EC 604 - Final Project

Introduction

Why Pass-Through Could be Incomplete?

- **Krugman (1986):** To maintain market shares, foreign suppliers might not change P and instead adjust profit margin.
- **Burstein, Eichenbaum, and Rebolo (2002):** The distribution costs and substitution away from imports to lower quality local goods
- **Hegji (2003):** The production may occur in several stages across many countries.
- **Gust, Leduc, and Vigfusson (2005):** International globalisation leads to lower trade costs and higher relative markups of the export firm.

Why We Compare VAR and IO Models?

- Nearly all the pass-through studies are based on the implementation of a VAR approach.
- Empirical studies, which use VAR, show that the set of countries in which annual inflation was on average less than 10% over the sample experienced low levels of ERPT.
- The VAR methodology is probably inadequate for countries that experienced significant macroeconomic instability as reflected in hyperinflation or very-high inflation rates.
- VAR in first differences may lead misspecification.
- Empirical studies show that the set of countries in which annual inflation was on average less than 10% over the sample experienced low levels of ERPT.
- Apart from analyzing pass-through through a new approach, IO methodology also presents sectoral results.

The Model

The model is a cost-push IO price model used to calculate the pass-through effect. Assume an economy with n producing sectors and two basic inputs, namely labor (L) and capital (K, representing all other factors of production). Labor is paid wages and salaries (W) and capital earns the operational surplus (V).

$$p_j = \sum_{i=1}^{n} a_{ij} \cdot p_i + e \cdot \sum_{i=1}^{n} m_{ij} \cdot p_i^* + v_j \quad \text{for} \quad j = 1, \ldots, n$$

Where:

p_j is the price of the output j,
q_j is the quantity of output j,
q_{ij} is the domestic intermediate use of output i by sector j,
a_{ij} is the direct domestic input coefficient, given by $a_{ij} = \dfrac{p_i \cdot q_{ij}}{p_j \cdot q_j}$,
e is the nominal exchange rate (number of domestic currency per foreign currency),
p_i^* is the import price of output i in foreign currency,
p_i^f is the import price of output i in domestic currency, given by $p_i^f = e \cdot p_i^*$,
m_{ij} is the direct imported input coefficient, given by $m_{ij} = \dfrac{p_i \cdot M_{ij}}{p_j \cdot q_j}$,
M_{ij} is the imported intermediate use of output i by sector j,
w_j is the unit labor cost, given by $w_j = \dfrac{W_j}{p_j \cdot q_j}$ for sector j,
v_j is the unit operational surplus (capital costs), given by $v_j = \dfrac{V_j}{p_j \cdot q_j}$ for sector j,
W_j is the total labor costs for sector j,
V_j is the total operational surplus (capital costs) for sector j.

This equilibrium price system can be expressed in matrix form as:

$$\mathbf{p} = \mathbf{A}^T\mathbf{p} + \mathbf{M}^T\mathbf{p}^f + \mathbf{w} + \mathbf{v}. \tag{1}$$

$\mathbf{p}$ is the vector of the commodity prices,
$\mathbf{p}^f$ is the vector of import prices in domestic currency, where $\mathbf{p}^f = e\mathbf{p}^*$,
$\mathbf{p}^*$ is the vector of import prices in foreign currency,
$\mathbf{e}$ is the scalar nominal exchange rate,
$\mathbf{v}$ is the vector of unit operational surplus (unit capital costs),
$\mathbf{w}$ is the vector of unit labor costs,
$\mathbf{A}^T$ is the transpose of the direct domestic input coefficients matrix $\mathbf{A}$,
$\mathbf{M}^T$ is the transpose of the direct imported input coefficients matrix $\mathbf{M}$.

Solving the model:

$$\mathbf{p} = (\mathbf{I} - \mathbf{A}^T)^{-1}(\mathbf{M}^T\mathbf{p}^f + \mathbf{w} + \mathbf{v})$$

Taking total differentials:

$$\Delta\mathbf{p} = (\mathbf{I} - \mathbf{A}^T)(\mathbf{M}^T\Delta\mathbf{p}^f + \Delta\mathbf{w} + \Delta\mathbf{v})$$

Assuming that all the domestic and direct imported input coefficients, basic input costs, and import prices in foreign currency are constant, the effect of a small change in the exchange rate on prices can be shown to be:

$$\Delta\mathbf{p} = (\mathbf{I} - \mathbf{A}^T)^{-1}(\mathbf{M}^T d\mathbf{e})$$

Dividing both sides gives the effect of the exchange rate on sectoral equilibrium prices as:

$$\frac{\partial \mathbf{p}}{\partial \mathbf{e}} = (\mathbf{I} - \mathbf{A}^T)^{-1}(\mathbf{M}^T \mathbf{i})$$

where $\mathbf{i}$ is the unit column vector. In this model, comparative-static partial derivatives measure the effects on sectoral equilibrium prices of a small change in the nominal exchange rate.

After calculating the changes in the sectoral equilibrium prices, the change in the general price level, π, can be calculated as a weighted average of sectoral price changes.

$$\pi = \sum_{i=1}^{n} \alpha_i \left(\frac{\partial p_i}{\partial e} \right)$$

where α_i is the share of commodity i in the aggregate consumption expenditures.