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Special drawing rights and inflation

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SPECIAL DRAWING RIGHTS
AND INFLATION

Manfred J. M. Neumann

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I. Introduction

In a recent paper on "The Desirable Rate of Creation of an International Money" ¹⁾ Pasquale Salin advances among others some interesting propositions about the effects of allocation of Special Drawing Rights (SDRs) on inflation. From an analysis of the workings of SDR allocation in a two-country (America versus Europa) model with fixed exchange rates Salin comes to the following conclusions: (i) "In the long run neither the rate of inflation (in Europa) nor the rate of growth of seigniorage paid (by Europa) are modified by the creation of SDRs."

"As soon as asset equilibrium is reached, SDR allocation at the same growth rate as dollar creation does not have any additional constant inflationary effect... But there exists a once-for all inflationary effect due to the introduction of SDRs..." ²⁾ (ii) "In the short run, SDR creation is inflationary (in Europa) and must be inflationary, and a constant rate of growth of SDRs (higher than the rate of growth of other reserve components) induces a variable rate of inflation (in Europa)." ³⁾

The purpose of this paper is twofold. Firstly, we want to demonstrate that Salin's conclusions about inflationary consequences of SDR allocation do not hold and do not follow from his analysis. The allocation of SDRs, sharply to be differentiated from the use of SDRs, is not inflationary, neither in the long run nor in the short run,

never mind what the rate of growth of SDR creation is . Secondly, we want to carry the analysis further ahead by taking into account the use of SDRs, that is the exchange of SDRs for key-currency or for foreign resources. The use of SDRs, indeed, may have inflationary consequences.

It will be convenient to organize our presentation as follows: We will start with a brief outline of Salin's model and his results (section II). Next, we will give an analysis of SDR allocation within a reformulated version of Salin's model (section III). It will be followed by a section on the effects of an home-made inflation (section IV) because this will permit to demonstrate what the essence of Salin's analysis really is. Thereafter we will trace the effects of the use of SDRs on the system (section V). The final section summarizes our main results.

II. Outline of Salin's Analysis

Salin bases his analysis on a two-country world in which exchange rates are fixed and prices are fully flexible. It is assumed that the national currency of one country, called America, is the key-currency and the only international liquid asset. So the world lives with a pure dollar standard. It is further assumed as a starting point that in long-run equilibrium America has a balance of payments deficit of constant real value. The rest of the world is the second country, called Europa.

For Europa a constant relationship between the quantity of money (M) and the monetary base (B) is assumed

$$(1) \quad M = k B$$

$$(2) \quad \frac{dM}{dt} \frac{1}{M} = \frac{dB}{dt} \frac{1}{B}$$

In the long run, the income velocity of money can be assumed to be constant; so we have

$$(3) \quad \frac{dM}{dt} \frac{1}{M} = \frac{dP}{dt} \frac{1}{P} + \frac{dy}{dt} \frac{1}{y} = \pi^E + \rho^E$$

where y is real income, P the general level of prices, π^E the rate of inflation (in Europa), and ρ^E the real rate of growth (in Europa).

From (2) and (3) follows

$$(4) \quad \frac{dB}{dt} \frac{1}{B} = \pi^E + \rho^E$$

Equation (4) shows that in the long run for given p^e the European rate of inflation depends on the growth rate of the monetary base. Assuming that the base is not expanded via acquiring domestic assets and disregarding net capital flows between Europa and America, the growth of the monetary base is determined by Europa's trade surplus

$$(5) \quad \frac{dB}{dt} = x p^A(t) y^A(t) - m p(t) y(t)$$

where x is the American marginal propensity to import, m the European marginal propensity to import, p^A the American price level, and y^A the American real income; x and m are assumed to be constant in the long run.

From (4) and (5) we find

$$(6) \quad \pi^E + p^E = p^A + \pi^A$$

This equation gives us the equilibrium rate of inflation in Europa for given values of p^E , p^A and π^A .

Now let us introduce SDRs. The SDRs to be analyzed here are a fiat international money created and allocated gratis; they are held by central banks and cannot be sold on the private market. Note that the SDRs here are not identical in every respect with the SDRs of the present world ⁴⁾. " The main assumption is that SDRs and dollars are perfect substitutes in official reserves as liquidity means and (source) components of the monetary base." ⁵⁾

Salin assumes that SDRs are allocated to Europa only.

If B_1 denotes dollar reserves, B_3 SDRs allocated and B_2 all other components, the European monetary base is

$$(7) \quad B = B_1 + B_2 + B_3$$

Assume with Salin that $B_2 = 0$, "in order to make the equations simpler", then one has

$$(8) \quad B_2 = 0$$

$$(7a) \quad B = B_1 + B_3$$

Next define a ratio q_1 of B_3 to B_1 and differentiate

$$(9) \quad q_1 = \frac{B_3}{B_1}$$

$$(10) \quad \frac{dq_1}{dt} \frac{1}{q_1} = \frac{dB_3}{dt} \frac{1}{B_3} - \frac{dB_1}{dt} \frac{1}{B_1} = T_3 - T_1$$

T_3 and T_1 are the growth rates of B_3 and B_1 respectively.

Then, from equations (1), (7a) and (9) one gets

$$(11) \quad M = k (1 + q_1) B_1$$

Differentiating and using (3) gives

$$(12) \quad \pi^E + \rho^E = \frac{dM}{dt} \frac{1}{M} = T_1 + \frac{dq_1}{dt} \frac{1}{q_1} \frac{q_1}{1+q_1}$$

This is the basic equation from which Salin derives his conclusions about the long-run and the short-run effects of SDR allocation on the European inflation rate as follows:

In the long run, when a desired ratio of SDRs to dollar reserves is reached, q_1 is constant and hence (dq_1/dt) is zero. Then it follows from equation (10) that $T_3 = T_1$, from equation (12) that $\pi^E + \rho^E = T_1$, and from equation (6) that $\pi^A + \rho^A = T_1$. Hence, "for ρ^E , π^A and ρ^A given, the long-run inflation rate of Europa is not modified by its allowance of SDRs." 6)

In the short run, that is during the transitory period from the situation before the first SDR allocation until the situation where the long-run desired q_1 is reached, the consequences appear to be different. During the transitory period Europa has to build up stocks of allocated SDRs such that q_1 increases. Thus, Salin concludes from equations (10) and (12): " If SDRs grow at a constant rate, higher than T_1 , in this transitory stage, q_1 is increasing and dq_1/dt is positive, and $(dq_1/dt)(1/q_1)$ is positive and constant... Thus, the inflation rate in Europa is higher, the higher the q_1 is. A constant rate of change in the q_1 -ratio is inflationary and at an increasing rate". 7) "It may... be stressed that, in the transitory period, SDRs are necessarily inflationary.

The higher T_3 is, the higher π^E will be, but the quicker the attainment of the desired q_1 will be." 8)

Finally, it should be noted that Salin's analysis is based on the remarkable assumption that the international agency responsible for SDR creation creates SDRs during the transitory period "at a higher rate than the long-run equilibrium one".

III. Analysis of SDR Allocation

In this section we present an analysis the results of which contradict Salin's conclusions. Later we will explain why Salin did not arrive at our results. Let us start with a discussion of the techniques of SDR allocation.

1. SDR Allocation and Monetary Base

How do the SDRs allocated to a country like Europa enter its monetary system? Consider the following simplified balance-sheet of a European central bank before any SDR allocation:

Balance-Sheet I

B_1	B
Dollar-Reserves	Base Money

Assuming that the central bank does not hold any domestic assets and liabilities, the monetary base consists on the sources side solely of B_1 , that is of dollar reserves gained from past trade surpluses with the rest of the world. On the uses side the monetary base consists of European currency held by banks and the public.

Now, assume SDRs are created and allocated to Europa. These SDRs, intended to supplement the dollar reserves as international liquid assets, clearly are assets for the European central bank and therefore appear on the asset's side of its balance-sheet, B_3 , (see balance-sheet II).

Despite these SDRs are

Balance-Sheet II

B_1 Dollar Reserves	B Base Money
B_3 SDRs	B_2^1 Contra-Entry SDRs

not allocated on a credit base, that is, despite Europa receives the SDRs as a donation without taking any liability of repayment, ⁹⁾ simple bookkeeping rules require the central bank to put a contra-entry of equal amount on the liabilities' side of the balance-sheet. ¹⁰⁾ If we derive the monetary base from the balance-sheet, we get

$$B = B_1 + B_3 - B_2^1$$

We find that the introduction of SDRs into the system does not affect the monetary base of Europa because the resulting positive source component B_3 will automatically be matched by the negative source component B_2^1 , the contra-entry to SDRs allocated. In this respect, SDRs allocated really are "dead" assets. In addition we find that the sum of remaining source components, B_2 , (besides B_1 and B_3) is not equal to zero due to the necessity of a contra-entry to B_3 . However, we can make B_2 equal to zero, if we assume that the central

Balance-Sheet III

B_1 Dollar-Reserves	B Base Money
B_2^2 Domestic Assets	
B_5 SDRs	B_2^1 Contra-Entry SDRs

bank purchases domestic assets, B_2^2 , equal in amount to the contra-entry to SDRs allocated. Then we have $B_2^1 = B_2^2$ and hence $B_2 = 0$. But note that under these circumstances the base will be increased by an amount equal to the domestic assets purchased.

From a comparison of the three different situations described by the above balance-sheets we can conclude: Firstly, the allocation of SDRs to a country does not change its existing monetary base in any way. Secondly, correct book-keeping shows that in the case of SDR allocations the sum of remaining source components, represented by B_2 , will only be zero (Salin's assumption), if and only if the central bank acquires a net amount of domestic assets which equalizes the value of the stock of SDRs allocated, measured in European currency.

2. A General Model

The model we are presenting here essentially is Salin's model

but it will be formulated in a more general way so that we will be enabled to derive a correct solution of the SDR-allocation case and to evaluate the specific solution derived by Salin.

In our model we use the equations (1) to (5) stated above with the following modification. In the trade-balance equation (5) dB is replaced by dB_1 , the rate of change of dollar reserves accruing from international trade. This modification is required because in a general formulation we have to take into consideration additional source components of the base besides the dollar reserves accruing from international trade. We introduce a formulation of the base identity which explicitly states all those source components which might be of interest for the purposes of our analysis,

$$(13) \quad B = B_1 + B_3 - B_2^1 + B_2^2$$

where B_1 are dollar reserves, B_3 the SDRs allocated, B_2^1 the contra-entry to SDRs allocated, and B_2^2 net domestic assets.

Next we define in addition to the ratio q_1 (see equations (9) and (10) above) the following ratios

$$(14) \quad q_2^1 = \frac{B_2^1}{B_1}$$

$$(15) \quad q_2^2 = \frac{B_2^2}{B_1}$$

Differentiating gives

$$(16) \quad \frac{dq_2^1}{dt} \frac{1}{q_2^1} = \frac{dB_2^1}{dt} \frac{1}{B_2^1} - \frac{dB_1}{dt} \frac{1}{B_1} = T_2^1 - T_1$$

$$(17) \quad \frac{dq_2^2}{dt} \frac{1}{q_2} = \frac{dB_2^2}{dt} \frac{1}{B_2^2} - \frac{dB_1^1}{dt} \frac{1}{B_1^1} = T_2^2 - T_1^1$$

where T_1^1 and T_2^2 are the growth rates of B_1^1 and B_2^2 respectively.

From (1), (13), (9), (14) and (15) we get the following equation for the money stock

$$(18) \quad M = k (1 + q_1^1 - q_2^1 + q_2^2) B_1^1$$

Differentiating and using (3) gives

$$(19) \quad \pi^E + \rho^E = \frac{dM}{dt} \frac{1}{M} = T_1^1 + \frac{dq_1^1}{dt} \frac{1}{q_1^1} \frac{q_1^1}{1 + q_1^1 - q_2^1 + q_2^2} - \frac{dq_2^1}{dt} \frac{1}{q_2^1} \frac{q_2^1}{1 + q_1^1 - q_2^1 + q_2^2} + \frac{dq_2^2}{dt} \frac{1}{q_2^2} \frac{q_2^2}{1 + q_1^1 - q_2^1 + q_2^2}$$

Equation (19) is a more general formulation of Salin's equation (12) and will serve us as the basic equation in our following discussions.

3. The Pure SDR-Allocation Case

In order to bring out the fundamental properties of SDR allocation let us assume that the European central bank does not hold any domestic assets or domestic liabilities; then

$$(20) \quad B_2^2 = 0$$

There are SDRs allocated to Europa which enter the balance-sheet of the central bank on the assets' side, B_3^1 , and which

require an identical contra-entry on the liabilities' side, B_2^1 . Hence, we have

$$(21) \quad B_3 = B_2^1$$

(20) and (21) imply

$$(22) \quad q_2^2 = 0 \quad \text{and}$$

$$(23) \quad q_1 = q_2^1$$

It follows that in the pure SDR-Allocation case the money stock equation (18) is reduced to

$$(18.1) \quad M = k B_1$$

Thus equation (19) takes the form

$$(19.1) \quad \pi^E + \rho^E = \frac{dM}{dt} \frac{1}{M} = T_1$$

What can we conclude from this solution? Our major conclusion is that the allocation of SDRs to Europa by itself does not have any effect at all on the European inflation rate, π^E , because the European monetary base and the money stock in no way are affected by SDR allocation.

This conclusion is valid, irrespective whether one is concerned with the long run or the short run; therefore, it clearly conflicts with Salin's conclusion that "SDRs are necessarily inflationary" during the transitory period between two long-run equilibrium situations. Why Salin arrived at this wrong conclusion we will explain in the next section. But before moving on we wish to emphasize not only that SDR allocation by itself is not inflationary but, moreover, that also the rate of growth of SDR allocation

is of no relevance in this respect. It may take any value without changing our result. Any rate of growth of SDR allocation is consistent with solution (19.1), for the simple reason that any increase in SDR allocation to Europa automatically will be matched by a corresponding increase of the contra-entry in the balance-sheet of the European central bank. And what is true for Europa, by the way, is equally true for any other country including America. As long as SDRs are allocated but not used, that is sold in exchange for foreign currency or foreign goods, they are "dead" assets.

Therefore, in the pure SDR-allocation case we necessarily are driven to the same conclusion as in the case of a pure dollar-standard regime: Given p^E and p^A the European inflation rate depends in equilibrium on the American inflation rate (equation 6), and this equilibrium will not be disturbed by SDR allocation.

IV. Analysis of Home-Made Inflation

1. The General Case

We drop now the assumption that the European central bank does not acquire domestic assets in excess of domestic liabilities [equation (20)], hence, B_2^2 and q_2^2 are different from zero and positive. However, we continue to assume that SDRs are allocated to Europa and are not used, so equations (21) and (23) hold.

In this case equation (18) takes the form

$$(18.2.1) \quad M = k (1 + q_2^2) B_1$$

and consequently (19) becomes

$$(19.2.1) \pi^E + p^E = \frac{dM}{dt} \frac{1}{M} = T_1 + \frac{dq_2^2}{dt} \frac{1}{q_2^2} \frac{q_2^2}{1 + q_2^2}$$

What we find is that the growth rate of the European money supply and - for given p^E - the European inflation rate depend as before on the growth rate of dollar reserves, T_1 , but in addition on the growth rate of the ratio of net domestic assets to dollar reserves, q_2^2 , weighted with a factor $q_2^2 / (1 + q_2^2)$. Given T_1 any increase in q_2^2 via T_2^2 will raise the growth rate of the European money supply and the European rate of inflation. This is the classic case of an home-made inflation.

In the long run such an home-made inflation could not be maintained by Europa. The system would turn to a new equilibrium, when q_2^2 reaches a desired level, so that $(dq_2^2 / dt) (1/q_2^2) = 0$. This implies that the European central bank cuts back the growth of net domestic assets acquired to its former level. Both source components, the dollar reserves and net domestic assets, would again grow at the same rate, $(T_2^2 = T_1)^{11)}$. Consequently, in the new long-run equilibrium again equation (6) would hold, stating that in the last analysis the American rate of inflation determines the European rate of inflation.

In the short run, however, during the transitory period before a new long-run equilibrium position of the kind described is reached, we would have an home-made inflation in Europa. The European inflation rate would be higher than

before, and via the deteriorating trade balance it also would induce a higher inflation rate in America. In order to reach a new desired long-run value of q_2^2 , this ratio must be raised, $(dq_2^2/dt)(1/q_2^2) > 0$. This implies that in the short run the European central bank acquires net domestic assets at a growth rate higher than the rate of dollar accruals, $T_2^2 > T_1$. The more T_2^2 exceeds T_1 , the more the European inflation rate would be pushed up, as can be seen from equation (15.2.1). The process induces a declining of T_1 which in turn will contribute to arrive more rapidly at the long-run q_2^2 desired and to shorten the transitory period before a new equilibrium is reached.

2. A Special Case (The Case of Salin)

In his analysis of the role of SDR allocation Salin assumes B_2 , the sum of source components of the base other than dollar reserves and SDRs, to be zero "in order to make the equations simpler". However, in analyzing the pure SDR-allocation case we have seen that it is not obvious that B_2 can be assumed to be zero; in any case there is the necessary contra-entry to SDR allocation which somehow has to be taken into account. In fact, it may be this simplifying assumption which easily induces one to overlook how SDRs enter the system.

Nevertheless, we also have seen that Salin's assumption can be justified, if one is prepared to make a very special assumption of the following kind: The European central bank for unknown reasons (because she just likes to) increases the monetary base by acquiring domestic assets exactly in

such an amount that the contra-entry to SDR allocation always is matched (see balance-sheet III above). In this special case the source component B_2 is zero and is composed of B_2^1 , the contra-entry, and B_2^2 , net domestic assets purchased.

Then we have

$$(24) \quad B_2 = B_2^2 - B_2^1 = 0$$

$$(25) \quad B_2^1 = B_2^2$$

This implies

$$(26) \quad q_2^1 = q_2^2$$

In addition, because of SDR allocation, equation (23) holds

$$(23) \quad q_2^1 = q_1$$

It follows that in this special case the ratios q_1 , q_2^1 and q_2^2 are identical and equal to plus one. This gives us the unusual choice to formulate two differently dressed solutions of our system.

For instance, if we cancel out q_2^1 and q_1 in equation (18), we will get the following solution

$$(19.2.2) \quad \pi^E + \rho^E = \frac{dM}{dt} \frac{1}{M} = T_1 + \frac{dq_2^2}{dt} \frac{1}{q_2} \frac{q_2^2}{1+q_2^2}$$

This solution, indeed, is exactly our equation (19.2.1) derived above which describes the general case of an home-made inflation in Europa. The conclusions derivable are the same as in the general case, except for one modification. This is the condition that the European central bank, because she just likes to, deliberately holds her acquisition of net domestic

assets in line with SDR allocation, $T_2^2 = T_3$. Nevertheless, one cannot escape from the conclusion that it is this acquisition of domestic assets and not the SDR allocation which inflates the base and the economy.

On the other hand, we might cancel out q_2^2 and q_2^1 in equation (18). This would give us an alternative

$$(19.2.3) \quad \pi^E + p^E = \frac{dM}{dt} \frac{1}{M} = T_1 + \frac{dq_1}{dt} \frac{1}{q_1} \frac{q_1}{1+q_1}$$

formulation, namely the one presented by Salin [see equation (12)]. If we take this equation by its face we easily are driven to Salin's conclusions concerning the effects of SDR allocation. However, as we now know from our analysis above, the appearance of the ratio q_1 in this formulation masks the true driving force. The driving force is not SDR allocation but is the policy of purchasing domestic assets, the extent of which is tied to the extent of SDR allocation by the chance of a curious decision of the European central bank.¹²⁾

V. Analysis of the Use of SDRs

We have seen that the allocation of SDRs as such is not inflationary. However, the use of SDRs may be. To use SDRs means that the European central bank sells SDRs to the American central bank in exchange for dollars. Now, the dollars received in turn can be used differently. They may either serve as a means simply to increase the level of dollar reserves above the level given by the equilibrium surplus in international trade. Or they may be used to compensate for absolute or relative losses of dollar re-

serves under the regime of an home-made inflation in Europa. These two cases have to be differentiated.

1. Pure Use of SDRs

Assume the European central bank prefers to possess dollars instead of SDRs, for one or another reason, ¹³⁾ and the American central bank is ready to accept the SDRs for a fixed price.

Before the exchange of SDRs is carried out, the monetary base of Europa, B^E , is given by equation (13)

$$(13) B^E = B_1^{1E} + B_3^E - B_2^{1E} + B_2^{2E}$$

where the dollar reserves accruing from international trade are described by B_1^{1E} . Remember that the SDR holdings, B_3^E , so far are equal to the contra-entry, B_2^{1E} . Now, if a certain amount of SDRs is sold to America, B_3^E will be reduced while new dollar reserves are gained which we will denote by B_1^{2E} . Then the base is given by

$$(27) B^E = B_1^{1E} + B_1^{2E} + B_3^E - B_2^{1E} + B_2^{2E}$$

where $B_1^{2E} + B_3^E = B_2^{1E}$. The reduction of SDR holdings leads to an equal increase in total dollar reserves. Therefore, while the composition of sources of the European monetary base is changed by the use of SDRs, the total amount of the base is not. If we cancel out the compensating sources of the base, i.e. the SDR holdings, the contra-entry, and the dollars received for SDRs sold, we find

$$(27a) B^E = B_1^{1E} + B_2^{2E}$$

that the European base and its rate of change are determined

by the development of international trade and by the central bank's policy of acquiring domestic assets.

Mutatis mutandis, the same is true for America. Assuming that there is no money creating commercial banking system the monetary base hold by the American public is given by

$$(28) B^A = B_2^{2A} - B_1^{1A}$$

where B_2^{2A} denotes net domestic assets acquired by the central bank and B_1^{1A} the liabilities to Europa due to international trade. If the American central bank buys SDRs from Europa in exchange for newly created dollars, the base of America is

$$(28.a) B^A = B_2^{2A} - B_1^{1A} + B_3^A - B_2^{1A}$$

where B_3^A are the SDRs received and B_2^{1A} the dollars given to Europa. Note that the monetary base of America is not changed by this operation because B_3^A and B_2^{1A} cancel out ¹⁴⁾.

2. Use of SDRs and Home-Made Inflation

An home-made inflation in Europa leads first to relative and later to absolute losses of dollar reserves and cannot be maintained in the long run, as we have seen in section IV. While the use of SDRs as such is not inflationary because it cannot change the amount of base money available to the European public as well as to the American public, it would on the other hand, permit Europa to prolong an home-made inflation. The dollars received in exchange for SDRs could be used to cover for some time the trade deficit finally emerging. With regard to this the use of SDRs can be viewed to be inflationary despite it is not the driving force of inflation. Then the question ist, how long can Europa maintain

its home-made inflation with the help of SDRs exchanged for dollar reserves?

Let us start from an equilibrium situation given by

$$(6) \pi^E + \rho^E = \pi^A + \rho^A$$

which in our model implies

$$(29) \lambda_I^E = \lambda_I^A$$

where λ_I^E and λ_I^A are the rates of growth of the monetary base in Europa and in America respectively. In equilibrium the rates of growth of B_2^{2E} , B_2^{2A} , B_1^{1E} , and B_1^{1A} are equal to λ_I^E and λ_I^A . When Europa starts an home-made inflation by raising λ_2^{2E} , the rate of growth of B_2^{2E} , above its equilibrium level λ^E will increase and so will the rate of inflation in Europa, π^E , for given ρ^E . Due to the increase of π^E the growth rate of the European trade surplus and hence λ_1^{1E} , the rate of growth of dollar reserves accruing from international trade, will start declining and in the course of the process eventually become negative. Thus, the inflationary policy of Europa will result in increasing losses of dollar reserves and thereby also induce a higher rate of inflation in America for unchanged λ_2^{2A} , the growth rate of the acquisition of domestic assets by the American central bank. If SDRs allocated to Europa are not used, Europa will be forced to end her inflationary policy when her dollar reserves are used up, at the latest. On the other hand, if SDRs are used, this will not add to inflation but it will permit to continue the inflation policy ¹⁵⁾.

Assume the exogenously given rate of growth of SDR allocation to Europa, λ^S , to be equal to the newly chosen European growth rate of acquisition of domestic assets, λ_{2T}^{2E} . The value of λ^S determines the longer-run maximum value of the growth rate of dollar reserves attainable by Europa via the use of SDRs, λ_{1T}^{2E} . Now, we know that during the whole transitory process - for unchanged λ_2^{2A} - the monetary growth rate of America, λ_T^A , will be above its initial equilibrium level but below the transitory monetary growth rate of Europa, λ_T^E ,

$$\lambda_T^A < \lambda_T^E$$

Assuming unchanged marginal propensities to import for America as well as for Europa throughout the paper, it follows that the rate of growth of European imports, λ^I , is determined by λ_T^E and is higher than the rate of growth of European exports, λ^X , which is determined by λ_T^A 16).

Thus, we have

$$\lambda^X < \lambda^I$$

and consequently a rate of growth of the European trade deficit, reflected by λ_{1T}^{1A} and by λ_{1T}^{1E} as well, which is higher than λ_T^E . In addition, we can derive that the more the gap between λ_T^A and λ_T^E is narrowing, the more λ_{1T}^{1A} will decline in response. We also know that the longer Europa is able to maintain her inflationary acquisition of domestic assets, λ_{2T}^{2E} (with $\lambda_{2T}^{2E} > \lambda_{2I}^{2E}$), the more λ_T^E will approach λ_{2T}^{2E} , and the more the American monetary rate of growth, λ_T^A , - which increasingly becomes dominated by λ_{1T}^{1A} - will approach λ_T^E . In the limit one might expect the growth rates to converge such that λ_T^E would become equal to λ_{2T}^{2E} and λ_{1T}^{1A}

would become equal to these rates. As a result, one might be led to the conclusion that Europa could maintain her inflationary policy if the longer-run maximum growth rate of dollar reserves attainable through the use of SDRs, determined by λ^S , is equal to or higher than λ_{2T}^{2E} , the inflationary growth rate of acquisition of domestic assets as chosen by the European central bank. However, to draw such a conclusion would in addition require to make an assumption about the initial level of SDR allocation of the following kind: The cumulated sum of SDR allocations to Europa over the period from the start of SDR allocation, $t = t_0$, to the final situation, $t = t_n$, where λ_T^E reaches λ_{2T}^{2E} has to be equal to or higher than the cumulated sum of dollar reserve losses by Europa over the fractional time period from the situation where the original dollar reserves of Europa resulting from former trade surpluses had been used up, $t = t_m$, to the final situation $t = t_n$. So, the required additional assumption would be

$$\int_{t=t_0}^{t=t_n} d \text{ SDR } dt \geq \int_{t=t_m}^{t=t_n} d B_{1T}^{1A} dt$$

which seems to be rather special.

In any case, we find that the existence and use of SDRs will enable Europa to maintain a deliberately chosen inflationary policy for a longer period of time than would be possible without SDRs at hand. The length of the time period gained for such a policy depends on the marginal propensities to import in Europa and in America, on the relative strength

of Europa's inflation policy as measured by the difference $\lambda_{2T}^{2E} - \lambda_{2T}^{2A}$, on the longer-run maximum rate of growth of dollar reserves attainable by Europa via the exchange of SDRs, λ_{1T}^{2E} , which depends on λ^S , and finally on the initial stock of SDRs allocated to Europa. The lower the relative strength of Europa's inflationary policy and the higher λ^S as well as the initial stock of SDRs allocated, the longer Europa will be able to maintain an home-made inflation for given marginal propensities to import.

It is a well known fact that by running an home-made inflation a country can change the terms of trade to its own credit under the regime of a dollar standard. Mutatis mutandis this also is true for a dollar-SDR standard. Europa will be the more able to change the terms of trade to her own credit, the more SDRs are allocated to her. For America it is difficult to escape from this unfavourable consequence of the SDR scheme; there are only two ways for escape. One is that America retracts the scheme by simply refusing acceptance of SDRs; then we were back at the dollar standard. The second way of escape open to America is to avoid the gap $\lambda_{2T}^{2E} - \lambda_{2T}^{2A}$ by continuously adjusting her growth path of acquisition of domestic assets to that chosen by Europa. However, this would not only mean for America to accept the burden of a higher inflation but also to give up the autonomy of its monetary policy.

VI. Concluding Remarks

The analysis of the role and consequences of SDR creation has to differentiate between the allocation and the use of SDRs. Allocation of SDRs changes the composition of the sources' side of a country's monetary base but it does not change the volume of the base or its growth path. Therefore, pure allocation of SDRs at whatever rate of growth has no inflationary consequences. If SDRs are not used they serve no other purpose than window-dressing in that they permit to display higher stocks of international liquid assets than otherwise possible.

Window-dressing certainly is not the only purpose of the SDR scheme. SDRs can be used to obtain national currency of the key-currency country from other countries. This again has no inflationary consequences because such operations change the composition of the monetary bases of the countries concerned but not volumes and growth paths of the bases. Allocation and use of SDRs as such are cosmetic operations with no relevance for the economies of the countries engaged.

However, this is not the whole SDR story. The availability of SDRs may have a "liberalizing" influence on domestic policies of some countries, especially on their monetary policies. These countries may be induced to use the additional margin, gained by the use of SDRs, to run home-made inflations for a longer time than would be possible under a pure dollar standard. With regard to this the use

of SDRs may have inflationary consequences despite it has to be stressed that even then the use of SDRs is not the driving force of inflation.

Under the regime of a dollar-SDR standard non-key currency countries by using SDRs are put in a position to change the terms of trade to their credit to a greater extent than would be possible under a dollar standard. In order to minimize such shifts of the terms of trade the key-currency country would either have to see to a holding down of the growth rate of SDR allocation or to engage in a competition of inflation. In both cases the autonomy of monetary policy of the key currency country is impaired.

Footnotes

- 1) Paper prepared for the "Third Konstanz Seminar on Monetary Theory and Monetary Policy", Konstanz 1972.
- 2) and 3) P. Salin, op.cit., p.18
- 3) Ibid, p.10
- 4) For a description of the present system see F. Machlup, Remaking the International Monetary System - The Rio Agreement and Beyond, Baltimore 1968.
- 5) P. Salin, op.cit., p.10
- 6) Ibid., p.11
- 7) Ibid., p.15
- 8) Ibid., p.16
- 9) The SDR creation reminds one on the Friedmanian helicopter money. However, the Friedmanian helicopter money adds to the existing money supply because it is hastily collected by members of the community; SDRs do not add to the money supply because they can be collected by central banks only.
- 10) See for instance the official balance-sheets of the Deutsche Bundesbank and the Österreichische Nationalbank in their respective annual reports.
- 11) The same would result, although in a different equilibrium position, if the European central bank would not care about the ratio q_2^2 but continue her inflationary policy until her dollar reserves are used up due to the growing trade deficit. Europa would have to reduce T_2^2 to the former level, thereby giving way for the settlement of a new equilibrium. On the other hand, it is clear that alter-

natively a new disequilibrium path, this time a deflationary one, could be chosen by reducing T_2^2 below the initial equilibrium level. In any case, the home-made inflation could not be maintained in the long run.

- 12) Note that the European central bank took this decision in order to help Salin in simplifying his equations.
- 13) For instance, the bank may view dollars to be more secure assets than SDRs.
- 14) Therefore, neither SDR allocations to America nor the acceptance of SDRs in exchange for dollars require America to start a neutralization policy, as considered by Salin. See Salin, op.cit., p.13.
- 15) Note that then the signs of B_1^{1E} and B_1^{1A} in equations (27) and (28.a) will change.
- 16) See equation (5).