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**Output Fluctuations and Monetary Shocks in Colombia:
Reply to Garcia**

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In her note, Maria Garcia revisited our work on macroeconomic linkages in Colombia. Employing recently available quarterly data and a more recent sample, she estimated a vector autoregression (VAR) using levels rather than first differences of the data and a Bayesian statistical technique (BVAR) rather than our structural VARs. Her investigation found that the time series properties of the major macroeconomic variables were similar to what we reported and, while the pattern of causation apparently shifted, the macroeconomic multipliers were mostly unchanged.

While we are encouraged by the similarities in results, our sense is that the reported differences in causal patterns do not owe to the choice of technique, which Garcia emphasized, but rather to her application of those techniques to a later time period. . .

As to the econometrics, most Colombian macroeconomic variables that are stated in nominal terms exhibit a high degree of persistence. This shows up in findings that show they have unit roots, which were reported in both papers. Since statistical inference becomes more complicated when variables that have unit roots appear on both sides of the equation

to be estimated we dealt with that problem by differencing the data. Garcia correctly noted that those macroeconomic relationships could be estimated in levels if some combination of the data forms cointegrating vectors. She did not, however, explicitly impose such structures on the levels relationships, by estimating, for example the equations in the error-correction form or using Johansen's maximum-likelihood technique (both of which are explained in Campbell and Perron (1991)). As a result, the statistical tests on individual or blocks of coefficients (these are the basis of the reported causality tests) from her levels equations do not have standard properties.

As to the choice of time period, Garcia worked with data from 1976 to 1993, whereas we estimated our equations with an earlier sample, from 1960 to 1987. Our results indicated that money was "exogenous" in the Granger sense, as causality ran from money to the other variables and not the other way around. This result is not entirely surprising. During the early part of our sample, a variety of controls impeded the free flow of international capital, giving the Colombian monetary authorities a greater measure of independence in determining the nominal money stock. This greater control was then properly reflected in our finding that money appeared at the top of a causal ordering. However, the substantial pace of financial innovation and explicit measures to liberalize the capital account over the past few years have moved Colombia closer to the paradigm of a small, open economy. In that circumstance, a central bank

attempting to manage the float of its currency surrenders its control of the domestic money stock. That is, we would expect to find that money can be explained by earlier movements of other macroeconomic variables- it is not exogenous in the Granger sense. Garcia found just that result.

Since other macroeconomic properties, such as the neutrality of money, are less sensitive to the degree of capital mobility, it is not surprising that Garcia arrived at similar conclusions to our own on the nature of dynamic multipliers. Monetary shocks have real consequences in the short run but these real effects diminish as prices and other nominal magnitudes adjust.

References

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