

Comment

Cristina Terra: In this paper, Krivonos and Olarreaga investigate the impact of world sugar prices on labor income in Brazil. This is a relevant question for Brazil, given that the country is a major sugar producer and the protection of the sector in developed countries keeps its international prices artificially low. This paper is a step forward in assessing the impact on Brazilian workers of a decrease of the price distortion in this sector.

The paper starts with a very interesting and thorough description of the sugar sector in Brazil, and it then performs an empirical exercise to assess the impact on labor income of a 10 percent increase in sugar prices, based on a three-step procedure. First, the authors estimate the effect of world sugar prices on domestic prices through the estimation of the cointegration relationship between international and domestic sugar prices. They also investigate the dynamics around the long-run relation using an error correction model. Second, they estimate the influence of domestic sugar prices on employment and on wages using the Heckman selection model to correct for the fact that wages are observed only for those employed. Finally, the coefficients estimated in the first two steps are used to compute the impact of a 10 percent increase in international sugar prices on workers' income in Brazil. They conclude that a rise in international sugar prices would increase household income, and this rise is homogeneous across income quintiles.

The authors present an interesting interpretation of the results of the Heckman model with respect to the interaction term between years of schooling and sugar prices: its impact is positive on wages and negative on employment. Hence, after an increase in sugar prices, more educated workers should experience higher wages, whereas the less educated should face higher employment. The authors argue, in a neat and simple way, that the different effects on skilled and unskilled labor may be explained by a difference in the labor supply elasticity between those two types of labor. If the labor supply for skilled labor is relatively less elastic than that of unskilled labor, then the

impact of an increase in labor demand would be stronger on wages among skilled workers, whereas for unskilled workers, the larger impact would be on employment. They suggest that such a difference in supply elasticities may also explain the more general empirical finding in the literature that wage inequality rises in developing countries following trade liberalization. In the case of Brazil, this may be true for the sugar sector, but not for the economy as a whole. Gonzaga, Menezes-Filho, and Terra show that the Brazilian trade liberalization in the 1990s brought about an increase in the relative wages of unskilled labor, in contrast to the evidence found for other developing countries.¹

In the final step of their empirical analysis, the authors decompose the impact of an increase in sugar prices on household income into wage and employment effects. Interestingly, workers in the top income quintiles would experience a relatively larger wage increase and a fall in employment, while low-income workers would see employment rise. This is compatible with the result mentioned in the previous paragraph, presuming that workers in higher income quintiles are, on average, more educated. According to the results of the Heckman model, sugar prices have a positive direct impact on employment, and the interaction of sugar prices with years of schooling has a negative coefficient. Hence, employment can be expected to increase on average, with a smaller rise or a fall for the top quintile. The opposite is true for wages. It is quite surprising that wage and employment effects work in opposite directions across income quintiles in such a way that the overall income effect is practically the same across them.

It would be interesting to explore the regional dimension of these results. Brazil is a very unequal country both at the individual level and in its geographical distribution. Fally, Paillacar, and Terra present evidence of a strong correlation between market access and regional wages in Brazil.² The empirical results in this paper show that the pass-through from international to domestic sugar prices is quite different across states, which suggests a differential impact on labor income across regions. I wonder what would be the impact of an increase in international sugar prices on regional inequality.

Despite the neat empirical results of the paper, the wage and employment effects captured there may not have been generated by sugar price changes. The price of sugar is correlated with the price of other agricultural commodi-

1. Gonzaga, Menezes-Filho, and Terra (2006).

2. Fally, Paillacar, and Terra (2008).

ties, and they have experienced an overall increase over the time period studied in this paper. It is therefore possible that sugar prices are actually capturing the effect of commodities prices. Further research should try and disentangle these effects, to establish more clear-cut evidence that sugar prices have an independent and relevant impact of their own, in addition to that of overall commodities prices.

References

- Baffes, John, and Bruce Gardner. 2003. "The Transmission of World Commodity Prices to Domestic Markets under Policy Reforms in Developing Countries." *Policy Reform* 6(3): 159–80.
- Bolling, Christine, and Nydia R. Suarez. 2002. "The Brazilian Sugar Industry: Recent Developments." *Sugar and Sweetener Situation & Outlook* (September): 14–18. U.S. Department of Agriculture, Economic Research Service.
- Fally, Thibault, Rodrigo Paillacar, and Cristina Terra (2008). "Economic Geography and Wages in Brazil: Evidence from Micro-Data," Working Paper 2008-23. Université de Cergy-Pontoise, Théorie Économique, Modélisation et Applications (THEMA).
- Gonzaga, Gustavo, Naércio A. Menezes-Filho, and Cristina Terra (2006). "Trade Liberalization and the Evolution of Skill Earnings Differentials in Brazil," *Journal of International Economics* 68(2): 345–67.
- Greene, William. 2000. *Econometric Analysis*. 4th ed. New York: Macmillan.
- Guilhoto, Joaquim J. M., and others. 2002. "Mechanization Process of the Sugar Cane Harvest and Its Direct and Indirect Impact over the Employment in Brazil and in Its Five Macro Regions." Seminar Paper 09/2002. University of São Paulo, Economic Research Institute (IPEUSP).
- Jones, Ronald W. 1971. "A Three-Factor Model in Theory, Trade, and History." In *Trade, Balance of Payments, and Growth*, edited by Jagdish N. Bhagwati and others. Amsterdam: North-Holland.
- Mitchell, Donald. 2005. "Sugar Policies: An Opportunity for Change." In *Global Agricultural Trade and Developing Countries*, edited by M. Ataman Aksoy and John C. Beghin. Washington: World Bank.
- Moraes, Marcia. 2004. "Analysis of the Labor Market of the Brazilian Sugar Alcohol Sector." University of São Paulo.
- Mundlak, Yair, and Donald Larson. 1992. "On the Transmission of World Agricultural Prices." *World Bank Economic Review* 6(3): 399–422.
- Neumark, David, Wendy Cunningham, and Lucas Siga. 2006. "The Effects of the Minimum Wage in Brazil on the Distribution of Family Incomes: 1996–2001." *Journal of Development Economics* 80(1): 136–59.
- Nicita, Alessandro. 2008. "Price Elasticities and Tax Reform in Mexico." *Applied Economics* 40(18): 2329–35.
- . 2009. "The Price of Tariff Liberalization: Measuring the Impact on Household Welfare." *Journal of Development Economics* 89(1): 19–27.
- Panizza, Ugo, and Christine Zhen-Wei Qiang. 2005. "Public-Private Wage Differential and Gender Gap in Latin America: Spoiled Bureaucrats and Exploited Women?" *Journal of Socio-Economics* 34(6): 810–33.
- Pavcnik, Nina, and others. 2004. "Trade Liberalization and Industry Wage Structure: Evidence from Brazil." *World Bank Economic Review* 18(3): 319–20.

- Porto, Guido. 2005. "Informal Export Barriers and Poverty." *Journal of International Economics* 66(2): 447–70.
- . 2006. "Using Survey Data to Assess the Distributional Effects of Trade Policy." *Journal of International Economics* 70(1): 140–60.
- . 2008. "Agro-Manufacture Export Prices, Wages, and Unemployment." *American Journal of Agricultural Economics* 90(3): 748–64.
- Ricci, Ruda, Francisco J. C. Alves, and Jose Roberto Novaes. 1994. "Mercado de trabalho do setor sucroalcooleiro no Brasil." Agricultural Policy Working Paper 15. Project PNUD/BRA/91/014. Brasília: Institute for Applied Economic Research (IPEA).
- Stock, James H., and Mark W. Watson. 1993. "A Simple Estimator of Cointegration Vectors in Higher-Order Integrated Systems." *Econometrica* 61(4): 783–820.
- Winters, L. Alan, Neil McCulloch, and Andrew McKay. 2004. "Trade Liberalization and Poverty: The Evidence So Far." *Journal of Economic Literature* 42(1): 72–115.