



Business cycle stylized facts and inventory behaviour: New evidence for the Euro area

Tatiana Cesaroni ^a, Louis Maccini ^{b,*}, Marco Malgarini ^c

^a Treasury Ministry of Economy and Finance, Rome, Italy

^b Department of Economics, Johns Hopkins University, 3400 North Charles Street, Baltimore, MD

^c ISAE, Rome

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ABSTRACT

The purpose of this paper is for the first time to use Business Tendency Survey data, first, to identify new facts that are useful for the interpretation of the decline in the volatility of real activity in the Euro area, and, second, to test the inventory management hypothesis as an explanation for the Great Moderation in Europe. We present stylized facts from the Business Tendency data on series for inventories, current production, current orders, and expected production for the Euro area, emphasizing the decline in the volatility of the series. Further, we investigate whether the decline in inventory volatility can be attributed to an endogenous change in the persistence of shocks to the accumulation dynamics of inventories or to an exogenous change in the shocks hitting the inventory optimisation process. Our results at Euro level generally indicate that there is no evidence of a break in the inventory accumulation process. On the contrary, the impact of exogenous shocks on inventory volatility appears to be steadily declining over time, beginning from the mid-1980s.

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1. Introduction

In recent years a number of studies—see, for example, McConnell and Perez-Quiros (2000), Blanchard and Simon (2001), and Stock and Watson (2003)—have reported stylized facts concerning the most important US macroeconomic time series. The main findings concern the decline in volatility observed in US macroeconomic data since the mid-1980s. Despite the large amount of literature on this topic and efforts to explain the evidence, the debate on the causes of the “Great Moderation” is still open. Blanchard and Simon (2001) attribute it to improvements in monetary and fiscal policy. Stock and Watson (2003) argue that the reduction in US output volatility should be attributed not only to better monetary policy but also to a decrease in the volatility of productivity shocks—the so-called “Good Luck” hypothesis. McConnell and Perez-Quiros (2000) propose an explanation for the reduction in US production volatility based on better inventory management practices within durable goods. More recent explanations – for example, Dynan et al. (2006) – focus on the role of financial markets in the propagation mechanism of the shocks.

Work has also proceeded to uncover stylized facts for the European Business cycle. A substantial literature has focused on

topics such as the synchronicity of national cycles with respect to the Euro area business cycle – Camacho et al. (2008) and Stock and Watson (2005), convergence – Carvalho and Harvey (2005) and Canova et al. (2007), the time varying nature of international business cycles – Artis et al. (2006), the dating of cyclical chronology – Simpson et al. (2001), Artis et al. (2004), and Giannone and Reichlin (2005), changes in the volatility of output growth and other characteristics of business cycles among European and G-7 countries – Agresti and Mojon (2001), Artis et al. (2004), Stock and Watson (2005), and Giannone et al. (2008), among the others.

The purpose of this paper is for the first time to use Business Tendency Survey data, first, to identify new facts that are useful for the interpretation of the decline in the volatility of real activity in the Euro area, and, second, to test the inventory management hypothesis as an explanation for the Great Moderation in Europe. In fact, unlike in the US, inventory data in Europe are not directly derived from specific quantitative surveys among firms, but are obtained as a residual in the form of inventory investment from the National Accounts. Hence, quantitative data exist on inventory investment, but not on inventory stocks. Studies that have explored the relationship between inventory investment and GDP in the Euro area include Dimelis (2001) and Chikan and Tatrai (2003). However, to investigate issues such as the behaviour of inventories over the business cycle and whether advances in inventory management techniques can explain the Great Moderation, inventory stock data are needed. To fill this

* Corresponding author. Tel.: +1 410 516 7607.
E-mail address: maccini@jhu.edu (L. Maccini).

gap, in this paper we make use of inventory stock data from the Business Tendency Surveys (BTS).¹ These data are qualitative in the sense that firms are not asked to provide quantitative information about a variable of interest (say, the level of production), but rather to state whether this variable has increased, stayed the same, or decreased with respect to the previous month. On inventories, the qualitative nature of the data means that firms are asked to state whether inventory levels are above or below “normal” levels generally interpreted as desired levels of stocks.

In the first part of the paper, we provide new stylized facts on business cycles for the Euro area – specifically, Italy, France, and Germany – and the United Kingdom in comparison with the US. We discuss the business cycle properties of the Business Tendency Survey data for the Euro area in order to provide evidence of their suitability to be used to interpret business cycle stylized facts. Since inventories are associated with the production of goods, we perform our analysis using Industrial Production as a reference for business cycle movements. Our results indicate that the BTS data are strongly correlated with Industrial Production and that the findings of a decline in volatility hold for these data as well. This evidence allows us to make use of Business Tendency Survey data on inventories to draw inferences regarding the role of inventories at the aggregate level.

Next, the paper provides new evidence on the causes of the decline in output volatility in the Euro area, investigating in particular the inventory management hypothesis. Whereas the hypothesis that better inventory management techniques brought about by computerization has been widely investigated as an explanation for the Great Moderation in the US,² few attempts have been made in this direction for Europe, essentially due to lack of reliable data on inventory stocks. To this end, we attempt to determine whether the decline in the volatility of Euro area economic activity can be attributed mainly to an endogenous change in the persistence of shocks to the accumulation dynamics of inventory movements, or rather to a change in the shocks hitting the inventory optimisation process, such as, sales, interpreting the latter as exogenous. Rather than undertaking a search for the best empirical model of the inventory accumulation process, we use a standard specification based on an AR process also used by Stock and Watson (2005), allowing for a discrete break in 1984, in order to evaluate changes in inventory accumulation over time.

The results indicate that the inventory accumulation process at the European level, excluding the case of Italy, did not experience a break in 1984. Rather, the impact of external, exogenous shocks seems to have been declining over time, starting in the mid-1980s, which has caused a decline in the volatility of the inventory accumulation process. In sum, it appears that inventories did not play a major role in causing the Great Moderation in Europe. Rather, the decline in the volatility of the inventory accumulation process seems to be due a decline in the volatility of exogenous shocks due to other forces, such as better monetary policy, “Good Luck”, or changes in the role of financial markets.

The paper is structured as follows: Section 2 reports business cycle characteristics for Industrial Production for the Euro area.

Section 3 describes the data set and reports the main stylized facts for key series in the Business Tendency Surveys. Section 4 explores the possible role of inventory accumulation in explaining the Great Moderation using the Business Tendency Survey data. Section 5 concludes.

2. Stylized facts about the Euro area business cycle

2.1. Data description

The data analysed cover the period 1963:1–2008:1 and were obtained from OECD statistical data base. For the real economy we use monthly seasonally adjusted values of the logarithm of the Industrial Production Index (IPI) for the United States, the United Kingdom, the three main Euro area countries (France, Germany, and Italy), and a Euro Core indicator built by aggregating data from France, Germany, and Italy.³ The data set also includes cyclical indicators drawn from qualitative surveys such as those on inventories, current production and production expectations in European countries. All the data are available on monthly bases. Cyclical economic activity is generally measured in terms of GDP; however, the agriculture and service sectors do not usually display a well defined cyclical pattern⁴ (see A’Hearn and Woitek, 2001), and are expected to hold far less inventory than industry. Moreover, GDP and industrial production growth rates are highly correlated. For the Euro Core, the contemporaneous correlation coefficient is equal to 0.9, and as Fig. 1 indicates the cyclical patterns in the two series are very similar. Focusing on Industrial Production is also of interest because the business cycle characteristics of Industrial Production have not received much attention in the literature. For these reasons, in this paper we choose to concentrate the analysis on the industrial sector instead of on total GDP.

The Euro Core, the UK and the US: Fig. 2 shows the yearly growth rates for Industrial Production for the US, the Euro Core countries taken as a whole, and the UK. The average yearly growth industrial activity is higher in the US (3.3%) than in the Euro Core (2.8%) and the UK (2.5%). Similarly to what Agresti and Mojon (2001) have already found when looking at GDP data, the timing of cyclical patterns also seems to be quite close: in all the countries considered, industrial activity lapse into a deep recession after the first oil shock, followed by a recovery and a “double dip” at the beginning of the eighties. The subsequent recovery appears to be steeper in the US than in Europe.

Another important divergence emerges in the early nineties, when a recession took place in the US and the UK in 1991–1992, but not in Europe, among other things because of the fiscal stimulus following German reunification. On the other hand, a recession occurred in Europe in 1992–1993, but not the US and UK, due to the financial crisis that occurred in Europe that arose primarily from the failure of the exchange rate agreement. In the first-half of the last decade, IPI growth was higher in the US than in Europe. However, European growth was catching up with that of the US in the last years of the sample, as a result of both a slowdown in the US and the resilience of growth in Europe. Over the entire period, US activity seems to be leading with respect to European fluctuations. On average, the volatility of business cycles seems to be higher in the US than in Europe, although it seems to slow down in all the countries towards the end of the sample.

¹ Malgarini (2008) has used Business Survey data in an analysis of the reduction in volatility in Italy, but he does not consider other European countries, and does not investigate whether advances in inventory management techniques are responsible for the decline in volatility.

² For investigations of whether advances in inventory management techniques are responsible for the Great Moderation in the US, see Ahmed et al. (2004), Blanchard and Simon (2001), and Stock and Watson (2003) for VAR approaches, Maccini and Pagan (2009) for a partial equilibrium model approach, and Kahn et al. (2002), Khan and Thomas (2007), and Iacoviello et al. (2007) for general equilibrium model approaches.

³ The three countries represent roughly 70% of the Euro area total value added and the correlation between Euro Core and Euro area Industrial Production is equal to 0.99.

⁴ In the case of agriculture, cyclical fluctuations are mainly determined by environmental factors.

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