions about quantity and

3 German, Danish and Czech terminology prefers to stress this aspect of discovered accumulations: e.g. the German inventories bear in their titles terms “Münzfunde” or “Schatzfunde”, Danish have “skattefunde”, Czech “nálezy mincí”.

4 General principles of classification of coin finds are set down in several textbooks and introductions to the field. See, e.g., P. Grierson, Numismatics. For the Indian context useful summary is found in J.S. Deyell, Living Without Silver. The Monetary History of Early Medieval North India. Delhi 1990, pp. 272-291.

structure of monetary media from hoards or coins available for inspection either in
the physical form or in the form of inventories, abstracts or treasure trove reports.
Neither hoards nor coins taken out of their hoard context are random currency
samples distributed evenly over time or a defined area as required by statistical
theory. Perhaps the closest parallel to random samples can be seen in the category
of the so called unintentional losses. In most cases, however, the concealment of
money was intentional and its owner was certainly led by motives and considera­
tions quite different from those of a modern statistician.

The Filters
As suggested above, the main difficulty inherent in any study of past monetary
systems by the (sole) means of extant coins, or better, coin hoards is that hoards
are not independent random samples drawn for the purpose of historical analysis
in conformity with the rigorous demands of statistics. The number, size and struc­
ture of these samples has been determined by subjects whose motivation is itself a
subject of scholarly debate and factors over which the contemporary historian can
exercise no control. It is therefore very important that he should be, as far as pos­
sible, fully aware of their existence and influence on the formation of the sample.
At this preparatory stage, the central question is to what extent and in which direc­
tions do these distorting factors create biases in the extant evidence, making it
structurally different from the hypothetical ideal random sample. Each hoard may
have its own particular bias or a combination of biases.

The situation is often further complicated by occasionally missing data on one
or more variables (due to, for example, lack of exact identification of coins as far
as their denomination, metallic composition or date of minting are concerned) or
by systematical exclusion of one variable from the published evidence (in the case
of U. P. hoards, systematical omission of number of doubles in hoards).

It will be obvious that in a situation where particular samples, typically of greatly
unequal size, are results of different types of sampling processes, distributed
unequally in space and along the temporal axis, they cannot be processed as a
single mass (in cases where this could be both suitable and convenient) and cannot
be subjected to certain types of analysis (e.g. testing) devised for evaluating inde­
pendent random samples. The diverse mass of hoards made available for histori­
cal analysis therefore has to be divided and grouped into several categories defined
by specific structural features and amounts of data (i.e. by the same number of
categories of variables in each group). It is these smaller, internally more homoge­
nous groups that should be subjected to quantitative analysis and used for formu­
lating specific questions.

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6 See, e.g. the discussion of German numismatists on main motives and incentives for hoarding
in the past societies, summarized in: P. Ilisch, Miinzfunde und Geldumlauf in Westfalen in Mit­
telalter und Neuzeit. Numismatische Untersuchungen und Verzeichnis der Funde in den Re­

7 Inapplicability of certain statistical procedures to non-standard samples is pointed out by e. g.
R. Floud, An Introduction to Quantitative Methods for Historians. London 1979, p. 188.
When we try, for example, to form an idea about the age structure of coin stock circulating in a certain period in the past, we shall have to limit our sample not only to hoards formed in the period concerned, but shall also try to exclude from this limited number long-term saving hoards that contain, from the point of view of circulating coin-stock, uncharacteristically high proportion of old coins, and also the so-called emergency hoards made up by homogeneous blocks of freshly minted coins drawn not out of circulation but taken more or less directly from the mint. Both would distort our results: the first type would make the age structure of the coin-stock look older, the second would exercise bias in the opposite direction. Both these types, however, form specific groups worth of study in their own right in their appropriate contexts.

The method chosen here for identifying and defining these groups is to describe and analyse “filters” or “sieves” through which hoards, understood as samples of coins, have to pass before they finally reach, in more or less biased and incomplete form, the hands of modern historian. On the following pages we shall look more closely at these “filters” and try to understand the way they distort these original (mostly also biased) samples.

Recently, an ingenious analysis of the hoard formation was made by P. Sarvas. Sarvas distinguishes five phases through which hoards have to pass before they reach the hands and eyes of the numismatist: 1. thesauration, 2. burying, 3. forgetting, 4. recovery, and 5. scholarly publication. Each of these phases is characterized by certain formative conditions which are arranged in a synoptic table; each

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>Thesauration I.</th>
<th>Burying II.</th>
<th>Forgetting III.</th>
<th>Recovering IV.</th>
<th>Publication V.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Constant</td>
<td>$x_1$</td>
<td>$x_2$</td>
<td>$x_3$</td>
<td>$x_4$</td>
<td>$x_5$</td>
</tr>
<tr>
<td>2. Need of the capital</td>
<td>$l_1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Inflation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. War</td>
<td></td>
<td>$n_1$</td>
<td>$v_1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. General upheavals</td>
<td></td>
<td>$n_2$</td>
<td>$v_2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Epidemics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Plowing, building activity</td>
<td></td>
<td></td>
<td></td>
<td>$w_1$</td>
<td></td>
</tr>
<tr>
<td>8. Exactness*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$w_2$</td>
</tr>
<tr>
<td>9. Level of education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$f_1$</td>
</tr>
<tr>
<td>10. Treasure trove laws</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$f_2$</td>
</tr>
<tr>
<td>11. Activity of collectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$f_3$</td>
</tr>
</tbody>
</table>

* Probability for an accidentally uncovered hoard (during plowing, bulldozing, transfers of greater volumes of earth, rubble etc.) to be noticed by people.

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factor is assigned a particular mathematic symbol that is subsequently made part of an equation expressing the total number of hoards available to scholars. The synoptic table has been translated and reprinted on previous page.9

The equation is \( F = (x_5f_1f_2f_3)(x_4w_1w_2)(x_3v_1v_2v_3)(x_2n_1n_2x_1l_1l_2C+n_1n_2C), \)
where \( F \) represents the total number of hoarded coins available to the modern research and \( C \) the total number of circulating coins of those types that are represented in the hoards. The table is probably more valuable as a heuristic device than an instruction for actual calculation: none of the symbols used in the table can be assigned an exact numerical value.

The concept of filters introduced in this study differs somewhat from that of P. Sarvas. My filters have been defined with the single intention of localizing qualitative distortions and quantitative changes in the hoard material as it passed along the temporal axis. The labels “constant” and “need of capital” used in Sarvas’ classification, for example, are not directly relevant to this purpose. If we are interested in describing factors that make hoarded material structurally different from the circulating currency, it may be advantageous to describe them under the heading of a filter or transformation stage. Viewed from this angle, phase III of the table should read “non-forgetting”; in my description it is made part of filter II. On the other hand, it seemed appropriate to insert another stage, that of registration, between recovery and publication. This is relevant esp. in cases where the published version draws on authentic treasure trove reports, but selects from them only certain data (variables), leaving out others. Original treasure trove reports may get lost or destroyed together with a lot of important data. This is especially unfortunate when the hoards are regularly dispersed (with coins distributed to museums, sold out or returned to finders) shortly after their registration – as is the case in India.

The filters introduced in this article are therefore different from the categories chosen by P. Sarvas for his table; they are situated in the interstices between links of chain: circulation – hoarding – recovery – registration – printed edition.

Filter I: Coins Circulating – Coins Hoarded

The first filter concerns the original composition of the sample: this only rarely exactly reflects the quantitative and qualitative characteristics of currency circulating in the place and time to which it belongs. Hoards are most conveniently dated by their latest coins: however, the time span between the oldest and latest datable coin is often very large (one hundred years or more) and, especially when the majority of coins is distributed rather evenly between the two terminal dates, one has to assume that the formation of the sum eventually hoarded was a relatively long process extending for more than one generation. Special cases are composite hoards containing two clearly separate parts belonging to different historical epochs – in the case of Indian hoards, for example, Indo-Sassanian, Khalji or Tughlaq coins buried together with Mughal silver rupees. The older part was probably a hoard discovered in the past and added by its new owner to his own savings. In
the U. P. records such hoards are rare: however, they remind us of the fact that every hoard has its own peculiar history and therefore a kind of “personal bias”.

Similar bias has to be taken into account when we turn to the examination of places of origin or mints of coins that made up the hoard. Here, coins of some mints may be heavily overrepresented in relation to others that were perhaps more typical for certain place or region. Many coins, esp. those of gold and silver, came into circulation in “bunches”, being released by the mints at the order of some owner of bullion – a merchant, a banker, an aristocrat, etc. It is reasonable to suppose that these homogeneous “bunches” were kept for some time together, travelling with their owners for sometimes long distances, and later were as a whole or in part hoarded and hidden.

These temporal and spatial biases cannot be eliminated: at best, they can to certain extent lose their weight when submerged into a larger mass of data coming from other hoards of a given period and area. Thus the picture we try to make of the structure of circulating currency will be always to a greater or lesser extent blurred. The above biases can be better guides for our understanding of hoarding patterns and habits of the moneyed part of the population.

The same can be said about yet another type of bias – the conscious decision on the part of hoarder to select certain coins or certain metal as most appropriate for hoarding and conservation of wealth. In India, the traditional hoarding metals were gold and silver. Copper was undoubtedly an important monetary metal used not only for lower-value transactions but also, until the end of the 16th century, as the official accounting unit of the Mughal fiscal apparatus (revenue demands of the Akbari administration were stated always in copper dams) and therefore most probably also for the overwhelming mass of financial operations of that time. It is true that up to the end of the 16th century copper often appears in hoards; still, its percentual share hardly adequately represents its importance as the basic monetary unit. And, of course, hoards are totally silent about widespread use of cowries, small shells used in wide areas of Mughal India for everyday low-value financial transactions.

Gold is a very special case: due to its high value it was, of course, an ideal medium for conservation of wealth. It may, therefore, seem strange that in Mughal hoards it is almost absent. A strong negative bias seems to have been at work: this, however, tends to distort not so much the evidence on the real position of gold as circulating metal (higher value payments were made mostly in silver rather than in gold) as on the size of its stock in relation to silver, and especially on its import-

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10 Examples drawn from the corpus of Mughal hoards described in Srivastava’s inventory include nos. 66/UP (Indo-Sassanian and Mughal), 807/UP (Khalji and Mughal) where both components are silver. More frequent are composite copper hoards or copper parts of mixed silver and copper hoards: e. g. nos. 184/UP, 540/UP, 868/UP (Tughlaq and Mughal) and several others.

11 A conveniently short term for this type of bias would perhaps be “hoarding factor” – a translation of the accepted German term “Hortungsfaktor”. See, e. g. J. Schüttenhelm, Der Geldumlauf im südwestdeutschen Raum vom Riedlinger Münzvertrag 1423 bis zur ersten Kipperzeit. Stuttgart 1987, pp. 99-100.

12 Percentual shares of gold, silver and copper coins in Mughal hoards are summarized in a table on p. 201 below.
stance as the medium most suitable for saving and hoarding. This bias was most probably not due to a conscious decision of original owners of gold, but rather to the behaviour of its later happy finders who regularly failed to report and hand over gold coins to the authorities. It is therefore more appropriate to treat it as part of filter three.

Hoarders' preferences do not limit themselves necessarily only to particular monetary metals at the expense of others. In each metal, coins of certain provenience, nominal value or age may be more desirable objects of hoarding than others. Again, main criterion seems to be the factor of value. European monarchs often tried to overcome frequent shortages of money by, for example, diluting, more or less perceptibly, the precious metal content of their coins. Older, less debased coins were therefore considered more valuable and – in compliance with the Gresham’s law – gradually disappeared from circulation. The reverse side of this process is their greater incidence in hoards. Taken as samples of circulating coins, such hoards then acquire a temporal bias that makes them, and the coin stock they are supposed to represent, look on the average older than they actually are.13

In Mughal India the situation was rather different. The Mughal silver rupee kept its standard weight and silver content all through the middle of the 18th century. Moreover, official regulations specifying special discounts on older coins raised artificially the value of freshly minted coins by several per cent, and thus discouraged people from keeping coins of older mintage.14 One could perhaps even speculate about a reverse bias: older coins in long-term savings might be the most natural candidates for spending if the need to cover some extra expenses arose.

Concerning the qualitative biases, mention should be made of silver fractions of Mughal rupees. These began to be minted during the reign of Akbar and, sooner or later, must have found their way into hoards. If the printed inventory records faithfully all occurrences of small silver coins in hoards (as seems to be the case)15, their role in hoarding – and in circulation probably too – was only marginal.16

The biases mentioned above inherent in the samples allow us to formulate only rather general conclusions concerning the actual structure of currency circulating in any area in a period of the past. Probably still more problematic are the quantitative aspects of the hoard evidence. Indian economic historians are from time to

13 J. Schüttenhelm, op. cit., p. 100.
15 In hoards no. 319/UP, 320/UP, 613/UP, 742/UP silver coins of one and the same regnal period are divided into two groups described separately. Criterion for this division is nowhere explained; we can only guess that they refer to two different types of silver coins, perhaps rupees and half-rupees or annas. In other cases – e.g. nos. 780/UP, 802/UP, 837/UP fractions are identified even in cases of their very small numbers or single occurrences in hoards.
16 Several hoards contain fractional pieces of the Akbari rupee that are said to be known only from literary evidence. 1/16th of rupee, the anna, was minted in some quantity in the reign of Shahjahan, but according to contemporary testimony, was “rare”. The same seems to hold good, more or less, for the nisar, a quarter-rupee struck by Jahangir, Shahjahan, Aurangzeb and Farrukhsiyar. I. Habib, The Currency System, p. 7; P. L. Gupta, Coins. New Delhi 1969, p. 125.
time attracted to the idea of ascertaining the relative or even absolute volume of currency circulating in a given period on the basis of frequency with which coins of certain date appear in museum catalogues, collections, or treasure trove reports. The assumption underlying these attempts is that there is a direct relation between the quantity of surviving coins on the one hand and the quantity of coins circulating in the respective period on the other. Unfortunately, the problem is not so simple. If the varying absolute numbers of coins of certain dates (or of certain period) extant in modern museums show any trends, these trends will, in the first place, tell us something about intensity of hoarding. Even here, however, their testimony is very imprecise – much more reliable are the hoards themselves, their varying numbers, sizes and locations. The historian-statistician should always pay attention to the hoard context – for example, extant coins may come from a greater number of smaller hoards or from smaller number of very big ones. In the latter case great quantity of coins of a certain period may be the result of the purely accidental fact of an extremely big hoard having been uncovered and registered in modern times. In the case of U. P. Mughal hoards, such bias is inherent especially in the high proportion of Akbari coins. The following table will illustrate this point. All hoards with 100 coins and more are listed individually.

Distribution of Akbari, Jahangiri, Shahjahani and Aurangzebi silver coins in hoards deposited in the area of U. P. in the years 1560-1942

<table>
<thead>
<tr>
<th>A. Akbari</th>
<th>Number of hoards</th>
<th>Hoard no.</th>
<th>Number of Akbari coins in hoard</th>
<th>Per cent of all Akbari coins</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>1</td>
<td>426/UP</td>
<td>1201</td>
<td>26.16</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>975/UP</td>
<td>556</td>
<td>12.11</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>450/UP</td>
<td>484</td>
<td>10.54</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>203/UP</td>
<td>207</td>
<td>4.51</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>530/UP</td>
<td>200</td>
<td>4.36</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>973/UP</td>
<td>162</td>
<td>3.53</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>972/UP</td>
<td>135</td>
<td>2.94</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>742/UP</td>
<td>127</td>
<td>2.76</td>
</tr>
<tr>
<td>123</td>
<td>115</td>
<td></td>
<td>1519</td>
<td>33.09</td>
</tr>
<tr>
<td></td>
<td>123</td>
<td>4591</td>
<td>4591</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Aziza Hasan was probably the first Indian historian who tried to draw conclusions for economic history from the evidence of coins. However, her basis was too narrow – she used only catalogues of museum collections that had been built up in a highly selective way. See her article The Silver Currency Output of the Mughal Empire and Prices in India during the 16th and 17th Centuries, IESHR VI,1 (1969), pp.85-116, subsequent critique of O. Prakash and J. Krishna­murty, ibid., VII (1970), pp. 139-150 and A. Hasan’s reply, ibid. J. S. Deyell returned to the theme several years later in his article Numismatic Methodology in the Estimation of Mughal Currency Output, ibid., XIII, 3 (1976), pp. 393-401. Newest attempt to squeeze out information from coins, this time those registered in the Treasure Trove Reports from the U. P., on the import of silver and its consequences, is S. Moosvi’s The Silver Influx, Money Supply, Prices and Revenue Extraction in Mughal India, JESHO XXX (1987), pp. 47-94 and Chapter 15 of her synthetic study The Economy of the Mughal Empire, c. 1595. A Statistical Study. Delhi 1987, pp. 351-374.
Comparison of coin totals of the four Mughal emperors shows that Akbari coins greatly outnumber those of the remaining three monarchs. S. Moosvi understood changing quantities of coins of particular years (or pentades) as direct indicators of mint activities and consequently of the influx of silver into Mughal economy.18

18 S. Moosvi, The Silver Influx, pp. 51-55. Quantities of coins assigned to the four emperors in her study differ from the numbers in the tables above. S. Moosvi saw the Treasure Trove Reports of the years 1880-1968, whereas Srivastava’s book, on which my calculations are based, includes new material and ends in 1978/79. Moosvi also eliminated all coins from the Deccan mints and converted silver coins of smaller denominations, as well as slightly heavier Jahangiri rupees into standard rupee units. In this study the latter recalculation was not feasible owing to incomplete information on the number of particular types of coins in Srivastava’s inventory. However, the proportions are similar: Moosvi counted 2653 Akbari, 1109 Jahangiri, 1678 Shahjahani and 1942 Aurangzebi coins. Hoard 426/UP datable to 1614/15 was discovered in 1907/08 and therefore must have found its way into Moosvi’s statistics.
This assumption is misleading. As our table of distribution of Akbari coins clearly shows, more than one quarter of all Akbari coins registered in U. P. Treasure Trove Reports comes from a single source – hoard no. 426/UP, which is one of the biggest Mughal hoards ever registered in the area of U. P. Published abstracts of the U. P. hoards do not contain information that might allow us to form a hypothesis about the possible origin of this hoard. The fact that somebody lost or hid such a huge amount of money which somebody else three hundred years later discovered and reported to the authorities may not necessarily have any direct relation to silver imports. The circumstances that led to the formation and particularly to the loss of this hoard were probably extraordinary. When we eliminate this extraordinary case from further statistical processing, number of Akbari coins descends to the level of quantities of Shahjahani and Aurangzebi coins (3390 Akbari compared to 3175 Shahjahani and 3631 Aurangzebi). In this context it should be also noted that two thirds of all Akbari coins come from 8 big hoards containing 100 or more coins, whereas the remaining 33 per cent is distributed between 115 smaller hoards. This distribution pattern is limited to Akbari coins only: as can be seen in the table, the proportion of big hoards to the total numbers of coins never exceeded 50 per cent. Thus, accidental factors and specific patterns of hoarding that may have varied in both longer and shorter time spans as well as in different areas invalidate the absolute numbers of (existing) hoarded coins as relevant data for reliable estimates of output of mints and silver imports.

There are two different theories concerning conditions conducive to hoarding. According to the first, hoarding is symptomatic of growing wealth and relative abundance of money; savings banks were unknown in the middle ages and the early modern era, and depositing precious objects and coins in safe and secret places was nothing unnatural. If the political and economic situation was stable, most of these accumulations were later dishoarded, spent and therefore dispersed. Even if such accumulations were numerous, today we have little material proof of their past existence. The complete loss of information about the location or even the very existence of a hoard probably occurred more frequently in dramatic and unusual circumstances: the memory may have been obliterated by the sudden death or expulsion of the owner or his relatives. (This aspect is better dealt with as part of our filter II). Such situations occur typically in times of wars, uprisings or other violent upheavals that, according to the second theory, themselves constitute important motive for formation of new hoards. That is why we typically have more hoards from times of wars than from periods of peace. It would be rash to con-

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19 Examples supporting this thesis can be probably drawn from any area with at least partly monetized economy affected by some violent disturbance. The example of hoards registered in Bohemia and published by E. Nohejlová-Prátové (red.), Nálezy mincí v Čechách, na Moravě a ve Slezsku, vols. I-IV, Praha 1955-58 is very instructive in this respect: two very prominent peaks in hoarding activity coincide with the Hussite wars of 1420's and 1430's and with the Thirty Years’ War of the 17th century. See ibid. vol. IV., p. 82. Causes of hoard formation are dealt with in a lengthy article by A. Blanchet, Les rapports entre les dépots monétaires et les événements militaires, politiques et économiques. Revue Numismatique XXXIX(1936), Ser. 4,
clude on the basis of such evidence that greater number of hoards in such cases indicates expanding money supply.

In sum, the higher incidence of hoards is due to specific events rather than more general economic processes. The latter can be often more profitably determined from material composition, fabric and weight of the coins rather than from their sheer numbers.

Filter II: Coins Hoarded – Coins Recovered in Modern Times

Not all hoards hidden and forgotten in the past have been discovered in the modern era; some still lay hidden in the ground, others were found accidentally in the pre-modern period. The fact that such discoveries occurred from time to time is attested not only by legends, tales and folklore in general, but also by certain type of the existing hoards themselves. As mentioned above, several U. P. hoards registered and described in modern times contain two clearly separate parts belonging to two totally different periods.

We have no means of estimating the rate of attrition of the original hoard stock due to these pre-modern discoveries. Generally, the more distant the date of hoard is from the present, the greater is the probability of its discovery in the past. As far as the frequency of hoards is concerned, owing to this filter older hoards are numerically underrepresented in comparison to the more recent ones. The rate of attrition was probably not even through the centuries and millennia: the rate of discovery must have been increasing steadily together with growing population density and, especially in the more recent times, with transport of great masses of earth in the intensive building of infrastructure, new houses, etc.

pp. 1-70, 205-270. This article reads more like a list of hoards formed in response to wars, military campaigns and local power struggles. Some of the examples, drawn from two millennia of European history are speculations and more or less convincing guesses. However, his main thesis is beyond doubt. Apart from political upheavals, there were also relatively minor disturbances of local and temporarily limited character: these too could induce people to hide their property. As a good example in this respect may serve the so called Lohe hoard discovered in Stockholm in 1937 and subsequently analyzed by B. Thordemann in a model study The Lohe Hoard: A Contribution to the Methodology of Numismatics. Numismatic Chronicle, vol. VIII (1948), Ser.6, pp. 188-204. Formation of this huge emergency hoard was traced to particular political crisis in Stockholm in 1743. Thorough study of local historical sources was necessary to identify the situation that led to formation of this hoard. Another example, this time known only from narration, is description left by Samuel Pepys in his diary of his own precautionary measures taken in the summer of 1667 in response to the danger of Dutch attack on London. J. Warrington (ed.), The Diary of Samuel Pepys. London, New York 1953, vol. II, pp. 481-2, 488 and vol. III, pp. 80-81. We have also a rare literary description of such a local crisis from Mughal India – an account left by a jeweller, Banarasidas of Jaunpur, about violence and extortion committed by the Mughal governor Quli Khan. R. Ch. Sharma, The Arda-Kathanak. A Neglected Source of Mughal History. Indica, vol. VII, no.1 (1970), p. 58. Hoards formed in this type of local crisis may be chronologically isolated and their testimony of some political disturbance may be deciphered only after careful study of local sources. Thordemann's thesis that "series of chronologically proximate deposits indicate periods of war or other political disturbance, while chronologically isolated finds do not allow of any such conclusion" (The Lohe Hoard, p.193) is formulated in this respect perhaps too sharply. For the German debate and subsequent empirical research (confirming the thesis stated above), see P. Ilisch, op. cit., pp. 3-5.

Finally, we should not forget that a number of hoards was later reclaimed by their owners or their informed relatives; these are hoards whose existence never disappeared from the memory of local inhabitants. Here the “sieve” is likely to be much more dense in periods of peace, which ensured greater continuity of habitation and tradition passing from one generation to the next. The “sieve” is understandably looser in times of wars, migrations, disturbances etc. This, together with greater hoarding activity, is the reason why periods of war and unrest are better represented in hoard statistics than periods of peace. The existence of the quantitative bias due to long-term attrition should be kept in mind particularly in comparisons of quantities of hoards belonging to different epochs; it is not exactly quantifiable. The period of two hundred years (1560-1760) which is under discussion here is perhaps too short for this bias to distort in a serious way the quantitative evidence. Fluctuations in the number of hoards over shorter periods, on the other hand, may be, for reasons stated above, quite strong – this should be borne in mind especially in attempts to relate the number of hoards to the volume of currency in circulation. There is no bias that could affect qualitative aspects (internal structure) of hoards passing through this filter.

Filter III: Coins Recovered in Modern Times – Coins Entered into Treasure Trove Reports

Not all coins recovered in modern times (defined for our purposes as the period when museums systematically register hoards and collect and catalogue old coins) have been entered into official museum inventories. From the total number of hoards recovered in modern times – in the case of U.P it is since 1882 when hoards reported to the authorities began to be registered and described in Treasure Trove Reports – only a fraction came to the notice of government officials or found its way into state museums. It is impossible to say how large – or rather, how small – this fraction actually was. According to an estimate of J.S. Deyell\textsuperscript{21}, up to 95 per cent of the hoards or even more may escape the attention of the state authorities and go unreported into private hands. Only a part of this mass of coins goes into private collections, whereas the great majority is melted and sold on the silver market as bullion.

We may ask whether hoards of Mughal coins have had in the last hundred years always equal chance to get into the possession of museums, or whether there was, at times, a selective bias affecting their share in all hoards registered in a given time-span in a given area. To get an idea about possible trends or fluctuations, the mass of data from the U. P., available for the period of 1882-1979 (total of 1141 hoards) has been divided into five-year periods and summarized in the following graph.

Basically, two interpretations of this graph are possible. According to one, the percentage of loss of hoards due to laxity in law enforcement would be seen as a constant, and the decline of registered hoards, noticeable since the fourth pentade

\textsuperscript{21} J. S. Deyell, \textit{Living Without Silver}, p. 279.
Coin hoards of the U. P. registered by the State Museum, Lucknow in the years 1882-1979

of this century, would be explained by the decline of absolute numbers of all hoards found in the area. This decline would be due to the simple fact that the total quantity of all hoards buried in the past gets gradually exhausted, and the decreasing trend noticeable in the graph simply reflects this fact. The second explanation might point to factors 8 to 10 of the list of P. Sarvas reproduced above. Use of machines capable of turning and transporting large masses of earth may destroy uncovered hoards or disperse them so that their parts or single coins easily escape human attention. Level of education may be perhaps less important than the opportunity to sell coins for metal on the bullion market or to private coin collectors. This last factor seems to be, particularly in the second half of this century, of growing importance, and may go a long way towards explaining the post-war declining trend.

Apart from these more or less general factors operating in many other countries of the world (numbers of finds registered in European countries show the same declining trend), there are several other features characteristic to the U. P. Even in the U. P., with its exceptionally high standard of treasure trove record keeping, the quality of registering and subsequent storing of records has been quite uneven. As A.K. Srivastava informs us in his introduction to the published volume, complete evidence of coin finds based on the original treasure trove reports is available for the years 1898-1918, 1939-1956/57 and 1965-1979 (the time of compilation of the inventory). The evidence from the intervening years is incomplete and has to be reconstructed, as far as possible, from other archival material. The situation is especially bad in the case of the late thirties, when the description of a hoard is
often restricted to laconic statement "Mughal" and "disposition not known". Such finds can be drawn only into the most elementary statistics about the total number of Mughal hoards. It is not improbable that unknown number of hoards was dropped completely. The fault does not seem to be in incompetent registration but rather in the later handling of the records.

As far as the share of hoards containing Mughal coins in the total number of all registered hoards is concerned, there does not seem to be any bias either in favour or against Mughal finds: their share in the total fluctuates mostly between forty and fifty five per cent (with two exceptions in the pentades of 1886-90 and 1946-50 when their share sinks to under thirty per cent).22

Turning to possible qualitative distortion, it is highly probable that in India this filter stops a greater proportion of gold coins than coins of any other metal. Gold is little affected by corrosion and its constantly high price on the market makes it ideal for conservation of value. Its original proportion in hoards was therefore probably higher than its share in hoards registered in the Treasure Trove Reports of the U. P.

### Gold, silver and copper in U. P. hoards containing Mughal coins inventoried in the years 1882 – 1978/7923

<table>
<thead>
<tr>
<th></th>
<th>Pieces</th>
<th>% of all coins</th>
<th>% in terms of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>139</td>
<td>0,24</td>
<td>3,6</td>
</tr>
<tr>
<td>Silver</td>
<td>44,057</td>
<td>76,3</td>
<td>95,13</td>
</tr>
<tr>
<td>Copper</td>
<td>13,509</td>
<td>23,4</td>
<td>1,27</td>
</tr>
<tr>
<td>Other</td>
<td>36</td>
<td>0,06</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>57,741</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The relatively low percentages of copper are due to the general prevalence of silver as the main and relatively accessible monetary metal whose higher intrinsic value made it more suitable for hoarding than the cheaper copper. Apart from the effects of this "hoarding factor", specific provisions of the Treasure Trove Law also played a considerable role (see below). On the other hand, the causes of the relatively very low percentage of gold, a metal most suitable for hoarding, must have been very different. In this case, small numbers suggest that gold coins, instead of being duly reported and handed over to the authorities, tended to disap-

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22 The average share of Mughal hoards in total is 44.64 per cent (pentades 1881-85, 1961-65 and 1971-75 have been excluded), standard deviation from the mean is 10.22. The Mughal share in the two exceptional pentades is 23.38 and 28.00 per cent respectively.

23 From the numbers have been excluded 535 gold coins of no. 763/UP (Treasury of Kunwarpur) as well as 2851 silver, 787 copper and 245 silver alloy coins of no.1060/UP (Treasury of Rampur). As these coins were inventoried by state officials directly on the spot, filter III in these two cases did not intervene. In all, coins from 528 hoards have been included. Percentual shares of gold, silver and copper expressed in terms of their relative value have been calculated on the basis of gold to silver rate 1: 12 and copper to silver rate 23:1. The rates are averages calculated for the period of 1560-1760 from data published by I. Habib in his article A System of Trimalism in the Age of the “Price Revolution”: Effects of the Silver Influx on the Mughal Monetary System. In: J. F. Richards (ed.), The Imperial Monetary System of Mughal India. Delhi 1987, pp. 148-150.
pear into private pockets. In comparison with silver and copper, gold is, in official reports and collections, most probably seriously underrepresented.

Of considerable interest in this context are the Treasure Trove Laws regulating the procedures of registration and disposal of hoards, as well as the remuneration for the honest finder. The first such law, Regulation 5, was passed in 1817. This was superseded by Act VI of 1878 which, supplemented with a minor amendment in 1891, remained in force until the end of British rule and was subsequently inherited unchanged by the independent India.

In its substance the Act is very liberal, but the accompanying procedures are very lengthy and cumbersome; this fact must have deterring effect on any finder - if he happens to know about the existence of the Act at all. His duty is to report and hand over the hoard to district officer who shall, by way of public notification, give a chance to potential owners of the find to raise their claim. If no such person appears in the stipulated time, the hoard is, after inspection, returned to the finder. The collector, however, may acquire the hoard, or part of it, for the government and pay to the persons entitled thereto a sum equal to the value of materials of the treasure. (In fact, it was only in 1884 that provincial governments were advised to issue instructions to collectors that all coins of non-British mintage should be invariably acquired for the government). If a claimant appears, the case is to be settled by a Civil Court. The final verdict and the sum to be paid is reported to be usually quite long in coming - four or five years are no exception. Moreover, few people are aware of the real content of this Act and many, including police officials, wrongly believe that hoards are the property of the state. This state of affairs has had two unfortunate results: finders try to hide their finds and police, on receiving notice, often tend to behave in an unduly harsh way. P.L. Gupta, an eminent Indian numismatist with lifelong experience in the field, believes that hoards that come to the notice of the Government constitute hardly five to ten per cent of all hoards found.

The Act contains also one provision that has worked as a kind of filter holding back copper hoards. Section 4 exempts from the application of the Act objects of value of less than ten rupees. Even at the beginning of the 1960s this sum could cover a hoard of five hundred copper coins. This may partly explain the fact that the Mughal copper hoards are apparently underrepresented, esp. in the hoard profile of the second half of the 16th century.

However, if we concentrate on a single metal (in this case on silver), the quality of our sample should not be affected by this filter – except perhaps by the loss of such rarities as the “zodiacal” coins of Jahangir sought after by every private or public collector. As the Mughal rupees kept an almost unchanging standard of

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24 J. S. Deyell reports about private collections containing rare gold coins coming undoubtedly from such unreported hoards. “Even academics appear embarrassed by questions about their source of gold coin photographs.” Living Without Silver, p. 281.


26 Ibid., p. 147.
weight for long periods of time, there is no reason for the existence of any serious qualitative bias. Quantitative attrition caused by this filter, on the other hand, must have been extremely heavy.

**Filter IV: Coins Inspected and Entered into Treasure Trove Reports – Published Evidence of Dispersed Coins**

Today's historians have at their disposal for visual inspection only a small percentage of the total of all registered and described coins. In India, state museums select only a limited number of specimens suitable for completing their own collections and distribute the rest to other museums or sell them on the market. Hoards are therefore usually soon dispersed and the historian is left only with written records. A lot of very useful information about coins that is available only after their careful visual inspection (composition, exact weight, wear, dies used, etc.) is either irretrievably lost or, if the coin is inspected after the hoard has been dispersed, taken out of its original context. In addition, there may be mistaken identifications or simple typographical errors that can not be corrected when the original is no longer available.

Moreover, many historians may not have ready access to the original Treasure Trove Reports and have to make do with the published inventories. In the ideal case, these should be in the form of reprints of the original reports, supplemented with the necessary critical apparatus. Unfortunately, the published inventory of the U. P. hoards that has supplied data for this article is in some important respects incomplete. Its compiler leaves out information about the number of duplicates in hoards; these data are important for statistical processing of year and mint frequencies. There are some obvious errors in dating which can be in most cases corrected: the less obvious ones could be eliminated only after careful comparison with the original reports. On close inspection, however, these errors seem to be marginal. We should not expect them to constitute any bias that would distort the data systematically in one direction. In short, published hoard inventories may be of unequal quality and comprehensiveness: the amount and structure of data selected for publication will in each case shape the research strategies of historians, and more or less limit the range of answers they may hope to extract from the available material. As far as the Mughal coins hoards are concerned, it seems that if we concentrate on a single metal (silver), understand the quantities of hoards and coins contained in them as indicators of past hoarding activities rather than of quantities of coins in circulation, and study the coins always in the context of their respective hoards, we can to a great extent escape the qualitative distortions inherent in the material. We should not hope to obtain in the end a set of absolute values on the extent of import of precious metals: even relative values, when set into their appropriate contexts, may yield interesting information. This, however, would be a theme for a more extended study.