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# THE DUALITY CONCEPT OF ACCOUNTING

by

Shoji Kasai

## Abstract

Accounting is basically the entire sequence of processes of depicting and recording the economic activities of a business enterprise, preparing the financial statements, and communicating them to users. Since the 1960s, however, there has been a tendency to emphasize only one phase of the sequence of processes that comprise accounting, namely the relationship between the financial statements and the user, and to regard the remaining processes as subsidiary to that end. In this paper I shall argue that the duality which governs the process of depiction of economic activities is a fundamental characteristic of accounting, and I shall address methodological issues concerning the basic equations, which represent duality concepts concretely. The basic equation has been formulated in various ways, but essentially we may discern two viewpoints: one, which admits of only one formulation, and a second, which hypothetically allows for multiple formulations whose explanatory power is validated through practice. I shall argue here, in the first place, that the former viewpoint is inadequate both for calculative objectives and in its methodology of theory construction, and go on to demonstrate the validity of the latter viewpoint. Secondly, I shall consider four theories, the capital equation, Walb theory, the balance sheet equation and the business capital equation (or trial balance equation), and discuss their explanatory power by reference to the construct of calculative objects. In conclusion, I shall argue that the business capital equation has the highest explanatory power.

### **Key Words**

duality, theory construction of basic equation corroboration of basic equation, capital equation, walb theory, balance sheet equation, business capital equation

## **( I ) ACCOUNTING AND THE DUALITY CONCEPT**

The structure of accounting, though it is manifested in double-entry book-keeping, tends to be ignored these days. This may be a consequence of an overemphasis on the utility of accounting in the decision making of users. I am convinced, however, that analysis of the structures of accounting remains a worthwhile endeavor, since if we consider accounting to be the process of depicting economic activities, preparing financial statements as a result of those depictions, and communicating them to information users, it is clearly the case that the preparation of financial statements depends on what method of depiction of the economic activities of business enterprises we adopt. Those who emphasize the utility of accounting in the decision making of users will focus only on the relationship between the information, which is the output of the system, and the users: the underlying processes will be treated as relatively unimportant.

I am not about to contend here that responding to the information needs of users is inconsequential. On the contrary, it is of primary significance for the discipline of accounting. And it must be admitted that, prior to the 1960s, accounting was not sufficiently interested in users' concrete information requirements. Allowing conceptually for only one calculative objective, the approach to the accounting structure was also one-sided. We can see today that feedback from users concerning their information needs has deepened our perceptions of the social role of accounting, its *raison d'être*, and have led to developments in accounting discipline.

At the same time, however, the modern emphasis on information needs seems somewhat excessive. Accounting is a sequence of given processes from the recording of transactions to the preparing of an income statement and balance sheet: the process as a whole must also be taken into consideration. It is equally one-sided to view nothing as significant beyond the relation of financial statements and users.

The issues discussed so far are all deeply connected with the definition of accounting as well. When accounting came to be taken as a sort of information service, the sphere in which accounting might apply expanded enormously: in fact to the margins of confusion, to the extent that reintegration became a necessity. Reintegration, in turn, has required a return to the original points of departure in order to achieve a redefinition of accounting. According to Aoyagi, accounting may be defined in either of two ways. The first is the structural definition: once a mechanism of data processing is specified, the output, or the output and input of that mechanism will be accounting information. The second is the functional definition: the character of any information will always depend on objectives and uses (Aoyagi 1972). With the functional definition the problem arises of whether, in general, the output can fulfil the standards of accounting information. On this issue, Yamamasu's theory may be remarked upon. Yamamasu questioned whether the four accounting standards in ASOBAT (1. relevance, 2. verifiability, 3. freedom from bias, 4. quantifiability) were effective criteria by which to determine the character and scope of accounting. Making the point that the four standards might equally apply to the making of maps, he suggests that those standards are insufficiently specific to accounting, and that such standards, which apply not only to accounting but to information in general, must, of necessity, be very unclear. He then goes on to discuss accounting in relation to MIS (Management Information System) as follows:

As long as we keep to the traditional premise in our definition, even if accounting may be considered as a sub-system of MIS, the essential scope and character of accounting will be preserved because of its distinctive features of object and structure of measurement. On the other hand, if we premise a definition on ASOBAT standpoint, accounting will be almost indistinguishable from a definition of MIS, as has been shown in "The Future Accounting Information System" in ASOBAT. But in that case, is accounting really broadened? Or is accounting simply absorbed into management information system?

Yamamasu concludes that accounting should retain its characteristic principles and methodology: that if we mean accounting to be a recognized discipline, and give it's *raison d'être* in society as justification, a stance based on ASOBAT principles will fail to meet our theoretical requirements (Yamamasu, 1982).

I believe that a significant distinctive feature of accounting is its dual construction, the unique element in accounting which generates accounting information: and in this regard, I am sure that any reconstruction of accounting should be based on a structural definition. My point of view is that accounting is a calculating and reporting mechanism, and that these distinctive technical feature determines the character of accounting.

Needless to say, in all that has been said so far, the double-entry book-keeping system has been tacitly understood to be the distinctive mechanism of accounting. My own contention is that the essential quality of accounting is its integration of dual aspects, a feature I shall call 'duality'. Accounting, of course, has a historical dimension, and has evolved, following on changes in users' requirements and in the economic activities of enterprises. But throughout its evolution one technical aspect of accounting has remained constant. I am referring to its dual aspect, which is manifested in the double-entry book-keeping mechanism.

The reader may well be familiar with the discussion memorandum of the FASB which deals with the 'nonarticulated' view, arguing that an articulation of balance sheet and income statement is not required (FASB, 1976). Though details of the discussion that led to the memorandum are unclear, it may be assumed that the theory proposed is not premised upon double-entry book-keeping: accounting information is therefore to be produced without being predetermined by any special structure. In any event, the nonarticulated view was not accepted by SFAC No. 3 of the FASB. So, as things stand presently, the assets and liability view and the revenue and expense view have currency, and in both cases the mechanism of double-entry book-keeping is clearly premised. Duality in accounting has thus present relevance.

Now the basic equation provides a schematization of duality in accounting, and has been expressed as the capital equation, the balance sheet equation, the trial balance equation, Walb theory, etc. These basic equations supply a base for a descriptive theory of the double-entry book-keeping mechanism which may then specify what the distinctive duality of accounting is. Approaches to the duality concept will vary significantly by theorist.

## (II) APPROACHES TO THE DUALITY CONCEPT

There are at least two ways to approach the duality concept. One is to choose one from among the various duality concepts in accounting, and to make this

concept, which is expressed concretely as a basic equation, a requisite. Another is to hold that, insofar as the basic equation fulfils certain conditions for duality, it may quite properly be termed accounting: in this case, a particular duality concept may be adopted by reason of its explanatory power in relation to current practice. There is another theory (Mattessich, 1964), which offers a systematization of duality over a much larger field, not limited to business accounting, but in this paper I will confine my attentions to the first-mentioned two approaches.

Supporters of the first approach may be found among those who favor the balance sheet equation. In their view, the technical distinctiveness of accounting lies in the balance sheet equation, which incorporates the duality of debit and credit of the balance sheet. Accounting, accordingly, must conform to the conditions consequent upon this duality, and, in effect, the balance sheet is to be regarded as a postulate of accounting, that is, as a unchangeable given through history. Allowance must, of course, be made for historical conditions, and this is achieved by isolating certain factors in the elements of the balance sheet equation and treating them independently. For example, if, in a certain historical period, income determination is required by social circumstances, the current profit account (one of the proprietor's accounts) is to be handled independently. In this case, the basic framework is composed of the current profit account and the balance sheet (excluding the current profit account). The current profit account is thus to be the income statement itself.

In short, this theory embraces two notions: one, a confidence that the universality of duality is distilled in the balance sheet, and two, that in order to meet social requirements, certain factors in the balance sheet equation may be handled independently.

The second approach, in contrast, has it that, insofar as the whole process of accounting fulfils conditions of duality (without fixing in advance any basic equation), any concept of duality may, as a hypothesis, be admitted. Consequently, in this theory, not only the balance sheet equation, but also the business capital equation (trial balance equation), Walb theory, etc., are all admissible as duality concepts. The relative validity of various duality concepts is only to be determined by their explanatory adequacy in relation to current practice. On this point the second approach departs radically from the first, in which a single concept is specified in advance. So which approach is to be preferred?

### (Ⅲ) ON THE FORMULATION OF THE BASIC EQUATION

With regard to the two approaches outlined above, I shall here argue in favor of the latter. I believe that the former approach suffers deficiencies both in its mode of construction of the basic equation and in its handling of calculative objective. Let me specify these deficiencies.

#### (1) Allocation of calculative objective

In discussions of the former approach, the balance sheet has widely been recognized as its preliminarily fixed basic equation. I share this position. It is characteristic to this approach that first a balance sheet equation is formulated without regard to objectives. A calculative objective (for example, an income determination), relating to social requirements, is then supposed, and met by handling certain elements in the balance sheet (the current profit account in the case of income determination) independently. Yamamoto has argued that present-day capital-income accounting is a relative construction given by the socio-economic communication environment around accounting, where periodic income determination is perceived as a prime objective of business accounting. This means that when a periodic income determination is socially required as a calculative objective, the current profit account is merely isolated from the balance sheet to prepare an income statement. The income statement is then contrapositioned to the balance sheet, which contains the rest of the accounts. In this way, capital-income accounting is achieved using income statement and balance sheet. If another social requirement is to be met, let us say, cash fund calculation, the cash account, which is another factor in the balance sheet equation, is isolated, in the same way, to create a funds statement. In this case, in fact, the balance sheet, fund statement and income statement come to be the three basic financial statements (Yamamoto, 1992).

One premise of this approach then is that the initial basic equation, the balance sheet equation, is to be made without regard to calculative objectives. Its other premise allows for the independent treatment of certain factors in the balance sheet equation as a strategy to meet the requirements of various calculative objectives. These two premises, however, remain assumptions merely: they have never been grounded theoretically. More discussion is clear-

ly called for.

Concerning the first premise, the problem arises as to whether an empirical object can be schematized without regard to calculative objectives.

Of course, there are systems whose elements have not been assigned meanings, namely calculus. The process of generating a calculus may be accomplished purely syntactically, that is without recourse to the meanings (semantic characteristics) of any expression in the system. A concrete scientific theory may then be constructed by giving the calculus determinate reference (by assigning meaning to its symbols). In this case there will be various interpretations of the same underlying calculus, which will, in turn, lead to many isomorphic scientific theories (Rudner, 1966). These interpretations, in which specific empirical theory will be introduced, are, it should be noted, necessarily **subsequent** to the formulation of a calculus.

In the case of the balance sheet equation, however, both sides of the equation include concrete meaning content, in the form of fund applications and sources. Interpretation is thus not subsequent, but **prior** to the formation of the equation. If meaning is thus already included, we may ask if it is possible to formulate a basic equation without specifying any concrete calculation objective. The basic equation, which governs the whole structure of accounting, is a large-scale construct that includes assumptions that presuppose a concrete calculation objective, distinctive construction of elements of calculative objects and a characteristic grammar between accounts. While individual characteristics of accounting structure may be investigated separately, at the level of analysis, as elements of pragmatics, semantics or syntactics, the basic equation itself, since it expresses the whole of accounting structure, must incorporate both its empirical objects (at the semantic level) **and** its calculative objective (at the pragmatic level). Once this argument is accepted, the impossibility of formulating the basic equation without a determination of its calculative objective becomes more than apparent.

Turning now to the second premise, which allows the balance sheet equation to be applied to various calculative objectives if each factor is treated separately, this premise is, as I mentioned above, linked with a confidence in the universality of the balance sheet equation. But on what foundation is this confidence grounded? In the historical evolution of accounting, it may be seen that calculative objectives follow on changes in the information needs of users, as well as on changes in the economic activities of enterprises. This being so, on what grounds is it claimed that the balance sheet equation is alone capable of satisfying all social requirements? No grounds are, in fact,



supplied, and the confidence emerges as founded on a form of a priorism (Popper, 1959), on a metaphysical proposition.

In spite of the fact that this approach's assumptions lack theoretical foundation, however, a technical method is nevertheless outlined, wherein it is stated that certain factors in the balance sheet equation are to be treated independently. That the financial statement, which is utilized in the accomplishment of calculative objectives, was originally a subordinate factor of the balance sheet equation, to be treated, formally, separately from the balance sheet, is something somehow overlooked. But without the independent status of the financial statement, this method is itself deficient, since within it there is no logical coordination of accounting structure. Yet the approach gives rise to a system of accounting, currently practiced, where income determination and calculative objective are treated as one and the same, and the current profit account, one of the credit factors of the balance sheet, is treated independently. The structure of accounting here consists in the balance sheet (excluding the current profit account) and, separately, the current profit account. On the question of the relationship between the balance sheet and the current profit account as the income statement, Yasuhira writes as follows (Yasuhira, 1979):

(In the system of the balance sheet equation) the revenue account/expense account should be considered a subordinate account in the capital account. Consequently, the calculation of income statement cannot be held to be on a parity with the calculation of the balance sheet: rather, it must be subordinated to the balance sheet or be treated as a schedule to it..... So the income statement should be treated as merely one part of the balance sheet calculation, namely the part that shows increase/decrease in capital: it thus becomes simply one account in the balance sheet. The balance sheet, in short, should be regarded as the prime calculation and the income statement as the subordinate calculation.

Yasuhira's thesis is very acute. A balance sheet that excludes the current profit account cannot be complete, and thus cannot be called an independent financial statement. The balance sheet can only be completed by transferring the income shown in the current profit account, and this process requires no more than a consideration of the balance sheet (including the current profit account); a separation of current profit account and balance sheet (excluding current profit account) is not warranted.

For the reasons given above, a theory that aims to meet social needs by treating certain factors of the balance sheet independently cannot be sustained. It is inappropriate to regard the balance sheet equation as a kind of postulate.

## **(2) On the formulation of equations**

Theory construction generally admits of two approaches; inductive method and hypothetico-deductive method. By which method, we may ask, is balance sheet equation formulated? Is the equation formulated by inductive method?

The theory which takes the balance sheet equation as the only valid base would seem to have affinities with inductive methodology, given that inductive method requires a theory to be formulated largely through the observation of empirical facts. For those who adopt the inductive approach, the world is all that is the case.

Inductive method has, however, given rise to considerable controversy in the philosophy of science. It seems that neither logically nor empirically can induction find justification. Logically, it is pointed out that whatever various singular statements may be obtained from a listing of empirical events, no universal statements can be logically inferred. The formulation of universal statements by induction always entails a logical leap; with any generalization based on induction by enumeration the possibility is always present that the next observation will supply a decisive falsification. Furthermore, past successful applications of inductive method cannot empirically justify inductive method either. We are quite at liberty to cite innumerable cases where induction has produced successful results, but if we claim that induction is thereby validated we will have supplied a justification which is itself dependent on induction; our reasoning will thus be circular, and our conclusion will still involve a logical leap.

A thoroughgoing critique of inductive method was undertaken by Popper (Popper, 1959; 1972), but as far back as the middle eighteenth century, Hume suggested that the credibility accorded induction was really only a psychological habit acquired in response to the repetition of singular observations.

Aside from traditional objections to inductive method, it has also been argued that what we perceive of empirical events is not a matter only of observation. For we may question whether observation statements themselves, are reliable (Popper, 1959; Kuhn, 1970). These criticisms center on the viability of

what B. Russell called sense-data sentences or what R. Carnap called protocol sentences. Inductive method is founded on the premise that it is possible to make statements about empirical events, as they are, unprejudiced by any interfering influences. Yet even if it were possible that all such *idola* (the term employed by F. Bacon) could be excluded, the formulation of sense-data or protocol sentences would remain a very controversial issue in present-day philosophy of science.

The central and persistent problem with inductive method is how perception and description follow on the base premise that independent empirical events occur. For it is argued that our perceptions of empirical events will always be conditioned by whatever specific theory we adopt. Thus, where no explicit theory regarding perception or description is advanced, it is held that it is impossible to apperceive and describe empirical events.

In the field of accounting, the theory of double-entry book-keeping by Ijiri is based on inductive method. His contention is that the exchange of two goods, which are in a cause and effect relation with each other, is assumed as one base concept in accounting, and that this exchange concept is actually grounded inductively (Ijiri, 1968;1976). Ijiri's theory is, however, widely disputed, mostly on the grounds that within inductive method distinctiveness must be treated only in general terms (Kasai, 1989). In any event, accounting structure theories based on inductive method are very rare. There are clear theoretical reasons why we should reject this method.

What then of the basic equation formulated according to the hypothetico-deductive method? As accounting is first and foremost an empirical science, if we are to take the basic equation as simply a hypothesis, then the verification/falsification process will be indispensable once our hypothesis has been formulated. Unfortunately, however, accounting structure theory has not, so far, been elaborated in such a way as to allow for this. What we have at present are approaches where the empirical object, which is expressed as the basic equation, exists, actually, at the level of formulation; we thus have an empirical object that would seem to have reality only in its expression in the basic equation. But, if this is the case, we are forced to the conclusion that the function of the basic equation is somehow to capture the essence of the empirical object. If this is the case, the basic equation is indeed based on methodological essentialism (Popper, 1957); our discussions are thereby reduced to the level of unproductive, metaphysical theorizings in which the character of accounting will suffer inevitable distortion.

Accordingly, insofar as accounting is still to be regarded as an empirical

science, we should not conceive of the basic equation as anything other than a hypothesis. Equally, the balance sheet equation, capital equation and the other equations in our discipline are all hypotheses merely, whose validity can only be ascertained by testing their explanatory power in relation to double-entry book-keeping practice, by a process of verification or falsification. In the end, all basic equations are equal at the level of formulation.

#### (IV) ON THE VALIDITY OF BASIC EQUATIONS

As I stated at the outset, it is my purpose here to suggest that various duality concepts should be admitted as hypotheses, and that we should not take just one duality concept into account. My arguments on the allocation of calculative purpose and regarding general methodology gave my grounds for this assertion. To comprehend exactly the intent of the basic equations, and to show the factors to which concrete verification/falsification procedures are to apply, a classification of the basic equations is required. I have already proposed a threefold classification of the various basic equations. The first is classification at the syntactic level, and this embraces the systems covered by input theory, process theory and output theory. Next is the semantic level, the systems covered by equilibrium theory and non-equilibrium theory. Last is the pragmatic level, the systems covered by property calculation, profit calculation, and capital calculation theories (Kasai, 1989).

Within the classification framework, we must attempt to verify or falsify our basic equations. Concretely, the possibility of a transfer of the profit of the income statement to the balance sheet (at the syntactic level), and the possibility of income determination (at the pragmatic level) invite our consideration. However, as I have discussed these issues elsewhere (Kasai, 1992), I shall confine my attentions here to the question of the construction of the calculative object at the semantic level.

Accounting is the description of the economic activities of business enterprises; how such economic activities are constructed has an impact on how we define the basic equation. Currently, the schema  $[G - W - G']$ , where  $G$  and  $G'$  are money, and  $W$  are commodities, is in general use. This schema depicts the circulation of social gross capital in capitalist economies, but business enterprises may nonetheless be handled using the schema because businesses are one factor in macro-economies. However, in order to apply the schema in accounting, some transformation is required, as accounting is

specifically the description of individual capital circulation. Again, differences in the way we handle transformations of the schema will create differences in our definitions of the basic equation, and the various resultant basic equations will also exhibit different degrees of explanatory power in practice.

How the schema  $[G - W - G']$  is transformed in accounting must, first of all, be specified. I would like to suggest that there are two transformation processes. This follows from my contention that an analysis of duality in accounting will reveal its specific character. In the first transformation process  $[G - W - G']$  is specified as the application form of fund or capital, and then the resource form, which is another phase of fund and capital, is introduced. Integration of these two attributes, application form and resource form, is then understood to encompass duality in accounting. In the second transformation process, only the phase of  $[G - W - G']$  is assumed as the empirical object of accounting, and duality is to be specified in the transformation of the schema. The capital equation and Walb theory fall within this second approach, while the balance sheet equation and the business capital equation (trial balance equation) fall within the first approach. Let us now consider these two transformation processes in accounting separately and in detail.

### (1) The capital equation

The second transformation process, in which only  $[G - W - G']$  is assumed as the empirical object of accounting, can itself be divided into two. One theory has it that  $[G - W - G']$  should be separated into two flows,  $[G - W]$  and  $[W - G']$ , and then the duality of the exchange relation between  $G$  and  $W$  should be introduced. This is Walb theory, which will be discussed later. The other theory takes  $[G - W - G']$  as a sequence of activities (in accounting this is the debit side concept), contrapositions this to net worth, which generalizes these activities as the concept of credit, and then formulates a concept of duality. This is the capital equation, which I shall consider straight away.

In actual business enterprises, innumerable  $[G - W - G']$  capital movements occur concurrently. The capital equation captures the fact that many property factors in combination create the capital apparent when, at a given point in real time, capital movement is isolated. Where the capital thus consists of many forms of  $G$  and  $W$ , the total amount of property will be  $[\Sigma G +$

$\Sigma W$ ]. If the total is then put as  $RV$ , the formula  $[\Sigma G + \Sigma W = RV]$  is obtained. As I mentioned before, since the formulation  $[G - W - G']$  is a generalization of capital circulation in a macro-economy, it cannot be applied as it is to accounting, whose purpose is to describe capital movements in relation to individual business enterprises. To put this another way, loans and debts in the financial markets, and accounts receivable and accounts payable in the commodity markets (all of these will be referred to as capital market factors hereafter) will be offset in a macro-economy. As a result, in the capital market schema  $[G - W - G']$ , capital market factors are not shown. In a macro-economy, capital market factors have meaning only as transfer, from one business unit to another business unit, of  $G$ .

To individual businesses, however, these factors of capital movement are of very real significance, indeed they are indispensable. Any accounting theory that does not recognize this will necessarily be imperfect.

It follows, then, that these market factors of capital movement must be incorporated into the formula  $[\Sigma G + \Sigma W = RV]$ . To achieve this an expansion of the  $G$  concept is required. As the capital movement of the capital market factors is future cash inflow (loans and accounts receivable) and future cash outflow (debts and accounts payable), an expanded  $G$  concept including not only current cash inflow/outflow but also future cash inflow/outflow will facilitate our new formulation. With  $G$ , which, includes future cash inflow, and  $L$ , future cash outflow, which is equivalent to  $-G$ , we obtain the formula  $[(\Sigma G + \Sigma W) - \Sigma L = RV]$ . Then, taking  $A$  the asset concept as  $G$  and  $W$ , we obtain  $[A - L = RV]$ . This formulation is, in fact, the capital equation (Schaer, 1914).

In the process of formulation of the capital equation described above, theoretical distinctiveness consists in the employment of dual modes of calculation of net worth, on the one hand the total of individual sums ( $A \cdot L$ ), and on the other the total sum ( $RV$ ) after certain business activities have taken place. The capital equation, therefore is not a schema that can express the process of a business economic activities in relation to external markets. Firstly, as far as commodity markets are concerned,  $[G - W - G']$  means an integrated description of purchases  $[G - W]$  and sales  $[W - G']$ . In the capital equation, however,  $G \cdot G'$  and  $W$  are only single factors of net worth, and cannot fulfill the conditions of the  $[G - W - G']$  concept in relation to business enterprises. The capital equation is only relevant, therefore, where its calculative objective is the calculation of net worth after economic activities have taken place, and where consequently  $G \cdot G'$  and  $W$  can be taken

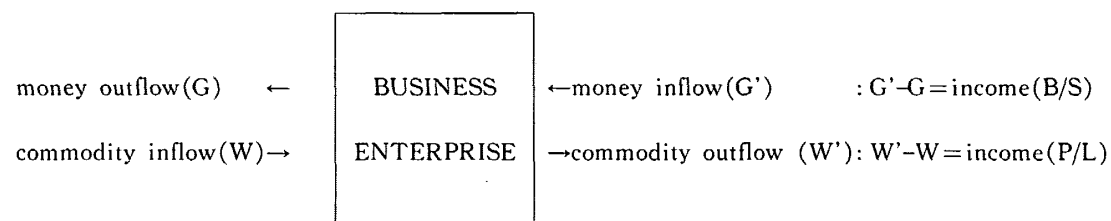
as factors in net worth construction. Secondly, with regard to capital markets, loans and debts, accounts receivable and accounts payable are merely factors in the construction of net worth, just like  $G \cdot G'$  and  $W$ . It is consequently impossible for the capital equation to describe economic activities that relate to the giving and receiving of credit in capital markets, which are among the most characteristic of business activities. Lastly, the capital equation cannot describe the production process.

The capital equation, then, can describe neither relations with commodity markets and capital markets nor internal production processes. This naturally results from the fact that in the calculative objective of the capital equation custodianship of net worth is understood to attain duality through the total of individual sums and the total sum, at the point of measurement. It is because of this, essentially, that the capital equation is an inadequate instrument for the description of the economic activities of business enterprises.

## (2) Walb theory

Let us now consider Walb theory, which creates a duality of  $G$  and  $W$ , dividing  $[G - W - G']$  into  $[G - W]$  and  $[W - G']$ .

Walb theory can be formulated in accounting as follows (Walb, 1926):



As reader may know, a balance sheet based on Schmalenbach theory was understood as a statement of items in suspense. This theory attracted two criticisms: 1. The balance sheet is heterogeneous regarding the difference between cash items and other items (whether cash is an item in suspense is questionable) 2. Lack of clarity regarding the active functions of the balance sheet. Walb tried to solve these problems by defining the economic activities of business enterprises as an exchange relation between  $G$  and  $W$ . In his definition, which the diagram above shows,  $W' \cdot W$  creates the income statement, and  $G'$  and  $G$  create the balance sheet. Because the balance sheet includes only  $G'$  and  $G$ , the first problem is overcome; furthermore, income

determination through  $G'$  and  $G$  can be achieved from the relation of  $W'$  and  $W$ . In this way, the defects of Schmalenbach theory were removed.

The character of Walb theory can be explicated if we relate it to  $[G - W - G']$ . Although in the diagram above outflow and inflow of  $G$  and  $W$  are drawn centred on the business enterprise,  $G$  and  $W$ , and  $G'$  and  $W'$  are clearly connected with commodity markets. In Walb theory, at least, the relationship between businesses and commodity markets in coordinated economies is introduced. While Walb theory takes a step forward by introducing commodity market relationships, however, much remains problematic in the theory. Firstly, capital movements, which arise in the relationship with capital markets, are not allocated in such a way as to properly reflect those functions that centrally characterize capital movements; in particular, the capital movements of lending and borrowing, which should only be related to the present inflow and outflow of  $G$ , have nothing to do with  $W$ . For this reason, the balance shown in the balance sheet will be influenced by the present inflow and outflow of  $G$ , and will produce different results from the balance of the income statement (profit). If the balance sheet has to attain income determination, the influence of the present inflow and outflow of  $G$  must be excluded. To do this, the loan account and the debt account are introduced as a factor of  $G$  by extending the  $G$  concept to include future inflow and outflow of  $G$ . These accounts in Walb theory are thus created by neutralization; they are not introduced on the basis of relationships with capital markets. The accounts receivable and accounts payable concept suffers from the same weakness. Here, only outflow and inflow of  $W$  are represented, not outflow and inflow of  $G$ . As a result, the balance shown in the balance sheet differs from that shown in the income statement. To preserve the income determination function of the balance sheet, accounts receivable and accounts payable are introduced solely in order to create an income determination function in the balance sheet; they are not introduced on the basis of any perception of the economic function of the giving and receiving of credit in business.

It should be clear from the above arguments that in Walb theory, as constructed, the capital market concept, because of the theory's calculative object, is effectively left out. To put this another way, if the consideration of income determination in the balance sheet had not been required, these accounts would not have been introduced. Walb theory is concerned exclusively with issues at the pragmatic level, and to this end sacrifices the construction of an appropriate calculative object at the semantic level.



Another problem with Walb theory is that it fails to provide a description of production processes. Concretely speaking, since Walb theory assumes economic activities to be an exchange relation of  $G$  and  $W$ , when  $W$  flows into a business, concern arises over the status of outflow of  $W(W')$ , which would contrast with inflow of  $G(G')$ . A result of the theory is that the process from  $W$  to  $W'$  is lost from sight. In Walb theory, the production process is understood as a set of relationships, such as that between the sale of materials and the purchase of goods in process, and the sale of goods in process and the purchase of finished goods. The consequence of this view is that the calculative object, being grounded only on the relationship between commodity markets and businesses, is the provision of an income determination function in the balance sheet.

Walb theory is thus inadequate to explain capital movements in business.

### (3) The balance sheet equation

If we take  $[G - W - G']$  as it is, the first problem that was pointed out in relation to Walb theory cannot be surmounted; capital movements in capital markets simply do not fit the schema. As I argued earlier, because debts and accounts payable arising in one business are offset by loans and accounts receivable in another, the impact of these factors on capital movements in a macro-economy is effectively nil. It is only for individual business enterprises that finances such as capital stock, loans and accounts payable, have distinctive meaning. As it is a principal characteristic of accounting that it is targetted at business enterprises, there can be no proper definition of the calculative object without systematic reference to capital movements.

The capital equation and Walb theory fail because they attempt to apply the  $[G - W - G']$  schema in a macro-economy directly to business accounting without allowing for the distinct relevance of capital movements to individual business enterprises. We cannot, in fact, avoid systematic incorporation of capital movements in relation to capital markets in any theory that lays claim to explanatory sufficiency. Thus we must formulate a theory that constructs duality by integration of the application form and resource form of fund or capital. This theory, once again, can be divided into two, depending on whether the balance sheet or trial balance is to be taken as the base. Needless to say, the balance sheet equation is subsumed under the former part.

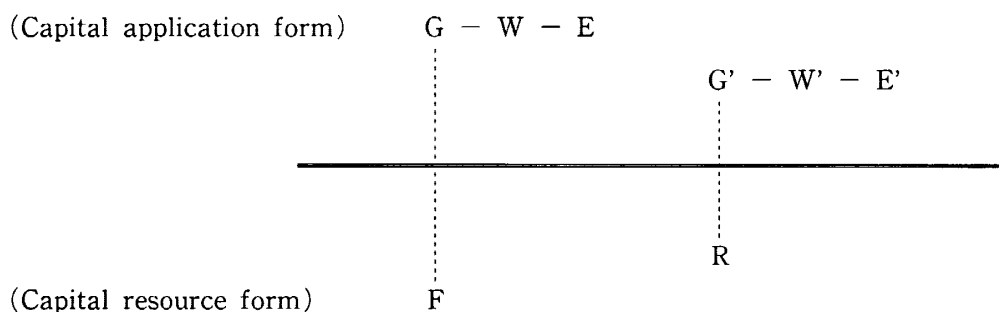
The formulation of the balance sheet equation is quite clear.  $[G - W - G']$  is to be assigned to the debit side of the balance sheet as application form of funds, to contrast with the source form on the credit side (Nicklisch, 1912; Paton, 1922). In this system, the revenue account and the expense account are allocated as increases and decreases on the source form on the credit side. As between the debit side (application form) and the credit side (source form) a duality is supplied, the balance sheet equation effectively frames the relationship between commodity markets and capital markets. It is, however, questionable whether the theory can properly explain present calculative objects, given its inability to describe production processes. Specifically, the expense account is described in the equation as the source form on the credit side, and is accordingly a fundamentally distinct category from  $W$ , that is, the asset account, on the debit side. As a result, an explanation of the phenomenon of metamorphosis of value of equipment assets into goods cannot be achieved. Reasons for phenomena of this kind, in fact, can only be premised on the homogeneity of asset account and expense account. The balance sheet equation cannot, in short, explain capital movements in relation to the production process. As a descriptive theory, then, the balance sheet equation is insufficient to explain capital movements in relation to present business enterprises.

#### (4) The business capital equation

Finally, I should like to discuss the calculative object of the business capital equation, which is based on the trial balance. The equation is obtained by an accounting transformation of  $[G - W - G']$ . This process involves four steps.

In the first step, the concept of infinite capital movement  $[G - W - G' - W' \dots]$  is introduced on the debit side, and  $[G - W]$ ,  $[G' - W'] \dots$  is taken as an independent capital circulation series. Given these criteria, and again considering this theory from the point of view of how well it describes capital movements in relation to individual businesses,  $[G - W]$  will here actually be followed by the expending of  $W$ . Then, if  $E$  represents the expenditure of  $W$ , the capital movement  $[G - W - E]$  furnishes the second step. This step describes the production process.  $G'$ , of course, follows the same pattern as  $G$ , and the capital movement  $[G' - W' - E']$  is shown side by side with  $[G - W - E]$ . Concerning the third step, and looking at the credit side, in as much as  $G$  or  $G'$  enter any business enterprise, some

preceding resource must be presumed. As  $G$  is financed from investors and creditors outside of a business enterprise, the resource form can be said to be externally financed capital( $F$ ). On the other hand, as  $G'$  is gained through the operating activities of business enterprises, the resource form may equally be considered as revenue, that is, internally financed capital( $R$ ). At this point, revenue and externally financed capital attain parity as the resource form of capital. This accounting transformation is shown in the following diagram:



As applications of capital are always possible, for the available range of financed capital ( $F+R$ ), the equation [ $G+W+E=F+R$ ] applies. As for the fourth step, returning to the debit side, capital movements other than those dealt with in the second step under [ $G - W - E$ ] must be incorporated in order that we satisfy our requirement that the calculative object should capture total individual business activity. There is, for example, the problem of loans. Loans are produced by outflows of  $G$ , but never reach expenditure( $E$ ), and return as  $G'$ . So, when loans are shown as  $D$ , [ $G - D - G'$ ] is obtained. But though loans are offset by debts as regards other businesses in a macro-economy, and are not shown in the capital circulation schema, as regards the business that is the subject of accounting, loans are an essential capital movement. At the same time, [ $G - D - G'$ ] is inherently different in character from [ $G - W - E$ ], capital movements in relation to the production process. Now, although capital movements arise in the passage of time, value increases in production are commonly held to be theoretically timeless. But it is, in fact, the case that the increase/decrease amount from  $G$  to  $G'$  in [ $G - D - G'$ ] is dependent on the elapse of time(Edwards and Bell, 1973).

Finally, having incorporated the capital movement [ $G - D - G'$ ], a basic equation is obtained, which takes the form:

$$G + D + W + E = F + R$$

This equation is the business capital equation (Yamamasu, 1979).

The unique advantage of the business capital equation is that it captures capital movements of production, something which, as we have seen, remains a problem in the balance sheet equation. Considering both organization and continuity in business enterprises, their association with both capital and commodity markets must be recognized as a distinctive feature of their activities. At the same time, a full grasp of the internal production process is essential. The basic equation must, therefore, reflect capital market and commodity market relationships, and the production process.

The explanatory power of the four equations examined in this paper can be graphically represented, as in the diagram below. The diagram clearly shows that the business capital equation offers the most complete description of current accounting practice.

|                                        | CAPITAL<br>EQUATION | WALB<br>THEORY | BALANCE<br>SHEET<br>EQUATION | BUSINESS<br>CAPITAL<br>EQUATION |
|----------------------------------------|---------------------|----------------|------------------------------|---------------------------------|
| Description of commodity<br>markets    | X                   | O              | O                            | O                               |
| Description of capital<br>markets      | X                   | X              | O                            | O                               |
| Description of production<br>processes | X                   | X              | X                            | O                               |

The business capital equation, which was devised by the Japanese academic Yamamasu (Yamamasu, 1972), provides a theoretical system of very great potential. The discussion in this paper on the formulation of the calculative object has been confined to the semantic level. But I have reached the same conclusions in my discussions of the explanatory power of accounting theories at both the pragmatic and syntactic levels, elsewhere (Kasai, 1992). It is the conclusion of the present paper that the business capital equation most adequately explains current accounting practice.

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