# Lecture 12: Local supply responsiveness

Local supply responsiveness

* Estimating local supply responsiveness
* Adding in demand
* Example of local responsiveness in Bangladesh
* Example of local responsiveness in northern Kenya

It is not necessary to estimate local supply responsiveness in well-integrated markets. In a local market perfectly integrated into the global economy with no logistical or financing constraints, supply should be almost perfectly elastic, meaning cash injected into the local market to stimulate demand should elicit a corresponding supply response (i.e., an inflow of product) at the pre-existing price. As discussed in earlier lectures, if local market prices closely track prices in spatially distant markets, those markets are integrated, implying that food is routinely tradable between them. In integrated markets, traders will have incentives to import additional food into the local market if the prevailing price at least covers their marginal cost of bringing in greater volumes. An injection of cash can induce increased flow of product from other markets with which the local market is closely linked.

*If an analyst can establish that markets are well integrated, that local markets are competitive (e.g., there are enough traders and/or adequate ease of entry and exit of traders), that food insecure households have adequate market access and that preferences do not indicate an underlying, unmet concern about cash and vouchers, cash and vouchers are likely suitable. Similarly, procurements are not likely to cause price increases in well-integrated procurement markets.*

**Estimating local supplier responsiveness**

Unfortunately, small, rural markets in developing countries are often not well-integrated with larger markets and/or lack adequate historical data to enable market integration calculations. When markets are isolated or poorly integrated, cash distributions may result in local inflation rather than an increased supply of goods into the local market. So the key question is how much added supply can local commercial traders provide and at what price. If data for market integration are not available, consider estimating marginal costs in order to assess supply responsiveness. Answering this question effectively requires estimating the prevailing local supply curve, that is, the amount of foodstuffs that local markets can deliver at different price levels. One needs to establish the total local cost (procurement cost in some distant market plus transport costs, credit, insurance, etc.) for additional supplies. The greater a traders’ capacity to increase delivery volumes at the pre-existing price or a level near it, the greater is the scope for cash-based response.

The usefulness of estimating the supply curve is reflected in the accompanying stylized graphic. Cash transfers – or any sort of transfer, including food aid – augment local demand for food. If local supply is infinitely elastic, as in the case of the dashed horizontal line, then prices are unchanged as transfers to food insecure households pushes out the demand curve (reflected in the shift from the lower downward-sloping curve marked “Base Demand” to the upper downward-sloping curve marked “Augmented Demand”). In this extreme situation, cash transfers are clearly first best. The opposite extreme is the case of perfectly inelastic supply, represented by the solid vertical line. In the case of perfectly inelastic supply, cash transfers push out the demand curve and only bid up the price of food without increasing consumption (as reflected by the point of intersection of the demand and supply curves relative to the horizontal axis). In such circumstances, supply augmentation through noncommercial imports of food aid is clearly necessary to improve food security. Real markets almost always fall between these two extremes, with some smooth or, more commonly, stepwise cost structure to expanding supply. In this step, the response analyst tries to draw (i.e., approximate) the supply curve.

Source: Barrett (2009)

*Discussions with traders to understand supply responsiveness*

The goal of drawing out the supply curve is to recover marginal costs for any *additional* volumes traders would deliver into a market. A supply curve is the locus of marginal costs for different delivery volumes. So one is simply trying to trace out how much it would cost to augment current deliveries by 1 ton, 2 tons, 3 tons, etc. up to the total assessed needs. This is usually best done through trader and key informant interviews (e.g., with banks and transporters) to establish what, if any, costs might increase for traders (i.e., procurement cost of food wherever they source it, transport and handling costs, short-term credit for operating expenses, etc.). If one does trader interviews, a simple questionnaire can solicit information on how much extra it would cost to bring in different additional increments (appropriate units will vary by context, from one ton to hundreds of tons) broken down into cost types. Include costs such as procurement price in source market, transport costs, handling costs, credit, storage costs, tariffs/taxes/fees, etc. Record the resulting costs and volumes for each trader. Cumulatively, these create the aggregate supply curve in the local market.

Question traders about their current volumes and capacity to expand. Traders may be able to estimate volumes sold in particular regions, speed of deliveries, competition levels of upstream suppliers and downstream purchasers, and, if they are willing, the cost and profitability of their own trade. If traders reply that they can increase supply, question them where they will store the supply and who will deliver the commodity. For traders to increase supply, they need to either purchase from their upstream supplier more frequently or in increased volumes, both of which would require increased usage of storage, trucks, and credit. It is important to verify that the traders are not all intending to leverage the same sources of excess capacity, such as limited storage space or few trucks because in the short run, it is quite difficult to increase the amount of storage or trucks.

Some checks on eliciting marketing margins includes asking traders if their entire stock was purchased today, how long it would take to resupply, and what sorts of constraints limit the amount of volume they currently trade. The first question helps to check that above responses on marketing margins are realistic. For example, if traders respond that they can increase their supply infinitely to meet any size increase in demand, but then reflect that it could take several weeks for them to restock supplies, it is unlikely that their response to questions of supply responsiveness are overstated. The second question on constraints to the volume traded allows analysts to probe traders for reasons that may inhibit their ability to increase supply, such as a lack of transportation or credit.

While traders can be important sources of information, eliciting supply responsiveness data from traders can be difficult for several reasons. First, larger market actors generally have fewer competitors and may not be willing to spend time with market analysts. Second, if traders perceive that their answer could be use in support of a particular intervention, they may have incentives to overstate their ability to meet demand. Finally, it will be quite difficult to generate a statistically significant sample of major market actors and will be more effective to approach them as key informants.

An example spreadsheet tracing out how marketing margins change as volume changes is below. Traders were first asked about their current costs (i.e., sales price), which are 2604. They then were asked how much more each could they provide at current costs (trader 1 could provide one metric ton, trader 2 could provide 20 metric tons) before costs would increase beyond 2604. The traders then were asked how much they could supply if prices increased. The traders provided both the additional amount they could supply and the new marginal costs. Other approaches include (1) asking traders how much more they could supply if prices increased by ten percent or (2) asking traders how much it would cost to supply X metric tons.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Additional Marginal Volume in metric tons | Additional Procurement Cost | Additional Transport Cost | Storage Costs | Taxes or Fees | Processing Costs | Interest or Short-term credit costs | | Other Costs | **Total Marginal Cost** |
| **Costs by trader** | |  |  |  |  |  | |  |  |  |
| Trader 1 | 1.00 | 1900 | 200 | 12 | 202 | 100 | | 190 | 0 | 2604 |
|  | 2.00 | 1900 | 450 | 12 | 202 | 100 | | 190 | 0 | 2854 |
|  | 5.00 | 2500 | 750 | 0 | 250 | 100 | | 300 | 0 | 3900 |
| Trader 2 | 20.00 | 1900 | 200 | 12 | 202 | 100 | | 190 | 0 | 2604 |
|  | 50.00 | 2500 | 500 | 0 | 250 | 100 | | 200 | 0 | 3550 |
| Trader 3 | 4.00 | 1900 | 200 | 12 | 202 | 100 | | 190 | 0 | 2604 |
|  | 12.00 | 2000 | 500 | 15 | 202 | 100 | | 250 | 0 | 3067 |

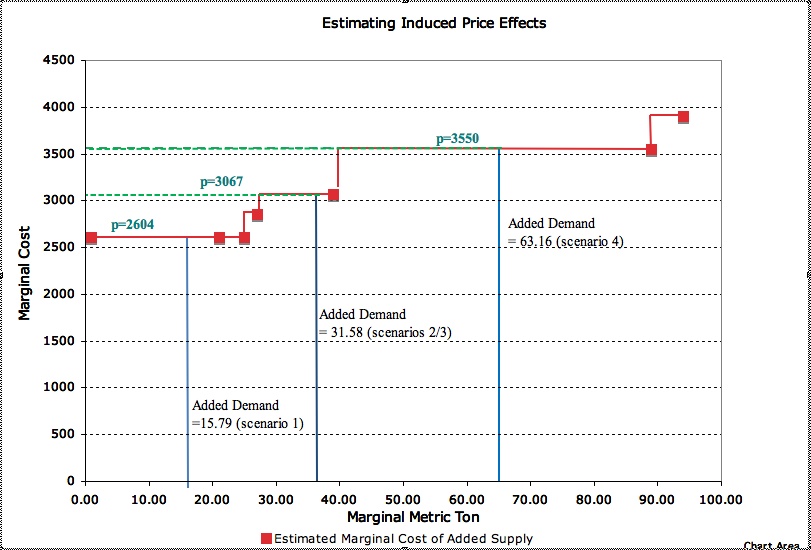
If the marginal costs of increased food supplies are increasing, then the food price increases likely to be induced by cash transfers will depend in part on the demand stimulus created by transfers.

Using the marginal costs by trader, we resorted the volumes to show how traders adding supply face increasing marginal costs:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Sorted volumes by Marginal costs | **Total Marginal Cost** | **Aggregate Added Supply** |
| Trader 1 | 1.00 | 2604 | 1.00 |
| Trader 2 | 20.00 | 2604 | 21.00 |
| Trader 3 | 4.00 | 2604 | 25.00 |
| Trader 1 | 2.00 | 2854 | 27.00 |
| Trader 3 | 12.00 | 3067 | 39.00 |
| Trader 2 | 50.00 | 3550 | 89.00 |
| Trader 1 | 5.00 | 3900 | 94.00 |

This direct elicitation approach will generate a realistic, stepwise aggregate supply function. Plotting the sorted values and their marginal costs will generate a stepwise supply function.

**Graphing marginal costs derived during a supply analysis**



Source: Barrett (2009)

**Adding in demand analysis**

Bigger increases in demand will stimulate greater price increases, which will tend to hurt food insecure households, especially those not receiving transfers. Thus some basic demand analysis is required to determine the expected change in demand. How much local demand responds depends on the size of the transfer, on prices, on the relevant income elasticity of demand and on the resulting size of the shift in the demand curve.

Below is an example of demand changes computed by estimating increased volume demanded for food due to cash distributions:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Market | Expected Cash Dispersal | Cost of staple per metric ton | Amount of food that could be purchased with cash | Income elasticity of demand: More elastic (closer to 1) | Income elasticity of demand: Less elastic (further from 1) | Additional Volume demanded: High estimate | Additional Volume Demanded: Low estimate |
| Market A | 100,000 | 1900 | 52.63 | 0.6 | 0.3 | 31.58 | 15.79 |
| Market B | 200,000 | 1900 | 105.26 | 0.6 | 0.3 | 63.16 | 31.58 |

Analysts are considering cash dispersal to food insecure households utilizing two different markets. In market A, the dispersal to food insecure households will be approximately $100,000, and in the second, market B, it is 200,000. The cost of staples, per metric ton, is 1900 in both markets. Simple division reveals the total amount of metric tons that could be purchased in this market, if every recipient spent all of their transfers on this one commodity. This is an unlikely assumption and therefore, we apply two income elasticities of demand. We use 0.6 and 0.3 as our high and low estimates of income elasticities. Recall that an income elasticity of demand of 0.6 means that for an additional dollar transferred, $0.60 will be spent on food. Applying the elasticities to the total amount of food that could be purchased results in estimated additional volume demanded.

Note that when trying to estimate the induced price effects in a market, the analyst wants to use the aggregate transfers to households in the area so as to capture the aggregate demand effect, which needs to be matched up to the elicited supply curve in order to establish expected price increases. The same technique can be applied when trying to estimate the expected price increases in source markets due to local or regional purchases by operational agencies, using the total purchase value instead of aggregate transfer value. If the expected induced price increases are on the order of 10% or more in a market, the proposed actions (whether LRP or cash transfers to households) are likely to harm food insecure net buyers in those markets and may be inadvisable.

Applying the elasticities of demand generates estimates of the additional supply needed. For this example, assume that the set of traders operating in market A is identical to the set operating in market B so that market A and B traders have identical marginal cost structures (in a true MIFIRA analysis, one would want verify this is the case by eliciting marginal costs from a subsample of communities). Returning to the supply schedule established through trader interviews about their marginal costs, we find that prices will barely increase in scenario 1, which is a distribution to households who use market A and who have a low elasticity of demand. However, in scenarios 2-4, the amount of food demanded will be greater than what traders can provide at current costs, resulting in an induced price change of at least 18%.

|  |  |  |  |
| --- | --- | --- | --- |
| **Income elasticity of demand scenario** | **Additional Supply Needed (MT)** | **Marginal Cost (find from ordered AS schedule)** | **Induced price change (%)** |
| Scenario 1: low (0.3) market A | 15.79 | 2604 | 0.2% |
| Scenario 2: high (0.6) market A | 31.58 | 3067 | 18.0% |
| Scenario 3: low (0.3) market B | 31.58 | 3067 | 18.0% |
| Scenario 4: high (0.6) market B | 63.16 | 3550 | 36.5% |

Because prices rise significantly with the higher distribution in market B, analysts may want to consider supplying some cash and some food, or depending on how quickly traders can restock, may want to consider distributing smaller amount of cash more frequently (i.e., rather than distribute 200,000 every three months, distribute 100,000 every six weeks, which could allow traders to restock without having to engage in addition, expensive methods to increase supply for a short-burst of increased demand).

These results turn, in part, on the size of the elasticity of demand. Yet, reliable estimates of the income elasticity of demand for staple products may not be available; in this example, the elasticities are quite high, suggesting that households will spend large portions of transfers on a single commodity. In a later example, we use the marginal propensity to consume as an alternative to the income elasticity of demand.

Establish through interviews with traders currently serving the market and key informants (e.g., transporters, bankers, government officials, importers) how much untapped capacity exists to deliver more food at current costs (of credit, transport, staffing, and food procurement in source markets), taking into consideration the possibility of new market entrants if there is added cash demand. The greater the untapped capacity, the greater is the space for cash-based response. If local market price series are strongly, positively correlated (historically and recently) with global market and import parity price series, the lower the likelihood that increased local demand will bid up prices significantly.

*Limitations of the analytic*

Gathering information about supplier responsiveness can be time intensive and difficult. The costs of commerce can be subtle and related either positively or negatively to a range of local or national government policies. Not only do some national governments sometimes employ protectionist policies that can impede food imports (or food exports from surplus zones or neighboring countries), but some local governments (or non-governmental authorities) impose unofficial policies (e.g., road tolls, taxation, security costs) that add to the costs of commerce, slow trade, or both.

To address some of these limitations, clearly state the assumptions in your model and make supportable claims. Avoid false precision. If there is not time available to estimate local marginal cost curves, another approach is to canvas local experts to get best guesstimates of the inverse price elasticity of supply, i.e., the percentage increase in price associated with a one percent increase in demand in the local market. Multiply the percentage increase in demand (ratio of increase in demand divided by total initial market demand) by the inverse price elasticity of supply to approximate the resulting percentage increase in price. This method can be used to estimate the resulting percentage increase in price across many percentage increases in demand due to cash transfers or local or regional purchase actions. The inverse price elasticity of supply can then provide a smoothed curvilinear approximation of the supply function.

Example 1: Basic Estimation of Supply Responsiveness to Demand

CARE-Bangladesh’s SHOUHARDO Maternal Child Health Program (MCHN) program targets pregnant and lactating women with children under 24 months old with a semi-monthly food aid ration. We used the MIFIRA framework to quickly assess whether markets were functioning adequately to allow a prospective substitution of cash for food-based responses for this previously identified beneficiary population. We used SHOUHARDO’s volume of food aid programming as a starting point to understand likely demand and broader market response to a prospective switch from food to cash.

Simple back-of-the-envelope computations suggest that switching from food aid deliveries to cash deliveries would make a relatively small impact on the total quantity traded in the main wholesale market in Sirajganj (Table 2). The same finding appears to hold true for the larger SHOUHARDO program nationwide. These calculations combined data from several readily accessible sources. The project needs assessment included a count of recipient households and the food aid ration size. The SHOUHARDO-MCHN program distributed 12 kilograms of wheat to each of 6500 Sirajganj District recipients in June, for a total distribution of 78 metric tons of wheat. To compute the equivalent volume of rice demanded, if cash were to be provided, we assumed the size of the cash grant would allow for a simple one-for-one substitution of rice for wheat. This is a very conservative assumption as households will typically not purchase baskets identical to their food rations, but will consume some non-food items as well. IFPRI (2007, p.68) found that among very poor households the marginal propensity to consume (MPC) food out of an additional increment of income lies in the range 0.30-0.45 (IFPRI, 2007. p. 68). In other words, given cash transfers, only 30% - 45% of the increased income will be spent on food, on average. Again making the most conservative assumption, at the upper end of the estimated MPC range (45%), the new demand for rice would be 35.1 metric tons.

In a brief interview, a single large wholesaler in Sirajganj City reported selling 1600 bosta of coarse rice per month, or 148.8 metric tons (1bosta≈ 93 kg). This one wholesaler would need to increase his monthly sales by only 25% in order to meet the entire extra market demand for rice that would result from converting existing food aid rations to cash transfers. He was confident that he could do so, but he would have to increase his price because the cost of his credit rises with the level of credit used. There are approximately eight to ten traders similar in size to this large trader in Sirajganj City. In order to meet the increased district-wide demand, each would have to increase throughput volumes by only 2.5-4.0%. Wholesale traders seemed able to increase their volume by that percentage without incurring extra costs. We limited our analysis of wholesaler responsiveness only to Sirajganj city. The market basin utilized by Sirajganj district recipients is certainly larger and may include wholesalers operating in other towns or districts who could also increase their supply. Finally, rice markets are generally well-integrated across larger Bangladeshi markets, tying the Sirajganj market basin to still-broader markets (Dorosh et al. 2004). Especially given the conservative assumptions used, it seems unlikely that a conversion of the SHOUHARDO-MCHN food aid program to cash transfers would drive up rice prices in the community.

**Estimated increase in demand if cash replaced food aid in a community receiving food aid (Sirajganj district, Bangladesh)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number of recipient house-holds (hh) | Grain given to each hh per month (kg) | Total food aid delivered per month (MT) | Marginal propensity to consume (MPC) food | Demand adjusted by MPC, per month (MT) | Monthly volume of largest seller in Sirajganj (MT) | Share trader would have to increase his trade volume | Estimated national imports per month (MT) | New demand as a ratio of imports |
| Sirajganj MCHN recipients | 6500 | 12 | 78 | 0.45 | 35.1 | 148.8 | 0.236 | 241,667 | 0.0001 |
| Total MCHN recipients | 85,000 | 12 | 1,020 | 0.45 | 459 | N/A | N/A | 241,667 | 0.0019 |

Source: Barrett (2009)

Thinking about the possibility of converting all MCHN programs in the country from food to cash, one needs to compare the resulting national-scale increment in demand to trade volumes. Central government data indicated 2.9 million metric tons of rice were imported in 2007-8. Following the same simple method of crudely estimating likely additional rice demand from a conversion to cash, we found it would amount to less than 0.2% of average import volumes. Again, the likelihood of inducing price increases seems extremely low. This exercise found only a modest expected shift in demand in the event of a switch from food aid to cash, and that expansion should be very feasible for traders to accommodate without triggering any significant price adjustment. However, even though the Bangladesh Ministry of Food and Disaster Management ensures a relatively high degree of food aid coordination across agencies, in situations in which a number of large food aid actors consider introducing cash transfers simultaneously without consulting each other, problems could result. The obvious implication is that some amount of inter-agency coordination is necessary.

As demonstrated in this one example, estimating the potential increase in demand is relatively easy provided one can synthesize data from multiple sources: basic needs assessment information; primary data from discussions with traders; and secondary data on estimated marginal propensities to consume and national trade volumes. In most settings, this should be feasible, especially with prior preparation through baseline analysis before agencies hit an emergency requiring rapid response analysis.

**Example 2: Estimating Supply Responsiveness using Marginal Propensities to Consume and Value of Excess Trader Capacity**

In this example, we estimate the increase in the market demand for food goods caused by an injection of cash transfers. To ascertain whether local markets can efficiently absorb the amount of cash entering the system from a cash-based food security response, one first needs to have a sense of how much local demand for food will increase. Local demand response to cash transfers will depend on several household and programmatic parameters.

First, we estimate household marginal propensity to consume food (MPCF) from an incremental change in income in order to approximate the amount of cash transfer that a recipient household will use to purchase food. To compute the MPCF, we asked each household how they would spend a one-time gift of Ksh2000 and computed the fraction to be spent on food. Column C of the below table displays location-averaged marginal propensity to consume food. Households indicate that on average they are likely to spend between 42% and 53% of an additional income increment on food. In other words, these households are likely to spend almost half of any one-time cash transfer they receive. Given that a one-time gift could be spent differently than a regularly occurring transfer during food insecurity, we use our elicited MPCF as a lower bound to demand response for food and an MPCF of 75% as an upper bound for demand response for food.

To calculate the total local increase in food demand we then average household own-valuation of the most recent food aid basket for each community (see Column B). The values vary widely, between Ksh1142 in Loiyangalani and almost twice that in Logologo. While food aid provision occurs roughly once every two months in our sample, we model the inflow as a single payment event. In later steps, we compare traders’ abilities to increase their supply to meet this demand.

To generate the increase in local monthly food demand created by a cash transfer program into these locations, we multiply the estimated household population by the community averaged marginal propensity to consume food and the value of the typical food aid basket. As of June 2008, the Kenyan Red Cross delivered World Food Program aid to 63,720 individuals in Marsabit district. Marsabit’s population is estimated to be approximately 160,000 households.[[1]](#footnote-1) Thus, recent targeting rates are roughly 40 percent. We offer two scenarios; one in which 40% of the total population is covered and the other with full coverage across the entire community. In Columns D, E, G, and H, we present the estimated value of increased local food demand resulting from a cash transfer program with the stated characteristics. The lower bound cash transfer valued at the going food basket valuation offered to the entire sub-location population varies between just under a million shillings in Loiyangalani to over 1.5 million in North Horr. The upper bound is between 1.6 million shillings in Dirib Gumbo to 2.2 million shillings in Loiyangalani. The next step is to ascertain whether the market traders are able to meet this demand without causing localized inflation in food prices.

Estimated Value of Food Demand Generated by Cash Transfer

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **HH population** | **Average value of food aid basket** | **Lower Bound MPC** | **Lower value of food demanded based on transfer to 40% of pop** | **Lower value of food demanded based transfer to entire pop** | **Upper Bound MPC** | **Upper value of food demanded based on transfer to 40% of pop** | **Upper value of food demanded based on transfer to entire pop** |
|  | A | B\* | C | D=AxBxCx0.4 | E=AxBxC | F | G=A\*B\*F\*0.4 | H=A\*B\*F |
| ***Dirib Gombo*** | 1170 | 1,797 | 0.53 | 445,728 | 1,113,863 | 0.75 | 630,747 | 1,576,868 |
| ***Kargi*** | 1831 | 1,349 | 0.49 | 484,124 | 1,210,204 | 0.75 | 741,006 | 1,852,514 |
| ***Logologo*** | 1131 | 2,263 | 0.47 | 481,177 | 1,203,198 | 0.75 | 767,836 | 1,919,590 |
| ***Loiyangalani*** | 1958 | 1,142 | 0.42 | 375,654 | 938,924 | 0.75 | 670,811 | 1,677,027 |
| ***North Horr*** | 2294 | 1,295 | 0.53 | 629,795 | 1,574,597 | 0.75 | 891,219 | 2,228,048 |

\* HH population is sub-location 99 Census scaled by 32%, which is the estimated Marsabit population growth rate from 1999 to 2009.

Source: Mude et al. (forthcoming)

Having determined possible increases in demand, we estimate the capacity of local food traders to meet rising food demand in a timely manner and at current prices. Several analytical tools can be employed to estimate supply responsiveness and the resulting change in price. Much of the ensuing analysis is generated from data solicited in the trader surveys. We consider a wholesaler to be any trader sourcing commodities from suppliers in external markets. By this definition, wholesalers are the principal source of food inflow into the communities.

To preclude double counting of supply, we focus our analysis only on these wholesalers. Wholesalers in remote areas will be providing product not only to consumers but also to some retailers in their communities as well as retailers in satellite markets. Given the small sample of wholesalers - at times only one per community - we employ conservative assumptions in our calculations to generate a feasible lower bound of excess capacity of wholesalers. This excess capacity guides wholesalers’ abilities to meet cash-transfer induced demand increases without incurring increased marginal costs.

First, each wholesaler’s maximum total capacity can inform both their ability to meet increased demand and identify constraints to increasing supply. We asked sampled wholesalers to declare the maximum volumes of the top three commodities they sold that they could supply at any one time given their current access to storage, transport, credit, etc., without increasing prices. Using self-declared commodity specific sales prices, we then valued these amounts to estimate the value of the maximum capacity per wholesaler at any one time (Column A).

We solicited, everything else held constant, the number of days traders needed in order to fully restock. Using a month as the relevant time span in which cash transfer impacts on the market are likely to bind, we then use this figure to generate the average maximum monthly frequency of restocking. In order to account for unforeseen delays and bottlenecks that may arise due to a simultaneous increase in the demand for transport, for supply from external sources, and for credit we use our solicited restocking estimate and divide it in half to compute a lower bound estimate. For Dirib Gombo, which does not have a single wholesaler, and whose wholesale market is therefore Marsabit town, we have used the supply capacity for Marsabit town. As Column B shows, Marsabit town, the primary market center in the district, can restock about 5 times a month while North Horr, the most remote town, can only restock once a month.

To generate the total community value of wholesaler monthly capacity, we multiply the maximum estimated one-off capacity of a single wholesaler by the monthly restocking frequency and by the number of wholesalers in the community (Column E). We then calculate the total value of average monthly sales to determine what the excess capacity is, and therefore, the ability of the market to absorb demand increases. We construct this variable by computing an average monthly value from the sum quarterly sales solicited from the traders and dividing by twelve. We then multiply this monthly average by the number of wholesalers in the community (Column F). The estimated value of excess capacity, in Column G, is simply the ratio of maximum capacity to current sales, the total value of monthly maximum capacity minus the total value of current monthly sales.

Value of Maximum Possible Wholesale Supply Capacity of Top 3 commodities

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Value of max one-off capacity per wholesaler** | **Max monthly restock frequency/2** | **Value of max monthly capacity per wholesaler** | **No of wholesalers** | **Total value of wholesaler monthly capacity** | **Total value of current monthly wholesaler sales** | **Value of Excess capacity** |
|  | A | B\* | C=AxB | D | E=CxD | F\*\* | G=E-F |
| ***Marsabit Town***\*\*\* | 4,056,250 | 5.0 | 20,281,250 | 10 | 202,812,500 | 21,975,000 | 180,837,500 |
| ***Kargi*** | 637,000 | 4.0 | 2,548,000 | 4 | 10,192,000 | 588,500 | 9,603,500 |
| ***Logologo*** | 372,125 | 4.0 | 1,488,500 | 2 | 2,977,000 | 529,300 | 2,447,700 |
| ***Loiyangalani*** | 1,024,813 | 4.5 | 4,611,659 | 4 | 18,446,634 | 10,284,000 | 8,162,634 |
| ***North Horr*** | 1,193,601 | 1.0 | 1,193,601 | 8 | 9,548,808 | 3,001,500 | 6,547,308 |

\* Monthly restocking frequency derived by dividing number of days required to restock to full capacity by 30 days.

\*\* Sample wholesalers estimated average monthly sales for top 3 commodities

\*\*\* Marsabit Town is the closest wholesale destination to Dirib Gombo, which is 15 minutes away by road.

Source: Mude et al. (forthcoming)

By combining the key demand and supply results from the above tables, we can compare the value of the excess capacity (estimated as the difference between wholesalers maximum monthly supply capacity and the current monthly average supply), with the value of increased demand generated by a cash transfer to the whole population. As the table below shows, in each sample community, the induced demand response is less than the excess capacity that suppliers can meet over a month with little, if any, increase in costs. We estimate that North Horr, despite the fact that its wholesalers restock once or twice a month and it is the most remote sub-location in the sample, can easily absorb induced demand, which is less than a quarter of excess capacity. At 49.2%, Logologo has the highest fraction of its surplus capacity being absorbed. This result is not surprising because Logologo is on the main road and less than an hour’s drive from Marsabit town, the local market hub. Therefore, wholesalers in Logologo do not need the capacity to carry large stocks as they can more easily replenish.

Induced Demand as a Fraction of Excess Capacity

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Value of Excess capacity** | **value of food demand generated by food basket value income transfer to entire pop** | **Cash-transfer generated demand as a fraction of excess capacity.** |
|  | A | B | A/B\*100 |
| ***Marsabit Town*** | 180,837,500 | 1,113,863 | 0.6% |
| ***Kargi*** | 9,603,500 | 1,210,204 | 12.6% |
| ***Logologo*** | 2,447,700 | 1,203,198 | 49.2% |
| ***Loiyangalani*** | 8,162,634 | 938,924 | 11.5% |
| ***North Horr*** | 6,547,308 | 1,574,597 | 24.0% |

Source: Mude et al. (forthcoming)

Dirib Gombo, whose retailers stock up from Marsabit town due to its proximity (less than 15kms away), naturally requires a trivial fraction of the town’s wholesale surplus capacity to meet its demand needs. And while Marsabit town acts as a central hub for many wholesalers and retailers in various towns in Marsabit district, at only 0.6 percent, Marsabit town should be able to comfortably handle a demand response equal to 166 times Dirib Gombo’s. As Dirib Gombo has a marginal propensity to consume food and a food aid basket value that is greater than the average of other communities, Marsabit town should be able to meet a cash transfer induced demand response equivalent to that generated by over 190,000 households – 166 times the population of Dirib Gombo. This capacity is greater than the 160,000 households estimated to inhabit the entire Marsabit district. It certainly seems that barring a major conflict or substantial damage in transport and marketing infrastructure, the markets of Marsabit town and its satellite locations are more than capable of catering to the level of demand increases likely to result from a substantial cash transfer program.

A related analysis further confirms this result. In the figure below, we present results of the following question, posed to traders: What would need to change for you to be willing to increase your capacity beyond your current maximum at current sales prices? That ‘increased demand’ is overwhelmingly ranked first indicates the capacity and willingness of traders to respond accordingly to a spike in demand. In addition, the fact that the previous analysis did not take into account the stocking rate response to a demand increase strengthens our result that the market supply would more than adequately absorb demand spikes due to a cash transfer.

Factors necessary for traders to increase their maximum stocking capacity at current sales prices

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Source: Mude et al. (forthcoming)

Having estimated traders’ excess capacity keeping their access to storage, transport, and credit constant, we now examine the potential sources of supply bottlenecks in the event of a sudden increase in demand from multiple traders. Asking traders to rank the factors that may affect how fast they were able to source the commodities to meet a spike in demand, the top ranked constraint for retailers and wholesalers was their cash on hand: that is, it may take them some time to put together the cash needed to purchase the commodities in demand (see figure below). As we have mentioned before, extending credit to customers is very common for both traders and wholesalers and an immediate spike in demand may require greater urgency in demanding credit repayments.

Factors affecting the speed at which extra supply is sourced



Source: Mude et al. (forthcoming)

Interestingly, accessing credit did not feature as a key constraint to making quick and substantial purchasing decisions. Indeed, five out of six wholesalers say that they can access additional credit or goods on credit quite easily or very easily get a loan for greater that 100,000Ksh. Although using credit for purchases would require negotiation and entail an application process that would slow down the purchase decision relative to cash, the fact that accessing credit seems relatively easy suggests that cash, through ranked as the top-most constraint, is not a pressing obstacle to sourcing supply. That commodity and transport availability are ranked second and third after cash therefore implies that the time delay in sourcing the necessary amount of commodity or identifying transport should also not be substantial constraint.

**Role of monitoring**

In situations of poor market integration or when historical price series are unavailable, local supply responsiveness can indicate whether cash-based transfers are appropriate. However, in these cases, ongoing monitoring is especially crucial, because there is limited information available on which to draw. Commodity prices change, transportation prices change, policies change, and traders enter and exit, all of which indicate that a reappraisal of current approaches may be warranted. The role of monitoring will be discussed further in the next lecture.

1. \* HH population is sub-location 99 Census scaled by 32%, which is the estimated Marsabit population growth rate from 1999 to 2009. [↑](#footnote-ref-1)