

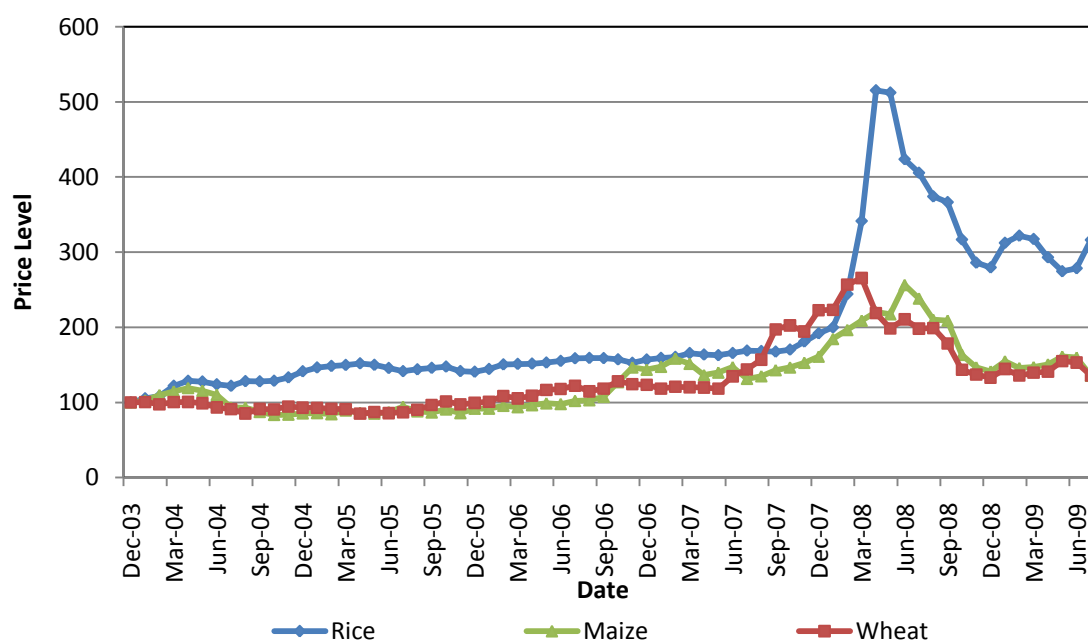
The impact of food price rises on poor Mexican households

David Phillips, Research Economist at the IFS

The period from 2003 to the summer of 2008 saw significant and sustained increases in global food prices, especially for staple goods such as maize, rice and wheat. For instance, between December 2003 and May 2008, the global price of rice rose by 415%. Such large price rises are of particular concern for developing countries such as Mexico, especially with respect to the standards of living of poor households, for whom spending on food is a very large part of their total expenditure. This article discusses the food price rises faced by Mexican households and details efforts to measure the welfare cost of these price rises using demand modelling.

First up, just how big and widespread were the rises in food prices? Figure 1 shows the world producer price index for maize, rice and wheat from December 2003 to July 2009. These price indexes are normalised so that the price in December 2003 is 100 and hence a value of 200 would indicate a price twice that of December 2003. Between the start of this period and their peaks in early 2009, the price of rice, maize and wheat rose by 415%, 156%, and 165% respectively. As a result, average prices in 2008 were 255%, 99% and 97% above the 2003 levels. Prices in international markets have since fallen back somewhat, but remain considerably higher than their 2003 level.

Figure 1. The World Producer Prices of Rice, Maize and Wheat

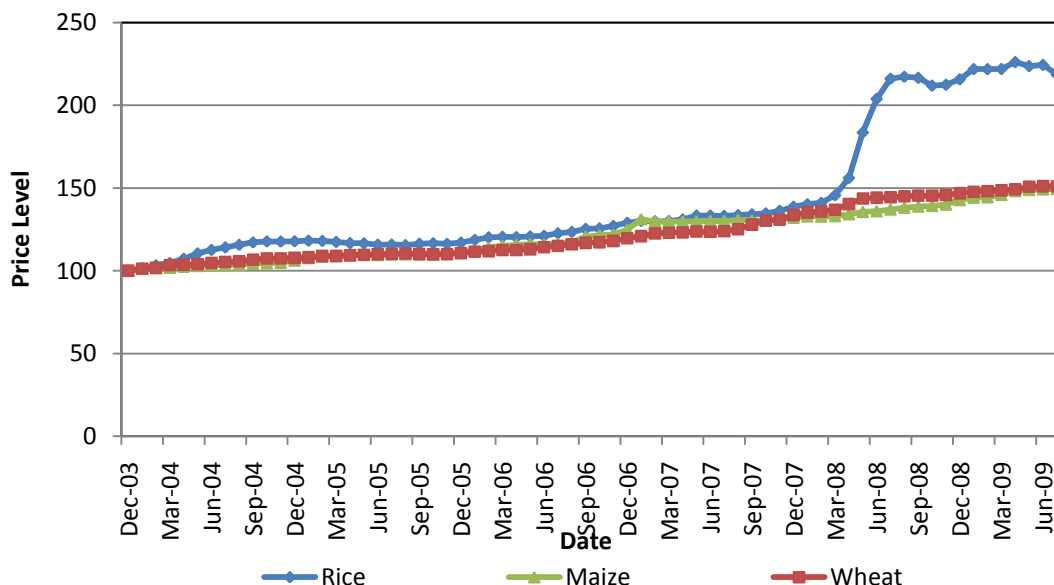


The price increases faced by consumers are not necessarily the same, however. For instance, world food prices are quoted in US dollars, and if Mexico's currency (the Peso)

were to strengthen against the dollar – meaning it takes fewer pesos to buy a dollar – the impact of the global price rises would be eased. More important, however, is the fact that the price consumers pay reflects the other costs food retailer’s face in addition to the cost of the food itself including things such as shop rental, staff costs and general overheads. If these costs do not increase, or increase by less, then the retailer’s marginal costs will increase by less than the world producer price of food. In a perfectly competitive market, firms charge a price equal to marginal cost, and therefore the rate of increase of consumer prices would be lower than that for producer prices. If the retail sector is not perfectly competitive, firms typically charge more than marginal cost and have some power to set their price. In this instance, competition strategies may be more complex. For instance, some firms may absorb much of the price increase, hoping to capture a larger share of the market.

The Mexican Central Bank publishes detailed data on the prices of foodstuffs and other consumer goods and services. Using this information on food prices, combined with data on how much people spend on different types of food it is possible to construct price indices for the 8 broad categories of goods that we can use for our analysis of how these price increases affected poor families. Figure 2 shows the consumer prices of the same 3 goods as figure 1. Two things stand out. First, the percentage price increase is considerably lower for Mexican consumer prices than producer prices. Second, whilst prices moderate from mid-2008 for the producer series, they continue to rise for consumer prices. This is likely to reflect two things. Foodstuffs, particularly grains, take some time to move through the supply chain, and retailers may delay price increases in case higher producer prices prove temporary. Hence, consumer prices continue to rise as they “catch up” with producer prices. The Mexican peso weakened in late 2008 and early 2009 and this may also act to increase prices during this period.

Figure 2. The Mexican Consumer Prices of Rice, Maize and Wheat



In order to look at the welfare costs of these price rises, we also need data about the food consumption of Mexican households. IFS researchers have access to a comprehensive survey of poor Mexican households living in rural areas that includes detailed information on their food expenditure, production and consumption. The survey also contains information on demographics and the household's economic circumstances.

A simple way of producing a "rough guess" of the welfare impact would be to multiply the amount a household spends on each good by the price increase of the good. Economists call such a "guess" a **first order approximation**. If you lack detailed household data or time is of the essence, this will usually provide a reasonable answer, but there are a number of reasons why it is likely to overstate the welfare cost.

The one focused on here is that individuals have the opportunity to **substitute** between goods in response to price rises. Suppose that the price of rice rose a lot, but the price of wheat products (such as bread) rose very little. It is likely you would be willing to cut back your purchases of rice and increase your purchases of bread to offset the higher price of the former. Because you choose to do this, the welfare cost is necessarily less than if one assumed unchanged purchasing behaviour. If purchases of wheat increase when the price of rice rises, we call wheat a **substitute** for rice. On the other hand if spending on a good falls when the price of another good rises, we call these goods **compliments**. An example of compliments may be sugar and tea.

The way we allow for such substitution to take place is to estimate a **demand system**. This is a way of structuring and estimating the links between consumption of different goods, prices, incomes and the demographic characteristics of households. It allows you to simulate the effects of an increase in prices or incomes on the amount of each good households will consume, and importantly for our purposes, the household's material wellbeing. Demand systems are widely used by economists, in government and in industry. For instance, recent talk s about setting a minimum price for alcohol have been based on demand system estimates that suggest the amount people drink is quite sensitive to the price of alcohol.

There are many different demand systems that could be used but a key criteria is how flexible they allow responses to price and income changes to be. The model used in this article is one of the most flexible available, and allows goods to be **luxuries** at one level of income, and **necessities** at another. So, for instance, the fraction of your spending going on meat may first rise as income increases, but may then fall as your income increases further. Such patterns have been shown to occur in many studies and do in this one.

As well as substituting between goods, a large fraction of households are able to shelter themselves from food price rises by relying on food grown and produced in the home. Analysis of our data shows that over two-thirds of households produce some of their own food, but that on average, it is only worth about 5% of their total food expenditure. The

largest part of this **home production** is made up of growing fruits and vegetables, rearing chickens and making one's own tortillas.

Just how much do we think price increases affected the poor Mexican households in our sample? Table 1 shows how the average estimated monetary cost as a proportion of total food expenditure varies by whether or not we include substitution or home-production effects. On average, food price increases have cost our households an amount equivalent to 17.7% of total food expenditure when you account for home production and substitution. If we include substitution but not home production it is 18.6%, vice versa 19.5%, and if we ignore both offsetting effects we obtain a figure of 20.3%. These are sizeable numbers, so even accounting for household's ability to offset food price rises, they still suffer a significant reduction in welfare. However, compared to our best estimate where we account for substitution and production, the first order approximation overstates the welfare cost by 2.6 percentage points (or nearly 15% of the actual value). This is probably an amount worth caring about from a policy perspective.

Table 1. The Welfare Effects of Price Changes

	Ignoring Home Production	Including Home Production
First Order Approximation	-20.3%	-19.5%
Including Substitution Effects	-18.6%	-17.7%

Our demand system also allows us to produce price and income **elasticities** that can be used as a rough check of whether we believe our analysis to be plausible but which are also of interest in their own right. Own-price elasticities measure the percentage change in the quantity of a good consumed when its own price changes by 1%. If the value is greater than 1 the demand for the good is termed **elastic**, otherwise it is **inelastic**. Cross-price elasticities measure the change in consumption of a good when the price of another good changes by 1%. We use these to measure the nature of the substitutability between goods. A negative cross-price elasticity means goods are compliments and a positive one means that they are substitutes. Finally income elasticities measure how the amount of a good purchased responds to changes in income. If it is less than one, the good is a necessity, and if it is greater than one is a luxury.

A full description of what we find would take a long time but here are a few examples. We find that animal products and wheat products are luxuries within total food expenditure (so that the fraction of expenditure on them increases as total food expenditure increases), whilst beans and basic goods (such as oil and sugar) are necessities (vice versa). This seems to make sense. Meat is quite expensive, and beans offer a cheaper protein substitute and one might want to switch as one gets richer. However, rather than finding that animal products and beans are substitutes, we find them to be compliments. This, however, demonstrates an important lesson in applied economics: you need to consider the local

context. In Mexico, for instance, meat and beans are often consumed together – think of burritos! Other goods show more typical patterns of substitutability; for instance, grains such as rice, maize and wheat are typically substitutes.

IFS research has therefore shown significant negative impacts of food price rises that are partly – but by no means fully – offset by changes in the goods households choose to buy and their own home production. This work is only a start, however, and economists will be working for some time yet incorporating additional features, to make the model more comprehensive. For instance, it is likely that higher agricultural prices feed through into higher profits and wages in the agricultural sector, offsetting part (or perhaps even all) of the rise in food prices. Considering such impacts would require considering the **general equilibrium** of the Mexican economy – a much more difficult job that would require additional data.