Companies' inventory policy undergoing a process of change: Results of a structural report by the delegates for regional economic relations

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1 Introduction

High inventories are a sign of non-harmonised production processes.

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High stock levels conceal problems in a company's organisation.

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'Lean' production methods and modern supply systems – on both the purchasing and sales side – enable companies to optimise their production processes and thereby have a direct influence over their inventories. The experience of a considerable reduction in inventories frequently mentioned by company executives has prompted the Governing Board of the SNB to carry out a more systematic investigation into the inventory policy applied by companies in the Swiss business world.[1]

Inventory investment is of interest from both a business management and a macroeconomic perspective. At the company level, stocks were not recognised as a strategic variable for net operating earnings and as a competition factor until the 1990s. Macroeconomically, inventories are significant on two counts. Firstly, the inventories component – in terms of its size – is regarded by business cycle theory as probably the most unstable demand aggregate; fluctuations in inventory investment are so marked that they can be considered to be *the* cyclical fluctuation (Tichy, 1994, p. 87). Secondly, changes in inventories largely escape statistical recording. For National Accounts (NA) purposes, changes in inventories are calculated as the difference between the stock value of inventories for the current period and that for the previous period. Since no official measurement of inventories exists, changes in inventories have in practice to be estimated.

This structural report focuses on the selective recording of the influence of new production methods and integrated supply chains on the amount of stocks held in the view of companies surveyed in the manufacturing and services sector. It proved far more complex and difficult to gauge the effects of the reconception of the value chain on fluctuations in inventories. Here, demands had to be largely subordinated to the capabilities and limitations of a company survey. Nonetheless, the survey questions relating to short-term fluctuations in inventories did provide some statements on trends from the occasional entrepreneur and also from the experts who were interviewed.

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2 Drafting and scope of the survey

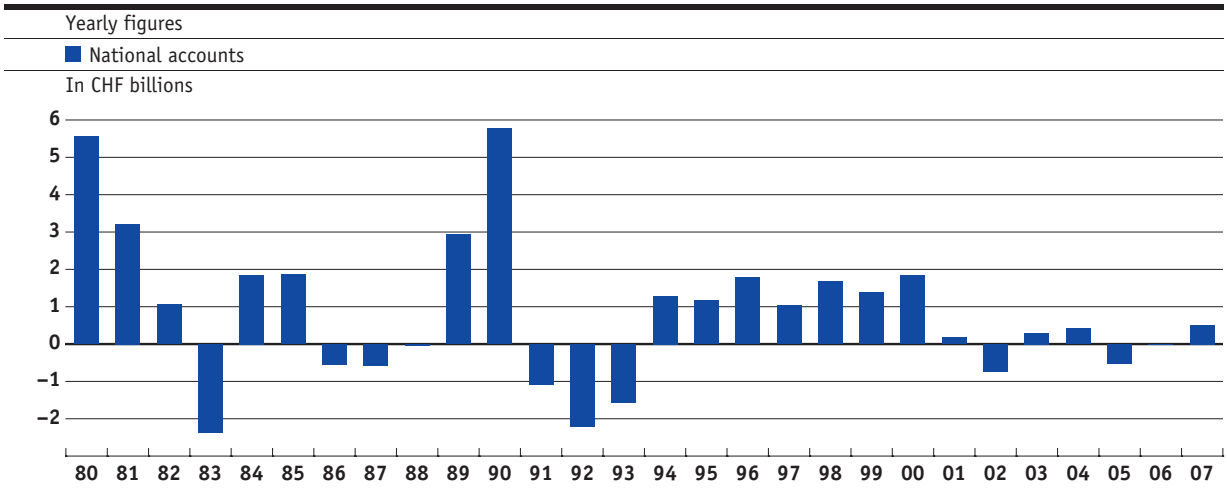
The drafting of the survey was discussed in advance with the Economic Analysis unit of the SNB and with representatives of the Swiss Federal Statistical Office (SFSO) and the State Secretariat for Economic Affairs (SECO). A questionnaire designed to serve as a guide for the interviews with the companies was also drawn up. The questions were primarily qualitative in nature, although a few of them were also quantitative; we realised that quantitative answers could probably be expected in very few cases. During the interviews, the entrepreneurs were also presented with an SFSO chart showing the nominal changes in inventories (annual values as per NA) over the period from 1980 to 2007 (cf. chart 'Nominal change in inventories' below).

The chart clearly reveals two key aspects. Firstly, the volatility of the series has decreased considerably since the early 1990s. Secondly, the average change in inventories has fallen sharply. While changes in inventories were clearly positive on average between 1980 and 1990, which means that inventories were built up considerably over this period, the average sinks to almost zero from 1991. These two observations point to a fundamental structural break. As a trend, this could be attributable to two factors. Either there has been a shift in the sectoral structure of the Swiss economy (tertiarisation) and/or inventory management by companies has been improved. The people we interviewed were supposed to say, on looking at the chart, whether it reflected their own company's experience and what factors could, in their opinion, have triggered these striking trends.

Depending on a company's activities, inventories may exist predominantly on the production side (input stocks of raw materials and semi-finished goods) or on the sales side (output stocks of finished goods) or on both sides. The questions the companies were asked therefore had to be worded precisely and the answers accompanied by a note specifying whether they related to input stocks or output stocks. The survey restricted itself to the traditional forms of inventories (physical stocks). Accordingly, for conceptual reasons no attempt was made to record what is known as service inventory (e.g. draft standardised contracts drawn up by a law firm without a specific client mandate).

The seven regional structural reports are based on a total of 47 company visits, 29 in the industrial sector and 18 in the services sector. Although the survey revealed some striking changes in inventory policy, only very limited conclusions can be drawn about the macroeconomic effects of such changes.

Nominal variation in stocks



Source: SNB

3 Results of the survey

The main results of the company interviews are presented in the following paragraphs. The results are set out and commented on in the form of propositions. Similarly, the field information is compared and contrasted – in duly brief form – with findings and empirical evidence discussed in the existing literature.

The information collected comprises, on the one hand, those company experiences that are associated with a paradigm shift in inventory philosophy and, on the other, those inventory-related changes that are probably more likely to reflect the general trend in the economy.

Proposition 1:
Trend towards a reduction in the inventory-to-sales ratio

Movements in the inventory-to-sales ratio have been examined in various empirical long-run time series studies. The influence of high interest rates on the significant reduction in this ratio in the UK manufacturing industry during the 1980s has been statistically confirmed (Black and Peters, 1994). The interest rate factor impacted on all inventory components (input, intermediate and output stocks). Irvine (2005) confirmed the trend towards a reduction in the inventory-to-sales ratio from 1983 for both the manufacturing industry and the retail trade in the US. He showed the influence of new production technologies and enterprise resource planning (ERP) on the inventory-to-output ratio. By contrast, Adam J. Fein, in an empirical analysis dated October 2004, expresses some doubts about a far-reaching reduction in the inventory-to-sales ratio for the US because of the technology factor (including IT).

In Swiss industry, the inventory-to-sales ratio has been reduced by around 50% in the last 10–15 years. The entrepreneurs and the experts questioned attribute this primarily to increasing cost-consciousness regarding merchandise inventory. In the economically difficult 1990s, Swiss industry was under considerable pressure to rationalise. The capital freed up in the first phase, partly as a result of optimising inventories, could be used to improve company profitability and growth – and if need be, to reduce indebtedness as well. In a second stage, the new, more flexible and leaner production methods are likely to have favoured a reduction of inventories. This was associated with faster through-put times and a generally greater business awareness of the creation of cross-company value-added networks between purchasing, production and sales/distribution. Having to concentrate on their core competencies also forced the companies to review the breadth and depth of their product ranges. This, too, resulted in their holding lower inventories.

For all their efforts to reduce inventories, the companies give absolute priority to avoiding out-of-stock situations and thus to ensuring their ability to deliver. The availability advantage (or 'convenience yield') can be a critical factor, particularly in time-sensitive situations.

In addition, at the macroeconomic level, the continuing trend towards the tertiarisation of the economy is likely to provide another plausible explanation of the lower inventory-to-sales ratio.

Proposition 2:
Inventory management largely optimised in the retail trade

Wholesale distributors have optimised and strongly centralised their regional warehouses. Thanks to very efficient supply chains, to all intents and purposes these warehouses now fulfil only a transit warehouse function, with a correspondingly high rate of inventory turnover. Consequently, in the retail trade the physical stocks are in essence to be found in the individual retail outlets.

The true rationalisation potential lies, firstly, in the minimisation of goods handling (movements of goods within a company's own warehouses and between the members of the supply chain). Secondly, as a result of the introduction of the consignment stock system, which is set up by the supplier with the customer, inventories can be optimised through a stable supply chain, the use of IT and the involvement of logistics partners.

Proposition 3:
Change from sellers' to buyers' market

Looking back, it appears that the capital goods industry, in particular, pursued a capacity-oriented strategy in the past which relied on relatively rigid sales forecasts and capacity planning systems. This was justified as long as it was operating in sellers' markets and 'pushed' the goods produced accordingly. It was the time of classical make-to-stock production, which – because the sales market was supply-driven – turned production smoothing into the optimisation target.

With the transition to buyers' markets and the corresponding changeover to made-to-order or customer-specific production, the relationship between production and inventories has changed fundamentally. Only what the market actually wants and is prepared to accept is produced. One result of this market-driven production is that fluctuations in demand impact more directly on capacity utilisation and thus on the rate of employment. Because of flexible annual working hours, the employment of temporary labour and outsourcing, a certain amount of market fluctuation can be absorbed within a company's own production system.

Proposition 4:

Strong influence of information technology and training

The aforementioned study by Black and Peters (1994) of the reduction in the UK manufacturing inventory-output ratio notes the existence of anecdotal evidence, at least, in support of information and communication technology (ICT) and the professionalisation of inventory management. According to this study, the main effect of technological progress has been on the management of input stocks and less on the management of output stocks.

In Switzerland, the entrepreneurs and experts questioned are unanimous in their view that developments in the fields of ICT, process management and logistics are assuming a key role in the optimisation of materials purchasing and inventory management.

Proposition 5:

Increased inventories at upstream stages with lower value added

The trend towards shifting inventories from the sales to the purchasing or supplier side is not just a question of market power; it is also taking place for cost analysis reasons. At the upstream stages, inventories have a lower value than after they have been processed further downstream, which means that less capital is tied up. This trend was to be found especially in those businesses that are integrated into a stable supply chain. Companies with this sort of set-up also operate with framework agreements (for the most part on an annual basis), which commit suppliers to producing a particular volume of output which the customer can draw on in accordance with its own order flow by meeting those orders out of stocks. Stocks of primary or intermediate products either remain with the supplier – the customer has an inventory reservation – or can be held as a consignment inventory with the customer. In both cases, the inventories are pre-financed by the supplier. This system increases the supplier's production flexibility, in that the supplier can optimise its production planning and produce bigger batches, for example. Usually, the supplier not only supplies its customer with the parts the latter wants but also offers complete IT-supported goods management systems and logistics services. From the perspective of the supply chain partners involved, inventories can be optimised and inventory fluctuations reduced.

Proposition 6:

Shorter product life-cycles tend to increase inventories

Due to the accelerating pace of company innovation and the increasingly shorter intervals between product developments, inventories (input stocks) are trending upwards. This is especially true in the innovation-introduction phase where old product generations are being simultaneously, albeit gradually, replaced. In addition, spare part inventories are also increasing in the case of product groups for which the company has given its customers particular service warranty periods. Furthermore, in the capital goods industry, in particular, the trend towards providing an additional offer of services is encouraging a build-up of spare part inventories. In view of the internationalisation of business and short delivery times, providing warranties for longer periods and supply readiness for spare parts have become crucial competition factors for suppliers.

Proposition 7:

Single European market encourages the creation of large central warehouses

Various international companies have, in recent years, run down their regional warehouses to a minimum safety inventory level and transferred management of the bulk of their finished products to a central warehouse covering several European sales market countries. The reduced inventory-carrying costs of central warehousing and the lower inventories that are held for the company as a whole as a result of centralisation permit substantial cost savings. Thanks in part to better utilisation of freight haulage fleet capacity, centralisation also allows further optimisation of transport costs. According to the companies surveyed, another crucial factor in the success of the centralisation model was the creation of the single European market, in which cross-border deliveries involve lower transaction costs (e.g. customs clearance).

Proposition 8:

Outsourcing is a controversial subject

At the macroeconomic level, no declining trend could be identified in the period since the early 1990s in the proportion of added value as a result of a strong increase in purchases of materials and services from abroad. According to a study carried out by SECO (2007), this finding holds true for both the economy as a whole and, in particular, for industry and its sub-sectors.

The outsourcing of whole production stages and of inventory-carrying and management – within Switzerland or abroad – is practised and rated very differently by the companies surveyed. To a considerable degree, outsourcing strategy depends heavily on the corporate philosophy of management. Companies that are contemplating outsourcing or have already reduced the length of their value chain are also for the most part endeavouring to shift the inventory function for the materials that need to be purchased to the supplier level. Although a company's own inventories can be reduced or even eliminated in this way, the company does need to build up appropriate safety and buffer stocks, with the precise level depending on stock replacement times.

Proposition 9:

Inventory fluctuations difficult to estimate

The largely inventory-free production achieved by a few companies is likely to be the ideal rather than the rule. Although some of the companies are convinced that fluctuations in their inventories have decreased over time, they are cautious about quantifying this. For instance, the view expressed by some companies was that inventory levels and fluctuations can be reduced to a certain degree by the use of improved ICT systems. However, that does require that supply chain partners exchange company and client data which, at times, may be 'sensitive'.

The experts questioned find it difficult to make generalised statements about inventory volatilities or movements over time. Although there are organisational and technological innovations that, in the entrepreneurs' opinion, suggest a trend towards a weakening of inventory fluctuations, the experts, by contrast, have reason to believe that the transition from earlier make-for-stock production to customer-driven production is tending to cause the frequency of fluctuations to increase and their amplitude to decrease. Because markets are competitive, demand is also volatile, which is reflected in more erratic ordering cycles. As a result, sales forecasts have tended to lose some of the importance once attached to them or now relate to a relatively short-term time horizon. Even the use of IT may not significantly reduce the imponderables in buyer behaviour across the whole client base.

Entrepreneurs' reaction times are much shorter today (partly because of IT and new management techniques) and production systems are no longer as rigid as they were in the past (lower fixed costs), and this has increased companies' capacity to absorb fluctuations in orders. According to the experts, the change in the pattern of fluctuation applies more to input stocks (whether held by companies themselves or by their suppliers) than to work in progress and inventories of finished goods, due to the tendency to shift inventories to the production stage where added value is lowest.

Proposition 10:

Vulnerability of integral production and supply systems

The globalisation of markets and the internationalisation of production due to comparative cost advantage have fragmented value chains in the companies, re-combining and interlinking them via partnerships. These technological and organisational innovations are, as a rule, associated with a reduction in input and output stocks at the individual company level.

Entrepreneurs are, however, aware that dependencies between the members of the value chain have increased as a result, and that the reliability of supply and quality assurance has become a critical factor. Global supply chains across great distances, across borders and between different cultures are more vulnerable and react very sensitively to changes – for example, to an increase in procurement and transport costs. The 'streamlining of processes' approach upon which industrial logic is based may also have an adverse impact on operational ability to absorb shocks, to the extent that supplier portfolios have been significantly reduced by comparison with past levels. As a result, shortages on procurement markets may have a very rapid and sensitive impact. In the raw materials segment, for example, companies have recently been forced to build up their input stocks through anticipatory or 'speculative' purchases. Hence companies' strategic risk is tending to increase.

4 Conclusion

From a structural perspective the report investigated the impact of new production methods in industry on movements in inventories and confirmed the sometimes considerable reduction in the inventory-to-sales ratio. In individual cases the study was also able to confirm that the centralisation of inventory-carrying in industry and the retail trade has made a significant contribution to the reduction in inventories. The single European market has encouraged the trend away from regional to centralised warehouses. In the opinion of the entrepreneurs and the experts, the potential for a further reduction in inventories has not yet been exhausted. The survey revealed that the capital cost of current assets does have an influence on the companies' inventory policy. The factors that played some role in the optimisation of inventories during the stagnation period of the 1990s are likely to have included the level of interest rates, together with rationalisation pressure.

Regarding fluctuations in inventories in conjunction with modern production methods and the cross-company interlinking of the value chain, the report's findings are mixed to vague. The answers received amount largely to suppositions or statements about trends. The conclusion to be drawn from them is that client-driven production and faster order cycles mean that the frequency of inventory fluctuations is likely to increase in future but that their amplitude, on the other hand, is likely to decrease.

Alongside the specialisation taking place in trade and industry, dependencies between the individual members of the value chain are tending to increase. As a result, shortages in particular areas of materials and goods flow may have a very rapid and sensitive impact. Hence companies' strategic risks are increasing. One consequence might be that, ex ante, bank borrowing becomes more difficult or expensive to obtain for SMEs.

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