Stocks and Economic Cycle

The impact of the intensification of the international financial markets crisis on credit supply and on the deterioration of consumers' expectations reflected on sharp reduction of sales and, at a second moment, on the interruption of purchase orders and, as a consequence, on accumulation of stocks. This Box aims to assess the recent behavior of stocks in the Brazilian industry and the significance of their fluctuations in periods of alternating economic cycles. The analysis will consider theoretical aspects related to the formation and maintenance of stocks and the evolution of specific indicators related to the country's industry.

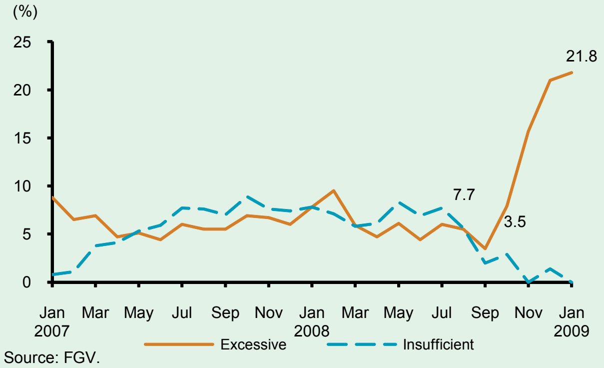
The concern with the impact of stocks over the cycles of production, sales and employment is not unheard of. During the 1940's, Metzler (1941) demonstrated the pro-cyclical role of stocks in Keynesian models. Abramovitz (1950) registered the relevant role of stock variations in the variation of gross domestic product. More recently, Blinder and Maccini (1991) argued that in a typical recession the stock reduction represents the most important part of the gross domestic product reduction.

Horstein (1998) established some stylized facts of the stocks accumulation and its relation with the economic cycle using data from the United States in the period from 1960 to 1995. The gross domestic product was subdivided into final sales and investment on stocks and each of these variables was submitted to a breakdown into a cyclical component and an irregular component. Horstein (1998) registered that the variance of stocks represented 28.6% of the total variance of the domestic product in the period. This participation, however, depended strongly on which series components have been used. When cyclical components of the three series have been considered, the participation of the variance of stocks in the variance of the domestic product restricted to only 5.8%; when irregular components have been considered, this participation reached 48.1%. Apparently, the investment on stocks is more important for the short-term fluctuations than for variances of domestic product during the economic cycle. In this sense, sharp falls and rises in the stocks may hold little information about the cycle stage in which the economy stands.

Another important aspect of the behavior of stocks is their relation with the final sales. Investments in stocks and final sales are not, in principle, correlated. When considered their cyclical and irregular components, however, the situation is different. One may examine that investments in stock are positively correlated to the final sales when the respective cyclical components are considered. Conversely, investment in stocks and final sales are negatively correlated when their irregular components are considered. Thus, apparently, during the economic cycle there is a relatively stable ratio of proportion between sales and stocks, which tend to be maintained at a higher level in periods of more significant sales, whereas, in the opposite sense, the irregular component translates unexpected stock variations.

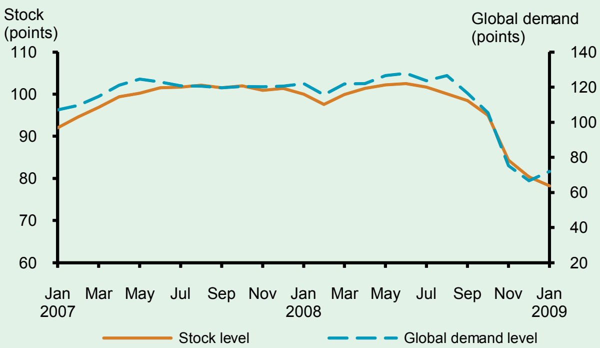
Just as released for the American economy, there are no quantitative and comprehensive statistics on stocks for the Brazilian economy, which hinders, for example, to ascertain if the stylized facts registered by Horstein (1998) for the American economy are observed or not in Brazil. There is, however, qualitative evidence. The Getulio Vargas Foundation (FGV) Manufacturing Industry Survey (SCIT) verifies whether a number of companies in the manufacturing industry have, in a given month, excessive, normal or insufficient stocks, based on an analysis of a sample of businessmen interviewed. The stock level indicator consists in the difference (percentage points) between the participation of companies that stated having insufficient stocks and of those which stated having excessive stocks added by 100. Thus, the indicator may vary from 200, in the extreme case that all of the companies consider that they have insufficient stocks, to zero, situation in which all the companies assess their stocks as excessive.

Figure 1 – Stock level Indicator[1/]



Source: FGV.
1/ Seasonally adjusted series.

Figure 2 – Stock level and Global demand[1/]



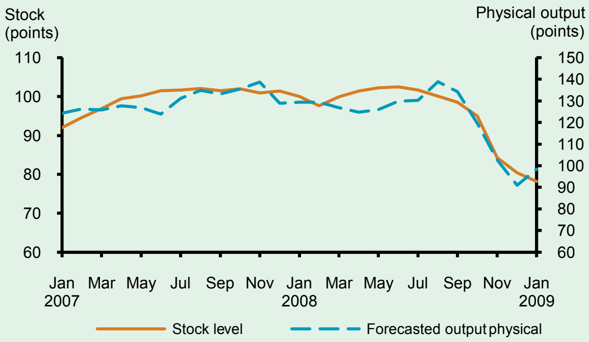
Source: FGV.
1/ Seasonally adjusted series.

The recent behavior of this indicator, registered in Figure 1, reveals that the number of companies which demonstrated having insufficient stocks in relation to the universe of companies surveyed remained between 5% and 10% from May 2007 to August 2008, period characterized by expansion of sales and production. With the aggravation of the international economic crisis, in September, this figure was reduced to 2%, until it reached zero in November, and, again, in January. The participation of a number of companies which reported excessive stocks, after remaining below 10% in the period of November 2006 to October 2008, reached 15.7% in November and 21.8% in January 2009.

Between April 2007 and September 2008, the balance between the number of companies with insufficient and with excessive stocks was known by the permanence of the indicator of stock level around the equilibrium level of 100 points, suggesting that the trajectory of expansion of sales and of production occurred at a pace which made it possible to adequately adjust the stocks. The same did not occur in the last quarter of the year, when the aggravation of the world crisis, as of September, was not anticipated by the companies and manifested itself in sharp reduction of industry's sales and in accumulation of excessive stocks. This process is shown on Figure 2, where one may observe that while global demand remained stable, the stocks were balanced and that after their non-anticipated, sharp decline, stocks piled in a similar proportion.

The relevance of the stock level as a determinant of physical production may be understood by the analysis of Figure 3, which shows that the indicator of physical production volume foreseen for the next three months, also contained in the FGV's Survey, remained above 120 points in the period from November 2006 to September 2009, revealing that there were more companies planning to expand production than the other way around. One should highlight that, in line with the trajectory of gradual expansion of production in this period, the stock indicator remained near the equilibrium. The sudden reduction of demand and the consequent accumulation of excessive stocks in the last quarter of 2008 led to a similar reduction in the volume of physical production foreseen for the three following

Figure 3 – Stock level and physical output1/



Sources: IBGE and FGV.
1/ Seasonally adjusted series.

months. The foreseen physical production indicator reduced from 134.2 points, in September, to 90.9 points, in December – the lowest value since April 1995. Again, it is observed that, if on the one hand, the stock level indicator was not helpful to signal the stage of the economic cycle, it unambiguously indicated an unforeseen shock on sales and on foreseen physical production.

SCIT statistics also allow the analysis of the manufacturing industry's stock level evolution broken down by use categories and segments. The monthly evolution of the aggregated stock level indicator, as registered on Figure 1, translated similar movements in three of the use categories and nine of the considered segments (Table 1), evincing, therefore, the widespread 0stock growth in the latest months.

It should be highlighted that the prospect of possible shortage of raw materials observed in the period prior to September 2008 has been an additional important element in the recent process of stock accumulation. In this sense, companies that accumulated excessive stocks of intermediate products and, especially, of raw materials in order to guarantee the continuity of their activities under the risk of supply exhaustion of these products became overstocked, subjecting their suppliers to more intensive stock expansions. It is worth noting that this type of defensive behavior, leading to the monopolization of stocks of raw materials and intermediate products, was not restricted to Brazil, but was observed in other mature and emerging economies as well, like China.

The recent expansion of stocks in the manufacturing industry occurred with sharp intensity in the automobile sector, which after registering relevant and constant rises in domestic sales and in production, began to reflect restrictions to credit and consumers' deteriorating expectations.

According to data from the National Association of Automotive Vehicle Manufacturers (Anfavea), the stock of vehicles at the assembling lines and at the car dealerships reached 305 thousand units in November, after registering average of 174 thousand units from January 2007 to October 2008. This movement, intuitively classified as an irregular component, translated into generalized interruption

Table 1 – Stock level[1/]

Itemization	2008				2009	Difference between Jan/2009 and		
	Sep	Oct	Nov	Dec	Jan	Dec/2008	Sep/2008	Average[2]
Manufacturing industry	98.5	95.0	84.3	80.4	78.2	-2.2	-20.3	-10.3
By use categories								
Consumer goods	99.1	99.8	84.1	81.1	75.5	-5.6	-23.6	-9.1
Capital goods	107.1	96.8	84.1	80.1	83.5	3.4	-23.6	4.9
Building material	97.4	94.4	92.8	90.2	81.3	-8.9	-16.1	-8.3
Intermediate goods	99.9	97.6	91.2	79.6	78.8	-0.8	-21.1	-14.5
By type								
Non-metallic minerals	86.9	90.1	81.8	70.9	60.1	-10.8	-26.8	-21.5
Metallurgy	100.1	92.3	86.4	73.0	69.3	-3.7	-30.8	-25.7
Mechanic	106.5	99.3	80.3	72.0	73.7	1.7	-32.8	-12.7
Electric fittings	100.0	101.2	88.4	66.1	63.9	-2.2	-36.1	-19.2
Transportation material	100.0	99.8	72.5	60.7	67.5	6.8	-32.5	-11.1
Furniture	90.4	84.2	86.2	85.5	77.5	-8.0	-12.9	-9.6
Cellulose and paper	99.5	90.5	87.8	72.6	72.5	-0.1	-27.0	-13.6
Chemical	101.5	99.2	97.1	86.3	92.9	6.6	-8.6	-4.5
Pharmaceutical	86.9	86.7	93.5	77.0	87.2	10.2	0.3	1.1
Plastics	90.4	93.5	87.8	85.9	91.4	5.5	1.0	3.0
Textiles	87.6	87.4	82.0	95.4	71.4	-24.0	-16.2	-5.5
Apparel and footwear	93.7	96.5	83.2	75.4	72.3	-3.1	-21.4	-8.2
Food products	98.9	93.8	92.5	94.1	90.0	-4.1	-8.9	-3.1
Other products	98.7	99.1	97.2	91.5	82.0	-9.5	-16.7	-13.6

Source: FGV / Manufacturing Industry Survey (SCIT).

1/ Segment of respondents which described their stocks as insufficient deducted from the segment which described them as excessive; measured in percentage points; seasonally adjusted series.

2/ Average of the series since April 1995.

of activities of the sector, with negative effects on distinct segments of the productive chain. In this scenario, and considering the unpredictable nature of this stock movement, the Federal Government opted for reducing the Industrialized Products Tax (IPI) levied upon the sales of automobiles, favoring the resumption of sales and production both in the sector and in the principal links of this productive chain.

As a result, there was rapid reduction of the stock level in the sector, to some 27 days of sales, below the historical average of 34 days.