Faculty Working Papers

TOWARD A GENERAL THEORY
OF TRANSLATION

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The purpose of this paper is twofold: First, to present a theoretical analysis of the problem of translating foreign accounts and, second, to interpret the results of this analysis in terms of fundamental concepts which provide a foundation for a general theory of transaltion. We see our second purpose best accomplished by way of contrast with traditional translation theory though this approach has its recognizable shortcomings. The contrast must rest upon our own interpretation of what constitutes conventional translation theory, interpretation which we cannot fully support within the confines of this single paper. Nevertheless, to justify an alternative it must be demonstrated that such alternative appears preferable to what exists. To do this we must turn to differences.

Nature of the Translation Problem

Definition of the Translation Problem

We take as given that consolidation is a primary use of translated financial statements. Hence, hereafter translation will be considered to consist of translating foreign accounts and consolidating those accounts with domestic accounts.

Source of the Translation Problem

The source of the translation problem must lie in differences which exist between foreign and domestic accounts which frustrates their immediate combination. There are two types of differences which could give rise to a translation problem. They can be described as qualitative differences and quantitative differences. There are numerous qualitative differences which might be cited as

sources of non-comparability and non-compatability between foreign and domestic accounts. There can be differing degrees of risk associated with conducting foreign operations and holding assets abroad as compared to domestic alternatives. There can be restrictions applicable to the operation of a foreign entity in its environment not applicable to domestic entities. There can be differences in credit policies and customs. For example, South American credit is more carefully and formally arranged so that "an unsecured account receivable is generally worth less in South America than it is in the United States.[1] To the extent that these types of differences cannot be compensated for through wise application of GAAP in the foreign country a problem exists.

There is no immediate answer to the question of how to contend with qualitative differences. This aspect of translation is clearly worthy of research, particularly in the area of disclosure techniques to give recognition or express caution with respect to these qualitative factors. However, no translation approach to adjust for truly qualitative differences has been suggested or is apparent. Translation deals with the quantitative elements of financial statements; therefore, we proceed under the assumption that the injurious effects resulting from the presence of qualitative differences are immaterial relative to the benefits gained from rational translation and consolidation and/or that disclosure techniques can be developed to mitigate against or nullify the dysfunctional effects of such differences.

The source of the translation problem, then, must reside with the second type of difference--quantitative. Reference to Ijiri aids in determining the basic quantitative aspects of financial statements.[2] Both foreign and domestic financial statements represent information about entities written in a numerical language. Each account constitutes a numerical surrogate for a principal in

the real world. This view is equivalent to Lorenson's view that accountants measure particular attributes of assets and liabilities.[3] In other words, a balance sheet account and its assigned numerical value at a point in time constitute the measurement (surrogation) of a real-world attribute (principal). Viewed either way, as attributes or as principals, their measurement is a quantitative aspect of financial statements. The attributes measured (or principals surrogated) in the sets of financial statements to be combined are a potential source of quantitative difference and so possibly constitute the source of the translation problem.

In order for the attributes measured in foreign accounts to differ from those measured in domestic accounts, however, different accounting principles would have to be followed from those used to develop the domestic statements. Further, these principles would need to be different in substance and not merely in form. For example, Parkinson maintains that the principles followed for the foreign accounts "need not necessarily be in harmony with accounting principles generally accepted in the country in which the parent company is resident." Instead, he argues that they should "be prepared in accordance with accounting practices most appropriate for the business and economic environment in which foreign operations are conducted."[4] Yet, depending upon what Parkinson has in mind, substantive differences may or may not be involved. That is, he may be acknowledging the need for differences at the detailed principles level, rather than at the pervasive principles level or the broad operating principles level as in the sense of APB Statement No. 4. As such we have merely wise application of GAAP and perhaps partial confrontation of the qualitative differences problem discussed above, and not creation of differences in the attributes of financial resources measured.

However, if Parkinson has in mind use of truly different sets of account-
ing principles, ones which result in measurement of different attributes, then
his logic is correspondingly difficult to accept. While the difference in
principles question is fundamentally one of degree, use of two different sets
of accounting principles is at odds with the basic presumption of most writers
on translation. In practice:

> U. S. firms generally require their wholly owned subsidiaries to
> maintain two sets of books--and often three. The two that are
> required are those using parent company accounting techniques
> and those required for local tax purposes. A third set may be
> used if publication of annual financial statements is locally
> required and is based on local accounting principles.[5]

From the standpoint of logical consolidation, if the attributes measured
are allowed to differ, the measurements cannot be added with a rational ex-
pectation of achieving an interpretable result. For example, it would be il-
logical to add replacement costs to historical costs or current cash equiva-
lents to replacement costs in the same consolidated account. GAAP already
create problems of vertical additivity (within statement additivity) by adding,
for example, current value assets to historically costed assets to arrive at
a total assets figure. Translation eff cted under multiple measurement rules
for the same accounts would compound the problem in terms of horizontal addi-
tivity (between statement additivity). The use of fundamentally the same prin-
ciples for all sets of accounts involved seems a necessity before translation
and consolidation can even be considered.

The point is, then, although the attributes measured in accounts could
give rise to a quantitative difference and so give rise to a translation problem,
there is no need or reason for that to be the case. Hence, only one quantita-
tive aspect of financial statements remains to give rise to the difference which
is the source of the translation problem--the unit of measure. Indeed, the

very need to translate arises from the need to provide a homogeneous measurement unit. The source of the translation problem must be and is heterogeneity in the measurement units used to develop the two (or more) sets of accounting measurements.

A Hypothetical Translation Example

To facilitate analysis of the accounting translation problem, it is desirable at this point to start with a non-accounting example. The accounting translation problem is by nature complex and somewhat unwieldy in the sense of abstracting important elements therefrom with ease. Further, it is often difficult to drop preconceptions regarding a particular problem. Given the source of the accounting translation problem as heterogeneity in the units used to take accounting measurements in different places, it can be seen that the translation problem is not totally unique. As a result, it is possible to create and draw upon an example of a "translation problem" that is simpler than the problem actually faced and yet contains the basic elements common to all heterogeneity of units problems of which the translation problem is one.

Assume that measurements of the height of selected individuals were taken in the U.S. and some in Europe and as a matter of course were expressed in yards and meters respectively. Assumed further that the same rules were followed in both locations for taking the measurements. For example, the rules followed could have been that all measurements were to be taken while the subjects were standing and all subjects were to be 45 years old at the time of measurement. This constitutes a translation problem if the measurements have to be used to gain information. Whether the measurements taken in the example are to be used or reported in the U.S. or in Europe, and whether they are going to be used as separate or combined sets of measurements, a translation problem exists. Even if the sets are not to be combined (consolidated) it can be pre-

sumed that a common frame of reference would be required to make the information of greatest use to a particular user. If the sets of measures are to be combined, of course, the problem of heterogeneity in the measurement units exists and must be confronted.

Solution to the above translation problem is not difficult. Reference to any dictionary will provide the translation rates required. If a dictionary or other reference work is not available but the measuring instruments are, say a yardstick and a meter stick, one could be laid upon the other and from the ratio indicated the needed translation rate calculated. Either way, an appropriate translation rate would be obtained which could then be applied to either set of measurements in order to restate them in the unit of measure of the other set. After restatement the translated numbers could be added to, subtracted from, multiplied by and divided by the unrestated numbers to extract the desired information from the measurements. The approach to solution followed above is not only commonplace but the logical approach in dealing with heterogeneity of units problems.

Definition of Translation

Drawing upon the above example a tentative definition of translation may be advanced and given substantive meaning.[6] Translation in general terms is a mathematical process of transforming measurements taken in terms of one scale of measurement into a second scale of measurement. Extending this definition to accounting, accounting translation is (should be) the mathematical process of transforming accounting measures scaled in foreign currency units of measure to accounting measures scaled in domestic currency units. Thus translation is a restatement process, not a measurement process. Measurement processes constitute a different and separable category of operations entirely.

While measurement involves mathematical operations, translation is a mathematical operation. The extent of the operation is defined by the circum-

stances. Translation does not create new relationships and states, it contends with existing ones. Measurement, on the other hand, defines its own circumstances. It creates new relationships and states. Measurement can involve a point of view, it can give preference to certain ends over others, it is more than simply a mathematical operation. It is a creator, not a converter, of information. Translation, in contrast, is a mathematical operation only and so is as neutral with respect to information content as are the mathematical computations it involves. There is advantage in this neutrality.

The neutrality of translation can be seen in the translation example given and can be directly related to accounting translation. For example, the translation effected in the example involved no bias toward one location over the other. It was purely a mathematical exercise. There was no subjective judgment inherent in the process that the European measurements were in some way "better" or "worse" than those taken in the U.S. or in some way more important. Translation itself has no point of view. True translation when applied to foreign accounts must result in treating foreign operations as separate going concerns. Having or encompassing no particular point of view, translation must treat all measurements as having equal status. Since accounting is, in separate application, treatment of the firms as separate viable entities true translation will not alter this state.

The translation effected in the example can also be seen as neutral with regard to future events. There is no presumption, for example, that the subjects measured will quickly grow or shrink or that the Europeans will immigrate to the United States and through better nutrition quickly increase their heights. By the same token, true translation applied in accounting must by definition be neutral with regard to future events and future actions of the firm; financial position must be considered independent of future expectations.

Lack of neutrality in the present sense can be said to be the primary factor causing traditional translation methods to be unsatisfactory.[7] Neutrality, as Chambers points out, "is the property by virtue of which a statement, singular or aggregative, is relevant to whatever ends are selected by the actor for consideration."[8] True accounting translation must possess neutrality in the sense above and therefore be relevant to whatever ends are selected.

The example also points to another element of neutrality inherent in true translation. In the example it was irrelevant that the measurements were of height standing. Perhaps a more useful measure is height sitting. For that matter, measurements of the height of individuals standing may be considered by almost everyone as totally useless information. The point is that none of these areas of debate entered into the translation problem in the example. As a practical matter we might argue that any theory of translation should not take on the task of changing GAAP but, rather, should accept the accounting principles deemed sufficient at present as given. Since true translation is neutral with regard to questions of "goodness" or "badness" of pre-translation numbers, this argument becomes redundant. As Lorenson points out, these are separate questions entirely.[9] Translation is neutral with regard to alternative measurement systems and the like and there is great advantage in this neutrality. An accounting method which is truly translation is applicable to all accounting measurements systems, past, present, proposed or yet to be proposed.[10]

Elements of the Translation Problem

The definition of translation adopted above states that translation is a mathematical process. Consolidation itself is simply an additional arithmetic operation—addition. For that matter much subsequent use of the quantitative information provided by translation and consolidation also reduces to applying

additional mathematical operations. For example, calculation and reporting of
earnings per share and other ratios or analysis by way of calculating sub-totals,
ratios, rates of return and the like. That evolves from an unbiased analysis
of translation is a concept of a metrics problem.

This is actually what the translation problem reduces to—a metrics problem.
To see why this is so it helps to recognize that in substance the translation
problem and the price level problem are almost identical and, in reality, con-
stitute the two parts which make up a larger heterogeneity of units problem
which exists when foreign operations are invovled. "In both situations the
objective is to achieve homogeneity in the units which are employed to measure
the results of business operations and the resulting financial position."[11]
This near equality between the two problems will be discussed further in a
subsequent section of this paper.

Because, conceptually, the two problems are nearly identical, a concep-
tual foundation for identifying the substantive elements of the translation
problem need not be invented. It is available in the literature which deals
with price level adjustment at the conceptual level. In particular, Sterling
and Chambers have clearly specified both the nature of heterogeneity of units
problems and their solution in an accounting context. For example, Sterling
describes the price-level problem and its solution as follows:

> The problem in its simplest terms is one of pure metrics. At
> any given moment in time there exists a ratio at which goods are
> stated as a specific number of units of the monetary numeraire. By
> this relation to units, all the good are related one to another. This
> is an instantaneous comparison which we have previously referred
> to as a price. By means of these prices a person can exchange until
> his utility is at a maximum, or a firm can exchange until its mone-
> tary expectations are at a maximum.
>
> At a different moment in time there is another series of prices
> which permits the same process...However, if this relationship of
> money to utility changes over time, i.e., if the same magnitude of
> money yields a different amount of utility at two instants, the

moments are not comparable and the price level is said to be unstable.

> The only thing that has changed is the size of the unit. A similarity transformation is needed in order to make the instants comparable in dollars. That is, we need to discover a constant coefficient that will equate the two units. This is precisely the same problem in concept as changing, say, feet to yards or pounds to tons.[12]

In other words, over time the size of the unit of measure can change with respect to the property which it expresses and the property which is possessed by the objects and events accounting measures. The result is heterogeneity in the units of measure, which if not corrected, prohibits the comparison and the addition of units and thus the equation of two objects. A metrics problem exists. In the context of the translation problem, consolidation constitutes addition of measurements a and b with respect to property p on an account by account basis. To constitute a combined measurement in conformance with the rules of addition, the combined measurement must have "the same property in the same measure as the sum of the individual measure of a and b; that is m(a) + m(b) = m(a+b)."[13]

Sterling also specifies the general solution to heterogeneity of units (translation) problems. It is necessary to "compare the existing units at both instants to the (an) invariant unit and express them as a ratio."[14] In the previous citation the ratio was referred to as a "similarity transformation" and a "constant coefficient." Elsewhere he refers to the ratio relationship between two units as a "transformation function."[15] The term "translation rate" is equally appropriate and particularly appropriate in this paper. Once the translation rate is discovered, in price level adjustment, it is then applied to measurements of one time dimension to transform them into measurements of a second time dimension. Taken together, the steps constitute a rule relating the time dimensions of the measurement units.

Chambers expresses an equivalent perception of heterogeneity of units problems and their solution. This perception seems fully captured in the following three arguments from his study:

> Measurement is the assignment of numbers to objects according to rules specifying the property to be measured, the scale to be used, and the dimensions of the unit.

> The scale of numbers of monetary units of given dimension is the scale of cardinal numbers; it is a ratio scale.

> Measurements made on a ratio scale of stipulated unit dimension may be transformed into measurements of a different unit dimension by the rule relating the two dimensions.[16]

The basic elements of heterogeneity of units problems and their solution as described by Sterling and Chambers can clearly be seen in the prior height measurement example. It can be noted that there had been measurements by way of assignment of numbers to objects. Rules specifying the property to be measured (height standing), a scale of numbers (the ratio scale of cardinal numbers) and given dimensions for each unit can be recognized in the example. Since measurements in physical scales are invariant through time, heterogeneity of units in the hypothetical example did not exist with respect to the time dimension of the measuring unit, as in the price level problem with which both Sterling and Chambers were primarily concerned. Instead, the difference existed with respect to what may be described as the place dimension of the measuring unit. Nonetheless, the two situations are fundamentally the same. The units in the example differed in size with regard to the property they expressed and which was possessed by the European and U.S. subjects alike.

Since the elements in the example problem correspond to the Sterling-Chambers description, as expected, the solution in the example follows the general solution they describe. The second solution presented in the hypothetical example illustrates this point best. Had the desired direction of translation been toward

the U.S. unit, the meter stick would have been laid upon the yardstick and would indicate a ratio of 1.093:1. Of course, both units involved are invariant so in the hypothetical translation example no reference to a third unit was required. The transformation function, translation rate, was directly calculable whereas in the price level problem a third unit of measure, goods, must be referenced. The last step in the solution to the example translation problem also corresponds to the last step in the general solution described by Sterling and Chambers. Namely, multiplication of the European measures by the translation rate to achieve homogeneity in terms of the U.S. unit of measure-- restatement with respect to equivalence in the place dimension of the U.S. unit.

Summary

Analysis of the translation problem begun at an elemental level leads to the conclusion that the accounting translation problem is a metrics problem. The source of the problem is heterogeneity in the units of measure used and so places the translation problem within a general class of problems. To that general class of problems there exists a general mathematical solution. This general solution can be seen operating in solution to problems involving units from the physical sciences as in the height measurement example presented. It can be seen operating in the solution to the price level adjustment problem as well.

The height measurement problem posed encompassed all elements of the accounting translation problem but one. That problem did not involve monetary units of measure. On the other hand, the price level adjustment problem does involve monetary units so between the two all elements of the translation problem are encompassed (see Footnote 6). The reasonable conclusion follows that the general solution to heterogeneity of units problems is equally applicable to the translation problem.

In its simplest terms, the general solution consists of mathematically relating two differing units with regard to the property they express in order to form a ratio or rate which equilibrates the two units at an instant in time. Placing the solution in the specific context of translating foreign accounts, the key to specifying the form of the mathematical process of translation is identifying the property expressed by the accounting unit of measure.

Monetary Units

Unit of Money vs. Unit of Measure

The U.S. dollar is both a unit of money and a unit of measure. The same holds true for the French franc, the German mark, the Mexican peso and so on; each if used to refer to both "the unit of money in a country and to the unit of measure in financial statements of companies in that country."[17] In fact, it is because the dollar, the franc and so on are units of money that any reason exists for their use as units of measure in accounting.

"Money is a commodity that can be owned and can be traded for other goods and services."[18] Because money as a commodity it accepted in exchange for any and all goods and services in an economy, it serves the useful purpose of being a medium of exchange. In turn, "the use of money as a medium of exchange makes the monetary unit an appropriate unit of calculation in respect of all actual and prospective operations in markets."[19]

As Sterling points out: "One requirement of a unit is that it 'possess' the same dimension as the object (measured)."[20] All "objects" exchanged in an economy at one time or another possess a money price or money value in terms of the unit of money in that economy. For this reason units of money may reasonably be used as units of measure to "perform the function of generalizing the relationship of objects to objects" thus relating "all objects to all other objects with respect to a particular property."[21]

A unit of measure constitutes a division on a scale of measurement and various scales are used in measuring various properties. "Monetary properties, such as historical cost, replacement price and resale price, are measured in monetary scales of measurement."[22] The operation of measurement itself is simply directed toward the end of placing a given object in a dimensional scale so that once numerousity of the units used is determined, the object measured will have been related to all other objects in the dimensional scale chosen.[23]

In our example of a simple translation problem and solution, all the objects possessed the property of height. The units of measure used also "possessed" the property of height so it became possible to take measurements of these objects according to a set of rules. In that particular example the rules were that the subjects must be measured while standing and while at the age 45 years. It is noteworthy that the units of measure did not possess the property height standing but only height. Height standing was only one of the many attributes with respect to height possessed by the subjects which could have been measured following a different set of rules.

This point is noteworthy from the standpoint that accounting principles should not be confused with attributes measured in applying these principles nor should principles or attributes be confused with the meaning associated with account balances. Strictly speaking, the only attribute of an object which can truly be said measured through use of any particular unit of measure is that property which both the unit of measure and the object measured possess. However, by following one set of rules for measuring over another, additional specific meaning can be given to the measurement. In the context of account-ing measurement of objects or events, by following specific rules during the measurement process, i.e., accounting principles, the resulting measures take

on additional specific meaning to any user who is aware of those rules. So it is that historical cost means something quite different from replacement cost even though these measures are all denominated in the same unit of measure. It is in combination that the rules of measurement followed (GAAP) and the units of measure used (monetary units) give specific meaning to an account balance.

The Property Identified

Every unit of measure has a meaning of terms of a real-world property which is separate from any number which may be placed before it. Inch, meter, yard, foot, centimeter all refer to distance. No matter what operational rules of measurement one is forced or chooses to adhere to, the number resulting from measurement has meaning only after the unit of measure is specified. Given the number 100, its meaning and the information it conveys can be changed at will simply by changing the unit of measure.

The property expressed by any monetary unit is command over goods and services. As Heath explains:

> The standard used in conventional accounting is not usually explicitly identified, but a standard is implicit in the type of monetary measurements made and reported. It is the amount of goods and services which can be purchased with a given amount of money. Those who use financial statements are assumed to understand and appreciate this equivalence between money on the one hand and goods and services on the other; if they did not, monetary measurement would convey little or no useful information.[24]

Heath's use of the term standard above should not lead to confusion, however. There is a difference between a standard of measurement and the property expressed by a unit of measure. It would have added confusion rather than clarity to have introduced the concept of standardization when examining the elements of translation problems and their solutions. However, the general

solution to heterogeneity of units problems offered by Sterling and Chambers might just as easily have been described as one of specifying a standard for the unit of measure and then standardizing the measurements.

The general solution specified required reference to an invariant relationship between units or to an invariant third unit. In our height measurement problem, reference was to an invariant relationship between the yard and the meter and solution involved standardizing all the data in terms of a single unit of measure. As the magnitude of distance expressed by a yard or a meter does not change, each unit is itself a standard. In a price level adjustment problem, what occurs during solution is reference to an invariant third unit-- goods. The ratio of goods to goods remains constant so that goods can be used (any good or set of goods and services) as the unit assumed to be temporally invariant.[25] A translation rate is computed based on the relationship between the dollar at points in time with respect to a constant magnitude of goods and services. Thus, price level adjustment serves to standardize the accounting measures with respect to purchasing power at a particular time, usually the current time period involved.

Arriving at a standard unit of measure is really a step in the solution to homogeneity of units problems generally. Unit properties and unit standards are not the same things. A unit standard is simply a specified single magnitude of the property expressed by the unit of measure under consideration. In accounting that property is command over goods and services. Further, it is general command over goods and services or general purchasing power which is expressed by currency measuring units. "If a monetary scale is to serve as a measurement scale at any time, the significance attaching to any unit of it is necessarily its general significance, its general purchasing power."[26]

The Dimensions of the Unit

Every monetary unit, foreign or domestic, possesses both a time dimension and a place dimension. "It is always a unit having a significance at a defined time and place."[27] Correspondingly, the meaning of any accounting measure denominated in currency units as an expression of economic power expended, received or held can vary depending upon the time and place to which it applies.

It is generally variation in the time dimension that receives the most attention, i.e., price level accounting. Yet the dollar, for example, also varies in significance within a place dimension. A dollar in Austin, Texas commands an appreciably larger quantity of goods and services than a dollar in New York City. Depending upon the location perspective of a viewer of a dollar measurement, the meaning and significance of that measure will differ. The measure possesses a place significance.

The place dimension of the dollar, however, is not limited to the geographical U.S. The purchasing power of the dollar in Mexico differs materially from its purchasing power in the U.S. Thus the place significance of the unit can vary just as can its time significance. However, it is very important to distinguish what place significance is being referred to so as not to introduce confusion and contradiction. A currency unit has a place significance as a counter and place significance as an expression of command over goods and services. In the first case the place significance of a dollar is limited to the U.S. It is in the U.S. and to U.S. viewers that an accounting measure denominated in dollars can, in general, be expected to have significance. It is in this regard that in the translation problem heterogeneity of units exists; a common familiar counter is required. Yet the dollar unit, or for that matter any currency unit, can be used to express the property of command over goods

and services in any place, anywhere in the place dimension, and so possess a place significance as an economic expression.

For example, though there may be 1 > reason to do so, dollar measures of domestically-held assets could be restated in terms of the purchasing power of the dollar in Mexico simply by multiplying the original dollar values by a ratio of the purchasing power of the dollar in Mexico to the purchasing power of the dollar in the U.S. The result would be measures which possess Mexican place significance as expressions of economic power and U.S. place significance with regard to the unit used to present the measures. On a more general level, any accounting measure in a set of accounts can be represented as

$a_{ijk}(x_{yz})$

where:

a_{ijk} — The measurement a entered to account i in the currency unit of country j at time k where:

i = 1 to n accounts

j = 1 to N countries

k = t-u to t, where t denotes the current point in time

(x_{yz}) — The dimensionality of the unit of measure where:

x = the property expressed by all currency units of measure; general command over goods and services

y = location in the place dimension--the country to which the expression x refers. The place significance of the unit as an expression of command over goods and services. y = 1 to N countries

z = location in the time dimension--the point in time to which the expression x refers. The time significance of the unit as an expression of command over goods and services. z = t-u to t.

Any pre-translation foreign accounting measure, where the subscript value of j and y for the U.S. = 1, would be represented as $a_{12k}(x_{2z})$. The heterogeneity of units problem exists with respect to the j subscript. The domestic

measures are of the form a_{11k} (x_{1z}). The foreign measure could be translated either as a_{11k} (x_{2z}) or as a_{11k} (x_{1z}). In point of fact, traditional translation results are of the form a_{11k} (x_1); i.e., a_{12k} x E_k = a_{11k} (x_{2z}) where E_k is the exchange rate at time k which when applied in translation measures conversion value, l_{2k} (x_{2z}) = a_{1k} (x_{1z}). On the other hand, a_{11k} (x_{2z}) is the natural outcome of the translation solution described in this paper; i.e., a_{12k} (x_{2z}) x l_{2k} (x_{2z})/l_{1k} (x_{1z}) = a_{11k} (x_{2z}). In both cases the heterogeneity of units problem is solved: the common counter (j=1) has been provided which has significance to U.S. users of financial accounting measures. However, the place significance of the measures themselves differ, the first measures make reference to the state of relativity[28] that exists or existed (k=z=t-y) in the foreign country location within the place dimension; the second makes reference to the U.S. economy.

The point that a foreign measure, $a_{12k}(x_{2z})$, can be converted to either $a_{11k}(x_{2z})$ or $a_{11k}(x_{1z})$ is of paramount importance. The alternatives can be likened to similar alternatives which exist in price level accounting. When accounts are restated for price level changes, almost invariably they are restated in terms of the size of the measurement unit during and at the end of the current period (z=t). Nevertheless, this does not have to be the case and statements for 1974 could be restated to 1935, or 1956, if any purpose could be seen for doing so (z=t-y). The same alternative is available in translation. The foreign accounts can be restated in dollars as expressions of command over goods and services with respect to the domestic economy or with respect to the foreign economy.

We believe it can be argued convincingly that traditional translation involves measurement of an attribute of foreign-held resources not measured in the foreign accounts prior to translation--future remittable dollar value. In

essence, this is treatment of the foreign-held assets as sources of converted

dollars of economic significance in the U.S. economy—$a_{ilk}(x_{1z})$. However, an

attribute measured in the foreign accounts before translation, through the use

of foreign currency units in taking the measurements, is command over goods and

services expended, received or held in the foreign economy. That information

content is lost in conventional translation in the attempt to measure a domes-

tic attribute of the foreign-held resources. Most or all of the meaning in-

herent in the foreign accounting measures with regard to economic power in the

foreign economy, the state of relativity in the foreign economy (price level)

and the effect of changes in the state of relativity (inflation) on firm values

is lost. Yet since the attribute reflected existed prior to translation, this

information can be preserved simply by restating the foreign measures while

preserving the original place significance of the foreign accounting measure-

ments—$a_{ilk}(x_{2z})$.

Price Level Adjustment Vis a Vis Translation

In a prior section we maintained that the price level problem and the

translation problem are quite similar. Repeatedly price level accounting has

been drawn upon in the discussion of the translation problem, and this reliance

on price level accounting reasoning is justified in that they are two parts

of a single larger problem, that of obtaining homogeneity in the accounting

measurement unit, of obtaining measures of standardized meaning when the measures

are taken at different times and different place.

Solving this overall probelm is important from both a measurement-additivity

standpoint and from the standpoint of providing useful information.

One wants to be able to assert that X had property Y under conditions
Z at time T in such a manner that the information contained in the
assertion can be used in other conditions and times to enable many

different kinds of people to make decisions. The assertion that
company X had net income of Y dollars in the United States during
1919 means nothing at all unless there is some way in which this
property can be compared with a net income in 1956 say--or in
England. Hence the need for a 'standard' dollar.[29] (emphasis
added)

In this paper we have treated the problems as being separate for two

reasons. First, at least at present, financial statements are generally not

price level adjusted.[30] Second, the separation is feasible since the problems

are separable by the dimension of the measuring unit which is relevant to each.

Whereas both are metrics problems, both are heterogeneity of units problems,

both are standardization problems, the price level problem deals with the time

dimension of the unit only just as the translation problem deals solely with

the place dimension.

Indeed, under no circumstances should the two problems be confused or,

worse yet, the solution to one problem felt to be all or part of the solution

to the other problem. In particular, price level adjustment is in no way

solution to the translation problem. This point is important since a great

deal of effort has been and is being expended by way of attempting to solve

the translation problem through price level adjustment.[31] This effect is

misplaced; a one dimensional solution cannot solve a two dimensional problem.

By comparing and contrasting the general form and general solution of the two

problems, the nature of each and their differences become clear.

The price level problem treated as a separate problem is a within state-

ment problem, a vertical problem so to speak. The translation problem on

the other hand, is a between statement or horizontal problem. This can be best

seen symbolically.

The price level problem is one of the general form $a_{11t}(x_{1t}) + a_{1t-u}(x_{1t-u})$. It is solved by constructing similarity transformations or translation rates of the form $1_{1t}(x_{1t})/1_{1t-u}(x_{1t-u}) = I^*_{1t-u}$ and by applying them to all $a_{11t-u}(x_{1t-u})$ measures. The result is to standardize or restate all measures to a current time frame as contemporary expressions of command over goods and services. In more familiar terms, ratios of the current general price level index and historical price level indices would be used. For example, $I^*_{1,t-u}$ might be $300/150 = 2.000$ where 300 is the general price level index at time t in country 1, and 150 the index of the price level at a particular time t - u when a particular measure was originally taken (say u = 10 periods ago). In effect, reference is made to a third invariant unit, a quantum or goods and services at another time t - u where u was perhaps 20 (i.e., the base year for the index series being t - 20 = 100).

The translation problem, on the other hand, is one of the general form $a_{11t-u}(x_{1t-u}) + a_{12t-u}(x_{2t-u})$. Following the general solution to heterogeneity of units problems the translation problem can also be solved by constructing similarity transformations or translation rates. This time, however, the rates would need to be of the form $1_{2t-u}(x_{2t-u})/1_{1t-u}(x_{1t-u}) = I_{1t-u}$ if the parent country is country 1 or $1_{1t-u}(x_{1t-u})/1_{2t-u}(x_{2t-u}) = I_{2t-u}$ if the parent country is country 2. As before, the foreign accounting measures could be each multiplied by the correspondingly dated translation rates $I_{2,t-u}$. The result would be foreign accounting measures restated to dollars of purchasing power equivalent to the purchasing power held by the foreign entity.

The point, of course, is that each of the two problems involves a different dimension of the unit. $I^*_{1,t-u}$ is not equal to $I_{1,t-u}$ since $1_{1t}(x_{1t})/1_{1t-u}) \neq 1_{2t-u}(x_{2t-u})/1_{1t-u})$. Application of one rate, in particular the similarity transformation to effect price level adjustment, is not a substitute for

application of the other rate to the accounting measures. Solution of the price level problem simply changes the temporal characteristics of accounting measures and leaves the translation problem totally intact. The only impact price level adjustment has on the translation problem is to alter the z subscript of certain pre-translation accounting measures from $t - u$ to t leaving the heterogeneity of units in the place dimension unaltered.

Exchange Rates

"Understanding the nature of translation will help to determine whether foreign exchange rates should in fact be used or whether other data should be used."[32] We have undertaken inquiry into the nature of translation to seek just such an understanding and can now effectively address the rate question. Our analysis suggests that the translation rates called for by the nature of the translation problem are similarity transformations, translation rates based upon ratios of the general purchasing power of each currency involved in a particular example of translation-consolidation. These coefficients can be termed price parity indices.

We can also conclude that the suitability of exchange rates in translation would seemingly rest on two factors: (1) the extent to which exchange rates are reasonable surrogate measures of price parity and (2) the extent to which foreign subsidiaries of U.S. companies conform to the concept of permanent viable separate entries (as opposed to dollar sources and drains) which is implicit in our analysis. Regarding these factors, the evidence available suggests that (1) exchange rates would be appropriate to all transactions of a relatively small proportion of all foreign-based firms and to few transactions of firms overall because of inapplicability of our concept of the firm and (2) exchange rates do not reasonably reflect the relative value or purchasing power of currencies.[33]

Basic Concepts of the Price Parity Theory

The general theory for the translation and consolidation of foreign accounts which we see as evolving from our analysis may be summarized by way of contrast with conventional theory. To begin with, traditional translation theory involves a concept of the firm as an extension of the parent, a source of dollar cash flows. The theory which underlies the price parity index approach involves a concept of the firm as a viable, separate going concern. Remittance to the parent is viewed as only one of many important aspects of foreign operations and of minor significance as far as periodic evaluation of the success or failure of the foreign firm is concerned.

Traditional translation theory involves a concept of the translation problem as one of effectively measuring changes in remittable dollar value. In effect, traditional theory is directed toward emphasis on reflecting the utility of foreign-held resources to the parent company. In contrast, the theory underlying the price parity approach involves a concept of the translation problem as a metrics problem deriving from the fact that accounting measurements have been taken in terms of different measurement scales. To allow comparison or combination of sets of measurements standardization is seen as required. In effect, the general theory advanced is directed toward emphasis on the utility of foreign-held resources to the foreign company. This emphasis is derived from an understanding that the resources are held and used in the foreign economy, that the most rational expectation is that on the whole this will continue to be the case in the foreseeable future, and that many if not most transactions will occur in the foreign economy.

It is presumed that if the purpose of accounting is to provide information for evaluation of past decisions and methods employed,[34] then the fact that the decisions were made and the methods were employed with regard to a measurably

different economic environment must be respected. It is presumed that if

accounting is "retrospective and contemporary monetary calculation the purpose

of which is to provide a continuous source of financial information as a guide

to future actions in markets,"[35] then the fact that many or most of the input

and output markets relevant to future actions reside in a measurably different

economy must be respected. It is presumed that if the purpose of accounting is

to provide useful information to any user, internal or external, then the fact

that measurements in units of differing significance defy interpretation without

standardization must be respected. What is true in price level accounting is

equally true in translation:

> It is just as pointless to add monetary units representing different
> purchasing powers (dollars of 1950, of 1955 and of 1960 when the
> purchasing power of the dollar has continually changed) as it is to
> add Belgian francs and French francs when they do not stand at parity.[36]

Adding or comparing dollar measurements and translated dollar measurements

representing different purchasing powers is also pointless.

The major conceptual difference between the price parity index approach

and traditional approach remains, however, that the latter define utility in

terms of command over dollars. The general theory of translation advanced, on

the other hand, defines utility in terms of command over goods and services.

The result is to replace the basic premises in traditional translation theory.

We suggest that traditional translation theory can be viewed as resting

upon two fundamental premises. The basic premise is that the objective of

conducting foreign operations is to generate cash flows to the domestic parent.

This premise implies maximization of remittable dollar values as the goal of

the firm and its decision makers. The second premise, logically derived from

this presumed objective, is that translation should measure levels and changes

in remittable dollar value. Justification from the standpoint of providing

relevant information is implicit in these premises; that is, the translation measurement process by definition will provide information relevant to assessing success or failure in meeting the major goal of the firm.

The first premise above is the most crucial as it constitutes the most fundamental premise or concept in traditional translation theory. Identification of maximization of remittable dollar value as the major goal of the firm can be described as the first step in the translation theory construction that has taken place to date. Such a first step is required; without an initial concept of the purpose in conducting foreign operations the second step in theory construction cannot be specified from the standpoint of providing relevant information to users. Without a concept of purpose for the firm there can be no concept of purpose in translating foreign accounts.

Our analysis implies rejection of the first premise of traditional translation theory. Consequently, the second premise as well as the whole direction taken in traditional reasoning (toward dollar measurement) is rejected. We have tacitly adopted a more fundamental goal for the firm, and three statements from Churchman are particularly relevant in this regard:

> The concept of a general asset is important because it suggests that possession of a specific asset can be treated as though it were possession of a certain amount of a general asset. In other words, we may be able to standardize the measurement of the size of specific assets by translating the size into a size of a very general asset (for example by translating the assets of a person or a firm into monetary terms).

> The power of an individual is defined hereafter as the size of his assets. More specifically, if a general asset exists in terms of which all other assets can be measured, then an individual's power is the size of his assets when measured by means of the standard. We are therefore considering a theory of value which asserts that the decision-maker tries to maximize his power.

> The reason for standardized data is easy enough to give. Without standards, one would have to report all the relevant information about the time, place, persons and so on, in addition to the

data report itself. Otherwise, no one would know what values to
assign to the variables in the laws that enable one to use the
report in other circumstances. But once a standard has been given,
then all data reports can be adjusted to the standard, and all that
is needed is the data report itself.[37]

Within these three statements reside the basic and secondary premises
of the price parity theory. They are replacement of and stand in contrast
to the two fundamental premises in traditional translation theory. The pur-
pose of business enterprise offered by Churchman is the maximization of "power;"
power is defined as the size of assets held; the size of assets held may be
specified in terms of a general asset (money); accounting measures are stan-
dardized in terms of the general asset and such standardization is useful.
Such a view of business enterprise and accounting measurement may be extended
to international business operations and translation.

Thus, the first premise of traditional translation theory can be replaced
by a more fundamental premise: The purpose of conducting foreign operations
is to maximize command over goods and services, the general asset expressed
by all monetary units. In turn, the second traditional premise can be replaced
by the following: The objective of translation is to standardize accounting
measures taken of the size of specific foreign and domestic assets in terms
of the magnitude of general asset held. These are the basic premises upon which
construction of a price parity theory may stand. The foregoing specification
of the translation problem as a metrics problem, and the price parity index
solution to the problem proposed, are natural outcomes of adopting these premises.

The basic premise that firms seek to maximize command over goods and
services is not unique to Churchman. Churchman equates maximization of "power"
with maximization of the general asset money. Since the real economic signi-
ficance of money resides in the command over goods and services it bestows,

"power" and purchasing power are equivalent. Sterling, on the other hand, uses the term utility but reaches the same conclusion as to the objective of the firm and its managers. He equates utility with command over goods and services and then purchasing power with command over money valued assets.

> Selection of the valuing agent required that we consider the nature of the enterprise, and we concluded that the motivation of the enterprise was provided by the trader-owner. In turn, the trader's motivation is the maximization of utility which varies in the same direction as the command over goods. Therefore we selected money as the appropriate valuing agent.[38]

Chambers, in constructing his respective theory of accounting, went directly to command over goods and the implicit objective of maximizing command over goods: "Holders of money or of claims to money or goods convertible into money are concerned with the general qualities of money as a medium of exchange, with its capacity to command a wide range of goods."[39]

The point is that maximization of command over goods and services (by way of maximizing income and asset money values) is broadly recognized as a fundamental motivation behind business enterprise. Being truly fundamental, it is descriptive of foreign and domestic business activity alike:

> The maximization of purchasing power available is a critical problem in international operations and every means possible must be used to achieve this result.[40]

Very important, the premise adopted that the multinational firm in conducting foreign operations seeks to maximize command over goods and services rather than remittable dollar values is more fundamental. It allows for remittance behavior but does not rely upon remittance for its validity. It cannot be contradicted by lack of remittance to the domestic company. It provides a goal for the foreign firm which is consistent with a domestic goal of obtaining a return on investment but it does not "put the cart before the horse" so to speak. Remittance is a specific end rather than means to an end and is but one of many possible ends which may rationally be sought periodically.

The earning of accounting or money income, and the increase in command over goods and services which should correspondingly occur (and foreign exchange is one of these goods) is the means to that end.

Conclusion

We have conducted, beginning at an elementary level, an analysis of the translation problem with the result of broad outlines of a general theory of translation. Essentially, the theory consists of (1) a view of foreign-based subsidiaries as separate going concerns operating in markedly different environments, (2) a view of the translation problem as a metrics problem where it is seen as possible and desirable to restate accounting measures so as to reflect those markedly different environments and (3) the basis for a methodology to solve the translation problem. Clearly we leave many questions unanswered. Yet at the very least we have given consideration to an alternative to present approaches, approaches which reduce to measurement by way of assumptions about an unknown and unknowable future.

FOOTNOTES

[1]Gerhard G. Mueller, *International Accounting*, (New York: Macmillan, 1967), p. 214.

[2]Yuji Ijiri, *The Foundations of Accounting Measurement*, Englewood Cliffs: Prentice-Hall, Inc., 1967).

[3]Leonard Lorenson, project director, American Institute of Certified Public Accountants, *Accounting Research Study No. 12*, "Reporting Foreign Operations of U.S. Companies in U.S. Dollars," (New York: AICPA, 1972).

[4]R. MacDonald Parkinson, author, Canadian Institute of Chartered Accountants, *Accounting and Auditing Research Committee Research Study*, "Translation of Foreign Currencies," (Toronto: CICA, 1972), p. 14.

[5]Business International Corporation, *Solving International Accounting Problems*, (New York: Business International Corporation, 1969) p. 3.

[6]For the present we ask that the hypothetical problem be accepted as equivalent to the specific accounting translation problem to the extent required to allow definition of translation therefrom. Later we will show that the height measurement problem and the accounting problem differ only with respect to the unit of measure involved in each. The gap in logic will be filled when price level adjustment and the problem and solution in the hypothetical example are related since the former *does* involve monetary units of measure.

[7]We see these methods as having two common antecedents to their development—perception of translation as a measurement process and willingness to project the occurrence of future events and transactions so as to make measurement possible. This latter willingness to speculate on the future is discernable in the assumptions, stated or unstated which are required to make logical most theoretical arguments offered in behalf of present methods. In particular, future remittances, the relative permanence of exchange rate levels and often the magnitude and timing of future foreign currency cash flows must be assumed. In any single instance of translation we estimate the probability for accuracy in these assumptions at near zero.

[8]Raymond J. Chambers, *Accounting, Evaluation and Economic Behavior*, (Englewood Cliffs: Prentice-Hall, 1966), p. 164.

[9]Lorenson, p. 33.

[10]This should not be construed as meaning that optimality in terms of information must result in all cases. For example, movement to a current cash equivalents measurement system might well suggest *measurement* of exchange value since the Chamber's system is oriented toward providing information on currently available alternatives. *Restatement* (pure translation) would result in translated measures related to only a subset of all currently available alternatives, only those available in the economy where resources are presently located.

[11] Samuel R. Hepworth, _Reporting Foreign Operations_, (Michigan Business Studies, Vol. 12, No. 5), (Ann Arbor: University of Michigan, 1956), p. 203.

[12] Robert R. Sterling, _Theory of the Measurement of Enterprise Income_, (Lawrence: The University Press of Kansas, 1970) pp. 332 and 333.

[13] Chambers, p. 90.

[14] Sterling, p. 334.

[15] "The resulting relationship is called, in metrics theory, a 'transformation function.' For example, the transformation function of yards to feet is the numeral 'three;' from inches to centimeters, '2.54;' etc." Ibid, p. 77.

[16] Chambers, Arguments 4.31, 4.34 and 4.38, pp. 101-102.

[17] Paul Rosenfield, "General Price-Level Accounting and Foreign Operations. _Journal of Accountancy_, CXXXI, No. 2 (February, 1971), p. 59.

[18] _Ibid_. See also Staff of the Accounting Research Division, _Accounting Research Study No. 6_, "Reporting the Financial Effects of Price-Level Changes," (New York: AICPA, 1965).

[19] Chambers, p. 77.

[20] Sterling, p. 77.

[21] _Ibid_., p. 82.

[22] Rosenfield, p. 59.

[23] Sterling, pp. 78-79.

[24] Loyd C. Heath. "Distinguishing Between Monetary and Nonmonetary Assets and Liabilities in General Price-Level Accounting,' _Accounting Review_, XLVII, No. 3 (July, 1972), p. 459.

[25] Sterling. p. 334

[26] Chambers, p. 94. An extensive literature dealing with price level adjustment exists directed at the question of the nature of inflation as it relates to the accounting measuring unit and variation in this unit's significance. There is little purpose to be served in extensively reproducing that literature. Three almost universal conclusions of present interest and subsequent methodological interest have been reached, however. First, it is generally concluded that the significance of the monetary unit when used for accounting purposes is its general significance. Second, notwithstanding the crudeness and arbitrariness of price level indices, their use to adjust for changes in the significance of accounting units of measure is justified. Third, generally speaking, a consumer price index is deemed to suit the purpose of such adjustment best and to be the most consistent with the nature and purposes of accounting measurement and business enterprise. The following are particularly useful references:

Ralph Coughenour Jones, Effects of Price Level Changes on Business Income, Capital and Taxes, (Columbus: American Accounting Association, 1956), esp. pp. 174-176. Chambers, esp. pp. 100, 199, 264, 228-229. Sterling esp. pp. 340-350. Accounting Principles Board, Statement of the Accounting Principles Board No. 3, "Financial Statements Restated for General Price-Level Changes," (New York: AICPA, 1969), esp. pp. 5 and 14. "Adjustment of Financial Statements to Reflect Variations in the Purchasing Power of Money in Periods of Inflation," as reprinted in Kenneth E. Berg, Gerhard G. Mueller and Lauren M. Walker, Readings in International Accounting, (Boston: Houghton-Mifflin, 1969), esp. p. 257. Staff of the Accounting Research Division, Accounting Research Study No. 6, esp. pp. 9,22 and 62-114. Richard Mattessich, Accounting and Analytic Methods, (Homewood: Richard D. Irwin, Inc., 1964), esp. p. 181.

[27]Chambers, p. 80.

[28]Any economic value—a current market value, a current replacement cost, a historical cost—is an expression of economic power and one which possesses meaning as a relative, not as an absolute. Just as motion itself is a meaningless concept except as between two physical systems or material bodies moving relatively to each other, historical cost, for example, is meaningless except as between all other prices and values at a point in time in a particular place. This is in contrast to an absolute, the value itself being its own ultimate basis for meanings, independent as the velocity of light is independent of the motion of its source.

[29]C. West Churchman, Prediction and Optimal Decision, (Englewood Cliffs: Prentice-Hall, Inc., 1961), p. 119.

[30]"General price-level information may be presented in addition to the basic historical-dollar financial statements, but general price-level financial statements should not be presented as the basic statements." Accounting Principles Board, Statement of the Accounting Principles Board No. 3, p. 12.

[31]For example, Zenoff and Zwick have advanced what they term the "Net Assets Method." In this method foreign currency financial statements are first adjusted for general price level changes and then, with the exception of net worth and debt, are translated at current exchange rates. David B. Zenoff and Jack Zwick, International Financial Management, (Englewood Cliffs: Prentice-Hall, 1969), p. 500.

[32]Leonard Lorenson, "The Temporal Principle of Translation, Journal of Accountancy, CXXXIV, No. 2 (August, 1972), p. 48.

[33]See Dennis E. Patz, "An Assessment of the Relevance of Exchange Rates to Translation," Faculty Working Paper No. 168, College of Commerce and Business Administration, University of Illinois at Urbana-Champaign.

[34]Edgar O. Edwards and Philip W. Bell, The Theory and Measurement of Business Income, (Berkeley: University of California Press, 1970, pp. 3-4.)

[35]Chambers, p. 102.

[36]Ibid., p. 92. See also Staff of the Accounting Research Division, Accounting Research Study No 6, p. 22.

[37]Churchman, pp. 325, 326 and 121-122 respectively.

[38]Sterling, p. 352.

[39]Chambers, p. 94.

[40]S. R. Sapienza, "Inflation and Foreign Investments," Financial Executive, XXXI, No. 4 (April 1963), p. 31