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Comment Mark M. Spiegel

The literature has long acknowledged that fluctuations in the terms of trade can have substantial effects. Mendoza (1995) estimates that terms of trade shocks can account for nearly one-half of observed variability in GDP. Moreover, Mendoza (1997) has shown that the variability of the terms of trade can affect savings decisions, and thereby influence long-term rates of economic growth.[1] This result implies that the welfare benefits from reducing macroeconomic uncertainty stemming from terms of trade fluctuations may be larger than the modest implications often suggested in the literature (e.g., Cole and Obstfeld 1991). As such, proper measurement of the intensity of various forms of terms of trade fluctuations is of primary interest. However, these studies fail to address the issue that terms of trade fluctuations faced by consumers are likely to differ from the commonly measured producer terms of trade fluctuations.

This chapter moves to fill this gap by introducing a concept that they label the "consumption terms of trade." They define the consumption terms of trade as the relative prices faced by home consumers for their export basket to the domestic price of their import basket. In contrast, the producer terms of trade that is commonly examined in the literature is defined as the set of relative prices faced by producers when making their export decisions. There are a variety of reasons why these two concepts need not be identical. For example, if firms price to market, consumers will face different prices than producers face in trade.

The chapter begins by examining the consumption terms of trade under the assumption that the law of one price holds. Retail price data is obtained from the Economist Intelligence Unit (EIU) worldwide survey of retail prices. The products used in the construction of the consumption terms of trade represent only 21.1 percent of the U.S. consumption basket, but 66 percent of tradables.

Using this data, the authors first conduct a variance decomposition of retail inflation versus overall price inflation, where worldwide inflation is calculated as the average inflation in goods and services by commodities. Their results using the EIU data correlate well with the OECD world inflation rate, with a correlation coefficient of 0.88.

They then calculate each good's contribution to overall inflation variability. Goods that exhibit either high variability or high degrees of comovement

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1. Among terms of trade shocks, the prominent role played by fluctuations in commodity values is well-documented. In particular, Hamilton (1983) finds that terms of trade fluctuations largely manifest themselves through energy price fluctuations.

with other goods are found to be more influential in determining overall inflation levels, analogous to "high beta" stocks that are more closely correlated with market equity portfolios. Indeed, they estimate such a beta measure, where betas exceeding one have greater than average contributions to inflation variability, while those with betas below one are less influential than average. They find that some goods, particularly food and energy, are particularly influential. Intuitively, the degree of influence a change in the price of a good would have on the variance of the terms of trade would be proportional to that good's net trade share and its covariance with the overall terms of trade.

To calculate the consumption terms of trade, they weight world goods prices at the retail level by national import and export trade shares, taking the pattern of trade as given and ignoring deviations from purchasing power parity. The consumption terms of trade is then the ratio of the calculated export price index to the import price index.

Using this measure, the chapter obtains a number of interesting results. First, the variation in the production terms of trade exceeds that in the consumption terms of trade, although this relationship does not hold for growth rates. Second, they find that the variability of the consumption terms of trade itself varies widely, from a low of about 1 percent in Australia to a high of 10 percent for Korea. Finally, the measured consumption terms of trade is distinct from the measured production terms of trade. These two measures are positively correlated, but with a correlation coefficient of only about 0.3 (0.4 in growth). This supports the argument that the consumption terms of trade is a distinct phenomenon from the commonly measured production terms of trade.

The authors then decompose the terms of trade into the contributions of individual goods, finding that the bulk of the observed variability in the consumption terms of trade comes from a small set of goods. In particular, they find that oil, automobiles, and medicine are notably influential. Moreover, while automobiles and medicine tend to move with the overall bundle, oil is particularly idiosyncratic relative to other goods.

Over the course of the sample, they identify two groups of countries that display U-shaped and inverse U-shaped patterns in their consumption terms of trade. The group identity of each country is primarily determined by whether it is an oil importer or exporter. One of the reasons for the strong influence of oil is that countries are fairly diversified in their production of other commodities, with net trade share for most commodities falling within the range of plus or minus 5 percent. This results in relatively balanced trade in those commodities and provides a hedge against shocks to the terms of trade. As discussed earlier, these goods that exhibit relatively balanced trade are unlikely to be influential over the variance of the terms of trade. In contrast, the net trade shares for oil and autos are much larger, 40 percent and

30 percent respectively, leaving these goods with much explanatory power in the determination of the variability of the consumption terms of trade.

The role played by oil in the determination of terms of trade variability is uniquely remarkable. Oil is found to explain over 60 percent of the variance in the terms of trade, despite the fact that oil does not display uniquely high variability. Instead, the exceptional role for oil stems from its idiosyncratic price patterns. Since oil prices follow idiosyncratic patterns historically, they end up being exceptionally influential, despite the fact that the univariate variability of oil prices is not remarkable. In contrast, retail gasoline prices do display a large amount of variability.

The authors then repeat their variance decomposition exercise for world inflation. Surprisingly, oil is found to have a low beta relative to world inflation, due primarily to its low correlation with world inflation, estimated by the authors at 0.35.

Turning to some comments, first and foremost, I would say that we learn a lot from this chapter. The authors make a compelling case that the behavior of the consumption and production terms of trade are quite different, leaving the consumption terms of trade a unique phenomenon worthy of study on its own. Since theory suggests that households would respond to the consumption terms of trade, using the production terms of trade as a proxy might lead to misleading conclusions.

We also obtain some surprising results from the variance decomposition exercises. In particular, it is surprising how low oil's contribution is to the variability of world inflation, given its extraordinarily large contribution to the variability of the consumption terms of trade. As discussed earlier, the surprising result is attributable to oil's weak correlation with overall inflation, but this would not be observable in the absence of the decomposition.

Finally, the goods decomposition reveals that a relatively small set of goods in addition to oil, particularly autos and medicine, account for almost all of the variability in the consumption terms of trade. While it was generally understood that oil had an exceptional impact, the result that the remaining variability is attributable largely in the movements of a small set of other goods is novel.

However, I also have some misgivings that should be addressed. First, the bulk of the analysis is conducted under the assumption that the law of one price holds. In practice, we observe substantial and long-lasting deviations from purchasing power parity, as in Crucini and Shintani (2008), who find that deviations from the law of one price have half-lives of eighteen months.

It therefore stands to reason that deviations from the law of one price (LOP) could influence the chapter's findings. For example, deviations from the law of one price may be one of the reasons why the chapter finds a weak

correlation between the production and consumption terms of trade, as the production terms of trade are measured with domestic prices and the consumption terms of trade are measured with international prices. Also, might deviations from the LOP influence the reported variability measures? In particular, by taking averages of goods price changes might we be underestimating the variability of the consumption terms of trade?

Fortunately, the current version of the chapter addresses this issue by calculating the terms of trade at local prices. However, the results indicate that the local price terms of trade differ markedly from that used in the rest of the chapter. For example, the median correlation between the two series by country is 0.6. This leaves us uncertain about the robustness of reported other results to allowing for deviations from the LOP. In addition, the observed variability of the local price consumption terms of trade is higher, supporting our conjecture that the use of averages of goods price changes led to underestimation of the variability of the consumption terms of trade.

However, it should be acknowledged that qualitatively the main results appear similar. In particular, the authors find that the approximately 10 percent decline in the contribution of oil to the variability of the local price consumption terms of trade results in an 11 percent increase in medicine, leaving the conclusion that a small set of goods determine the variability of the consumption terms of trade intact.

Another misgiving I have with the exercise is that the trade bundle is assumed to be invariant to price changes. In the past, we have seen episodes where substantial adjustments were made to price changes; for example, subsequent to major oil price increases. At some level, this raises the question of what the terms of trade measure truly represents, as one needs to take some stand on the composition of the production and consumption bundles to conduct this kind of exercise. Also, this assumption might push the results in the opposite direction of the bias introduced into the measure of variability of the consumption terms of trade by the LOP assumption, as not allowing for changes in the consumption bundle is likely to bias the perceived variability upwards if consumers switch toward products exhibiting reduced prices.

However, I would finish with two "big picture" questions: First, is this additional terms of trade measure important, in the sense that making this distinction will substantively alter our understanding of macroeconomic phenomena? Using the single terms of trade measure, Hamilton (1983) already concluded that oil prices were very influential. Suppose that we just used the production terms of trade. We would be properly measuring the production terms of trade by definition, but, of course, the measured consumption terms of trade might be off.

I wonder how far off we would be in predicting the impact of terms of trade variability on the variability of consumption. Recall that countries are

close to being hedged in most commodities. There might, however, be scope for substantive differences between, say, oil prices and consumer petroleum products, which appear to be more variable. It seems that some kind of horse race is in order.

Finally, can we push the comparison to that of core inflation more forcefully? It seems that the influential commodities are analogous to the important impacts observed by food and energy in inflation. However, we know that food and energy are typically excluded from core inflation measures that policymakers prefer to use because they detract from our ability to predict medium-term inflation.

Similarly, might there be cases where we are less interested in commodities that are influential only in the short run? That is, might we better use a "core" terms of trade volatility measure? For example, agents may smooth changes in terms of trade that are not perceived to extend at least to the medium-term. Might oil be downweighted in such a measure as well?

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