Inventory investment and production in Europe during the "Great Recession": Is there a pattern?

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ABSTRACT

The paper examines the nexus between inventory investment and the change in aggregate production during the "Great Recession" of 2008/09 for 29 European countries. A fairly uniform pattern emerges. Inventory investment is positively correlated with changes in production and follows the latter with a time-lag of two to three quarters. Very few countries (Austria, Greece, Spain and Switzerland) diverge from the typical pattern. This might hint to problems with respect to data quality.

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1. Introduction

The literature concerned with the empirics of inventory investment asks, which pattern between inventory investment, production and sales can be found in the data. This research has uncovered a number of stylized facts (see Ramey and West, 1999). First, inventories move procyclically, which means that inventory investment is positively correlated with sales. Second, production is more volatile than sales. These two findings have been confirmed by Blinder and Maccini (1991), Hornstein (1998), Dimelis (2001) and Wen (2005) for the US, by Chikán and Tátrai (2003), Wen (2005), Chikán et al. (2005) and Chikán and Kovács (2009) for OECD countries, by Wilkinson (1989), Christodoulakis et al. (1995) and Dimelis (2001) for EU countries and by Chikán and Horváth (1999) for a group of 88 developed and developing countries. A recent strand of the literature including Carpenter et al. (1998), Guariglia (1999), Brown and Haegler (2004), Bagliano and Sembenelli (2004) and Guariglia and Mateut (2010) rationalizes the procyclicality of inventory investment by linking the depletion of inventories to financing constraints which rise during recessions and become less binding during upswings.

Against the backdrop of this literature, our aim is to examine the nexus between inventory investment and the change in aggregate production for Europe, focusing on the "Great Recession" of 2008/09. This complies with Dimelis' (2001, p. 4) claim that fluctuations of inventory investment become particularly interesting over the contraction of the cycle. Apart from focusing on the recent recession, the paper is novel in two other respects. First, we construct so far unavailable time series for quarterly inventory investment from Eurostat data and second, we look at data for a large sample of 29 European countries—all 27 EU countries plus the two larger EFTA countries Norway and Switzerland instead of zooming in on the major economies as the bulk of the literature has done.

The paper also carries forward earlier work, which was motivated by intelligence we had received that the Swiss Federal Statistical Office (OFS) makes unusually strong hands-on calibrations to the first incoming values from the Statistic on value added, which is the most important data source for the supply-side calculation of GDP in Switzerland. So our earlier research focused on developing plausibility checks for Swiss GDP and productivity growth figures (see for instance Abrahamsen et al., 2005; Hartwig, 2008). Although such checks cannot prove or disprove the official data, they suggested that official figures understate the true average Swiss labor productivity growth rate by one third. The present paper also aims at contributing to a better understanding of the quality of macroeconomic data, arguing that a striking divergence of single countries from a typical European pattern (provided such a pattern emerges) speaks in favor of low data quality or an inadequate modeling of inventory investment in the respective countries rather than a different behavior of economic agents.

The paper is organized as follows. The next section illustrates the course of production in our 29 countries over the "Great Recession" of 2008/09. In Section 3 we then describe the changes in inventories and investigate whether a typical pattern between changes in production and inventories existed over the recession period. Section 4 concludes the paper.

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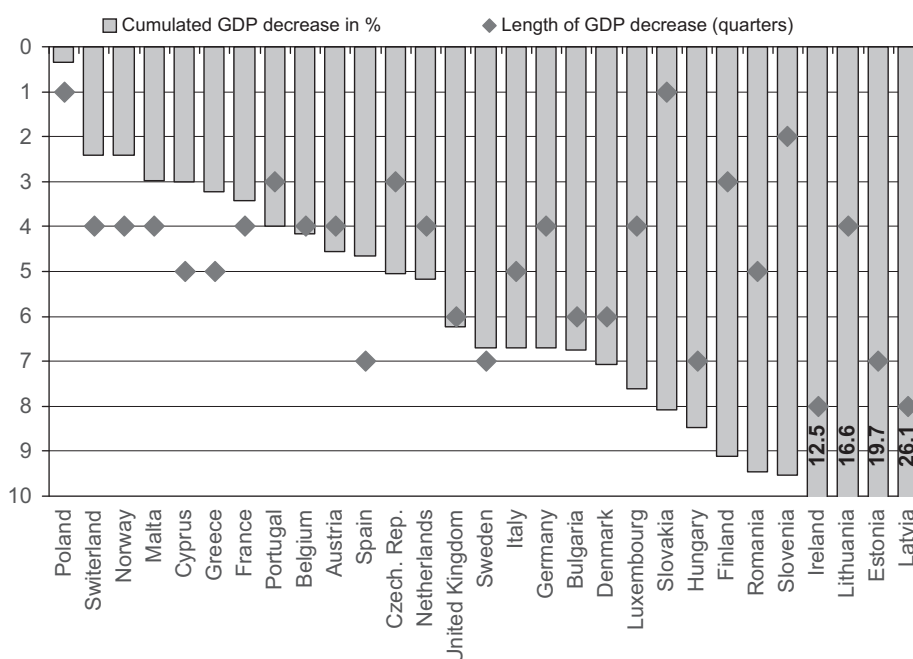E-mail address: hartwig@kof.ethz.ch (J. Hartwig).

Fig. 1. Extent and length of GDP decrease 2008–2009.
Source for all data: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database. We used the vintage of the database from April 8th 2010, which was the first to cover the whole year of 2009 for all countries.

2. The "Great Recession" of 2008/09

Most European countries experienced a sharp economic downturn over the period 2008/09. For EU27 countries and the two larger EFTA countries Norway and Switzerland, Fig. 1 shows the cumulated loss in production from the beginning of the downturn onward (as bars) as well as the duration of the downturn (as diamonds). Only Poland got off lightly without a substantial decline in GDP. Also in Slovakia, production dropped only during one quarter. This drop, however, amounted to as much as 8.1% (not annualized).

Following Newson (2009), we define the duration of the GDP decline as the period of time between the beginning of the contraction and the quarter in which GDP reached its lowest point. Therefore, a quarter with an increase in GDP still belongs to the contraction period if it is followed by a quarter in which GDP declines again, provided that the decline is more pronounced than the previous increase. For example, Romania recorded an increase in GDP by 2.4% in the third quarter of 2009. Because GDP dropped again by 2.5% in the next quarter, the contraction period, according to this definition, lasted until the fourth quarter of 2009. Instead of a decline in GDP of 9.3% over three quarters, we therefore record a decline of 9.5% over five quarters for Romania as shown in Fig. 1.

As the figure shows, the extent and the duration of the GDP decline are not closely correlated. The recession was most pronounced in those West European countries in which housing market bubbles burst (Spain, Ireland, the UK, Denmark and Sweden) and the collapse was extremely pronounced and mostly long-lasting in the Baltic countries. Apart from Poland, the two EFTA countries Switzerland and Norway had the smallest decline in GDP. Also in terms of the duration of the recession, these two countries fared relatively well as only six countries in our sample had a shorter recession than them.

In the five largest EU member countries, the contraction set in during the second quarter of 2008; in most other countries it began somewhat later. The Central Eastern European countries were hit last. In most countries (18 out of 29), the strongest drop

in production occurred in the first quarter of 2009. For 9 countries, the fourth quarter of 2008 was the worst. Norway and Cyprus, who fared relatively well during the recession, record the strongest drop in value added in the second quarter of 2009.[1]

3. Inventory investment and change in GDP

In order to determine the relationship between inventory investment and the change in GDP we need data from the National Accounts on the change of inventory levels at previous year's (constant) prices in national currency. For our analysis it would be desirable to cleanse the data from the net acquisition of valuables, which is irrelevant for the business cycle. However, as too few countries report this category separately, we use data on the change of inventories including the net acquisition of valuables. This should not be very harmful for two reasons. First, in the countries which report them, net acquisition of valuables is rather small in relation to overall inventory investment. Only Luxembourg and Switzerland are exceptions in this respect. Furthermore, since net acquisitions of valuables are not much affected by the business cycle, they should not introduce any bias into our time series of inventory investment.

Research on European inventory investment was hampered so far by the fact that not all European countries provide these data on a quarterly basis. Some countries, e.g. Switzerland, only report the inventory impulse, i.e. the change in inventory investment or in other words, the second derivative of the aggregate level of inventories in relation to GDP. Nevertheless, based on Eurostat data it is possible to calculate consistent time series for the change in inventory levels for all countries under investigation.

To this end, we draw on data on gross investment and gross fixed investment at constant prices. We calculate investment at previous year's prices (real investment) from nominal levels and

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[1] The working paper version of this article (Abrahamsen and Hartwig, 2011), which can be found at our website www.kof.ethz.ch, offers detailed graphical presentations of all our results.