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CHANGES IN INVENTORIES AND HOLDING GAINS:  
THE CASE OF SWITZERLAND DURING THE YEARS 1996-1998

Invited paper submitted by the Swiss Federal Statistical Office\*

**Introduction**

1. During the estimation of gross domestic product (GDP) for the years 1997 and 1998, the dynamism of changes in inventories in the Swiss economy struck observers. After a modest rise in 1996 (+486 million), inventories in current prices increased by 2.3 billion in 1997 and by 5 billion in 1998. Such a pronounced change may be due to a variety of factors. It could, for example, indicate a weakness in terms of outlets (final consumption, intermediate consumption, investment in fixed capital, exports). However, this development has to be seen in the context of an appreciable recovery of the Swiss economy, with GDP increasing by 1.6% in 1997 and by 2.3% in 1998. Hence, the main macroeconomic aggregates witnessed growth.

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\* Prepared by Mr. Philippe Stauffer.

2. An examination of the composition of inventories shows the decisive influence of **commercial** inventories, which increased by 1.9 billion in 1997 and by 5.6 billion in 1998. The economic situation alone does not justify such a change. Two exceptional elements, both connected with international trade, played a fundamental role:

- In 1997, Switzerland strongly increased its imports of diamonds (+21.8%);
- In 1998, imports of precious metals in the form of scrap skyrocketed (+713.6%).

3. These imports were not matched by exports. Consequently, the inventories of enterprises active in intermediation and wholesale trade vastly increased, giving rise to the overall expansion noted above. Imports of diamonds and materials are, therefore, at the origin of the growth of inventories recorded in Switzerland.

4. This paper will endeavour to study the implications of this situation in greater detail, from both the practical and the conceptual standpoint. After recalling the provisions relating to valuables in the 1993 System of National Accounts (1993 SNA) and the Balance of Payments Manual, we will highlight the particular role played by our country in international trade in diamonds and precious metals, and will quantify the impact of the developments in question on Switzerland's GDP. Then we will try to go beyond the recent figures and focus on the role of inventories in national accounting. In the old systems, all stored non-financial assets were counted in changes in inventories. The 1993 SNA offers the possibility of recording transactions for some assets under the heading "Acquisitions less disposals of valuables". The breakdown is performed according to the benefits derived by the owner of the assets. This innovation allows for a finer analysis of the behaviour of the different economic agents. Nevertheless, the interpretation of changes in inventories remains problematical. We believe that we are witnessing new microeconomic behaviour in inventory management. Inventories are no longer linked solely to a production process but are being handled in a very dynamic way. Enterprises are continuing to acquire materials and supplies having regard for their order books or contracts, and they are also buying or selling inventories having regard for movements in relative prices and their expectations concerning exchange rates. Inventories are thus becoming a source of income independent of the productive logic of an enterprise's principal activity. We will look at how this new inventory management affects the macroeconomic aggregates and conclude by placing the problem in a broader context.

### **Provisions relating to valuables in the various manuals**

5. The United Nations SNA manual and the International Monetary Fund (IMF) manual both deal with valuables. The provisions of the 1993 SNA are more detailed. Thus, valuables appear in the balance sheets and the accumulation accounts of the various sectors (chapter X). These accounts relate to assets<sup>1</sup> held by the various economic actors. The SNA distinguishes between three types of produced assets:

- **Fixed assets**, defined as produced assets that may be used repeatedly or continuously in processes of production for more than one year (10.7);

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<sup>1</sup> For a definition of assets, see paragraphs 10.2 et seq. of the 1993 SNA.

- **Inventories**, which may include materials, supplies, work-in-progress, finished products or goods for resale;
- **Valuables**, defined as goods of considerable value held as stores of value.

6. The **balance sheets** measure the value of inventories at the beginning and end of the accounting period. The **accumulation accounts** record the changes in value of assets, liabilities and net worth over the accounting period. It is these flow accounts, and more particularly the acquisitions of non-financial assets account, that interest us here. The acquisitions of non-financial assets account distinguishes five categories of changes in assets:

- Gross fixed capital formation;
- Consumption of fixed capital;
- Changes in inventories;
- Acquisitions less disposals of valuables;
- Acquisitions less disposals of non-produced non-financial assets.

7. Of interest to us for this paper are changes in inventories and acquisitions less disposals of valuables.

8. **Changes in inventories** (P52) represent the value of inventories acquired by the enterprise less the value of inventories disposed of during the accounting period. Inventories may be materials and supplies, work-in-progress, finished products or goods for resale.

*Materials and supplies* consist of the kinds of goods that are entirely used up when they are fed into the production process. The 1993 SNA specifies (10.101) that these kinds of inventories include precious metals or stones when they are intended to be used as intermediate inputs into the production of other goods or services. Manufacturers of jewellery or dentists, for example, keep precious metals for use in their output.

*Goods for resale* are goods acquired by enterprises, such as wholesalers or retailers, for the purpose of reselling them to their customers. The goods are not processed further by the enterprises, except for presenting them for resale in ways that are attractive to their customers. Thus, goods for resale may be transported, stored, graded, sorted, washed, packaged, etc. by their owners but are not otherwise transformed (1993 SNA, 10.113).

9. *Additions* to inventories are recorded when products are purchased, produced or otherwise acquired. *Deductions* from inventories are recorded when products are sold, used up as intermediate consumption or otherwise relinquished (3.104). The 1993 SNA also stipulates: "In order to ensure that output is consistently valued, finished goods transferred into inventories are valued as if they were sold at that time, while additions to work-in-progress are valued in

proportion to the estimated current basic price of the finished product” (10.98). The European System of Integrated Economic Accounts (1995 ESA) reiterates these principles and further states that:

- Finished goods transferred into the producers’ inventories are valued as if they were sold at that time, at current basic prices;
- Reductions in work-in-progress (as withdrawn from inventories when production is finished) are valued at current basic prices of the unfinished product;
- Goods for resale entering the inventories of wholesalers and retailers are valued at their actual or estimated purchasers’ prices of the trader;
- Goods for resale withdrawn from inventories are valued at the purchasers’ prices at which they can be replaced at the time when they are withdrawn (not when acquired) (1995 ESA, 3.122).

10. The heading “**Acquisitions less disposals of valuables**” (P53) does not exist in the old accounting systems. Valuables are goods of considerable value that are not used primarily for purposes of production or consumption but are held as stores of value (10.7). The 1993 SNA notes that their principal economic benefit lies in the fact that they can be expected to hold their value relative to the prices of other goods and services. Valuables consist of (10.116):

(a) Precious stones and metals such as diamonds, non-monetary gold, platinum, silver, etc., held by any units provided that they are not intended to be used as intermediate inputs into processes of production;

(b) Paintings, sculptures, etc., recognized as works of art and antiques;

(c) Other valuables, such as jewellery fashioned out of precious stones and metals and collections.

11. The 1995 ESA further specifies that acquisitions or disposals of valuables include:

- The acquisition or disposal of non-monetary gold, silver, etc. by (central) banks and other financial intermediaries;
- The acquisition or disposal of valuables by enterprises whose principal or secondary activity does not involve the production of or trade in such types of goods; as a consequence, this acquisition or disposal is not included in the intermediate consumption or fixed capital formation of the enterprises;

- The acquisition or disposal of such goods by households; as a consequence, these transactions are not included in final consumption expenditure by households (3.126).

12. As indicated in the 1995 ESA, this convention avoids the need for frequent reclassification between the three main types of capital formation (acquisitions less disposals of valuables, fixed capital formation and changes in inventories), for example in the case of transactions involving such goods between households and art dealers.

13. It follows that:

- (1) The SNA classifies an asset according to the **benefits** derived by its owner (10.3). If it is to be associated with a production process, the asset is an element of gross fixed capital formation or changes in inventories. If the asset is held as a store of value, it becomes a valuable. An institutional unit may therefore be studied as a producer of goods and services and/or as an owner of assets.
- (2) Any institutional unit may hold valuables. Belonging to a particular sector does not therefore imply exclusive treatment of the asset.
- (3) Inventories are to be valued in relation to their replacement value on the market.

14. The 1993 Balance of Payments Manual contains fewer provisions relating to valuables, which are included in transactions relating to goods. Their treatment must not be different from that of any other commodity (215). Reference is made to non-monetary gold, i.e. gold not held as reserve assets by the monetary authorities. The Manual (157, 184, 202) recommends that, when feasible, this should be subdivided into gold held as a store of value and gold held for other (e.g. industrial) purposes. Monetary gold is treated as a financial asset, so that monetary gold transactions should be included in the financial account (214). In summary, only gold is given special treatment in the Balance of Payments Manual. Monetary gold is distinguished from non-monetary gold and, in the case of the latter, industrial gold is distinguished from gold held as a store of value.

### **Switzerland and international trade in valuables**

15. Table 1 traces Switzerland's imports and exports of valuables for the years 1996 to 1998.

**Table 1. Import and export of valuables**  
(millions of Swiss francs, at current prices)

	1996	Rate of change in %	1997	Rate of change in %	1998	Rate of change in %
<b>A. Gem stones</b>						
Imports	3 062.4	34.6%	3 809.4	24.4%	3 725.9	-2.2%
Exports	2 547.8	8.2%	2 356.0	-7.5%	1 797.5	-23.7%
<b>Balance</b>	<b>-514.6</b>	<b>-738.5%</b>	<b>-1 453.4</b>	<b>182.4%</b>	<b>-1 928.4</b>	<b>32.7%</b>
<b>B. Precious metals, except gold and silver in ingots</b>						
Imports	784.2	-15.1%	2 015.9	157.1%	4 051.3	101.0%
Exports	988.1	-14.4%	1 927.1	95.0%	2 167.4	12.5%
<b>Balance</b>	<b>203.9</b>	<b>-11.5%</b>	<b>-88.8</b>	<b>-143.6%</b>	<b>-1 883.9</b>	<b>2 021.5%</b>
<b>C. Works of art</b>						
Imports	715.1	88.8%	990.1	38.5%	1 026.0	3.6%
Exports	634.6	30.7%	763.0	20.2%	749.3	-1.8%
<b>Balance</b>	<b>-80.5</b>	<b>-175.5%</b>	<b>-227.1</b>	<b>182.1%</b>	<b>-276.7</b>	<b>21.8%</b>
<b>D. Antiques</b>						
Imports	134.9	3.9%	183.9	36.3%	177.5	-3.5%
Exports	244.4	6.8%	238.7	-2.3%	227.6	-4.7%
<b>Balance</b>	<b>109.5</b>	<b>10.6%</b>	<b>54.8</b>	<b>-50.0%</b>	<b>50.1</b>	<b>-8.6%</b>
<b>E. Total: A + B + C + D</b>						
Imports	4 696.6	26.7%	6 999.3	49.0%	8 980.7	28.3%
Exports	4 414.9	4.5%	5 284.8	19.7%	4 941.8	-6.5%
<b>Balance</b>	<b>-281.7</b>	<b>-154.5%</b>	<b>-1 714.5</b>	<b>508.6%</b>	<b>-4 038.9</b>	<b>135.6%</b>

16. The overall movement is clearly dominated by “Gemstones” and “Precious metals”. Table 2 (see annex) gives more detailed information about these two items.

17. We can make the following observations:

**Gemstones:** Switzerland holds a strong position in the *diamonds* trade. It traditionally imports more than it exports. The trade balance has deteriorated extensively over the past three years (1997-1999), with imports increasing and exports declining. Diamonds are usually imported for resale without further processing but the trading houses also have large workshops. A substantial proportion of the diamonds imported thus appear in the inventories of enterprises recorded in the “Wholesale trade and trade intermediation” division of the General Classification of Economic Activities (NOGA).

**Precious metals:** Swiss banks are very active in the international negotiation of *contracts* for precious metals. These are transactions involving financial assets that appear in the balance of capital movements and should not be counted in that context. The *physical* movements of precious metals should also not be neglected. These movements are extremely erratic. Switzerland, has, moreover, the particularity of importing enormous quantities of *precious metal scrap* (gold, platinum, etc), which

is melted down and re-exported in the form of ingots. These items are included in the balance of capital movements. The resulting systematic disequilibrium does not pose any particular problem except for 1998, because imports increased from 232 million Swiss francs to nearly 1.9 billion. With scrap exports remaining stable, the result was a considerable trade deficit.

### Impact on national accounting in Switzerland

18. Table 3 shows the contribution of each aggregate to the growth of GDP measured from the viewpoint of expenditure.

**Table 3. Contributions of the various components to GDP growth**

Change in each component, as a % of total GDP of the previous year

	<b>1996</b>	<b>1997</b>	<b>1998</b>
Domestic demand, excluding changes in inventories	<b>0.2%</b>	<b>0.8%</b>	<b>2.0%</b>
Total final consumption	1.2%	1.1%	1.3%
Gross fixed capital formation	-1.0%	-0.3%	0.7%
<i>of which: Investment in capital goods</i>	<i>0.0%</i>	<i>0.2%</i>	<i>0.7%</i>
<i>Construction</i>	<i>-1.1%</i>	<i>-0.5%</i>	<i>0.0%</i>
Domestic demand including changes in inventories	<b>0.3%</b>	<b>1.4%</b>	<b>2.7%</b>
External contribution	0.4%	0.2%	-0.5%
Overall balance of goods	0.0%	-0.4%	-0.5%
<i>Overall balance of services</i>	<i>0.4%</i>	<i>0.7%</i>	<i>0.0%</i>
GDP	<b>0.7%</b>	<b>1.6%</b>	<b>2.3</b>

19. We note that:

- In 1998, domestic demand excluding changes in inventories increased by 2%. When changes in inventories are included, the increase is 2.7%. We may therefore deduce that changes in inventories added 0.7 of a percentage point to GDP growth, significantly more than in previous years.
- The external contribution declines, and then becomes negative. This is largely due to the deterioration of the balance for goods.

20. The two phenomena are obviously connected. A substantial proportion of imports of precious items is to be found in commercial inventories. While still lagging in 1996 (-320 million), commercial inventories increased by 1.9 billion in 1997 and by 5.6 billion in 1998. Enterprises therefore kept a large proportion of the imported goods. An analysis of this behaviour reveals that imports were dictated by exceptional circumstances:

- Imports of *diamonds* are connected with the major political and social changes that have occurred in the world during the past three years (strikes in South Africa, unrest in eastern Europe, etc.). The conglomerates which control the diamond trade engaged in preventive purchases and brought a large part of the diamonds thus acquired into Europe. The United Kingdom, the United States and Israel have also been playing an important role in this trade. Individual purchases connected with the transition to the year 2000 also played a part.
- Imports of *precious metal scrap* were due to the crisis in South-East Asia, which had forced many private individuals to sell their jewellery at low prices in 1998. Such items were imported into Switzerland to be melted down.

21. These exceptional elements make it difficult to undertake an economic analysis of changes in inventories. The situation, excluding gemstones and precious metals, can be presented as follows (table 4):

**Table 4. Changes in inventories excluding net imports of gemstones and precious metals**

(millions of Swiss francs, at current prices)

	1996	1997	1998
<b>Total changes in inventories</b>	<b>486</b>	<b>2 347</b>	<b>5 077</b>
Balance of exports of gemstones	-515	-1 454	-1 928
Balance of exports of precious metals	204	-89	-1 884
<b>Adjusted changes in inventories</b>	<b>175</b>	<b>805</b>	<b>1 265</b>

22. The increase in inventories other than of precious metals and gemstones is significantly more moderate than the total result. According to some observers, these changes in inventories are what should be taken into account for an analysis of the economic situation. Transactions connected with valuables involve very large sums but generate only a small amount of value added. This approach can, unfortunately, be faulted on one point: the balance between uses and supplies at national level requires us to take account of all imports. Imports are goods placed at



the disposal of the national economy by the rest of the world. Together with national output, they help to satisfy total demand. Disregarding some of these imports would break this link. Without further adjustment, the share of total demand satisfied by resident producers would be overestimated. Total changes in inventories therefore well reflect the economic behaviour of different agents.

23. We must realize that part of the problem stems from some of the conventions of writing used in the Swiss balance of payments. Imports of precious metal scrap are counted in special trade. Once melted down and transformed into ingots, however, this same scrap appears, no longer in the current balance, but in the capital balance. We thus record a deficit even if the scrap is exported in the form of ingots during the same year. The bias caused by this convention remains limited, except for the enormous deficit of 1998. In 1999, the trade in such goods fell back to “normal” levels.

24. Notwithstanding the foregoing remarks, it has to be accepted that there is a problem of evaluation and interpretation of changes in inventories. The following section develops on this idea and considers the problem of market projections.

### **Observations and conclusion**

25. Economic forecasting is guided by the reasons for keeping inventories, as evidenced at the micro-economic level. On this basis, we usually distinguish two macro-economic models for stockholding:

- (1) Enterprises hold inventories in order to ensure that their marginal costs of production remain constant over time. Inventories allow them to match production with changes in sales. In such cases, enterprises keep inventories in inverse proportion to their level of production: when output increases, inventories contract. The inventories therefore serve as a buffer and show a counter-cyclical movement.
- (2) Enterprises may be concerned about not meeting demand. Inventories protect against the risk of demand proving stronger than anticipated. In such cases, enterprises keep inventories of finished products in proportion to their level of production: when the economy expands, output rises and enterprises want to hold more inventories. The inventories show a pro-cyclical movement.

26. These models assume that inventories are linked to production. The enterprise's principal activity (production of goods, intermediation, etc.) implies a given type of inventories (finished or semi-finished products, products for resale, etc.). According to the national accounting systems, acquisitions of diamonds and precious metals by a commercial enterprise should be included, as appropriate, in changes in inventories. However, considering that these enterprises derive a holding income appreciably higher than earnings from trade (trade margins), we can reasonably ask whether this activity should not appear under “Acquisitions less disposals of valuables”.

27. It is interesting to note that with trade in gemstones, as indeed for financial intermediaries, the enterprise's income is derived less and less from a productive activity as defined in the national accounting systems. The earnings are, by contrast, generated by speculative activities which give rise to holding gains. These earnings will eventually make it possible to remunerate the factors of labour and capital. While such holding gains are essential for an understanding of the economic behaviour of these agents, they do not appear explicitly in the sequence of current accounts but only in the revaluation accounts.

28. What is certain is that changes in inventories - for the reasons mentioned in this paper - are less and less correlated with the activity of production. Hence, econometric models that attempt to estimate inventories from GDP should in future also allow for the speculative projections of certain agents based on economic factors such as, for example, relative changes in prices or exchange rates.

Annex**Table 2. Content of the headings "Gemstones" and "Precious metals"**  
(Millions of Swiss francs at current prices)

<b>Gemstones</b>	<b>1996</b>	<b>Shares in %</b>	<b>1997</b>	<b>Shares in %</b>	<b>Rate of change in %</b>	<b>1998</b>	<b>Shares in %</b>	<b>Rate of change in %</b>
<b>Imports</b>								
Pearls, fine and cultured	46.9	1.5	84.2	2.2	79.6	104.6	2.8	24.2
Diamonds	2510.2	82.0	3057.3	80.3	21.8	3047.9	81.8	-0.3
Gem stones	397.8	13.0	511.9	13.4	28.7	414.0	11.1	-19.1
Synthetic stones	24.9	0.8	37.4	1.0	50.2	36.9	1.0	-1.3
Chippings and powder of stones	82.6	2.7	118.6	3.1	43.6	122.5	3.3	3.3
Total	3062.4	100.0	3809.4	100.0	24.4	3725.9	100.0	-2.2
<b>Exports</b>								
Pearls, fine and cultured	56.2	2.2	74.6	3.2	32.7	100.4	5.6	34.6
Diamonds	2071.0	81.3	1803.4	76.5	-12.9	1210.0	67.3	-32.9
Gem stones	275.2	10.8	282.4	12.0	2.6	298.9	16.6	5.8
Synthetic stones	71.7	2.8	97.1	4.1	35.4	91.7	5.1	-5.6
Chippings and powder of stones	73.7	2.9	98.6	4.2	33.8	96.4	5.4	-2.2
Total	2547.8	100.0	2356.0	100.0	-7.5	1797.4	100.0	-23.7
<b>Balance</b>								
Pearls, fine and cultured	9.3	-1.8	-9.6	0.7	-203.4	-4.2	0.2	-56.4
Diamonds	-439.2	85.3	-1253.9	86.3	185.5	-1837.9	95.3	46.6
Gem stones	-122.6	23.8	-229.5	15.8	87.2	-115.1	6.0	-49.8
Synthetic stones	46.8	-9.1	59.7	-4.1	27.6	54.8	-2.8	-8.2
Chippings and powder of stones	-8.9	1.7	-20.0	1.4	124.0	-26.0	1.4	29.9
Total	-514.7	100.0	-1453.4	100.0	182.4	-1928.5	100.0	32.7
<b>Precious Metals</b>								
	<b>1996</b>	<b>Shares in %</b>	<b>1997</b>	<b>Shares in %</b>	<b>Rate of change in %</b>	<b>1998</b>	<b>Shares in %</b>	<b>Rate of change in %</b>
<b>Imports</b>								
Gold	31.6	4.0	69.5	3.5	120.1	38.7	1.0	-44.4
Platinum, incl. paladium and iridium	641.5	81.8	1697.2	84.2	164.6	2097.8	51.8	23.6
Precious metal scrap	96.6	12.3	231.8	11.5	140.0	1885.6	46.5	713.6
Miscellaneous silver and plated items	14.5	1.9	17.3	0.9	19.4	29.2	0.7	68.4
Total	784.2	100.0	2015.9	100.0	157.1	4051.3	100.0	101.0
<b>Exports</b>								
Gold	83.3	8.4	195.8	10.2	135.0	125.6	5.8	-35.9
Platinum, incl. paladium and iridium	778.4	78.8	1560.1	81.0	100.4	1848.5	85.3	18.5
Precious metal scrap	71.0	7.2	104.4	5.4	47.1	103.0	4.8	-1.4
Miscellaneous silver and plated items	55.4	5.6	66.7	3.5	20.5	90.3	4.2	35.3
Total	988.1	100.0	1927.1	100.0	95.0	2167.4	100.0	12.5
<b>Balance</b>								
Gold	51.7	25.4	126.3	-142.0	144.0	86.9	-4.6	-31.2
Platinum, incl. paladium and iridium	136.9	67.1	-137.1	154.4	-200.2	-249.3	13.2	81.8
Precious metal scrap	-25.6	-12.5	-127.3	143.4	398.0	-1782.6	94.6	1299.8
Miscellaneous silver and plated items	40.9	20.0	49.4	-55.6	20.9	61.1	-3.2	23.7
Total	203.9	100.0	-88.8	100.0	-143.6	-1883.9	100.0	2021.5

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