A Fresh Look at Inflation Accounting

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I. THE PROBLEM

It is widely accepted that no entirely satisfactory system of inflation accounting has yet been devised, despite years of discussion.

Nevertheless new accounting standards enforcing the incorporation into the official accounts of adjustments for price changes have been recently published in the USA ("FAS33") and in the UK ("SSAP16").

Only large companies, however, will have to comply with these rules, which even their proponents regard as experimental.

The American and British standards are very different from one another and from various official reports previously published.

These differences in approach result from a persistent lack of clarity in the analysis of the effects of price changes on business wealth and productive capacity.

In my opinion, the present confusion is due to the fact that efforts have been made to find definite answers to a series of questions considered separately, without having first produced a comprehensive model of analysis of all the interrelated phenomena involved.
A first example to illustrate this: endless discussions have surrounded the question of whether inflation accounting should reflect the impact of general inflation in the economy or the effect of changes in replacement values of individual company assets.

I believe that no such choice has to be made. Any organization is affected simultaneously by overall inflation and changes in specific replacement costs; therefore, both phenomena should be accounted for in a single system.

Another controversial issue which, in my opinion, cannot be resolved if taken in isolation is whether and how the gain arising from having debts in a period of inflation should be recognized in the accounts.

The fact is that, in times of inflation, the monetary expression of a given capital must be adjusted if it is to continue to represent the same purchasing power.

Then a gain arises if net assets, valued at current costs, exceed the adjusted monetary expression of capital. That indebtedment should increase this gain by reducing the capital to be revalued is only a corollary of a more crucial fact.

Confusion culminates in the debate over how to define “profit”, what can be distributed to shareholders and what should be taxable.

Satisfactory answers to these questions will be found only if the interrelations between net worth, productive assets, real level of indebtedment and the effects on these of general inflation, specific prices fluctuations and business operations are analysed fully and clearly.

To present a comprehensive model of analysis of these phenomena is the object of what follows.

II. A PROPOSED MODEL OF ANALYSIS

1. Starting point: the adjusted balance sheet

When all prices are stable, historic cost accounting provides an adequate representation of economic and financial reality.
In particular, the amount of total assets appearing on the balance sheet is equal to both

– the current value to the business of all its productive assets, and
– the current purchasing power of all funds invested in the business.

This is no longer true when prices change; then, the value of productive assets is determined by the specific replacement costs of these assets whereas the purchasing power of funds invested is determined by the general level of prices in the economy.

It will become apparent that the distortions produced by changing prices stem from this fundamental dichotomy.

This is why the foundation of the model is a form of adjusted balance sheet which reports assets at their specific current replacement costs and shareholders’ funds, i.e. equity, at a value determined by the application of some general price index.

At this stage, it is practical to introduce a symbolic representation of the balance sheet.

The historic cost balance sheet of a typical commercial business reduced to its essential items can be represented as follows:

\[
\begin{align*}
\text{equity} & \quad E \\
\text{long term debt} & \quad L \\
\text{profit not yet appropriated} & \quad G \\
\text{gross fixed assets} & \quad F \\
\text{accumulated depreciation} & \quad -D \\
\text{stocks} & \quad S \\
\text{net current monetary assets} & \quad C \\
X & = X
\end{align*}
\]

To set up an adjusted balance sheet along the lines previously indicated,

(a) non monetary assets are valued at their current replacement cost, and

(b) equity is valued as the original capital multiplied by the variation in general price index since the start of the business, plus all additions to equity (including retained earnings), each multiplied by the corresponding variation in general price index.

One could show only the adjusted values for these items, but it is preferable to indicated separately historic values and adjustments equal to the differences between current and historic values.
With such a separation between historic cost items and adjustments to them, the adjusted balance sheet of a typical commercial business looks like this:

\[
\begin{array}{ccc}
\text{historic} & + & \text{adjustment} \\
\text{cost} & & \\
E & e & F \\
L & - & -D \\
G & g & S \\
\hline
X & + & x = X + x \\
\end{array}
\]

The balancing item \( g \) is equal to \( f - d + s - e \); it measures the excess of the appreciation of net assets \( f - d + s \) over the increase in the monetary expression of equity \( e \).

The "gearing effect" is reflected in the value of \( g \); when debts are substituted to part of the equity, the term \( e \) is diminished and \( g \) correspondingly increased.

A simple example should make the meaning of the various symbols introduced perfectly clear.

Let us consider a new business entity being started, and assume that
- initial funds consist of capital = 50 and interest free long term loan = 50;
- of this, 50 are immediately invested: 30 in property and 20 in gold;
- the balance is kept in cash.

The initial balance sheet at time \( t^0 \) is:

\[
\begin{align*}
E^0 &= 50 \\
L^0 &= 50 \\
F^0 &= 30 \\
S^0 &= 20 \\
C^0 &= 50 \\
100 &= 100
\end{align*}
\]

Let us assume that in the first accounting period \( t^0 \) tot \( t^1 \)
- the business is completely inactive; there are no transactions, no expenses, and property does not suffer any depreciation;
the rate of general inflation in the economy is 20%;
the market value of similar property rises by 10%;
the price of gold rises by 25%.

Since no event to be recorded in conventional accounting has occurred, the historic cost items remain unchanged; so $E^1 = E^0$, $L^1 = L^0$, $F^1 = F^0$, $S^1 = S^0$ and $C^1 = C^0$.

The adjustments for inflation and changes in asset values are:
(a) on equity : $e^1 = 60 - 50 = 10$
(b) on fixed assets : $f^1 = 33 - 30 = 3$
(c) on stock : $s^1 = 25 - 20 = 5$.

Therefore the balancing item is $g^1 = f^1 + s^1 - e^1 = 3 + 5 - 10 = -2$.

Hence the balance sheet at time $t^1$:

$$
\begin{array}{cccc}
E^1 = 50 & e^1 = 10 & F^1 = 30 & f^1 = 3 \\
L^1 = 50 & g^1 = -2 & S^1 = 20 & s^1 = 5 \\
\hline
100 & 8 & 100 & 8
\end{array}
$$

It can be readily seen that "net worth", or "net assets" (i.e. assets - debts), has increased by 8.

However, from the point of view of the owners of the business, this increase in net worth is insufficient to maintain intact the purchasing power of their investment.

In other words, if the business were to be wound up at $t^1$, realizable net worth attributable to owners would be $108 - 50 = 58$, when it should have been $110 - 50 = 60$ to maintain the "real" value of their investment.

Therefore a potential "loss" expressed by the balancing item $g^1 = -2$ is incurred.

The position would have been different had indebtment been higher.

Say $L^1 = L^0$ had been 75 instead of 50 and $E^1 = E^0$, 25 instead of 50, then $e^1$ would have been 5 instead of 10 and $g^1$ would have been 3 instead of $-2$, thus showing a potential "gain" due to the "gearing effect"
(which derives from the fact that, from the owners’ point of view, only equity has to have its purchasing power maintained).

All of this is plain enough, but to what extent is it really relevant in the case of a going concern engaged in commercial activities, which neither its managers nor its owners have any intention of liquidating.

This question is answered in the next section where interactions between changes in replacement values and business transactions are analysed.

2. Adjusted profit and revaluation gain

Let us now consider the changes affecting a typical commercial business over a certain accounting period $t_1$ to $t_2$; the balance sheets at start and at end, adjusted as explained in the previous section, are:

\[
\begin{array}{cccc}
E^1 & e^1 & F^1 & f^1 \\
L^1 & -D^1 & -d^1 & \ \\
g^1 & S^1 & s^1 & \\
C^1 & & & \\
X^1 & x^1 & X^1 & x^1 \\
\end{array}
\quad
\begin{array}{cccc}
E^2 & e^2 & F^2 & f^2 \\
L^2 & -D^2 & -d^2 & \\
g^2 & S^2 & s^2 & \\
C^2 & & & \\
X^2 & x^2 & X^2 & x^2 \\
\end{array}
\]

Notice that $G^1 = 0$ because the balance sheet at start is assumed to be prepared after appropriation.

The total change in net worth over the period $t_1$ to $t_2$ is given by

\[
(E^2 + e^2 + G^2 + g^2) - (E^1 + e^1 + g^1) = (E^2 - E^1) + (e^2 - e^1) + G^2 + (g^2 - g^1)
\]

How much the position has improved (or worsened) in real terms over the period is measured by the increase (or decrease) in net worth which

(a) is not due to additions to equity $(E^2 - E^1)$, and
(b) exceeds the increase necessary to maintain constant the purchasing power of equity $(e^2 - e^1)$.

Therefore, the measure of how “better or worse off” in real terms the business has become is the change in adjusted net worth less the
change in adjusted equity; in other words, the measure of success achieved is equal to $G^2 + (g^2 - g^1)$.

This shows that the historic cost profit $G^2$ gives only an incomplete idea of how well the business is doing.

But does it matter? It was stated after the presentation of the adjusted balance sheet that $g$ expresses a potential profit or loss that would only be realised in the event of winding up.

As we are considering a going concern, does $(g^2 - g^1)$ represent a useful piece of information?

The crux of the matter is that changes in replacement values
- not only determine a new value of $g$,
- but also affect the real cost of assets used up through industrial and commercial operations (goods delivered, fixed assets depreciated, etc...).

Indeed the real cost to an on-going business of assets consumed is their replacement value, because when assets are consumed in the process of earning revenues (which is the raison d'être of an on-going business), provisions have to be made against revenues for the replacement of assets “sacrificed”, in order to keep intact the “productive” capacity of the business.

It follows that, in periods of rising replacement values, the conventional “historic cost profit” is overoptimistic in that it does not take into account the full cost of productive assets relinquished in the course of business.

Therefore, a revised definition of profit is needed: the “adjusted profit”.

The ADJUSTED PROFIT (OR LOSS) measures the overall increase (or decrease) in net assets between two specific points in time $t^1$ and $t^2$ due to business operations, after the replacement of assets held at $t^1$ has been provided for on the basis of values at $t^2$.

Since only changes in net worth due to business operations are included in adjusted profit, it follows that pure “hoarding gains (or losses)” on assets held at $t^2$, whether already held at $t^1$ or acquired between $t^1$ and $t^2$, are excluded.
As it happens, these hoarding gains (or losses) are reflected in 
\((g^2 - g^1)\).

Another important point is that amongst assets consumed during the 
period \(t_1\) to \(t_2\), only those that were already held at \(t_1\) have to be charged 
to adjusted profit at their replacement value at \(t_2\); this is because it is 
the level of productive assets at \(t_1\) that serves as reference in the compa-
rison.

The difference between historic cost profit and adjusted profit is 
equal to the total of all adjustments based on values at \(t_2\) pertaining to 
assets held at \(t_1\) and consumed between \(t_1\) and \(t_2\).

If that difference is added to \((g^2 - g^1)\), the resulting total does incor-
porate all hoarding gains (or losses) on assets held at start (whether 
consumed or kept until the end) and on new assets acquired during the 
period and kept until its end.

This total can therefore be deemed "revaluation gain".

To sum up, we can state the following:

(a) the increase in real net worth over and above the increase in ad-
justment of equity for general inflation is measured by
\[ G^2 + (g^2 - g^1) \]
where \(G^2\) = historic cost profit
\(g^2 - g^1\) = hoarding gains of the period \(t_1\) to \(t_2\) on all assets 
held at \(t_2\) over and above the revaluation of 
equity;

(b) adjusted profit = \(G^2 - A\)

where \(G^2\) = historic cost profit
\(A\) = total of adjustments based on values at \(t_2\) pertaining 
to assets held at \(t_1\) and consumed between \(t_1\) and \(t_2\);

(c) revaluation gain = \((g^2 - g^1) + A\)

where \(g^2 - g^1\) and \(A\) have the same meaning as above;

(d) adjusted profit + revaluation gain = \(G^2 + (g^2 - g^1)\).

In other words, the global measure of how better or worse off the busi-
ness has become over an accounting period can be split into two com-
ponents: 1. adjusted profit, which shows how business operations have 
affected net productive assets, and 2. revaluation gain, which measures 
the passive effects of changes in values of assets and of general infla-
tion.
For the managers of a going concern, adjusted profit is obviously the more important indicator, but it only assumes its full meaning when complemented by the revaluation gain. This statement will be elaborated upon in section III.

Let us now use an example to illustrate the concepts introduced.

By the same token this example will also show how the choice of a given method for the pricing of issues from inventories fits into the previous analysis.

This will be highlighted by the use of both FIFO and LIFO in the same example.

A firm trading in some commodity owns a building and a stock and has a bank account; the business is financed by equity and a long term loan.

The basic data at \( t^1 \), the start of an accounting period, are:
- historic cost of building = 100; accumulated depreciation stands at 50%; market value of comparable property is 120;
- stocks consist of 100 units, of which 10 are recorded at the historic cost of 0.5/unit, 40 at 1/unit and 50 at 1.1/unit;
- potential purchase price at \( t^1 = 1.2/\text{unit} \);
- bank account balance = 50;
- long term loan = 100;
- original capital plus retained earnings appropriated = 100; the weighted average change in price index applicable to the total is 15%.

Hence the adjusted balance sheet at \( t^1 \):

\[
\begin{array}{ccc}
E^1 = 100 & e^1 = 15 & F^1 = 100 & f^1 = 20 \\
L^1 = 100 & -D^1 = -50 & -d^1 = -10 \\
g^1 = 15 & S^1 = 100 & s^1 = 20 \\
C^1 = 50 & & \\
\hline
200 & 30 & 200 & 30
\end{array}
\]

Notes: \( f^1 = 120 - 100 = 20; D^1 = 50\% \text{ of } 100; d^1 = 50\% \text{ of } (120 - 100); \\
S^1 = 10 \times 0.5 + 40 \times 1 + 50 \times 1.1 = 100; s^1 = 100 \times 1.2 - 100 = 20; \\
e^1 = 15\% \text{ of } 100; g^1 = 20 - 10 + 20 - 15 = 15

Over the period \( t^1 \) to \( t^2 \):
depreciation on building is 10\% of gross value; market value rises to 130;

- trading operations are as follows:
  20 units sold at 1.2 each (cost on FIFO basis = 10 \times 0.5 + 10 \times 1 = 15;
  cost on LIFO basis = 20 \times 1.1 = 22)
  10 units purchased at 1.2/unit
  50 units sold at 1.3 each (cost on FIFO basis = 30 \times 1 + 20 \times 1.1 = 52;
  on LIFO basis = 10 \times 1.2 + 30 \times 1.1 + 10 \times 1 = 55)

- possible purchase price at t^2 estimated at 1.3/unit;
- interest on loan is 1\%;
- general price index goes up by 10\%.

Adjusted profit for period t^1 to t^2 = G^2 - A, with

G^2 being
\[
\begin{align*}
\text{sales} & : 20 \times 1.2 + 50 \times 1.3 = 89 \\
\text{cost of goods sold} & : \text{FIFO} = 15 + 52 = 67; \text{LIFO} = 22 + 55 = 77 \\
\text{depreciation} & : 10\% \text{ of } 100 = 10 \\
\text{interest} & : 1\% \text{ of } 100 = 1
\end{align*}
\]

A being
\[
\begin{align*}
\text{adjustment on depreciation: } & 10\% \text{ of } (130 - 100) = 3 \\
+ \text{adjustment on units} & : \text{FIFO} = 10 \times (1.3 - 0.5) + 10 \times (1.3 - 1) \\
& + 30 \times (1.3 - 1) + 20 \times (1.3 - 1.1) = 24 \\
& \text{LIFO} = 20 \times (1.3 - 1.1) + 30 \times (1.3 - 1.1) \\
& + 10 \times (1.3 - 1) = 13
\end{align*}
\]

Hence the adjusted profit, using FIFO and LIFO:

<table>
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<tr>
<th></th>
<th>G^2 FIFO</th>
<th>A FIFO</th>
<th>A.P. FIFO</th>
<th>G^2 FIFO</th>
<th>A FIFO</th>
<th>A.P. FIFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>89</td>
<td>-67</td>
<td>89</td>
<td>-77</td>
<td>-10</td>
<td>-10</td>
</tr>
<tr>
<td>- goods sold</td>
<td></td>
<td>-24</td>
<td>-91</td>
<td>-13</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>- depreciation</td>
<td></td>
<td>-10</td>
<td>-13</td>
<td>-10</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>- interest</td>
<td>-1</td>
<td></td>
<td>-1</td>
<td>-1</td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>profit</td>
<td>11</td>
<td>-27</td>
<td>-16</td>
<td>1</td>
<td>-16</td>
<td>-15</td>
</tr>
</tbody>
</table>

One notices that whilst the two systems FIFO and LIFO lead to very different historic cost profits, their adjusted profits are quite close.

Before computing the revaluation gain, let us draw up the adjusted balance sheets at t^2, again using FIFO and LIFO to deal with stocks:
Stocks on FIFO basis

\[
\begin{array}{cccc}
E^2 = 100 & e^2 = 26.5 & F^2 = 100 & f^2 = 30 \\
L^2 = 100 & -D^2 = 60 & -d^2 = -18 \\
G^2 = 11 & g^2 = -7.5 & S^2 = 45 & s^2 = 7 \\
 & C^2 = 126 & \\
211 & 19 & 211 & 19
\end{array}
\]

Stocks on LIFO basis

\[
\begin{array}{cccc}
E^2 = 100 & e^2 = 26.5 & F^2 = 100 & f^2 = 30 \\
L^2 = 100 & -D^2 = -60 & -d^2 = -18 \\
G^2 = 1 & g^2 = 2.5 & S^2 = 35 & s^2 = 17 \\
 & C^2 = 126 & \\
201 & 29 & 201 & 29
\end{array}
\]

Notes: \( f^2 = 130 - 100 = 30; D^2 = 60\% \) of 100; \( d^2 = 60\% \) of \((130 - 100)\); \( e^2 = 15 + 10\% \) of 115 = 26.5

with FIFO, \( S^2 = 100 - 67 + 12 = 45; s^2 = 40\times1.3 - 45 = 7 \)

with LIFO, \( S^2 = 100 - 77 + 12 = 35; s^2 = 40\times1.3 - 35 = 17 \)

Revaluation gain for period \( t^1 \) to \( t^2 = g^2 - g^1 + A \); hence:

\[
\begin{array}{cccc}
\text{FIFO} & \text{FIFO} & \text{FIFO} & \text{LIFO} \\
g^2 - g^1 + A & = & R.G. & g^2 - g^1 + A & = & R.G. \\
-7.5 - 15 + 27 & = & 4.5 & 2.5 - 15 + 16 & = & 3.5
\end{array}
\]

It appears finally that
- with FIFO, adjusted profit + revaluation gain = \(-16 + 4.5 = -11.5 \)
- with LIFO, adjusted profit + revaluation gain = \(-15 + 3.5 = -11.5 \).

This was to be expected since the global change in net worth depends only on replacement values at start and at end.

III. INTERPRETATION AND CONCLUSIONS

The previous analysis has highlighted the contrast between periods of price stability and periods of changing prices:

- when prices are stable, net worth is a measure of both net productive assets and funds attributable to owners; profit is well defined as the
global increase in net worth, minus new equity if any; its interpretation is straightforward;

- when prices change, the global variation in net worth no longer accounts for the true cost of assets consumed; hence a new concept, "adjusted profit", has to be used; on the other hand, the variation in net worth also contains pure hoarding gains which have nothing to do with actual business operations; furthermore the new value of net worth at the end of a period must be compared to what it should have become to preserve the purchasing power of owners' funds; hence the introduction of a second new concept, "revaluation gain".

Thus, whereas under the price stability assumption one concept of "profit" unambiguously showed how well the business was doing, one must now use two concepts: "adjusted profit" and "revaluation gain".

The "adjusted profit" provides an indication of commercial performance by setting against revenues the adjusted cost of assets held at the start of the accounting period and consumed in the process of earning these revenues. It is determined by the combined effects of operations and changes in replacement values.

The "revaluation gain" is the excess of appreciation on assets held at the start of the period and new assets acquired and retained over the increase in the monetary expression of equity; it is determined by the combined effects of changes in replacement values, general inflation, and balance sheet structure (in particular gearing).

"Adjusted profit" and "revaluation gain" can have opposite signs yielding a net total positive or negative.

This is so in the two extreme cases of

1. a firm trading in some appreciating commodity which incurs an adjusted loss whilst enjoying an overall increase in real net worth due to revaluation of stock;
2. a high-technology company with decreasing product costs which enjoys an adjusted profit whilst its real net worth is reduced as a result of devaluation of inventories.

What is the best situation to be in? How should the shareholders be treated in either case and what should the tax authorities do?

In the first case, the firm is losing productive assets because the cash flow is insufficient to cover the replacement of stocks. Should such a si-
tuation last for some time the firm would see its activity diminished and it would gradually liquidate itself. Because of lack of available cash there can be no question of paying dividends. Nevertheless shareholders would see the value of their capital increase, provided the realisation value of assets was in line with replacement costs.

From the point of view of the taxman, there can be a case for some sort of capital gain tax since the firm is “beating general inflation” simply by being in a line of business where assets appreciate.

In the second case, the level of productive assets is increased as the cash flow more than covers the replacement of stocks. Activity can grow through self financing. Yet overall value is decreasing. If dividends are paid, which is perfectly possible in view of the adequate cash flow, shareholders will be in roughly the same position as the holder of a high yield bond in times of inflation and rising interest rates, i.e. receiving a high interest on a devaluing asset. Incidentally, in the first case shareholders would have been rather like the owners of an appreciating antique.

As far as taxation is concerned, there is a case for resisting the temptation to bite into the cash flow, because the company will have to face a higher real level of indebtedness, will be more susceptible to increased interest charges and overheads and will be forced to do more business to maintain the same level of earnings.

The cases where “adjusted profit” and “revaluation gain” have the same sign are of course much clearer.

When the sign is positive, dividends could be paid up to the level of “adjusted profit” and taxation could have both an “income tax” and a “capital gain tax” element.

When the sign is negative, there can be no question of either dividend or tax.
REFERENCES


RESUME

Le présent article est consacré à une analyse générale du problème de la comptabilité d’inflation.

L’analyse présentée prend en considération les variations de valeurs spécifiques des différents actifs ainsi que la variation de pouvoir d’achat affectant les fonds propres.

En outre, cette analyse rend compte du gain dû à l’endettement en période de hausse des prix.

Deux concepts fondamentaux complémentaires sont introduits: celui de profit ajusté, établi sur la base des valeurs de remplacement, et celui de gain de réévaluation.