ii) Relief in Commodities when there is Domestic Production of Physical Capital

In some cases disaster relief in commodities may be incompatible with the economic structure of the disaster stricken area, region or country. For example, the new technologies transmitted via modern equipment may lead to the use of more capital intensive methods of production in the region. This may reduce the possibilities for achieving the beneficial results indicated earlier and be harmful in terms of future development, e.g., via a reinforcement of undesirable changes in the functional distribution of income. These changes may occur if the new equipment supplied provides technological advantages to the recipients relative to other producers in the area. This may imply concentration of capital which, together with higher levels of capital intensity, can - in countries where the underutilization of labor is a major problem - worsen economic conditions.

Thus, even if some changes are considered to be improvements at the individual level it is not obvious that they will be so in the aggregate. For the whole economy, if the technological improvements on individual basis are to be considered beneficial, there must be no associated adverse indirect effects on variables such as the utilization of resources, distribution of income and on the structure of total demand.

If the physical inputs supplied by relief operations are also produced locally, there will be a risk for price disincentives. A supply surplus will lead to a fall in prices and thus to a decrease in profits and investment incentives. Depending on expectations about future market conditions the price disincentives may counteract an immediate recovery of production levels and of growth in rates of production. In an economy where the facilities for shifting production

to alternative profitable activities are very limited, this effect may cause serious distortions, altering the structure of domestic production. But again, the structure of production in LDCs with very limited possibilities for production of physical capital make the occurrence of this effect unlikely.*)

In a long-run perspective, relief in commodities from abroad in the form of bilateral arrangements (tied-aid) may risk inducing adverse effects of the type discussed when referring to the characteristics of "traditional" foreign aid. That is, in the absence of import facilities and a continued flow of foreign assistance in the future, the physical capital given may tend to become obsolete. Or, it may lock in production in the areas assisted to a high-cost source of supply, lowering the productivity of local investments and influencing economic development adversely.

To conclude the analysis in this part we may say that relief in commodities to producers when there is no domestic production of physical capital and there are no incompatibilities will be effective in compensating and neutralizing the effects caused by a natural disaster. Furthermore, it will have important indirect effects, improving the level of utilization of local resources, factor productivity and income distribution in the stricken country. On the other hand, if there are local supply possibilities or incompatibilities with the local structure of production, conditions of factor productivity, income disparities, underutilization of resources and economic underdevelopment in general will be aggravated.

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*) In fact all demand coming from afflicted areas requires physical inputs like water pumps, electrical engines, transformers, etc. that are not produced at home and difficult to purchase with own funds. The case is similar for requirements of inputs used in industrial or agricultural production. (See for instance the section "Review of Recent Disaster Situations" in UNDRO's Newsletter for a more detailed description of requirements in connection with disasters).

4.3 The Effects of Relief in Services

The third form of disaster relief is in services. Services to affected producers will mostly take the form of management in connection with the reorganization of production activities or restarting of communication systems. The most typical examples of this kind are services for restarting agricultural production, re-establishment of small business enterprises, reopening of markets, traffic routes and transportation systems in general. There are also services given at the community, regional or national levels. These services include management and training in connection with general reconstruction plans and the provision of public services of all kinds. At the community level services may also include creation or organizational, managerial and other facilities implemented via local cooperatives or the like.

The nature of this type of assistance would be better illustrated with the help of some reports about the economic conditions encountered in the disaster-stricken areas of Guatemala and the way in which some disaster relief organizations confronted it. This is done in detail in chapter 7. Here, let us only point out that according to such reports the general economic conditions of the stricken areas hindered any effective implementation of disaster relief operations. Therefore, some attempts to restart economic activities and improve the conditions of such areas became an obvious objective (Grupo Suizo,1980,pp.75-85).Among other things, this was done with efforts to reduce illiteracy levels, introduce accounting, managerial and organization techniques and adapt more modern and complex agricultural methods at the same time that reconstruction programs were being carried out. The improvements reported from the efforts made (see, e.g., the "OXFAM Disaster Relief" Chapter 7, section 4) point to increased factor productivity,

higher production and income levels and an increased degree of self-reliance in general. This, seems to have accelerated the process of economic recovery in the areas assisted.

Keeping in mind that most of the production processes traditionally utilized in poor areas of LDCs are at low levels of technology with very low rates of labor productivity, the effects of new knowledge just mentioned may play a very important role. Let us specify this. Economic conditions will not be improved if new and modern physical inputs are supplied in the absence of necessary knowledge. What in some cases has been the main motor behind economic development (e.g. in West Germany after the war, where capital stocks were completely renewed) can in LDCs lead to serious frustrations. The absence of both technical knowledge and of the necessary infrastructure for economic activities may in the long run impede improvements of development capacity. In this respect, specific for disaster relief are the effects of knowledge supplied to groups which for a number of reasons can not be reached by other forms of development programs.

5. Effects of Relief to Consumers

Relief to consumers means compensation to afflicted households for the welfare losses arising from the damage that disasters cause to individual's health, life and consumption possibilities in general. As we shall see, compensating individuals for welfare losses may have development inducing effects as well. The analysis of these aspects here will also be organized according to the three forms of relief: in cash, in commodities and in services.

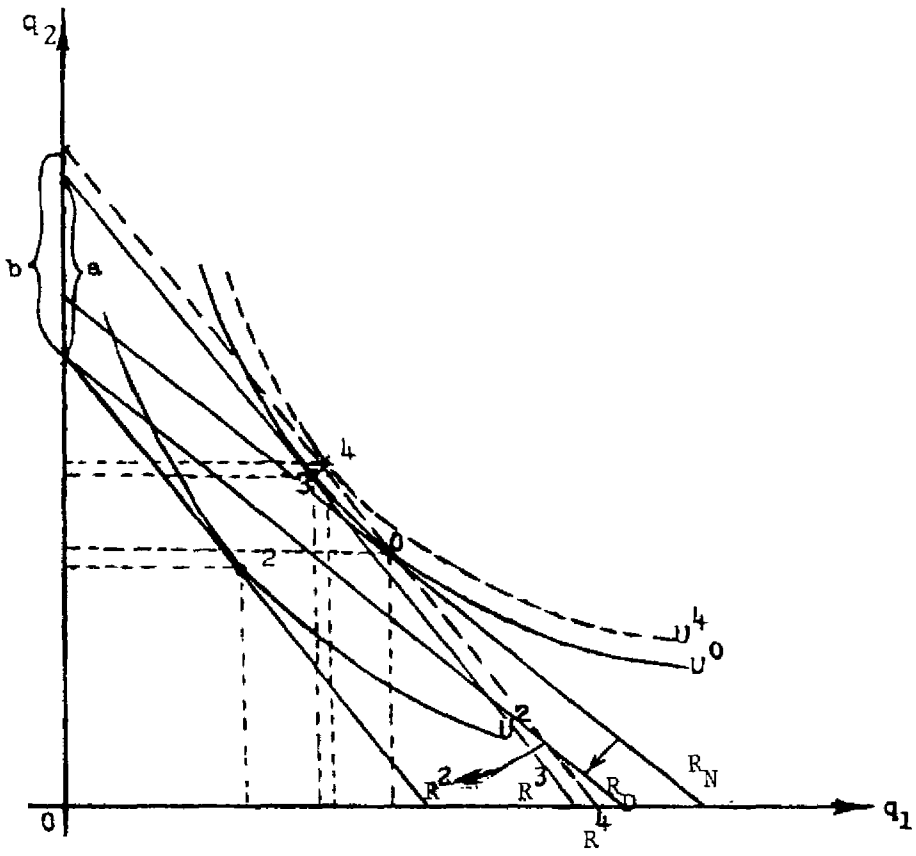
5.1 Cash Relief and Commodity Relief when Commodities Are Locally Available

As in previous cases the effects of cash relief to consumers will depend on the amount of cash provided and the possibility domestic production has to satisfy the new needs arising. Here, we shall assume that the amount of cash given is sufficient to compensate the households for the reductions in wealth suffered and treat the case where the commodities needed are available locally.

From an analytical point of view useful for a comparison with other relief alternatives, it is worthwhile to differentiate between two general principles for determining the amount of cash relief to consumers. One would be to compensate for income losses in order to make it possible for individuals to recover previous levels of utility. The other would involve giving individuals cash equal to the value of the commodities consumed before the occurrence of the misfortune. (In actual use, these two principles would be applied with some degree of approximation, of course.) The two principles differ as to their consequences if relative prices have changed as compared to the predisaster situation. Such a change is likely to take place as a result of the disaster. For example, the production conditions, in particular the amount and quality of the remaining physical capital, may have changed to a varying extent among the commodities produced locally.

In figure 1, the effects of the two principles are shown graphically. Point 0 represents the individual's situation before the occurrence of the natural disaster. Point 2 represents the situation after the disaster when income and relative prices have changed.

Figure 1.



Relieving the individual by compensating him for income reduction makes it possible for him to regain the level of satisfaction represented by the old indifference curve. The utility-maximizing individual will then reach point 3 in the diagram at the new market prices. This point, however, shows a composition of consumption which differs from the initial at point 0.

The second case, giving the individual cash equal to the value of his consumption before the occurrence of the natural disaster (point 0), implies that he will have to be given a larger amount of money than in the first case. This means, of course, that he finds it possible to optimize consumption at a higher level of utility than before (cf, point 4). Thus, the second principle implies that too much will be given to him

if compensation, as assumed, is the objective. This can be seen by looking at the differences in distance between a and b on the vertical axis. In other words, using the first principle would save resources which could be utilized for other projects or to help other people, as the size of the relief budget is likely to be inadequate under all circumstances.

As we have seen, cash relief allows consumption to adjust to prices and preferences when the commodities in question are available at the given prices. This is no longer necessarily so, if relief is given in commodities. If post disaster income is zero and commodities are given to the individual in amounts equal to the predisaster consumption pattern (point 0 in the Figure) and if he can not or will not trade in these commodities (due to high transaction costs, for example), he will now end up in a situation where the disaster relief is inefficient. As the market value of this commodity bundle is still equal to that of the second case just discussed, too much will be spent on compensating the individual (see R^4). The same is true, of course, if he can and will trade (at negligible transaction costs) in these commodities, which will take him to the same final point as in the second case. If, however, households have some income to spend in the post disaster situation (e.g., as indicated by R^2), and a corresponding smaller amount of commodities are given as relief, this inefficiency problem will be reduced or even disappear.*)

Relief in commodities may be less efficient than cash relief for another reason as well. If the commodities in question are locally available, as we have assumed here, and the relief is given in commodities from outside the region or the country, this will depress the market for the local producers, some or all of whom may be among those in need of relief. In contrast, cash

*) For similar ideas on these issues see Thurow (1974) and Rashid (1980).

relief will help individuals in the recipient areas (or country) to recover their sales since it will increase the levels of effective demand in society, which have decreased as a result of the natural disaster. Increased sales opportunities will provide improved incentives for domestic producers and thus increase levels of investment and employment. In that case the short-run tendencies of the economy to contract will be avoided.

Some beneficial indirect effects of the disincentives to local production created by commodity relief have been pointed out in the extensive literature about the effects of different forms of development aid. One argument is that in the case of food aid the price reductions expected may be to the advantage of poor people who will gain from real income changes (Hamilton, 1978). Another is that beneficial effects may come from saving domestic resources to be spent on alternative production (Isenman-Singer, 1977). That is, foreign commodity aid will release at least part of the domestic resources, previously used in the production of such commodities, for other purposes. If so, commodity aid may stimulate alternative production which in the long run may prove to be more efficient than the production it has replaced and improve the import capacity in the recipient country. (See also Svedberg, 1978.)

These claims, which surely could be relevant for some LDCs during conditions of "normal" life, may be of minor importance in situations of catastrophe, since the acute conditions of disaster characterized by falling incomes, unutilized resources and worsening income distribution can not tolerate still more disincentives even if they are supposed to generate beneficial indirect effects on development in the long run.

There are already several examples where disaster relief in commodities has created serious economic problems via disincentives. In Guatemala, it is said (Knightley, 1978), the provision of food made internal food prices fall from their normal level of about US $ 7.5 per 100 pounds prior to the earthquake to US $ 4.6 during the months following (up to July 1976). Comparing this observation with the information on the development of food prices, table 3, chapter 2, we can see that it in fact coincides with the falling tendency of prices for cereals, eggs, tubers and fresh fruits. This, however, is not so for the other products indicated in the table. In any case, according to other sources (Norton, date unspecified) the foreign aid given had a depressing effect on local prices at least for a few weeks following the earthquake. As Norton puts it "after two weeks the Government (of Guatemala) asked for no more food to be sent in, but it kept arriving. The aid depressed the local prices for grain, and the campesinos found that despite their recent harvests the low prices hit their pockets". (A similar observation for some disaster-stricken coummunities of the USA has been made by Dacy-Kunreuther; 1969, chapter 3). Similarly, the observations by Norton (idem) and reports of the UNDRO (1976, September, paragraphs 13-17) indicate that a lot of non-food commodities needed and provided from abroad could be bought on the spot in local markets in Guatemala. This had (Norton, ibid) "pernicious effects" impeding a normalization of economic life in the stricken areas. In poor regions of LDCs with very few production alternatives, there may be a considerable danger that the recovery process will be counteracted by adverse effects of this type. In such circumstances, the aid may offset the few possibilities the stricken areas have (for instance, in agriculture or textiles) for self-recovery of production levels. Thus there is a risk that the disaster relief may be harmful in the sense that the adverse effects may increase income and wealth

disparities, accentuate dispossession, etc. against the poor individuals or regions affected. Especially if the individuals or areas with higher socioeconomic status are generally able to take advantage of organized relief better than those with lower status (Carmack, ibid; Gwynne, et al, idem), this may tend to perpetuate the status quo of different groups of individuals and regions.

Furthermore, the depressing effects on local production arising from commodity relief often mean that migration rates from rural to urban areas are increased (typical for situations of disasters in LDCs).*) This may in fact turn out to increase the rates of unemployment for the whole economy. But it will certainly contribute to increasing the severe social problems of urban unemployment.

*) In Guatemala the changing market conditions described apparently went against laborers in agriculture and in temporary works in connection with the tourist industry, i.e., in markets altered by complete disruption. So, for example, a report of Swiss Aid on the conditions encountered in the area of Santiago Sacatepeques (Grupo Suizo, 1979-80, pp. 75-85) indicates that the disruptions of markets resulting from the earthquake involved people in the stricken areas in a job seeking process. This situation was specially serious in the rural areas where people abandoned the countryside for the big cities in order to find means for survival. According to the reports of the Norwegian Church Aid (NCA), a similar situation of reduced income bringing opportunities may have arisen in the areas of San Martin and Patzaj (Hawkings & Skjörshammer, 1979) where the destruction of bridges, roads and other infrastructures lead traditional markets to break down completely. From these areas a great share of male labor migrated to the cities or coastal region in hope of work. However, it is reported "they only added to the lasting problems of unemployment and other social conditions of slums in urban areas" (ibid; Chavarría Smeaton, 1978).

5.2 Commodity Relief when Commodities Are Not Locally Available.

As we have seen, local availability and production of the consumer goods locally demanded makes commodity relief from the outside less efficient than cash relief by preventing a smooth adjustment to preferences in some cases and by depressing the market for local producers with possible farreaching social and economic consequences. The evaluation of relief in commodities is of course quite different when the commodities supplied are not available locally. But the evaluation depends to a large extent on the type of commodities provided from abroad.

If the commodities supplied are demanded by the local population, in the sense that they replace goods that were imported prior to the disaster and now can not be afforded, commodity relief may be at least as beneficial as cash relief. It would be preferable to the recipients if it turns out that the donors are willing to provide a larger amount of such commodities than what corresponds to the cash relief they could offer. Relief in commodities of this kind could also mean that supplies are made available much faster than if cash relief were to be used for importing such commodities. This would be particularly important for commodities such as medicine and similar necessities.

However, it is also possible that the commodities supplied are "imposed" by the donors creating needs of a completely new character, intentionally or not.*) The

*) A typical example of these indirect effects is what occurred in Guatemala. There, relief from ouside provided galvanized corrugated metal for roofing. After some lapse of time serious deafness in inhabitants appeared and roofs corroded. The former effect was due to noise caused by the rainfall, the latter due to high concentrations of salt in winds. A new demand for services and commodities was generated that way. (This example has been taken from the evaluation report to UNDRO following the earthquake in Guatemala.)

creation of a demand for new commodities may be inappropriate to local conditions of production or very expensive to satisfy via imports in the future.

In addition, certain types and quantities of commodities may in fact have a negative value for the recipient country. In Guatemala, shoes, clothes and drugs were given in excessive quantities. In addition they were often of an unsuitable kind. Thus, attempts to cope with these gifts only used up local resources needed for other activities (Gwynne, Collings and Begley, 1978). In the case of drugs, professionals from the disaster relief teams worked for more than a month in the hopeless task of finding something that could be used out of the tons of medicine sent from abroad. Finally, it was realized that most of the minor share of drugs that were found useful could have been bought in local markets (Archives of the National Emergency Committee, Guatemala City).

Here, we have seen that disaster relief in certain forms may have detrimental consequences for the recipient country. In the last mentioned case, it may be so even to the extent that the net effect of an individual relief project is negative. Such negative consequences of disaster relief as well as other similar aspects should of course be taken into account when alternative forms of disaster relief are compared and when disaster relief is compared with traditional forms of foreign aid to LDCs. We shall return to these aspects in Chapter 8.

6. Institutional Effects of Relief Operations

Thus far we have seen that disaster relief, depending on how it is given, may give rise to institutional changes such as an improved state of financial institutions, market integration, and disaster preparedness.

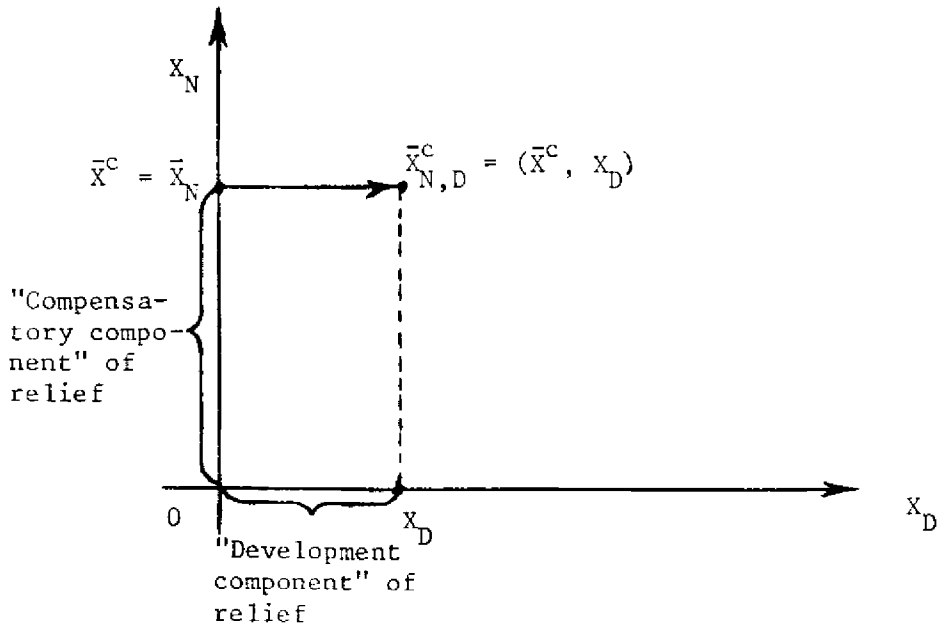
Using the geometrical representation of the uncertainty model developed in chapter 3, we shall illustrate in more detail how such institutional improvements may be embodied in a given amount of compensation.

For the sake of exposition we take the case of an improved disaster preparedness potential that would result from the disaster resistant properties of the physical items reconstructed. In figure 2 below we have represented a situation for an individual living at the minimum level of subsistence who we assume is affected by total losses of his initial endowments $\bar{X}_N$. Given that he will use the whole amount of his endowments for current consumption only, when the catastrophe occurs, his consumption, $\bar{X}_D$, will be zero (cf. our presentation in chapter 3, section 2). This situation may be characterized as:

$$X_N = \bar{X}_N \; ; \; X_D = 0$$

where N stands for a "normal" state after the disaster.

Figure 2

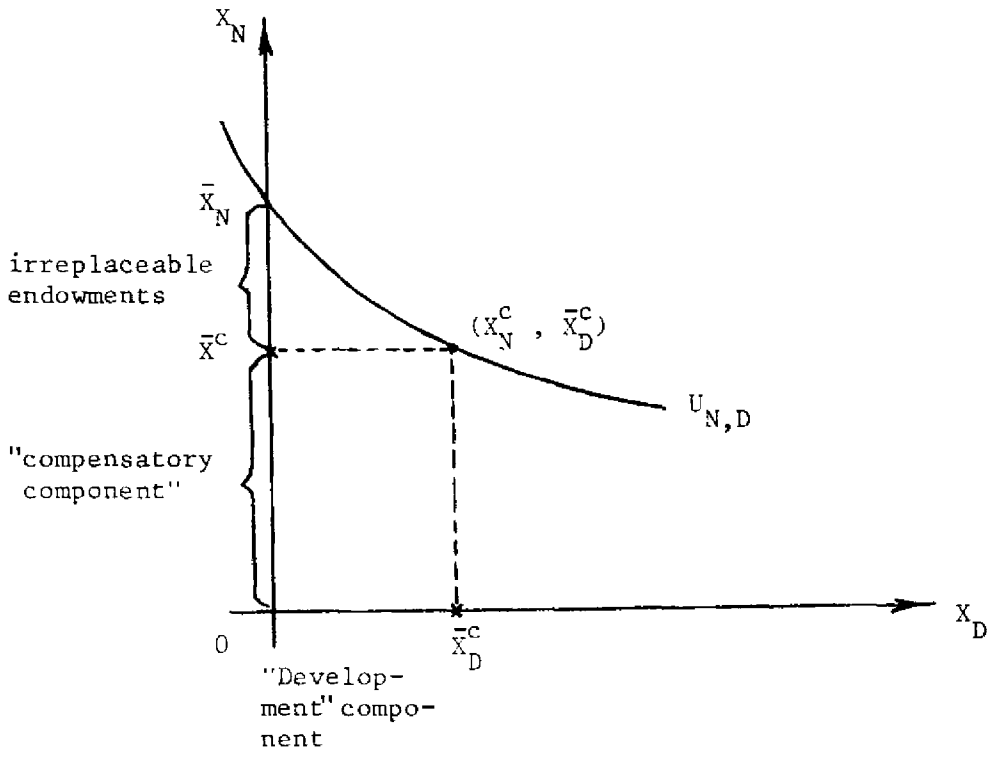


Now we open the model and introduce foreign relief. In that case full compensation for the losses caused may be interpreted as a situation where the individual gets the possibility of reachieving his initial consumption level $\bar{X}_N$. That is, he receives $\bar{X}^C = \bar{X}_N$, which we may call the "compensatory component" of relief. For simplicity, let us assume that the individual lost his house and that compensation means replacing it with a new one. Assume that the new house, reconstructed on the basis of better techniques, will have disaster resistant properties. If so, replacement of housing (by an amount of $\bar{X}^C$) means that the individual is, automatically, being assured against the ocurrence of new disaster in the future. That is, by compensation, he is being moved to a situation like the one determined by point $\bar{X}^C; X_D$ in figure 2, and so is receiving the possibility of consuming a amount X_D in case a disaster occurs in the future. Considering the role that improved disaster preparedness plays for economic development of disaster-prone countries, such an effect may be taken as an improvement of development preconditions of the receiving country. This means that X_D may be taken as the "development component" embodied in the compensation given here.

It may be the case that a part of individual losses are irreproducible. However, due to the fact that the properties just mentioned are embodied in disaster relief, compensation for wealth losses may be fully satisfied even in such cases. This will be illustrated with the help of figure 3 below.

In figure 3 we have plotted the individual's indifference curve ($U_{N,D}$), passing through the predisaster point ($\bar{X}_N$, 0). (See Ch. 3, section 2.) In this figure, $\bar{X}_N - \bar{X}^C$ on the vertical axis stands for the amount of endowments lost by the individual at the occurrence of the disaster and not replaced by the disaster relief. $\bar{X}^C$ is the amount of endowments replaced ($\bar{X}^C < \bar{X}_N$).

Figure 3



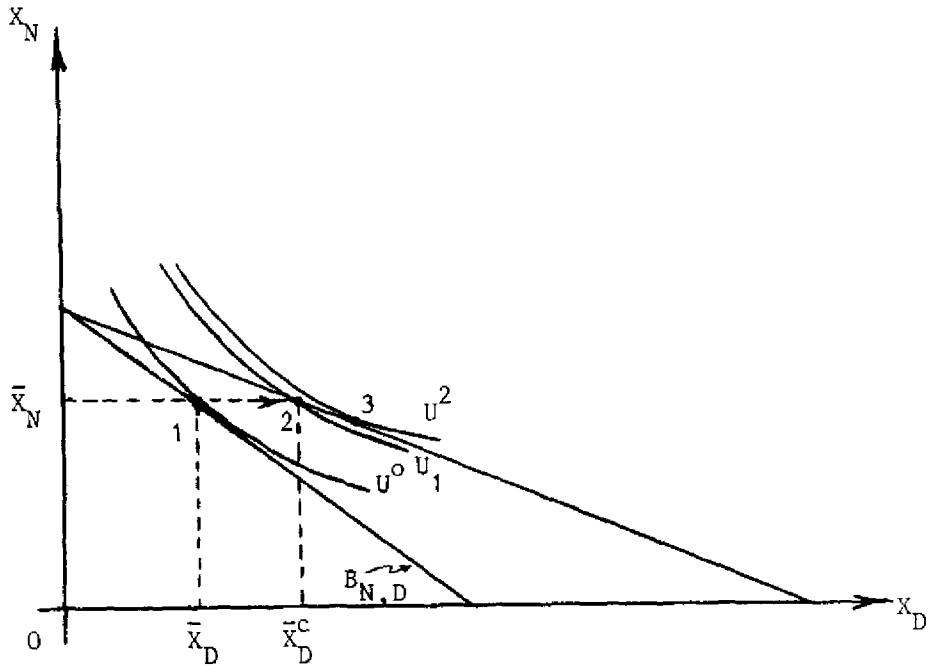
But, as before, the properties embodied in $\bar{X}^c$ may be such that the individual is being granted a level of consumption $\bar{X}_D^c$ in a state D (if a catastrophe occurs). Here the new consumption is taken to be a point on the individual's indifference curve, implying that the individual's initial welfare is reachieved.

These two cases exemplified the "development component" of disaster relief seen as the quantitative improvements that a given amount of compensation may induce. Even if this development component can not be observed immediately, its effects will nevertheless be noticeable long after relief activities have been completed, e.g., in case a new catastrophe occurs in the future.

There may be cases where individuals adjust to the risk of catastrophes by themselves, perhaps by saving food

or cattle in order to consume, sell or exchange these stocks when a catastrophe occurs. Cases like these are represented by point 1 in figure 4 below, where $B_{N,D}$ is the individual's budget line and $\bar{X}_N$ is interpreted as exceeding the minimum level of subsistence. Here, disaster relief means shifting the individual's endowments from point 1 to, e.g., point 2. Point 2 reflects

Figure 4



improved wealth and higher consumption possibilities ($\bar{X}_D^c > \bar{X}_D$) for the individual in case a new catastrophe occurs in the future, i.e., improved disaster preparedness. Such a situation may arise, for example, from improvements in housing which may also imply better storage facilities and, in turn, reduce the cost for individuals of such activities. Or, silos reconstructed on the basis of modern techniques will improve possibilities of storing food at the community level, reducing even further the costs of preventive measures. That is, in both of these cases prices for "insurance" will be lower after compensation than those relevant

before the catastrophe. In that case, the budget line for the individual in figure 4 will pivot outwards leading to higher levels of consumption in state D.

In some cases, the individual's possibilities of own "insurance" (even if very small) have together with the disaster relief been enough to introduce insurance activities of the more "conventional" type in the areas assisted. Actually, in Guatemala, life and property insurance are being provided to people together with the new housing (CRN, 1981, p. 8). That is, by compensation and the people's own purchasing capacity it has been possible to achieve higher wealth levels for the individuals assisted (point 3 in figure 4). It is probable that individuals in the assisted stricken areas of Guatemala have reached a higher level of (post-disaster) consumption claims as the one determined by point 2 or 3 in figure 4.

7. Other Effects of Foreign Disaster Relief

7.1 Changes in Attitudes

In the scarce literature about the effects of disaster relief some observations refer to changes in individuals' attitudes. "Free" relief, it is said, may reduce individuals' own initiatives to recover conditions of normal life and may interfere with relief operations or prevent people from taken precautionary measures against future disasters. This is a kind of moral hazard problem. (See, e.g., Kunreuther, 1973, p. 45; Taylor, 1977, pp. 5-6.) For example, in an evaluation of disaster relief operations made by the A.I.D. in Guatemala (A.I.D., 1977, pp. 32 and 68-71) it is reported that people actually destroyed what little they were left with in order to qualify for free relief. Also, the requesting of relief comes to be seen as a normal and reasonable solution to the problems of daily living,

"people leave off doing what they usually do for survival in favor or waiting in line for relief agency rations". In many cases, however, the attitudes just mentioned may have also been a result of communication and information problems as between relief agencies and the afflicted people or, of unfulfilled promises of "disaster adventurers" (sic) which arrived at the disaster areas shortly after the earthquake to offer aid which never came (A.I.D., ibid, pp. 32 and 68).

In the long run indirect effects of these types may reduce the degree of self-sufficiency, increasing the necessity of help from outside and worsening the ability of the stricken country to generate wealth on its own (cf. our earlier discussion on the effects of "tied aid").

7.2 Balance of Payments Effects

If disaster relief is received in convertible foreign exchange and is not directly used to purchase importables, the foreign exchange rate of the recipient country may temporarily tend to appreciate. If so, temporary foreign trade distortions can be expected. If exports are price elastic, currency revaluation will cause a tendency for the balance of payments to deteriorate. Moreover foreign grants increasing financial possibilities will help to increase the overall level of liquidity of the economy. In turn, this will increase purchases of exportables and importables or induce inflationary pressures that will reinforce the tendency of domestic products' competitiveness in foreign markets to fall.

Depending on the type of exports affected by the market variations just mentioned some sectors or regions of the disaster-stricken nation will be affected adversely.

This effect will be serious if the sectors and regions affected by foreign trade distortions are the same as those stricken by disasters. If so, and considering that production of exportables in LDCs is often of the labor-intensive type, the depressed labor markets may tend to worsen to the disadvantage of low income people. Although temporary, such an effect may reduce income bringing opportunities even for people not directly affected by the physical destruction caused. This means that there will be some risk that the disaster relief will counteract rather than reinforce the recovery process.

8. Concluding Remarks

Summarizing the analysis of the previous sections we find that the effects of disaster relief depend to a large extent on the specific form in which the aid is given, the structure of production in the country and the behavior of its recipients.

In general the outcome of a given type of disaster relief is not easily predictable. In fact, it is not entirely certain in each case that the effects of disaster relief are on balance beneficial to the country as a whole. Moreover, there are situations in which the development inducing effects of the disaster relief are more pronounced than those of other forms of foreign aid. For example, we have seen that cash relief given to compensate afflicted producers may give opportunities to improve the state of financial institutions in disaster stricken areas. In an LDC context, this may be rather important because it permits the realization of economic activities that are otherwise discriminated against by the segmentation of financial markets. We have also seen that cash relief provides opportunities of distributing aid in accordance to local needs and priorities and the general structure of the local economy.

Analyzing the effects of relief given in commodities and services we have seen that these forms of assistance may be detrimental to economic activity if local supplies of such commodities are or can be made available. On the other hand, when there are no local supplies, this kind of relief may be of great value if the right kinds of commodities are supplied. It may speed up the process by which commodities crucial for restoring production or vital consumption activities are made available. Moreover, in the case of capital goods such relief may facilitate the transmission of new technology. According to our analysis, these possibilities are likely to improve the efficiency of the techniques of production used in the communities and thus may lead to a general upgrading of the level of skills of the labor force with beneficial results for other economic activities. In donating modern equipment and in teaching people new and more efficient techniques disaster relief provides low-income sectors and regions with a better basis to participate in economic life.

Analyzing the effects of relief from the consumption side of the economy we have seen different ways by which economic development preconditions may be improved. For example, improved quality in the new houses constructed, transmission of managerial, administrative and organizational capacities needed to distribute aid efficiently will increase disaster preparedness. In other words, it may lead to changes in insurance prerequisites with beneficial results for the future welfare of individuals in the areas assisted.