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Informational rigidities and the stickiness of temporary Sales☆

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ABSTRACT

How do retailers react to cost changes? While temporary sales account for 95% of price change in our data, retail prices respond to a wholesale cost increase entirely through the regular price. Sales actually respond temporarily in the *opposite* direction from regular prices, as though to conceal the price hike. Additional evidence from responses to commodity cost and local unemployment shocks, as well as broader evidence from BLS data, reinforces these findings. Institutional evidence indicates that sales are complex contingent contracts, determined substantially in advance. In a standard price-discrimination model, these institutional practices leave little money "on the table".

1. Introduction

The speed of price adjustment to aggregate shocks is a central determinant of the effects of demand shocks on output and in particular the effects of monetary and fiscal policy. In an influential study, Bils and Klenow (2004) show that consumer prices adjust quite frequently. Subsequent empirical work has shown, however, that much of this price flexibility is due to temporary sales, which have empirical characteristics that are vastly different from "regular" price changes (Nakamura and Steinsson, 2008). An important question is to what extent price changes associated with temporary sales contribute to the adjustment of aggregate inflation to aggregate shocks.

A growing literature on sticky information points out that even if prices do change, they may fail to respond to recent economic shocks if the information set on which the price changes are contingent is old (e.g., Mankiw and Reis, 2002; Burstein, 2006). In these cases, the prices may be flexible but follow "sticky plans" whereby pricing decisions are made only periodically. Section 8 discusses how the institutions of price setting in the consumer packaged goods industry are such

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that the timing and magnitude of sales are determined by trade promotion budgets and schedules that are largely set at low frequencies.

Motivated by this institutional evidence, we investigate to what extent temporary sales reflect sticky plans as opposed to playing an important role in how retailers respond to cost shocks. The paper uses a detailed data set on retail and wholesale prices from a large US retailer over the period 2006–2009. Our main empirical exercise is to study how the retailer responds to wholesale cost increases. If both regular prices and sales are equally flexible margins of adjustment, then in response to a wholesale cost increase, the retailer might (1) raise the regular price, (2) decrease the frequency or size of sales, or (3) both.[1] Because temporary sales account for 95% of all price changes in our data, one might think that sale prices account for a large share of retail price adjustment to cost shocks.

Our findings contrast strongly with this prediction. In a substantial fraction of cases, when the base wholesale price increases, the regular retail price responds quickly and completely. In the remaining cases, the regular retail price responds more incompletely and with some delay. However, in neither of these cases do we find any evidence of a decrease in the frequency or size of temporary sales. To the contrary, we find that discounts temporarily *increase* when regular retail prices increase in response to a wholesale price increase–suggesting that the retailer is trying to mask the associated regular price increase.

We present three additional pieces of evidence for our central finding that sales do not play an important role in how prices respond to macroeconomic shocks. First, we provide evidence that temporary sales fail to react to commodity cost shocks. While the frequency of regular price increases roughly quadrupled in response to the sharp commodity price increases in the middle part of our sample (i.e., the Great Recession), we find no response in sales. Second, we provide evidence that temporary sales fail to react to changes in local unemployment rates. Third, we use BLS microdata to show that time variation in sale prices does not contribute to the variance or cyclicality of inflation, or to the response of inflation to an identified monetary policy shock in a vector autoregression (VAR).[2] This generalizes our finding that retailers do not use sales to respond to shocks beyond just a single retailer.

We conclude the paper by asking two questions. First, we ask why retailers respond to cost and demand shocks by adjusting regular prices instead of sale prices. We use Hendel and Nevo's (2013) model of sales to study the profit losses that firms face in not adjusting their discounts in response to cost shocks. In this model, the optimal response to higher costs is for the retailer to raise regular prices and reduce discount depth. However, the profit advantage to the retailer from optimally adjusting the magnitude of discounts in response to changes in marginal costs is miniscule: two orders of magnitude smaller than the benefits of price discrimination per se. While the use of sale prices to price discriminate is crucially important, varying the extent of price discrimination in response to a cost shock is not.

Second, given that 95% of the price variation in our data is explained by sales, are sale prices truly flexible? We present institutional features of retail and wholesale pricing for consumer packaged goods that indicate that sale prices are governed by sticky plans. Most sales are "funded" out of trade promotions budgets and planned substantially in advance according to a "trade promotions calendar." Both the trade promotions budget and the calendar are revised only infrequently. Hence, although the trade promotion system yields price variation, the system itself is not easily varied.

These institutional features also help to reconcile our findings with previous results reported by Eichenbaum et al. (2011) (henceforth, EJR). In particular, the finding that retailers respond to cost increases using the regular price instead of sale prices may at first appear to be at odds with EJR, who find that the vast majority of sales are associated with a change in wholesale prices. Does this imply that sales are, in fact, a key part of the response to wholesale price movements? Not necessarily. EJR's measure of wholesale prices includes manufacturer trade deals. Our discussion of the institutions of pricing in consumer packaged goods highlights two institutional features of trade deals that suggest we need to be cautious when interpreting variation in sale prices in response to trade deals as a measure of whether retailers use sale prices to respond to cost shocks. First, since reductions in wholesale prices during trade deals are often "funded" from trade deal budgets, which retailers are "spending down" when they hold a sale, observed movements in wholesale prices associated with such trade deals may not reflect true reductions in marginal costs (much like plane tickets purchased with frequent flyer points are not free). But if marginal costs do not change at the time of trade deals, why do retailers change the retail price at these times? They do so because a contractual obligation is associated with receiving the trade deal funds—the second institutional feature of trade deals we wish to emphasize in this context. Trade deals are jointly planned well in advance, and manufacturers often require evidence that the retailer actually put the product on sale before they will release the allocated funding from the trade deal budget. These institutional features of trade deals help to explain why EJR's estimates of cost pass-through from wholesale prices (including trade deals) are so much higher than estimates of the pass-through of underlying manufacturer costs (see, for example, Nakamura and Zerom, 2010, and Hong and Li, 2017).

Although trade deal budgets are generally stable, we recognize that they are not completely inflexible. Manufacturers may occasionally adjust their trade deal budgets, and these events could be interpreted as cost shocks to the retailer. Moreover, we cannot rule out the possibility that such adjustments are sometimes influenced by macroeconomic conditions. However, we see no evidence of this in our investigation of (1) the response to commodity cost shocks, (2) the response to changes

[1] Section 7 shows that both outcomes are predicted by Hendel and Nevo's (2013) model.

[2] There is some evidence of a lower-frequency relationship between the level of discounts and unemployment, as emphasized by Kryvtsov and Vincent (2014), but even there, the magnitude of the cyclical fluctuations in the discount is very small. See our discussion at the end of Section 6.