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Welfare consequences of food prices increases: Evidence from rural Mexico

Orazio Attanasio [a,b], Vincenzo Di Maro [c], Valérie Lechene [a,b,*], David Phillips [b]

[a] UCL, UK
[b] Edepo, IFS
[c] DIME, The World Bank

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ABSTRACT

This paper presents an analysis of the welfare consequences of recent increases in food prices in Mexico using micro-level data. We estimate a QUAIDS model of demand for food, using data collected to evaluate the conditional cash transfer program *Oportunidades*. We show how the poor have been affected by the recent increases and changes in relative prices of foods. We also show how a conditional cash transfer program provides a means of alleviating the problem of increasing staple prices, and simulate the impact of such a policy on household welfare and consumer demand. We contrast this policy with alternative policy responses, such as price subsidies, which distort relative prices and are less well-targeted.

1. Introduction

The substantial increases in world food prices over the decade up to 2009, and especially between 2006 and 2008, have raised considerable concerns about the welfare of poor households, for whom food represents a substantial share of consumption, and who might already be at levels of consumption close to subsistence. The implications that deterioration in nutrition and food security might have in the long run make this a key policy issue for developing country governments who need to implement appropriate policy responses.

Quantifying the impact of the increases observed in recent years on household welfare is not easy for a variety of reasons. First, as prices of different foodstuffs have been changing at different rates, households may have been able to alter their spending patterns, exploiting relative price changes to limit the impact of food price rises on their welfare. Assessing these substitution possibilities requires estimating a demand system. Second, some households might be net producers of some of the items whose prices increase. Therefore, for some poor households, some price increases might result in an increase in welfare.

In this paper, we develop a demand system to analyze the impact of food price rises on poor households in rural Mexico. This means we can account for the impact of substitution on the demand-side and by using data on consumption of home-produced food, we can also control for the income effects that changes in the prices of these goods have. Hence, our work is most similar to that of Ravallion and van de Walle (1991) who analyze the effect of rice price changes in Indonesia. However, we do not model changes in the production of foodstuffs by households in response to price changes, either for consumption by the household or for sale in the market. While this is a limitation in our analysis, in the context of rural Mexico it does not, in fact, look like a major one: for instance, only 5% of households are observed producing an amount equivalent to more than 13% of their food expenditure in our data.[1]

Our approach, in addition to the estimates of the impact of food price rises on consumer welfare, allows us to consider the welfare impact of policy responses to the price increases, including subsidies to specific commodities, or cash transfers. From an efficiency point of view, interventions that do not try to affect prices are probably to be preferred: price controls can lead to problematic rationing and reductions in supply, and while general price subsidies avoid these problems, they are usually poorly targeted and, by definition, distort relative prices. However, direct transfers can be difficult to design and to target, particularly in a developing-country context. It is therefore natural to look at existing programs to see if they can be used to address the specific need for

* Corresponding author. Tel.: +44 207 679 10 13.
E-mail addresses: o.attanasio@ucl.ac.uk (O. Attanasio), vdimaro@worldbank.org (V. Di Maro), v.lechene@ucl.ac.uk (V. Lechene), david_p@ifs.org.uk (D. Phillips).

[1] As for the supply side, in the future we plan to consider only the effect that a change in price has on a producer's income. This exercise can be considered as a first order approximation of the type considered by Deaton (1989) and Ravallion and Lokshin (2004).

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intervention induced by increases in food prices. The presence of conditional cash transfer programs (CCTs) gives policy makers in some developing and middle income countries an important opportunity to respond to price increases by increasing the value of these transfers.

There is another sense in which CCTs can be useful. Many of these programs have been rigorously evaluated, and in order to do this, detailed survey data have been collected that include information on expenditure and consumption patterns and, in some cases, unit values and prices. These surveys therefore provide an invaluable data source for estimating the impact of food prices on poor households. In particular, one can use them to estimate detailed and theory consistent demand systems that can then be used to estimate 'true' price indices for different types of households that reflect substitution possibilities when relative prices change. These price indices then allow one to evaluate the consequences of food price increases for consumer welfare.

In this paper, we use information from the evaluation of the rural component of the very large Mexican CCT known as *Oportunidades* (formerly PROGRESA). The program was accompanied by a large evaluation effort that included the collection of extensive household surveys in, initially, 506 localities. Multiple waves of this survey were gathered: in this paper we use five surveys collected between October 1998 and October 2003.[2] This data, unlike that available from the national household budget survey (the *Encuesta Nacional de Ingresos y Gastos de los Hogares* or ENIGH, for short) is not representative of the entire population of Mexico. However, there are two main reasons why we chose to use the evaluation sample. First, the data is very much focused on the population eligible for *Oportunidades* and geographic areas that have been targeted by the program. This means that the surveys cover mainly the poor and vulnerable households that food price rises are likely to hit hardest. A survey like ENIGH might not have enough low income people. Second, and more importantly, use of the evaluation sample allows us to identify reliable local-level prices for the various foodstuffs entering our demand system. As we discuss later, this would not be possible using the ENIGH data, for which problems of conflating variations in price with variations in quality of individual purchases would be much more significant.

The exercise we propose – the estimation of a demand system to construct true price indices for the population of interest and the assessment of the welfare losses implied by observed food price increases – is conceptually straightforward. We estimate a model of demand using data on expenditure and prices between 1998 and 2003, and assuming that preferences are stable after 2003, we can use the estimated demand system and observed changes in consumer prices since 2003 to simulate the welfare impact of the food price boom. Implementing such an exercise, however, is not trivial. We have to address many methodological, empirical and practical issues.

From a theoretical point of view, we need to specify a theory-consistent demand system and decide on the econometric techniques to be used to estimate it. From an empirical point of view, there are a number of practical issues to resolve. First, a very detailed and long list of commodities needs to be grouped into appropriate aggregate commodities to allow feasible estimation of a demand system. Defining the consumption aggregates involves trading off simplicity and feasibility with the need to maintain sufficient detail to capture the effects of changes in relative prices and substitution possibilities. Second, we need to compute price indices for the commodity groups using the prices of the component commodities that make each group. As our approach requires us to allow for and use the presence of different prices in different localities and regions, these indices must be constructed at the local level. Making the information on prices consistent across time (and in some instances, across localities) is not always easy. Third, information on prices of foods is not directly available; instead the survey records expenditures and quantities, from which unit values are constructed. This poses a number of difficulties detailed in Section 4.

The rest of the paper is organized as follows. We start by presenting some background information on the increases in world food prices and in Mexico in Section 2. In Section 3 we discuss the data sources used and Section 4 discusses how we construct the necessary information on prices and quantities from this data. We then discuss the demand system that we will be estimating. This is done in Section 5, which presents the specific model of demand we estimate, the quadratic almost ideal demand system (QUAIDS, Banks et al., 1997), and the econometric techniques employed to estimate it. Section 6 presents the results we obtain from our estimated demand system. Rather than presenting the coefficients, we discuss both the income and price elasticities implied by the estimates. Using this demand system, we analyze the welfare implications that different price change scenarios have for the households in our sample in Section 7. We look both at averages and the distributional consequences of the price changes. We also consider several policy experiments, including price subsidies and cash transfers. Section 8 concludes.

2. Food price increases: Mexico and the world

Between 2006 and 2008, world food prices increased dramatically. The increase was particularly stark for commodities such as rice, corn and wheat, which constitute the staple foods for many poor households around the world. World food prices (like other commodity prices) subsequently fell considerably from their 2008 peaks, although in the case of wheat and corn, further large increases took place in 2010 and 2011, and in the case of rice, prices remain well above the levels seen prior to the commodity-price boom (see, for example, Timmer, 2008).

Figs. 1 to 3 plot the price of rice, corn, and wheat for the world from 1985 to January 2012 and for Mexico from 1996 to January 2012. We also include the average prices observed in the *Oportunidades* survey data for each survey wave (with the latest survey taking place during autumn 2007). For international prices we use IMF primary commodity prices, while for Mexico we use the national consumer price index. This allows us to put the increased prices observed in our data into a proper international and national context. The rise in the international price of rice, corn and wheat in recent years is spectacularly evident in the figures and it dwarfs the other spikes visible in the series.

Mexico was obviously not immune from these increases. What matters for consumers, however, are not commodity prices per se, or producer prices, but the extent to which movements in these are reflected in consumer prices. The latter are not nearly as volatile as producer prices. Hence, while the Mexican retail prices of rice, corn

Fig. 1. Rice prices.

[2] Although there exist later waves of the survey, we do not use them for different reasons as explained below in Section 3.