Responding to Costs

Variation in coffee bean (commodity) costs is a major cause of variation in manufacturer prices. Table 2 presents regressions of changes in coffee prices on lagged changes in coffee bean costs. The first panel presents results for manufacturer prices, while the second panel presents results for retail prices. For comparability, the statistics are for 2000-04. The "base" prices don't include sales (in the case of retail prices) or trade deals (in the case of manufacturer prices) in order to estimate the impact of commodity prices on both regular prices and prices including sales and promotions.

A standard specification of a cost pass-through regression from the international economics literature was used (see Goldberg and Campa, 2004). In particular, we regress current changes in prices on current and past changes in costs to analyze quarterly data. This is because coffee commodity costs are highly persistent: the hypothesis of a unit root cannot be rejected.[11] The pass-through regressions may be seen as tracing out an impulse response function to changes in costs: the estimated coefficients indicate what fraction of the change in commodity costs at a certain point in time is reflected in current price changes. The sum of the coefficients gives the longrun response of prices to costs (Goldberg and Campa, 2004).[12]

[11] An alternative approach would be to estimate an error-correction model, as used by Gomez and Koerner (2002). However, there may be no cointegration between coffee prices and commodity costs over the time period. In addition, methods for analyzing cointegration in panel data are new and developing.

[12] The number of lags in the regression were selected such that adding additional lags did not affect the longrun rate of pass-through.

Table 2
Regression of current price changes on past changes in commodity cost[1] (quarterly data)

Variable	Manufacturer prices		Retail prices	
	Base	Net	Base	Net
Δ Commodity cost (t)	0.272	0.215	-0.122	0.142
	(0.055)	(0.066)	(0.020)	(0.039)
Δ Commodity cost (t-1)	0.480	0.488	0.500	0.450
	(0.034)	(0.039)	(0.138)	(0.024)
Δ Commodity cost (t-2)	0.003	0.002	0.301	0.015
	(0.028)	(0.024)	(0.009)	(0.017)
Δ Commodity cost (t-3)	-0.031	0.030	0.040	0.072
	(0.025)	(0.024)	(0.009)	(0.016)
Δ Commodity cost (t-4)	-0.017	0.075	-0.043	0.137
	(0.029)	(0.027)	(0.010)	(0.017)
Δ Commodity cost (t-5)	-0.072	0.078	0.036	0.078
	(0.023)	(0.029)	(0.009)	(0.016)
Δ Commodity cost (t-6)	-0.038	-0.029	0.118	0.006
	(0.024)	(0.026)	(0.009)	(0.020)
Constant	-0.005	-0.0001	0.001	0.006
	(0.0003)	(0.001)	(0.0002)	(0.0003)
Quarter dummies	Yes	Yes	Yes	Yes
Number of observations	2,506	3,649	46,243	46,243
R^2	0.189	0.114	0.060	0.079

Source: Authors' analysis of Nielsen, Promodata, and New York Board of Trade data, 2000-04.

[1] The dependent variable in these regressions is the change in price in a particular quarter. The standard errors are clustered by unique product and market for the manufacturer price regressions.

The regressions indicate that, on average, a 10-cent increase in green-coffee-bean prices yields approximately a 2-cent increase in both net manufacturer and net retail prices in the current quarter (2.1 cents for wholesale prices and 1.4 cents for retail prices). If a cost change persists for several periods it will be incorporated into manufacturer prices approximately cent-for-cent with the size of the change in the commodity cost.

A cent-for-cent decrease in prices due to decreasing costs does not imply a constant percentage markup of prices over marginal costs. Indeed, for the percentage markup to remain fixed, prices would have to fall more than one for one with costs. This distinction is particularly important when fixed costs are substantial, so gross margin above marginal cost is high, as is the case for ground coffee.

Consider the dramatic fall in coffee prices between the first quarter of 2000 and the last quarter of 2001, when coffee beans traded on the New York Board of Trade (NYBOT) lost about 65 percent of their original value. The per-ounce cost of coffee beans fell by about 5.5 cents, while average manufacturer and retail coffee prices both fell by 4 to 5 cents. While the retail and manufacturer price changes are similar in magnitude to the change in commodity costs, the percentage change is very different. As a consequence, the percentage markup of prices over marginal costs for coffee manufacturers increased dramatically during this period.

To follow up on this idea, cost pass-through regressions for prices and costs are presented in log form. In these regressions, the coefficients indicate the percentage change in prices associated with a given percentage change in costs.

Recall that the sum of the coefficients for the different lags can be interpreted as the long-term effect of a cost shock. Summing the coefficients in this way yields a longrun rate of pass-through of 0.247 for net retail prices and 0.262 for net manufacturer prices. This implies that, on average, a 10-percent increase in manufacturer green-coffee-bean prices yields about a 3-percent increase in retail and manufacturer prices. Thus, the regression in logs provides direct evidence that a given percentage change in cost translates into a much smaller percentage change in manufacturer or retail prices.

There are two reasons for the difference between pass-through in levels and pass-through in logs. First, there is a substantial markup of prices over marginal costs in this industry. Second, variable inputs other than green coffee beans contribute to marginal cost. These factors drive a wedge between commodity costs and prices, implying that full pass-through, in percentage terms, differs substantially from cent-for-cent pass-through.

A report on prices for soluble (instant) coffee in the United Kingdom finds similar results on the nature of price adjustment. According to the United Kingdom Competition Commission report, "An econometric estimation of the relationship between green-coffee-bean prices and retail selling prices over the last 10 years showed that, for Maxwell House soluble coffee, a 1-pound increase in the cost of beans for delivery in 45 days led to an increase of more or less exactly 1 pound in retail selling prices over a year; over half of that increase occurred within 4 months" (United Kingdom Competition

Commission, 1991). A similar rate of pass-through was also found for Sweden, Denmark, and Finland (Durevall, 2003). This "additive" pass-through is also found in the gasoline market (Borenstein et al., 1997).

In interpreting this type of cost pass-through regression, it is not clear whether manufacturer prices respond to lagged changes in commodity prices because of actual delays in response or because manufacturer prices respond only to changes in commodity costs that are expected to persist for some period of time. These two effects may be confounded because changes in commodity costs that have already lasted for several periods may also be more likely to persist in the future.

The R^2 values for the regression results presented in tables 2 and 3 reiterate that variation in green-coffee-bean prices explains a much higher share of the variation in manufacturer than in retail prices. The main reason for this difference is that there is a greater deal of high-frequency "noise" in retail prices than in manufacturer prices. Much of this noise is associated with retail promotions. The explanatory power of the regression is much higher if regular retail prices, excluding promotional prices, are used.

Table 3
Regression of log current price changes on log past changes in commodity cost[1] (quarterly data)

Variable	Log manufacturer prices		Log retail prices	
	Base	Net	Base	Net
Δ Commodity cost (t)	0.122	0.117	-0.034	0.062
	(0.014)	(0.016)	(0.006)	(0.012)
Δ Commodity cost (t-1)	0.148	0.151	0.125	0.104
	(0.010)	(0.011)	(0.004)	(0.016)
Δ Commodity cost (t-2)	-0.016	-0.024	0.092	0.012
	(0.009)	(0.009)	(0.003)	(0.048)
Δ Commodity cost (t-3)	-0.034	-0.010	0.015	0.027
	(0.008)	(0.008)	(0.003)	(0.039)
Δ Commodity cost (t-4)	-0.008	0.028	-0.022	0.042
	(0.011)	(0.011)	(0.004)	(0.034)
Δ Commodity cost (t-5)	0.033	0.024	0.0001	0.007
	(0.008)	(0.009)	(0.003)	(0.017)
Δ Commodity cost (t-6)	-0.027	-0.041	0.040	-0.018
	(0.009)	(0.010)	(0.003)	(0.035)
Constant	-0.036	-0.009	0.010	0.029
	(0.002)	(0.003)	(0.001)	(0.011)
Quarter dummies	Yes	Yes	Yes	Yes
Number of observations	2,506	3,649	46,243	46,243
R^2	0.194	0.1316	0.053	0.071

Source: Authors' analysis of Nielsen, Promodata, and New York Board of Trade data.
[1]The dependent variable in these regressions in the log change in price in a particular quarter. The standard errors are clustered by brand.