

## **Are Retailers More Sensitive to Changes in Business Conditions Compared to Wholesalers?**

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### **Abstract**

*This study examines the impact of macroeconomic factors like employment, industrial production, and real GDP on the performance of retailers and wholesalers. While previous studies focus on the relation between business cycles and firm performance, this current study looks at a better, more detailed index (i.e. the ADS Index) that measures daily values of business conditions in U.S. Using the ADS Index, this study compares how retailers and wholesalers are affected by the macroeconomic conditions. The results show that when the ADS Index increases by one unit, retailers' profit margin, return on assets, and return on equity values increase by 0.19%, 0.05%, and 0.21%, respectively. The corresponding increases for wholesalers' are 0.18%, 0.10%, and 0.34%. While the results for profitability are statistically significant for both groups, the liquidity results are weak. For retailers, only quick ratio is affected significantly. For wholesalers, none of the liquidity measures are affected by the business conditions.*

**Keywords:** Business Cycles, Business Conditions, Wholesalers, Retailers, Profitability, Liquidity

**JEL Classification:** E32, G30, G31, G32

### **1. Introduction**

The previous research has shown that firms' financials, including their profitability and liquidity values, suffer during economic recessions. Although we know that there is a significant relation between business cycles and firms' financials, we do not know the degree of the impact. Firms' profitability and liquidity values suffer, but by how much? In other words, what will be the change in their financials when there is a certain amount of change in macroeconomic conditions?

This study attempts to quantify the impact of business conditions on both retailers' and wholesalers' liquidity and profitability values. We first look at the impact of business conditions on retailers and then look at the impact on wholesalers. By examining them separately, we intend to find which group of firms is more sensitive to a change in business conditions.

Besides comparing the two groups' reactions, in this study, we also try to quantify the impact of business conditions on each group. In order to achieve that objective, we cannot use a simple recession/expansion classification. We need a measure that is a continuous variable, rather than a binary variable. If we use a business conditions measure that has daily values, then we can easily test each group's sensitivity to a unit change in business conditions.

Until recently, there was no such index that was widely accepted or used. In 2009, Aruoba, Diebold, and Scotti created an index (i.e. the ADS Business Conditions Index) that daily tracks the conditions in the U.S. This index is now calculated each business day by the Philadelphia Federal Reserve Bank in cooperation with Aruoba, Diebold, and Scotti, and it is posted on Philadelphia Fed's website every day.

The ADS Index tracks several different economic indicators. These are weekly initial jobless claims, monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales, and quarterly real GDP in real time.

It is an improvement over the recession/expansion classification because it has specific values in each calendar day. The average value of the ADS index is zero (i.e. frequently, the index is slightly adjusted to make the overall average zero) and this value reflects neutral business conditions. Positive values indicate better-than-average conditions, whereas negative values indicate worse-than-average conditions. For the 1984-2004 period, the index values ranged from -1.90 during the 1990-91 recession to 1.71 in 1984. The 2001 recession period has the second lowest index value of -1.38.

The paper proceeds as follows: Section II reviews the literature, Section III states the hypotheses, Section IV explains the data and the methodology, Section V shows the empirical results, and finally Section VI concludes.

## **2. Literature**

The related literature on the effects of recession on trade firms focus mainly on the retail firms. Little et al. (2009) compare the returns on net operating assets of retail firms during two recession years and two non-recession years and classify them into two groups: firms that pursue a differentiation strategy (i.e. firms with high relative net operating income to sales and low relative operating asset turnover) and firms that pursue a cost leadership strategy (i.e. firms with high relative operating asset turnover and low relative net operating income to sales). Little, Little, and Coffee (2009), on the other hand, suggest that retail firms pursuing a differentiation strategy are not more likely to achieve a higher return on net operating assets than those firms pursuing a cost leadership strategy in a recessionary period.

Dooley, et al. (2010) find that wholesalers respond late and drastically to recessions, while retailers respond quickly and more conservatively. Niskanen and Niskanen (2000) find that firms use trade credit as a means of price discrimination and that this affects their accounts receivable balances. They show that when interest rates rise, the demand for trade credit increases, and as a result, firms' accounts receivable balances increase. Rimo and Panbunyuen (2010) use Swedish listed companies to show the effects of companies' solvency and current ratios on their short-term working capital management. Niskanen and Niskanen (2000) show that the supply of trade credit, firm size, interest rate level, the ratio of current assets to total assets, and insufficient internal financing affect firms' accounts payable balances.

García-Teruel and Martínez-Solano (2007) show that, firms can create value by reducing their inventory level and by shortening the receivables collection period. Betancourt and Gautschi (1993) note that higher levels of distribution services cost firms more to produce but reduce costs for their customers.

Blinder (1981) and Blinder and Maccini (1991) argue that, in a typical U.S. recession, declining inventory investment accounts for most of the decline in GDP. According to Hornstein (1998), inventory investment fluctuations are not important for output fluctuations over the business cycle, but they are important for short-term output fluctuations. West (1992) finds that while U.S. inventories are sharply procyclical, Japanese inventories are only mildly procyclical.

Zakrajsek (1997) shows that, a large portion of the volatility of the retail inventories over business cycles is due to fluctuations in internal financing. Irvine (1981) argues that retail inventory levels depend on the cost of capital for firms and that variations in cost of capital could be related to business cycle.

Banerjee and Kaya (2013) examine the 2001 recession and test for differences in inventory levels, trade credit extensions, and working capital financing between the retailers and wholesalers. They show that retailers tend to do worse in recessions when compared to the wholesalers. They find that net working capital and long-term debt levels of wholesalers are not significantly affected by the business cycle, whereas retailers have significantly less net working capital and more long-term debt in the recessionary period compared to the expansionary period.

Balas and Kaya (2013) show that in expansionary periods, trade firms have better liquidity ratios, and are able to sell their inventories faster compared to recessionary periods. As a result, these firms have more cash in hand during these periods. The trade firms are also able to collect their receivables faster in these good times compared to the recessionary periods. As a result, their total asset turnover ratios improve during these favorable periods, meaning that they can more efficiently use their assets to create sales in these good times.

## **3. Hypotheses**

In line with the previous literature, we expect our sample firms to suffer financially during economic downturns when compared to better times.

Firms' profitability values should decline during economic downturns due to declining sales (and the lost economies of scale) as well as relatively stable costs (i.e. firms cannot adjust quickly). We expect both retailers and wholesalers to suffer. Therefore, our hypotheses regarding the impact of business conditions on profitability are:

*Hypothesis 1: Retailers have lower profit margins, lower return on assets values, and lower return on equity values when business conditions are unfavorable.*

*Hypothesis 2: Wholesalers have lower profit margins, lower return on assets values, and lower return on equity values when business conditions are unfavorable.*

With regard to liquidity, we expect firms' quick ratios to go down when business conditions are unfavorable. On the other hand, we expect their current ratios to be more stable even when business conditions are unfavorable. These expectations are due to the previous findings in Banerjee and Kaya (2013). Banerjee and Kaya (2013) have shown that, due to reduced sales, firms tend to have lower cash levels and higher inventory levels during economic recessions. They show that lower cash levels and higher inventory levels balance out each other, therefore current asset levels do not significantly differ across business cycles. Banerjee and Kaya (2013) have also shown that, firms' current liabilities levels do not differ across business cycles. Therefore, in this study, we expect firms' current ratios to be relatively stable in good versus bad times.

We expect firms' quick ratios to go down in bad times because Banerjee and Kaya (2013) have shown that firms' inventory levels are significantly lower in expansionary periods when compared to recessionary periods. Since quick ratio excludes inventory from current assets, we expect to see a significant result here for quick ratio. We expect to see similar results for retailers and wholesalers.

Therefore, our hypotheses on firms' liquidity measures are:

*Hypothesis 3: Compared to more favorable periods, when business conditions are unfavorable, retailers tend to have lower quick ratios (but similar current ratios).*

*Hypothesis 4: Compared to more favorable periods, when business conditions are unfavorable, wholesalers tend to have lower quick ratios (but similar current ratios).*

#### **4. Data and Methodology**

Our sample consists of all retailers and wholesalers that have the relevant financial data posted on Compustat. Due to data availability, we focus on the period from January 1, 2000 to December 31, 2005. As a measure of business conditions in U.S., we use the ADS Business Conditions Index that tracks several different economic indicators like weekly initial jobless claims, monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales, and quarterly real GDP in real time. The daily values of the index is calculated and posted daily on Philadelphia Fed's website. The ADS index is an improvement over the general recession/expansion classification because instead of classifying each day as either a recessionary day or an expansionary day, the ADS Index has actual values each day. The average value of the index is zero. Positive values reflect favorable conditions and negative values reflect unfavorable conditions. For our sample period, the index ranged from -1.38 (during 2001 recession) to 0.80.

Below are the variables that are used in the empirical analyses:

##### **The Dependent Variables:**

###### **a. Profitability Measures:**

Profit Margin:  $\text{Net income/Sales}$

Return on Assets (ROA):  $\text{Net income/Assets}$

Return on Equity (ROE):  $\text{Net income/Equity}$

###### **b. Liquidity Measures:**

Current ratio:  $\text{Current assets/Current liabilities}$

Quick ratio:  $(\text{Current assets}-\text{Inventory})/\text{Current liabilities}$

##### **The Independent Variables:**

ADS Index: The daily index value from Philadelphia Fed's website

Size: Natural log of sales

M/B: Price/Book value of equity

Profitability: EBITDA/Assets

Tangibility: Net property, plant, and equipment/Assets

Leverage: Total debt/Assets

Table 1 reports the summary statistics for the Retailers. There are 5,179 firm-quarter observations. The medians of profit margin, ROA, and ROE are 2%, 1%, and 2%, respectively. The median values of Current Ratio and Quick Ratio are 1.68 and 0.62, respectively.

**Table 1: Summary Statistics for Retailers**

	Mean	Median	St.dev.
Size	5.41	5.35	2.03
M/B	1.79	1.33	1.85
Leverage	0.55	0.54	0.20
Profitability	0.03	0.03	0.07
Tangibility	0.29	0.27	0.17
Profit Margin	-0.06	0.02	0.99
ROA	-0.00	0.01	0.10
ROE	-0.02	0.02	2.88
Current Ratio	2.06	1.68	1.79
Quick Ratio	0.93	0.62	1.31
N	5,179		

Table 2 reports the summary statistics for the Wholesalers. There are 4,401 firm-quarter observations. The medians of profit margin, ROA, and ROE are 1%, 1%, and 2%, respectively. The median values of Current Ratio and Quick Ratio are 1.72 and 1.05, respectively.

Comparing the two tables, we can conclude that Wholesalers have a lower profit margin, on average, compared to Retailers. On the other hand, the two groups' ROA and ROE values are similar. When we look at the liquidity ratios, we are seeing that although the two groups have similar Current Ratios, Wholesalers have much higher Quick Ratios compared to Retailers. Quick Ratio excludes inventory from current assets, therefore we can conclude that Wholesalers have more cash and receivables and Retailers have more inventory compared to the other group.

In order to quantify the impact of business conditions on Retailers' and Wholesalers' Profitability, we use the following equation:

$$\text{Profitability} = c_0 + c_1(\text{ADSIndex}) + c_2(M/B) + c_3(\text{Size}) + c_4(\text{Tangibility}) + c_5(\text{Leverage}) + \varepsilon \quad (1)$$

Where the dependent variable "Profitability" is one of the following measures in each regression: the Profit margin, the Return on assets ("ROA"), or the Return on Equity ("ROE").

In order to quantify the impact of business conditions on Retailers' and Wholesalers' Liquidity:

$$\text{Liquidity} = c_0 + c_1(\text{ADSIndex}) + c_2(M/B) + c_3(\text{Profitability}) + c_4(\text{Size}) + c_5(\text{Tangibility}) + c_6(\text{Leverage}) + \varepsilon \quad (2)$$

Where the dependent variable "Liquidity" is one of the following measures in each regression: the Current Ratio or the Quick Ratio.

**Table 2: Summary Statistics for Wholesalers**

	Mean	Median	St.dev.
Size	4.60	4.78	2.15
M/B	1.57	1.13	2.60
Leverage	0.59	0.61	0.20
Profitability	0.02	0.02	0.05
Tangibility	0.17	0.11	0.17
Profit Margin	-0.06	0.01	1.52
ROA	-0.00	0.01	0.09
ROE	-0.02	0.02	0.71
Current Ratio	2.28	1.72	4.92
Quick Ratio	1.41	1.05	3.98
N	4,401		

### 5. Empirical Results

Table 3 reports the results of the robust regressions where Retailers' Profit margin, ROA, and ROE are explained by the four control variables (i.e. size, M/B, Leverage, and Tangibility) and the ADS Index (equation (1)). When we look at the main independent variable, the ADS Index, we are seeing that in all three regressions, the coefficient for the ADS Index is significant at 1% level. In the first regression where Profit Margin is explained, the coefficient for the ADS Index is 0.0019, meaning that for each unit increase in the ADS Index, Retailers' profit margin go up by 0.19%. . In the second regression where ROA is explained, the coefficient for the ADS Index is 0.0005, meaning that for each unit increase in the ADS Index, Retailers' ROA go up by 0.05%. In the third regression where ROE is explained, the coefficient for the ADS Index is 0.0021, meaning that ROE go up by 0.21% for each unit increase in the ADS Index. The results here indicate that, as expected, business conditions significantly affect retailers' profitability values.

**Table 3. The Impact of Macroeconomic Factors on Retailers' Profitability Measures**

Model	Profit Margin	ROA	ROE
C <sub>0</sub>	-0.0078 (<0.001)	-0.0046 (<0.001)	-0.0373 (<0.001)
ADS Index	0.0019 (0.0019)	0.0005 (0.0040)	0.0021 (<0.001)
Size	0.0021 (<0.001)	0.0008 (<0.001)	0.0024 (<0.001)
M/B	0.0001 (0.6076)	-0.0002 (0.0131)	-0.0012 (<0.001)
Leverage	-0.0365 (<0.001)	-0.0127 (<0.001)	0.0252 (<0.001)
Profitability	1.0578 (<0.001)	0.6234 (<0.001)	1.1628 (<0.001)
Tangibility	-0.0142 (<0.001)	-0.0101 (<0.001)	-0.0199 (<0.001)
R <sup>2</sup>	0.4268	0.5999	0.4244
N	5,179		

Table 4 reports the results of the robust regressions where Wholesalers' Profit margin, ROA, and ROE are explained by the four control variables (i.e. size, M/B, Leverage, and Tangibility) and the ADS Index (equation (1)). When we look at the main independent variable, the ADS Index, again we are seeing that in all three regressions, the coefficient for the ADS Index is significant at 1% level. In the first regression where Profit Margin is explained, the coefficient for the ADS Index is 0.0018, meaning that for each unit increase in the ADS Index, Wholesalers' profit margin go up by 0.18%. . In the second regression where ROA is explained, the coefficient for the ADS Index is 0.0010, meaning that for each unit increase in the ADS Index, Wholesalers' ROA go up by 0.10%. In the third regression where ROE is explained, the coefficient for the ADS Index is 0.0034, meaning that ROE go up by 0.34% for each unit increase in the ADS Index. The results here indicate that, as expected, business conditions significantly affect Wholesalers' profitability values.

The results in Table 3 and Table 4 confirm our first hypothesis: Both Retailers and Wholesalers have lower profitability values in bad economic times. On the other hand, when we compare Tables 3 and 4, we can say that Wholesalers' profitability values are more sensitive to a change in business conditions when compared to Retailers' values. For example, for each unit increase in the ADS index, while Retailers' ROA go up by 0.05%, Wholesalers' ROA go up by 0.10% (i.e. double). Also, for each unit increase in the index, while Retailers' ROE go up by 0.21%, the corresponding increase for Wholesalers is 0.34%.

**Table 4. The Impact of Macroeconomic Factors on Wholesalers' Profitability Measures**

Model	Profit Margin	ROA	ROE
C <sub>0</sub>	-0.0006 (0.6653)	-0.0058 (<0.001)	-0.0335 (<0.001)
ADS Index	0.0018 (0.0084)	0.0010 (<0.001)	0.0034 (<0.001)
Size	0.0008 (<0.001)	0.0006 (<0.001)	0.0008 (<0.001)
M/B	0.0000 (0.8401)	0.0001 (0.2011)	0.0006 (<0.001)
Leverage	-0.0324 (<0.001)	-0.0093 (<0.001)	0.0280 (<0.001)
Profitability	1.2295 (<0.001)	0.6943 (<0.001)	1.4062 (<0.001)
Tangibility	-0.0089 (<0.001)	-0.0140 (<0.001)	-0.0284 (<0.001)
R <sup>2</sup>	0.3190	0.4810	0.3527
N	4,401		

Table 5 reports the results of the robust regressions where Retailers' liquidity values are explained by the five control variables (i.e. size, M/B, Leverage, Profitability, and Tangibility) and the ADS Index (equation (2)). In the first regression where Current Ratio is explained, the coefficient for the ADS Index is positive but statistically insignificant (coefficient=0.0177, p-value=0.3393). In other words, as expected, the business conditions index does not explain Retailers' current ratios. On the other hand, in the second regression where Quick Ratio is explained, the coefficient for the ADS Index is positive, and it is significant at 1% level (coefficient=0.0585, p-value<0.001). As expected, the ADS Index explains Retailers' Quick ratios. When conditions are more favorable, Retailers' Quick ratios go up but their Current Ratios are stable. Therefore, Hypothesis 2 is confirmed for Retailers.

Table 6 reports the results of the robust regressions where Wholesalers' liquidity values are explained by the five control variables (i.e. size, M/B, Leverage, Profitability, and Tangibility) and the ADS Index (equation (2)). In the first regression where Current Ratio is explained, the coefficient for the ADS Index is negative but insignificant at 10% level (coefficient=-0.0253, p-value=0.1980). In other words, as expected, the business conditions index does not significantly explain Wholesalers' current ratios. In the second regression where Quick Ratio is explained, interestingly the coefficient for the ADS Index is positive but insignificant at 10% level (coefficient=0.0108, p-value=0.4542). Here, we are seeing that, for Wholesalers, neither Current ratio nor Quick Ratio is affected by business conditions. Therefore, Hypothesis 2 is only partly confirmed for Wholesalers (instead of just the Current Ratio, both ratios are stable)

**Table 5. The Impact of Macroeconomic Factors on Retailers' Liquidity Measures**

Model	Current Ratio	Quick Ratio
C <sub>0</sub>	3.4777 (<0.001)	1.3506 (<0.001)
ADS Index	0.0177 (0.3393)	0.0585 (<0.001)
Size	-0.0258 (<0.001)	-0.0120 (0.0028)
M/B	0.0145 (0.0367)	0.0751 (<0.001)
Leverage	-2.4547 (<0.001)	-1.1700 (<0.001)
Profitability	1.1182 (<0.001)	0.4022 (0.0013)
Tangibility	-0.9098 (<0.001)	-0.4354 (<0.001)
R <sup>2</sup>	0.2739	0.1311
N	5,179	

**Table 6. The Impact of Macroeconomic Factors on Wholesalers' Liquidity Measures**

Model	Current Ratio	Quick Ratio
C <sub>0</sub>	3.7463 (<0.001)	2.2989 (<0.001)
ADS Index	-0.0253 (0.1980)	0.0108 (0.4542)
Size	0.0115 (0.0215)	-0.0080 (0.0302)
M/B	-0.0049 (0.2113)	0.0073 (0.0101)
Leverage	-3.0125 (<0.001)	-1.8586 (<0.001)
Profitability	1.4354 (<0.001)	0.1651 (0.3073)
Tangibility	-0.8613 (<0.001)	-0.2724 (<0.001)
R <sup>2</sup>	0.3048	0.2298
N	4,401	

## 6. Conclusion

Previous studies have shown that firms suffer financially during economic downturns. These studies generally show that a general economic recession/expansion classification successfully explains firms' financials. A few of these studies have even focused on the impact of business cycles on retailers' financial performance.

This current study is an improvement over the previous papers in two ways: First, it examines the impact of business conditions on both retailers and wholesalers, and then compares the two groups. The results here show which group is affected more by economic downturns. Second, it uses a recently developed index that measures the strength of the economy continuously rather than the more general economic recession/expansion classification. This recently developed index, the ADS Index, tracks several different economic indicators. These are weekly initial jobless claims, monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales, and quarterly real GDP in real time. The daily values of the index are posted on Philadelphia Fed's website.

The results here show that when the ADS Index increases by one unit, retailers' profit margin, return on assets, and return on equity values increase by 0.19%, 0.05%, and 0.21%, respectively. The corresponding increases for wholesalers' are 0.18%, 0.10%, and 0.34%. All of these impacts are statistically significant at 1% level. While the results for profitability are statistically significant for both groups, the results for liquidity are weak. For retailers, only quick ratio results are significant. This is as expected because Banerjee and Kaya (2013) show that there is no significant difference between trade firms' current assets or current liabilities across business cycles. The insignificant result for current ratio is also as expected because Banerjee and Kaya (2013) show that firms' inventory levels are significantly lower in expansionary periods compared to recessionary periods, and as we know, quick ratio excludes inventory.

For wholesalers, none of the liquidity measures are significantly affected by the business conditions. Wholesalers' liquidity levels do not seem to significantly change when business conditions change.

Besides comparing how retailers and wholesalers perform during economic downturns, this study also provides us with a tool to estimate these firms' profitability and liquidity measures in between the quarterly financial statements. Any researcher or investor who wants to estimate a retailer's or a wholesaler's financials can do so by using the findings here. We now know the change in these firms' profitability and liquidity measures when there is a unit change in the ADS Index.

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