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Special Commentary

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Can Manufacturing Take Down the Service Sector?

Executive Summary

The mining sector, which includes energy production, and the manufacturing sector in the United States have weakened in recent months, and concern is spreading about a broader U.S. recession emanating from these sectors. Could the manufacturing and mining sectors, which respectively account for 12 percent and 2 percent of real value added in the U.S. economy, pull the service sector, which represent two-thirds of the U.S. economy, down with them?

Our statistical analysis finds that the effect of the mining sector on the service sector is rather small, which is intuitively appealing given the small size of the former. Manufacturing has a more pronounced effect on the service sector, but our analysis finds that it would still require a 3 percent contraction in real value added in the manufacturing sector to turn growth in the service sector negative. A contraction of this rough order of magnitude occurred in the 2001 recession in the United States. In other words, the downturn in manufacturing would need to be rather sizeable to bring the entire economy to its knees. Although a manufacturing downturn of that magnitude does not seem likely in 2016, it is not completely inconceivable either.

Could the manufacturing and mining sectors pull the service sector down with them?

How Big Are the Manufacturing and Service Sectors?

There is little doubt that the U.S. manufacturing sector has taken a hit from slow growth in the rest of the world and the appreciation of the dollar. Real exports of goods have declined 3.1 percent since hitting an all-time peak in Q4 2014, and manufacturing production has been essentially flat since July 2015. Could this slowdown, if not soon-to-be downturn, in the manufacturing sector have a negative impact on the service sector?

Figure 1 suggests that it indeed could. The ISM manufacturing index has been below the demarcation line separating expansion from contraction for four consecutive months. The non-manufacturing index, which measures the pace of activity in the service sector, hit a 10-year high in July but it has subsequently receded to a two-year low. The drawback to the purchasing managers' indices that are shown in Figure 1 is that they measure breadth in their respective sectors rather than depth. That is, they measure the percentages of businesses that are reporting a change in business activity but they do not tell us by how much activity is changing. What we need is a way to measure the quantitative effect that the manufacturing sector has on the service sector.

The service sector is more than five times as large as the manufacturing sector.

Before we turn to a discussion of the statistical analysis that we conducted, let's look at the relative sizes of each sector. As shown in Figure 2, the private service sector accounts for two-thirds of real value-added (i.e., wages, salaries and profits) in the U.S. economy. The manufacturing and construction sectors account for 12 percent and 4 percent of real value added, respectively. In other words, the service sector is more than five times as large as the manufacturing sector.



Figure 1

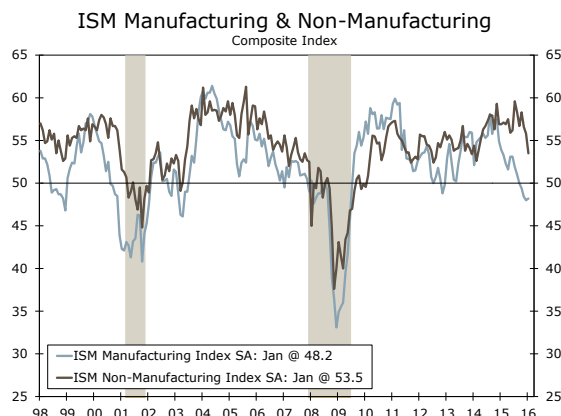
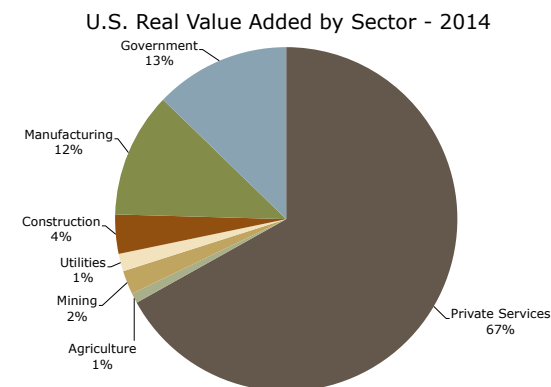


Figure 2



Source: Institute for Supply Management, U.S. Dept. of Commerce and Wells Fargo Securities, LLC

Measuring the Effects of Manufacturing on the Service Sector

We use a statistical technique that allows us to impart a “shock” to growth in one sector and then analyze the effect that the shock subsequently has on growth in other sectors of the economy.¹ As shown in Figure 3, our shock comprised a one percentage point reduction in growth in real value added in the manufacturing sector. We then plot how growth in real value added in the manufacturing sector subsequently evolves over the subsequent eight quarters. The solid line in the chart denotes our point estimates of the effect that the shock has on growth in real value added, while the dotted lines mark our 95 percent confidence interval. In sum, the shock initially reduces growth in real value added in the manufacturing sector by 1 percentage point, but the effect on growth rates in the manufacturing sector in subsequent quarters quickly dies out.

Figure 3

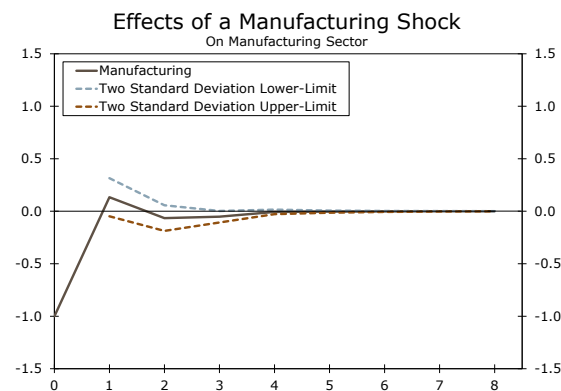
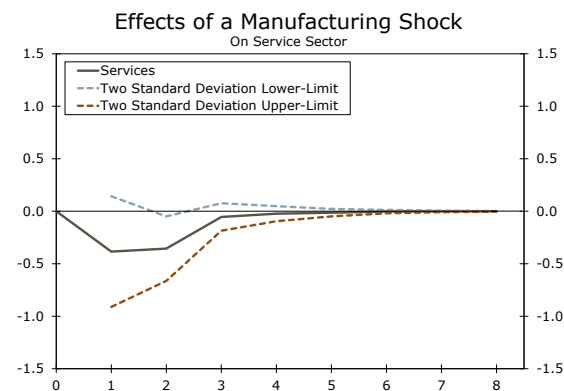


Figure 4



Source: Wells Fargo Securities, LLC

Figure 4 plots the effects that the manufacturing sector has on the service sector. One quarter after the 1 percentage point hit to growth in the manufacturing sector, growth in real value added in the service sector falls by 0.4 percentage points, but the effect lingers. That is, two quarters after the hit to growth in the manufacturing sector, growth in the service sector is depressed by

¹ We estimated a four-equation vector autoregression (VAR) that contained quarterly growth rates in real value added in the service, manufacturing, construction and mining sectors. The data set spans Q1-2005 to Q3-2015 and we used the first lag in each sector as the independent variables in each equation. We then calculated the impulse response functions that are shown in Figures 3, 4, 7 and 8. The econometric results are available upon request to interested readers.

We use a statistical technique that allows us to impart a “shock” to growth in one sector and then analyze the effect that the shock subsequently has on growth in other sectors of the economy.

another 0.4 percentage points. By the third quarter after the shock, the effect on growth in the service sector has essentially died out.

So what does this analysis mean for the service sector today? Growth in real value added in the service sector is currently running about 2 percent on a year-over-year basis. Given this underlying run rate, it would take three consecutive quarterly declines of 1 percent in the manufacturing sector to turn growth in real value added in the service sector negative on a year-over-year basis, everything else equal.

How likely are three consecutive quarterly declines of 1 percent or more in the manufacturing sector? Quarterly data on real value added exist since only 2005, and three consecutive quarterly declines of 1 percent or more in the manufacturing sector has occurred only once during that relatively short period, during the Great Recession. The probability of a repeat of that calamity anytime soon appears to be rather low.

However, if we use annual data on real value added, we can go back to 1998. As shown in Figure 5, real value added in manufacturing contracted 4 percent in 2001 (roughly 1 percent per quarter for four consecutive quarters). Therefore, a manufacturing downturn today on the same order as the 2001 episode would be enough to lead to a recession in the service sector. Although a manufacturing downturn of that magnitude does not seem likely in 2016, it is not completely inconceivable either.²

Figure 5

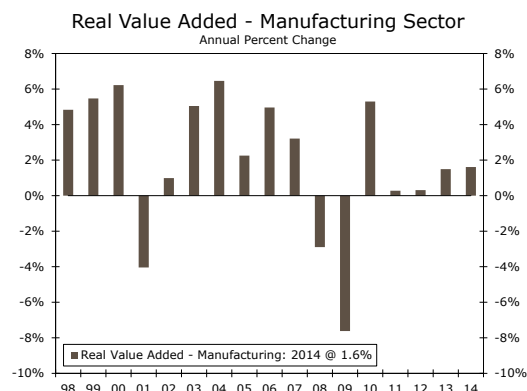
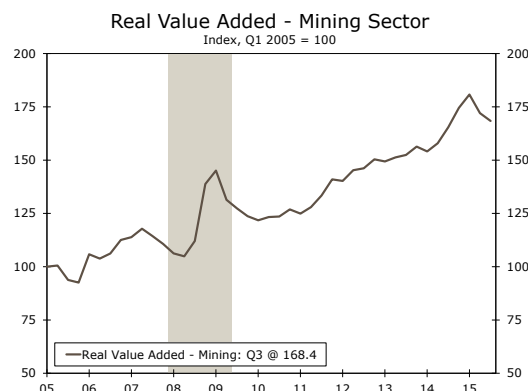


Figure 6



Source: U.S. Department of Commerce and Wells Fargo Securities, LLC

The Mining Sector Is Rather Small

The mining sector, which includes energy production, has been hammered recently. As shown in Figure 6, real value added in the mining sector has dropped about 7 percent since its peak in early 2015, and further declines in coming quarters seem likely. Could these large declines in the mining sector bring the service sector to its knees?

Probably not. Our statistical analysis finds that a 1 percentage point contraction in the mining sector has essentially no effect on growth in real value added in the service sector (Figure 8). This empirical result seems intuitively appealing because the mining sector accounts for only 2 percent of real value added in the overall U.S. economy (Figure 2). Although hoteliers and other service providers in oil-producing states such as North Dakota, Wyoming and Oklahoma may be feeling the effects of cutbacks in the oilfields of those states, the direct effects of the downturn on the broader service sector in the United States likely will be limited.

Our analysis finds that a 1 percentage point contraction in the mining sector has essentially no effect on growth in real value added in the service sector.

² Real value added in the manufacturing sector was up 1.4 percent on a year-ago basis in Q3-2015 (latest available data).

Figure 7

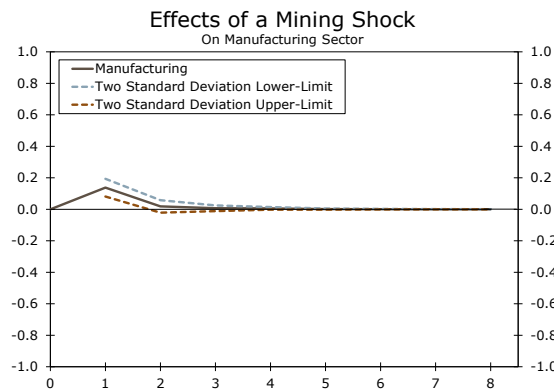
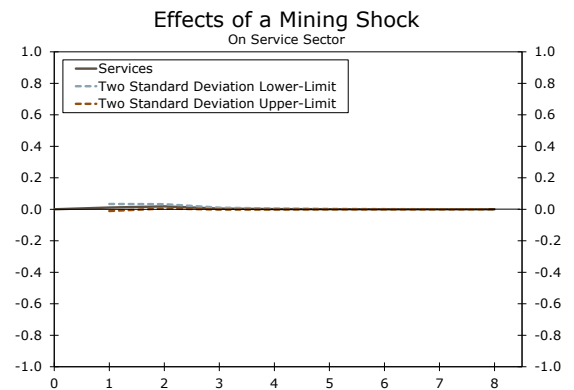


Figure 8



Source: Wells Fargo Securities, LLC

Conclusion

How literally should we take the statistical results that are discussed above? Any statistical model contains errors, and the statistical analysis that underlies the graphs in this report is hardly error free. In that regard, the relatively short time period for which data on real value added by sector exists (i.e., 2005 through 2015) reduces the robustness of our formal statistical analysis. However, Figure 2 is instructive. The manufacturing accounts for just 12 percent of real value added in the U.S. economy. The mining sector is even smaller at only 2 percent.

Could downturns in these sectors lead to slower growth, if not outright contraction, in the service sector? Sure. Common sense and our formal statistical analysis both suggest that a downturn in the manufacturing sector could have a negative effect on the service sector. That said, the drop in real value added in the manufacturing sector likely would need to be on the order of the 2001 downturn to lead to an outright contraction in the service sector. In other words, the downturn in manufacturing would need to be rather sizeable to bring the entire economy to its knees.

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