Comments on Chapter 20 of the updated SNA93

By Michael Wolf, Senior Economist at the National Accounts Dept. Statistics Sweden

Comment no 1

In paragraph 20.8 it is mentioned that "…the price of an asset declines over time…" but this is an example of the misuse of the concept price it should be read "…the *value* of …" instead. The decline in value of an asset over time occurs because the volume of services decreases not because the price changes. It is a change in volume (quantity or the quality of a given quantity) of the asset not the price. Gross fixed capital formation is according to SNA calculated without any impact of price changes in the assets. Price changes are only taken in to account when we move from one accounting period to another and wants to show the accounts in the prices of the same period (year). So, in consequence I would like to change all misinterpretation of the concept price and/or value in chapter 20.

Comment no 2

In paragraph 20.13 it is stated that "…there is an identity between the value of income the asset yields and the discounting inherent in establishing its current value." which I believe is correct especially if current is interpreted as meaning present and not the opposite of constant.

But if we use the information in the numerical examples (table 20.1) dividing the income with the value of the stock does not give 5% in return to capital but rather 3,2% or lower which indicates that there must be an error in the examples. I have created an alternative example shown below.

The reason why the numerical examples are wrong is that they have not been constructed with enough care. What happens is that an investment (GFCF) is made in the beginning of year 1 which contributes to output at the end of year 1. This contribution is assumed to be 100, contributions of diminishing degree is also assume for four consecutive years. It is obvious that the gross income which equals the contribution can not be received at the beginning of the year because this implies that we do not need the asset to reach it. Using the asset to increase output takes some time and in this example the gross income is realised at the end of the period (year). A further assumption is also needed and that is an assumption of the rate of return to capital or as it is mentioned "discount rate". The discount rate is assumed to be 5 percent every year.

To be able to calculate the value of the stock of assets (capital in common language) when it starts being used it is necessary to discount the gross income for all five years to the beginning of the first year not to the end of the first year which mistakenly has been done in the numerical examples. The value at the end of year 1 equals the value at the beginning of year 2 and so on. Doing this and allowing for more precision by using two decimals the alternative table 20.1 is shown below.

Table 20.1

			Discount rate 5%				
beginning of	**year 1**	**year 2**	**year 3**	**year 4**	**year 5**		**Sum of**
end of		**year 1**	**year 2**	**year 3**	**year 4**	**year 5**	**5 years**
Contribution to asset value							
from earnings in ↓	0						
year 1	95,24	100					
year 2	72,56	76,19	80				
year 3	51,83	54,42	57,14	60			
year 4	32,91	34,56	36,29	38,1	40		
year 5	15,68	16,46	17,28	18,14	19,05	20	
future periods							
	268,22	**281,63**	190,71	116,24	59,05	20	
opening balance value	**268,22**	**181,63**	**110,71**	**56,24**	**19,05**	**0**	
value index	1,00	0,68	0,61	0,51	0,34	0	
income	13,41	9,08	5,53	2,81	0,95		31,78
cons. of fixed assets	86,59	70,92	54,47	37,19	19,05		268,22
rate of return	0,05	0,05	0,05	0,05	0,05		

So, dividing the income of year 1 with the value of capital at the beginning of year 1 now gives a value of 5 percent. Consequently all numerical examples in chapter 20 have to be rearranged to show this correct treatment of how values changes over time.

Comment no 3
In paragraph 20.14 it is stated that it is possible to derive the value of capital stock from the knowledge of its decline in value. But this is only true in a constructed example, when we move to reality we have two unknown variables (rate of return and value of capital stock) which varies inversely to each other. Higher rate of return (discount rate) implies a lower value of capital stock and vice versa. By assuming something of either one of these two variables we can derive the other but which of them that should be assumed and which should be derived is not given at least not without a guideline like an economic theory.

Hitherto, according to the SNA, we have known the value of the original investment and by using empirical information of age-value relations or assuming a specific pattern we have been able to calculate consumption of fixed assets and the asset stock value at the beginning of the next period. We can of course instead assume something about the future discount rate and the future gross income occurring as a result of the use of assets. But it will be obvious that assuming something about the future is the same thing as deviating from empirical facts. Such a treatment also raises questions like: how do we deal with unpredicted outcomes?

Comment no 4
In paragraph 20.17-18 it is argued "that making assumptions about efficiency decline is likely to lead to superior results" over the alternative which is to use information on the age-value relation. The example of an age-value relation in paragraph 20.17 is misleading because the assumed value decline is totally unrealistic. What is normally assumed by national accountants f.ex. at the BEA is that the value declines with the same ratio each year so that the remainder at the end of each year in relation to the beginning of the very same year is of equal magnitude over all years. This is the geometric depreciation rate model.

With a geometric depreciation rate it is not so easy to construct a finite example so we have instead made an example with a scrap value at the end of year five. This can also be interpreted as further income will be a consequence of the future use or sale of the asset. The discounted value of this income (20,86) at the beginning of year 1 is 16,34 which is exactly how much higher the initial value of the asset is in this example in relation to the one in comment no 2. As in the original example 20.3 we let the value of the asset in the end of year 1 be 282. If we take efficiency to be the change in gross operating surplus then, in my case, we will have a consistent interpretation. The case is consistent with a 40 percent decline in efficiency (72,44/120,72) and age-value decline between the years (96,58/160,97).

Table 20.3

				Discount rate 5%			
beginning of	**year 1**	**year 2**	**year 3**	**year 4**	**year 5**		**Sum of**
end of		**year 1**	**year 2**	**year 3**	**year 4**	**year 5**	**5 years**
Contribution to asset value							
from earnings in ↓	0						
year 1	114,97	**120,72**					
year 2	65,7	68,99	**72,44**				
year 3	37,54	39,42	41,39	**43,46**			
year 4	21,46	22,53	23,66	24,84	**26,08**		
year 5	12,26	12,87	13,51	14,19	14,9	**15,65**	
future periods	16,34	17,16	18,02	18,92	19,87	20,86	
	268,27	**281,69**	169,02	101,41	60,85	36,51	
opening balance value	**268,28**	**160,97**	**96,58**	**57,95**	**34,77**	**20,86**	
value index	1,00	0,6	0,6	0,6	0,6	0,6	
income	13,41	8,05	4,83	2,9	1,74		30,93
cons. of fixed assets	107,31	64,39	38,63	23,18	13,91		247,42
rate of return	0,05	0,05	0,05	0,05	0,05		

In my opinion it is preferred to use empirical information. This means that age-value relations which are possible to infer with econometric methods out of data is a better choice than assumptions on age-efficiency patterns which rarely are observable or measurable. A further problem in valuing assets this way is that the contribution to production is normally a combined outcome of several assets which implies that what we at best can achieve is a valuation of a compounded asset of productive capacity.

Comment no 5
Let us now assume that something unforeseen happens under the second year in the example shown in table 20.1. A strike, for example, lowers the assets contribution to output with 2 units (78 instead of 80). This was not taken into account when the consumption of fixed capital plan was made up. The income is also reduced with two units and the rate of return is only 3 percent instead of the economy average of 5 percent. The question is: how should this be reflected in the accounts?

Table 20.1 b Changes in table 20.1 due to a strike in year 2

				Discount rate 5%			
beginning of	**year 1**	**year 2**	**year 3**	**year 4**	**year 5**		**Sum of**
end of		**year 1**	**year 2**	**year 3**	**year 4**	**year 5**	**5 years**
Contribution to asset value							
from earnings in ↓	0						
year 1	95,24	100					
year 2	72,56	76,19	**78**				
year 3	51,83	54,42	57,14	**62**			
year 4	32,91	34,56	36,29	38,1	40		
year 5	15,68	16,46	17,28	18,14	19,05	20	
future periods							
	268,22	281,63	190,71	116,24	59,05	20	
opening balance value	268,22	181,63	110,71	56,24	19,05	0	
value index	1	0,68	0,61	0,51	0,34	0	
income	13,41	9,08	3,53	4,81	0,95		31,78
cons. of fixed assets	86,59	70,92	54,47	37,19	19,05		268,22
rate of return	0,05	0,05	0,03	0,09	0,05		
other changes		**-40**	**40**				
income/normal rate of return			70,71	96,24			
normal rate of return			0,05	0,05			

Well we have two possibilities, one is to adjust the opening balance value at the beginning of year 2 (before the strike has occurred) and the other is to make no adjustment at all. Adjusting the opening balance would show a reduction in the asset value with 40 units (2/0,05) to 70,71 which is the same as valuing the asset as the income divided with the average rate of return. This might seem attractive from the valuation of capital service point of view because the true value of capital services will then be calculated. But from a statistical point of view it is problematic. The adjustment is made when we already know the outcome (ex post) and exchanged for the statistical value which instead can be used to evaluate the outcome of year 2. In this sense year 2 yields a lower rate of return because of the strike. Should we adjust values to the theoretical optimal or should we interpret the outcome in relation to specific events?

I prefer using the standard way of calculating stock values and to relate the income to these. This is from an empirical point of view more interesting than to manipulate the stock value to always show the assumed rate of return. Certainly when the decline in value of stocks of assets is estimated with the use of empirical facts.

If an unexpected event reduces the value permanently (-40) this should be adjusted in the other changes in volume account. But in my case the fall in output year 2 has been offset by an increase in the following year and thus restoring the value (+40) of assets.

Comment no 6
From table 20.3 above (comment no 4) it is possible to take another route in valuing assets. In cases when consumption of fixed assets is assumed to have a geometrical pattern, i.e. the same rate of reduction each year in relation to the net value, the value of gross operating surplus (GOS) together with an assumption on the normal rate of return (or discount rate) can be used to calculate both the value of the composite stock and consumption of fixed assets (CoFA). This is done by dividing operating surplus with the sum of the rate of CoFA and rate of return. In my alternative table 20.3 the GOS occurring by the end of year 2 is 120,72 and the sum of the rates is 0,45 (0,40+0,05) which gives a value of 262,27. The problem in this case is that the composite rate of CoFA is not constant unless the different assets in the stock are homogeneous, i.e. not very different in economic respect.

Comment no 7
In paragraph 20.24 efficiency is said to be known or estimated but this is rarely the fact, the efficiency pattern is normally assumed. That is because efficiency of an asset in the economic sense used here is efficiency in producing operating surplus and operating surplus is not in it self observable.

Comment no 8
In paragraph 20.27 land is discussed. In our opinion there is a misunderstanding of what is meant by value. It is stated that the value of land “is assumed to remain constant” but this is not true according to our view. Valuation in constant prices is made to capture volume changes. Land is constant in volume so there is no depreciation in SNA. The value of land can change, though. This is the case in a situation with no price changes in produced goods and services but with an increases in output, f.ex. due to the use of fertilizers. If the increase in output value is greater than the input value of fertilizers this will increase net income to the land owner and also the market value of land. This occurs because the marginal cost of producing fertilizers is lower than the increase in the output when it is used in agriculture.