The impact of the recession on different sized firms

A view from the micro-data

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Summary

This article uses quarterly data on turnover to analyse the performance of small, medium and large firms between 2001 and 2009. The analysis draws on two firm-level datasets which are the *Monthly Inquiry into Distribution and Services Sector* (MIDSS) and the *Monthly Production Inquiry* (MPI). For the services sector, it is found that small firms were hardest hit by the downturn, followed by medium-sized firms, which in turn have done worse than large firms. For the manufacturing sector the opposite results were reported. The turnover of large firms fell the most, followed by medium-sized firms, with smaller firms contracting the least. In both the services and production sector, volatility in turnover has increased during the sample period and in the run up to the recession – a reflection of greater price and output fluctuations in the last three years.

Introduction

This article presents new analysis of the UK economy during the recent recession. Micro-data reporting on quarterly turnover at the firm-level have been used to look at the relative performance of different sized firms between 2000 and 2009. Firms have been categorised into three size-bands according to employment. These are: small (0–49), medium (50–249) and large (250+). The raw micro-data were sourced directly from two monthly business surveys. The *Monthly Inquiry into Distribution and Services Sector* (MIDSS) for the services sector and the *Monthly Production Inquiry* (MPI) for the manufacturing sector.

The three main findings from this study are:

- For the service sector (MIDSS), small firms have been hit by the crisis worse than medium-sized firms, which in turn have done worse than large firms.
- For the manufacturing sector (MPI), large firms have been hit by the crisis worse than medium-sized firms, which in turn have performed worse than small firms.

- For both MIDSS and MPI surveys, volatility in all of the turnover series – regardless of firm size – has increased during the sample period.

Micro-data allows a more detailed analysis of the economy to be undertaken, based on firm-level characteristics, than simply looking at the published aggregates. However, some care should be taken in interpreting these results. Although monthly business surveys have been aggregated into quarterly figures so as to be presented on a similar basis to the published macro-data, it does not allow for a direct comparison. Therefore, before the main results are reported, the next section of this article puts the micro-data into proper context. The final section concludes.

Putting micro-data into context

Although micro-data inform the production of economic time series published by ONS they are rarely directly comparable. This is because micro-data

- undergo a number of qualitative adjustments as they move along the data production chain, and
- are balanced against other data sources. For example, monthly business surveys will be benchmarked against larger annual surveys and administrative data sources, and made coherent with data on income and expenditure through input-output analyses

Adjustments to micro-data are typically made to correct (or remove) outliers and level-shifts. These often result from methodological changes in the data collection process, but other important sources of irregularity that frequently require attention include:

- Milestones payments of big firms – very large increases in turnover for a particular firm may be further investigated by ONS staff in order to clarify the exact nature of any large milestone payments. If such a payment is associated with the provision or production of goods or services which have been in the making for many months or perhaps even years, then this figure clearly needs to be spread through time appropriately to reflect this.
- Big firms entering or leaving the sample – large mergers or takeovers, or perhaps significant business re-locations between the rest of the world and the UK can result in structural breaks in turnover and employment data. These may need to be accounted for so as to reflect what is really happening to economic activity in the UK.

A fuller description of the MIDSS and MPI data and collection methodologies is provided in **Box 1**.

Figure 1 shows a comparison of MIDSS and MPI growth rates with that of Gross Domestic Product (GDP) at market prices. Clearly the ‘raw’ micro-data time series are more volatile than published GDP, but the timing of the recession in each is broadly the same. Given that MIDSS and MPI, together, only cover around half of all economic activity in GDP, an exact correspondence would not necessarily be expected.

Despite the issues surrounding micro-data, ONS does currently publish a near completely unadjusted data series based on MIDSS and MPI – namely the Turnover and Orders in Production and Services Industries (TOPSI)². Barring some small adjustments to the data, these exhibit very similar time series behaviour to the micro-data series constructed for this study (see **Figure 2**). For

instance, the main difference between MPI micro-data and TOPSI manufacturing is the inclusion of non-manufacturing production industries such as extraction (mining and quarrying) and utilities (water, gas and electricity generation) in the former but not the latter. This data gives users access to raw data on turnover and orders (both home and export) for a variety of industries, but unlike in this study, breakdowns according to individual firm characteristics are not included.

Box 1 Methodology underlying MIDSS and MIPS data collection

This study employs micro-data consisting of responses to the *Monthly Production Inquiry* (MPI) and the *Monthly Inquiry into Distribution and Services Sector* (MIDSS). These surveys are very similar in terms of the questions posed to individual business, but obviously differ in the businesses they target. Responses obtained through the MPI are primarily related to business activity occurring in the primary and secondary sectors of the UK economy (based on the Standard Industrial Classification (SIC) scheme this roughly corresponds to codes 1,2 and 3 at the 1-digit SIC level) whereas responses given to the MIDSS survey relate to the tertiary sector of the economy (which corresponds to codes 5,6,7,8 and 9 at the 1-digit SIC level).

Both surveys inquire into firms' turnover, their employment as well as other useful figures, such as the amount of turnover generated as a result of exported products and services. Typically – with the exception of MIDSS for which employment data is only sampled quarterly, all of the three categories of variables – that is turnover, export value and employment – are available at monthly frequency. The micro-data pertaining to these surveys held in the Virtual Micro-data Laboratory (VML)¹ contains additional finer breakdowns, such as the number of full- and part-time male and female employees, but such detailed breakdowns are only requested from firms at quarterly intervals.

Both of the surveys are carried out using a methodology of stratified sampling, which uses ONS's standard business register, the Inter-Departmental Business Register (IDBR), as the main sampling frame. Stratification is carried out based on a (frozen) level of employment which is usually updated each new year. Smaller firms occupying the lower strata of the sample are usually sampled on a rotating principle, resulting in smaller firms being repeatedly sampled for 15 consecutive months, after which they are replaced with a newly chosen stratum. Large firms belonging to the upper stratum are sampled indefinitely (or until they cease trading). Any firm which does not survive its initially allotted sampling spell, is replaced with a new firm which embodies characteristics close to the ones of the firm dropped out as a result of ceasing trading.

Figure 1 MIDDSS, MPI and GDP growth rates

Per cent – quarter on same quarter one year ago

Source: Office for National Statistics

Figure 2 MIDSS, MPI and TOPSI

Per cent, quarter on same quarter one year ago

Source: Office for National Statistics

Analysis of MIDSS and MPI micro-data by firm size

This section presents summary statistics and graphs showing growth rates of turnover in small, medium and large firms from MIDSS and MPI micro-data. This includes a comparison of mean growth rates, the volatility of growth and peak-to-trough changes through the recent recession. The peak-to-trough analysis is based on both seasonally unadjusted and seasonally adjusted data³. The monthly turnover data reported in MIDSS and MPI is in current market prices so will reflect both price and volume changes. Also, it has been aggregated up to a quarterly basis to be more comparable with headline published data which is also published quarterly. However, the same analysis on monthly data is presented in the **Annex** to this article.

MIDSS micro-data on turnover by firm size

Turnover growth of different-sized firms in MIDSS between 2002 Q1 and 2009 Q3 is shown in **Figure 3** and the key summary statistics are provided in **Table 1a**. Over the sample as a whole, small and large firms experienced similar average (four-quarter) growth rates of 7.6 per cent and 7.8 per cent respectively. This was faster than medium-sized firms, which expanded at an average rate of 6.7 per cent. However, comparing average growth rates in the first half of the sample with the second half of the sample shows significant slowdowns for small and medium firms, whilst large firms actually experienced an increase in average growth rates. These patterns are corroborated by the peak-to-trough analysis in **Table 1b**, which clearly shows that during the recession small firms experienced the severest fall in turnover, followed by medium firms and then large firms.

This suggests that larger service-sector firms showed a greater resilience through the recession than smaller service-sector firms. This may reflect different patterns of activity by firm-size – with smaller firms concentrated in the provision of specialist or boutique services (such as pubs and restaurants) which are especially vulnerable to a fall in discretionary demand – and larger firms in areas of service provision where demand is more stable (such as large food retailers). Large service-sector firms may also have shown greater resilience to the downturn due to the advantages of scale and diversification that result from being big. For example, large firms are less likely to be dependent on selling a particular product to a particular regional or country market.

Volatility in turnover growth rates, as measured by the standard deviation in Table 1a, is seen to fall with firm size. This is also apparent in Figure 3, where the turnover growth of small firms shows more fluctuation than medium-sized firms and, in turn, large firms. Turnover volatility was also greater in the second half of the sample than the first half. This may reflect higher volatility in commodity and energy prices and also the impact of the financial crisis and subsequent recession on volumes, after a long period of relatively low inflation and steady growth in the UK economy⁴.

Figure 3 MIDSS quarterly growth rates in turnover: by firm size

Per cent, quarter on same quarter one year ago

Source: Office for National Statistics

Table 1a MIDSS turnover data: summary statistics

Variable	Number of time series observations	Mean growth rate, quarter on same quarter one year ago (%)	Standard deviation
2002 Q1 – 2009 Q3			
Small	31	7.6	24.1
Medium	31	6.7	11.7
Large	31	7.8	6.6
Total	31	7.1	8.2
2002 Q1 – 2005 Q4			
Small	16	10.0	20.3
Medium	16	8.5	5.4
Large	16	6.2	6.6
Total	16	7.2	6.3
2006 Q1 – 2009 Q3			
Small	15	5.0	28.0
Medium	15	4.6	15.9
Large	15	9.4	6.5
Total	15	7.1	10.0

Source: Office for National Statistics

Table 1b MIDSS turnover data: peak-to-trough analysis

	Raw 'unadjusted' data		Seasonally adjusted data	
	Timing of the recession	Peak-to-trough (%)	Timing of the recession	Peak-to-trough (%)
Small	2008 Q2–2009 Q1	-37.5	2008 Q2–2009 Q2	-37.6
Medium	2006 Q4–2009 Q2	-20.5	2008 Q2–2009 Q2	-19.1
Large	2008 Q4–2009 Q2	-11.1	2008 Q4–2009 Q2	-3.4
Total	2008 Q2–2009 Q2	-13.0	2008 Q3–2009 Q2	-10.9

Source: Office for National Statistics

MPI micro-data on turnover by firm size

Figure 4 presents firm turnover by size from the MPI with corresponding summary statistics in **Table 2a**. Between 2002 Q1 and 2009 Q3, small firms experienced the fastest average growth rates at 3.4 per cent compared to 2.1 per cent for medium-sized firms and 2.0 per cent for larger firms. A particularly striking feature of the data is the acceleration in turnover growth rates in 2007 and the first quarter of 2008 for medium and large firms, followed by a sharp contraction up until 2009 Q2. This is reflected in the peak-to-trough falls in turnover reported in **Table 2b**, which were correspondingly greater for large than small firms.

Figure 4 MPI quarterly growth rates in turnover: by firm size

Per cent, quarter on same quarter one year ago

Source: Office for National Statistics

These turnover movements partly reflect the rise and fall in energy and other commodities prices over this period. This turnover pattern is likely to be driven by large firms in the (extraction, energy and processing industries). However, it is also clear that the recession impacted strongly on the manufacturing sector, and there is reason to believe that larger firms were the most severely affected.

Smaller manufacturers operating in niche markets may have been able to absorb the crisis better than larger, more globally orientated producers such as car makers or intermediate capital goods producers. The sharp reduction in global trade as a result of a world-wide recession, the downswing in the stocks cycle, and a sharp fall in investment spending would be expected to have a strong knock-on effect on UK manufacturing, especially larger firms that are more likely to be export orientated. These factors have also been represented in figures on the volatility of turnover growth, where larger firms have exhibited greater volatility in growth rates than medium and small firms. Furthermore, this volatility was once again greater in the second half of the sample, coinciding with the sharp rise and fall in energy and commodity prices and the downturn in GDP between 2008 and 2009.

Table 2a **MPI turnover data: summary statistics**

Variable	Number of time series observations	Mean growth rate, quarter on same quarter one year ago (%)	Standard deviation
2002 Q1 – 2009 Q3			
Small	31	3.4	7.4
Medium	31	2.1	5.1
Large	31	2.0	9.5
Total	31	2.0	8.1
2002 Q1 – 2005 Q4			
Small	16	5.9	5.2
Medium	16	2.7	4.2
Large	16	-0.4	3.5
Total	16	0.2	3.4
2006 Q1 – 2009 Q3			
Small	15	0.8	8.5
Medium	15	1.5	5.9
Large	15	4.7	12.9
Total	15	4.0	11.0

Source: Office for National Statistics

Table 2b **MPI turnover data: peak-to-trough analysis**

	Raw 'unadjusted' data		Seasonally adjusted data	
	Timing of the recession	Peak-to-trough (%)	Timing of the recession	Peak-to-trough (%)
Small	2006 Q4–2009 Q1	-15.3	2006 Q4–2008 Q4	-10.4
Medium	2008 Q2–2009 Q1	-12.3	2008 Q2–2009 Q2	-10.1
Large	2008 Q2–2009 Q1	-17.0	2008 Q1–2009 Q2	-14.3
Total	2008 Q2–2009 Q1	-16.1	2008 Q1–2009 Q2	-13.4

Source: Office for National Statistics

Conclusion and possible directions for further research

This article uses micro-data to analyse the impact of the recession on different sized firms. Interesting results have been reported on the different experiences of small, medium and large firms in the UK production and services sectors. Size is not the only firm-level characteristic and micro-data could be used to analyse a variety of other characteristics against performance. Micro-data also supports other potentially interesting analyses, such as the survival rates of different firms, precise turning points in sectors and industries, as well as informing the revisions process of GDP estimates.

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Notes

1. The Virtual Micro-data Laboratory (VML) is a facility within ONS which enables secure access to restricted data for research purposes. A number of different dataset are available – covering economic, social and financial aspects of the UK economy. More information on the VML can be found at www.ons.gov.uk/about/who-we-are/our-services/vml/index.html

2. Turnover and Orders in the Production and Services Industries (TOPSI) provides monthly current price estimates of turnover and orders based on SIC 2007. Most services and production activities are covered. The publication provides data on:

- total turnover with production and services (excluding construction, retail and financial services)
- export and home turnover for manufacturing industries (some exclusions)

- export and home orders for manufacturing industries (some exclusions)

More information on TOPSI is available at www.statistics.gov.uk/StaBase/Product.asp?vlnk=15359

3. Seasonal adjustment is undertaken using the X-11-ARIMA programme.

4. Between 1993 and 2008 the UK economy expanded for 63 successive quarters, its longest peacetime expansion. Combined with low and steady inflation, this period has been referred to as 'The Great Moderation'. Since 2008 inflation and output volatility has re-emerged. Commodity prices have gone through a strong cycle since 2008 impacting on inflation rates, and following the global financial crisis in 2008, the global economy experienced its deepest post-War recession.

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Annex – Turnover by firm size using monthly data

These additional figures and tables replicate the analysis on MIDSS and MPI micro-data presented in this article using monthly data.

Figure A1 MIDSS monthly growth rates in turnover: by firm size

Per cent, month on same month one year ago

Source: Office for National Statistics

Table A1a MIDSS turnover data (monthly): summary statistics

Variable	Number of time series observations	Mean growth rate, month on same month one year ago (%)	Standard deviation
2002 M1 – 2009 M9			
Small	93	7.9	25.2
Medium	93	6.8	12.8
Large	93	7.8	7.2
Total	93	7.2	8.7
2002 M1 – 2005 M12			
Small	48	10.2	20.8
Medium	48	8.7	7.1
Large	48	6.2	6.9
Total	48	7.2	6.7

2006 M1 – 2009 M9

Small	45	5.5	29.2
Medium	45	4.8	16.8
Large	45	9.5	7.2
Total	45	7.2	10.4

Source: Office for National Statistics

Table A1b MIDSS turnover data (monthly): peak-to-trough analysis

	Raw data		Seasonally adjusted data	
	Timing of the recession	Peak-to-trough (%)	Timing of the recession	Peak-to-trough (%)
Small	2008 M6–2009 M3	-49.7	2008 M6–2009 M5	-38.1
Medium	2006 M10–2009 M8	-33.0	2008 M5–2009 M6	-20.0
Large	2008 M12–2009 M5	-17.9	2008 M11–2009 M5	-4.4
Total	2008 M3–2009 M5	-12.0	2008 M6–2009 M5	-11.8

Source: Office for National Statistics

Figure A2 MPI monthly growth rates in turnover: by firm size

Per cent, month on same month one year ago

Source: Office for National Statistics

Table A2a **MPI turnover data (monthly): summary statistics**

Variable	Number of time series observations	Mean growth rate, month on same month one year ago (%)	Standard deviation
2002 M1 – 2009 M9			
Small	93	3.6	9.3
Medium	93	2.2	6.4
Large	93	2.1	10.6
Total	93	2.1	9.3
2002 M1 – 2005 M12			
Small	48	6.1	7.9
Medium	48	2.7	5.4
Large	48	-0.4	4.8
Total	48	0.3	4.7
2006 M1 – 2009 M9			
Small	45	1.0	10.0
Medium	45	1.6	7.3
Large	45	4.8	14.1
Total	45	4.1	12.2

Source: Office for National Statistics

Table A2b **MPI turnover data (monthly): peak-to-trough analysis**

	Raw data	Seasonally adjusted data	Raw data
	Timing of the recession	Peak-to-trough (%)	Timing of the recession
Small	2006 M11–2008 M8	-28.2	2006 M7–2008 M11
Medium	2008 M9–2009 M1	-21.5	2008 M3–2009 M4
Large	2008 M9–2009 M1	-24.9	2008 M2–2009 M6
Total	2008 M9–2009 M1	-24.1	2008 M3–2009 M9

Source: Office for National Statistics