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I. Introduction

The nature of adjustment of economic variables such as the price level to changes in monetary policy has been the subject of many studies and the center of much controversy among economists. The neutrality of money in the long run is accepted by most, and the focus has shifted to the relationship between money and prices in the short run. In his 1981 survey of price adjustment studies, Gordon (1982) considers the short-run inertia of prices to be the main point of contention between "auction market theorists" and "disequilibrium theorists."

Less attention has been paid to the distribution of price changes across sectors in the economy. However, if prices in different markets exhibit varying degrees of flexibility, the short-run effects of monetary policy on prices in those markets will differ.

In this paper, we consider the role played by the flexibility of prices in different sectors of the economy in determining the effects of money growth on those sectors. We show that the agricultural and nonagricultural sectors of the U. S. economy experience different short-run reactions to money growth and that the same distinction holds for farm and retail food prices. We also examine potential changes in these relationships that may have resulted from the two major shifts in U. S. monetary policy during the 1970s.

The theoretical model is a variant of the Dornbusch model of exchange rate determination in which the assumption of sticky goods prices is replaced by one in which some goods prices vary freely. Agricultural commodities are treated as flex-price goods while nonagricultural goods are treated as fixed-price goods, to use the terms suggested by Hicks (1974). We show that the model produces overshooting of agricultural prices analogous to the overshooting of the exchange rate in the Dornbusch model. Empirical evidence in support of the result appears in the third section along with tests for changes in price flexibility over time.

II. The Behavior of Agricultural Prices When Other Goods Prices are Sticky

Dornbusch (1976) showed that, in an asset market framework, the exchange rate can overshoot its long-run equilibrium value following a monetary shock if the nominal prices of other goods in the economy are sticky, perhaps due to costly price adjustment. If long-run neutrality holds, initial relative prices are restored once all adjustments have occurred. The path taken by goods prices to the new equilibrium level will determine the adjustment of the exchange rate to its long-run equilibrium.

For the sake of the discussion, we treat all agricultural commodities as flex-price goods and all nonagricultural goods as fixed-price. Arguably, some nonagricultural goods fit the former classification while several agricultural commodities exhibit some downward inflexibility of prices due to price-support schemes. The model could also be generalized by allowing for a trend rate of money growth and inflation, but simplicity is gained by treating the money stock as changing only at discrete intervals, and otherwise known and constant.

Our simple version of the overshooting model includes two goods sectors and a money market, and it can be used to illustrate the effects of a one-shot change in the money stock. Generalization to a secular money growth/inflation model would simply require that these shocks be deviations from some trend growth. Of course, any resulting price effects would be deviations of nominal prices from their implied long-term path.

Frankel (1979) used the overshooting model to combine competing theories of exchange-rate determination. His empirical analysis of the dollar-deutschemark exchange rate provided support for the sticky price model. Other generalizations of the Dornbusch model which focus on the exchange rate are given by Mussa (1981) and Obstfeld and Rogoff (1984). Frankel (1986) and Frankel and Hardouvelis (1985) have examined the behavior of flexible prices other than the exchange rate using an overshooting model. In their work they considered commodity inventories as assets with rates of return related to yields on securities by an arbitrage condition. Their results indicate that commodity futures prices react instantaneously to the difference between actual and expected money supply announcements.

The model is based on uncovered interest parity so that

$$i = i^* + x \tag{1}$$

where i denotes the domestic nominal interest rate, i^* is the rest-of-world rate, and x is the expected rate of depreciation of the domestic currency. The domestic country is assumed to be a small country so that i^* is exogenously determined.

The expected rate of depreciation is assumed to be proportional to the gap between the current and long-run equilibrium exchange rates,

$$x = \Theta(\bar{e} - e), \qquad \Theta > 0, \tag{2}$$

where e is measured as the logarithm of the domestic price of the rest-of-world currency. This expectations scheme can be shown to be consistent with perfect foresight in this model (Dornbusch, 1976). Long-run equilibrium is characterized by $x = 0$, $i = i^*$, and $e = \bar{e}$.

The money market is assumed to clear at every point in time with money demand given by

$$m - q = \phi y - \lambda i \tag{3}$$

where m is the logarithm of the money supply, q is the logarithm of a price index, and y is the logarithm of income. The price index is a weighted average of the two prices in the economy:

$$q = \alpha p_N + (1 - \alpha)p_A \tag{4}$$

where p_N is the logarithm of the nonagricultural price and p_A is the logarithm of the agricultural price.

Assumptions about the tradability of the fixed-price good are unimportant to the results so long as some reason for price stickiness exists. However, the agricultural good is assumed to be traded and to obey the law of one price even in the short run so that

$$e = p_A - p_A^*. \tag{5}$$

The small country assumption permits p_A^* to be set equal to zero by normalization.

Combining equations, real money demand is

$$m - \alpha p_N - (1 - \alpha)\, e = \phi y - \lambda i \tag{6}$$

or, substituting both (1) and (2),

$$m - \alpha p_N - (1 - \alpha)\, e = \phi y - \lambda\Theta(\bar{e} - e) - \lambda i^*. \tag{7}$$

This expression summarizes equilibrium in financial asset markets. If the current values for m and y are taken to be long-run equilibrium values, the long-run version of (6),

$$\bar{m} - \alpha\bar{p}_N - (1 - \alpha)\, \bar{e} = -\lambda i^* + \phi\bar{y}, \tag{8}$$

may be subtracted to yield

$$\alpha(\bar{p}_N - p_N) + (1 - \alpha)\, (\bar{e} - e) = -\lambda\Theta(\bar{e} - e) \tag{9}$$

or

$$e - \bar{e} = -\alpha[(1 - \alpha) + \lambda\Theta]^{-1}\, (p_N - \bar{p}_N). \tag{10}$$

The exchange rate deviates from its long-run equilibrium value by an amount proportional to deviation of the nonagricultural price from its long-run level. This is equivalent to

$$p_A - \bar{p}_A = -\alpha[(1 - \alpha) + \lambda\Theta]^{-1}\, (p_N - \bar{p}_N). \tag{11}$$

Since $dp_N/dm = 0$ and $d\bar{p}_N/dm = d\bar{p}_A/dm = 1$, the derivative of (11) with respect to m gives us the immediate response of p_A to a change in m:

$$\frac{dp_A}{dm} = 1 + \frac{\alpha}{(1 - \alpha) + \lambda\Theta} \tag{12}$$

Conceptually, a one-shot doubling of the money supply that leaves y unaffected would double both p_A and p_N in a world of perfect price flexibility. But if p_N is sticky, p_A and e immediately more than double or overshoot their new equilibrium values. According to the above results, p_A and e gradually fall to $\bar{p}_A$ and $\bar{e}$ as p_N rises to $\bar{p}_N$ over time. Initial relative prices are eventually restored so long as long-run neutrality holds. A similar overshooting of nominal e and p_A would occur following decreases in the money supply. The case of $\alpha = 1$ is the Dornbusch (1976) solution in which all goods prices are sticky. A value of α in between zero (perfect price flexibility and no overshooting) and one produces a smaller degree of overshooting--the more flex-price markets, the less they are characterized by overshooting.

The predictions from the overshooting model appear to fit the experience of U. S. agriculture during the 1970s and 1980s (Rausser, et al., 1986). Granted, the law of one price and the uncovered interest parity assumptions made above may not hold in the short run for the United States. However, there does appear to be a link between accommodating monetary policy and relative prices favorable to agriculture and between tight money and unfavorable relative prices.

This can occur so long as agricultural prices are more flexible than nonagricultural prices. Should the law of one price fail to hold, there will still be relative price changes--even though p_A may not actually overshoot--to the extent that agricultural prices adjust more rapidly than nonagricultural prices. Similarly, the exchange rate itself may fail to overshoot following changes in monetary policy because of short-run output effects which result from interest rate changes (Dornbusch, 1976) or because other countries peg the values of their own currencies against the U. S. dollar. However, as long as p_A changes more rapidly than p_N following changes in money growth, there are relative price changes between agricultural and nonagricultural goods.

III. Price Flexibility and Adjustment to Monetary Changes: Empirical Evidence

We tested for differential effects of money growth on prices in different sectors by estimating the following model using percentage changes:

$$\dot{p}_{it} = \alpha_0 + \delta\dot{p}_{i,t-1} + \sum_{i=0}^{K} \beta_i \dot{m}_{t-i} + \sum_{i=0}^{3} \gamma_i \dot{g}_{t-i}. \qquad (13)$$

The lag length, K, was chosen by maximizing $\bar{R}^2$ over the range of models (differing by the lag length on m). A maximum of 12 lags was tried. The index of prices received by farmers (IPRF) was chosen to represent flexible prices while the nonfood component of the Consumer Price Index (CPINF) represented the sticky prices in the economy. Quarterly dummies were included, and a lagged dependent variable was used to capture partial adjustment effects.[1] The magnitude and significance of that variable could also serve as an indicator of price flexibility. To account for any possible short-run cyclical effects of output on the path of prices, output growth variables were included in the equations.

Although one could use the above model to classify prices in terms of their flexibility, our focus was on establishing a basis for examining how monetary policy causes relative price changes which affect the farm sector.

Thus, we distinguish between results obtained using the IPRF from results obtained using the consumer price index for food and beverages (CPIF) which contains a sizable marketing margins component.

Regression results obtained using OLS are reported in Table 1. To test for the neutrality of money, we tested the null hypothesis that the sum of the coefficients of lagged money equals $(1 - \delta)$ where δ is the coefficient of the lagged dependent variable. The test can be derived from equation (12) by observing that in the long run:

$$\dot{p}_{i,t} = \dot{p}_{i,t-1}$$

and that

$$\dot{m}_{t-i} = \dot{m}_{t-\ell}, \qquad \dot{g}_{t-i} = \dot{g}_{t-\ell}, \qquad \text{for all } i,\ \ell;$$

thus, the long-run effect of money on prices can be derived as:

$$\dot{p}_{lr}(1 - \delta) = \sum_i \beta_i \, \dot{m}_{lr} + \sum_i \gamma_i \dot{g}_{t-i_{lr}}$$

and

$$\frac{d\dot{p}_{lr}}{d\dot{m}_{lr}} = \frac{\sum_i \beta_i}{1 - \delta} .$$

So

$$H_0 : \frac{\sum_i \beta_i}{1 - \delta} = 1 \qquad \text{or} \qquad \sum_i \beta_i + \delta = 1. \tag{13}$$

Equation (13) thus becomes the null hypothesis for the neutrality test. On the basis of this test and the $\bar{R}^2$ criterion, a model with only contemporaneous effects of money growth was chosen for the IPRF index while the results

TABLE 1

Regression Results for DIPRF and DCPINF

Variable	DIPRF	DCPINF
C	-4.877 (2.329)[a]	-0.815 (0.720)
$\dot{p}_{t-1}$	0.113 (0.147)	0.692 (0.147)
$\dot{g}_t$	0.267 (0.721)	0.051 (0.135)
$\dot{g}_{t-1}$	0.190 (0.694)	0.068 (0.125)
$\dot{g}_{t-2}$	-0.293 (0.691)	-0.025 (0.120)
$\dot{g}_{t-3}$	1.046 (0.662)	0.043 (0.124)
$\dot{m}_t$	1.568 (0.953)	0.104 (0.189)
$\dot{m}_{t-1}$		-0.099 (0.180)
$\dot{m}_{t-2}$		-0.077 (0.167)
$\dot{m}_{t-3}$		-0.033 (0.172)
$\dot{m}_{t-4}$		0.028 (0.166)
$\dot{m}_{t-5}$		0.144 (0.199)
$\dot{m}_{t-6}$		0.260 (0.176)

(Continued on next page.)

Table 1--continued.

Variable	DIPRF	DCPINF
$\dot{m}_{t-7}$		0.310 (0.167)
$\dot{m}_{t-8}$		0.195 (0.174)
$\dot{m}_{t-9}$		-0.170 (0.196)
$\dot{m}_{t-10}$		0.076 (0.186)
	$\bar{R}^2$ DIPRF = 0.067	$\bar{R}^2$ DCPINF = 0.516

$H_0 \quad : \delta + \beta_0 = 1$ $\qquad$ $H_0 \quad : \delta + \sum_{i=0}^{10} \beta_i = 1$

$F_{1,33}$: 0.482, $P > F = 0.491$ $\qquad$ $F_{1,33}$: 1.031, $P > F = 0.317$

[a]Figures in parentheses are standard errors.

showed that, for the CPINF, a model with 10 lags on money growth was appropriate.

In analyzing the empirical results, we concentrate on several aspects relating to predictions of the theoretical model. Namely, we are interested in the differential effects of money on the different prices, the neutrality hypothesis [as expressed in (13)], the overshooting hypothesis $\left(dp_t^{IPRF}/dm_t > 1\right)$, and the differential speed of adjustment of different prices (as expressed by the coefficient of the lagged dependent variable).

The instantaneous effect on flexible farm prices is estimated to be 1.57 which suggests overshooting. While the associated standard error is large, the point estimate and the small and insignificant partial adjustment effect are consistent with the price flexibility assumption. In contrast, for the CPINF, both the instantaneous effect and the coefficient and significance of the lagged dependent variable suggest slower adjustment. The sum of the coefficients on money growth and the lagged dependent variable coefficient is not significantly different from 1. Later lags on money are more significant than earlier ones.

The distinction between a rapid adjustment of farm prices as opposed to a slow one for nonfarm ones is consistent across lag lengths. In fact, a model for farm prices with 10 lags features a larger and more statistically significant instantaneous effect of money growth. To test hypotheses across equations, a second set of results was derived by jointly estimating the preferred models using Zellner's Seemingly Unrelated Regressions technique. Note that the results for this approach shown in Table 2 are not substantially different than the ones presented in Table 1. The joint test for an equal instantaneous response of the two prices to the monetary shock cannot be rejected at the 10 percent significance level.

TABLE 2

Regression Results for DIPRF and DCPINF

Variable	DIPRF	DCPINF
C	-4.954 (2.329)[a]	-0.883 (0.716)
$\dot{p}_{t-1}$	0.144 (0.146)	0.671 (0.146)
$\dot{g}_t$	0.238 (0.721)	0.059 (0.135)
$\dot{g}_{t-1}$	0.177 (0.695)	0.083 (0.125)
$\dot{g}_{t-2}$	-0.295 (0.691)	-0.027 (0.120)
$\dot{g}_{t-3}$	1.048 (0.662)	0.045 (0.124)
$\dot{m}_t$	1.591 (0.953)	0.109 (0.189)
$\dot{m}_{t-1}$		-0.137 (0.179)
$\dot{m}_{t-2}$		-0.082 (0.166)
$\dot{m}_{t-3}$		-0.045 (0.171)
$\dot{m}_{t-4}$		0.053 (0.165)
$\dot{m}_{t-5}$		0.122 (0.198)
$\dot{m}_{t-6}$		0.296 (0.174)

(Continued on next page.)

Table 2--continued.

Variable	DIPRF	DCPINF
m_{t-7}		0.327 (0.165)
m_{t-8}		0.220 (0.172)
m_{t-9}		-0.175 (0.194)
m_{t-10}		0.120 (0.184)

H_0 : $DM_{IPRF} = DM_{CPINF}$

$F_{1,76}$: 2.016, $P > F = 0.159$

[a]Figures in parentheses are standard errors.

In the theoretical model presented in the previous section, overshooting of flex prices to a shock is defined in reference to the long-run equilibrium in which the whole system reaches equilibrium simultaneously (both flex and fixed prices). Since for the case of 10 lags on money growth, the sum of the coefficients does not significantly differ from 1 for either price index; and given the selection criterion for lag length, the parameters of the two models were jointly estimated using SUR assuming a lag length of 10 for both. Results are shown in Table 3. The magnitude and significance of the instantaneous effect of money on the IPRF are as suggested by theory. Both the magnitude of the coefficients and t-statistics suggest a strong and significant reaction of IPRF to changes in money growth. An F-test at the 5 percent level revealed that the instantaneous responses of the two prices differ significantly, a result that supports the assumption in the theoretical model. A joint test that the sum of the coefficients on money in each of the models is equal to 1 cannot be rejected at the 5 percent significance level. Results of the tests are also presented in Table 3.

Table 4 includes the results for the best-fitting model for the CPIF. The behavior of this regression is more similar to that of the CPINF than it is to the IPRF. Lombra and Mehra (1983) found a larger but slower effect of money growth on food prices the further along the marketing chain, so this is consistent with their results. We find that the fourth lag on money growth is the most important of the 12 lags and that the neutrality hypothesis is rejected for shorter lag lengths. Also indicating the stickiness of the CPIF is the large and significant coefficient on the lagged dependent variable.

Finally, Table 5 presents results from the joint estimation (using SUR) of the three equations. For the reasons explained above, a 10th order lag was

TABLE 3

Regression Results for DIPRF and DCPINF

Variable	DIPRF	DCPINF
C	-8.469 (5.261)[a]	-0.820 (0.720)
$\dot{p}_{t-1}$	0.212 (0.169)	0.667 (0.145)
$\dot{g}_t$	0.474 (1.012)	0.054 (0.135)
$\dot{g}_{t-1}$	1.066 (0.904)	0.068 (0.125)
$\dot{g}_{t-2}$	-0.452 (0.873)	-0.025 (0.120)
$\dot{g}_{t-3}$	1.403 (0.891)	0.040 (0.124)
$\dot{m}_t$	2.778 (1.255)	0.090 (0.188)
$\dot{m}_{t-1}$	-2.192 (1.305)	-0.103 (0.180)
$\dot{m}_{t-2}$	-0.060 (1.234)	-0.079 (0.167)
$\dot{m}_{t-3}$	-0.902 (1.237)	-0.030 (0.172)
$\dot{m}_{t-4}$	1.591 (1.193)	0.026 (0.166)
$\dot{m}_{t-5}$	-1.917 (1.500)	0.151 (0.200)
$\dot{m}_{t-6}$	1.828 (1.226)	0.267 (0.176)

(Continued on next page.)

Table 3--continued.

Variable	DIPRF	DCPINF
m_{t-7}	0.554 (1.164)	0.318 (0.167)
m_{t-8}	0.847 (1.173)	0.206 (0.174)
m_{t-9}	-1.268 (1.238)	-0.153 (0.195)
m_{t-10}	2.501 (1.330)	0.080 (0.186)

H_0 : $DM_{IPRF} = DM_{CPINF}$

$F_{1,66}$: 4.330, $P > F = 0.041$

$$H_0 : \frac{1}{1-\delta} * \sum_{i=0}^{10} \beta_i^{DIPRF} = 1, \quad \frac{1}{1-\delta} * \sum_{i=0}^{10} \beta_i^{DCPINF} = 1$$

$F_{2,66}$: 1.1998, $P > F = 0.308$

[a]Figures in parentheses are standard errors.

TABLE 4

Regression Results for DCPIF

Variable	DCPIF
C	-0.981 (1.401)[a]
$\dot{P}_{t-1}$	0.532 (0.158)
$\dot{g}_t$	0.100 (0.199)
$\dot{g}_{t-1}$	0.459 (0.196)
$\dot{g}_{t-2}$	-0.166 (0.213)
$\dot{g}_{t-3}$	0.072 (0.197)
$\dot{m}_t$	0.066 (0.281)
$\dot{m}_{t-1}$	-0.305 (0.262)
$\dot{m}_{t-2}$	-0.375 (0.276)
$\dot{m}_{t-3}$	-0.028 (0.312)
$\dot{m}_{t-4}$	0.607 (0.245)
$\dot{m}_{t-5}$	-0.005 (0.317)
$\dot{m}_{t-6}$	0.227 (0.269)

(Continued on next page.)

Table 4--continued.

Variable	DCPINF
$\hat{m}_{t-7}$	0.195 (0.267)
$\hat{m}_{t-8}$	0.396 (0.267)
$\hat{m}_{t-9}$	-0.102 (0.274)
$\hat{m}_{t-10}$	0.193 (0.273)
$\hat{m}_{t-11}$	0.447 (0.283)
$\hat{m}_{t-12}$	-0.396 (0.310)

$$H_0 \quad : \frac{1}{1-\delta} * \sum_{i=0}^{12} \beta_i = 1$$

$F_{1,31}$: 0.344, $P > F = 0.562$

[a]Figures in parentheses are standard errors.

TABLE 5

Regression Results for DIPRF, DCPINF, and DCPIF

Variable	DIPRF	DCPINF	DCPIF
C	-9.633 (5.232)[a]	-0.824 (0.720)	-1.044 (1.091)
$\dot{p}_{t-1}$	0.000 (0.136)	0.643 (0.145)	0.459 (0.129)
$\dot{g}_t$	0.847 (0.997)	0.056 (0.135)	0.113 (0.205)
$\dot{g}_{t-1}$	1.181 (0.903)	0.068 (0.125)	0.372 (0.189)
$\dot{g}_{t-2}$	-0.287 (0.869)	-0.025 (0.120)	-0.114 (0.189)
$\dot{g}_{t-3}$	1.235 (0.888)	0.036 (0.124)	0.118 (0.185)
$\dot{m}_t$	2.343 (1.298)	0.076 (0.188)	0.065 (0.265)
$\dot{m}_{t-1}$	-1.902 (1.298)	-0.107 (0.180)	-0.279 (0.270)
$\dot{m}_{t-2}$	-0.437 (1.222)	-0.082 (0.167)	-0.224 (0.253)
$\dot{m}_{t-3}$	-0.801 (1.236)	-0.028 (0.172)	-0.180 (0.258)
$\dot{m}_{t-4}$	1.547 (1.193)	0.025 (0.166)	0.513 (0.250)
$\dot{m}_{t-5}$	-1.215 (1.463)	0.159 (0.199)	0.032 (0.315)
$\dot{m}_{t-6}$	1.843 (1.226)	0.274 (0.175)	0.417 (0.264)

(Continued on next page.)

Table 5--continued.

Variable	DIPRF	DCPINF	DCPIF
$\dot{m}_{t-7}$	0.736 (1.161)	0.325 (0.167)	0.003 (0.248)
$\dot{m}_{t-8}$	1.023 (1.170)	0.216 (0.173)	0.530 (0.244)
$\dot{m}_{t-9}$	-0.980 (1.230)	-0.137 (0.195)	-0.088 (0.273)
$\dot{m}_{t-10}$	2.398 (1.329)	0.083 (0.186)	0.267 (0.278)

H_0 : $DM_{IPRF} = DM_{CPINF}$

$F_{1,99}$: 3.208, $P > F = 0.076$

H_0 : $DM_{IPRF} = DM_{CPIF}$

$F_{1,99}$: 4.515, $P > F = 0.036$

H_0 : $DM_{CPINF} = DM_{CPIF}$

$F_{1,99}$: 0.001, $P > F = 0.973$

[a]Figures in parentheses are standard errors.

specified for all the equations. No substantial change in the results and the conclusions derived in the previous models occurs although the significance of the instantaneous effect of money on the flexible price index is reduced. Pairwise F-tests for the equality of instantaneous response coefficients across price indices are also shown in Table 5. The hypothesis of equal instantaneous responses between IPRF and CPINF is rejected at the 10 percent significance level. The equality of the IPRF and CPIF responses is rejected at the 5 percent level while the hypothesis of equal instantaneous responses of CPIF and CPINF cannot be rejected.

The extent to which flexible prices overshoot their long-run equilibrium following a monetary shock depends on several parameters, as shown in (12). It is increasing in α (the share of fixed prices in the price index) and decreasing in λ (the semielasticity of money demand with respect to the interest rate). Thus, changes in the economy affecting these parameters can be expected to cause changes in the relationship between price changes and money growth.

We hypothesized that changes in monetary policy such as the shift to floating exchange rates and the targeting of reserves in October of 1979 could show up as shifts in these parameters. To the extent that moving to floating exchange rates reduced the degree of insulation of some sectors from world prices, α might have fallen in the early 1970s. Similarly, apparent increases in λ over time that were found when a simple money demand equation was estimated suggested that λ had risen with interest rates after 1979 (Stamoulis, 1985; Stamoulis et al., 1985)

We performed Chow tests to see if expected changes in price flexibility followed. In the case of our preferred model for farm prices, we found that there was no statistically significant change in the coefficient on money growth. The effect of money appears to increase slightly after 1973 with a large decrease after 1979, but these changes, although consistent with expectations, were not significant.

IV. Summary and Conclusions

In this paper we have presented a modification of the Dornbusch model which illustrates one means by which money growth can cause relative prices to change in the short run. As long as other prices in the economy are less flexible, money growth will cause the relative price of agricultural products to rise while tight money will have the opposite effect. This was illustrated in the model under the assumptions of a small country and perfect commodity arbitrage.

Empirical results for the United States gave some support to the assumptions. While the results do not confirm the overshooting hypothesis, they are consistent with short-run relative price changes. Given the fact that many sticky price influences enter the index used for the flex-price market, especially for price changes in the downward direction, this is not surprising. At the same time, some of the nonfood prices are flexible. The results obtained by Frankel and Hardouvelis (1985) for specific commodities over a shorter time period would support the observation that our results probably understate the distinction between those commodities which are actually described by perfect price flexibility and the rest of the sectors of the economy. Further research with individual goods prices will be of interest.

Elsewhere we have reported regressions of a similar nature using Australian data (Chalfant et al., 1986). The results suggested the same distinction and the same relative price changes following changes in money growth rates.

We hypothesized structural shifts following changes in the design of monetary policy during the 1970s. These did not appear to have major effects on our regressions suggesting that their influence on price flexibility may not have been that great. Possibly, identifying other events associated with a change in the number of flex-price markets will permit empirical validation of that result.

Finally, one must conclude that, given the ad hoc specifications used for the evidence concerning price flexibility, structural models of the agricultural sector with linkages to the external economy will permit better tests of these propositions. Elsewhere (Rausser et al., 1986), we have reported the results of simulating the effects of different levels of money growth on U. S. agriculture. It is impossible to separate the effects of real interest rate changes, etc., which occur in a model of the U. S. economy from the effects outlined in the simple model presented in this paper. What is clear from such results is that the effects of monetary policy are substantial. Our aim in this paper has been to point out that even a very simple model of price determination could admit this result and that it requires no irrationality, no special exchange rate effects in agriculture, and no large-country assumptions.

APPENDIX: DATA SOURCES

Data Description and Sources

IPRF: Index of Prices Received by Farmers. 1967 = 100. Agricultural Statistics, various issues. U. S. Department of Agriculture, Washington, D. C.

CPINF: Consumer Price Index (all urban)--Commodities Less Food and Beverages. 1967 = 100. U. S. Department of Labor, Bureau of Labor Statistics.

CPIF: Consumer Price Index (all urban)--Food and Beverages. 1967 = 100. U. S. Department of Labor, Bureau of Labor Statistics.

MNY1: Money Stock M1. Billions of Current Dollars, Seasonally Adjusted. Board of Governors of the Federal Reserve System. Federal Reserve Bulletin. Washington, D. C.

GNP72: Gross National Product, 1972 Prices. Seasonally Adjusted at Annual Rates. U. S. Department of Commerce. Bureau of Economic Analysis. National Income and Product Accounts of the United States, Washington, D. C.

FOOTNOTES

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[1]In the tables that follow, the coefficients of seasonal dummy variables are not reported. Complete results are available upon request.

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