CHAPTER 4. THE EFFECTS OF DISASTER RELIEF - A GENERAL OVERVIEW

1. Introduction

In the preceding chapters we have analyzed the effects of natural disasters on the economic conditions of the stricken region or country and of various measures to mitigate such effects. In this chapter we shall analyze the likely type of effects of disaster relief and, in particular, disaster relief from outside sources. The main purpose is to look at the compensatory vs the development inducing potentials of disaster relief. In order to do so we introduce foreign disaster relief by distinguishing among cash disaster relief, disaster relief in terms of commodities and disaster relief in terms of services. In economic analysis it is usual to distinguish only between cash assistance and assistance in kind. Our distinction here is motivated by the fact that different forms of disaster relief can be seen to affect economic development in different ways.

The analysis will proceed as follows. Firstly, we define the different concepts used and present the methodology to be utilized. Secondly, we summarize in general terms the effects of natural disasters described in chapter 2. This will provide us with the necessary analytical starting points. Thirdly, we analyze the different effects by looking separately at the effects of the relief given to producers and consumers, respectively. Finally, we concentrate on the development effects of institutional and technological changes.

2. Definitions and Methodological Considerations

In chapter 2 we saw that a natural disaster may alter the basic activities of the economy. These alterations of economic activities originate in the increased scarcities of the physical inputs used in production or in individual consumption. Through market reactions, these input changes could lead to changes in:

- the composition of demand and production
- the relative prices for commodities and production factors
- the allocation and utilization of resources
- the productivity of the inputs used in production and
- the distribution of real income.

All these changes, if radical enough, will alter what previously might have been a steady state of growth of the economy. Changes in the variables indicated above may alter the paths of real output and economic development. Thus, to study the influences of disaster relief on economic development we have to discuss how disaster relief will reinforce or counteract these changes. In addition, we must look at the institutional and organizational changes that the distribution of relief may induce. Therefore, our analysis of the "compensatory" and "development inducing" effects of the disaster relief[*)] will have as a starting point the post-disaster economic conditions of individuals, sectors and regions described above.

To enable a discussion of the effects of relief, the analysis will be focused on the following forms of relief: cash relief, relief in commodities and relief in services. By cash relief we mean the money in foreign or home currency provided via disaster relief organiza-

[*)] For a definition of these effects see Chapter 1, section 3.

tions, such as NGOs, FGOs, and governmental institutions. (For a description of the character of these institutions and organizations see Chapter 6, section 2.) By relief in commodities we mean the physical items, such as food, medicine, shelter, cloth and other items to satisfy immediate needs and machinery, equipment, or the like provided in connection with more comprehensive relief operations. By relief in services we mean the duties performed by institutions or organizations, like medical care, social assistance, and the transmission of technical, managerial, administrative, organizational and other knowledge, etc.

A review of the reports about disaster relief operations reveals that the type of assistance given tends to differ over the post-disaster period. So for instance, disaster relief in commodities to satisfy immediate needs is typical for the initial phase following a disaster (the emergency phase) while equipment, machinery or even cash to finance local investments are typical for the later phases of recovery or reconstruction. As far as possible, the different effects induced by each form of relief considered will be illustrated with observations from the Guatemalan case.

3. A Summary Description of How Disasters Affect Economic Activities

The following presentation of the state of the economy in an LDC aims at providing us with a framework for our discussion rather than at a detailed description of a disaster-stricken LDC's economy.

To begin with we shall consider production agents, who are assumed to maximize profits subject to production constraints, and consumption agents, assumed to maximize preference functions subject to budget constraints. Moreover, these agents are supposed to interact through a variety of market activities for both commodities and production factors.*)

3.1 The Production Side of the Economy

Factors of production are of course heterogeneous. Capital consists of man-made physical inputs, such as machinery, advanced equipment, rudimentary equipment etc, natural resources of productive land and other natural resources of different kinds and labor of skilled people, such as professionals, technicians and others with a certain level of knowledge and education, and unskilled labor, such as people with low levels of literacy or professional ability. Here we shall assume that all inputs but labor are homogeneous. For simplicity we shall assume that the working population consists of two types only: skilled and unskilled labor. In this way we try to observe the coexistence of a small wealthy, highly educated elite with masses of illiterate, poor people, as well as the coexistence of a small industrialized society with weak, impoverished peasant communities typical for "dualistic" LDC economies. (Todaro, 1981, pp. 64-65.). As described in chapters 1 and 2, in LDCs we find the case of poor people working in agriculture - with very low levels of knowledge and using rudimentary production processes - to produce food for selfsubsistence or for sale competing with more organized production units where advanced levels of mechanization and knowledge are used.

*) It should be pointed out that there are a lot of factors that, according to different authors, limit the use of traditional microeconomic assumptions in the analysis of problems that concern LDCs' economies. These include the relevance of assuming profit maximization when referring to production agents in low income sectors (see Lipton, 1968; Roumasset, 1976) the rigidity of prices and the character of markets and institutions (see Meier, 1976, pp. 12-18; Griffin 1974, 1976, 1978) etc. But, since our presentation aims only at giving a framework for the discussion these limitations will here be less of a problem. However, when such limitations may appear as important to the results obtained, they will be explicitly considered by our analysis.

Another characteristic of production in LDCs is that the individual's income earning possibilities lie in different kinds of activities. Thus, for example, a person may work part of a day or a season in various farm activities and the rest of the day or season in services of a different kind.*)

When analyzing a firm working under well developed market conditions it is not usually necessary to consider any financial constraint. But in LDCs the possibilities of loans are very limited or even nonexistent, even under normal circumstances, so a financial constraint has to be taken into account. And, in a state of catastrophe there are even greater financial difficulties in the stricken areas. So, it is important to consider that the quantities of a good an individual in a disaster-stricken LDC can produce will be limited by a lack of financial resources. This form of expressing the behavior of producers makes our representation more general in the sense that it can represent producers working under typical LDC conditions as well as a modern, capitalistic firm.

The effects of disaster on production activities described in chapter 2 may be summarized as follows. Production units in stricken areas will suffer interruption owing to losses in physical capital or reduced availability of labor and to distribution difficulties owing to disruption of transportation facilities. Afflicted low-income peasants working in agriculture, services and handicrafts may be suffering from falling incomes due to disrupted markets for the products or labor they sell, to injuries and to losses of equipment or housing (their working place). In addition, reduced market opportunities may lead to financial difficulties for self-financing pro-

*)In Guatemala, it is said (Bunch and Rudell, 1977, pp. 2-3), about 75 per cent of people in the highlands (the zone most affected by the earthquake) are small farmers who "to make ends meet" go down to the south coast plantations and sell their labor to earn cash; ... they go down to the coast and earn what they need to pay back production credit and other debts".

ducers that worsens their possibilities for production and profits.*) How grave the financial difficulties and subsequent income reductions will get will depend on alternative market opportunities open for individuals, such as the possibility for selling part of their remaining endowments or of migrating to adjacent areas and the possibilities for factor substitution and for switching to the production of another commodity. In other words, it will depend on the marginal rate of technical substitution and the marginal rate of product transformation in the units afflicted.

3.2 The Consumption Side of the Economy

As already pointed out the destruction of physical units and the physical injuries and risk to health that disasters cause may reduce income levels and the accessibility of the items or services produced in the stricken areas. This, in turn, may change the conditions underlying the composition of consumption. For example, the destruction of a bridge may force the utilization of light boats to cross the river or the rerouting of traffic, increasing the utilization of adjacent roads in the stricken area. Physical injuries and risk to health will change the usual composition of the medical, health and other social services and of the medicine, shelter, etc. otherwise consumed. In general, a reduction in commodity supplies may cause input prices at the market to increase. But the depressed markets and financial difficulties characterizing a state of disaster are more likely to cause input prices (specially of labor) to tend to fall. If wages fall relative to other prices the real income

*) It has been pointed out by different authors (see Bhagwati and Chakravarty, 1969, pp. 32-38) that falling prices for marketed output in self-financed agriculture will not necessarily lead to reduced levels of production. The need for cash at lower prices may induce individual peasants to produce more rather than less of the marketed product (i.e., there is a backward binding supply curve). Although there are reasons to assume such behavior for sufficiently long periods during which markets remain depressed after a disaster it is more likely that falling prices of marketed output will lead to a fall in production.

will fall and this may tend to induce a fall in effective demand which will reinforce the tendency of the economy to contract.

Commodity prices will change according to the conditions of supply and demand in each specific case and activity level. As described in chapter 2, these conditions will depend not only on the effects of the natural disaster itself but on those of the disaster relief as well. For some commodities, prices will be determined mainly by conditions in international markets. In Guatemala, this is the case for domestically produced "tradeable goods" such as coffee, cotton and sugar. But, as we have seen in Chapter 2, the major share of commodities produced in the stricken areas are "non-tradeable" goods such as beans, cereals, milk and construction materials. In addition, a large part of the afflicted areas are more or less isolated from the rest of the economy. Thus, we can assume that, wherever the disaster and/or the disaster relief have played a significant role, they have had - at least temporarily - a significant effect on prices as well.

4. Effects of Disaster Relief on Producers

4.1 The Effects of Cash Relief

In general, the effects of cash relief may depend on how large it is, how it is distributed and how it is used by the recipients. Here, in a first stage, we shall simplify matters and assume that an amount of cash relief sufficient to compensate the recipient for the damage is provided in home currency to the producers affected. In addition, we assume that the producer receiving cash relief will use it to purchase the physical items he needs to start producing again. The case where cash given from abroad to administrators of relief media who purchase commodities locally in order to be distributed among affected producers is left to be discussed at the end of this section. The exchange rates effects of transforming foreign into home currency are considered in section 7.2 of this chapter.

i) Cash Relief when Physical Capital is Available Locally

If the inputs needed are produced and can be purchased locally, the production difficulties of individual recipients will be solved. In addition, increased demand will influence the conditions for local producers or sellers of physical capital.

In the first case, the production of the recipients of relief may even reach higher levels than it had originally. There are at least two reasons for this. One is that the new physical units (machinery, equipment, etc.) may be more modern and productive than the old. The other is that, indirectly, financial possibilities for producers in the stricken areas may be improved. It is likely that the financial means flowing into the stricken areas opening up new channels of financial assistance will improve the efficiency of financial institutions or create new ones (private as well as governmental). Usually cash grants must be channelled through local financial institutions which need to establish subsidiaries in, or expand services to, the stricken areas. For producers in such areas this means access to banking services from which they have otherwise been deprived. (Cf, the case of improved institutional factors in connection with the Guatemalan National Housing Bank, BANVI, described in Ch. 2 sections 5.d and 5.f and the disaster relief of OXFAM, described in Chapter 7). In the long run, institutional improvements of this nature will alter the preconditions for production in areas that have been isolated for a long time. So, this may help to solve one of the more lasting problems in LDCs. Usually the financial markets in LDCs are "segmented" which, among other things, makes it difficult for a great deal of investments to be carried out. Cash relief, in providing the funds required for the restarting of activities, will help afflicted producers to avoid these problems.*) If the situations

*) For a discussion of problems about segmented markets in LDCs see McKinnon, 1973.

described here do in fact arise, and this means that the inputs needed must be produced or purchasable locally, cash relief may be a good form for helping the disaster-stricken region to recover production levels sooner than otherwise.

The increased demand for physical inputs will imply that local producers or sellers of such inputs will get incentives for increasing their investments. Labor utilization in restarting and expanding production sectors will rise and economic recovery in stricken areas will have good possibilities of success. If, moreover, this kind of production was of the labor intensive type then increasing possibilities of getting work may be reflected by an improved distribution of income among individuals. In addition, if significant, the overall increased level of economic activities giving regional or total production (GNP) a chance to grow may in the long run improve the development possibilities of the economy as a whole.

ii) Cash Relief when Physical Capital is not Available Locally

The conditions and composition of production, the isolation, transportation difficulties, etc. of disaster-stricken areas limit the likelihood of the beneficial effects of cash relief just described. What is more likely is that cash relief to producers will reinforce the changes in relative prices for physical inputs generated by the effects of the natural disaster and, thus, in some way be harmful for the recovery process in stricken areas. This will be the case in the short run because of the geographical distance to producers of physical capital in the same country or in foreign countries which will cause the demand surplus arising to remain. Other factors of production such as labor and land will remain unutilized and there will still be a latent tendency for the economy in disaster-stricken areas to contract.

Thus, despite the incentives from increases in effective demand, this form of relief might cause the economy to react in such a way that the income distribution is altered owing to changes in relative prices or to inflationary pressures.

Such tendencies for the income distribution to change may work along the following lines. Firstly, the changes may favor the owners of physical capital in the production units not affected by the disaster. This may be so due to continued realization of the gains from production keeping the market shares for their products unchanged or even increasing them. The tendency of profits to change in this direction and the pressures on the production of the scarce commodity may tend to increase the level of local economic activities during later periods. However, considering the few possibilities disaster stricken regions may have to carry out new investments and to absorb existing labor surpluses - especially if physical capital is not available locally - the realization of such beneficial effects will be unlikely.

Secondly, the market wages for unskilled laborers or their real income may tend to fall due to a continued underutilization of their services. According to different authors (see e.g.- Lewis, 1954, p. 149) the conditions of unlimited supplies of labor reflected by historically determined wages in LDCs will imply that a reduced demand for labor will not lead market wages to fall. However, the fact that the wage level in the capitalist sector in LDCs depends upon earnings in the subsistence sector (Griffin, K., 1974, p. 235), and given that post-disaster conditions are characterized by increased rates of migration due to lack of income bringing opportunities in the affected areas, real income for unskilled laborers in abandoned agricultural activities will surely fall. That is the fall in real income will come from reduced production in the subsistence sector which is not registered by markets.

On the other hand, the falling tendency of real income for unskilled laborers may be counteracted if factor substitution is possible, i.e., if unskilled labor can be substituted for the physical units destroyed. This may be possible in some cases, e.g., in some rural activities that use simple methods of production, but, according to different observations in disaster-stricken LDCs (cf, ch, 2, section 4.b and 5.a above), it would not seem to play any major role in counteracting the income distributional processes referred to here.

iii) Cash Relief through Financial Intermediaries - A Comparison with Traditional Foreign Aid

A share of cash relief from abroad is given through different administrators, such as NGOs, FGOs, or local governmental authorities. In this case, the administrators of relief media do not necessarily give money to affected producers but often, rather, the physical items required to start producing again. Cash relief is also used to finance investments in more comprehensive disaster relief programs, e.g., in connection with the reconstruction or improvement of damaged infrastructures and the creation of production facilities necessary to fulfill those programs. In the first case, the effects on the local economy of purchasing the physical items needed locally will in principle be the same as those already analyzed. In the latter case, when investing in more comprehensive programs, the effects may be somewhat different and need to be discussed.

During the phase of recovery or reconstruction that we shall refer to here, cash relief may permit investments that allow the specific post-disaster and general economic conditions of stricken areas to be taken into consideration. For example, in Guatemala once the state of crisis had declined assistance seems to have been well coordinated and cash relief properly distributed and invested in accordance with local needs and priorities.

As we show in chapters 6 and 7, cash relief through organizations such as CARITAS, OXFAM and other NGOs, and to some extent also some FGOs, permitted disaster relief operations that successfully counteracted the original tendencies of markets to work against afflicted individuals and regions (status-quo reinforcing tendencies, see, e.g., Jackson, 1977).*)

The programs referred to above were implemented by investing in the formation of cooperatives and committees, the creation of administrative, organizational and related capacities in the local communities. This not only gave incentives to individuals for self recovery but increased efficiency in administrative processes as well (CARITAS, ibid; Hawkings and Skjörshammer, ibid; Swiss Aid, ibid; Grupo Suizo, ibid). Simultaneously, involving afflicted people in the implementation of programs at all levels in the reconstruction processes and letting them pay back a share of the assistance given improved their feelings of "responsibility" and self conficence (A.I.D., 1977). Moreover increased involvement in releif operations apparently improved people's capacity for identifying problems and finding solutions on their

*) Of a disaster relief program of about US $ 6 million CARITAS spent approximately US $ 1.5 million on the reestablishment of infrastructures, creation of income bringing opportunities, technology transmission and various socio-economic programmes (CARITAS, 1979: Stricker, 1977). The remainder was used to reconstruct houses and improve the construction techniques used (ibid.). The factories for metallic structures, bricks, wood products, etc, established to support reconstruction programs, as well as the programs to restart rural activities in general, reduced migration from the communities of Supango, Cubulco, Salamá, San Juan, Sacatepequez, etc. (CARITAS, ibid.). The small industries created in connection with reconstruction in the stricken areas were directed to solve the problems of delivery of construction materials from the only firm in the country (see CARITAS, 1977). However, simultaneously, they came to serve as a welfare improving element. Swiss CARITAS and CARITAS of Spain in coordination with the local subsidiary CARITAS Arquidiosesana implemented training programs in the areas that improved laborers' productivity and increased their income bringing opportunities at the same time that houses were reconstructed.

own. In other words, as already pointed out in Chapter 1, section 2, the disaster relief provided that way became a catalyst for the provision of development aid to areas that had been isolated for a long time.

The relief operations just decribed seem to illustrate the proposition that cash relief permitting investments that take the specific characteristics of the areas assisted into consideration may possibly increase the productivity of local factors of production and induce institutional changes important for economic development. If so, one may argue that disaster relief has properties that traditional forms of foreign development aid may fail to have. This may be better illustrated by considering the following statements about certain characteristics of foreign development aid to LDCs. It is argued (Griffin, 1978, pp. 61-71)*) that foreign aid:

a) is essentially a substitute for domestic savings and is used to increase consumption rather than investments

b) induces changes in the composition of domestic investments and methods of production causing an increase in the capital-output ratio so that the growth rate of the receiving country actually falls.

Several reasons for the decline in domestic savings induced by foreign aid are pointed out (Griffin, ibid.). First, public savings may decline. This may happen either if tax revenues fall, e.g., due to reduced taxation, diminished efforts to collect taxes or inflation problems and inelastic tax systems, or if there is a change in the composition of government expenditure in

*) For an idea of the debate about these questions see: Griffin (1973), Newlyn (1973), Papanek (1972 and 1973),

favor of public consumption through higher salaries, greater social security benefits, etc. Second, foreign capital may lower private domestic savings. This may be so either because it makes debt financing available on soft terms or because private foreign capital may enter the economy through participation in mixed enterprises, preempting the most profitable investment opportunities. Either of these factors may reduce the incentive of local investors to save. Finally, capital imports may reduce domestic savings by stimulating the consumption of importables so that foreign aid may have only a slight positive effect in increasing domestic investment. And this slight effect may be more than offset by an increase in the capital-output ratio of the economy.

The increase in capital-output ratio may be due to the following factors (idem). Usually, it is argued, donor countries use aid to achieve many objectives, among which economic development is only one. Political objectives are "paramount" and in most instances these can be best achieved by concentrating on large, dramatic and highly visible projects. "The demand for monumental projects is likely to create its own supply, but in the process the effectiveness of investment will almost surely diminish" (ibid, p. 68). Next, aid is usually channelled directly to the government of the recipient country which tends to alter the pattern of investment in favor of large social overhead capital against "directly" productive activities, discouraging, e.g., the construction of factories. A general bias against directly productive activities should tend to increase the aggregate capital-output ratio. Normally, foreign aid agencies seem to prefer to finance one project costing, say, £ 40 million rather than 40 projects costing £ 1 million each. For these reasons, "aid programs tend to sponsor large dams rather than small irrigation schemes, major highways rather than secondary roads, university buildings rather than village schools, etc." (idem). Furthermore, in case foreign aid can be used only to finance the foreign exchange costs of a project, recipient countries may be induced to select projects which are intensive in foreign exchange and to design any given project so as to maximize the foreign exchange component of the project. This project selection and design reduces still further the impact on growth of any given volume of investment. Finally, in case aid is tied (75 percent of bilateral assistance to LDCs is tied, idem) aid tends to lead to higher cost of imported goods and to a continuing flow of high-cost imports in the form of spare parts, ancillary equipment etc. Thus, the recipient country may become "locked in" a high-cost source of supply that permanently lowers the productivity of its investments.

In the light of the characteristics of foreign "development" aid just mentioned one may argue that cash disaster relief invested in the form described previously may have specific properties that induce economic development, and that deserves special consideration. Firstly, cash relief channelled directly to traditionally poor individuals in less developed areas, isolated from administrative centers and usually discriminated against by local governmental programs may have a low impact, if any, on public tax revenues or on the composition of its expenditures. Given the nature of the units of production assisted (small scale, self-sustaining, labor-intensive rural production), the disaster relief given may be less likely to reduce the incentive of local investors to save or to stimulate the consumption of importables and exportables to any great extent. What is more likely is that cash relief used to create facilities will have a greater impact than traditional forms of development aid in raising the level of domestic investment. Finally, the fact that cash relief permits untied investments in reconstruction and improvements of small-scale industries, factories, small irrigation schemes, secondary roads, village schools, etc., the impact on growth of a given volume of relief will be greater than that of a corresponding volume of foreign aid. Disaster relief in the form indicated here may raise the productivity of local investments in general and lower rather than raise the capital-output ratio of the economy.

Taking into consideration the dualistic character of LDCs' economies an increase in the productivity of the inputs used in local production in the areas assisted may have additional beneficial effects of importance. For example, if the productivity of labor used in agriculture increases at the sectoral level, _ceteris paribus_, the market value of the marginal product in that sector will rise relative to other sectors (e.g., relative to the manufacturing urban sector). This will give incentives to increase agricultural production, reducing unemployment in rural areas. In addition, if wage levels in the urban manufacturing sector are institutionally fixed (see, Corden-Findlay, 1975; Harris-Todaro; 1970; Todaro, 1969), wages in rural areas will rise relative the _expected_ wage level in urban areas. This will lower the amount of urban unemployment as a consequence of reduced rates of labor migration from the countryside into the cities.

Thus, cash disaster relief permits investments that are more easily absorbed by the local economy. If such investments actually materialize, this will facilitate a rapid recovery of production levels in stricken areas and possibly even promote wage increases for workers in traditional low-wage sectors.

4.2 The Effects of Relief in Commodities

In general, the effects of relief in commodities (physical capital) to producers will depend on the extent to which the units given are:

- sufficient to compensate the recipients for the damage suffered and necessary for restarting production
- produced in the domestic market within the region or in outside regions and
- compatible with existing local preconditions of production.

i) Relief in Commodities in the Absence of Local Production of Physical Capital

Let us assume a situation in which there is full compensation of wealth losses and a neutralization of continued losses due to production difficulties. If the physical capital given from abroad is compatible with local preconditions of production, improvements in factor productivity of the type referred to in connection with cash relief will be likely. Relief in commodities to producers may involve the transmission of more efficient techniques of production from the donors to the recipients. This means improved possibilities of increasing levels of production, profits and self-financing. Thus, relief in kind may help to counteract adverse changes in income distribution and, what may be important in conditions of depressed markets after disasters, to recover the levels of labor and land utilization by supporting the re-establishement of economic activity in the affected areas.

If these improvements become widespread so that the marginal productivity of, e.g., labor increases at the sectoral level, then economic recovery will be initiated and the beneficial effects at the sectoral and regional levels discussed previously will also be true here.

When analyzing the effects of cash relief we talked about possibilities of institutional improvements arising from the influx of financial capital to disaster-stricken areas. Here, however, providing physical units directly means that there will be no such effect. On the other hand, the adverse effects of cash relief on the distribution of income, arising from demand pressure changing relative prices adversely, will be less of a problem here. In this case, physical capital from abroad, in the absence of local supplies, may play an important role in neutralizing the market tendencies to worsen income distribution. This neutralization may work in two ways. Firstly, relief in commodities will reduce the pressures of surplus demand on the prices for physical capital in local markets thus counteracting the tendency of income and profits to increase in favor of local sellers or owners of physical capital. Secondly, the functional distribution of income will be influenced if relief in kind helps afflicted producers to participate in production activities sooner than would otherwise have been the case. The distortions in the distribution of income owing to the differences in damages caused by the catastrophe (often in direct relation to pre-disaster wealth conditions) will in part be neutralized. Any tendency for capital to concentrate to non-affected producers and areas will be counteracted.

Thus, if the physical capital given is sufficient, labor and land will be put to work earlier and the tendency of the local economy to stagnate and the income distribution to worsen will be easier to control. However, to provide physical capital to LDCs may be connected with some risks. This will be discussed next.