

Immizerizing Technical Progress:

The Effect of Product Innovations on Consumption and Welfare of the Poor in Less Developed Countries. Theoretical Analysis and Empirical Observations in Zaire

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I. Introduction

Technical progress in its various forms has traditionally been considered as the main source of long term increases in economic well-being in rich and poor countries. In view of the experience of many less developed countries (LDCs) during the past two decades the validity of this finding may be questioned. Respectable growth rates in the industrial sector have often been accompanied by declining real per capita incomes. In addition, it is likely that even data showing declining real per capita income underestimate the extent of new poverty, because the income share of the poorest within these countries may have declined¹ and because price hikes resulting from the introduction of new products may have hurt the poor and benefited the rich. It is claimed here that some of the immizerization of the poor can be directly attributed to inappropriate forms of technical progress.

Technical progress occurs in various forms. One way of classifying these forms is according to the main goals pursued by the innovating firm. Industrial innovations focusing on product

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1 Adelman and Morris (1973).

characteristics may be called product innovations. They often imply some kind of process innovation. Pure process innovations on the other hand leave the product characteristics unchanged. Although these two forms of technical progress are not always separable the present study analyses only product innovations and their implications for the consumption and welfare levels of the poor in low-income countries.

The argument that there may be inappropriate products and inappropriate product innovations consists of two distinct issues. One is the familiar idea that certain goods require production techniques which may be inappropriate, given the particular resource endowment of a country. The second and less familiar issue is the suggestion that certain high quality products may also be harmful in consumption, in that their proliferation and the subsequent disappearance of simpler and cheaper standard products benefit the wealthy and hurt the poor.² For example, the use of bottle-fed milk instead of breast-feeding under low-income living conditions, especially in rural areas of LDCs, has been shown to be harmful and dangerous for the children and parents concerned. This case is well known and does not need much theoretical analysis to prove the welfare losses involved. But the argument of inappropriate products in consumption can be presented in a more general framework using conventional welfare criteria. The purpose of the present study is to spell out the general conditions under which such welfare losses typically occur and to examine in a less developed African country what may have been the welfare implications of a number of recent product innovations.³

In the first section the problem of welfare losses to the poor caused by product innovations is analysed theoretically by using the Lancasterian characteristics approach. The necessary conditions for actual and potential welfare losses are derived. In the second section empirical evidence is presented from a sample of fifteen product innovations analysed in Zaire. Obviously, the

² Several writers concerned with appropriate technologies for LDCs have recently pointed to the implications of product choice for consumers' welfare levels and for the use of productive factors, especially: For details, see Steware (1972) and Helleiner (1975).

³ The term product innovation is used here to include new products or qualitatively improved products in the market of a specific country and not necessarily new products at the world level.

characteristics approach lends itself even less to measurement than the conventional product approach to consumption. Therefore, whenever precise measurement is impossible procedures are used which come closer to informed guessing than to exact measurement. Nevertheless, it is felt that the importance of the problem for LDCs is such that the lack of quantitative precision is acceptable. In the conclusion policy implications are derived and a link is established between appropriateness in consumption and appropriateness in production.

II. Welfare Effects of Product Innovations

The most useful way of dealing with quality standards and product mix in the choice of technique is to use Lancaster's "new approach to consumer theory"⁴. In the context of LDCs this has first been suggested by Helleiner⁵ who argued that through the introduction of new products in LDC markets the poor can be made worse off if the new products exhibit less of the "essential" and more of the "Luxury" characteristics. Distinguishing between these two groups of characteristics, "essentials" and "luxuries"⁶, the argument can be demonstrated in a simplified version in Figure 1.

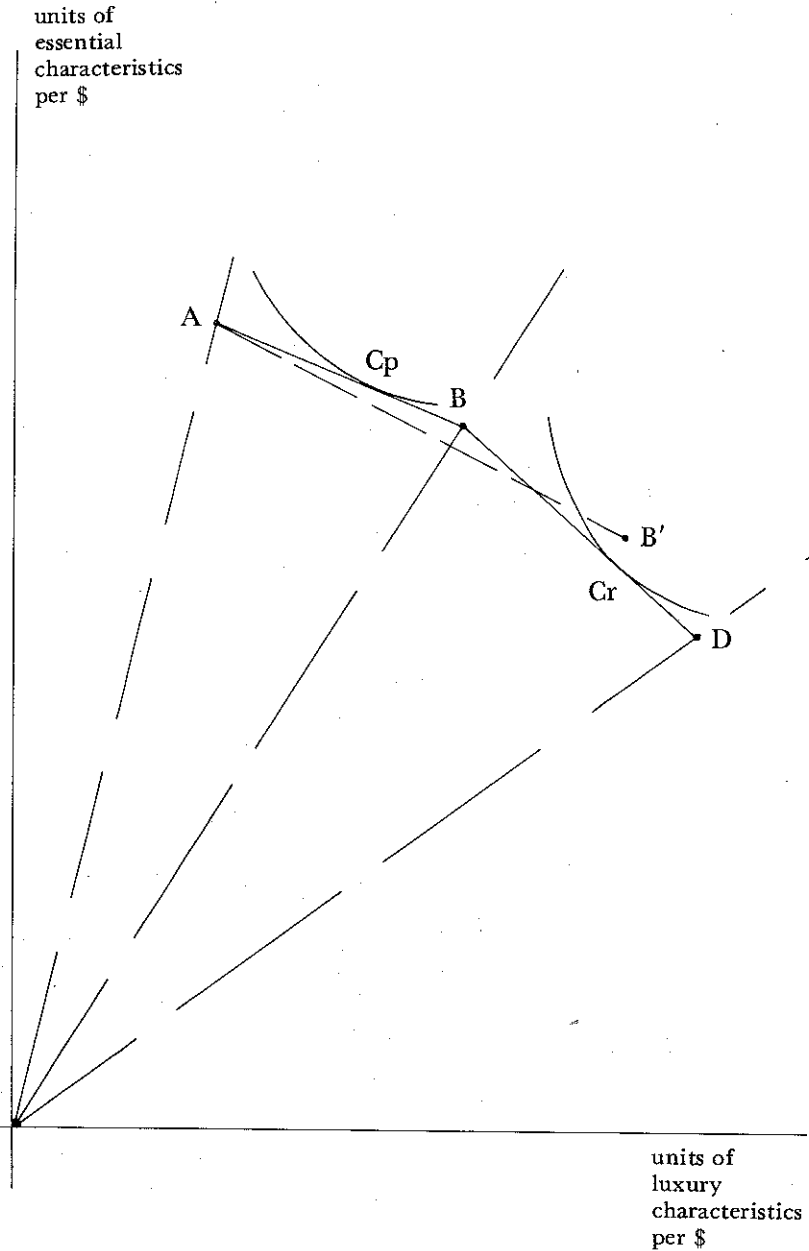
A, B and D are commodity vectors in characteristics space. Each of the three points represents a specific amount of the goods A, B and D which can be bought for the same amount of money. Let A be the most basic variety, containing most of the essential characteristics and least of the luxury characteristics, B the standard variety and D the luxury variety of a particular product. Line ABD is the consumption possibilities frontier when it is assumed that all linear combinations of the three goods can be purchased. This implies that goods are perfectly divisible. Representative indifference curves, I_p and I_r , of two groups of consumers, the poor and the rich, are drawn to show that the poor will choose C_p and the rich will choose C_r as most preferred bundles. The replacement of B-goods by B'-goods with the characteristics-price combination shown by B' leads to a loss of welfare for the poor and to a

4 Lancaster (1966).

5 Helleiner (1975).

6 Further reference to "essentials" and "luxuries" as characteristics without quotation marks.

Figure 1
WELFARE LOSSES CAUSED BY THE SUBSTITUTION OF NEW
"LUXURY" PRODUCT (B') FOR A STANDARD VARIETY (B)



gain of welfare for the wealthy. Helleiner suggested that "the consumption-technological innovations introduced to the LDCs have been biased in the luxury direction" and that "the bias in the introduction of new products is likely to have favoured the tastes of the wealthier classes".⁷

Luxury characteristics may be defined by a high, and essential characteristics by a low, income elasticity. In Figure 1, the coordinates measure amounts of characteristics per dollar, and the underlying utility function $U/Y = F(z/Y)$ is a transformation of the original utility function $U = U(z)$, with z being a vector of characteristics and Y disposable income. This transformation is necessary in order to portray consumption bundles of different budget levels on the same consumption possibilities frontier. Using different indifference curves for various groups of consumers does not imply different utility functions. Assuming that a unique and nonhomothetic utility function reflects the tastes of different groups of consumers, indifference curves at different levels of income, when scaled down to the per-dollar level, may very well intersect each other, as is the case in Figure 1. As a result of the transformation the quantities of characteristics per dollar measured on the axes correspond to the inverse of the implicit prices of characteristics.⁸

Our main concern with the welfare level of the poor may reflect a Rawlsian view of social welfare. It can be justified by assuming that a very unequal distribution of income and wealth is typical of most LDCs. There is considerable evidence available supporting this assumption.⁹ If traditional development strategies have contributed to widen the gap between the rich and the poor rather than to close it, then a more progressive strategy would focus on absolute poverty levels and the welfare of the poorest.

The identification of welfare losses to the poor arising from product innovations poses a number of problems, such as the definition of the poor's welfare function, the measurement and classification of characteristics as well as of changes of the implicit

7 See Helleiner (1975).

8 By "implicit price" of a characteristic we simply mean the inverse of the quantity of a characteristic that is obtained per money unit when the commodity is purchased. Obviously the true implicit price of characteristics is lower than that because the commodity price covers the costs of all characteristics.

9 See for instance Chenery, et. al (1974).

prices of characteristics. As to the welfare function the simplest approach would be to assume that the poor are only interested in essentials and derive no satisfaction from luxury characteristics. Such an assumption, which is reminiscent of a basic needs view of the poor's welfare, may be useful for the sake of argument, but it is certainly an over-simplification. Using conventional hyperbola-shaped indifference curves in characteristics space we assume that the preference map of the poor is skewed toward essential characteristics. The following theoretical analysis is based on this assumption, but for the purpose of measurement a simpler criterion is being used later.

What are the necessary conditions for the occurrence of welfare losses to the poor? To examine this let us start with a simple situation in which there is, before the innovation, a single standard or low-cost variety available which is replaced by a new variety having less of the essential and more of the luxury characteristics per dollar. In this case it depends strictly on tastes whether the innovation increases the welfare of consumers. With preferences strongly biased in favour of essentials the innovation is likely to impose welfare losses on the poor. Without exact knowledge of the poor's preferences we cannot make inferences about such welfare losses.

In the second and more general case where two or more varieties of a particular goods category are available, the frontier of efficient consumption possibilities is no longer a single point but a segmented line. Consumers may choose any one single variety or a combination of two or more varieties as the preferred commodity and characteristics bundle. Suppose first that only the variety A in Figure 1 is chosen by the poor. Then the conditions for welfare losses depend again strictly on preferences, just as in the case of a single available variety, as long as the variety A is the object of change. If the characteristics of B are changed, which the poor do not purchase anyhow, the effects of innovation would only affect the rich. The case, where the poor initially choose only the variety B, can be dismissed because A would not be available if even the poor do not buy it.

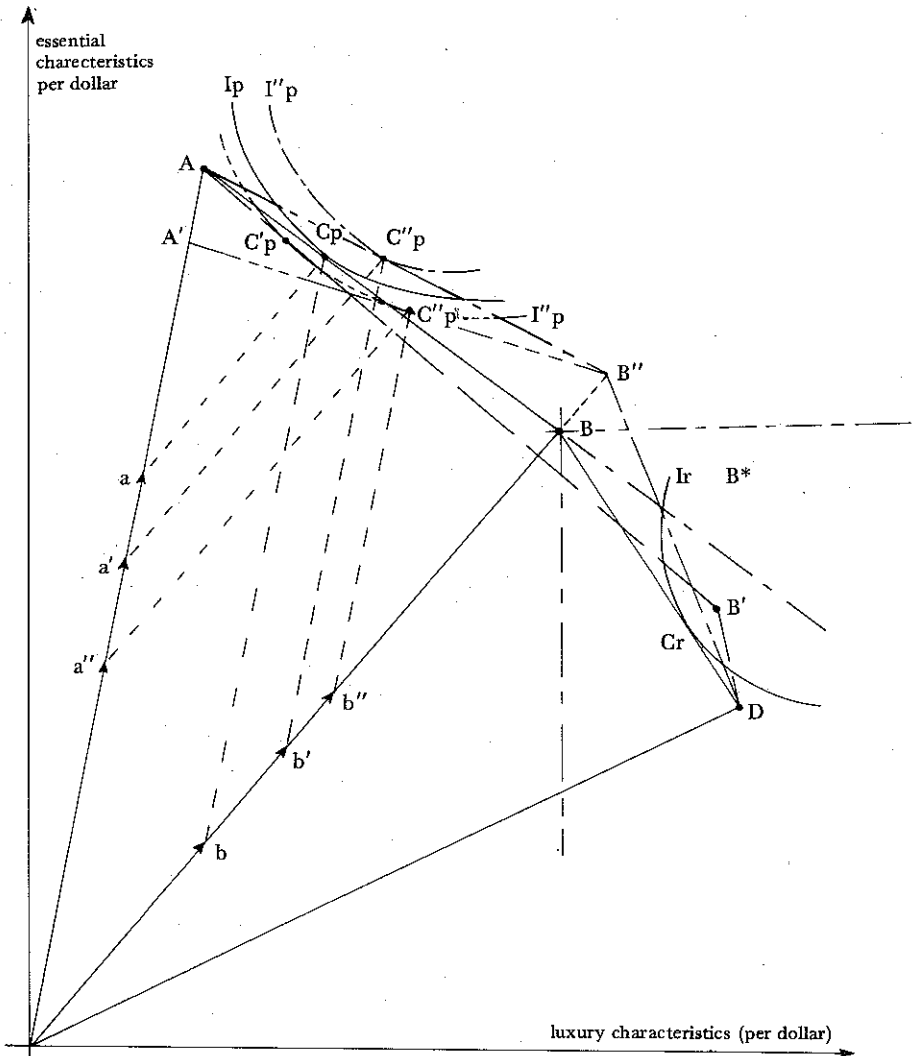
The most interesting case is the one when the poor initially choose a combination of A and B, or any other combination of several varieties, and when the quality change affects at least one

of them. In this case knowledge of the preferences revealed through purchase decisions before the innovation and of the changed characteristics and prices is sufficient in order to make inferences about the resulting welfare changes. Exact knowledge of the preference map is not required in this case because the change of the implicit prices of characteristics tells whether the relevant segment of the consumption possibilities frontier is shifted inwards or outwards. Obviously, for welfare losses to occur the relevant line segment of the frontier must shift inwards. This can happen in two ways, as shown in Figure 2 where in the initial position the poor purchase a mixed basket of the low-cost (A) and the standard (B) varieties, but nothing of the luxury variety (D).

In the first case the vector B may shift to B' as a consequence of the change in B's characteristics. This can be interpreted as replacement of a standard consumption good by a luxury-type and more expensive one. The quantity of essential characteristics obtainable per dollar is reduced and that of luxury characteristics is increased. The resulting shift of the consumption possibilities frontier clearly lowers the welfare of the poor.

In the second case, a shift of B to B*, less essential and more luxury attributes can be bought per dollar than before. Nevertheless, the consumption possibilities frontier shifts outward in the area relevant for the poor, thus potentially increasing their welfare. The vector B may even shift to B'', which can be interpreted as an unequivocal quality improvement or as a reduction of the price of B-goods. Since more of both characteristics can be obtained per dollar a welfare gain must result if no further changes occur in the position of the frontier. However, as Figure 2 shows in the case of B shifting to B'', some demand of the poor will shift from A-goods to B-goods (now B''). The goods combination C_p'' consists of more of B'' and less of A than C_p . As a consequence of declining demand for A-goods their price may then be increased reflecting diseconomies of reduced scale of production. This price increase of the low-cost variety A shortens the vector A to A' and may shift the frontier to a position further inward than before the introduction of B* or B''. The price increase of the low-cost variety A may of course also occur without important demand shifts from A towards the improved variety of B-goods, simply because the producing firms wish to promote B* or B'' and to phase out the variety A. The demand shift, however, makes the price increase more plausible as a consequence of the product innovation.

Figuer 2
 INWARD SHIFTS OF THE CONSUMPTION POSSIBILITIES FRONTIER
 OF LOW – INCOME CONSUMERS (“THE POOR”), DUE TO PRODUCT
 INNOVATIONS



In both cases, shifts of B to B' and to B* or B'' both accompanied by a price increase of A, one may ask why consumers do not revert to the initial position in order to avoid welfare losses. We assume here that the shifts of B as well as the price increase of A-goods are irreversible. This assumption can be explained by three major factors. First, the strong influence of the purchasing power of the rich on the product mix. B'' or B* are not only bought by some of the poor, but mainly by the rich who's demand typically favours luxury products. Second, to the extent that the promoters of the new varieties are foreign-owned firms, their behavior is usually explained by demand patterns and competition in their home countries. Third, trade and other commercial policies of the host countries may be responsible for the diffusion of luxury products in LDCs. This point merits further attention at a later stage.

The crucial condition for welfare losses is therefore the disappearance or price increase of the standard or low-cost varieties. If new varieties were introduced and the old ones remained available at constant prices then welfare losses would not occur, as the consumption possibilities frontier would not shift inwards. Further conditions of welfare losses related to the implicit prices of characteristics and are best analysed by considering the two areas southeast of B, above (region B*) and below (region B') the line segment AB extended beyond B. Price changes of other, especially low-cost, varieties are excluded for the moment. Some varieties with less of the essential characteristics than B may be preferred to B and increase the welfare of the poor, as is indicated by the outward shift of the frontier to AB*. While in the earlier case of a single standard variety B being replaced by B* or B' we were not able to assure welfare losses or gains without exact knowledge of the preference map we can be somewhat more explicit in the present case. Whenever consumers (the poor) have revealed their preference for a pre-innovation bundle consisting of some A and some B then the replacement of B by B* must always increase their welfare. Conversely, a shift of B to B' implies a clear decrease in the poor's welfare. Similarly, if the low-cost variety A is subject to the innovation the welfare loss is inevitable if A' lies to the south of the line segment AB. The position and slope of the line segment are determined by the implicit prices of the characteristics. The slope of the frontier corresponds to the relative implicit price of luxury in terms of essential characteristics, or to the rate of substitution between luxury and essential characteristics

implicit in the prices of the commodities. The characteristics change in B then leads to a welfare loss if the relative price of luxury in terms of essential characteristics is increase. If it is lowered, the innovation must improve the welfare of the poor provided that no other price changes occur, especially no price increases in low-cost varieties like A.

One of the factors explaining the replacement of standard or low-cost by luxury varieties of consumption goods is product differentiation among competing sellers. Naturally, they may also diversify by offering products with an increased content of essential characteristics, but it is more likely that product innovations focus on luxury attributes. Such innovations are usually introduced by foreign firms, especially multinationals, and reflect consumer preferences typical for high-income countries. Therefore, the sellers of new products in LDC markets typically cater to the demand of higher-income groups than to that of the poor.

In addition, trade policies of the host country government may provide incentives for local and foreign producers to supply high-quality goods. For instance, import licensing may prohibit imports of similar products to those produced domestically, but *de facto* this may work to prohibit the cheap varieties and to give the producers of the luxurious varieties a captive market.¹¹ This may happen especially when large foreign firms are at the same time domestic producers and the principal importers. Production processes of low-cost varieties may be no longer in use in the high-income countries and therefore not easily available to producers in LDCs. Further, governments may openly or indirectly subsidize the production of luxury products at the expense of standard varieties by offering tax benefits to foreign investors and by favouring the use of modern techniques.

So far we have considered only welfare effects assuming that both tastes and incomes are constant. In a dynamic context where incomes and tastes are not immutable, rising income will typically shift the demand of the poor towards luxury goods, encouraging producers to expand the production of luxury goods and to abandon the production of standard varieties. In this case welfare losses cannot be proven on the basis of conventional welfare criteria. However, it is also likely that consumers, and especially the poor,

¹¹ I am indebted to Clark Leith for this observation.

are not provided sufficient information enabling them to make efficient choices among new and old products. Rather than changing the preferences of consumers, the commercialization of new varieties with high luxury content may induce them to purchase products which they might not choose on the basis of perfect information.

The foregoing discussion shows that the welfare effects of changes in consumption technology depend on inequalities in the distribution of income and have consequences affecting the distribution of welfare. Is it possible that such welfare effects are also felt by the whole community? First, it seems possible that the losses of the poor outweigh the gains of the rich, although conventional welfare criteria do not permit us to prove this. Second, when all members of the community are assumed to have identical tastes in spite of different income levels and when their preferences can be described by the single indifference curve I_p , welfare losses of the kind described are more difficult to imagine. Shifts of B to B' would not be endorsed by the consumers as a whole. Shifts of B to B'' increasing the content of essential and luxury characteristics can again be explained by product differentiation under competitive pressure and/or technical change. The eventual inward shift of the frontier, however, following the price increase of low-cost substitutes, is more difficult to assume when only one set of preferences prevails. Earlier we assumed that the inward shift is irreversible because high-income consumers do not demand any of the low-cost variety A. Under the present assumption of a single indifference curve it is less likely that the whole community suffers through an initial innovation of the type B''.

In summary, we can conclude that welfare losses from product innovations are most likely to occur to only part of the society and usually the poor. The necessary and sufficient conditions for these welfare losses to the poor are (1) the disappearance of the standard or low-cost variety when the luxury variety is introduced and (2) a change of the implicit prices of characteristics such that the consumption possibilities frontier shifts inwards in the relevant region. Although an increase of the implicit price of essential characteristics is neither a necessary nor a sufficient condition for the inward shift of the relevant section of the frontier it is the most likely event to achieve such a result. It can, however, leave the consumers better off if it is matched by a sufficient implicit price decrease of luxuries. When the pre-innovation consumption

bundle is known to be a combination of several varieties we can even conclude exactly whether the frontier has shifted inwards or outwards, thus reducing somewhat our uncertainty about consumers' preferences.

III. Empirical Evidence of Changing Consumption Technologies in Zaire

The discussion of welfare effects caused by product innovations leads to the question of how important such effects are in reality. It is probably always possible to find consumption goods in an economy for which the characteristics-price relation changes in such a way that some consumers, possibly those in the lowest income group, are hurt, because they can buy less of the essential and perhaps only desired characteristics per money unit. That alone should not be a matter of concern. The welfare loss is important, however, if it is a widespread phenomenon; i.e., if a significant portion of the population is likely to suffer because widely used consumer goods are involved. In the context of Zaire we have taken a sample of recent product innovations and analysed the potential and actual welfare effects they may have conferred on Zairean consumers. Before presenting this evidence it is necessary to see how welfare losses can be identified and measured empirically.

(a) Actual and Potential Welfare Losses

In the previous section it was shown that even if essential and luxury characteristics can be clearly distinguished and measured it would remain uncertain whether product innovations result in actual welfare losses. At most, we can conclude whether the consumption possibilities frontier has shifted inwards or outwards. In order to tell whether such shifts of the frontier occur in the sections relevant to the consumption of the poor, knowledge of the poor's preference map or at least of their pre-innovation purchases of different product varieties is required. Without this knowledge it is only possible to observe potential welfare losses, defined as those resulting from inward shifts of the consumption possibilities frontier in regions of the characteristics space which are likely to be relevant to the consumption of low-income consumers, i.e., regions in which the amounts of essential characteristics are relatively high

and the amounts of luxury characteristics are low. It was also shown that the proof of losses depends on our knowledge of the implicit prices of attributes. Since they are usually not available, three simplifying assumptions must be made.

First, when new luxury products are substituted for simpler standard varieties, or when the quality of conventional products is improved, it is assumed that more of the luxury characteristics, the quantity of which is x , can be bought than before. Thus, only shifts of the commodity vector B to the right are examined. This assumption is not unduly restrictive since product innovations typically emerge from high-income countries and focus on attributes with high income elasticities. Second, it is assumed that decreasing amounts of the essential characteristics (y) per dollar (i.e., downward shifts of the commodity vector) are sufficient to cause potential welfare losses. This is clearly a break away from the previous analysis which showed that a downward shift of vector B is neither a necessary nor a sufficient condition for the frontier to shift inwards.

With these assumptions, only the percentage change of the product price ($\Delta p/p$) and the percentage change of the quantity of essentials ($\Delta y/y$) associated with the innovation need to be measured; if the coefficient ($\Delta y/y : \Delta p/p$) is smaller than one, it follows that less of the essential characteristics can be bought per dollar, which is interpreted as a reduction of the consumption possibilities of the poor. The coefficient $\Delta y/y : \Delta p/p$ represents the inverse of the implicit price change of essential characteristics and it is further referred to as implicit price change, π .

A third assumption is necessary because the quantification of product characteristics is extremely difficult. When product innovations increase the quantity of luxury characteristics only, or when they increase the quantity of both, but of luxuries more than of essentials, then it is assumed that the implicit price change is smaller than one, because the price must have increased more than the quantity of essentials. To illustrate, assume that sugar has only two characteristics, sweetness and whiteness. Call sweetness the essential and whiteness the luxury characteristic. As only whiteness is enhanced by the additional process stage of refining and as the cost of this additional process stage adds to the price of sugar, the implicit price per unit of sweetness increases, implying $\pi < 1$. Three similar cases from typical consumption goods pro-

duced in Zaire (wax prints, needle-punched blankets and packaged bread) are included in Table 1.

These assumptions have permitted a classification (in Table 1) of product innovations according to whether the implicit price change of essentials is smaller or larger than one (column 7). It must be emphasized, however, that the assumptions are restrictive and that the classification implies a high degree of judgement. The first crucial step requiring such judgement is the identification of characteristics as essentials and luxuries when their income elasticities are not known. One way of dealing with this problem is to admit only one essential characteristic, say the property of a good which makes it what is, and to classify all other characteristics as luxuries. The essential characteristics of cotton fabric for instance would be "cloth-ness" and other attributes, such as fineness, lightness, elasticity, durability, colour, crease resistance, etc., would be luxuries. It is easily seen that this approach does not do any more justice to real-world consumption decisions than an intelligent guess about income elasticities. Casual observation of consumption patterns of low-income consumers in Zaire suggests that some quality attributes, such as the durability and evenness of fabrics or the odor and lather of soap, play an important role in their consumption decision and may be classified as essentials. One may also think of an essential characteristic as a composite of all those physical attributes for which demand is income-inelastic. Even if the income elasticities of implicit demand for characteristics could be easily measured the dividing line between essentials and luxuries would be arbitrary.

(b) Measurement of Price Differences

The price increase due to the introduction of the new variety is not easily measured since the introduction may have occurred some time ago and single-product price indices are seldom available for longer periods. The fact that to-day's prices of standard and luxury varieties of goods are often not very different suggests that the former may have increased when the new variety was introduced. The prices may also contain varying amounts of monopoly rent because the selling firms may sell the products at different profit margins.

In the sample of product innovations considered here the approximate price difference between luxury and standard

varieties (column 6) refers to the present difference, not the one which prevailed in the moment when the new varieties were introduced. The observed price difference may be low in comparison to the real cost difference in the moment of introduction. On the other hand, the luxury variety is often extensively imported and the observed price difference may overstate the actual cost difference. A typical example is the one of African prints. Domestic production of true wax prints - as opposed to "imitation wax" - started in 1970, but imported "wax" has always been favoured by Zairean consumers and, at times, its imports have been restricted, increasing the domestic price above the tariff-ridden import price. As a consequence the price of imported "wax" is substantially higher than the price of domestically produced "wax" which, in turn, is about forty per cent higher than the price of ordinary prints ("imitation wax").

(c) Appropriateness in Consumption

The final step is the application of the above criteria in order to differentiate appropriate and inappropriate innovations. In the absence of a comprehensive social cost-benefit approach, we have called those quality-improving product innovations of the sample "inappropriate in consumption" for which the implicit price change of essentials is larger than or equal to one. On the basis of our assumptions this is equivalent to saying that product innovations, in order to be appropriate in consumption, must not entail welfare losses for the poor. In the sample of 15 products summarised in Table 1 this condition is met by eleven out of fifteen cases. In four cases the per-dollar content of essential characteristics seems to be reduced by the innovation combined with a price increase, either because only luxury characteristics are increased (refined sugar, wax prints, and needle-punched blankets) or because the price increase seems to be larger than the gain in essential characteristics (packaged bread).

As to actual welfare losses to low-income consumers there is further evidence that such losses have not been important in Zaire. The reason is that the cheaper varieties have usually remained available and continue to satisfy most of the domestic demand. In all 15 cases of Table 1 the standard varieties continue to be produced. This evidence affects potential welfare losses and, for stronger reasons, also actual ones. The market shares of new

Table 1

PRODUCT INNOVATION IN

Product category (1)	Standard variety (old product) (A) (2)	New variety or improved quality (B) (3)	Characteristics enhanced by "essentials" (y) (4)	"luxuries" (x) (5)
(1) Sugar	non and semi re- fined sugar	refined sugar	—	—whiteness —fineness
(2) Bread	unpacked loaves	wax paper packed loaves	hygiene	—luxury appearance
(3) Edible fat	cooking fat	margarine	better taste	packaging
(4) Cigarettes	dark local blends ("plains")	mild imported blends, filter tip	—mildness —reduced tar	luxury package
(5) Beer	standard ale and larger	"de-luxe" beer	—maturity —homogeneity	luxury appearance (bottle)
(6) Soap	household soap	toilet soap	—odor —smooth washdown	—shape —package
(7) Laundry soap	soap powder	synthetic deter- gent powder	washing power (cold water)	—
(8) light cotton fabric	conventional quality	improved quality, (Sanforized)	—durability —homogeneity —colour stability	—shrink resistance
(9) African prints	regular prints (incl. imitation wax)	true wax prints	—	wax appeal
(10) Heavy fabrics	heavy cotton drill or woollen fabrics	synthetic fabrics (Tergal)	—durability —crease resist- ence	modern appeal
(11) Blankets	woven fabric	needle-punched fabric	—	luxury appeal
(12) Footwear	leather and rubber footwear	plastic footwear	—durability —water resistance	—
(13) Household furniture	wooden furniture	plastic and metal furniture	durability	—
(14) Cement	portland cement	portland cement	homogeneity	—
(15) Electrolytic copper	copper at 99.5% purity	copper at 99.95% purity	purity	—

Sources: Conjoncture économique 1972, 1973, 1974; République Ju Zaire;
Evaluations of investment projects by the Investment Commission, Government of Zaire
Internal reports of government departments;
Interviews with representatives of producing firms.

ZAIRE'S MANUFACTURING SECTOR

Approximate price difference (B-A) (in %) (6)	"Implicit price change" $\frac{\Delta y}{y} \frac{\Delta p}{p}$ (7)	Share of B in total consumption in % (8)	Share of B in total production in % (9)	Comments (10)
> 0 ^{a)}	< 1	-	-	only semi-refined sugar is produced in Zaire; projected plants include refining
10	< 1	-	-	approval of proposed price increase was refused by the government
16	> 1	35	33	totals refer only to commercialized cooking fats
50	> 1	25	23	one of the few exported manufactured goods
20	> 1	n.a.	n.a.	"de luxe" beer was recently introduced to substitute for import
130	> 1	10	8	imports
100	> 1	5	4	substantial price difference may be unjustified by "essentials"
50	> 1	n.a.	n.a.	totals refer to all commercialized soaps and detergents; increased washing power may not justify Δp
40	< 1	24	17	strong product diversification
n.a.	> 1	7	4	demand for wax prints enhanced by government's authenticity policy
150	< 1	n.a.	n.a.	prices are lower than those of woollens, but higher than those of cotton drills
< 0	> 1	35	25	price increase mainly explained by higher quality of raw material
n.a. b)	> 1	n.a.	n.a.	B sells at lower prices than A
n.a. b)	> 1	n.a.	n.a.	strong product differentiation
n.a. b)	> 1	n.a.	n.a.	new plants have semi-automatic process control
n.a. b)	> 1	n.a.	n.a.	automatic process control

Notes: a) The price change is irrelevant since $\Delta y = 0$.

b) The price change is irrelevant since $\Delta x = 0$.

n. a. = not available.

varieties shown in col. 8 and 9 are generally smaller in production than in consumption. Therefore, to the extent that luxury varieties have conquered markets and substituted for standard varieties this is not reflected by the structure of domestic production.

(d) Consumer Price Indices

In this context it is interesting to consider several price indices of consumption goods in Table 2. During the ten years' period from 1964 to 1974 the general retail price index increased from 100 to 548.5. Table 2 shows the price indices of 12 selection consumption goods, the only ones for which price indices are available for the same period. The prices of all locally manufactured goods of this sample have increased less than the general retail price index, and prices of the more basic items (beer, laundry soap, sandals, cigarettes, men's underwear, sugar and printed fabric) have risen less than those of the more income-elastic ones¹² (imported wax prints, margarine, toilet soap, men's shirts). This evidence supports, however weakly, the hypothesis that inward shifts of the consumption possibilities frontier which might have been caused by shifts of domestic production from basic to luxury goods were probably not of major importance.

(e) The Influence of Trade Policies

It is possible that both the disappearance of low-cost varieties from the market and the ensuing consequences for the implicit price of essential characteristics are not adequately reflected by our indicators in Table 1. Let us therefore examine whether biased trade policies may have influenced the availability and price of low-cost varieties in our sample. The easiest way of checking this is to consider the structure of nominal¹³ tariff protection. As Table 3 shows there is no clear bias in favour of either high-cost or low-cost products, but a general reading of the tariff structure beyond the products of this sample suggests a slight tendency for low-income products to be taxed less. A bias in the tariff structure more easily

¹² It would be more significant to compare the price indices of new product varieties with those of standard varieties, or with a composite index of manufactured goods, but such indices are not available in Zaïre.

¹³ Effective protective rates were also calculated in this study, but not available for the product varieties of Table 1.

Table 2

RETAIL PRICE INDEX OF CONSUMPTION GOODS IN
MARKETS OF KINSHASA, AUGUST 1974 (OCTOBER 1964 = 100)

General Index (61 items)	548.5
Food Products (40 items)	653.1
Clothing (10 items)	376.9
Div. Household Goods (11 items)	409.4
Sugar	376.3
Margarine	540.9
Beer	240.5
Men's Knit Underwear	307.4 to 314.5
Men's Shirts	466.3
Imported Wax Prints	578.4
Local Printer	460.7
Children's Clothing	291.4
Sandals	292.8
Toilet Soap	483.2
Laundry Soap	279.0
Cigarettes	295.0

Source: Université Nationale du Zaïre, *Cahiers Economiques et Sociaux*, Vol. XII, No. 1 (1974), pp. 126-131.

observable is the one protecting those products which are domestically produced.¹⁴ We cannot exclude, therefore, that the protective measures have contributed to the disappearance of even simpler low-cost varieties, for instance of the cottage type, such as soap bars or hand-made cigarettes, with even lower implicit prices of essential characteristics. Selective import licensing may have acted in the same direction, but we have no information about

¹⁴ It will be remembered that the sample of Table 1 is limited to products which are also produced domestically.

biases in the licensing procedures of the Zaire government with respect to high-cost and low-cost products.

(f) Limitations

Can we conclude from this evidence that, from the standpoint of consumption technology, the problem of inappropriate products does not exist in Zaire? Certainly not. It is useful then to spell out the limitations of this study beyond those imposed by the definition and qualification of welfare losses. First, most of the luxury goods sold in Zaire are imported and not produced there. They were excluded from consideration in the present context. A complete analysis of consumption technologies in Zaire would require a much larger sample including those products which are only imported. Extremely high income disparities seem to exist in Zaire, and so does conspicuous consumption. There is no doubt that the consumption patterns of the rich minority have influenced the demand of lower-income consumers and, also the production decisions of domestic producers.

Second, the transmission of consumption patterns of the rich from high-income countries to LDC's operates through various channels of information and especially through advertising. The role of advertising in the "transfer of tastes" has been stressed by Langdon who gathered evidence in Kenya of the negative influence of multinational corporations.¹⁵ In Zaire commercial advertising has been restricted by law for some time. Several managers reported in interviews that the total volume and incidence of advertising had been insignificant in comparison with the levels which are normal in western countries. In only two of the fifteen product innovations of the sample we were able to discover in the firms' cost calculations advertising outlays and they amounted to less than 5% of total production cost. Nevertheless, the present study does not adequately deal with the wider and rather complex problem of taste transfers.

Third, the problem of quality standards has been approached here by examining recent product innovations. One could argue that even products identified as standard varieties have a certain luxury content, and that even their quality standards may be inap-

¹⁵ Langdon (1975).

Table 3
NOMINAL IMPORT TAXES IN %
ON SELECTED CONSUMPTION GOODS IN ZAIRE

Sugar	35
Margarine	50
Cigarettes, all types	200
Beer	100
Soap	
Household	50
Toilet	50
Detergent	50
Cotton Fabric	
Printed	40-50
Dyed	50
Synthetic Fabric	50
Blankets	
Standard type	90
Luxury type	90
Footwear	
Rubber & Plastic	40
Leather	40
Household Furniture	
Wooden	100
Metal	100

Source: République Démocratique du Congo, Tarif des Droits d'Entrée, 1968.

appropriate for Zaire's stage of development. Langdon, for instance, has argued that even industrial-type laundry soap produced by subsidiaries of multinational firms in Kenya is inappropriate in comparison with the conventional hand-made variety.¹⁶ In Zaire, where artisan skills are scarce, we have found it inappropriate to apply such restrictive judgements, although the encouragement of small-scale trades is consistent with the concept of appropriate consumption technologies advocated in this study. One reason, of course, is our uncertainty with respect to the welfare function of

¹⁶ Langdon (1975).

the poor in LDC's. In addition, even if for the purpose of analysis preferences of individuals or groups (e.g. the poor) can be replaced by other criteria, such as the fulfillment of basic needs, it does not easily follow that new product varieties are necessarily only intensive in luxury characteristics. The relationship between product characteristics and human needs has not yet been studied sufficiently by economists. For instance, it can be shown that the amount of washing power per dollar contained in synthetic detergents is superior to that of conventional soap, especially when cold water is used for washing. It is also not necessarily true that subsidiaries of multinational companies in LDC's produce with the same quality standards as in the industrial countries. To check this we have submitted several products of Zairean production, including standard and luxury varieties, to tests by Canadian firms. In all cases (laundry and toilet soap, knitted goods, cotton fabric and prints, cigarettes) with the exception of one type of leather shoes, the qualities were judged to be below Canadian standards.

(g) Intermediate Goods

Finally, some special comments are necessary about intermediate goods. Inappropriateness in consumption has been examined so far mainly from the standpoint of final consumption, although our sample includes two intermediate products (cement and copper). For intermediate goods, excessive quality standards have been observed by several authors, for instance bricks designed for multi-storey buildings being used for small houses. The identification of such cases, sometimes referred to as "over-kill", is relatively less problematic because there is no utility function directly involved, so that the decision criteria are more objective. On the other hand, experience and engineering knowledge are necessary to establish and apply such criteria in order to set appropriate quality standards for specific industries. In Zaire, insufficient quality standards were reported to us in interviews in several firms of different industries: a producer of electrical cables complained about the insufficient purity of copper from local production; a producer of soft drinks importing glass bottles claimed the locally produced bottles were more breakable; a furniture producer mentioned the poor quality of small metal parts of local production as the reason for the high import content of his inputs. Even if these arguments are discounted for pro-import biases, the observations made in manufacturing firms suggest that backward

linkages in Zaire's economy could be strengthened through certain quality improvements in local firms producing intermediate inputs.

IV. Conclusion

The study attempts to answer the question whether product innovations, including those improving the quality of standard product varieties, may be harmful to low-income consumers in LDC's. Since the observation of actual welfare losses requires the exact knowledge of consumers' preferences or the use of alternative welfare criteria a simpler criterion is employed, which is the implicit price of essential characteristics. The latter rises if the relative increase of the commodity price is larger than the relative increase of the essential characteristics content of the improved product variety. Potential welfare losses for consumers are assumed to occur if the implicit price of essential characteristics increases as a consequence of the introduction of the new product variety. On the basis of this criterion and a sample 15 product categories, including two intermediate products, it is concluded that innovation-caused welfare losses do not seem to have occurred frequently in Zaire because most innovations of the sample did not lead to the disappearance of standard varieties. Furthermore, the majority of innovations may have lowered the implicit price of essential characteristics. The validity of this conclusion is limited by the smallness of our sample, the obvious welfare implications of the criterion used and by the difficulties in measuring characteristics.

Several policy conclusions can be drawn from the discussion. First and most generally, governments concerned with the welfare of the poor and searching for appropriate technology policies should not only focus on the factor proportions problem but also on the direct welfare effects in consumption. Specifically, they should promote the production and import of low-cost varieties. Quality-improving product innovations may be tolerated as long as low-cost varieties remain available. This may be achieved by preventing producers and importers from widely advertising luxury products. Especially, governments should not provide incentives to producers of luxury brands. Policies promoting the application of low-cost and intermediate technologies may prevent the spreading of products typically consumed by high-income consumers.

The final identification of product innovations as "inappropriate in consumption" is part of the wider problematic of appropriate technology. Traditionally appropriateness of technologies has been judged mainly or exclusively with respect to the effects on production, employment, resource availability and other aspects, always related to production. The present approach makes evident that the question of which technologies are most appropriate for specific LDC's must also be seen from the consumers' viewpoint. The two kinds of analysis, concerning appropriateness in consumption and appropriateness in production, do not readily link together. While the former focuses on product innovations of specific varieties or quality improvements of a product, the latter focuses on production techniques. The relationship between specific product varieties and the techniques required to produce them is not quite unambiguous and has been analysed elsewhere.¹⁷ To the extent that a one-to-one relationship exists one can then describe possible trade-offs between appropriateness in consumption and appropriateness in production. A product variety such as the often discussed plastic shoe may have the virtue of being appropriate in consumption according to a criterion like the one used in this study, but inappropriate in production because of negative implications for employment, income distribution and other aspects. Only a comprehensive approach to social cost-benefit analysis may be able to integrate all of these effects and reveal the socially optimal product type and technique.

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¹⁷ Siggel (1978).

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