

IMPACTS OF CHANGES IN THE BRAZILIAN MEAT EXPORTS ON THE BRAZILIAN ECONOMY

Flávia Maria de Mello Bliska¹, Joaquim José Martins Guilhoto²

¹ University of São Paulo and Institute of Food Technology (Meat Technology Centre)

² University of São Paulo and University of Illinois (Regional Economics Applications Laboratory)

Keywords: meat exports; animal-raising's sectors; slaughter and meat process industries; Brazilian economy.

Background:

This work analyzes how changes in domestic and foreign macroeconomic variables can impact the Brazilian meat exports and consequently the Brazilian economy. We used a Vector Auto-Regression (VAR) model to evaluate the impact of changes in the domestic and foreign macroeconomic variables on Brazilian meat exports; next the results obtained in the VAR model were applied in an Input-Output model to evaluate the changes in the levels of importance of the different production sectors, and especially in the animal-raising's sectors and slaughter and meat process industries. The results indicate that changes in macroeconomic variables can cause significant impacts on Brazilian meat exports, which can affect the Brazilian economy mainly in the following sectors: corn farming, cattle, poultry and other animal-raising's sectors, other farm products, chemistry, pharmacy and veterinary, plastic goods, beef, poultry and other meat process industries, other food products, commerce and transport, public usefulness and services; and according to increase in the production processes efficiency of the beef and poultry industries, the impacts of changes in the Brazilian meat exports on those sector decrease.

Objectives:

In this work we intend: a) to analyze how the changes in domestic and foreign macroeconomic variables can impact the Brazilian economy, and in particular its beef and poultry exports; b) to verify how changes in the production process of the beef and poultry industries can affect the impacts of changes in the Brazilian meat exports on the Brazilian economy.

Methods:

In this work we used an approach similar to that used in LIU, CHUNG & MEYERS (1993) to analyze the impacts of domestic and foreign macroeconomic variables on U.S. meat exports. VAR approach was used to examine the resulting impacts on the U.S. beef, pork, turkey and chicken exports, in the context of an open economy. Following LIU, CHUNG & MEYERS (1993), the macro sector in the open economy is composed of goods market, the foreign-exchange market, and the money market. The goods market includes the demand, supply, and equilibrium condition of goods and services. The demand for goods and services of the home country is specified as consisting of domestic absorption and current account. For given levels of government expenditure (G) and taxes (T), domestic absorption (da) is specified as a function of real output (y) and the interest rate (r), as they affect consumption and investment. The current account (ca) measures the country's net exports of goods and services and is specified as a function of relative price level (ep*/p) and real outputs (y and y*) of the domestic and foreign countries, given the tax levels (T and T*). The exchange rate (e) is measured in terms of R\$/foreign currency. Equation (1) through (8) describe the domestic macro economy. The foreign variables (except T*) appearing in the above equations are also treated as endogenous.

$$\begin{array}{llll}
 da = da(y, r / G, T) & (1) & ca = ca(ep^*/p, y, y^* / T, T^*) & (2) \\
 y = da + ca & (4) & r = r^* + (e^e - e) / e & (5) \\
 m / p = l(r, y) & (7) & m = m(y, p) & (8)
 \end{array}
 \begin{array}{ll}
 p = p(y, m) & (3) \\
 e^e = e^e(e) & (6)
 \end{array}$$

The nominal price (p) is expressed as a function of real output (y) and the nominal money supply (m). Real output captures the impact on price of the real sector, while the money supply captures the impact of the monetary sector. Given the exogenous variables (G, T and T*) and foreign endogenous variables (p* and y*), equations (1) through (4) can be used to solve for the domestic price and the quantities of the variables p, da, ca, and y, if the exchange rate (e) and interest rate (r) can be also determined. The real money supply is m/p and l is the real money demand expressed as a function of interest rate and real output. The money supply is specified as a function of real output and price, as the monetary authority is assumed to target the levels of the two variables by adjusting its supply of money.

The VAR approach was developed by SIMS (1980). It was used mainly in studies, which studied the dynamic relationship between macroeconomic and agricultural variables within the open economy (BARNETT *et al.*, 1983; BESSLER, 1984; CHAMBERS, 1984; BRANDAO, 1985; BRADSHAW & ORDEN, 1990; BARROS & AGUIAR, 1994; PICERNO, 1996). The VAR analysis permits one to analyze the causality among more than two variables and the impact forecasting in each variable on the other variables, and to determine the intensity and duration of these impacts. In this work, the effects of the shocks in macroeconomic variables on the Brazilian meat exports are the elasticities used later in the Input -Output model to analyze the impacts of changes on Brazilian meat exports in the Brazilian economy. Therefore, all variables were transformed to natural logs before estimations. That is, in the impulse analysis, the effect on each variable divided by the standard deviation of the impacted variable is a percentage variation in that variable which result from a variation of 1% in the impacted variable.

In the Brazilian Meat Export model, the meat export volumes and prices are endogenous variables. We have also the following variables: the domestic consumption (as a proxy for the domestic absorption), domestic and foreign output and money suppliers, and the exchange rate. The VAR model still includes the Industrialized Countries Industrial Production Index (as a foreign economic activity indicator) and world meat imports (as a proxy for the world income level). In the VAR model we used Likelihood Ratio tests to determine the appropriate number of lags in the systems. We estimated a system with seasonal dummies and another one without dummies, and we also conducted the Likelihood Ratio test to verify the necessity of seasonal dummies inclusion. The ordering of the

variables in the systems is very important, since the innovations in the first series affect contemporaneously all other variables; innovations in the second variables have no contemporaneous effects on the first variable, but affect the others, and innovations in the last variable have no contemporaneous effects on the other variables. Moreover, there is no economic reason to justify the effects of innovations in the Brazilian meat exports on the macroeconomic variables. So, the Brazilian poultry and beef exports were always classified in the last positions in the systems. Thus, they are contemporaneously affected by all the other variables, but they have no contemporaneous effects on the others.

The results obtained in the VAR model were applied in an Input-Output model to analyze the changes in the levels of the importance of the different production sectors. We used the Brazilian Input-Output Matrix of 1995 (IBGE, 1995). Some sectors of the Production and Input Tables were opened into different segments to permit the study of the cattle and poultry-raising sectors and the meat industry sector. Then we made a final balance of the Production and Input Tables to redistribute the internal values of these matrices into row and column totals (BACHARACH, 1970; RODRIGUES, 1997). We used annual data on the macroeconomic variables and meat variables for the period 1961 through 1995.

Results and discussions:

The results show that: a) shocks in the exchange rate affect beef and poultry, but the effects of those shocks are more significant on the beef exports (impacts in the exchange rate and the initial effects of these impacts on the meat exports have always the same direction); b) the world meat imports, as a proxy for the world income level, is very important to Brazilian meat exports, but on average the impact of a shock in the variable is more significant on the poultry exports; c) the industrial production index of the industrialized countries is also important to beef and poultry exports, but on average is more significant to poultry exports; d) shocks in the beef exports price affect poultry exports, but shocks on the poultry exports price do not affect beef exports; e) shocks in the Brazilian GDP are also important to beef and poultry exports, but shocks in the domestic GDP and the initial effect of these shocks on Brazilian meat exports have contrary direction; f) impacts of a shock in the foreign GDP tend to be delayed, but increase over time; g) effects of shocks in the domestic macroeconomic variables decline to zero over time, but effects of shocks in foreign macroeconomic variable tend to stabilize in a level different of zero; that is, in general, the foreign macroeconomic variables exert impacts on beef and poultry exports more significant than domestic macroeconomic variables in the first periods after the shocks, and the effects of shock in foreign variables are more persistent; h) changes in Brazilian beef exports produce changes in the Brazilian economy (in the production, imports and total salary levels) mainly in the following sectors (ordered from the higher impact to the smaller one): Cattle slaughter/industry, Cattle-raising, Other animal-raising, Commerce/transport, Other farming products, Chemistry, Services and Other food products; i) changes in Brazilian poultry exports produce changes in the Brazilian economy mainly in the following sectors (also ordered from the higher impact to smaller one): Poultry slaughter/industry, Poultry-raising, Other food products, Commerce/transport, Chemistry, Corn farm production, Other farming products, Services; j) changes in the production process of the beef and poultry industries do not affect their share in the Brazilian economy, but according to increase in the production processes efficiency of the beef and poultry industries, the impacts of changes in the Brazilian meat exports on those sectors decrease.

Conclusions:

a) Changes in macroeconomic variables can cause significant impacts on Brazilian meat exports, which can affect the Brazilian economy mainly in the following sectors: corn farming, cattle, poultry and other animal-raising's sectors, other farm products, chemistry, plastic goods, cattle and poultry slaughter/industry, other food products, commerce/transport, and services; b) according to increase in the production processes efficiency of the beef and poultry industries, the impacts of changes in the Brazilian meat exports on those sectors decrease.

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