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Employment in Agribusiness and Purchases of Agricultural Products: The Effects of Monetization in Yugoslavia

Dragan Miljkovic and Roberto J. Garcia

ABSTRACT

Efforts to stabilize employment and output in the agricultural sector of Yugoslavia through monetization contributed to inflationary pressures. Granger causality tests suggest that increases in the rate of growth in the supply of money to subsidize state-owned agribusinesses were insufficient to maintain purchases of wheat and corn, but did cause purchases of cattle and swine. This result may be explained by producers having more flexibility in grain marketing (i.e., storage options and private buyers) and the perishability issues related to livestock marketing. The policy to maintain employment through monetization is shown to have been ineffective.

Key Words: agribusiness, employment, Granger causality, inflation, money supply, state purchases, Yugoslavia.

Policymakers interested in stability in the general prices of an economy must understand the relationship between a government's macroeconomic policy instruments, such as the level of expenditures or the rate of growth in money supply and changes in the rate of inflation. Unfortunately for many newly emerging market economies, these lessons were learned only after policymakers produced extremely high rates of inflation or, in some cases, hyperinflation.

Nowhere in post-communist Europe has inflation been as extreme as in the case of present-day Yugoslavia, which consists of Serbia

and Montenegro. By January 1994, the rate of inflation was 1.5×10^{20} percent for the previous 25-month period, and an annual rate of inflation of more than 500 quadrillion percent, each recorded as the second highest in history (Petrovich, Avramovic, and Covic). At that time, the government announced a plan to cut spending and eliminate the budget deficit by year's end, and ordered the Central Bank of the Federal Republic of Yugoslavia to stop printing money, to introduce a new currency, and to tie the value of the currency to the Deutschemark. Practically overnight, the rate of inflation was reduced to almost zero, which was the experience in Germany 70 years earlier under similar circumstances.

Several factors have contributed to the inflationary shocks of the early 1990s. These include the breakup of former Yugoslavia into five successor states: Bosnia-Herzegovina, Croatia, the Federal Republic of Yugoslavia (Montenegro and Serbia), Macedonia, and

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Slovenia;¹ the increase in military expenditures for the war between Bosnia, Croatia, and Serbia; the refugee problem arising from the fighting; the United Nations' (U.N.'s) economic embargo on Yugoslavia; and ultimately the financing of fiscal deficits through monetization. These events affected the traditional agribusiness marketing channels that existed in the former Yugoslavia, reducing agricultural export earnings and the returns to state-owned farms and agribusiness enterprises.

Between 1980 and 1990, the state-owned agribusiness sector in the former Yugoslavia produced, on average, about 39% of the wheat, 16% of the corn, and 11% of the milk, and raised about 50% of the cattle and 60% of the hogs for slaughter [Statistical Institute of Yugoslavia (SIY), *Statistical Yearbook of Yugoslavia*]. However, the state-owned agribusiness sector, prior to the breakup, controlled the marketing channel for agricultural commodities, performing most of the processing, wholesaling, and retailing activities within the country's agro-industrial food complex.

This investigation provides a background into agricultural production and agribusiness marketing in the Federal Republic of Yugoslavia (FRY), and presents the economic circumstances leading up to the period of hyperinflation between January 1991 and January 1994. The study analyzes the government's role in maintaining employment in the state-owned agribusiness sector and as a purchaser of agricultural commodities and food products.

The specific objectives of this study are twofold: (a) to determine the causality between the government's policy to maintain the level of employment in the state-owned agribusiness sector and the rate of growth in the supply of money through monetizing the fiscal deficit during the period of hyperinflation, and (b) to analyze the effects of monetization (i.e., the rate of growth in the supply of money) on the purchases of agricultural products by the

state-owned agribusiness sector. Granger causality is used to establish causality between employment and the rate of growth in the supply of money, and the causality between the rate of growth in the supply of money and the quantities of selected agricultural products (wheat, corn, cattle, hogs, and milk) purchased (i.e., demanded) by state-owned agribusiness enterprises (i.e., wholesale and food-processing firms).

A number of studies have used Granger causality as a means to provide empirical evidence for future construction of structural models, but the literature is relatively sparse for countries where markets are in transition or developing countries when the macro economy has been unstable (Florkowski and Elnagheeb; Wu and Yao; Baffes and Shah; Ran, In, and Dillon). Criticism of causality tests is common because of the inadequate attention to model structure consistent with economic theory. Simply describing the linkage among selected variables will, by design, omit relevant explanatory variables and result in specification error. However, in cases where data are not available or where the market/economic conditions do not permit adequate time-series estimation, causality testing may be appropriate to summarize correlation or determine causality. The value of such tests is that they can provide the insight for the future modeling framework that may be possible when the country's situation stabilizes in the medium to long run. In the case of FRY, causality tests are attempted to provide evidence as to whether or not the government's policy to stabilize the state-owned agribusiness sector has been effective.

Agricultural Production and Agribusiness Marketing

The former Yugoslavia and Poland were exceptions to the rule of no private ownership of agricultural land, and were the most market-oriented economies in Eastern Europe. Agricultural commodities were produced on state farms, cooperatives, and private farms. More than 75% of land in production was privately held in the former Yugoslavia, producing more than 50% of the total agricultural output (SIY,

¹ Present-day Yugoslavia refers to the Federal Republic of Yugoslavia, which consists of Montenegro and Serbia; the former Yugoslavia refers to the states of Bosnia-Herzegovina, Croatia, Montenegro, Serbia, Macedonia, and Slovenia. The analysis in this study includes only the Federal Republic of Yugoslavia.

Statistical Yearbook of Yugoslavia). The state-owned sector involved in agricultural production was much larger in scale relative to the private sector, and yields also tended to be higher. In addition to the economies of scale, the state-owned sector benefitted from subsidized credit, export subsidies, and lower prices for inputs because of volume discounts offered by input suppliers.

Price ceilings were set by the government for agricultural commodities and food products but, in general, prices throughout the marketing system were discovered at the market, below the government's ceiling. During economic situations when the market pushed up prices, the ceiling would be increased as a result of the market pressures. The presence of private producers assured that a system of government-set prices for state-owned farms and cooperatives was inoperable, and prices between state-owned vertically integrated firms could not deviate too far from the market rate. As a result, production quotas were not imposed on state farms or cooperatives.

Agricultural commodities were marketed primarily along the state-controlled marketing channels, through the completely vertically integrated agro-industrial enterprises called "kombinats." Some small-scale private agribusiness enterprises did exist; however, the capacity of these enterprises accounted for only about 10% of the market (Petrovic, Avramovic, and Covic; Savic). During the period of economic instability, the government's primary objective was to maintain the level of employment in the state-owned agribusiness sector and to support the purchasing power of these enterprises.

With the breakup of Yugoslavia in 1991, the traditional marketing channels and links between firms and republics have been adversely affected. The role and importance of state-owned wholesalers and food processors in the agribusiness marketing system have diminished, providing opportunities for private agribusiness marketing firms to enter the industry. Production subsidies through subsidized credit and subsidized exports have been reduced or eliminated, and other market distortions have been relaxed.

Table 1. Agricultural Production for Selected Commodities

Year	Wheat (000s MT)	Corn (000s MT)	Meat (000s MT)	Milk (mil. liters)	Total Agri- culture
1975	3,025	6,179	512	1,589	89
1980	3,246	6,564	578	1,805	100
1985	2,931	6,237	636	1,974	100
1986	2,940	8,413	628	1,953	111
1987	3,187	5,559	642	2,006	104
1988	3,960	4,790	635	1,962	101
1989	3,406	5,921	616	1,944	105
1990	3,869	3,623	633	1,898	98
1991	4,109	7,818	568	1,774	108
1992	2,101	4,513	521	1,802	89
1993	3,049	4,002	611	1,715	86

Source: SIY, *Statistical Yearbook of Yugoslavia*.

Notes: MT = metric tons; total agricultural production is an index, with base year 1985 = 100.

Agricultural production and agribusiness marketing has been and remains an important sector of the economy, maintaining a net exporting status for trade in agricultural commodities and food products, despite the U.N. embargo ("Beating the Sanctions on Serbia"). In 1990, agricultural production and services, and the manufacture of food and beverage products in Yugoslavia accounted for 22% of the total social product of the economy. Agricultural exports contributed almost 14% of the country's export earnings in 1991 (SIY, *Statistical Yearbook of Yugoslavia*).

In table 1, the production of selected commodities and an index of total agricultural production are presented. The reduction in agricultural output coincides with a general decline in economic activity in the country beginning in 1991-92. The trend is a little misleading in that 1991 produced record crop yields for corn and wheat. The implication of the abundant supply of grains in 1991 is evident in a slower growth rate of prices for cereals and products. In table 2, price indices for cereals and livestock products are compared at different levels of the marketing channel. The data suggest that the rise in food prices was slowed by the favorable growing conditions in 1991, but accelerated rapidly in 1992-93 when production began contracting again.

Table 2. Price Indices for Cereal and Livestock Commodities and Food Products

Year	Indices for Cereals and Products			Indices for Livestock and Products		
	Producer	Wholesale	Retail	Producer	Wholesale	Retail
1984	100	100	100	100	100	100
1985	142	179	167	147	163	163
1986	215	205	149	189	167	182
1987	244	260	251	196	230	218
1988	302	274	273	319	314	306
1989	932	1,148	1,436	1,136	1,581	1,551
1990	635	492	589	523	567	603
1991	160	201	216	190	240	216
1992	9,730	11,615	9,903	9,156	8,769	8,377
1993	8.8×10^{14}	1.3×10^{15}	4.2×10^{13}	2.1×10^{15}	6.2×10^{15}	1.7×10^{14}

Source: SIY, *Statistical Yearbook of Yugoslavia*.

Hyperinflation and the Growth in Money Supply

Hyperinflation, defined according to the convention of Cagan, begins in the month when monthly inflation exceeds 50% (Cagan; Sargent). The recent experience with high rates of inflation in Yugoslavia (shown in table 3) is different from that in the other economies in transition because it was largely the result of monetization of large government deficits, rather than "corrective inflation" resulting from the liberalization of previously controlled prices and from liquidation of excess money and near money assets left over from the days of central planning, or from distortionary macroeconomic policies of governments of less-developed countries (LDCs) (Bruno; De la Barra, Marchant, and Isinika).

Market liberalization had occurred earlier in FRY than in the other economies in transition, but the level of the monetary overhang (i.e., the ratio of broad money supply to GDP) in the late 1980s contributed to the inflationary shock of 1989, when retail prices rose by 518% in the final four months of the year. The macroeconomic data suggest that the monetary overhang in FRY continued to exceed the International Monetary Fund's (IMF's) benchmark of 0.4 in 1990 and 1991. Beyond the benchmark, the IMF suggests that a government is allowing the rate of growth in the supply of money to increase too rapidly relative to the GDP, resulting in an acceleration in the rate of inflation. Confirming the IMF's expectations, the rate of inflation in FRY between 1992 and 1994 is the second highest recorded in history (as shown in table 4).

Table 3. Selected Macroeconomic Variables for Yugoslavia

Year	Gross Domestic Product ^a			Money Supply ^b	Monetary Overhang	Rate of Inflation
	Nominal	Real	Change			
1990	320	27.5	-11.6	179	0.53	680
1991	266	21.9	-20.4	237	0.89	222
1992	4,819	17.4	-20.5	725	0.15	9,026
1993	142,111	12.4	-28.7	18,500	0.13	21.64×10^{13}

Sources: Petrovic, Avramovic, and Covic; Savic; International Monetary Fund; and SIY, *Statistical Yearbook of Yugoslavia*.

^a Nominal GDP is in billions of current dinars, real GDP is in billions of 1993 dollars, and change in GDP is based on the percentage change in real GDP.

^b Money supply, expressed in billion dinars, is money plus quasi-money, calculated from M1 data in Petrovic, Avramovic, and Covic; M1 to quasi-money ratios calculated from data in the IMF *International Financial Statistics*; and money supply growth data in Savic.

Table 4. Comparison of the Three Largest Hyperinflations Historically Recorded

Country	Years	No. Months Duration	Rate of Inflation (%)	
			Entire Duration	Last 12 Months
Hungary	1945-46	12	3.8×10^{29}	3.8×10^{29}
Yugoslavia	1992-94	25	1.5×10^{20}	5.5×10^{17}
Germany	1922-23	16	1.0×10^{12}	8.6×10^{10}

Sources: Sachs and Larrain; Sargent; Savic; and Petrovic, Avramovic, and Covic.

As with Weimar, Germany, FRY's government finances came under initial pressure as a result of external shocks. In FRY's case, this was a result of (a) the disintegration of the country in mid-1991, disrupting the traditional economic links and the existing marketing channels, and reducing the tax base; (b) the civil war between republics of former Yugoslavia, effectively breaking the economic links between those nations and FRY; and (c) sanctions imposed by the international community, severing the remaining trade links.² Between 1990 and 1993, government revenue decreased from \$10.5 billion to \$2.7 billion, or from 42% to 15% of GDP (SIY, *Statistical Yearbook of Yugoslavia*).

However, the government did not curb expenditures in line with the reduction in tax receipts. Despite a 30% drop in tax revenues, spending increased by 8.1% in dollar terms during 1991. By 1993, the government produced a deficit of \$2.8 billion, or 30.1% of GDP, which was completely monetized by the banking authorities (Savic; Petrovic, Avramovic, and Covic). The monetizing of a deficit of 30% of GDP produced the hyperinflation. Sachs and Larrain assert that monetizing a deficit of 10-12% of GDP is the threshold beyond which hyperinflation results. This threshold percentage is about one-third the size of the deficit that was monetized in the case of FRY. Furthermore, as inflation accelerated, the fiscal system broke down because whatever tax revenue the government did collect had lost its real value due to the lag in revenue

collection, i.e., the Olivera-Tanzi effect (Tanzi). This increased the pressure for the government to print more money as a means to correct for the shortfall in revenue, creating momentum for another inflationary spiral. Hence, prices accelerated even faster than the money supply, and consumers were forced to spend their depreciating dinars as quickly as possible.

For agriculture and agribusiness, the hyperinflation was not as severe as for other sectors of the economy; nevertheless, total agricultural output declined by almost 15% between 1989 and 1993. With the exception of the record crop yields in 1991, agricultural output has steadily declined since 1989 (refer to table 1). Disruption of the economic links between input suppliers and producers, between producers and agribusinesses, and between the agribusiness marketing channels among republics adversely affected production and movement of commodities and goods. In spite of the reduced production and marketing activities, the state-owned agricultural sector was prohibited from laying off employees, particularly when economic sanctions were imposed by the international community. This resulted in enterprises with operating deficits, which were financed by soft loans from state-owned banks.

Agricultural production declined as yields per hectare in 1992 and 1993 decreased; however, domestic supply still exceeded total demand for most basic food products (SIY, *Statistical Yearbook of Yugoslavia*). Although, because of the size of the agricultural sector and structure of FRY's economy, no real food shortages occurred during this period, it would be incorrect to suggest that the agricultural sector was not affected by the hyperinflation.

² The European Community imposed an economic blockade in November 1991, and this action was followed by an embargo sanctioned by the United Nations in May 1992, which escalated to a full U.N. blockade in April 1993.

Speculative shortages did occur to a limited extent, particularly for less perishable commodities and food products, because input prices increased faster than commodity and food prices. As the currency depreciated faster than the rate of inflation, the dinar no longer functioned as a store of wealth (a measure of value), and was no longer accepted as a medium of exchange. This added to the uncertainty, resulting in the hoarding of some products, barter transactions, and the export of some food products which were exempted from the embargo.

Data and Methodology

All data in the analysis (and in the tables) are for FRY (i.e., Serbia and Montenegro) and were compiled by statistical agencies of the federal government. The analysis involves monthly data for all variables for the 37 months between January 1991 and January 1994. The period for the analysis corresponds with the beginning of hyperinflation and ends during the month when the economic stabilization plan was implemented, generally accepted as the recovery period. Monthly data on employment levels in the state-owned agribusiness sector, and the quantities of wheat, corn, cattle, swine, and milk purchased by state-owned wholesalers and food processors are used in this study and are collected from various issues of the *Monthly Statistical Bulletin of Yugoslavia* and the *Monthly Statistical Review of the Republic of Serbia*, published, respectively, by the Statistical Institute of Yugoslavia and the Statistical Institute of the Republic of Serbia. Data on the rate of growth of the money supply are provided by the Central Bank of FRY, as reported in a manuscript by Savic. To smoothen the variation in the data series, the logarithms of the original data are used in the causality analysis.

The Granger causality test is used to assess the causal relationships between some relevant macroeconomic variables. Prior to conducting the Granger causality test, the stationarity of the original data series was examined. A sto-

chastic process (Y_t) is called stationary if the mean of Y_t is constant, the variance of Y_t is σ_y^2 and finite, and the covariance of Y_t and $Y_s = \lambda_{t-s}$ such that $\sigma_y^2 = \lambda_0$. Thus, a stationary process will have time invariant mean, and the variance and the covariance between the value of the process at two different points in time depend only upon the distance between the time points and not upon time itself (Granger and Newbold). An integrated process is one that can be made stationary by differencing. A discrete process integrated of order d must be differenced d times to attain stationarity, and is notated as $I(d)$. The well-known random walk process, described by $(1 - L)Y_t = \epsilon_t$, where L is the lag operator and ϵ_t is a white-noise process with a zero mean and no temporal autocorrelation, is integrated of order one. In other words, a random walk process is nonstationary in levels and needs to be differenced once to attain stationarity.

The details of the Granger causality test are available in many publications (e.g., Granger and Newbold; Harvey; Enders). Granger's method for detecting causality between two variables expresses a stationary time series dependent variable Y_t as a function of its own lagged value Y_{t-1} , or of the lagged independent variable X_{t-1} suspected to influence the dependent variable, i.e.:

$$(1) \quad Y_t = \alpha_0 + \sum_{j=1}^p \alpha_j Y_{t-j} + \sum_{i=1}^q \beta_i X_{t-i} + \epsilon_t$$

If inclusion of X_{t-1} improves the prediction of Y_t , then X is said to Granger "cause" Y . The direction of the causality may be tested by treating X as the dependent variable and Y as the independent variable. The standard F -test is conducted to test $H_0: \beta_i = 0$ for all i . If the null hypothesis is accepted, adding X does not help to predict Y_t , and X does not determine Y . If the null hypothesis is rejected, adding X , as in equation (1), helps to predict Y_t , and X does determine Y .

For the purposes of this study, two separate causality tests are conducted. In the first test, the rate of growth in the supply of money (MS) is a dependent variable, affected by the lagged rates of growth in MS , the level of em-

ployment (*EMPLOY*) in the state-owned agribusiness sector, and the lagged levels of employment, expressed as:

$$(2) \quad MS_t = \alpha_0 + \sum_{j=1}^p \alpha_j MS_{t-j} + \sum_{i=0}^q \beta_i EMPLOY_{t-i} + \epsilon_t$$

The hypothesis to be tested is as follows: H_0 : The rate of growth in *MS* is not determined by the level of employment in the state agricultural sector and the rate of growth in *MS* in previous periods. The rate of growth in *MS* is defined as the monthly percentage change in money plus quasi-money expressed in billion dinars. Employment is the number of workers employed in state-owned wholesaling and food-processing enterprises. Although the government intended to maintain the level of employment in this sector, the number of workers employed in the sector declined by 10% over the 37 months as a result of workers seeking other employment.

In the second test, the variable *PURCHASES* (defined as the purchases of food products by the state) is a dependent variable affected by lagged purchases, changes in the rate of growth in *MS*, and lagged changes in *MS*, expressed as:

$$(3) \quad PURCHASES_t = \alpha_0 + \sum_{j=1}^p \alpha_j PURCHASES_{t-j} + \sum_{i=0}^q \beta_i MS_{t-i} + \epsilon_t$$

This relationship is regressed for each commodity (wheat, corn, cattle, hogs, and milk) and the hypothesis to be tested is stated as: H_0 : Purchases of an agricultural product by state-owned wholesalers and processors are not determined by the rate of growth in *MS* and purchases of that agricultural product by state-owned agribusinesses in previous periods. Purchases are defined as government purchases of each commodity in metric tons, and in 1,000 liters in the case of milk.

Results and Implications

The augmented Dickey-Fuller (ADF) test is used to examine the stationarity in the original data on the employment levels in the state-owned agribusiness sector, the rate of growth in the supply of money, and quantities of selected food products purchased by state-owned wholesalers and processors (Fuller; Dickey and Fuller; Banerjee et al.). Based on the ADF test, it was found that the series on employment and quantities of selected products purchased by the state-owned wholesaling and food-processing sector is integrated of order one, $I(1)$. Thus, the stationarity is achieved by differencing the series once. The series on money supply was found to be integrated of order three, $I(3)$. Hence, the above series is differenced three times to achieve stationarity. This is an expected result because of the continuous high rates of inflation and hyperinflation in FRY. It seemed reasonable to include the current rate of growth in the supply of money as a variable to test for any instantaneous causality due to the nature of hyperinflation and the fact that no weekly or daily data, which would be more appropriate, were available.

No a priori knowledge was available to suggest how many lags should be included in the estimation of equations. The experimental estimations started from lag zero and ended where the Akaike information criterion was minimized. In cases where the lag of the independent variable is zero, there is instantaneous causality. Finally, because causality analysis assumes that there is constant variance in the residuals, the residual variance was tested for heteroskedasticity. These tests suggest that heteroskedasticity is not present or is not statistically significant.

The results from the Granger causality tests are reported in tables 5 and 6. Unidirectional causality existed between employment levels in the state-owned agribusiness sector and the lagged rate of growth in *MS*, and the rate of growth in *MS* (the dependent variable) at the 5% significance level. The results suggest that employment levels do not have an effect on the rate of growth in *MS* (i.e., the coefficient

Table 5. Estimation of Money Supply and Results of Granger Causality Test

Dependent Variable	Independent Variables	Estimated Coefficient	t-Ratio
Money Supply (<i>MS</i>):	<i>MS</i> _{<i>t</i>-1}	1.238	5.857*
	<i>EMPLOY</i> _{<i>t</i>}	-47.068	-1.159
	<i>Constant</i>	0.106	0.250
<hr/>			
	No. Lags in Independent Variable	Null Hypothesis: $H_0: \beta_i = 0 \forall i$	Calculated F-Value
Causality between growth in <i>MS</i> and <i>EMPLOY</i> :	<i>MS</i> (0)	Reject H_0	17.237

* Denotes statistical significance at the 5% level.

Table 6. Estimation of Purchases and Results of Granger Causality Tests

Dependent Variables	Independent Variables	Estimated Coefficient	t-Ratio
<i>PURCHASES</i> of Wheat:	<i>Wheat</i> _{<i>t</i>-1}	0.0391	0.2121
	<i>MS</i> _{<i>t</i>}	-0.0314	-0.3362
	<i>Constant</i>	0.0330	0.1141
<i>PURCHASES</i> of Corn:	<i>Corn</i> _{<i>t</i>-1}	-0.2818	-1.6299*
	<i>MS</i> _{<i>t</i>}	-0.0297	-0.6303
	<i>Constant</i>	0.0233	0.1604
<i>PURCHASES</i> of Cattle:	<i>Cattle</i> _{<i>t</i>-1}	-0.2286	-1.1480
	<i>Cattle</i> _{<i>t</i>-2}	-0.0154	-0.0806
	<i>MS</i> _{<i>t</i>}	0.0020	0.1367
	<i>MS</i> _{<i>t</i>-1}	-0.0372	-1.3868*
	<i>MS</i> _{<i>t</i>-2}	-0.0852	-3.0749**
	<i>Constant</i>	0.0077	0.2036
<i>PURCHASES</i> of Swine:	<i>Swine</i> _{<i>t</i>-1}	-0.4490	-2.317**
	<i>Swine</i> _{<i>t</i>-2}	-0.3576	-1.880**
	<i>MS</i> _{<i>t</i>}	0.0050	0.271
	<i>MS</i> _{<i>t</i>-1}	-0.0386	-1.263
	<i>MS</i> _{<i>t</i>-2}	-0.0600	-1.883**
	<i>Constant</i>	-0.0190	-0.426
<i>PURCHASES</i> of Milk:	<i>Milk</i> _{<i>t</i>-1}	-0.4925	-2.816**
	<i>MS</i> _{<i>t</i>}	-0.0029	-0.347
	<i>Constant</i>	-0.0495	-1.970**
<hr/>			
	No. Lags in Independent Variable	Null Hypothesis: $H_0: \beta_i = 0 \forall i$	Calculated F-Value
Causality between <i>PURCHASES</i> and <i>MS</i> :	Wheat (0)	Accept H_0	0.075
	Corn (0)	Accept H_0	1.643
	Cattle (2)	Reject H_0	5.036
	Swine (2)	Reject H_0	3.472
	Milk (0)	Reject H_0	4.104

Note: Single and double asterisks (*) denote statistical significance at the 10% and 5% levels, respectively.

on *EMPLOY* does not have the expected sign, but it is not statistically significant), but that the lagged rates of growth in *MS* do have an effect on present rates of growth in *MS*. Both of these results are consistent with economic expectations. These are expected results because the government was attempting to maintain the employment level in the state-owned sector and the purchasing power of state employees through increased budget deficits, forcing the Central Bank of FRY to cover operating deficits by printing money and issuing soft loans. Hence, the level of employment was exogenous to the monetization of the deficit. Lagged growth in *MS* is expected to cause an increase in current *MS* because of the inflationary spiral effect.

In the case of causality between the state purchases of agricultural commodities and the growth in *MS*, rejection of the null hypothesis depends on the type of commodity. The null hypothesis was accepted in the cases of wheat and corn, but rejected in the cases of cattle, swine, and milk. The results indicate that there exists causality from the rate of growth in money supply to quantities of cattle, swine, and milk purchased by state-owned agribusiness marketing firms, while such a relationship could not be determined for the major grain crops of wheat and corn. This implies that even large increases in the supply of money did not provide the state-owned wholesale and processing sector with enough financial support (subsidies) to meet its capacity, and less grain was purchased. In the cases of cattle, swine, and milk, state and private farmers did not have a practical storage option for these highly perishable commodities or have an alternative to the state-owned processors to market their commodities. For grain producers, there is more flexibility in the marketing of grain because most of the state and private farms did have storage facilities.³

Furthermore, as early as 1991, some grain

processing activities were being performed by the private sector, including small livestock feed grain millers which used corn as a key ingredient in feed meal, and wheat flour millers. Most of the activities were performed by small-scale enterprises, but their numbers were increasing and started presenting serious competition to the state-owned sector. The capital required to invest in a milling operation was not as costly as for a meat-processing operation. Most of the new entrepreneurs came from state-owned enterprises (SOEs) where they learned about technology and the production process. With their technical knowledge, they applied better management practices to these private firms and have been able to challenge the state-owned sector effectively. Thus, producers were not under pressure to sell their entire grain production to the SOEs if market conditions for crops were unfavorable.

For the estimations of purchases of cattle and swine, the lagged *MS* coefficients are negative and the current *MS* coefficients are positive. These results are consistent with expectations because increases in rate of growth in *MS* from previous periods have an effect on present prices, reducing current purchases of these commodities. It is also consistent that the values of the coefficients are larger in magnitude as the lag increases, implying that the economy feels the effects of the increase in the rate of growth in *MS*. For the case of milk, the coefficient on current *MS* has an unexpected negative sign. However, the coefficient is small in magnitude and is not statistically significant.

Policy Implications

Monetary policy which creates economic instability and uncertainty may jeopardize the development of new opportunities within the agro-industrial sector and prevent the efficient transfer of intermediate products. This results in greater scarcity of food products or value-added products, making these goods more expensive. Given the spiraling inflation and the deterioration in the value of the currency, the choice for marketers, firms, and consumers is either to denominate food prices in hard cur-

³ This occurred in 1991, which was a record year in terms of grain production. Large volumes of grain were stored on farms because farmers did not want to sell the crop at unfavorable terms. In this case, producers held on to negotiate with the government for higher prices.

rencies or to store commodities that maintain their value over time. In the event that hard currency is unavailable, this results in barter, holding of speculative stocks, and hoarding. Over time, this behavior creates distorted economic patterns which may give rise to intermediaries who have an interest in protecting the status quo. The economic stabilization program, initiated in 1994, has controlled the growth in money supply, stabilized the exchange rate and inflation, and eliminated the fiscal deficit. However, these are preliminary results, and the implications for the agricultural sector cannot yet be determined.

Policies that aim to maintain employment levels within an inefficient state-owned sector without providing growth opportunities to the private sector may lead to further shrinkage of food production and, eventually, to real shortages. Perhaps, optimistically, this policy has exposed the inefficiency of the state-owned food-processing and wholesaling sector, providing a lesson for other countries which still have large state-owned agribusinesses that control the marketing of agricultural commodities and food products.

Conclusions

The Federal Republic of Yugoslavia recorded one of the highest hyperinflationary conditions in history during the past few years. External shocks produced the first wave of hyperinflation in the late 1980s, but in the early 1990s, in addition to external shocks, hyperinflation was the result of inadequate macroeconomics policies, particularly monetization of fiscal deficits. For the state-owned agribusiness sector, the government sought to artificially maintain stable levels of employment, supporting the purchasing power of state-owned firms and employees in that sector. The number of employees in the state-owned and operated agribusiness sector changed to a lesser extent relative to other economic sectors during this period of time, fueling extreme inflationary pressures. The mechanism by which the government attempted to do this was by transferring income (i.e., printing money and issuing soft loans) so that firms could continue to pur-

chase agricultural commodities and to pay workers' salaries, which increased in a price-wage spiral.

Granger causality tests were performed to determine (a) the causality between the rate of growth in *MS* in previous periods and the government's policy to maintain employment in the state-owned agribusiness sector and the current rate of growth in *MS*, and (b) the causality between the quantity of agricultural commodities purchased by the government and the rate of growth in the supply of money. In the first test, it was confirmed that there exists unidirectional causality. However, the estimation results indicate that the causality was driven by the rate of growth in *MS* in previous periods rather than actual employment levels (which were insignificant).

For government purchases, it was determined that even large increases in the supply of money did not affect (cause) purchases of wheat and corn by the state-owned processing and wholesaling sector. This result is consistent with economic theory and coincides with the high rates of inflation that were occurring in the economy of FRY. For livestock products, there is evidence to suggest a causality between the rate of growth in the supply of money and the quantities of cattle and swine purchased by the state-owned food-processing and wholesaling sectors. For these agricultural commodities, SOEs still have monopsony power because the high initial investment costs prevent the private sector entry into the industry. Hence, the government's policy to monetize the budget deficit may have actually pressured cattle, swine, and milk producers to further decrease their production because they did not have storage alternatives. When confidence in the currency is lost, which occurs with the high rates of inflation, and when real prices are unstable, producers of highly perishable products will choose to reduce production rather than to continue marketing products.

Although agricultural production declined, due to the size of the agricultural sector in FRY, no real food shortages occurred. In spite of the decline in production, the state-owned agribusinesses (which accounted for about

90% of the wholesaling and processing capability) were unable to operate at high rates of capacity despite the government's transfer of nominal money. While the government tried to maintain employment in the state-owned agribusiness sector, the result may have actually encouraged the private sector to perform storage and other marketing functions in the case of less perishable products. For highly perishable products, the net effect may have been to further discourage production by producers, making it even more costly for the government to support the state-owned agribusiness sector. In turn, this could have resulted in a larger distortion to the economy, precipitating real, as well as speculative, food shortages. On the other hand, this policy may help to dramatize the lessons of monetizing to overcome government budget deficits and encourage greater fiscal responsibility.

Limitations of Granger causality and data for FRY do not allow for concrete conclusions, but the limited information from the causality tests does provide some interesting insight into how agricultural marketing and employment in the state-owned agribusinesses were related to growth in money supply as a result of government policy. Future studies may be able to develop a framework with which to model macroeconomic policies in economies in transition when the economies stabilize in the medium to long run.

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