

Zambia*

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1 Introduction

This paper investigates the poverty impacts of the Doha development round of the WTO in Zambia. The trade reforms involved in the development round introduce new opportunities and new challenges to poor households in developing countries. These opportunities and challenges are multidimensional, since households are affected as consumers and as income earners. As consumers, households will face changes in the prices of goods consumed by the family. As income earners, households will face responses in wages, employment, agricultural income, and crop substitution. These are the impacts investigated in this paper.

Our analysis builds on two links, one connecting trade reforms with prices and quantities, and another linking household income and consumption patterns with those price and quantity changes. The estimated price changes are taken from Hoekman, Nicita and Olarreaga (2005), who lay out a global model of world supply and demand. To link the price changes to household consumption, we describe their patterns of expenditure. On the income side, we examine income sources in urban and rural Zambia separately. Since in urban areas the major sources of income are wages and employment, we look at income gains originating in increases in wage and employment due to trade. In rural areas, households derive income mostly from agricultural activities, such as growing of cash crops. We thus estimate agricultural income gains using growth prediction in agricultural exports.

It is generally agreed that international trade can work as a vehicle for poverty alleviation in developing countries. But there is also some consensus that complementary policies are needed. Faced with new opportunities in world markets, firms and farmers may benefit from policies like access to credit, information, or education, to take full advantage of trade reforms. We provide some evidence on the role of complementary policies by carefully looking at several case studies. In rural areas, we explore the productivity impacts of agricultural extension services and of cotton marketing reforms in Zambian farms. In urban areas, we investigate the poverty impacts of a policy that would provide selected employment opportunities to household heads.

For completeness, we also explore the welfare and distributional consequences of an ambitious Doha scenario in which tariff and subsidies in agriculture are fully eliminated,

trade facilitation is improved, and non-tariff barriers are cut by half.

Our findings are as follows. The Doha development round, in the business as usual scenario (Hoekman, Nicita, and Olarreaga, 2005), would lead to negligible welfare impacts, on aggregate at the national level and across deciles of the income distribution. The explanation lies in i) the small estimated price changes due to the Doha scenario; and ii) some deficiencies in household supply responses. In the end, we find that Doha would have small negative impacts on household welfare. When supply responses are introduced into the model, particularly if boosted by complementary policies, these small losses become small gains.

The “ambitious Doha” scenario would instead lead to more significant gains across the entire income distribution. Domestic tariff liberalization, associated with the “ambitious” Doha scenario would generate employment losses and small income gains for the Zambian population. Lower prices for key consumption goods due to lower tariffs would benefit quite significantly all households. At the end, the consumption gains associated with lower prices dominate the losses from job destruction so that Zambia stands to gains from the ambitious scenario. As before, even higher gains can be expected from complementary policies in agriculture.

The paper is organized as follows. In section 2, we provide an overview of trade and poverty in Zambia. In section 3, we embark on the analysis of income gains or losses from the Doha development round. Here, we study complementary policies, too. In section 4, we turn to the consumption effects. In section 5, we merge the income effects and the consumption effects to estimate the overall impacts of the Doha round at the household level. Section 6 summarizes the impacts of the ambitious Doha scenario. Finally, section 7 concludes with a summary.

2 Trade and Poverty in Zambia

Zambia is a landlocked country located in southern central Africa. Clockwise, neighbors are Congo, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Namibia, and Angola. In

2000, the total population was 10.7 million inhabitants. With a per capita GDP of only 302 US dollars, Zambia is one of the poorest countries in the world and is considered a least developed country. The goal of this section is to provide a brief characterization of trade and poverty in Zambia.¹

2.1 Poverty

Zambia is one of the poorest countries in the world and suffered from increasing poverty rates during the 1990s. Table 1 provides some information on poverty dynamics.² Our measure of poverty is the head count ratio, the proportion of the population with an income below some level defined by the poverty line. This poverty line is the monetary value of a bundle of goods that would allow the consumer to reach a minimum caloric intake and cover minimal non-food expenses. Poverty lines are taken from official figures from the Zambia Central Statistical Office.

In 1991, the poverty rate at the national level was 69.6 percent. Poverty increased in 1996, when the head count reached 80 percent, and then declined towards 1998, with a head count of 71.5 percent. In rural areas, poverty is widespread; the head count was 88.3 percent in 1991, 90.5 percent in 1996 and 82.1 percent in 1998. Urban areas fared better, with a poverty rate of 47.2 percent in 1991, 62.1 percent in 1996 and 53.4 percent in 1998.

Table 2 provides a more comprehensive description of the poverty profile, by provinces. Zambia is a geographically large country, and provinces differ in the quality of land, weather, access to water, and access to infrastructure. The capital Lusaka and the Copperbelt area absorbed most of the economic activity particularly when mining and copper powered the growth of the economy. The Central and Eastern provinces are cotton production areas. The Southern Province houses the Victoria Falls and benefits from tourism. The remaining provinces are less developed.

There were significant differences in the poverty rates across regions. All provinces

¹This section is based on Balat and Porto (2005).

²The poverty analysis can be done using the 1991 Priority Survey, and the 1996 and 1998 Living Conditions Monitoring Surveys. The 2002 LCMS was not available at the time this paper was written. For more details on these sources of data, see Balat and Porto (2005).

showed aggregate poverty counts higher than 60 percent, except for Lusaka, the capital (48.4 percent). Poverty in Copperbelt was 63.2 percent and in Southern, 68.2 percent. The highest head count was observed in the Western province, where 88.1 percent of the total population lived in poverty. The other provinces showed head counts in the range of 70 to 80 percent. Poverty was much higher in rural areas than in urban areas. Even in Lusaka, a mostly urban location, rural poverty reached over 75 percent. In the Western province, 90.3 percent of the rural population lived in poverty in 1998. Urban poverty was lower, never exceeding 70 percent of the population (including the Western province).

2.2 Trade Trends and WTO

Zambia's major trading partners are the Common Market for Eastern and Southern Africa (COMESA), particularly Zimbabwe, Malawi and Congo, South Africa, the EU and Japan. The main imports comprise petroleum, which account for 13.2 percent of total imports in 1999, metals (iron, steel), for 16.9 percent, and fertilizers, for 13 percent. Other important import lines include chemicals, machinery, and manufactures.

Zambian exports have been dominated by copper. In fact, since Independence and up to 1990, exports consisted almost entirely of copper. Only recently has diversification into non-traditional exports become important. In 1990, metal exports accounted for 93 percent of total commodity exports. Non-traditional exports, such as primary products, agro-processing, and textiles, accounted for the remaining 7 percent. From 1990 to 1999, the decline in metal exports and the increase in non-traditional exports are evident. In 1999, for example, 61 percent of total exports comprised metal products, while 39 percent were non-traditional exports. Within non-traditional exports, the main components are primary products, floricultural products, textiles, processed foods, horticulture, textiles, and animal products.³

Tariffs are the main trade policy instrument; quantitative restrictions have been mostly eliminated, but there are some import controls based on environmental, sanitary, or security issues. As of 2002, the tariff structure had four bands (0 percent, 5 percent, 15 percent, and

³For more details, see WTO (1996).

25 percent) with an average rate of around 13 percent. Most tariff lines are ad-valorem, and item are rarely subject to seasonal, specific, compound, variable or interim tariffs.

The most common tariff rate is 15 percent, which is applied to around 33 percent of the tariff lines. Almost two thirds of the tariff lines bear a tariff line of either 15 percent or 25 percent, while 21 percent of tariff lines (1,265 lines) are duty-free. These include productive machinery for agriculture, books, and pharmaceutical products. Raw materials and industrial or productive machinery face tariffs in the 0-5 rates. Intermediate goods are generally taxed at a 15 percent rate, and the 25 percent rate is applied to final consumer goods and agricultural-related tariff lines. More concretely, agriculture is the most protected sector, with an average tariff of 18.7 percent, followed by manufacturing, with a 13.2 percent. The average applied MFN tariff in mining and quarrying is 8.2 percent.

Exports are largely liberalized. There are no official export taxes, charges or levies. Further, export controls and regulations are minimal. Maize exports, however, are sometimes subject to bans for national food security reasons. In 2002, for instance, the export ban on maize was in place.

3 Income

We are most interested in exploring the effects of trade on the income of Zambian households. By affecting wages and cash agricultural income, trade opportunities are likely to have large impacts on household resources and on poverty. As argued by Deaton (1989, 1997) and others, the short-run effects of price changes can be assessed by looking at income shares. In Table 3, we report the average income shares for different sources of income. At the national level, the main sources of income are income from home consumption (28.3 percent), income from non-farm businesses (22.3 percent) and wages (20.8 percent). Regarding agricultural income, the sale of Food crops accounts for 6.3 percent of total income, while the sale of Cash crops, for only 2.5 percent. Livestock & Poultry and Remittances account for 5.5 and 4.9 percent of household income, respectively.

There are important differences in income sources between poor and non-poor households.

While the share of own-production is 33.3 percent in the average poor household, it is 19.1 percent in non-poor families. In contrast, while wages account for 32.9 percent of the total income of the non-poor, they account for only 14.1 percent of the income of the poor. The shares of the income generated in non-farm businesses are 20.8 and 25 percent in poor and non-poor households respectively. The poor earn a larger share of income from the sales of both food and cash crop, and lower shares from livestock and poultry.

It is interesting to compare the different sources of income across rural and urban areas. In rural areas, for instance, 42.5 percent of total income is accounted for by own-production; the share in urban areas is only 3.3 percent. The share of non-farm income in rural areas is 16.7 percent, which should be compared with a 32.1 percent in urban areas. In rural areas, the shares from food crops, livestock, wages and cash crops are 9.1, 8.1, 6.9 and 3.8 respectively. In urban areas, in contrast, wages account for 45.3 percent of household income, and the contribution of agricultural activities is much smaller.

The description of income shares is also useful because it highlights the main channels through which trade opportunities can have an impact on household income. We can conclude that, in rural areas, households derive most of their income from subsistence agricultural and non-tradable services (non farm income). Cash crop activities and agricultural wages comprise a smaller fraction of total household income. In urban areas, the focus will be on labor markets, employment and wages. In what follows, we study income gains in rural and urban areas separately.

3.1 The Development Round and Income Gains in Rural Areas

Trade reforms have an effect on prices and on quantities produced and exported. To see how these changes affect the household, consider the case of cotton in Zambia. This is one of the major cash crops in rural Zambia. The elimination of US subsidies, for instance, would lead to a leftward shift of world supply and thus to an increase in world prices. Since US supply would be lower and producer prices would go up, the quantity of cotton produced and exported in Zambia would increase. We can interpret these effects as generating two sources of gains for agricultural producers in Zambia. First, since prices are higher, farmers

would receive a higher net price for their product. This is a first order gain that can be estimated with income shares as in Table 3. But there is an additional channel that benefits farmers: they can now increase their output of cotton and sell it in international markets. These are generally second order effects, which will therefore be relatively small unless the household has idle resources (land, labor) or enjoys increases in productivity.

To get a sense of the impacts of Doha trade reforms on agricultural household income and poverty, we need to begin by looking at the price and quantity change induced by the development round. In the case of rural Zambia, the main agricultural activities are cotton, tobacco, maize, vegetables, and groundnuts. In column (1) of Table 4, we reproduce the price changes estimated by Hoekman, Nicita, and Olarreaga (2005). A key observation here is that the relevant price changes are quite small. This means that income earners in Zambia are not going to benefit much from these price changes alone and that quantity responses are going to be critical for poverty reduction.⁴ Column (2) reports the estimated quantity changes for the major cash crops in Zambia. We observe that cotton exports would increase by 5.5 percent; tobacco, by 17.95 percent; and maize, by 9.63 percent. Exports of vegetables and groundnuts would not be much affected.⁵

Given the price and quantity changes reported in Table 4, our task now is to estimate the changes in household income and to assess the poverty impacts of Doha. In terms of prices, we will assume that all households face the same price changes. This may not be true if some households are “closer” to the market than others, but we do not have good data to assess these issues.⁶

Another concern is how to allocate the quantity changes among farmers. We adopt a procedure that allocates quantities exported in proportion to the individual likelihood of being a producer of each exportable commodity. This probability can be estimated with the relative propensity score as follows. The propensity score $p(\mathbf{x})$ is the estimated probability of producing the different agricultural commodities as a function of characteristics \mathbf{x} . That

⁴For some examples of supply responses, trade and poverty, see Heltberg and Tarp (2001), Lopez, Nash and Stanton (1995), Porto (2004), and Balat and Porto (2005).

⁵Notice that the Doha development round analyzed in Hoekman, Nicita, and Olarreaga (2005) includes an exogenous increase of 2 percent due to improvements in trade facilitation.

⁶Nicita (2005) studies the role of price transmission in the event of trade liberalization in Mexico.

is,

$$(1) \quad p(\mathbf{x}_i) = P(D = 1|\mathbf{x}_i),$$

where D is an indicator of whether the household is a producer of the commodity in question.⁷ In short, we begin by estimating a probability model for being a cotton producer, a tobacco producer, a hybrid maize producer, a vegetable producer, or a groundnut producer. Next, we rescale these probabilities by the total sum of the individual propensity scores as follows

$$(2) \quad \tilde{p}(\mathbf{x}_i) = \frac{p(\mathbf{x}_i)}{\sum_i p(\mathbf{x}_i)}.$$

This rescaling transform the estimated propensity score into weights that we can use to allocate the increased exports. That is, we allocate the estimated growth in exported quantities according to the relative propensity score given by equation (2).

It is important to notice that we are allowing for supply responses not only among cash market producers but also among subsistence farmers. That is, we allocate the supply responses to both actual producers of agricultural commodities and to potential producers that are actually subsistence farmers. This means that we allow for a movement of farmers from subsistence agriculture to cash crop agriculture. Of course, households that are already involved in cash agriculture are probably more likely to produce cash crops and so they are more likely to get a higher predicted propensity score. This feature of the model is also intuitive, since it is likely that a farmer doing cash agriculture is going to continue doing cash agriculture once market opportunities expand.

Our main findings are reported in Table 5. Here, we report first and second order effects of the price and quantity changes based on our procedure to allocate them to different households. These effects comprise two terms: the first order effect is the product of the estimated price changes of the different goods and the income shares of the different Zambian households; the second order effect can be captured by multiplying the quantity change

⁷For more details on the estimation of the propensity score, see Dehejia and Wahba (2002), Heckman, Ichimura, Smith and Todd (1996), Heckman, Ichimura and Todd (1997) and (1998), Rosenbaum and Rubin (1983) and Rubin (1977).

of the household by the price change (by 1/2). Table 5 shows that positive, albeit very small, income effects can be expected from the “Business As Usual” scenario of the Doha development round. For instance, the reforms would generate an aggregate gain of only 0.10 percent. There are some larger gains at the bottom of the distribution (see the results for the first decile), but the magnitudes are too small to deserve further attention. Overall, thus, the business as usual scenario will probably not have a significant effect on the agricultural income of a typical rural household in Zambia.

There are two key elements behind these results: the small price responses generated by Doha and the large shares of income generated by subsistence activities. It is worth asking, thus, whether there are scenarios in which Doha will have more relevant poverty impacts. Our claim in this paper is that one channel through which developing countries may benefit from new trading opportunities is by sizeable supply responses. Moreover, we believe that important effects can be achieved only if households could increase output while keeping costs relatively constant. This requires increases in productivity (i.e., being able to produce more output with the same inputs) or having “idle” resources (like land or family labor). International markets (i.e., Doha) would deliver the new opportunities to sell the output, and complementary policies would allow households to benefit from them.

To see this in a hypothetical situation, let us assume that households can increase their output of agricultural crops (as reported in column (2) of Table 4) at no additional costs. This would correspond to an unconstrained model in which, for example, households can increase the production of market crops without giving up too much resources in subsistence activities. What would the additional income gains of such a scenario be? Table 6 reports these additional changes in household income, as a share of initial income, following the reforms of the Doha development round. Notice that in order to calculate the total income gains, the figures in Table 6 should be added to the first and second order effects previously reported in Table 5. We show the effects of an expansion of trade in cotton, vegetables, tobacco, maize and groundnuts by deciles of the total Zambian population.

Even in this case, we find that the additional aggregate agricultural income gains are rather small, of around 0.62 percent of initial household income (so that, for instance, total

agricultural income gains would be equivalent to roughly 0.72 percent of average household income). There is some variation across deciles of population: whereas the gains are 2.11 percent, 1.06 percent and 0.89 percent in the first three deciles, they are less than half of a percentage point at the middle and upper tail of the income distribution. This is an interesting result, because it suggests that the gains, albeit small, are higher among the poorest rural Zambian households.

We believe that there is an important message behind the investigation of these scenarios. Our findings convey the idea that Doha alone will not be able to do much in terms of poverty reduction in Zambia. Instead, it is a combination of Doha reforms and a set of complementary policies allowing for the full benefits of the new trading opportunities what would cause the average household in rural Zambia to become richer and to escape from poverty. Moreover, there is evidence that WTO reforms, accompanied by complementary policies, would benefit the poor proportionately more than the rich.

It is necessary to link the increased supply responses observed in Zambia with a number of complementary policies. The issue is related to facilitation of trade and farm production. Faced with new opportunities in world markets, farmers need to learn how to take advantage of those opportunities. As shown in Table 3, almost all rural households are engaged in subsistence agriculture, the production of food for family consumption. In many cases, a very large fraction of total consumption comes from subsistence. If the development round and international trade are going to affect rural farmers, then a movement from subsistence to market agriculture is needed. Some households will respond to Doha incentives by switching to cash crops. But many others, faced with a myriad of constraints, will be unable to do so.

There are several key policies that would ease the transition from subsistence to market, like access to credit, infrastructure, education, marketing, and information about markets. More educated households will be more prepared to face international markets, and will be more prepared to adopt new crops and production techniques. If credit is made accessible to rural farmers, a larger fraction of them will be able to cover any necessary initial investment (in seeds, fertilizer, tools) needed to substitute sweet potatoes production for cotton production (for instance). If better infrastructure is provided, transaction and

production costs will be lower, facilitating trading of cash crops. And if better marketing opportunities arise, farmers will be “closer” to the market. All these sensible arguments highlight the need for complementary policies if the best practice scenario is going to be reached.

In order to provide a more specific argument for the role of complementary domestic reforms and the interaction with trade opportunities, we rely on two separate pieces of evidence. First, we look at the role of extension services in agriculture in rural Zambia. These are services provided by the government (and by some agricultural intermediaries) that give farmers information and support on a variety of issues. These include information about markets, prices, buyers, and sellers; education on technology adoption, crop diversification, and crop husbandry; information on fertilizer use, seeds, and machinery. They also include many other aspects of every day topics that may take place in the process of agricultural production. Second, we look at the role of domestic marketing reforms in cotton. Concretely, we discuss the effects of the privatization of cotton commercialization (i.e., the elimination of the cotton marketing board) that took place in Zambia during the 1990s.

A lot can be learned about the role of complementary policies by looking at the impacts of extension services and marketing reforms on farm productivity. This is only an example of the role of those policies, but one that, we believe, makes a clear point about what can be done to help farmers take full advantage of new market opportunities. We briefly comment on the main findings of two recent papers, Balat and Porto (2005) and Brambilla and Porto (2005). Both papers use data from the Zambian Post Harvest Survey, a farm survey with data on farm production, yields, input use, basic household characteristics and demographics, and indicators of whether the household received extension services or not. Building on an empirical model of cotton yields, Balat and Porto (2005) find that households that have received extension services are on average more productive in market agriculture than households that have not received extension services. In fact, receiving agricultural extension services increases production per hectare by 8.4 percent.

Brambilla and Porto (2005) study the impacts of the elimination of the cotton marketing board. They find that, following an initial period of failure in these reforms, Zambian farmers

increasingly adopted cotton as a major cash crop. In addition, cotton yields significantly increased. This was due to a combination of access to inputs, increased know-how, improved marketing information, and increased efficiency in input use.

Altogether, these reforms allowed farmers to take advantage of the gains associated with exports of agricultural commodities like cotton. These two examples corroborate the idea that education, information, and marketing services are key factors driving the best practice supply responses that are needed to secure gains from international trade.

3.2 The Development Round and Income Gains in Urban Areas

As argued before, the channels through which trade affects urban households are different from the rural channels. Whereas, as we have seen in the previous section, agriculture is key in rural areas, wages and employment are more important in urban areas. Concretely, the benefits from Doha will be revealed mostly by an increase in employment opportunities.

To estimate the poverty effects of this eventual increase in jobs, we proceed as follows. The main assumption of the exercise is that labor markets are characterized by a large pool of unemployed individuals. This seems reasonable, especially since the unemployment rate in urban Zambia is over 15 percent. This implies that the new employment opportunities would be exploited by unemployed individuals, and that the wage rate can be assumed to remain roughly constant. In consequence, we estimate a model of employment probability jointly with an earnings regression model. In fact, we implement a Heckman model of wages and employment. The model is estimated jointly with likelihood methods. After estimating the model, we predict, for each unemployed individual, the probability of becoming employed and the imputed wage on the basis of the estimated coefficients from the model and the individual characteristics. Then, we rank individuals based on their predicted propensity score and we allocate employment opportunities to those with a higher probability of employment until all the new job vacancies are filled.

We consider two alternative models of employment. In the first model, every unemployed individual is treated in the same fashion. That is, they are all included in the likelihood. We denote this scenario as the “all individuals” model of employment. In the second model, we

assume that the new employment opportunities benefit the heads of the families only. We denote this scenario as the “heads only” model of employment. These two models may be compared to illustrate another set of complementary policies to trade.

To investigate the poverty effects of the new jobs, we calculate employment changes based of estimates of exports, imports, and price changes reported by Hoekman, Nicita and Olarreaga (2005). Changes in quantities exported, imported and consumed allow us to predict changes in output which we link to employment using labor requirements. Following the business as usual scenario in Doha, we estimate an increase in employment of around 0.9 percent. This increase in jobs is the net result of increases in employment in export sectors and the decline in employment in import competing sectors. Notice that the small estimated increase in employment is in line with the small price and quantity changes reported before.

Results are in Table 7. The first column reports the results from the “all individuals” model. We find that the gains in the baseline scenario would be fairly small, of around 0.48 percent of initial income. Notice that in this “all individuals” model the gains are not concentrated in the lower deciles as before, but rather are spread more or less uniformly from the first to the seventh deciles. An explanation of this result is the correlation between new employment probabilities (as measured by the estimated propensity score) and having someone employed in the family (so that the gains concentrate around households with at least someone in employment, which tend to be richer households). This indicates the importance of peer effects: if there are employed individuals in the family, it might be easier to benefit from new opportunities in the labor market. A possible implication of this result is the role of network complementary policies: connected individuals are more likely to enjoy new opportunities.

We investigate this idea further by estimating a model in which only heads can become employed. Results are reported in the second column of Table 7. Notice that the gains are now slightly higher across the entire income distribution, with an aggregate average gain of 0.55 percent of initial household income. It is interesting to observe that the income gains are relatively higher at the bottom five deciles of the income distribution. In other words, the “heads only” model would work in favor of the poorest Zambian households. It seems that

a policy that links employment opportunities to household heads is likely to complement trade opportunities to the benefit of the poor.⁸

4 Expenditures

We turn now to the investigation of some of the consumption effects of the price changes induced by the Doha development Round. We begin by describing the structure of expenditure by household, a characterization that will allow us to understand the short-run impact of trade on consumers.

Table 8 reports the average budget shares spent by Zambian households in different goods in 1998. As expected, most of the budget was spent on food, with a national average share of 67.5 percent. The average was higher in rural areas (reaching 73.6 percent) and lower in urban areas (56.6 percent). Further, the poor spent a larger share of total expenditure on food than the non-poor. At the national level, for instance, 71.7 percent of the total expenditure of an average poor family was devoted to food, while for non-poor households the average was 59.2 percent.

Other goods accounting for a significant share of total expenditure were Personal Items, Housing, Transport, Alcohol & Tobacco and Education. However, these average shares were always below 10 percent. The usual differences between urban and rural households, and between the poor and the non-poor were observed. For instance, non-poor households tended to spend a larger fraction of expenditure on Clothing, Personal Items, Housing and Transportation. Budget shares on Education and Health were not different across poor and non-poor households. Comparing rural and urban households, we find that rural households consumed more food, and urban households more Personal Items, Housing, Transportation and Education. Shares spent on Clothing, Health, and Alcohol & Tobacco were not very different.

There is one fundamental lesson that can be learnt from Table 8. In Zambia, as in many

⁸These results should be carefully interpreted. We are not actually performing an evaluation of such a policy, but rather using this example to illustrate channels by which domestic reforms can complement global trade reforms. Needless to say, the actual implementation of a policy like this is far from easy. See Jalan and Ravallion (2004) and Galasso and Ravallion (2004).

low income developing countries, the largest fraction of household expenditure is spent on food. In consequence, the largest impacts of trade policies and economic reforms on the consumption side will be caused by changes in the prices of food items. Expenditures on other non-food items are relatively less important in terms of total expenditure, the welfare impacts being lower as a result.

4.1 The Development Round and Consumption Effects

This section studies the impacts of the Doha development round on consumption expenditure. Based on the price changes estimated by Hoekman, Nicita and Olarreaga (2005), we observe that, for food items, which account for 67.5 percent of the budget, the average price increase is estimated at around 3 percent. Clearly, these price changes will have an impact on household welfare that will not be so significant. Another 16.2 percent of the budget is spent on non-traded goods, such as health, housing, education, transportation, and remittances. We don't have price changes estimated for these goods.⁹ The remaining 16.3 percent is spent on other tradable goods, such as clothing, alcohol and tobacco and personal goods. Here, the prices of each of clothing and tobacco are expected to increase by around 1 percent.

The estimated consumption effects are reported in Table 9. We show the total effects (in the last column) and the effects for selected goods, like clothing, vegetables, meat & poultry, fish, cereals, dairy, and tobacco. The aggregate losses are estimated at 0.98 percent of initial expenditure. There is some evidence that the lower deciles are getting hit harder by the price changes. The main component among the consumption effects comes from the changes in the prices of cereals. This includes maize, which is the main staple of Zambian

⁹In general equilibrium, the prices of the non-traded goods are likely to change if, for example, there are changes in factor prices (wages) induced by trade. Measuring these impacts, however, is very difficult and is outside the scope of the present study. See Porto (2003) for an attempt to measure some of these effects for the case of Argentina.

households.¹⁰

5 Total Welfare Effects of The Development Round

We now put all the effects together to investigate the total effects of the Doha development round. The results are reported in Table 10. Model 1 is the constrained model in agriculture; it includes first and second order effects on production (but without the complementary reforms), the consumption effects, and the “all individuals” employment effects. We estimate that the average impact of Doha development round is negative, but relative small: the average aggregate loss is equivalent to 0.40 percent of household income. There is some heterogeneity in the impacts, with somewhat higher losses among the poorest deciles. The main forces driving these results are the small and distributionally neutral income gains in both agriculture and “all individual” employment, and the poverty bias of the increase in the price of cereals.

Model 2 is the unconstrained agricultural model. It allows for complementary policies to boost agricultural gains in rural areas, consumption effects and “all individuals” employment effects. As a result of the complementary policies, the aggregate impact of the development round (in the business as usual scenario) is now positive, but very small: the average gain is of 0.22 percent of household income. Interestingly, there is now distributional conflict: while the bottom 7 deciles would gain from the expanded business and usual, the top 3 deciles would lose. This is because complementary policies would boost agricultural responses among the poorest households, particularly in rural areas. This suggests some pro-poor effects of a combination of the business as usual Doha reforms and complementary policies.

¹⁰This analysis does not consider the role of substitution in consumption. When prices change, consumers substitute the more expensive goods for the cheaper ones. This means that the consumption losses reported in Table 9 are actually an upper bound since the losses will be ameliorated by consumption responses. Notice, however, that the corrections for second order effects in consumption are usually small and are not likely to change the conclusions in any significant way (Porto, 2005).

6 An Ambitious Doha Scenario

In this section, we explore the impacts on an ambitious Doha scenario including the elimination of all tariffs, the elimination of agricultural subsidies, improvements in trade facilitation, and a reduction in non-tariff measures.¹¹ There are two additional effects to consider. First, the elimination of Zambian tariffs will cause domestic prices to decrease. Second, further market access in developing countries may boost agricultural exports and employment.

Results are reported in Table 11. We follow the same methodology as before: we estimate Income Gains from the ambitious Doha scenario while allowing for first and second order effects (column 1); additional income gains from complementary reforms (column 2); employment gains (column 3); and consumption gains (column 4). The total effects are displayed in columns 6 (Ambitious Doha) and 7 (ambitious Doha plus complementary policies).¹²

Our simulations show that Zambia would gain, on aggregate, from the ambitious scenario. In model 1, without complementary policies, these gains are equivalent to 1.64 percent of average household income (column 5). With complementary reforms, the gains are boosted, reaching 2.41 percent (model 2). In order to understand the intuition behind this result, we compare next the income gains in agriculture, the employment effects, and the consumption effects in the two scenarios.

Notice first that the income gains in agriculture (columns 1 and 2) are roughly similar in the Business as Usual and in the Ambitious Doha scenario. The first and second order effects in agriculture are equivalent to 0.17 of average household expenditure; the additional income gains from the elimination of supply constraints through complementary policies are equivalent to 0.77 percent.

Whereas in the business as usual scenario employment increases in Zambia (albeit by only

¹¹See Hoekman, Nicita, and Olarreaga (2005) for a detailed description of the business as usual and the ambitious scenarios.

¹²Since the ambitious Doha scenario in Zambia requires a significant cut in tariffs, there an additional effect to consider, i.e. the loss of government revenue. To deal with this, we assume transfers from consumers to compensate for revenue losses.

0.9 percent), it declines in the ambitious scenario by nearly 4 percent. The reason is that the ambitious scenario includes the elimination of Zambian tariffs, which in practice causes more job destruction than the job creation associated with the global reforms. Concretely, we find that the average loss in employment wages would be equivalent to 0.81 percent of household income. Notice that the losses are concentrated at the top of the income distribution (in the extreme case, the first decile does not lose from job destruction). This is because unemployment is likely to be much higher among the poorest households so that better-off households (those that have employed members before the reforms) are likely to suffer higher losses.

The major difference in the welfare impacts of the two scenarios lies in the consumption effects. While they were negative in the business as usual scenario, they are positive in the ambitious scenario. The key factor driving this difference is the elimination of domestic tariffs in the ambitious scenario, which forces domestic prices down (as pointed out before, the changes in international prices is roughly the same in the two scenarios). Households benefit, on average, from the reduction in prices by about 2.29 percent. Households at the top of the income distribution gain significantly more than households at the bottom (compare the gains of 2.84 or 2.79 in deciles 9 and 10 with the gains of 1.74 and 1.78 in deciles 1 and 2). The reason is the following. Whereas goods such as clothing face high tariffs, with an average of around 15-20 percent, cereals, the main staple of the poor, face relatively lower tariffs, of only 5 percent. Therefore, the price of clothing declines as a result of the ambitious scenario, but the price of cereals goes up because the cut in tariffs is not enough to compensate for the increase in international prices (generated by lower agricultural subsidies and tariffs).

As in the business as usual scenario, complementing Doha with domestic reforms would cause an increase in the expected gains from trade liberalization. On average, the gains would increase from 1.64 to 2.41 percent. More importantly, these additional gains from complementary policies would benefit poor households. In the last column of Table 11, the gains for the bottom three deciles would be roughly doubled by the complementary policies. In contrast, the increase in the gains at the top of the distribution would be relatively small. The important message is, once again, that domestic policies that complement Doha can

be successful in boosting the gains and in ameliorating eventual losses, particularly at the bottom of the distribution, i.e., among the poor.

7 Conclusions

In this paper, we have investigated some of the impacts of WTO reforms on poverty in Zambia. This is a low income country, with widespread and prevalent poverty at the national and regional levels. At the same time, the Doha development round is expected to generate gains for poor families in developing countries. This paper has studied if this is indeed the case in a country like Zambia. We have looked at households as consumers and at households as income earners. We have looked at workers and wages in labor markets in urban areas and at farmers and cash agricultural income in rural areas. We have examined two scenarios, the Business as Usual and the Ambitious Doha.

Our main finding is that the Doha development round in the business as usual scenario is likely to have fairly small impacts on household welfare in Zambia. If anything, we estimate small losses from the development round. There is an important caveat, though: complementary domestic policies matter. If Doha reforms are accompanied by concomitant domestic reforms, the losses are likely to become gains, particularly among the poorest households. As examples of complementary policies, we have explored the cases of the provision of extension services in agriculture, the privatization of marketing institutions in cotton, and the implementation of employment plans targeting household heads.

An ambitious Doha scenario would instead be more conducive to poverty reduction. This is mainly because the elimination of Zambian tariffs would cause the prices of key consumer goods to decline, thus benefiting households as consumers. The magnitudes, however, remain fairly small. The conclusion that complementary policies matter survives. When complemented with policies that facilitate production for the export sector, the ambitious scenario generates bigger gains, not only at the national level but particularly among the poorest households. This result illustrates the role of these complementary policies and highlights the room for aid for trade in poverty alleviation.

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Table 1
Poverty in Zambia
(head count)

| | 1991 | 1996 | 1998 |
|----------|------|------|------|
| National | 69.6 | 80.0 | 71.5 |
| Rural | 88.3 | 90.5 | 82.1 |
| Urban | 47.2 | 62.1 | 53.4 |

Note: The head count is the percentage of the population below the poverty line. Own calculations based on Priority Survey (1991), Living Conditions Monitoring Survey (1996) and Living Conditions Monitoring Survey (1998).

Table 2
Poverty Profile in 1998
(head count)

| | total | rural | urban |
|---------------|-------|-------|-------|
| National | 71.5 | 82.1 | 53.4 |
| Central | 74.9 | 82.3 | 60.5 |
| Copperbelt | 63.2 | 82.1 | 57.5 |
| Eastern | 79.1 | 80.6 | 64.4 |
| Luapula | 80.1 | 84.6 | 52.4 |
| Lusaka | 48.4 | 75.7 | 42.4 |
| Northern | 80.6 | 83.3 | 66.4 |
| North-Western | 74.3 | 77.4 | 54.1 |
| Southern | 68.2 | 73.0 | 51.8 |
| Western | 88.1 | 90.3 | 69.5 |

Note: The head count is the percentage of the population below the poverty line. Own calculations based on the Living Conditions Monitoring Survey (1998).

Table 3
Sources of Income
(percentage)

| | National | | | Rural | | | Urban | | |
|-------------------------|----------|-------|----------|-------|-------|----------|-------|-------|----------|
| | total | poor | non-poor | total | poor | non-poor | total | poor | non-poor |
| Own Production | 28.3 | 33.3 | 19.1 | 42.5 | 42.9 | 42.0 | 3.3 | 4.4 | 2.4 |
| Sales of Food Crops | 6.3 | 7.6 | 3.8 | 9.1 | 9.5 | 7.6 | 1.4 | 1.7 | 1.1 |
| Sales on non-Food Crops | 2.5 | 3.0 | 1.3 | 3.8 | 4.0 | 2.9 | 0.1 | 0.1 | 0.1 |
| Livestock & Poultry | 5.5 | 6.8 | 2.9 | 8.1 | 8.7 | 5.9 | 0.8 | 1.0 | 0.7 |
| Wages | 20.8 | 14.4 | 32.9 | 6.9 | 5.9 | 10.3 | 45.3 | 40.3 | 49.4 |
| Income non-farm | 22.3 | 20.9 | 24.9 | 16.8 | 16.3 | 18.3 | 32.0 | 34.7 | 29.7 |
| Remittances | 4.9 | 5.0 | 4.8 | 5.3 | 5.0 | 6.1 | 4.3 | 4.9 | 3.9 |
| Other sources | 9.5 | 9.0 | 10.3 | 7.5 | 7.7 | 6.9 | 12.8 | 13.0 | 12.7 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: The table reports income shares. Own calculations based on Living Conditions Monitoring Survey (1998).

Table 4
Price and Quantity Changes
(percentage)

| | Price Changes | Quantity Changes |
|--------------|------------------|---------------------|
| Cotton | 3.51 | 5.51 |
| Vegetables | -0.05 | -0.19 |
| Tobacco | 1.30 | 17.95 |
| Hybrid Maize | 3.99 | 9.63 |
| Groundnuts | -0.12 | 0.83 |

Note: Based on Hoekman, Nicita, and Olarreaga (2005). The simulated reform is a business as usual scenario of the Doha development round. This includes an improvement in trade facilitation that explains why price declines in groundnuts can be accompanied by quantity increases.

Table 5
Agricultural Income Gains
Business as Usual Scenario
(as a share of household income)

| Decile | Cotton | Vegetables | Tobacco | Hybrid Maize | Groundnuts | Total |
|--------|--------|------------|---------|--------------|------------|-------|
| 1 | 0.11 | -0.002 | 0.007 | 0.07 | -0.001 | 0.19 |
| 2 | 0.09 | -0.001 | 0.006 | 0.05 | -0.002 | 0.15 |
| 3 | 0.05 | -0.001 | 0.002 | 0.05 | -0.001 | 0.10 |
| 4 | 0.07 | -0.001 | 0.003 | 0.05 | -0.001 | 0.12 |
| 5 | 0.05 | -0.001 | 0.002 | 0.04 | -0.001 | 0.09 |
| 6 | 0.04 | -0.001 | 0.001 | 0.04 | -0.001 | 0.08 |
| 7 | 0.03 | -0.001 | 0.003 | 0.05 | -0.001 | 0.08 |
| 8 | 0.03 | -0.001 | 0.001 | 0.03 | -0.001 | 0.06 |
| 9 | 0.02 | -0.001 | 0.002 | 0.04 | -0.001 | 0.06 |
| 10 | 0.02 | -0.001 | 0.001 | 0.04 | -0.001 | 0.07 |
| Total | 0.05 | -0.001 | 0.003 | 0.05 | -0.001 | 0.10 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998). Based on the price and quantity changes estimated by Hoekman, Nicita, and Olarreaga (2005), we estimate first and second order effects in agricultural production. See text for details.

Table 6
Additional Income Gains From Complementary Reforms
(as a share of household income)

| Decile | Cotton | Vegetables | Tobacco | Hybrid Maize | Groundnuts | Total |
|--------|--------|------------|---------|--------------|------------|-------|
| 1 | 0.27 | -0.012 | 0.62 | 1.20 | 0.023 | 2.11 |
| 2 | 0.16 | -0.005 | 0.16 | 0.73 | 0.013 | 1.06 |
| 3 | 0.12 | -0.003 | 0.28 | 0.49 | 0.010 | 0.89 |
| 4 | 0.09 | -0.002 | 0.06 | 0.31 | 0.008 | 0.47 |
| 5 | 0.06 | -0.002 | 0.04 | 0.38 | 0.004 | 0.49 |
| 6 | 0.05 | -0.001 | 0.03 | 0.22 | 0.003 | 0.29 |
| 7 | 0.02 | -0.001 | 0.10 | 0.21 | 0.003 | 0.33 |
| 8 | 0.02 | -0.001 | 0.01 | 0.14 | 0.002 | 0.17 |
| 9 | 0.02 | -0.001 | 0.03 | 0.20 | 0.002 | 0.25 |
| 10 | 0.01 | -0.001 | 0.01 | 0.11 | 0.002 | 0.13 |
| Total | 0.08 | -0.003 | 0.13 | 0.40 | 0.007 | 0.62 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998). The results are based on the simulated effects of the elimination of supply constraints in agriculture. See text for details.

Table 7
Income Gains From Employment Growth
(percentage)

| Decile | All Individuals | Heads Only |
|--------|-----------------|------------|
| 1 | 0.65 | 0.90 |
| 2 | 0.62 | 0.37 |
| 3 | 0.28 | 0.41 |
| 4 | 0.63 | 0.93 |
| 5 | 0.63 | 1.00 |
| 6 | 0.88 | 0.68 |
| 7 | 0.60 | 0.69 |
| 8 | 0.17 | 0.26 |
| 9 | 0.23 | 0.20 |
| 10 | 0.10 | 0.12 |
| Total | 0.48 | 0.55 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998). The “all individuals” model assumes that all household members can enjoy the growth in employment; instead, the “heads only” model allocates the new job openings to unemployed household heads.

Table 8
Average Budget Shares
(percentage)

| | National | | | Rural | | | Urban | | |
|-------------------|----------|-------|----------|-------|-------|----------|-------|-------|----------|
| | total | poor | non-poor | total | poor | non-poor | total | poor | non-poor |
| Food | 67.5 | 71.8 | 59.3 | 73.6 | 74.6 | 70.3 | 56.6 | 63.1 | 51.2 |
| Clothing | 5.6 | 4.8 | 7.1 | 5.6 | 5.2 | 7.0 | 5.5 | 3.6 | 7.1 |
| Alcohol & Tobacco | 3.6 | 2.9 | 4.9 | 3.7 | 3.0 | 6.0 | 3.3 | 2.3 | 4.1 |
| Personal Goods | 7.1 | 6.8 | 7.6 | 5.7 | 6.1 | 4.5 | 9.5 | 9.1 | 9.9 |
| Housing | 4.5 | 4.2 | 5.0 | 2.9 | 3.0 | 2.4 | 7.3 | 7.7 | 6.9 |
| Education | 2.5 | 2.6 | 2.3 | 1.9 | 2.1 | 1.0 | 3.6 | 3.9 | 3.3 |
| Health | 1.4 | 1.3 | 1.6 | 1.3 | 1.3 | 1.5 | 1.7 | 1.5 | 1.7 |
| Transport | 4.2 | 3.2 | 5.9 | 3.4 | 3.1 | 4.3 | 5.5 | 3.6 | 7.1 |
| Remittances | 1.3 | 0.7 | 2.4 | 1.0 | 0.7 | 1.9 | 1.9 | 0.8 | 2.8 |
| Other | 2.4 | 1.7 | 3.9 | 0.9 | 0.8 | 1.2 | 5.1 | 4.2 | 5.9 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Note: The table reports budget shares. Own calculations based on Living Conditions Monitoring Survey (1998).

Table 9
Consumption Effects
Business as Usual Scenario
(percentage)

| Decile | Clothing | Vegetables | Fish | Cereals | Dairy | Tobacco & Alcohol | Meat & Poultry | Total |
|--------|----------|------------|--------|---------|--------|-------------------|----------------|-------|
| 1 | -0.03 | 0.01 | -0.006 | -1.39 | -0.001 | -0.02 | -0.01 | -1.44 |
| 2 | -0.04 | 0.02 | -0.006 | -1.18 | -0.001 | -0.03 | -0.02 | -1.26 |
| 3 | -0.04 | 0.02 | -0.006 | -1.14 | -0.001 | -0.03 | -0.02 | -1.22 |
| 4 | -0.05 | 0.02 | -0.006 | -1.04 | -0.001 | -0.03 | -0.04 | -1.14 |
| 5 | -0.05 | 0.02 | -0.005 | -0.93 | -0.002 | -0.03 | -0.04 | -1.04 |
| 6 | -0.05 | 0.02 | -0.005 | -0.83 | -0.003 | -0.03 | -0.02 | -0.93 |
| 7 | -0.06 | 0.02 | -0.005 | -0.76 | -0.004 | -0.04 | -0.02 | -0.87 |
| 8 | -0.07 | 0.01 | -0.005 | -0.65 | -0.004 | -0.04 | -0.02 | -0.77 |
| 9 | -0.08 | 0.01 | -0.004 | -0.52 | -0.005 | -0.04 | -0.02 | -0.66 |
| 10 | -0.08 | 0.01 | -0.003 | -0.36 | -0.005 | -0.06 | -0.00 | -0.49 |
| Total | -0.05 | 0.01 | -0.005 | -0.88 | -0.003 | -0.03 | -0.02 | -0.98 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998). Only first order effects are estimated (no substitution responses are allowed).

Table 10
Total Welfare Effects
Business as Usual Scenario
(percentage)

| Decile | Model 1 | Model 2 |
|--------|---------|---------|
| 1 | -0.60 | 1.50 |
| 2 | -0.48 | 0.58 |
| 3 | -0.85 | 0.05 |
| 4 | -0.39 | 0.08 |
| 5 | -0.32 | 0.17 |
| 6 | 0.03 | 0.32 |
| 7 | -0.20 | 0.13 |
| 8 | -0.54 | -0.37 |
| 9 | -0.36 | -0.11 |
| 10 | -0.32 | -0.19 |
| Total | -0.40 | 0.22 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998). Model 1 includes income gains in agriculture, employment effects, and consumption effects. Model 2 adds complementary reforms in agriculture.

Table 11
Total Welfare Effects from Ambitious Scenario
(percentage)

| Decile | Income Gains | | Employment Gains | Consumption Gains | Total Effect | |
|--------------|--------------|----------------|---------------------|----------------------|--------------|----------------|
| | Doha | Compl. Reforms | | | Doha 1 | Compl. Reforms |
| 1 | 0.38 | 2.15 | -0.00 | 1.74 | 1.85 | 4.00 |
| 2 | 0.21 | 1.24 | -0.48 | 1.78 | 1.51 | 2.75 |
| 3 | 0.16 | 1.38 | -0.25 | 1.94 | 1.86 | 3.23 |
| 4 | 0.16 | 0.44 | -0.60 | 2.13 | 1.69 | 2.13 |
| 5 | 0.16 | 0.68 | -0.86 | 2.22 | 1.52 | 2.20 |
| 6 | 0.11 | 0.35 | -0.91 | 2.36 | 1.56 | 1.91 |
| 7 | 0.16 | 0.58 | -0.88 | 2.60 | 1.88 | 2.45 |
| 8 | 0.09 | 0.23 | -0.83 | 2.72 | 1.98 | 2.21 |
| 9 | 0.11 | 0.46 | -1.43 | 2.84 | 1.52 | 1.99 |
| 10 | 0.12 | 0.20 | -1.88 | 2.79 | 1.03 | 1.23 |
| Total | 0.17 | 0.77 | -0.81 | 2.29 | 1.64 | 2.41 |

Note: Own calculations based on Living Conditions Monitoring Survey (1998).