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Oil prices and the terms of trade

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Abstract

The combination of substantial terms of trade variability and unstable correlation patterns of trade prices with output and trade volumes has led some to suggest a break in the link between trade volumes and prices. We find that oil accounts for much of the variation in the terms of trade over the last twenty five years and its quantitative role varies significantly over time. And since our dynamic general equilibrium model predicts that the economy responds differently to oil supply shocks than to other shocks, changes in their relative importance helps to account for the unstable correlations in the data. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Relative price movements remain the central issue in international macroeconomics, with their source a continuing object of speculation and debate. We study one such price, the terms of trade, which we define as the ratio of the import deflator to the export deflator in national income and product accounts. In four countries for which quarterly data are available for four decades, we find that the

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terms of trade has been highly variable relative both to real output and to the predictions of existing dynamic general equilibrium models of trade (Backus et al., 1994, for example, or Stockman and Tesar, 1995). This variability, moreover, has been substantially greater over the last twenty years than the first twenty. We also find that the correlation of terms of trade movements with real output and trade volumes varies widely over time and across countries.

We show that a large part of the variability of the terms of trade is associated with extreme movements in oil prices. Accordingly, we study the terms of trade and its correlation with other variables in a setting in which events affecting the production of oil interact with the production and sale of other goods. The structure blends the Backus et al. (1994) model of two large industrial countries with the Crucini and Kahn (1996) treatment of international trade in intermediate inputs into production. In our theoretical economy, two industrialized countries produce imperfectly substitutable goods using capital, labor, and oil. These two goods are then aggregated into final consumption and investment goods. A third country produces oil but consumes final goods.

This structure mimics in a simple way the interaction between large industrialized countries and largely non-industrial oil producers. The result allows us to study the responses of trade flows and real output to changes in oil production and industrial productivity. As one might expect, the volatility and comovements of the terms of trade depend on the nature and source of disturbances. We consider three different disturbances: a domestic productivity shock, a foreign productivity shock, and an oil supply shock. As in earlier work, productivity shocks alone produce little in the way of terms of trade volatility. The reason, ironically, is that the model generates insufficient variability in export and import quantities. Since quantities and prices are linked (the relative price equals the marginal rate of substitution), lack of variability in the quantities is inherited by the prices unless we adopt unrealistically low substitution elasticities.

Two features of the model help us to account for terms of trade variability. First, the supply of oil becomes partly exogenous, leading to dramatic price changes. We think this fits our experience in the 1970s quite well. Second, the technology exhibits little opportunity to substitute oil for capital and/or labor. As a result, relatively small variations in the quantity of oil are associated with substantial variation in its relative price.

The same mechanism helps to account for the unstable correlation between the terms of trade and output. In the model, fluctuations in the terms of trade and output generated by productivity shocks are positively correlated, while those generated by oil shocks are negatively correlated. A domestic productivity disturbance leads to an increase in domestic output and a fall in the relative price of the domestic good - an increase in the terms of trade. Oil supply disruptions, on the other hand, lead to output reductions in countries that use imported oil as an input into production and therefore an inverse relation between the terms of trade and output. Unstable correlations are the result, in this setting, of changes over

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