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The Price Is Not Always Right

On the Impacts of (Commodity) Prices on Households (and Countries)

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Abstract

This paper provides an overview of the impact of once-and-for-all changes in commodity prices and other prices on household welfare. It begins with a collection of stylized facts related to commodities based on household survey data from Latin America and Africa. The data uncover strong commodity dependence in both continents: households typically allocate a large fraction of their budget to commodities and they often depend on commodities to earn their income. This income and expenditure dependency suggests sizable impacts and adjustments following commodity-price shocks. The paper explores these effects with a review of the literature. It studies consumption and income responses, labor-market responses, and spillovers across sectors. It ends up providing evidence on the relative magnitudes of various mechanisms through which commodity prices affect household (and national) welfare in developing economies.

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The Price Is Not Always Right: On the Impacts of (Commodity) Prices on Households (and Countries)*

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1 Introduction

Energy prices rose more than 140% between 2000 and 2013, according to the World Bank's energy-price index, while the food-price index rose by more than 80%. These increases in commodity prices motivated research to assess the implications for households and workers in developing countries, as well as policy responses. An example is the World Bank's 4 billion dollar contribution to a joint fund with J.P. Morgan to help developing countries invest in commodity-price hedging instruments launched in June 21, 2011.[1] Yet commodity prices have stalled since 2012, and observers are once again concerned about the social and economic consequences of declining commodity prices[2]. Clearly, part of the concern is about the volatility of commodity prices, as much as the medium-term trends per se.

Whether it is the trends or the volatility of commodity prices, knowledge about the effects of commodity-price fluctuations on household welfare is useful for policy as much as it is useful for understanding economic behavior. It is also important to have a sense of the magnitudes of the impacts involved.

The objective of this article is to put forth an economic framework for understanding how people in developing countries are affected by relatively permanent changes in commodity and other prices. The approach is to review the literature framed by a toy model that highlights issues relevant in the discussion of prices and welfare. The review of the literature canvasses research from various branches, including shocks to exchange rates, financial crises, and trade reforms. In all these cases, the shocks manifest themselves as price changes, and thus the findings are relevant for the discussion of commodity prices. We complement the literature review with a detailed analysis of household-survey data on commodity dependence in Latin America and Africa.

Since we are interested in the impact of commodity prices on household welfare and behavior, our framework builds on agricultural household models. This framework analyses how households choose consumption bundles and how they earn their living. In some cases, especially in rural areas, income is generated by agricultural production (profits). In other

[1] World Bank, Press Release No:2011/559/EXT, Washington, DC.

[2] See, for example, "Life after the Commodity Boom," *The Economist*, March 29, 2014

cases, where the economy is more industrialized, wages and employment are the predominant sources of income, which can be affected by commodity prices. Since prices can affect both consumption and income, the simple framework opens the door to a discussion of how household welfare is affected by changes in commodity prices, both in the short- and long-run. The literature provides numerous empirical findings that can bring together various pieces of the puzzle illustrated by the framework.

First, we review the literature on the first-order impacts of price changes. These are the impacts that would take place if households adjust neither the quantities of commodities that they consume nor change the sources of income they receive in response to the price change. The article derives the commonplace net-consumer-versus-net-producer result, which establishes that a price increase hurts net-consumers and benefits net-producers.

Second, we discuss spillovers from commodity prices to other sectors. This refers to, for instance, whether households adjust all consumption choices in response to higher food prices, or whether only food expenditures are affected. Also, we report evidence on spillovers in employment and wages; that is, changes in food prices can affect wages and employment not only in the food sectors (primary, agro-manufactures) but also in non-food sectors.

Third, the paper reviews how prices are transmitted to the local economy. Because commodities are traded in international markets, most of the shocks associated with commodity prices are global in nature. Consequently, a relevant question is the extent to which changes in international prices pass-through to domestic markets.

Fourth, the paper explores available evidence on consumption and production responses. Here, we review how consumers adjust the quantity and quality of the consumption basket, as well as other behavioral responses associated with consumption. We also explore some of the patterns of adjustment in production, particularly supply responses in agriculture.

It is important to mention at the outset that there are at least five related literature surveys. These are Winters, McCulloch and McKay (2004) and Goldberg and Pavcnik (2004), which cover trade liberalization and poverty; Goldberg and Pavcnik (2007) and Harrison, McLaren and McMillan (2011), which cover trade and the distribution of income; and Lederman (2013), which covers trade and inclusive growth. Our review complements

this work by merging issues of poverty with issues of inequality. Furthermore, we have a somewhat narrower focus, as we are mainly interested in commodity prices, but we take a somewhat deeper look at some of these issues, all in the context of a general framework.

The rest of this paper is organized as follows. Section 2 presents an overview of household commodity dependence in Latin America and Africa. Using various household income and expenditure surveys from Latin American and African countries, we estimate the average budget shares spent on commodity-related sectors (mostly food and energy), and the average income share derived from commodity-related sectors (agriculture, forestry, fishing, mining, food manufactures, and energy). The data reveal strong commodity dependence in both continents. Section 3 introduces the analytical framework and reviews the literature that measures those effects using data from developing countries. The implications of price changes for net-consumers and net-producers are central in this analysis, with labor markets, various types of spillovers across markets, and imperfect price transmission of border prices playing fundamental supporting roles in the story. Section 4 turns to departures from first-order effects and studies the role of household adjustments in production and consumption. Section 5 presents a simple example of the magnitudes of the different channels identified in the paper using Mexican data. Section 6 concludes.

2 Commodity Dependence: Stylized Facts

This section characterizes the dependence on commodities of households in developing countries. To study dependence on consumption, we focus on expenditure shares spent on items related to commodities, mainly food and energy. Households' dependence on commodities on the income side is then measured by income shares in agriculture (including forestry and fishing), mining, food manufactures (beverages, food, and tobacco), and energy. An important aspect of the analysis is related to poverty and inequality, because dependence on commodities either on the consumption or the income sides can vary across quintiles of the income distribution in a given point in time.

Regarding commodity-dependence on the consumption side, Table 1 presents the average

expenditure shares on commodities for eight Latin American countries: Argentina, Bolivia, Colombia, El Salvador, Mexico, Nicaragua, Panama, and Peru. There is significant cross-country variation in the average share spent on commodities, ranging from an average share of 71.3 percent in Bolivia to 31.7 percent in Mexico. A common feature is that, in all these countries, the share of commodity expenditures decreases across quintiles. This is expected due to Engel's Law: richer households typically spend a smaller share of their total expenditures on food. In Bolivia, for example, the average commodity share is 82.9 percent in the first quintile and 54.4 percent at the top quintile. In Mexico, the average share of the bottom quintile is 40.6 percent and it is 20.8 percent at the top. In Colombia, the poorest households spend, on average, 80.1 percent on commodities; the richest households spend 41.6 percent. Clearly, differences in the populations covered by the surveys across countries (i.e., urban versus rural populations) can account for part of the differences in the average commodity expenditure shares. But, leaving this aside, the data reveal a very high commodity dependence on the consumption side, especially for the poorest households.

Table 2 reports commodity-dependence of household expenditures for a set of African countries. There is also significant variation across countries, from a minimum average share of 42.7 percent in South Africa to a maximum of 89.9 percent in Madagascar and 84.4 in Tanzania. The commodity dependence on consumption seems higher in Africa than in Latin America, however. In most countries, commodity dependence in consumption is more prevalent at the bottom of the quintile distribution. This means that Africa and Latin America are both highly dependent on commodities and, moreover, this dependence declines with household income. This pattern explains the literature's concerns about the poverty impacts of commodity price hikes.

Tables 3 and 4 turn to dependence on the income side. The aim is to measure the share of household income derived from commodities, including income from employment (wages) and self-employment (for instance, agricultural home production). The following sectors are included in our definition of "commodities:" agriculture, forestry, and fishing; mining; food manufactures (including beverages and tobacco); and energy. Starting with Latin American data for 2004, Table 3 reports the total combined share of income derived

from commodities. Income commodity dependence varies widely across countries. This comparison, however, is unlikely to be very useful because of differences in coverage. An example of this is Argentina, which in spite of being a country with a relatively important agricultural sector, the household survey suggests that only 3.2 percent of household income is, on average, derived from commodities. Clearly, this is more a manifestation of the urban focus of the survey than of the economy. In the discussion that follows, it is thus convenient to focus more on within country comparisons across quintiles. A regularity in most of our Latin American data is that lower quintiles exhibit higher shares of income derived from "commodities." The differences are sometimes important. In Paraguay, for instance, while the bottom quintile earns 44.4 percent of income from commodities, the top quintile earns only 14.7 percent.

Table 4 uncovers similar patterns in the African data. The income commodity dependence in Africa is very high (higher than in Latin America) and varies across countries. The lower quintiles also tend to show higher commodity dependence. In Ghana, for instance, the share of income derived from commodities is 71.4 in the first quintile, and 27.1 in the top quintile. Table 4 shows that, in the data, most of the dependence from commodities in Africa is related to dependence on agriculture. Since the data from both continents indicates that poor households are on average highly dependent on commodities on both the consumption and income sides, the distinction between net consumers and net producers will become particularly relevant for the literature that attempts to assess the distributional and poverty impacts of commodity-price fluctuations.

As a preliminary step in this direction, it is worth analyzing the evolution of consumption and income dependence on commodities during a period of time when global commodity prices rose. The purpose of the empirical exercise is to describe the changes in income shares observed in the data from 2004 to 2008. Transitions in and out of dependency can be studied with panel data, which is unavailable in our sample countries. We can, however, build pseudo-panels of households using repeated cross-section with the method proposed by Dang, Lanjouw, Luoto and McKenzie (2011). Since only the income surveys in Latin America are repeated cross-sections, we focus here solely on *income* commodity dependence

for Latin America. It suffices to say that due to sampling and measurement issues, one can get a distorted view of over-time trends by looking just at the household expenditures and incomes between cross sections. What is needed is a methodology that removes the effect of changes in household samples on the average household consumption and income shares derived from commodities.

To build the 2004-2008 pseudo-panel, we focus on households observed in 2004 and estimate commodity income shares for these households in 2008. This procedure requires the estimation of a regression model for commodity income shares separately for the 2004 and 2008 samples. We then use the estimates from the 2008 sample, together with the residuals from the 2004 regression to produce counter-factual panels. Intuitively, we predict average income shares using the observed covariates in 2004 and the estimated parameters for 2008.[3]

The results are reported in Table 5. The first row reproduces the observed income shares in 2004 that were reported in Table 3, while the second row shows the predicted 2008 shares. A key result is that income dependence on commodities increased in Chile, El Salvador, Honduras, Peru, and Uruguay, which is expected given the rise in global commodity prices. However, dependency remained roughly constant in (urban) Argentina and in the Dominican Republic; Brazil and Mexico experienced a slight decline in commodity income dependence; while in Costa Rica, Ecuador, Panama, and Paraguay, the decline was large. This international heterogeneity might be surprising – given the commodity price boom – but differences are expected due to various factors discussed below.

It is also noteworthy that the dynamics of income dependence on commodities varies across quintiles within countries. In El Salvador, Honduras, and Uruguay, income dependence increased not only on average, but also for all quintiles. In Chile, average dependence rose, but it decreased for lower quintiles and increased for higher quintiles.

[3]Let $s_{i,t}$ be the commodity income share of household i at time t. The cross-section model for t is $s_{i,t} = \mathbf{x}'_{i,t}\beta_t + \varepsilon_{i,t}$. For $t+1$, the model for household j is $s_{j,t+1} = \mathbf{x}'_{j,t+1}\beta_{t+1} + \varepsilon_{j,t+1}$, where we use j instead of i to highlight the fact that these are repeated cross-sections, not panels. Denote $\widehat{\beta}_{t+1}$ the OLS estimates of β_{t+1}. From the empirical distribution of the residuals, let $\widetilde{\varepsilon}_{i,t+1}$ be the draw attached to household i. With these estimates, the prediction for the income commodity shares for household j at time t is $\widetilde{s}_{i,t+1} = \mathbf{x}'_{i,t}\widehat{\beta}_{t+1} + \widetilde{\varepsilon}_{i,t+1}$. Note that, since we are taking averages, the residuals vanish (or are very small). Consequently, the lower and upper bounds in Dang, Lanjouw, Luoto and McKenzie (2011) are very close in our experiment. We report below the lower bound.

In contrast, in Peru, average dependence also rose, but it increased for lower quintiles and decreased for higher quintiles. In Argentina and the Dominican Republic, average dependence remained constant; but it increased for low quintiles and declined for high quantiles in Argentina; and declined for low quintiles and increased for high quintiles in the Dominican Republic. In Brazil, Ecuador, Mexico and Paraguay, average dependence rose, declined for low quintiles, but it increased for higher quintiles. Finally, in Costa Rica and Panama, dependence declined for the average as well as for all quintiles.

These results uncover several observations that are important for the subsequent analysis. First, the data show that households adjust after price shocks. In fact, the commodity income shares changed between 2004 and 2008, when global prices rose to record levels. Second, these adjustments were heterogeneous, not only across countries but also across quintiles of the distribution of income within countries. In what follows, the literature review aims to shed light on the impacts of commodity price changes on household welfare and on household responses and adjustments in response to price signals.

3 Price Changes and Household Welfare

This section explores the impacts of price changes on household welfare. Our analytical framework builds on standard agricultural household models, as in Singh, Squire and Strauss (1986). Although this framework has influenced a large body of research spanning various fields of economics, the ongoing discussion will modify it as needed to illustrate key issues associated with the welfare impacts of commodity price changes.

The framework analyzes the consequences of price variations from the viewpoint of households. Analyses of welfare changes resulting from such price signals tend to follow the approach pioneered by Dixit and Normal (1980), in which a household's budget constraint is (at least initially) assumed to be fixed.[4] Simply put, in equilibrium, household expenditures (including savings) have to be financed with household income (including transfers).

In turn, total household expenditures are, by definition, the sum of expenditures across

[4]An alternative method is to start with the indirect utility function,see Deaton (1997).

goods, evaluated at their corresponding prices and quantities (for a given level of household utility). However, the households *decision* about how much to spend depends on the prices of the consumed goods, on the level of utility, and on other household characteristics (such as household composition).

A household's income, on the other hand, comprises the sum of the wages of all working members of the household plus profits from business or other economic activities. Profits include, for instance, the net income from agricultural production or farm enterprises. They depend on prices, technical capacity and household characteristics. Since profits are defined as sales net of purchases of inputs, some of the costs imposed by taxes on inputs or intermediate goods can be assessed by their impacts on profits. Income may also comprise transfers (public or private), savings and other unmeasured returns to factors of production, such as land holdings.

This simple framework highlights the fact that household welfare depends on market equilibrium variables such as prices and wages (that affect household choices) and also on household endowments. For example, household consumption depends on the prices of consumer goods, and household income depends on the type of labor endowment (skilled, unskilled), the market wage rate, and the prices of goods produced by economic enterprises run by members of the household. It follows that changes in commodity prices affect welfare directly via consumption and production decisions, and that these impacts are heterogeneous insofar as they depend on household choices and endowments. In addition, there are short-run impacts when households do not adjust their consumption, employment or production choices; medium-run impacts refer to the welfare (or consumption or income) effects that take into account partial adjustments; and long-run impacts take into account income growth, investments, and other factors that are related to long-run choices. In other words, the time horizon associated with the impact of price changes on household welfare is commonly defined by the extent to which a household has been able to maximize its total consumption or income in light of the price changes.

3.1 First-Order Impacts

Let us consider now the impacts of changes in the price of a commodity. To simplify, we follow Deaton (1989a) and assume that the principle of "separability" holds.[5] Under this assumption, production decisions are independent of consumption decisions (utility maximization). This means that we can consider the income level of the household as exogenous (once optimal production decisions have been made) when utility maximization takes place as the household adjusts its consumption bundle. The separability assumption is not just a technicality: it allows us to simplify the welfare analysis, but it is valid only under certain economic conditions, such as perfect and complete markets for goods, credit, insurance and so on. [6]

Prices affect both expenditures and income, even if separately. On the consumption side, consumers are worse off if prices go up but are better off if prices go down. In a first order approximation, these impacts can be measured with budget shares. That is, the size of the effect of a price change on a household directly depends on how important the good is in the household's total expenditures. On the income side, there is also a direct impact on profits, if the household produces the affected good, which depends on the share of income attributed to this good. In rural economies, this source of income can account for a large fraction of total income. In more urbanized economies with more developed labor markets (as in many places in Latin America), the role of the direct production of (agricultural) goods tends to be less important.

Comparisons of budget shares and income shares establish a key result in the literature: a price increase hurts *net consumers* (defined by the difference between expenditures and incomes associated with the commodity whose price changed) and benefits *net producers*. The opposite is true for price declines: net consumers are made better off and net producers worse off. Further, the direction of welfare impacts carries over to the level of a national economy or any aggregate unit of analysis: a country that is a net exporter of an agricultural

[5] See Barnum and Squire (1979) and Singh, Squire, and Strauss (1986) for a theoretical discussion of the principle of separability. Benjamin (1992) tests for separability in Indonesia and cannot reject it.

[6] To further simplify the exposition, we also assume separability between consumption and leisure in utility.

good will benefit, on average, from price increases, whether they come from global market fluctuations or from international policy reforms such as the international liberalization of agricultural trade policies or subsidies; but net importers will probably be hurt by those changes. In the context of the recent food crisis, for instance, this implies that countries that are net importers of food were in principle hurt, while net-exporters were the winners.

3.2 Households, Net-Consumers, Net-Producers and Inequality

The net-consumer/net-producer result was introduced by Deaton (1989a), who launched a literature to study the distributional effects of price changes. Deaton (1989a) used data from the Thailand Socioeconomic Survey of 1981-82 to explore the distributional consequences of an export tax on rice across Thai households. He found that an increase in the price of rice (resulting from the elimination of the export tax) would benefit the *average* household. The average poor, as well as the average rich, would benefit little. The benefits for the poor are small because they tend to both consume and produce lots of rice, thus selling little. The average benefit to the rich is also small because while sellers are often large, there are few of them among the rich. The gains would be much higher in the middle of the income distribution, indicating that the middle class would gain the most from higher rice prices.[7]

The ideas introduced in Deaton's work have been, and still are, extensively utilized in the literature. Early examples include: Deaton (1989b), who reviews applications for Cote d'Ivoire, Indonesia, and Morocco; Budd (1993), who investigates food prices and rural welfare in Cote d'Ivoire; Benjamin and Deaton (1993), who study cocoa and coffee in Cote d'Ivoire, too; Barret and Dorosh (1996), who look at rice prices in Madagascar; and Sahn and Sarris (1991), who examine structural adjustments in several Sub-Saharan African countries. Deaton (1997) provides an account of the early use of these techniques in distributional analysis of pricing policies.

Recently, there has been a rebirth of this type of work motivated by the food-price "crisis" associated with skyrocketing prices in global markets. Ivanic and Martin (2008)

[7]Notice, however, that this analysis does not take into account the fiscal implications of eliminating the tax.

cover ten case studies using household survey data from Bolivia (2005), Cambodia (2003), Vietnam (1998 and 2004), Malawi (2004), Nicaragua (2001), Pakistan (1999), Peru (2003), and Zambia (1998). The authors find an overall poverty-increasing impact of higher food prices because, in the sample, most poor households are net consumers of food (both in urban and rural areas).

Wodon et al. (2008) apply this method to a dozen West and Central African countries, Burkina Faso (2003), Ghana (2005-2006), Democratic Republic of Congo (2005), Gabon (2005), Guinea (2002-2003), Liberia (2007), Mali (2006), Niger (2005), Nigeria (2003-2004), Senegal (2006), Sierra Leona (2003), and Togo (2006). The authors focus on rice, wheat, maize, other cereals, milk, sugar and vegetable oils and find that a 50 percent increase in prices for selected food items would cause an average increase in the share of the population in poverty of between 2.5 and 4.4 percentage points. The average impact would be between 3.7 and 5.2 percentage points in urban areas, and between 2.2 and 4.1 points in rural areas. They also find significant heterogeneity across countries, as expected.

While the net-consumer/net-producer result is intuitive, it rests on two critical assumptions, namely that the first-order approximation is valid and that labor markets are unaffected by the price change (Deaton, 1997). The first-order approximation is analytically useful, but it is valid conceptually only for small price changes. We say "conceptually," because in principle budget and income shares could be used to measure the distributional effects of both small and large price changes, but the approximation error will be larger when price changes are large. In these cases, it is crucial to incorporate supply and demand responses, and we discuss these below. The role of labor markets is discussed next.

3.3 Labor Markets

Price changes also affect wages. The mechanisms are simple. Consider, for instance, a small open economy that takes commodity prices as given in international markets. Changes in relative product prices cause some sectors to expand and some others to contract. As a result, labor demand for different types of labor in different sectors can change, thus

affecting equilibrium wages.[8] In the literature, these responses are captured by "wage-price" elasticities, which measure the proportional response of wages to price changes. These elasticities may vary across members of a household when they are endowed with different skills (unskilled, semi-skilled or skilled labor) or if they work in different sectors (industry premia). Clearly, if countries differ in technologies, endowments, or labor regulations, the responses of equilibrium wages to prices can be heterogeneous across countries as well.

The response of wages can generate first-order effects on household welfare. To account for these responses, the standard net-consumer/net-producer proposition needs to be modified. To see this, consider the extreme case where a farm-household consumes a product but does not produce it at all. Instead, the household earns income from selling labor in neighboring farms. By omitting wages, this household would be mistakenly classified as a net consumer and could thus be presumably hurt by a price increase. But if wages respond positively to prices, the final welfare effect may not necessarily entail a loss.

This type of wage responses were studied in Ravallion (1990), who explored the conditions under which net-consumers of food products in Bangladesh lose or gain in the face of increased food prices when rural wages adjust. Ravallion estimates low elasticities of agricultural wages to food prices and concludes that responses are unlikely to be strong enough to offset the short-run adverse distributional effects of higher food prices. The long-run estimates appear to be more favorable to the poor, but it would nevertheless take around four years for any gains to materialize. Boyce and Ravallion (1991) take another look at this issue using newer data for Bangladesh. They set up a dynamic econometric model of agricultural wages and rice prices. They find that increases in rice prices relative to the prices of manufactured goods have adverse effects on the real wages (measured per quantity of rice) in both the short and long runs.

In a study of informal export barriers and poverty in Moldova, Porto (2005) amends the first order approximation used by Deaton (1989a) to allow wages to adjust. In this setup, exporters produce agro-manufactures (i.e., wines or apple juice) for international markets. They purchase primary products from the farmers (grapes, apples) and manufacture exports

[8]Notice that we are referring here to prices of tradable goods. For non-traded goods, the issues are more complex since they are endogenous.

using, among other inputs, labor. Farmers are endowed with land and labor and allocate time (net of leisure) to the "farm" labor market, the home (land) plot to produce primary inputs (grapes) for sale, or to work in nearby farms. In this framework, Porto derives additional welfare impacts given by the direct impact on wages. Also, a given farm can either sell or purchase labor in the "farm-labor" market, and, consequently the estimation of the first-order welfare effects needs to include the additional impacts that arise due to changes in wage earnings or paid wages. Porto (2005) finds that increases in the prices of agro-manufactured exports such as wines (a major export sector in Moldova) have sizeable poverty-reducing impacts. Wages respond positively to export prices and this causes first order gains that dominate both the consumption losses due to higher consumer prices and the profit losses due to higher wages paid to hired labor.

Porto (2006) studies a case where households consume products, sell labor in the market, but do not produce farm products. His model applies well to urban, middle-income economies, where farm activities are not relevant (and are not captured by the available household surveys either). Porto explores the distributional consequences of MERCOSUR—a regional trade agreement between Argentina, Brazil, Paraguay and Uruguay—in Argentina and finds welfare gains for the average poor and middle-income households (and negligible effects for the wealthiest households). This is because, on top of gains from price reductions due to tariff cuts, there are changes in wages that favor unskilled workers over skilled workers, and unskilled workers are concentrated at the bottom of the income distribution.

Three recent studies are also worth mentioning. Ferreira, Fruttero, Leite and Lucchetti (2013) examine the consequences of food price inflation in Brazil, a large food producer with a predominantly wage-earning agricultural labor force. They find large and negative consumption effects, which are also markedly regressive, as expected. However, they also uncover a positive and progressive income effect, particularly in rural areas. Overall, thus, the Brazilian middle-income household suffered larger proportional losses than the very poor or the richer households. Jacoby (2013) reaches a similar conclusion in his study of food prices in India. Specifically, once the wage gains are accounted for, he finds that rural households

across the income spectrum actually benefit from higher agricultural commodity prices. Finally, Nicita, Olarreaga, and Porto (2013) examine the presence of a pro-poor bias in trade protection of six Sub-Saharan African (SSA) countries, Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Gambia, and Madagascar. Their model includes consumption effects, agricultural income effects, and labor income effects. They find that trade policies tend to be biased in favor of poor households because protection increases the agricultural prices of goods that are sold by African households, and this effect dominates the impacts on both expenditures and wages.

3.4 Spillovers

Broadly speaking, spillovers are the impacts of a change in market i on the activity in market j. There are two types of spillovers. Production linkages occur when the expansion of a sector affects upstream activities (backward linkages) or downstream activities (forward linkages). Expenditure linkages occur when the increase in income due to the expansion of a sector raises the demand for outputs and thus the derived demand for inputs in other sectors. Given our focus on commodities, we emphasize here spillovers in agriculture. The large literature on the topic uncovers two main regularities. First, the linkages are strong in rural areas because households earn a large share of their income from and spend a large share of their total expenditures in goods produced locally. Second, both production and expenditures spillovers are important (Mellor and Johnston, 1984; Delgado, 1996; Harriss, 1987). Evidence on spillovers in agriculture in Latin America can be found in the regional study by De Ferranti et al. (2005). They report that while the share of the primary sector in GDP is 12 percent, there are massive spillovers to the rest of the economy. In fact, the multiplier factor from the primary sector to national GDP is 0.22 so that, for instance, a one percent growth of the rural natural resource sector is associated with an increase of 0.22 percent increase in national GDP (much higher than the 0.12 percent increase to be expected from the sector's share of GDP). The multiplier for the income of the poorest households is even higher at 0.28.

Note that spillovers can be interpreted as general equilibrium effects, but they are not

necessarily the same. If there is some sort of labor immobility in general equilibrium, for instance, then a change in the price of good i may have no effect on the wages paid in sector j. In such a scenario, there are no spillovers even in a general equilibrium setting. This distinction is useful to organize our discussion. Of the papers reviewed above, Ravallion (1990) assumes no spillovers or general equilibrium effects from rice prices to non-agricultural wages. The author estimates a partial equilibrium model. An alternative interpretation is that labor markets are segmented. In contrast, Porto (2006) and Nicita (2009) take a general equilibrium approach and assume that a change in a given price p_i affects economy-wide wages. This assumes that labor markets are integrated and workers are freely mobile across sectors; an increase in wages in one sector spills over to other sectors.

Porto (2008) describes a variant of the spillover mechanism. Markets can be segmented so that wages can differ across sectors. However, sectors are related via forward and backward linkages, so that an expansion of one sector may have implications for other sectors. In such a setting, changes in corn prices in Mexico can affect the corn sector directly as well as various rural services associated with corn production. For instance, higher corn prices may require more labor in corn planting, weeding, and harvesting (thus causing wages in the corn sector to increase) and may also require farm services (road graveling, farm-gate and fence repairing, etc.). Porto finds that allowing for those spillovers can make a big difference is assessing the welfare impacts of higher corn prices. In particular, the average Mexican low-income household tends to be a net-consumer of corn and consequently is made worse off by an increase in corn prices. However, once spillovers from the corn sector to agricultural wages are allowed to take place, even low-income net consumers stand to gain from higher corn prices.

Clearly, the type of assumptions used to model labor markets is crucial to determine the impacts of a so-called commodity-price crisis. While in theory assumptions may help illustrate a result, in practice it is important to work with realistic assumptions. In the end, the existence or lack of spillovers, and the nature of those spillovers, will be specific to the case under study, and it is a priori difficult to make generalizations.

Different types of spillovers arise when other product markets, rather than labor markets,

are affected. These spillovers are likely to take place in non-traded goods. As we have shown above, changes in commodity prices affect factor prices, including wages. If the wages earned in non-traded sectors are affected, then the cost of producing these goods will change, and this in turn will affect the equilibrium prices of these goods. As a result, there are additional welfare impacts on the consumption side. Notice that these are first order impacts. Porto (2006) provides an example of how to estimate these impacts for the case of the countries that are members of the MERCOSUR customs union. He uses time series of prices to recover the elasticity of the price of non-traded goods with respect to the prices of traded products; import tariff cuts by MERCOSUR appear to cause the prices of non-traded goods to decline and households to benefit. It is noteworthy that these spillovers are similar to those highlighted by, for instance, Burstein, Neves, and Rebelo (2003) for the computation of the real exchange rate and the adjustment of prices to stabilization programs.

3.5 Price Pass-Through

So far, the review has focused on a generic analysis of price changes. Often, these price changes, especially if they refer to commodities, are generated by external shocks. It is thus important to review the literature on the pass-through of international prices to the domestic economy and, furthermore, to the household. There are various literatures that are relevant here: international economics, international trade, and economic development. While this collection of theories and empirical analyses play different roles in our framework, we can learn from all three of them.

Standard models of international trade and international economics assume competitive markets (and homogeneous goods) and friction-less trade. In this scenario, markets are integrated and the law of one price holds: domestic prices are equal to the international prices converted to the local currency. Any difference between these prices is due to transport and distribution costs as well as to trade policy. In this family of models, a proportional change in the exchange rate, in the international price, or in the tariff is fully transmitted to domestic prices. There is, however, strong evidence against this prediction. The papers reviewed by Rogoff (1996) consistently reject the law of one price for a variety of products

and countries.

The second type of impact arises when distribution costs *change*. Distribution activities are mostly non-tradable services, which require factors of production such as labor and land. If factor prices react to changes in international prices or exchange rates, then distribution costs will themselves change, and this increase can feed into a larger-than-proportional increase in the domestic price of imported goods.[9] There is evidence that this mechanism can be relevant in practice. In Argentina, for instance, Burstein, Neves and Rebelo (2003) show that the distribution margin in wholesale and retail is around 60 percent. Using calibration methods to compute the impact of a stabilization program (i.e., they study a decline in the exchange rate), the authors find that the increase in the relative prices of non-tradable goods can be 42 percent higher in a model with distribution costs than in a model without such costs.[10]

Another strand of literature is the work on exchange-rate pass-through (ERPT), which is defined as the percentage change in import prices resulting from a 1 percent change in the exchange rate. ERPT models are often associated with imperfect competition in product markets (but they are consistent with perfect competition as well). Goldberg and Knetter (1997) identify two conditions for full pass-through: i) constant mark-ups and ii) constant marginal costs. These conditions are unlikely to hold in a given market and, as a result, the literature has found strong evidence of imperfect pass-through. In their review, Goldberg and Knetter (1997) conclude that we should expect a pass-through rate of around 60 percent. Because this literature includes measures of costs in the derivation of the pass-through rate, the results imply that around 40 percent of the change in the exchange rate is actually offset by changes in markups. In a comprehensive analysis of pass-through rates, Campa and Goldberg (2005) find large differences across developed countries. The estimated rate for the U.S. is 42 percent, it is 98 percent in France, 80 percent in Germany, and 46 percent in the United Kingdom.

[9] Note that this is a type of spillover as those discussed above.

[10] With perfect pass-through, Burstein et al. (2003) assume that the prices of tradable goods decrease in the same proportion as the decrease in the exchange rate. When non-traded prices adjust, the calibration results predict an increase in the relative price of non-tradable goods of 15.4 percent (without distribution costs) and of 25.7 percent (with distribution costs).

An interesting paper that attempts to incorporate the estimation of tariff-rate pass-through into the trade and poverty literature is Nicita (2009). Nicita argues that while imperfect price transmission has been established in the literature (as our review suggests), most of the work on the impacts of trade on poverty, and more generally on the distributional impacts of pricing policies, implicitly assume full pass-through. He attempts to fill this gap by estimating tariff-rate pass-through for Mexico. He finds lower pass-through rates for both manufacturing (27 percent) and agriculture (33 percent) and supports these findings by arguing that pass-through is likely to be smaller in a developing country like Mexico due to lack of domestic transport infrastructure.

Another important strand of the literature is the work on spatial market integration and the efficiency of arbitrage. In the presence of transport costs, prices across regions differ in the size of the transport costs but should move together due to arbitrage. In practice, three scenarios can be observed: efficiency, characterized by price differentials that can be perfectly accounted for by transport costs; segmented efficiency, characterized by price differentials that are smaller than transport costs (so that markets are competitive but segmented and high transfer costs make trade and arbitrage not profitable); and inefficiency, characterized by price differentials that are larger than transfer costs and thus imply unexploited arbitrage profits (due to market power, for instance).

There are various procedures to test for spatial market efficiency.[11] The state-of-the-art method is the parity bound model of Sexton, Kling and Karman (1991), Baulch (1997), and Park et al. (2002), among others. The method relies on maximum likelihood methods to estimate a switching regression model for the three states, efficiency, segmented efficiency and inefficiency. As expected, the evidence is mixed. Baulch (1997) finds that rice markets in the Philippines are spatially efficient and that differences in prices levels are due to transaction costs. Instead, Cirera and Arndt (2006) report inefficiencies in maize markets in Mozambique. Notably, these inefficiencies are somewhat reduced by market liberalization (but not by road rehabilitation) but tend to persist over time.

[11] See, for instance, Fackler and Goodwin (2002).

4 Household Adjustment in Consumption and Production

The discussion has followed the traditional first-order approach to assessing the distributional effects of commodity price changes. A major concern with this approach is that it does not allow households to respond to the changes in the economic environment. In fact, even when wage adjustments are incorporated, the standard approach takes the net-consumer/net-producer position of the household as "exogenous." This is just a datum in the analysis that we can assess using survey data, as we did when we described the dependency of households in Latin America and Africa in section 2. The net-position of the household is, however, endogenous when households respond.

It is often argued that the first-order approximation can be accurate for small price changes. The "endogeneity" of a household choice is in these cases, a second order concern in the sense of being unimportant. This is true, and there are numerous examples where the framework works very well. The evaluation of the Doha Development Agenda is one instance, see Hertel and Winters (2006) or Hoekman and Olarreaga (2007). For larger price changes, as those that can be expected from a persistent food-price crisis (or a collapse of global commodity prices), the approximation error grows larger. This section thus explores how large this error can actually become and discusses how the approximation can be improved by measuring household responses in consumption and production.

A consumer will always lose from an increase in prices, but the losses can only be ameliorated by reducing purchases of the more expensive goods. A producer will instead always lose from a price decline. In this case, adjustments can mitigate the losses by shifting resources to more productive activities. Similarly, a farm that hires labor will lose from higher wages, even if labor is substituted with other factors of production. Finally, a worker will lose from a reduction in wages, even if he decreases labor supply to enjoy more leisure.

For a farm-household, or more generally in a model where the household participates in multiple markets, adjustments can play a bigger role. In fact, Porto (2008) shows that it is possible for a household to change sides of the market (that is, to become a net producer

after a sufficiently high price increase) so that even an ex-ante net consumer can benefit from a price increase. In what follows, we illustrate various sources of adjustment and discuss attempts to quantify them.

4.1 Consumption Responses

We begin with consumption because research in this area has been prolific. To incorporate consumption responses, research needs to estimate a system of demand elasticities (own- and cross-price elasticities) to identify the pattern of substitution in consumption. The estimation of such a demand system is difficult, however.

There is a long tradition in economics in estimating systems of demand equations. The type of estimation method depends critically on the available data. In the early days, when only national account data were available, estimation relied on time series of various consumption aggregates and price indices. The search for a utility-consistent empirical model of demand converged to the Almost Ideal Demand System (AIDS) model of Deaton and Muellbauer (1980), which is now the leading framework to study demand elasticities.

The mass-production of household surveys in more recent years—a process in which the World Bank has been instrumental— has broadened the options for demand analysis. However, while expenditure surveys provide detailed accounts of what people consume, they collect little information on prices. In some cases, community questionnaires collect price data at the village level, and this variation can be exploited to identify demand elasticities. For those cases in which the surveys collect information on quantities purchased as well as on expenditures, demand elasticities can be recovered from unit values—the ratio of expenditures over quantity. Deaton (1987, 1988, 1990) developed a model of demand for quantity and quality that allows for the extraction of the price signal embedded in the unit values at the level of a market (or cluster of households residing near each other and thus shopping for consumption goods in the same markets) and these price signals identify the demand elasticities. Because the estimating equations are not necessarily derived from a utility framework (that is, the equations do not form a full-blown AIDS model), the estimated parameters cannot be used to recover the parameters of the utility function. However, they

do reveal how household consumption responds to price changes.

Deaton's unit values procedure has been used extensively to look at issues of tax reforms (see, for instance, Deaton (1989b), Deaton and Grimard (1992), and Deaton (1997) for case studies of Thailand, Pakistan, India, and Cote d'Ivoire).[12] A nice application of Deaton's methods to welfare analysis is the research conducted by Friedman and Levinsohn (2002), who studied consumption responses during the Indonesian financial crisis of 1997. They compared the welfare effects resulting from a first order approximation (that is, without substitution effects) with the ones resulting from a second order approximation (thus including substitution effects). However, they did not take into account wages or, more generally, income responses. Two major findings are worth emphasizing in the context of the discussion about the magnitude of consumption responses to market signals. On the one hand, the losses estimated as first order approximations for the urban poor were high, roughly about 50 percent of the pre-crisis level of per capita expenditures. In rural areas, the losses of the poor were equivalent to nearly 40 percent of their pre-crisis real consumption. On the other hand, allowing for substitution effects in consumption made a big difference. The estimated losses were cut by half for the urban poor and by more than 40 percent. These results imply that first order approximations can be quite large when price shocks are large, as those observed during the Indonesian crisis (when prices increased by 100 percent or more). In cases of economic crisis, when large price changes may be the norm rather than the exception, the results of Friedman and Levinsohn (2002) warn us about the perils of ignoring second order terms in welfare analysis. In light of the stylized facts presented in section 3, these adjustments need to be taken into account in the context of the recent surge of commodity prices.

4.2 Farm Supply Responses

We turn now to farm supply responses. As throughout all of our analysis, we are interested in responses at the household level and especially for the poorest households.[13] Since

[12] In short, the difference is that compensated demand elasticities are needed for welfare analysis and uncompensated elasticities are needed to analyze tax reforms.

[13] We do not cover aggregate supply responses in our review.

these are households typically involved in agriculture, much of our review is concerned with agricultural farm responses.

Conceptually, the issues are those that we discussed within consumption responses. Faced with changed relative prices, the question is whether there is any adjustment in production and what factors prevent or facilitate that adjustment. It is perhaps not really surprising to learn that supply responses are somewhat feeble in developing countries. The literature is too large for a comprehensive review, but some of most fascinating recent examples include Cadot, Dutoit and de Melo (2009) on vanilla-market reforms in Madagascar and McMillan, Welch, and Rodrik (2003) on cashews in Mozambique.

The evidence on supply responses is not always so bleak, however, as two strands of literature illustrate. First, a common finding in empirical work is that sizeable responses can be expected when price changes are accompanied by appropriate complementary factors such as access to inputs, information and credit (McKay, Morrissey, and Vaillant, 1997), productive assets like animals and tools (Deininger and Olinto, 2000), productive capital, education, and land quality (López, Nash, and Stanton, 1995; Heltberg and Tarp, 2002). Second, there is a growing literature showing responses to marketing reforms under successful contract farming arrangements. Two examples will make the point: Brambilla and Porto (2011) estimate large adjustments in cotton production after changes in the outgrower contract environment in Zambia; Maertens and Swinnen (2009) estimate similarly large responses in the vegetable sector in Senegal.

Another way to explore these issues is to look at the performance of subsistence farmers relative to commercial farmers. Subsistence farmers produce for home-consumption, whereas commercial farmers earn income by selling their produce in markets. The evidence indicates that commercial farming is associated with higher consumption and incomes than subsistence farming. Cadot, Dutoit and Olarreaga (2006) estimate an average loss in income of those in subsistence of 43 percent relative to commercial farmers that produce the same crop. Even with much smaller margins, what is puzzling is why subsistence farmers do not transform themselves into commercial farmers by selling their harvest in markets? This question is essentially about supply responses to market signals.

Cadot, Dutoit and Olarreaga (2010) argue that there are barriers to exit from subsistence agriculture, but the issue highlights explanations of why supply responses to market signals might be sluggish. There are two major barriers. One is risk: cash crops are riskier than food crops so that part of the difference in return is actually a risk premium (Fafchamps, 1992; Rosenzweig and Binswanger, 1993). The other barrier is related to missing markets: the differential rate of return is due in part to the shadow price of a good with missing markets such as for labor or food crops (de Janvry, Fafchamps, and Sadoulet, 1991). Notice that missing markets can arise due to variable transaction and transportation costs, fixed transaction costs (searching for partners, enforcing contracts with distant buyers, establishing quality), or sunk costs of transacting. One example is Key, de Janvry and Sadoulet (2000), who illustrate how supply responses are affected by transaction costs. Another interesting example is Cadot, Dutoit and Olarreaga (2006), who show that sunk costs can be particularly large, ranging from 124 to 153 percent of the market value of the average annual farm output in Madagascar.

We end this section with a caveat. Positive and large supply responses to price changes are always an indication that economic incentives work. However, in the context of our analytical framework of section 3, these supply responses comprise second order effects. In consequence, they are likely to generate only small welfare impacts because of the opportunity cost of the resources used in the production of different goods. While this argument does not invalidate the search for supply responses in the data, it strongly argues for a careful interpretation of the findings.

5 Quantifying The Mechanisms: The Case of Mexico

In this section, we use data from Mexico to quantify the different channels uncovered by our review of the literature. The main objective is to illustrate how the mechanisms work. Our results are reported in Table 6.

We begin with the net consumer-net producer proposition. In the first panel of Table 6, we compute the first order welfare impacts of a (hypothetical) increase of 20 percent in

corn prices in rural Mexico (Porto, 2008). Net producers would enjoy gains equivalent to 1.78 percent of their initial (i.e., pre price increase) average expenditure. Net consumers would instead suffer a loss of 1.93 percent. For the whole sample, the average impact of an increase in corn prices is negative, but small (equivalent to only 0.39 percent of average national income).

To incorporate labor market responses, recall that the impacts depend on how wages respond to price changes, and this in turn depends on whether we think that labor markets are integrated or segmented and on whether there are spillovers and backward or forward linkages (Ravallion, 1990; Porto, 2005; Porto, 2006). Continuing with the case of corn in Mexico, we give two examples in Table 6. In the second panel, we assume that labor markets are "segmented" and thus we only allow wages in the agricultural sector to respond to corn prices. We use a wage-price elasticity of 0.40 (as estimated in Porto, 2008). The income gains of net producers jump to 7.22 percent and their net gain is now 6.23 percent—nearly 3.5 times higher than before. For net consumers, the income gains are more modest, of around 1.99 percent, and these gains are not enough to offset the consumption losses. In the end, even with wage responses, net consumers would be made worse off by the rise in corn prices. The national average effect would, however, be positive: higher corn prices would bring welfare increases of 2.17 percent, on average.

In another example, in the third panel of Table 6, we allow for spillovers from corn prices to the wages of self-employed individuals (in rural areas). The idea is that increases in agricultural prices may raise the derived demand for labor in services, odd-jobs and, more generally, in local rural labor markets (not exclusively in agriculture). Using the same wage-price elasticity as before (0.40), we estimate the following welfare impacts: i) the income gain of net producers would be equivalent to 10.22 percent of their initial income, and the net gain would be 9.78 percent; ii) net consumers would also gain, with an income gain of 3.44 percent and a net gain of 0.44 percent; iii) the average national gain would be equivalent to 4.32 percent on initial income.

As argued above, the net position of the household can be endogenous and it can thus change in response to a price shock. Consider, for example, an increase in the price of

corn and let households be able to adjust. If consumption responses are sufficiently strong (because households can substitute easily to other food products) and/or if supply responses are large enough, then a net-consumer can in principle become a net-producer and thus benefit from the increase in corn prices. The standard argument against this caveat is that second-order adjustments of the type described here are often small and thus unlikely to change the implications of the first-order calculations. An example is shown in the fourth panel of Table 6, where we estimate consumption substitutions and supply responses. Allowing for consumption and production second order effects does not, in fact, affect the results. The gains for net producers are slightly larger and the losses for net consumers are slightly smaller, but the welfare impacts are not affected much.

6 Conclusions

This paper provided an overview of the impacts of price changes on household welfare. We began by exploring commodity dependence in the data and by looking at expenditure and income dependence in the household surveys from Latin American and Africa. Our analysis suggests a strong dependence on commodity prices, a dependence that is biased towards the poor, especially on the consumption side.

The paper then tackled the conceptual issues related to commodity dependence. It did so by laying out a theoretical framework, which described how changes in commodity prices affects consumption, production, wages, and household adjustments. Each of these aspects of the analysis of commodity dependence is illustrated with evidence from existing literature.

Our review tells the story of heterogeneous responses to commodity price changes. Most shocks to commodity prices are international in nature and the pass-through to domestic prices is imperfect (that is, changes in international prices are not translated one to one to domestic prices). The pass-through is also heterogeneous across countries and depends on infrastructure, institutions and market structure (the nature of imperfect competition in domestic markets).

Faced with a price shock, households are affected on both the consumption and income

sides. On the consumption side, higher prices cause welfare losses. In Latin America and particularly in Africa, higher food prices can cause large welfare losses, especially for the poor. On the income side, rising commodity prices can bring gains or losses, depending on which goods are produced and also on how wages respond to those price changes. The evidence shows that households tend to earn a significant share of their total income from commodities so that the consumption losses can be ameliorated, sometimes to a large extent. This is most likely to occur when wages and spillovers from commodities to other sectors are taken into account, in particular if wages respond positively to increases in labor demand in primary sectors and if the spillovers to non-primary sectors are positive (via either production or expenditure linkages). In the end, the overall welfare impacts depend on the net consumer-net producer position of the household, *after* taking into account wage income. Net consumers will be hurt by price increases, and net producers will benefit. As expected, these impacts are heterogeneous across countries. Some countries will gain and some others will lose. Also, in a country that gains from higher prices, there will be households that gain and households that lose out. Conversely, there will be winners and losers within countries that lose as an aggregate. If anything, the evidence seems to suggest a larger probability of welfare losses for poor households.

Household adjustments can work as a cushion to protect against price changes. Given a price increase in commodities, consumption responses can ameliorate the consumption losses and production responses can boost the income gains. Typical adjustments under the separability assumption appear not to be enough to overturn the initial impacts derived from a static view of commodity dependence. Non-separability, which is likely to be a real feature in many developing countries, can work in both directions. Sometimes, market failures can shut down markets completely so that price changes can become irrelevant for many households. While this can work as a protective device, it can also hinder the realization of any efficiency gains and of expanded market opportunities. Sufficiently large price changes in the presence of market failures can generate discontinuities in household responses that can potentially multiply the typically small responses found in the empirical literature – in the real world, the price is not always right.

We end with some caveats. First, due to space limitations, our review has focused on welfare impacts and we have neglected issues of insurance, coping mechanisms, and social protection policies. Second, the review centered the discussion on one-shot price shocks. In particular, we have not covered the literature on the effects of commodity price volatility. In addition, even in the case of one-shot price shocks, we should note that there might be hysteresis in the effects. In other words, a price shock may have long term implications, even if the price change reverts at a later date (Baird, Friedman and Schady, 2011). These themes require careful consideration in future assessments of the developmental implications of price signals.

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Table 1
Commodity Expenditure Shares
Latin America

	Quintiles p/c expenditures					Total
	(1)	(2)	(3)	(4)	(5)	
Argentina	61.8	48.9	42.3	37.5	29.0	43.9
Bolivia	82.9	78.7	73.0	67.6	54.4	71.3
Colombia	80.1	69.1	61.7	55.6	41.6	61.6
El Salvador	65.2	59.6	54.6	49.4	39.0	53.5
Mexico	40.6	36.2	32.4	28.4	20.8	31.7
Nicaragua**	63.5	60.9	57.3	54.4	41.6	55.5
Panama**	60.0	49.0	43.9	37.4	28.3	43.7
Peru	60.1	50.6	42.6	35.8	26.1	43.0

Note: Own elaboration based on expenditure surveys.

Table 2
Commodity Expenditures Shares
Africa

	Quintiles p/c expenditures					Total
	(1)	(2)	(3)	(4)	(5)	
Burundi	56.3	60.7	63.1	61.9	53.2	59.1
Benin	65.5	63.8	62.9	59.8	56.5	61.7
Burkina Faso	77.1	72.5	67.4	60.9	48.0	65.2
Côte d'Ivoire	57.2	56.6	55.8	49.3	39.4	51.6
Cameroon	71.7	69.7	67.1	62.3	53.3	64.8
Ethiopia	84.0	79.7	77.0	70.5	55.5	73.3
Ghana	71.2	68.5	67.1	66.6	65.4	67.8
Gambia	67.6	71.3	71.0	70.9	68.6	69.9
Guinea Bissau	74.5	76.6	76.5	77.3	71.5	75.3
Kenya	85.0	82.7	80.7	76.6	67.8	78.5
Madagascar	89.6	90.5	90.7	90.6	88.1	89.9
Mali	79.5	74.4	73.1	67.5	68.8	72.7
Malawi	81.2	79.9	78.4	74.9	69.2	76.7
Nigeria	92.4	82.6	81.6	80.5	74.7	82.3
Rwanda	78.8	69.1	60.8	49.7	27.7	57.2
Senegal	63.7	63.2	62.7	59.8	54.7	60.8
Tanzania	90.0	88.4	85.8	82.9	74.9	84.4
Uganda	74.7	75.5	71.9	67.1	53.0	68.4
South Africa	63.6	55.7	46.7	32.1	15.6	42.7

Note: Own elaboration based on expenditure surveys.

Table 3
Commodity Income Shares
Latin America: 2004

	Quintiles p/c income					Total
	(1)	(2)	(3)	(4)	(5)	
Argentina	3.1	3.1	3.2	3.2	3.5	3.2
Bolivia	38.2	19.6	17.1	13.8	10.6	19.9
Brazil	22.3	14.8	10.1	7.8	5.5	12.1
Chile	17.7	15.6	13.4	10.8	9.0	13.3
Colombia	13.7	14.7	11.0	8.3	6.2	10.8
Costa Rica	26.0	23.9	19.1	13.1	8.9	18.2
Dominican Republic	22.0	16.1	12.7	12.4	7.4	14.1
Ecuador	44.1	33.9	24.5	17.5	11.5	26.3
El Salvador	19.6	17.1	10.9	7.8	5.4	12.2
Guatemala	25.2	23.0	20.6	14.3	11.1	18.8
Honduras	43.7	34.8	21.8	14.1	11.1	25.1
Mexico	24.1	14.0	11.0	7.1	6.4	12.5
Nicaragua	36.9	29.6	20.8	15.7	15.0	23.6
Panama	32.9	17.3	11.6	9.7	4.5	15.2
Paraguay	38.4	27.9	22.5	17.1	15.5	24.3
Peru	37.6	27.1	17.3	11.2	9.5	20.5
Uruguay	9.6	6.9	4.7	3.8	3.5	5.7
Venezuela	23.1	19.3	13.5	11.8	8.2	15.2

Note: Own elaboration based on household surveys.

Table 4
Commodity Income Shares
Africa

	Quintiles p/c income					Total
	(1)	(2)	(3)	(4)	(5)	
Burundi	54.0	57.9	60.8	59.6	51.7	56.8
Benin	60.6	58.3	56.9	54.1	52.2	56.4
Burkina Faso	73.9	69.4	64.3	57.3	43.7	61.7
Côte d'Ivoire	57.1	56.5	55.5	49.0	38.6	51.3
Cameroon	68.4	66.8	64.3	59.9	51.7	62.2
Ethiopia	82.4	78.0	75.2	68.3	52.6	71.3
Ghana	67.5	65.2	64.3	63.8	62.5	64.7
Gambia	67.3	70.8	70.0	69.4	66.4	68.8
Guinea Bissau	68.4	72.6	72.0	73.0	67.3	70.7
Kenya	83.0	80.9	78.8	74.6	65.6	76.6
Madagascar	85.7	87.5	88.0	87.8	85.0	86.8
Mali	76.8	71.0	69.4	63.1	63.7	68.8
Malawi	58.8	61.0	60.9	59.2	55.6	59.1
Nigeria	88.5	75.3	75.0	74.8	69.6	76.6
Rwanda	77.7	67.3	59.1	47.9	26.4	55.7
Senegal	61.6	61.0	60.2	57.1	51.8	58.3
Tanzania	90.0	88.4	85.8	82.9	74.9	84.4
Uganda	71.2	73.0	69.3	64.3	49.5	65.5
South Africa	58.8	51.6	43.9	31.0	15.4	40.1

Note: Own elaboration based on household surveys.

Table 5
Commodity Income Shares
Methodology Using Repeated Cross-Sections
Latin America : 2004-2008

	year	Quintiles p/c income					Total
		(1)	(2)	(3)	(4)	(5)	
Argentina	*2004*	3.1	3.1	3.2	3.2	3.5	3.2
	2008	4.2	3.8	3.2	3.0	2.5	3.3
Brazil	*2004*	22.3	14.8	10.1	7.8	5.5	12.1
	2008	16.9	14.6	12.0	9.6	5.9	11.8
Chile	*2003*	17.7	15.6	13.4	10.8	9.0	13.3
	2009	16.0	16.0	14.0	12.6	10.9	13.9
Costa Rica	*2004*	26.0	23.9	19.1	13.1	8.9	18.2
	2008	18.9	20.3	17.5	13.6	8.1	15.7
Dominican Republic	*2004*	22.0	16.1	12.7	12.4	7.4	14.1
	2008	17.2	13.9	11.4	9.5	6.7	11.7
Ecuador	*2004*	44.1	33.9	24.5	17.5	11.5	26.3
	2008	32.3	28.6	24.4	19.8	12.3	23.5
El Salvador	*2004*	19.6	17.1	10.9	7.8	5.4	12.2
	2008	28.3	22.4	17.9	14.0	8.0	18.1
Honduras	*2004*	43.7	34.8	21.8	14.1	11.1	25.1
	2008	44.4	39.4	29.4	20.6	12.6	29.3
Mexico	*2004*	24.1	14.0	11.0	7.1	6.4	12.5
	2008	18.9	13.9	11.1	9.4	7.0	12.1
Panama	*2004*	32.9	17.3	11.6	9.7	4.5	15.2
	2009	20.7	14.6	10.9	9.4	4.2	12.0
Paraguay	*2004*	38.4	27.9	22.5	17.1	15.5	24.3
	2008	33.0	26.9	22.9	19.1	14.7	23.3
Peru	*2004*	37.6	27.1	17.3	11.2	9.5	20.5
	2008	39.1	29.4	20.7	13.1	7.7	22.0
Uruguay	*2004*	9.6	6.9	4.7	3.8	3.5	5.7
	2008	14.9	14.5	12.8	11.3	8.6	12.4

Note: Own elaboration based on household surveys.

Table 6
Welfare Effects of Price Changes
Examples from Mexico

	Net Producers	Net Consumers	All
First Order Effects			
consumption effects	-0.99	-2.70	-1.99
production effects	2.78	0.77	1.60
net effects	1.78	-1.93	-0.39
Segmented Labor Markets			
income effects	7.22	1.99	4.16
net effects	6.23	-0.71	2.17
Labor Market Spillovers			
income effects	10.77	3.14	6.31
net effects	9.78	0.44	4.32
Second Order Effects			
consumption effects	-0.93	-2.53	-1.87
production effects	3.05	0.84	1.76
net effects	2.12	-1.69	-0.11

Note: Own calculations based on Porto (2008).