Dairy imports and import policy in Mali and their implications for the dairy sector in the Bamako area

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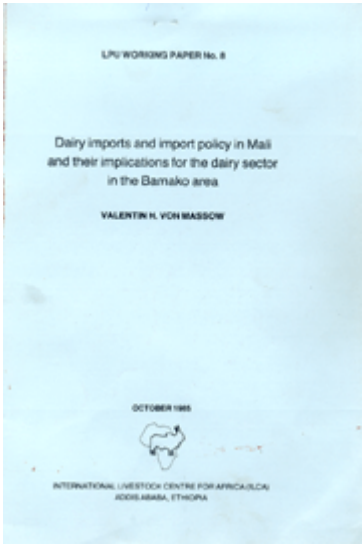

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List of acronyms

CIP	Commerce Interieur et Prix (Bamako)
Collaiba	Collective Laitiere de Bamako
CRZ	Centre de Recherche Zootechnique (Sotuba)
DNE	Direction National d'Elevage (Bamako)
EC	European Communities
FCFA	Franc CFA, currency of the African Financial Community
FM	Malian Franc
INRZFH	Institut National de la Recherche Zootechnique Forestiere et Hydrobiologique (Bamako)
LME	whole liquid milk equivalent (for the conversion see App. 1)
OMBEVI	Office Malien du Betail et de la Viande (Bamako)
SMIG	Salaire Minimum Interprofessionel Garanti
SOMIEX	Societe Malien d'Importation et Exportation (Bamako)
ULB	Union Laitiere de Bamako
WFP	World Food Programme

Note: The Franc CFA has replaced the Malian Franc as the national currency from July 1984 onwards. The official exchange rate at that time was FM 100 = FCFA 50.

Abstract

Dairy imports into Mali are not yet of a dramatically large size but dairy consumption in Bamako, the capital, almost totally depends on them. This report discusses the economic relationship between supply, demand and imports of dairy products in the Bamako area. It focuses on the influence of Government policy on dairy imports.

On the production side it appears that the present marketing system does not provide sufficient service to stimulate higher milk production. The Union Laitiere de Bamako (ULB) which was set up to promote dairy development has in the past largely neglected the collection of local fresh milk. ULB recently raised its prices to producers—though still not sufficiently—in order to be able to compete with informal traders.

The Government pursues three main objectives with its dairy import policy: to provide consumers with dairy products at 'reasonable prices', to stimulate an increase in local milk production, and to generate funds for the national budget. The instruments used to the benefit of consumers are retail price fixing and the use of dairy food aid for reconstitution into liquid milk. Producers are to benefit through ULB's collection activities, through the use of the food aid sales revenues in dairy development projects, and possibly-although this has not been stated explicitly-through the import monopoly for canned milk powder and condensed milk given to the parastatal Societe Malienne d'Importation et d'Exportation (SOMIEX). The Government raises funds by collecting tariffs on dairy imports, by charging ULB a price for the use of dairy food aid, and by taxing ULB's profits.

Assessing the effects of dairy import policy in Mali in a general way reveals that imports would have been slightly higher over the last decade if only changes in population, income and domestic milk production, but no policy or other influences, had affected them. In more detail, the Government's retail price fixing has had the effect of subsidising the consumption of condensed and reconstituted liquid milk while taxing that of canned milk powder. Total welfare effects on consumers, however, are negligible. Consumption of imported dairy produce has been stimulated rather than consumption of local fresh milk. It is nevertheless unlikely that producer prices for milk were substantially higher if dairy imports were less. No economic argument seems to hold for keeping up retail price fixing and the SOMIEX monopoly. The development of local milk production appears to be hampered more by shortcomings in the milk marketing system than by competition through dairy imports.

It is shown in the end that ULB's role to serve both consumers' and producers' interests is economically feasible but ULB's activities need being reorganised. In addition to the already existing provision of inputs for milk production, more emphasis must be laid on producer prices and collection services.

Introduction

0.01 Only recently has the tremendous growth of imports in dairy products into Sub-Saharan Africa become a subject of wider interest. Over the last decade, the sub-continent as a whole showed a sixfold increase in foreign exchange spent on dairy imports. Almost 2.2 million tons of dairy products (expressed in whole liquid milk equivalents = LME; see App. 1) were imported commercially on average annually during the years 1980–1982. To this figure another 0.7 million tons LME of food aid in dairy products have to be added. West Africa accounted for almost 50% of all dairy imports into sub-Saharan Africa (von Massow, 1984 a).

0.02 Various factors on the supply and demand side, exogenous influences such as population growth or income changes, and the effects of national governments' policies have all caused this increase in dairy imports. In order to find out its effects, one has to understand these causes or "factors of influence" which are mainly of a country-specific nature. However, it can be expected that some of the factors and/or effects are similar in some countries. An analysis of the factors which have caused dairy imports to increase and of their effects for individual countries may provide insights which can be used for careful generalisation.

0.03 Mali has been chosen for such an in-depth analysis of dairy imports and dairy import policy, although the increase in its dairy imports has not been spectacular. But Mali shows some characteristics which are similar to those of several other countries. First, we find a main milk consumption area around the capital city (Bamako) where causes and effects of dairy imports can relatively easy be studied. Market links for milk between this centre of demand and more distant areas are weak or non-existent. Second, Mali regularly imports milk powder and butter-oil for reconstitution into liquid milk which suggests a most direct competition between imports and local production.

0.04 The study is divided into five chapters. It starts with a brief description of production, consumption and trade patterns for milk and dairy products in Mali (Chapter One). Chapter Two introduces the policy measures affecting dairy imports. The factors which influence the development of consumption, production and imports of dairy products and in particular the impact of policy regulations on them are discussed in Chapter Three. In Chapter Four, the economic effects of dairy imports and related policies are calculated. An assessment of welfare changes is derived from changes in prices. In the calculation, particular emphasis is put on the role of those imports which enter the domestic market either through the parastatal SOMIEX or which are ingredients for industrial reconstitution. The results are complemented by a discussion of the possible distributional effects of dairy import policies. Chapter Five addresses reconstitution of milk powder and butter-oil in more detail, and includes a discussion of the role of the dairy plant ULB (Union Laitiere de Bamako). This discussion focuses on ULB's price and marketing policy and its economic and financial situation. These determine whether or not it is feasible to pursue a strategy of using the revenues from sales of dairy food aid for dairy development.

Chapter One: Background

Production of milk and dairy products

1.01 According to Jahnke (1982, p. 233), 70 % of Mali's land area can be classified as arid, and another 26% as semi-arid land. Over 60%of the non-arid land, i.e. areas with a growing period of more than 90 days and at least 500 mm rainfall per year, are exposed to tsetse infestation. The tsetse challenge may vary but the infested areas must be assumed to have impaired potential for livestock production (Jahnke, 1982, p.18 and 234). The following distribution of cattle and the classification of production systems must be seen in this ecological context.

1.02 The Ministere Charge du Developpement Rural (1982) gives the following rough breakdown of the national bovine herd and its characteristics regarding milk production (see Wilson et al, 1983 for more details): 9% of the estimated 5.13 million head of cattle (1981–1983) are held in a pure pastoral system. The milk available for human consumption amounts to about 50 1 per year per cow and is entirely used within the herder's family. 15% of the national herd are held in connection with dry cropping in an agro-pastoral system where part of the milk may be sold or exchanged for basic foodstuffs. About 35% of the national herd are held within the irrigated or seasonally flooded areas of the interior delta of the Niger river, partly in seasonal transhumance between the delta and neighbouring areas. Annual milk production (available for human consumption) per cow has been estimated at 120 l (235 l per lactation; see Diallo and Wagenaar, 1983, and for more details Wagenaar et al, 1985). Trade in milk and milk products is confined to local markets where the women will sell residual parts of the daily offtake (for a case study on the distribution between sales and home consumption see Dicko et al, 1981). The remaining 41% of the cattle herd are found in the Sudanian belt and the more southern parts of the country. The prevailing system there is agro-pastoral or intensive agricultural settlement with close linkages between crop and livestock production.

1.03 Only the middle and the southern parts are likely to be affected by dairy imports. Two reasons can be named for this assumption. First, transport facilities and road infrastructure are relatively poor throughout the country, particularly in the north. Neither imported goods nor products produced in distant areas can travel far beyond the place where they are produced or offloaded from modern means' of transport. Second, production systems which are geared towards self-sufficiency in milk at the family or village level will not be influenced significantly by the effects of dairy imports. We may note, however, that the lack of marketing infrastructure must partly be held responsible for the high levels of auto-consumption in milk which are found in remote areas. In summary, the areas of relative abundance of milk supply are not likely to be affected by dairy imports but the milk deficit areas are. The latter include some larger towns and above all the capital, Bamako, in the south-west of the country. The following discussion can thus be largely confined to the area around Bamako. Other areas are only included in case there are special reasons for doing so. The analysis is further restricted to dealing with cows' milk only. That is by no means to deny the contribution of sheep, goats', and camel milk to human consumption in some parts of Mali, particularly in the north (for some figures see Kone, 1983). However, as with the regional links, it can be argued that interactions between non-bovine milk production and dairy imports are too weak to be considered here.

1.04 There are no data available on the actual supply of locally produced fresh milk into Bamako. Total milk production for the area can be roughly calculated by using total herd numbers and average production parameters. Livestock numbers are available at the administrative level of "cercles". The "cercle de Kati" is the closest approximation to the area that is likely to supply Bamako with fresh milk. The total bovine herd in this cercle has been given at 122,000 head (OMBEVI, 1983 b). Another 15,000 head are held directly in the district of Bamak6. The calculation of milk production in and around Bamako thus starts from a total of 137,000 head of cattle. A first complication arises from the fact, that different bovine breeds have different reproductive performances and different genetic potentials for milk production (see Tall, 1971, p. 16 and the sources to App.2). Some average parameters for the area that could supply Bamako with milk are given in Appendix 2 (for a comparison with other sources and a discussion of such parameters see Wagenaar et al, 1985, chapter 9). According to the calculations 137,000 head of cattle provide an annual milk production for human consumption of between 4,000 and 11,000 tons (see Appendix 2, point 4). A crucial parameter then is the partition of total production between home consumption and marketed output. The Office Malien du Betail et de la Viande (OMBEVI) has found out that on average about 20% of the total milk offtake for human consumption are sold from those herds which are managed by the herd owners themselves. The rate of "commercialisation" is given as 80–90% for those herds where a hired herder ("berger") is in charge (see OMBEVI, 1983 a, p. 53). Herders often receive milk as part of their salaries. The average annual rate of commercialisation over all herds is assumed to lie between 40 and 50%. In a recent follow-up survey to the present study von Massow and Kone (1985) found an average rate of commercialisation of 35% in the dry, and 63% in the rainy season, among 35 herds in the vicinity of Bamako. The annual average is 56%. The supply of marketed fresh milk in and around Bamako can thus be calculated to range between 2,200 and 4,800 tons per annum (see App. 2, point 5). About three quarters of this supply—83% according to the findings of van Massow and Kone (1985)—will reach the market during or shortly after the rainy season when more fodder is available.

1.05 It is important to note, firstly, that the above calculation uses standard parameters averaged over time, space and different producers. The actual quantities of milk produced and supplied annually in the area around Bamako may fall short of, or exceed these figures substantially. The alternative calculations in Appendix 2 already indicate the variability of results which must be expected when the parameters are varied according to different sources of information. Average milk yield per cow per day and the rate of commercialisation in particular, have a significant influence on the resulting marketed milk supply. This attaches a big question mark to calculations such as the one above. It also shows that relatively large effects may result from seemingly small changes in one or more of the milk production and utilisation parameters. Second, the calculation of milk supply around Bamako does not yet tell us how much of this supply is actually sold in the city of Bamako rather than in the villages where it is produced. If we assume that half of the marketed milk production is sold either directly or through intermediaries to consumers in the city, the supply of local fresh milk to Bamako amounts to between 1,000 and 2,500 tons annually. In a similar calculation OMBEVI (1983 b, p. 34) arrives at about 400 t of milk that would be readily available only from the. "concessions rurales" (a set-up of mixed smallholder farms located in the surroundings of Bamako which are organised in cooperative association, supported by the Malian Government). This amount is believed to be immediately accessible .for processing by the dairy . plant Union Laitiere de Bamako (ULB).

According to the same source, another 250 tons could be made available with the help of some extension work and assistance in supplementary feeding. OMBEVI has estimated that a total of about 700 tons of milk per year are available for commercialisation from the "concessions rurales" (OMBEVI, 1983 a, p. 53). But not all of it would be within the reach of ULB. Such figures, however, can only be used as rough indicators of the level of production and supply of milk around Bamako:

1.06 The factors which hamper better performance in milk production have been listed by Kone (1983, p. 5 f). They include climatic and socio-economic constraints as well as the technical basis for milk production, e.g. the availability of feed, the genetic potential, or the quality of herd management. The short-term government policies discussed in this paper can only influence economic constraints. Indirect effects on production technology can result if milk producers take more initiative towards investment, say in genetic improvement. of their herds, once the, economics of milk production are favourable in the long run. reduction costs per litre of milk, however, vary substantially between farm enterprises. Veterinary expenditures per year and animal ranged between FM 650 and FM 4,370 in those, enterprises analysed by OMBEVI (1983 b, p. 27). Levels of feed supplementation ranged from FM 1,000 to FM 13,200 per year and animal. OMBEVI also compiled total costs of producing milk for one dairy farm over different years. They varied between FM 189 and FM 281 per litre (value added tax not included; see OMBEVI 1983 b, p. 74). The recent study by von Massow and Kone (1985) on traditional milk production around Bamako arrives at average total costs per litre of FCFA 83 (= FM 166 ; the Franc CFA has replaced the Malian Franc as the national currency from July 1984 onwards; the official exchange rate at that time was FM 100 = FCFA 50). We will come back to the question of production costs and farm-gate prices for milk in Chapter Five when the role of ULB in dairy development is discussed.

1.07 The last issue in this chapter concerns on-farm processing of milk. Soured milk ('lait caille'), cheese, butter and ghee can be produced by using simple low input technology (see Kone, 1983, P. 8). The advantages of such processing activities are better storability, more flexible marketing, and in some cases income increases by way of the value added through processing. There is no quantitative information available about the extent of on-farm processing. The results by von Massow and Kone (1985) suggest, however, that the transformation of fresh milk into other products only takes place for the purpose of home consumption. The price ratios between fresh milk and processed milk products appear to favour the sale of fresh milk. Occasionally, petty traders are forced to sell some residual unsold amounts of their collected milk as 'lait caille', but the quantities involved seem to be negligible.

Consumption of dairy products

1.08 Total consumption of milk and dairy products can be calculated by adding total net dairy imports (in LME) to domestic milk production. The figures in Appendix 3 indicate that milk production in Mali has now (1982/83) again reached the pre-1972/74 drought level. Consumption of dairy products can be estimated at about 137,000 t LME, with 22% of it coming. from imports. This amounts to an average annual consumption per caput of 18 kg LME over the whole country. With human population growing by 2.6% on average per year (World Bank 1983, Ann.19), dairy consumption per caput has been declining in relation to the 1968-70

average of almost 22 kg LME. These aggregate figures must, however, be carefully interpreted. Firstly, data on milk production result from calculations with standard parameters based on total livestock numbers, similar to the calculation presented in Appendix 2. Secondly, within Mali there are large regional differences in milk production, in the availability of imports, and consequently in dairy consumption per caput. Thirdly, the present level of consumption and the respective rate of self-sufficiency in milk of 78% (1983) do not yet tell us whether or not milk consumption per caput is sufficient. To meet the publicly announced consumption target of 40 kg annually per head of population (Gouvernement de la Republique du Mali, 1981), dairy imports would have to be mope than six times their present level—resulting in a degree of self-sufficiency of 35%—if domestic milk production cannot be increased in the short run. Or, at constant levels of dairy imports, milk production would have to increase by 150 to reach the consumption target of 40 litres per caput (calculated for the 1983 population).

1.09 Before we provide some calculations on milk consumption in Bamako, where most imported dairy products are consumed, we shall briefly discuss the question of nutritional status in Mali. According to the World Bank (1983, Ann. 24), the Maligns on average are only provided with 85% (1980 figure) of their theoretical calorie requirements. More detailed case studies in rural areas substantiate this assessment, particularly for children (see IDRC, 1980). Alongside the higher vulnerability of special groups, there is also a seasonal and a regional differentiation (see Traore et al, 1983, p. 8 f). The most problematic period with regard to the availability of basic foodstuffs is during the "soudure", i.e. the last weeks or months before the new harvest when stores run low (usually between July/August and late September). Systems where milk forms a relatively greater proportion of the average diet than grains are generally better armed against seasonal shortages (see Wagenaar-Brouwer, 1986). They are pastoral rather than crop-based farming systems. The overall nutritional situation of pastoralists whose diet mainly consists of milk is nevertheless worse than that of agriculturalists whose diet is based on grains. The nutritional situation thus deteriorates towards the drier north. Urban populations usually have better means to acquire their basic needs. Their governments, of whatever political colour they may be, often take better care of them than of the rural population (see Bates, 1983). Yet even in Bamako children have been found to suffer from malnutrition (Service de la Nutrition, personal communication). In qualitative terms, the major shortcomings of the average diet, particularly among children and pregnant or lactating women, are iron and vitamin A and C deficiencies. Protein-energy-malnutrition (PEM) is prevalent in many parts of the country (see Mondot- Bernard, 1980, p. 78). Milk and also fish are two of the products traditionally consumed in Mali which because of their ingredients have the potential to alleviate PEM as well as part of the vitamin deficiencies (see Wagenaar-Brouwer, 1986 and Service dela Nutrition, n.d.).

1.10 Imports of dairy products can contribute to an improvement of the nutritional situation. The distribution of dairy imports between different consumer groups or areas in Mali, however, is not exactly known. A partition can tentatively be deduced from the kinds of dairy products imported with their retail price and storability as the criteria of distinction. Table 1 gives the results of such a partition of dairy imports for the year 1982.

Table 1. *Dairy imports into Mali by product group and tentative partition. between consumer groups and areas of consumption (1982).*

Kind of dairy product	Quantity t LME	%	Import value 000$	%	Probable area and group of consumption[1]
Luxury dairy products[2]	2,872	9.7	1,360	29.8	90% Bamako[3]; high income[4]
Dry and condensed milk in cans[5]	17,960	60.7	3,200	70.2	60% Bamako; low/medium inc
Skim milk powder and butter-oil as food aid[6]	5,855	19.8	–	–	all Bamako; low/medium inc.
Project food aid	2,889	9.8	–	–	rural areas; lowest income
Total imports	29,576	100	4,560	100	–

1. The partition is realistic but not based on direct evidence. Its basis are practical considerations (liquid milk from ULB cannot, without cooling facilities, be transported beyond Bamako) and information acquired from various sources in Bamako.

2. Includes fresh milk, butter, cheese and similar products.

3. Only a few major towns besides Bamako are supplied with luxury dairy imports. They are Bougouni, Kayes, Koulikoro, Mopti, Segou and Sikasso. Hot all of them, however, necessarily receive all kinds of products.

4. No quantitative information for the definition of income groups is available.

5. Subject to the import monopoly for the parastatal Societe Malienne d'Importation et Exportation, SOMIEX (see Chapter Two, para 2.05 f).

6. To be reconstituted by ULB (see Chapter Two, para 2.12 f).

Source: Own calculation based on FAO Trade Yearbook 1982; FAO 1984 and SOMIEX, personal information.

1.11 According to Table 1, about 65% of total dairy imports, including food aid, are consumed in the Bamako area. 25% are sold in other towns, and 10% are part of project aid like "Food for Work Programmes" of the World Food Programme (WFP). Those commercial imports which are consumed outside Bamako provide about 10 kg LME per head of population in the towns and surrounding districts mentioned in footnote 3 of Table 1. The calculation is based on a total urban population of 733,000 (1982) in all these towns together (based on Annuaire Statistique, 1981, p. 31 and Cohen, 1979, p. 24 f). Any figures concerning the consumption of imported dairy products outside Bamako may, however, be overestimated and the respective quantities may not be reached in every single year. This is due to constraints in the transport system, and SOMIEX also has problems to maintain and administer its retail shops in the more remote areas.

1.12 The total number of people who satisfy parts of or all their demand for food in the city of Bamako can only be estimated. Cohen, in 1979, projected a total of 620,000 inhabitants for 1985 (Cohn 1979, p. 32 medium range estimate). This figure appears to have been over taken by reality. The numbers most quoted at present are a population of 700,000 in Bamako itself plus

some 50,000 in the near vicinity who buy part of their consumption needs in the city. On the bases of these 750,000 people, per caput consumption of dairy products originating from imports approaches 26 kg LME. At an annual supply per caput of between 1 and 3 kg of locally produced fresh milk (based on a total supply of 1,000 to 2,500 tons, see the calculation in the previous chapter), consumption would steel exceed the unofficial estimate of 23 to 25 kg (Service de la Nutrition, personal communication). Both estimates, however, are well below the government's target for milk consumption of 40 kg per caput. They substantially fall short of the 62 kg per caput defined by FAO as the average milk consumption to be maintained for a balanced diet (see ILCA, 1979, p. 4).

Trade in milk and dairy products

1.13 We need to distinguish between internal trade in milk and dairy products which links domestic producers with consumers; and external trade which provides the balance between domestic consumption and production. Mali is a net importer of dairy products and no dairy exports have to be considered. Internal and external trade are linked in two ways. Internal trade channels for domestically produced milk and milk products can also be involved in the distribution of imported commodities. On the other hand, they are a decisive factor in determining the competitive performance of the domestic milk sector against imported dairy products.

1.14 Growth in imports of dairy products into Mali has not been spectacular since the mid-seventies. Between 1968 and 1972,however, total dairy imports increased from less than 1,000 t LME annually to over 15,000F t LME and more than doubled in the following year (see App.3). At the peak (in 1975) of this development, which was caused by the 1972–74 drought in the Sahel, Mali imported almost 55,000 t LME of dairy products. 38% of these were in the form of food aid, whereas less than 3% were 'luxury' dairy products like fresh milk, butter and cheese. At present (1982 figures), about 30% of the total of 30,000 t LME are in the form of food aid and 10% are 'luxury' products. The remaining 60% are imports of milk powder and condensed milk in cans (see Table 1 in Chapter One, para 1.10). Two-thirds of the almost 9,000 t LME of food aid consist of skim milk powder and butter-oil from the EC to be used for industrial reconstitution by ULB. The rest comes in as part of project food aid like the WFP's "Food for Work Programmes". The rate of self-sufficiency, i.e. the share of domestic production in total consumption (which is domestic production plus total imports) went down from almost 100 in the late sixties to 51% in 1974. Since 1979, it has been relatively stable at between 76% and 80%. Per caput consumption also remained about constant during this period (see App. 3).

1.15 The development of import values is similar to that of volumes. Expenditures for commercial dairy imports. (in current terms) reached a peak of 8.02 million in 1974, equivalent to FM 3.86 billion or 13% of the value of total exports from Mali. After an intermediate period with lower levels, expenditures for dairy imports have now again reached $ 4.56 million (1982) which almost equals the 1974 level in terns of national currency. The share of foreign exchange earnings (value of all exports) spent on dairy imports has been between 2% and 4% since 1977. If food aid is valued at commercial prices for the respective commodities, its share in the total import value, i.e. expenditures for commercial imports plus the value equivalent of food aid, is 27% at present (1982). Expenditures on 'luxury' dairy products make up for 22% of the total

import value (including the value equivalent of food aid) which figure exceeds the respective share in volume terms of 10% (see above). As can be seen from Table 1 in Chapter One, para 1.10, the share of 'luxury' imports in actual expenditures equals 30%.

1.16 Annual expenditures on dairy imports into Mali increased by almost 80%, to FM 2.98 billion, between 1979 and 1982. Only 8.6% of this increase were due to the effect of increases in volumes, whereas 85.5 and 5.9% were due to rising unit values (prices) and the combined effect of rising prices and volumes respectively (see the formula in App. 6). Growing expenditures for dairy imports (expressed in Malian Francs) thus largely reflect changes in international prices and in the exchange rate rather than changing import volumes. In real terms, deflated with the consumer price index for the Bamako markets (Annuaire Statistique, Mali; base year transferred from 1962/63 to 1973), expenditures for dairy imports increased by 25% from 1979 to 1982, or 7.8% on average per year. In contrast, the increase in the volume of dairy imports over the same period was 2.2% on average per year, which is less than population growth. Thus dairy imports did not contribute to an overall rise in per caput milk consumption during that time: But real expenditures per caput for dairy imports (in Malian Franc) increased.

1.17 Internal trade in milk and dairy products in Mali is not well developed. Due to long distances and poor road conditions in rural areas, hardly any milk is traded between regions. A large proportion of the milk produced is consumed directly in the producing household. There may be more trade in milk products, such as ghee, but the problem of long distances and poor road conditions will also prevent this trade from playing an important role. It can nevertheless be assumed that some areas have a potential milk surplus which could be sold to milk deficit areas—mainly the. major cities—if marketing channels were available. In the area around Bamako, the marketing function is provided by two milk collection centres of the Union Laitiere de Bamako and by specialised milk traders who collect fresh milk from producers, boil it, and sell it directly to consumers in Bamako. Petty traders provide an important market outlet for milk producers—in some cases the only one—but it is important to know more about their performance vis-a-vis ULB. In order to assess the efficiency of petty traders in providing both an attractive market outlet to producers and a reliable supply of good quality milk to consumers, a number of data are needed. They include information on the reliability and stability of services, on marketing margins, and on competition within the petty trade (see Mbogoh, 1985, p. 81 f).

1.18 It was not possible within the scope of this study to carry out a detailed empirical analysis of the trade channels which supply Bamako with dairy products. The only quantitative information available about milk trade, other than that through ULB, stems from an interview (of about 2 hours duration) with one petty trader. This single example nevertheless reveals some interesting results (data are for 1984/85). The trader, who has been in the business for 10 years, daily collects the milk from 2 villages and several individual homesteads. He does not have a competitor in his collection area. His transport capacity, on a 25 cc motorbike, is 120, l per day which he can only fully utilise in the rainy season. His clientele are consumers who he describes as 'generally rich'—though not expatriates—and who on average each take 1 to 1.5, l per day. The trader states that he travels about 180 km per day during the rains and about half that distance in the dry season. His only treatment of the milk is boiling. No cooling facilities are available. In the rainy season he occasionally has to sell some residual amounts as soured milk ('lait caille') within his village.

1.19 The trader pays a producer price of FCFA 200/l in the dry and FCFA 150/l in the rainy season. ULB's collection centres at present (1984) pay FCFA 110/l in the rainy season and do not collect in the dry season. Prices paid by consumers in Bamako are about FCFA 225/l in the dry and FCFA 200/l in the rainy season. The trader was about to raise his selling prices to FCFA 250 and 225/l respectively which he was convinced would not create any difficulty with consumers. At these price levels it is unlikely that he could succeed in topping up his profits by adulterating the milk. Appendix 7 provides a calculation of the trader's profits based on the interview. The calculation shows that petty trade in milk at present appears to be a profitable enterprise. The trader's monthly income about matches that of a mid-level civil servant in Government. According to existing legislation, a grading license is required. Absence of controls, however, lets him ignore this regulation and he does not even know what the present fee is for the license. Since 1983/84, new legislation on producing, trading and transforming milk has been under preparation (DNE, personal communication). It includes regulations to control hygienic standards, and a closer monitoring and registering of traders seems to be envisaged. Provision of high hygienic standards for milk undoubtedly deserves the Government's attention. In case these measures and the planned legislation alto at curbing petty trade in favour of other marketing channels, notably ULB, it must be asked, however, on what basis such an interference is justified. We will come back to this subject in Chapter Five where the role of ULB is discussed.

1.20 Two ULB collection centres for fresh milk provide the third milk marketing channel into Bamako, in addition to petty traders and direct producer-consumer links. These centres are located in Bankoumana and Dialakoroba, about 50–60 km south-west and south-east of Bamako. ULB's stated policy is to tie producers to the collection centres as their only market outlet. As an incentive some additional service is offered by selling animal feed (cotton seed or cotton seed cake). ULB, however, has difficulties with feed supply and the collection also suffers from irregularity. In the dry season no milk is collected at all. In addition to these shortcomings, the price offered to producers until 1983/84, was FM 170/l at the collection centre, while petty traders were offering FM 200–250/l at the farm-gate (ULB, personal communication and OMBEVI 1983 b, p.30). From a simple comparison of these prices it becomes obvious why ULB did not manage to increase its milk collections in the past. In fact, the absolute quantities of local fresh milk collected, as well as their share in ULB's total output declined over the last decade (see App. 8). In the 1984 collection season ULB increased its price to producers to FM 225/l, or FCFA 110/l respectively after the currency change. This is still less than the FCFA 150/l quoted above as paid by the petty trader. We will come back to the price comparison in the context of ULB's role in dairy development which is discussed in Chapter Five.

1.21 Two further aspects must be mentioned. Firstly, in 1984/85 ULB has started collecting more significant quantities of milk from contracted producers which they deliver at their own expense to the factory gate. Most of these producers are administrators or businessmen in Bamako and many are politically influential. They are organised in the Collective Laitiere de Bamako (Collaiba), founded in 1984. The agreement between ULB and Collaiba includes a buying price of FCFA 225/l (formerly FM 450/l) and monthly payment. The price is subject to the condition that all Collaiba producers together deliver a daily minimum quantity which is negotiated per season (ULB and Collaiba, personal communication). Secondly, increased intake of fresh milk requires special marketing on ULB's side. The sales price for reconstituted liquid milk at present is FCFA 130/l at the retail level (formerly FM 260/l) and FCFA 110/l (FM 220/l) at the

wholesale level. This price reflects the low production cost of reconstituted milk from food aid imports, but it is only half ULB's buying price for fresh milk from Collaiba and about equal to the price paid at the collection centres. At the moment there is no special ULB market outlet for locally produced fresh milk. Petty traders and producers selling directly to consumers in Bamako, however, get FCFA 200–250/l (1983/84), depending on the season (see also App. 7). A retail price for ULB's sales of Collaiba's and other locally produced fresh milk is now being negotiated with the Government. It appears that the patterns of milk trade in the Bamako area are changing at the moment and we will have to discuss the consequences which this will have for ULB and dairy policy in Mali.

Chapter Two: Dairy import policy

2.01 It is desirable to identify the objectives of a policy before going into the details of implementation. Dairy imports and dairy import policy, however, have not until recently been an area of public date in Mali or the subject of major government statements. Nor does the five-year plan 1981-1985 mention any specific objectives concerning dairy imports (see Gouvernement de la Republique du Mali, 1981). We therefore have to start from the back, starting with a discussion of the existing regulations in the field of dairy imports. We will then try and deduce the objectives which explicitly or implicitly appear to guide the Government's policy.

General regulations

2.02 All imports into Mali are subject to licensing allocation of foreign exchange and to the value added tax (VAT) of 11.11% as at 1984 (CIP, personal information). The economic effects of import licensing and foreign exchange rationing on any particular product group such as dairy products are difficult to assess. Any authorised importer is entitled to a global quota of foreign exchange but its allocation to different products remains his own decision within the respective regulations. The obvious objective behind controlling expenditures on imparts is to save foreign exchange. Foreign exchange control in this general form cannot be interpreted as a special instrument of dairy import policy.

2.03 The Government raises taxes on all food imports. Tariff rates have been subject to several amendments since 1962. Tariffs were fixed in 1967 for butter at 15% of the import value (c.i.f.), for cheese at 25%, and for all other dairy products at 10% (law No. 67–29 AM–RM, Art. 3). Also in 1967, the "Comite Consultatif du Lait" (CCL) was founded (decree No. 12, Dec. 1967), but it does not have any legislative power. Import tariffs have now (1983/84) reached a level of 40% for butter and cheese, 10% for joghurt and 5% for liquid milk. It appears that tariffs are the higher, the more expensive the product. This can be interpreted as reflecting an objective of generating funds through taxing imports as well as saving foreign exchange by reducing import demand (for a more comprehensive discussion of objectives and respective instruments of dairy import policy see von Massow, 1984 a, Part Two). Progressive import tariffs, i.e. increasing tariff rates with increasing unit values of the product imported, might also have been designed to protect the domestic processing industry. In the Malian case, such a policy would aim at favouring ULB's production of butter, cheese and joghurt relative to selling raw liquid milk. The progressive element in the tariff would thus protect ULB's processing activities rather than its sales of liquid milk from whatever source. The differentiation in tariffs for. dairy products, however, is older than ULB itself and ULB's main selling product has always been liquid milk rather than further processed products (see para 2.10 and Chapter Five). We can conclude that the objective of taxing imports of dairy products and of imposing progressive tariffs on them is generating funds for the national budget and/or saving foreign exchange. Consumers with higher incomes buy imported butter, cheese etc. and they are relatively higher taxed. The tariff differentiation would nevertheless be a welcome protection for ULB in case an increase in processing activities is considered. The special tariffs for imports of skimmed and condensed milk in cans are discussed later in connection with the regulations concerning SOMIEX.

2.04 In summary, general regulations applicable to dairy imports into Mali include an ad valorem import tax and a general value added tax. Both taxes aim at generating funds rather than— as could be assumed in the case of the specific tax — at protecting domestic milk production and processing. An import license is required for all imports including dairy imports. Equally, any expenditure in foreign exchange is subject to Government allocation. Licensing and foreign exchange rationing, like the VAT, reflect general objectives of the Government's external trade policy, i.e.. to generate revenues for the national budget and to economize on foreign exchange. Such non-specific regulations certainly affect dairy imports but we will not be able to quantify their effects.

Regulations concerning SOMIEX

2.05 The parastatal Societe Malienne d'Importation et Exportation (SOMIEX) is a major importer of food commodities which it sells in its own retail shops. Its role is to secure the continual supply of basic consumer goods at 'reasonable' prices (SOMIEX, personal information). These prices are subject to Government approval and are the same in the whole country, regardless of differences in transport and distribution costs. SOMIEX has the import monopoly for milk powder in cans and for condensed milk, including the right to authorize others to import these products. We need to discuss under which conditions the combination of retail price fixing and import monopoly is economically justified. SOMIEX officials state that the prime objective behind that policy is to benefit consumers. The two products covered by SOMIEX price fixing arid import monopoly are subject to import tariffs and the VAT of 11.11%. The tariffs are applied at fixed rates which are at present FCFA 55/kg for milk powder and FCFA 44/kg for condensed milk. These are preferential (i.e. low) rates and SOMIEX maintains that the consumers who have to pay them belong to a lower income group than those who buy imported 'luxury' dairy products and pay a higher tariff (SOMIEX, personal information).

2.06 The definition of the objective of SOMIEX's activities thus has to be refined to favouring low or medium income consumers, while still generating funds for public expenditures (this judgement is reflected in Table 1 in Chapter One, para 1.10). Throughout the years, however, SOMIEX has had to be subsidised by Government in order to pursue its 'social role' of benefitting consumers. Recently there has been a decision demanding that SOMIEX be economically viable without subsidies, despite its special role as benefactor of consumers (SOMIEX, personal information).

2.07 Bearing in mind this ambivalent set of policy objectives, we now need to clarify the reasoning behind the instruments chosen, i.e. the combination of retail price fixing and import monopoly. The import monopoly for SOMIEX is a necessary complement to the fixing of retail prices only if these prices are fixed *above* world market prices (plus transport costs). For without controlling imports, the Government could not keep domestic prices at higher levels than those on the international markets: the higher prices in Mali would suck in imports of milk powder and condensed milk until domestic prices would again equal international prices (which assumes that changes in Mali's imports do not affect world market prices, i.e. the 'small country assumption' applies). The objective of the SOMIEX regulations, however, is to benefit rather than to tax

consumers. We would thus expect that domestic prices are set below world market prices rather than above them. How can this obvious contradiction be explained?

2.08 First, SOMIEX claims that the argument of imperfect market conditions applies. It assumes that without the monopoly private traders would, in the absence of competition between them, demand higher prices than those presently demanded by SOMIEX. The perceived malfunctioning of the market mechanism is thus taken as the cause for installing a 'benevolent' parastatal institution which—through its monopoly—shall implement the politically desired prices. It is difficult to judge what really would happen if imports of the products in question were liberalised. It could be argued, however, that the best way for a Government to cope with imperfect market conditions is through a policy which ensures the functioning of the market forces (market regulation) rather than through their replacement by statal takeover.

2.09 Second, there is the argument of Mali's specific geographic situation. SOMIEX retail prices are fixed uniformly for the whole country at about cost prices c.i.f. Bamako, i.e. export prices (f.o.b.) in Europe plus transport and related costs to Bamako (SOMIEX, personal information). Transport costs, however, become higher, the further north and north-east of Bamako the imports are sold. Consumers in these areas are subsidised by a uniform price level. On the other hand consumers are taxed in the southern and western parts of the country which are closer to the importing ports (Abidjan and Dakar) than Bamako is. Cost prices in these areas are accordingly less than the uniform price level. SOMIEX prices are thus above free market prices in the south-west and below them in the north-east. To maintain uniform prices throughout the country requires some kind of import control. The SOMIEX monopoly, however, is not effective throughout the country. No figures are available about imports of dry and condensed milk in cans which are brought into Mali illegally by other traders than SOMIEX. But it is well known that in the south (Sikasso) and west (Kayes) of Mali the SOMIEX monopoly is being evaded (SOMIEX, personal information). Third, there is always a possibility that governments pursue conflicting objectives and accordingly have chosen conflicting instruments. The import monopoly for SOMIEX may reflect an objective of keeping close control . over expenditures of foreign exchange, whereas the price fixing reflects the objective of benefitting consumers.

2.10 In order to assess the validity of the above arguments we need to provide some empirical information on imports and prices for the two products. To start with, the argument holds that the import monopoly—or any other form of import control—is required in order to keep up uniform prices in those areas where they are set above free market price levels. Free market prices equal world market prices (c.i.f. Abidjan or Dakar) plus transport and distribution costs to the areas concerned. We need to know whether actual SOMIEX retail prices for milk powder and condensed milk in cans are fixed higher or lower than free market prices. We can then calculate the actual subsidy or tax on these products for consumers in different areas. It has already become clear that no import monopoly is required if the uniform SOMIEX retail prices are fixed *below* free market price levels, regardless of the area. Any competition by commercial traders would reach the market at higher than the SOMIEX prices. Imports by other traders would only meet a demand which exceeded the (subsidised) quantities imported by SOMIEX and for which consumers were willing to pay higher free market prices. The monopoly is necessary, however, if SOMIEX prices are fixed *above* free market prices in low transport cost areas, because without controlling imports, the higher prices would not prevail at the market. The revenues from

demanding higher prices in low transport cost areas can then be used to subsidise consumers in high transport cost areas. Yet, the Government needs good political or nutrition-based reasons for such a strategy since it is not justified on economic grounds.

2.11 To summarise, it has become clear that the combination of SOMIEX monopoly and price fixing is a consistent policy only if the government has special reasons for subsidising consumers in northern and north-eastern areas at the expense of those in the south and west of the country. Only then is a control on imports of milk powder and condensed milk in cans a necessary complement to the price fixing. But even then it could be limited to cover the low transport cost areas only since the danger of price cutting does not exist in other areas. In all other cases the monopoly is unnecessary or even incompatible with the Government's objectives. In Chapter Four, a quantitative basis for this discussion will be provided.

Food aid and ULB

2.12 The Union Laitiere de Bamako (ULB) was set up in 1967 with the twofold objective of helping to develop milk production in sedentary and transhumant farming areas in Mali and of providing urban populations with milk and milk products in sufficient quantities at low prices (see Kone, 1983). ULB runs the country's only dairy plant in Bamako which commenced production in 1969 with a planned capacity of 10,000 l. per day. In fact, ULB's activities are confined to the Bamako plant, support of the dairy research station Sotuba (at Bamako) and to the collection centres at Bankoumana and Dialakoroba. The Sotuba station conducts research in cross-breeding with exotic breeds and envisages the dissemination of a new standard breed (50% Montbelliard, 25% Zebu Maure, 25% N'dama; INRZFH, personal communication). Milk production from the Sotuba station is considered to be an additional benefit (ULB, personal information).

2.13 From the beginning, the creation of ULB was intended to be accompanied by external assistance. From 1969 to 1974, the World Food Programme (WFP) provided raw materials for reconstitution into liquid milk. The revenues were to be used in a fund for the promotion of dairy development which the Government allocated to the Sbtuba station (FAO, 1978 b, p. 18). At present (1984), the EC delivers 600 t of skim milk powder and 200 t of butter-oil per year as food aid to the Malian Government (free at ULB's factory gate via Abidjan, see CCE, 1983 b). The Government sells these amounts to ULB at a price of FCFA 95/kg (FM 190) for skim milk powder and FCFA 235/kg (FM 470) for butter-oil. ULB retail prices are fixed by Government directive. The Government's revenues from dairy food aid equal FCFA 104 million (FM 208 million) per year which amount is currently credited to the Commission Nationale d'Aide aux Victimes de la Secheresse in the Ministry of the Interior. The allocation of this so-called 'fonds de contre-partie' is open for renegotiation in 1986. ULB's revenues from sales of reconstituted milk, net of processing costs and of the FCFA 104 million to be paid to the Government, have to be added in order to obtain the total benefit of EC dairy food aid. ULB's net revenues from sales of reconstituted milk are equal to its total net profit if food aid deliveries are the only ingredients for production. At present, this is almost the case since ULB's collections of locally produced milk and its commercial purchases of skim milk powder are negligible.

2.14 ULB's net profit is presently taxed at a rate of 33.3% which is a special rate applicable to young industries. In the long run, the tax rate will be 50%. Of the remaining 66.7% (50% in the long run), 60% are allocated to the promotion of dairy development in Mali, and are presently used in the Sotuba research station. 35% are reserved for ULB's investment fund and 5% go to a 'fonds social' (ULB, personal information). It has not been possible to follow the further use of these amounts in the respective budgets. We will discuss these regulations in more detail in Chapter Five below.

2.15 In addition to the bulk shipments to ULB, there is also food aid coming in as part of special projects. The WFP runs "Food for Work Programmes" in several parts of the country which include milk powder in the food package. For the discussion of dairy import policy we do not have to further pursue these since no policy objectives with regard to dairy imports or dairy development are involved. The way in which the "Food for Work Programmes" are organised rules out any significant influence on domestic production or consumption of milk.

2.16 In conclusion, we can identify the following objectives and respective instruments of dairy import policy in Mali:

- To *benefit consumers* of milk and dairy products. This objective plays a decisive role in Mali's dairy import policy. It appears in the legislation concerning both ULB and S0MIEX. The instruments chosen to pursue this objective are SOMIEX price fixing for milk powder and condensed milk in cans; the establishment of ULB with external support; and the fixing of retail prices for ULB sales.
- To *generate funds* for the national budget. Tariffs on dairy imports and the taxation of ULB profits serve this objective. The generation of revenues for the Government by selling EC food aid to ULB can also be included here, although the 'fonds de contre-partie' is earmarked to serve a special purpose.
- To *promote dairy development* in Mali. The creation of ULB and research at the Sotuba station, including the use of funds originating in food aid deliveries, are explicitly designed to support the development of domestic milk production. It is also possible that by restricting imports the SOMIEX monopoly increases prices and thereby contributes to stimulating domestic production. This effect, however, has not been stated as one of the Government's explicit objectives in the context of the SOMIEX monopoly.

The first objective of consumers' benefit involves a trade-off with the objectives of fund generation and of benefitting producers. These trade-offs may be partly offset by the fact that the respective instruments to pursue the objectives are directed towards different consumer groups. Any effect on the overall price level, however, will incur a trade-off between consumer's and producer's interests.

2.17 Against this background, two main questions merge with respect to an analysis of dairy import policy in Mali. First, how successful have the policy instruments been in reaching the objectives pursued by the Government? If possible, the respective benefits to producers and consumers, in comparison to a situation without the policy, should be quantified. Second, once success or failure of dairy import policy can be assessed, what are the (economic) implications and what are possible improvements? There is not enough empirical, information available to quantify all questions and certainly there is a constraint with regard to the number of policy

alternatives that can be discussed. However, we shall follow these two main questions in the further analysis of dairy import policy in Mali as far as possible: Chapter Four provides an assessment of the economic effects of the different regulations. Chapter Five looks at policy alternatives, exemplified by the role of ULB. The discussion involves the objectives both of consumers' and producers' benefits.

Chapter Three: Factors which influence dairy imports

3.01 We have chosen a stepwise approach to determine the causes for changes in dairy imports in the past. First, the factors are analysed which are likely to have influenced domestic consumption of dairy products. Second, and independently from the first step, we discuss the factors which are likely to have determined domestic milk production. As a third step, the effects of dairy policy interventions on dairy imports are analysed. The obvious shortcoming of such a partial analysis is that it does not include possible interactions between the factors on the consumption, production or policy side. The reason for using this approach, in addition to the lack of data on the production side, is a technical one: the number of observations available (12 years, from 1972 to 1983) is not sufficient to include all explanatory variables in a multiple regression. The analysis is further confined to Bamako as the main area of consumption.

The demand side

3.02 Total consumption of dairy products in a given year equals domestic milk production plus dairy imports. In staple goods, changes in stocks have to be considered, but many dairy products have a short shelf life. Condensed milk and milk powder in cans are generally storable whereas milk powder in bags for industrial reconstitution can only be stored if appropriate facilities are available. Some of the dairy products imported into Mali will not immediately be consumed, but no figures on stocks are available. For the following calculation we assume that stocks of dairy products are constant over time. The majority of imported dairy products are consumed in Bamako (compare Table 1 in Chapter One, para 1.10). Only SOMIEX imports, i.e. canned milk powder and condensed milk, are transported to other towns in significant quantities. In the absence of accurate figures about internal trade in processed dairy products, we have to assume that the shares consumed in areas other than Bamako do not change over time. This assumption may lead to biased results for the period of the 1972–74 drought in the Sahel, but it seems fair for the remaining years. All other dairy imports almost exclusively reach consumers in Bamako, either because their price levels are too high compared to the buying power in rural areas and/or because their transport requires cooling facilities which are not sufficiently available. Both arguments apply to imports of 'luxury' dairy products, whereas only the latter applies to reconstituted liquid milk from food aid.

3.03 The following products are included in the analysis of consumption of milk and dairy products: total ULB production, 60% of total SOMIEX imports. and 90% of all imports of 'luxury' products (see App. 4 and 5 and Table 1 in Chapter One, para 1.10). All food aid other than raw materials for ULB reconstitution is assumed to be utilised outside Bamako. No figures are available about changes in the consumption of locally produced milk. The contribution of local fresh milk to total consumption must thus be ignored, except for the quantities collected by ULB. The error involved, i.e. the quantities not included in the analysis, ranges between 4 and 11% of estimated total consumption (see Chapter One, para 1.12). The error may be bigger if local milk production fluctuates substantially over time.

3.04 Factors which are most likely to have affected the development of dairy consumption in Bamako are population growth, changes in consumers' buying power, and changes in prices for milk and dairy products. We expect that changes in population and disposable incomes are

positively correlated with changes in consumption. Rising prices should lead to a decline in consumption, and vice versa, that is the price elasticity of demand is expected to show a negative sign.

3.05 The influence of the different factors has been quantified using a log-linear multiple regression. The base data for the calculation are presented in Appendix 9. The resulting regression equation reads as follows (see App. 10):

log (consumption per caput) = – 2.49

R^2 = .97) + .44 * log (SMIG index, real)

+ .97 * log (price index, real)

+ .30 * log (time trend)

+ .13 * (73/74 drought dummy

Changes in per caput consumption of dairy products in Bamako between 1972 and 1983 can be explained by changes (in real terms) in the Salaire Minimum Interprofessionnel Garanti (SMIG), by changes in real dairy prices, by a trend variable, and by the effect of the 1972/74 drought (see App. 9 and 10 for further details). The influence of population growth on dairy consumption is eliminated from the analysis by specifying the dependent variable as consumption *per caput*. The SMIG index has been chosen as income variable since no statistically significant influence of GNP per caput in real terms was found. This may be explained by the fact that GNP per caput only serves as an approximation of income, calculated on average over the whole economy. The SMIG index reflects the actual income of Government employees in Bamako who are among the main consumers of imported dairy products.

3.06 The coefficient of the SMIG index (log) in the equation above gives the income elasticity of demand for dairy products. The value of + .44 is roughly what one would expect (compare FAO, 1978 a, where an income elasticity of + .68 is given for African countries' milk demand). Between 1972 and 1983 , every 10% increase (decrease) in real available income, as expressed by the SMIG index, has led to a 4.4% increase (decrease) in demand for dairy products. The decrease of the SMIG in real terms since 1977 has accordingly contributed to curb dairy consumption (see App. 9). The price elasticity of demand for dairy products is + .97 in equation (1). That means, dairy consumption is positively correlated with changes in consumer prices. This result certainly does not comply with the general theory of demand. One possible explanation for the unexpected positive sign of the price elasticity is the choice of a synthetic average price index as independent variable. This index includes SOMIEX selling prices for condensed and dry milk in cans, the ULB retail price for liquid (reconstituted) milk, and the retail price of or butter. All prices are expressed in constant terms (deflated with the Bamako consumer price index) and are weighted with their relative shares in total dairy consumption in Bamako. The price for local fresh milk is not included since the respective quantities also are not included in total consumption (see para 3.03). The following elasticities appear if the average price index is replaced by SOMIEX retail prices for dry and condensed milk. The income

elasticity (SMIG index) increases to + .74 and the price elasticities for dry and condensed milk are – .76 and + 1.04 respectively (all variables are significant at the 1 or 10% level; together they explain 83% of the total variability). It seas that the influence of the price for condensed milk in the combined and weighted index overrules that of the price for dry milk. We still need to find an explanation for the positive sign of the price elasticity of demand for condensed milk. Since all condensed milk is. imported under SOMIEX monopoly, the quantities consumed may be determined by import policy decisions rather than by changing consumer prices. The analysis of the effects of policy decisions on quantities of dairy products imported (see para 3.13 f.) will provide us with some more information about this issue.

The supply side

3.07 It is extremely difficult to quantify the supply of locally produced fresh milk to Bamako. We can only estimate the presumed contribution of local milk to consumption by calculating with average parameters. The results approximate the absolute quantities produced in one year, but do not indicate changes over time in production parameters or in the proportion marketed. One can infer those changes from changes in prices for fresh milk in Bamako, which are published in the Annuaire Statistique (various years). We expect that prices for fresh milk, ceteris paribus, decline when supply increases, and vice versa. They should also decline when the supply of competing products, i.e. dairy imports, increases. Prices for fresh milk in Bamako should thus reflect changes in local milk supply end in SOMIEX and ULB imports or in their retail prices respectively.

3.08 Annual rainfall (in mm) in Bamako is the only factor on the supply side for which data are available. In a linear regression, a significant (negative) correlation with real prices for fresh milk emerges, but only if lagged by two years (the coefficient of –.03 is significant at the 10% level, the R square is .40). There is, however, no explanation for a 2-years tune lag between rainfall and milk prices. A regression of real prices for fresh milk on real prices for dry, condensed and ULB reconstituted milk does not yield any significant results. Nor can changes in the imported quantities of all dairy products combined explain the changes in prices for local fresh milk. Other variables that have been tested for their influence on prices for fresh milk include ULB collection and total production; SOMIEX imports; and population and income growth. All these factors could be expected to influence local milk production and the price for fresh milk. But no significant empirical evidence can be found.

3.09 The regression of real retail prices for fresh milk in Bamako on imports of dry mite in cans, ULB production and a trend variable-though not significant-produces signs of the regression coefficients. Prices increase over time, but decrease with growing imports of dry milk, both in cans and for ULB production. The substitution elasticities, however, are almost zero. This may indicate that at the present price ratios consumers of local fresh milk in Bamako do not, to any large extent, substitute fresh for dry milk. Another argument to support this assumption is the development of retail prices (in current terms) for dry milk in cans, fixed by SOMIEX, in relation to those for fresh milk. The price ratio was 8.0 on average between 1972 and 1977. With prices for fresh milk strongly increasing thereafter, the ratio fell to an average of 3.6 between 1978 and 1983. Consumers in Bamako could thus, in the first half of the seventies, buy 1 litre of fresh milk at about the sane price as the equivalent to it ire dry milk (1 kg of dry milk equals 7.6

litres of whole liquid milk, see App. 1). Since 1978, the price for 1 litre of fresh milk increased to more than double the price for the equivalent amount in dry milk. Consumption of dry milk may have been restricted by the SOMIEX monopoly. But the fact that nominal prices for fresh milk could increase despite the relative decline of those for dry milk suggests that substitution effects between consumption of these products are weak. There must be other factors on the supply side to explain changes in prices for fresh milk.

2.10 It appears that no adequate quantitative evidence exists at the macro-level to identify the factors which influence the production and supply of milk. But there may be some inferences to be made from analysing the economics of milk production at the farm level. To start with, consumer prices for local fresh milk substantially increased in nominal terms throughout the seventies. In real terms, deflated with the consumer price index, Bamako (1973 = 100), they remained about constant between FM 129 and FM 150 per litre *(*FCFA 65 to 75). The development of producer prices will have paralleled this development of consumer prices if we assume that marketing margins (in real terms) have not changed over time. If producer prices remained constant in real terms, however, one could only expect milk production to have increased if real costs of production had declined. There is no evidence of such a decline and no major technological change in milk production to reduce costs per unit output has been introduced. According to the preliminary results of von Massow and Kone (1985), a substantial part of the total costs of producing 1 litre of milk are made up by depreciation of the herd. Real consumer prices for beef in Bamako have remained about constant and real export prices for Malian live cattle have increased since 1977 (see von Massow,1984 c, App. 1). Real costs of herd depreciation have accordingly stagnated or even increased. Real costs of feed supplementation (26% of total costs; see Chapter One, para 1.06) can be approximated by taking producer prices for cotton, assuming that prices for cotton-seed have developed similarly. Prices for cotton have decreased in real terms over the last decade (see Banque Centrale, 1983, p. 14 f). But prices for transport have gone up, and milk producers often have to pay excessive prices since the demand for cotton-seed by far exceeds the supply. Herder salaries (21% of total costs) in real terms have remained constant to the extent that they are paid in kind i.e. milk. No quantitative evidence is available for the remaining cash payments and for veterinary expenditures (5%of total costs).

3.11 In summary, real costs of producing milk in the area around Bamako appear to have been about constant over the last years. At constant real prices for milk and in the absence of cost-reducing technical change this implies that we cannot expect production to have increased significantly. Combining this result with that from the analysis of milk demand in Bamako, we arrive at the following conclusion: stagnating domestic milk production and a growing population, ceteris paribus would lead to increased dairy imports and/or to a decline in per caput consumption. The decline in real available incomes, on the other hand, has reduced the demand for milk and thus decreased imports and/or per caput consumption. We now have to discuss in which direction the various import policy measures may have influenced the development of imports and per caput consumption.

Policy indicators

3.12 Changes in demand and supply for milk and dairy products indirectly affect dairy imports. But there are also direct influences on the flow of imports of dairy products. First, the major economic forces are changes in the ratio between domestic and international prices, including those resulting from a changing exchange rate, and fluctuations in the availability of foreign exchange (see von Massow, 1984 a, p.20 f.). Second, there are interventions of national policies. The instruments of dairy import policy in Mali have already been described. By way of import taxes, foreign exchange allocation and the binding of the Malian Franc to the French Franc (membership in the African Financial Community, CFA, as at present), the Government interferes with all three variables. The SOMIEX monopoly must also be taken into account since it represents a direct quantitative interference with dairy imports.

3.13 The combined effects of government policies on dairy imports have been modelled by von Massow (1984 a, p. 23 f), using a simple commodity identity. With changes in population, income and domestic milk production as independent variables, a residual term is calculated that includes the effects of policies as well as of other influences. In Mali, factors other than changes in population, income and domestic milk production have curbed the quantity of commercial dairy imports by –.3% annually over the last decade. Without these, others e.g. policy, influences, dairy imports into Mali would have grown by +.2% on average per year rather than declined by –.1% between 1972–74 and 1980–82 (for the formula see von Massow, 1984 a, App.12). This fairly rough calculation is based on aggregate national production and import data. It would need further elaboration in order to quantify the effects of national policies on imports more accurately. But we can use this result as a first approximation.

3.14 Of the macro-economic variables, only foreign exchange appears to have influenced the *value* of dairy imports in the past. A log-linear regression of total dairy import values over the availability of foreign exchange (both in $ US) between 1968 and 1982 displays a coefficient of + .86 (significant at the 1% level, the R square is .46). The results for" calculations with 1– or2– year lags foreign exchange are statistically not significant. No data are available to measure the effects of import tariffs and exchange rate setting. Changes in population and income per caput do not appear to have influenced total values of dairy imports, nor do any of the relevant retail prices. SOMIEX imports make up for a dominant part of the value of total dairy imports. Through SOMIEX, the Government can thus largely control the amount of foreign exchange to be spent on dairy imports. Our results suggest that the Government in the past indeed has used its controlling power regarding SOMIEX dairy imports.

3.15 The *quantities* of dairy products imported appear to reflect influences other than those that have been identified above to determine total import values. The SOMIEX monopoly was established by the Government without defining a particular quantitative level for imports of the two products concerned. SOMIEX is bound by import licensing and its imports are influenced by the allocation of foreign exchange. But no information could be obtained as to the internal mechanisms within SOMIEX to allocate the foreign exchange to different products. No price variable, i.e. border price, retail price or the ratio between them, appears to affect the quantities imported. Nor does the price ratio between dry milk and condensed milk affect SOMIEX imports of dry milk, and no significant influence can be found for imports of condensed milk. Total

SOMIEX imports of dairy products (in quantity terms) are nevertheless determined by population and income changes (the two variables together explain 86 % of the variability of SOMIEX imports). By this measure, the Government does not appear to have had a strong influence on the amounts of dairy products imported through SOMIEX.

3.16 Another way to assess the influence of Government policy on dairy imports is to compare domestic consumer prices with the respective unit values at the border. The price comparison can be interpreted in two ways: first, the ratio between border and (fixed) domestic prices depicts the extent to which domestic consumer price levels range above or below international prices. We can interpret the respective quotients as nominal rates of tax on or subsidy for the consumption of imported dairy products. Second, the correlation between price changes on international and domestic markets, i.e. the transmission elasticity, expresses the degree to which the Government insulates domestic prices from the fluctuations of international prices. A low transmission elasticity indicates a high degree of insulation. We thus distinguish between the degree of subsidisation/taxation and the degree of insulation (compare Scobie, 1981, p.54). The empirical results for the degree of subsidisation/taxation of dairy consumption in Mali are given in Table 2:

Table 2. *Nominal rates of consumer subsidisation or taxation for imported dairy products in Mali, 1972-1983.*

Year	SOMIEX imports						ULB imports		
	Dry milk in cans			Milk, condensed and evaporated			Reconstituted liquid milk		
	Price dom.	Border	Tax rate	Price dom.	border	Tax rate	Price dom.	border	Tax rate
	[FM/kg]			[FM/kg]			[FM/kg]		
1972	504	504	1.00	168	422	.40	140	215	.65
1973	423	423	1.00	185	462	.40	140	212	.66
1974	477	462	1.03	200	473	.42	140	215	.65
1975	670	367	1.82	275	454	.61	140	209	.67
1976	670	451	1.49	275	350	.78	140	215	.65
1977	670	409	1.64	275	369	.75	140	226	.62
1978	670	628	1.07	275	421	.65	180	250	.72
1979	670	425	1.57	275	409	.67	180	225	.80
1980	670	547	1.23	275	423	.65	180	240	.75
1981	750	714	1.05	375	505	.74	180	273	.66
1982	870	747	1.16	500	523	.96	260	289	.90
1983	990	825	1.20	440	590	.75	260	302	.86

Note: Nominal rates of tax or subsidy are calculated as domestic retail prices divided by the border prices (c.i.f.). Prices for dry, condensed/evaporated and reconstituted milk are SOMIEX and ULB retail prices respectively. Border prices are calculated at official

exchange rates. Transport costs from the border to the place of consumption are ignored. The border price equivalent for 100 litres of reconstituted milk is calculated as 9.5 times the border price for dry milk, plus 3.5 times the border price for butter-oil plus processing costs of FM 15,000 per 100 l.

Source: Own calculation based on FAO Trade Yearbook; ULB and SOMIEX, (personal information)

It appears that, since 1972, quotients for condensed milk and for reconstituted milk have been less than 1, i.e. consumption of these products has been subsidised by Government price setting. Dry milk in cans has been sold at higher than international prices, that is, consumption of dry milk has been taxed in the past.

3.17 These results need to be modified by including transport and other intermediary costs. The rate of subsidy for condensed and for reconstituted milk increases if transport costs are included; and the consumption of dry milk may also turn out to be subsidised. Second, border prices have been calculated at official exchange rates. Real degrees of consumer subsidisation or taxation would have to include distortions in the official exchange rate. Third, a regional differentiation would be needed for SOMIEX imports, since they are sold at uniform prices throughout the country. In summary, the effects of Government policy, according to the ratio between border and domestic retail prices, are as follows: Imports of condensed milk and of raw materials for the reconstitution of liquid milk have been stimulated by prices to consumers which are below the levels that would prevail in a free market situation. For dry milk in cans, we need to know transport costs in order to determine whether the price to consumers has been above or below the free market level. This interpretation assumes that consumption and imports of any product increases ceteris paribus with decreasing prices, i.e. the price elasticity of (import) demand is negative (but see the earlier discussion at para. 3.06).

3.18 The calculation of the transmission elasticity, i.e. the extent to which fluctuations of international dairy prices are transmitted to the domestic market, gives the following results: ULB prices and the SOMIEX price for dry milk show a transmission elasticity of +.47 over the period 1972 to 1983. Any fluctuation in the border price for dry milk by 1% has led to half a percent fluctuation in domestic prices (see App. 10 for the statistical significance). The transmission elasticity for condensed milk is + 1.39. The Government thus only insulated consumer prices for ULB reconstituted milk and SOMIEX dry milk from fluctuations on the international markets. By so doing it may also have intended to preserve a marketing margin for SOMIEX. But domestic prices were allowed to roughly follow world market price trends in their general direction.

3.19 In summary, the different approaches to assessing the extent to which dairy imports in Mali are influenced by the effects of Government policy do not give a uniform picture. Foreign exchange control seems to have curbed imports in terms of their total values. The effects of retail price fixing should have stimulated imports in quantity terms although changes in population and income also appear to have had s strong influence on them. The number of policy instruments involved and their contradictory effects indicate that the Government has riot pursued a coherent dairy import policy. Domestic prices for different dairy products nevertheless show a common

pattern over the last decade: dining the drought years, 1972 to 1975, retail prices for imported dairy products were low in comparison with world market prices. The availability of large amounts of dairy food aid in these years may have facilitated the setting of low consumer prices. Between 1975 and 1980/81, prices were kept constant in nominal terms with the exception of a slight rise in ULB prices. Since then, prices have risen in line with border prices (see Table 2).

Chapter Four: Economic effects of dairy imports and import policies

Changes in prices and related parameters

4.01 The effects of different dairy import policies on consumers and producers of dairy products can be calculated if the changes in prices are known which result from these policies. By comparing the resulting prices with those that would prevail in the free trade situation (which can be described as the "no policy" bench mark), we can identify who gains and who looses as a consequence of a particular policy, and quantify the respective welfare changes. Equally, the free trade situation serves as the system of reference when benefits or losses of a dairy import policy are assessed for the country as a .whole. The first question is, whether or not the country would at all produce milk if trade in dairy products were absolutely free. In other words, does the country have a comparative advantage in producing milk? We can answer this question by comparing the costs of producing one litre of milk domestically (at undistorted input prices) with the international prices, i.e the price for importing one litre of milk, or the equivalent in other dairy products, if there were no tariffs or other restrictions on trade. The country has a comparative advantage for producing milk if the cost of milk production is equal to, or lower than, the international price.

4.02 Fresh milk, as the original farm product, is not traded internationally in such amounts that its prices could be compared across country borders. But the price for reconstituted liquid milk can be derived from international prices for its ingredients, skim milk powder and butter-oil plus processing costs. With regard to the costs of producing milk in Mali, or more specifically, in the Bamako area, no time series is available. Using the production costs presented in Chapter One (para 1.06) as a rough indication, it appears that the import prices for reconstituted milk of between FM 209 and FM 302 as given in Table 2 (Chapter Three, para 3.16) are in the same general range as the costs of between FM 189 and FM 281 given by OMBEVI (1983 b). Average total costs per litre given by von Massow and Kone (1985), at FCFA 83 (FM 166) for traditional herds, are below the respective import price. However, none of these cost estimates are statistically representative; marketing costs to Bamako and transport costs from the border to Bamako respectively are not included; no information is available as to what extent the costs of milk production include taxes or subsidies on inputs; and, above all, no correction has been made to account for differences in quality between fresh and reconstituted milk. There may be an economic argument for producing milk in the Bamako area, but no firm conclusion can yet be drawn.

4.03 Alternatively, with no statistically reliable data on production costs available, comparative advantage can be estimated by using data on market prices for milk as proxies for data on production costs. This assumes, if it is to be valid, an undistorted input structure and an economically efficient marketing system. Consumer prices for local fresh milk on the Bamako market have gone up steadily from FM 145 per litre in 1974 to about FM 400–450 in 1984 (FCFA 200–225; see Figure 1) . By that measure, local milk supplies to Bamako since 1977/78 have been produced at costs higher than the comparative international prices for reconstituted milk. However, as has already been argued by von Massow (1984 b, p.16), milk producers

around Bamako are able to compete with international supply if the consumers have a strong preference for fresh over reconstituted milk. There is indeed some evidence that this is the case: reconstituted milk is sold by ULB at a constant price throughout the year, which is only about half the price for fresh local milk. Nevertheless, ULB's sales seem to be affected by the supply of fresh milk into Bamako. On average between 1979 and 1982, ULB's monthly output of reconstituted milk reached 113 of the annual average between March and July, i.e. before the rainy season when fresh milk is in short supply, but only 84% between November and February, i.e. after the rains when fresh local milk is in relatively abundant supply (ULB, unpublished documents). Seasonal fluctuations in total demand will have contributed to this development but it seems likely that the availability of supplies of fresh local milk also impaired ULB sales. It may be, however, that only a small group of high income consumers is willing to pay the premium for fresh milk.

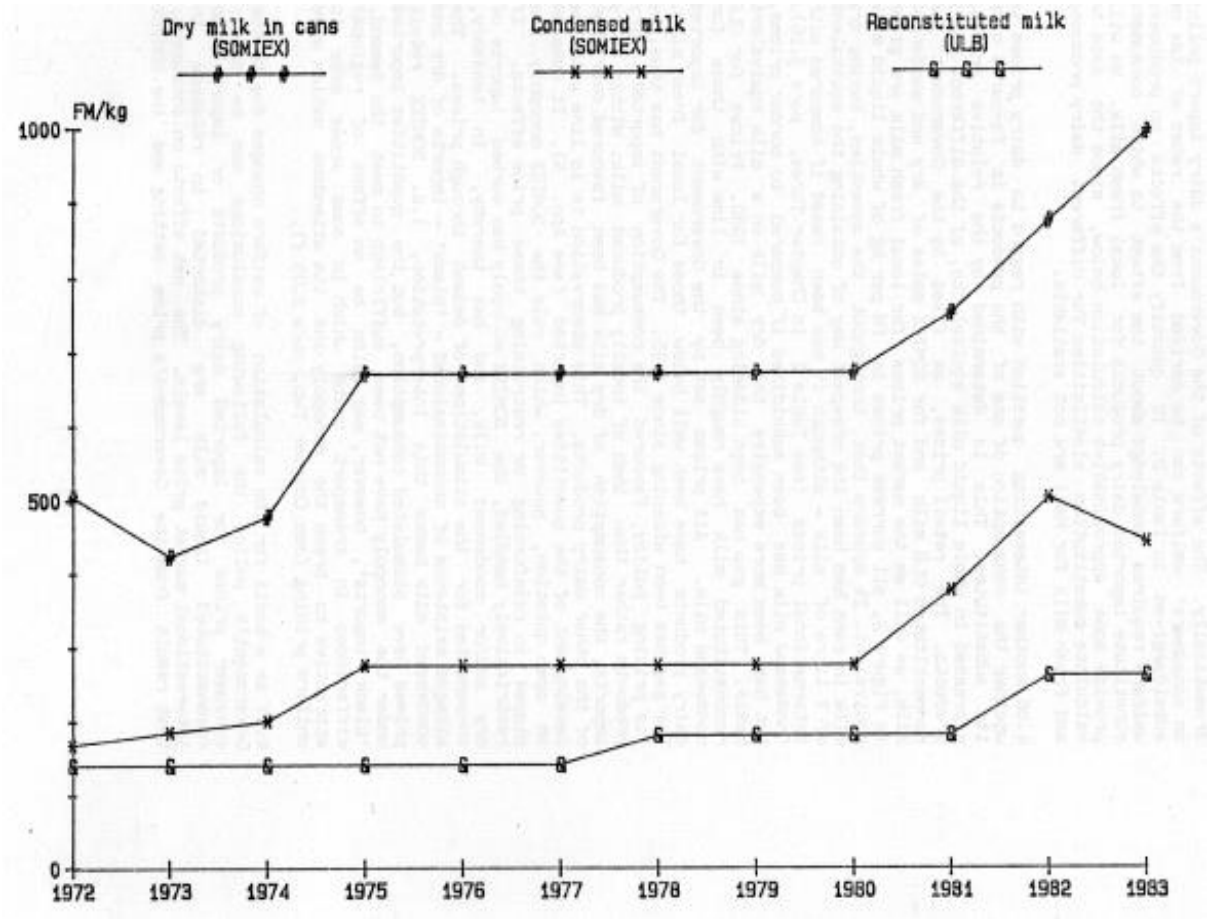

Figure 1. *Retail prices (in current terms) for different dairy products in Bamako, 1972-83.*

4.04 The calculation using consumer prices arrives at the same conclusion as the one using production costs. Both suggest that there seems to be an economic argument for supplying Bamako with locally produced milk. More accurate data are needed in order to verify this conclusion. The more strongly consumers in Bamako prefer fresh rather than reconstituted milk, the more a comparative advantage for local milk production is likely to hold.

4.05 Against this background of an assessment of comparative advantage we can move on to identifying the price changes which result from Government policies. Taking import prices (c.i.f.) at official exchange rates to approximate free trade prices, we can then compare them with domestic market prices. According to the results in Table 2 (Chapter Three, para 3.16), domestic retail prices for reconstituted milk have been subsidised by about 20% in the last few years. The price setting for dry milk has been taxing consumers, whereas condensed milk, like reconstituted milk, has been subsidised if compared to international price levels. Dry and condensed milk, which are most prominent in dairy imports, are currently not produced in Mali. That means, no direct competition with local supplies takes place. The price difference between fresh and reconstituted milk indicates that these two also have to be treated as different products Consumers will nevertheless substitute between all the products, once the price ratios change dramatically. The effects of the Government's dairy import policy on consumers' welfare can be derived from the rates of tax or subsidy given in Table 2. To quantify the effects on producers welfare requires knowledge about the extent to which consumers substitute imported dairy products for local fresh milk. We will provide some approximative calculation below, since the data to calculate substitution elasticities for different dairy products and fresh milk for Mali are not available.

4.06 Another interesting question with regard to dairy prices is whether the consumption of one of the products is favoured over its substitutes. This is determined by the relative prices, expressed in whole liquid milk equivalents, of the different dairy products. The retail prices, as fixed by the Government for reconstituted ULB milk and for SOIMIEX sales of dry and condensed milk, as well as the market prices for local fresh milk are given in Figure 2, all current prices in FM per kg of whole liquid milk equivalent. It appears that, throughout the seventies, buying dry milk in cans has been the cheapest way of obtaining the equivalent of 1 litre of milk - although it has been taxed if compared with international prices (see Table 2 in Chapter Three, para 3.16). Condensed milk has been subsidised if compared to border prices, but has been more expensive than dry milk on a milk equivalent basis. This gap has been widening since 19$0. Prices for ULB reconstituted milk have roughly been in line with those for condensed milk. All prices set by the Government for imported dairy products have been well below those for local fresh milk. The gap has been widening since 1975. The Government has thus, by its pricing policy, favoured the consumption of imported dairy products rather than that of locally produced milk. Within dairy imports, the consumption of dry milk has been favoured over that of the other dairy products. This observation is in line with the development of the quantities imported (see App. 4). It remains an open question, however, which role the SOMIEX monopoly has played in reinforcing or restraining these price effects. If restrictively handled, the SOMIEX monopoly has curbed imports of dry and/or condensed milk, and has thereby, in tendency, compensated for the stimulation of demand through prices. The alleged existence of uncommissioned 'black' imports of dry and condensed milk backs this interpretation, i.e. SOMIEX retail prices have stimulated consumption, but the quantities imported under the monopoly have not been sufficient to meet the demand. 'Black imports', however, may also be an effect of regional differences in transport costs which in some areas make it attractive to break the monopoly and its attendant nation wide uniform pricing (see Chapter Two, para 2.09 f).

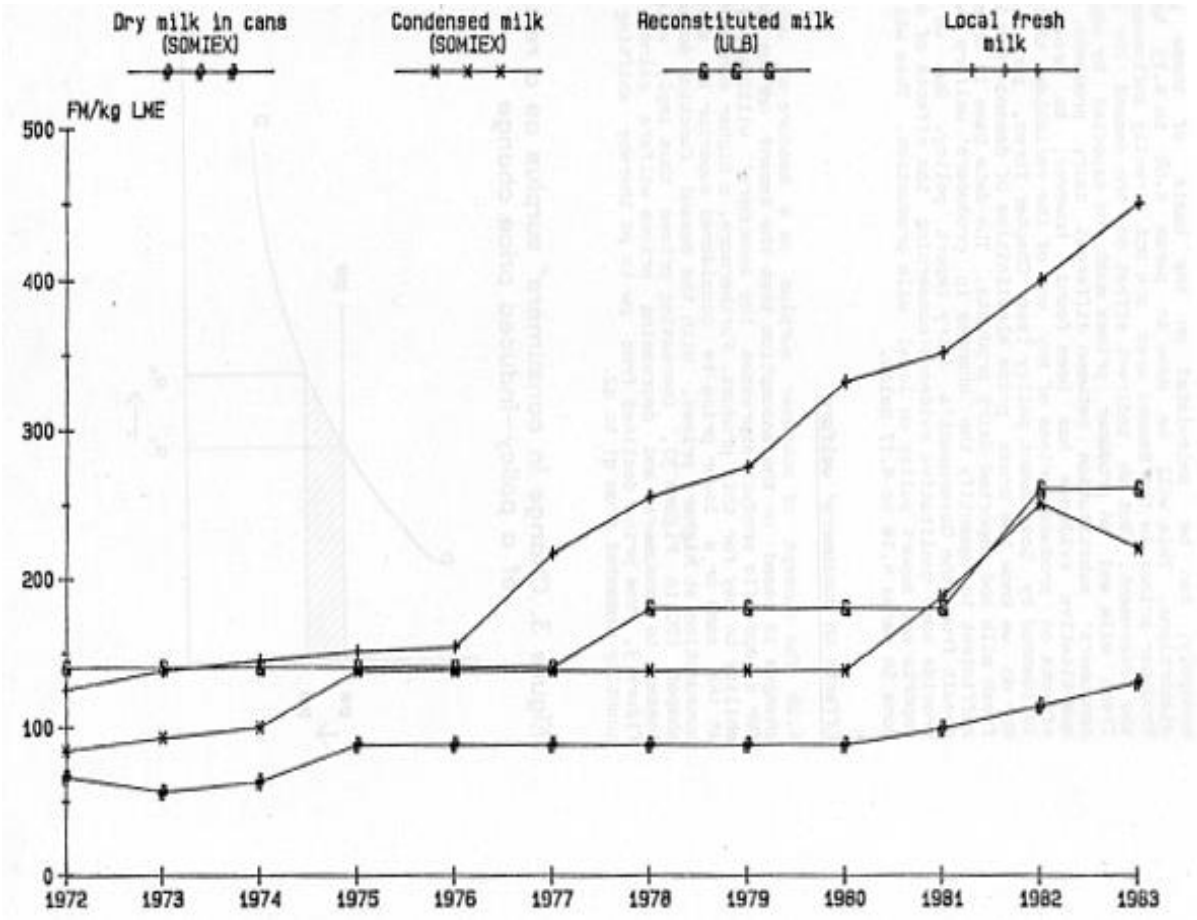

Figure 2. *Comparative retail prices fin current terms for different dairy products in Bamako (Whole liquid milk equivalents) 1972-83.*

4.07 As a basis for the calculation of welfare changes due to the Government's policy the following conclusions can be drawn: consumer prices for imported dairy products or import-based reconstituted liquid milk are distorted in relation to international market price levels. The net effects on consumers, that result from the Government's price setting and the SOMIEX monopoly, can be calculated on the basis of these price distortions. This will be done in paras 4.08 to 4.13 below. Producer prices in the Bamako area are not directly influenced by the Government. But an indirect effect on the demand for local fresh milk and on producer prices must be expected by way of consumers' substitution between different dairy products. No quantitative evidence has been found, however, to prove the effects on producer prices of any one of the variables that are influenced by Government policy (see Chapter Three, para 3.08): Nor do we know the cross price elasticities of demand for local fresh milk and imported dairy products. The data base is thus not sufficient to quantify the changes in producers' welfare which result from the Government's dairy import policy. But we will provide some qualitative evidence concerning the effects of dairy imports and import policy on local milk production. This will be done in paras 4.14 to 4.17 below.

Effects on consumers' welfare

4.08 The concept of consumer surplus as a measure of welfare changes is based on the assumption that the demand on the market for a specific product expresses the consumers' willingness and ability to pay for this product. Furthermore, a higher consumption at the same or a lower price is considered superior to a lower consumption at higher prices. With the demand function normally shaped (DD in Figure 3), increasing prices thus imply welfare losses to consumers and decreasing prices welfare gains. In figure 3, the price declines from pw to pd thereby shifting the quantity demanded from q1 to q2.

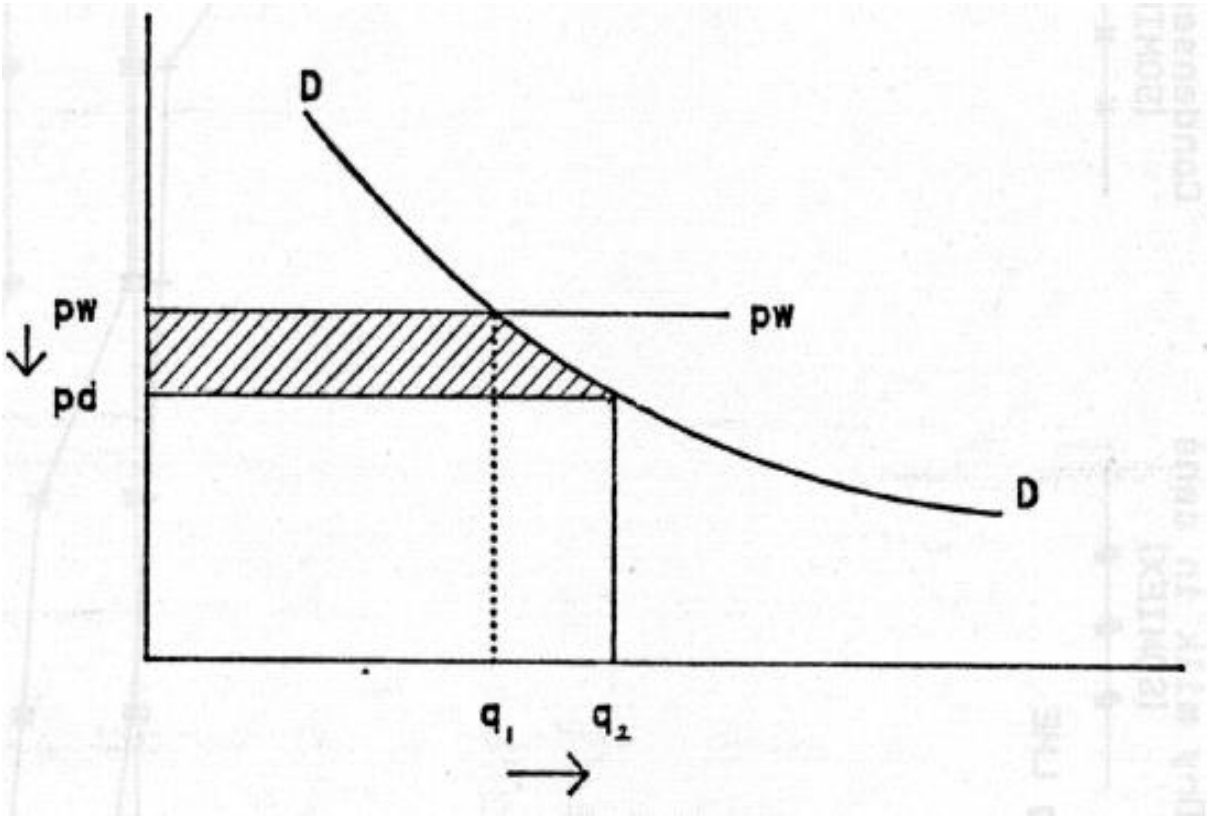

Figure 3.*Change in consumers' surplus as a result of a policy-induced price change.*

The following calculation is a partial welfare analysis for individual dairy products. It compares the actual prices and quantities consumed with those that would prevail in the "no-policy" case, i.e. when domestic prices equal international prices. The different price levels for those products which are influenced by dairy import policy in Mali, i.e. dry, condensed and reconstituted milk, have already been given in Table 2 (Chapter Three, para 3.16). Assuming constant elasticities, the demand function for a single product (i) is

(1) $D_i = b_i * pd_i^e i$,

with D = demand, b = variable factor including all non-price influences, pd = domestic price, and e = price elasticity of demand. The change in consumers' surplus (2) arising from a policy which distorts domestic prices away from the level of international prices is equal to

(2) $CCS_i = - b_i /(e_i +1) * (pd_i^{e+1}i - pw_i^{e+1}i)$,

where pw = the international price at the point of crossing the border. In figure 3, the change in consumers' surplus is positive and is denoted as the shaded area below the demand curve DD and between the two prices pw and pd. It is assumed in equations (1) and (2) that the cross price elasticities of demand between different dairy products is equal to zero. That is, in such a partial analysis, consumers do not substitute between, for example, dry and reconstituted milk when prices change.

4.09 The results of equation (2) are given in Table 3 for those three dairy products which are influenced by Government policy. Since the price elasticities of demand for the single products could not be isolated from other effects, different levels of price reaction have been assumed. It appears that at price elasticities of 0, –.25, –.5, –.75 and –1 respectively, the changes in consumers' surplus from 1972 to 1983 have been negative for dry milk in all years with the exception of 1972/73; positive for condensed milk throughout the years; and positive also for reconstituted milk. Consumers have thus benefited from Government policy concerning condensed and reconstituted milk. The sensitivity of the absolute amounts to changing elasticities is relatively low. The differences in consumers' surplus between elasticities of 0 and –1 are 12%, 25% and 16% of the total change on average over all years for dry, condensed and reconstituted milk respectively. The same differences between elasticities of –.25 and –.75 are 6%, 11% and 8%.

Table 3. *Partial analysis of changes in consumers' surplus due to dairy import policy in Mali, 1972–83.*

	SOMIEX		ULB
	Dry milk in cans	Condensed milk	Liquid Milk
Year	Change in consumers' surplus (million FM)		
1972	.3	184.0	90.1
1973	.3	313.8	114.6
1974	–38.4	1184.8	161.6
1975	–1217.3	459.4	160.2
1976	–843.3	106.2	240.0
1977	–878.0	104.0	315.3
1978	–98.8	41.9	274.9
1979	–544.4	157.3	148.7
1980	–220.0	65.9	214.0

1981	–59.0	168.3	398.4
1982	–268.0	22.6	159.0
1983	–345.0	97.0	278.2
Total	–4511.6	2905.2	2555.0
Annual average	–376.0	242.1	212.9
(e = – 0.5)			
Annual average for			
e = 0:	– 340.7	291.7	233.2
e = –1:	– 418.2	193.2	194.8

Note: For the equation see text. The calculation assumes a price elasticity of demand (e) of –.5 for all three products. The analysis is "partial" in the sense that all cross price elasticities are assumed to be zero.

Source: Own calculation based on FAO Trade Yearbook; Annuaire Statistique.

4.10 The partial calculation as presented in Table 3 can be extended to include the effects of Government policy on all three products and the substitution effects between products. The respective equations for products (i), (j) and (k) are

(3) $D_i = b_i * pd_i^e i * pd_j^e ij * pd_k^e ik$,

(4) $D_j = b_j * pd_j^e j * pd_i^e ji * pd_k^e jk$, and

(5) $D_k = b_k * pd_k^e k * pd_i^e ki * pd_j^e kj$,

with $e_{ij} = e_{ji}$; $e_{ik} = e_{ki}$; $e_{jk} = e_{kj}$.

The resulting total change in consumers' surplus when shifting from international prices (pw) to the actual situation (pd) is denoted as

(6) $CCS = b_i/(e_i+1) * (pd_i^{e_i^{+1}} – pw_i^{e_i^{+1}}) * pw_j^e ij * pw_k^e ik + b_j/(e_j+1) * (pd_j^{e_j^{+1}} – pw_j^{e_j^{+1}}) * pd_i^e ji * pw_k^e jk + b_k/(e_k+1) * (pd_k^e k^{+1} – pw_k^e k^{+1}) * pd_i^e ki * pd_j^e kj$.

In this calculation, first the price for product (i) is shifted from (pw) to (pd). Prices for products (j) and (k) are shifted subsequently. The results of inserting the respective data for dry, condensed and reconstituted milk as products (i), (j) and (k) respectively in equation (6) are given in Table 4:

Table 4. *Analysis of. total changes in consumers' surplus due to dairy import policy in Mali, 1972–83.*

Year	SOMIEX		ULB	Total
	Dry milk in cans	Condensed milk	liquid milk	dairy products
	change in consumers' surplus (million FM)			
	- All cross price elasticities = 0.5			
1972	1.3	697.1	175.4	873.8
1973	0.5	661.5.	162.5	824.4
1974	–52.4	680.7	186.2	814.E
1975	–1456.6	247.7	164.1	–1044.7
1976	–898.7	113.3	177.0	–608.4
1977	–1147.9	142.2	200.2	–805.5
1978	–167.0	198.1	263.5	294.7
1979	–990.0	174.7	174.2	–641.1
1980	–494.0	196.6	228.3	–69.1
1981	–99.8	153.6	293.5	347.3
1982	–279.2	23.1	188.7	–67.5
1983	–384.0	164.3	270.4	50.7
Total	–5967.7	3452.9	2484.0	–30.9
Annual average	–497.3	287.7	207.0	–2.6
-All cross price elasticities = 0				
Total	–4186.6	2851.4	2503.4	1168.2
Annual average	–348.9	237.6	208.6	97.4
-All cross price elasticities = 1				
Total	–8505.3	4174.1	2474.3	–1856.9
Annual average	–708.8	347.8	206.2	–154.7

Note: For the equation see text. The calculation assumes a price elasticity of demand (e) of –.5 for all three products. The slight differences between the results of the partial analysis in Table 3 and of the full analysis at cross price elasticities = 0 in this table are due to the calculation with average intercepts (b) in the full analysis. The averages reflect different phases in the Government's price setting (see Figure 1, para. 4.03). They cover the periods 1972–74, 1975–80 and 1981–83 for dry and condensed milk (SOMIEX), and 1972–77, 1978-81 and 1982–83 for reconstituted milk (ULB). That means the (b) for SOMIEX products for the years 1972, 1973 and 1974 are taken as av. 1972–74, etc.

Source. Own, calculation based on FAO Trade Yearbook; Annuaire Statistique.

4.11 By including substitution effects between the three dairy products, the changes in total consumers' welfare originating from Government policy for dry, condensed and reconstituted milk are calculated. Assuming cross price elasticities of 0.5, the Government's dairy import policy shows very little effect on consumers' welfare (FM – 2.6 million on average per year) if compared to the no-policy situation. Consumers will have gained an average annual benefit of about FM 100 million if no substitution between dairy products occurs. If cross price elasticities are significantly greater than 0, the consumers are apt to have lost. The price setting for condensed and reconstituted liquid milk shows positive effects on consumers' welfare in all alternatives whereas dry milk prices have had negative effects.

4.12 Several caveats need to be borne in mind when interpreting these results: First, the calculations in Tables 3 and 4 are based on assumptions about the own price elasticities and cross price elasticities of demand for dry, condensed and reconstituted milk. The empirical findings seem to indicate that cross price elasticities are close to zero, although it is hardly conceivable that consumers do not substitute between dairy products once relative prices change dramatically. The prices for dry, condensed and reconstituted milk, however, as shown in Figure 1 (Para 4.03), have developed parallel to each other in the past. The Government's price setting will thus not have stimulated major shifts in the consumption of different imported dairy products. Second, transport costs from the border to the respective area of consumption are ignored. Their inclusion modified the results. Border prices increase in comparison to those calculated in Table 2 (Chapter Three, Para 3.16) if transport costs are included. That means, positive changes in consumers' surplus become higher and negative ones are reduced or even converted to positive. In the Malian regional context this implies that total welfare gains for consumers are the lower, the more imported dairy products are traded in the south and west of the country. Third, domestic retail prices for reconstituted milk have been compared, with commercial border prices for skim milk powder and butter-oil. But the bulk of imports of these products is food aid, i.e. free of charge to the Malian Government. The comparison is based on the assumption that to benefit consumers is not the only objective of this food aid. If it was, the appropriate calculation would be to compare the actual prices with cost prices, i.e. only the costs of ULB processing and distributing activities. In reality, however, the objective of the food aid is twofold: to benefit consumers *and* to help develop domestic dairy industry. It is thus legitimate to measure the distortions arising from Government price setting in relation to international prices, rather than to cost prices, since the border prices determine the economically optimal price level for both consumption and production (see the discussion of comparative advantage in Para 4.01 f.).

4.13 Summarising the results and their modifications it appears that the inclusion of transport costs would increase the calculated consumers' surplus whereas the regional distribution of dairy imports in Mali tends to decrease it. In any case, total welfare effects for the consumers of daisy products are not dramatically large. The benefits arising from lowered prices for condensed and reconstituted milk are about compensated by the losses through higher prices for dry milk in cars. The Malian Government, by means of its price setting for dairy products, has not significantly benefitted consumers, as was one of its objectives. The combination of import taxes, the monopoly for SOMIEX and retail price setting is more or less neutral in comparison to the "no-policy" situation, i.e. if international market prices were to prevail. The administrative and direct financial costs of this policy, including for many years the Government's financial

support to S0MIEX, are not known. But the question arises whether they are justified by the effects.

Effects on producers' welfare

4.14 In Figure 4, the change of producers' surplus is shown resulting from price changes which government policy may have caused. If the supply curve is SS, a decreasing of producer prices from pw to pd will lower the quantity supplied from p1 to p2. The producers' loss then is equal to the shaded area above (or to the left) of the supply curve SS and between the two prices pw and pd.

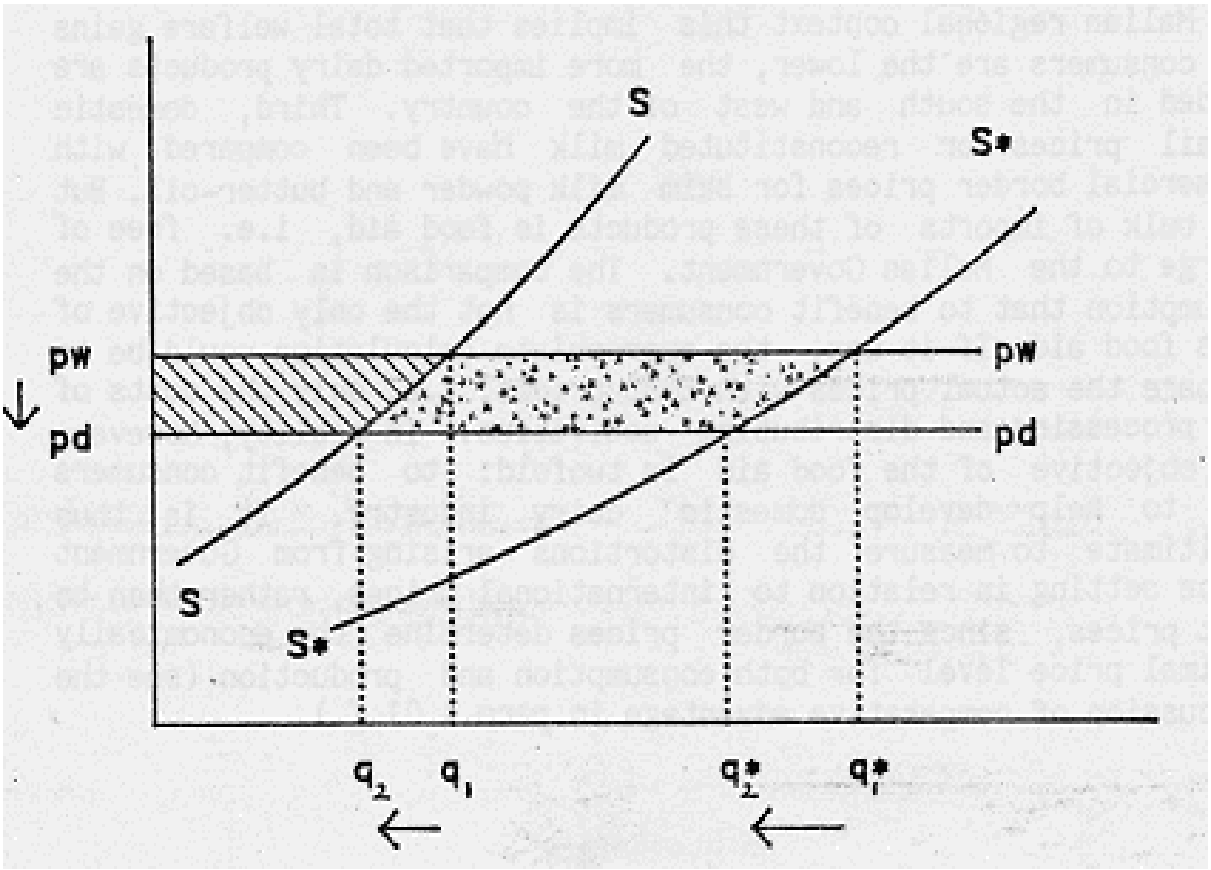

Figure 4. Change in producers' surplus as a ,result of o policy-induced price change.

In the Malian case, however, we do not have sufficient information to calculate the changes in producers' surplus that result from dairy import policy. Firstly, no data on changes in milk supply are available. That means, we do not know if the actual supply of fresh milk is equal to, for example, q_2 in Figure 4 or equal to q_2*. The change in producers' surplus can accordingly be the shaded area—if supply equals q_2 , or the shaded *plus* the dotted area—if supply equals q_2*. Furthermore, any estimates of price elasticities of milk supply would have to distinguish between short-term and long-term reactions. And we would need to know more about the gross-price elasticities of demand between different dairy products. In the absence of these data we cannot quantify changes in producers' welfare.

4.15 Some qualitative evidence can nevertheless be provided in order to indicate the expected direction of the effects of dairy imports and import policy on domestic milk production. We can infer some information from the development of ULB buying prices for fresh milk. With prices declining in real terms over the years, ULB's collections of fresh milk fell from about 375,000 litres in 1972 to virtually zero in 1980 (see App. 8). The reluctance on the part of ULB to offer competitive buying prices for fresh milk has certainly been supported by the availability of cheap, imported raw materials for reconstitution. Milk producers will have reacted to declining prices (in real terms) either by reducing their production or by shifting to other market outlets or increased home consumption. Other marketing channels for fresh milk are available but their capacities are limited. It can thus be argued that ULB's collection policy, which must be seen in a context with its imports, has tended to impair domestic milk supply.

4.16 The influence of dairy imports on the overall price level for fresh milk and hence on producers' welfare could not be quantified empirically. With 90% or more of Bamako's' dairy consumption imported, one would nevertheless expect that prices for local fresh milk would be higher if dairy imports were not available to consumers at all, or only in smaller quantities. Higher prices would probably elicit a greater supply of milk. There is, however, a caveat to this argument. Firstly, prices for local fresh milk are already about double those for imported dairy products. At the present consumer price of FCFA 225–250/1 only a small group of high income consumers with a strong preference for fresh milk can afford to buy it. It is unlikely that a reduction of imports followed by even higher prices would substantially increase the demand that appears on the market with the necessary buying power. Producers' welfare would thus hardly be changed by a change in import policy. Secondly, despite the high consumer price level, only those few producers receive comparatively high prices, who can sell directly to consumers in Bamako or who are members of Collaiba, the producers' marketing cooperative, and can sell to ULB at a similarly attractive price. For the majority of producers, the economics of producing milk at current prices do not appear to be such as to stimulate further investment (see vim Massow and Kone, 1985). The conclusion is that the constraints in the marketing system for fresh milk (see Chapter One, para 1.17 f.) seem to affect milk production more than dairy imports. An improvement of the marketing system for local fresh milk appears to bear more potential for enhancing producers' welfare than changes in dairy import policy.

4.17 In conclusion, we can distinguish two different effects and their probable extent: first, dairy imports and import policy can have direct effects on domestic producer prices. The little evidence we could obtain suggests, however, that producer prices for milk in the Bamako area would not be substantially higher if imports were less. This hypothesis is based on the observation that fresh milk and imported dairy products are markedly different products and appear to be consumed by different income groups: Second, dairy imparts and import policy can have indirect effects on domestic production: These occur through the activities of dairy plants that can substitute between imports for reconstitution and collection of local milk: In Mali, ULB has, in the past, opted for imports and has neglected local supply. Petty traders have profited. by way of large marketing margins whereas producers did not get the full benefit of the high consumer prices for fresh milk.

Distributional aspects

4.18 The welfare considerations have been discussed an a general level. It also is of interest to know how different consumer groups— which cad be classified according to their incomes—are affected by government. policy. Expectations should not be entertained of obtaining empirical quantitative answers concerning the distribution of welfare effects since the data needed for that purpose are virtually non-existent in Mali. But some qualitative assessments can be made.

4.19 The consumption of imported dairy products by different income groups has been estimated in Table 1 (Chapter One, pats 1.i0). According to this scheme the benefits as well as the losses to consumers (which have been presented in aggregate in Table 4) would be borne by low and medium income earners in Bamako and in some areas where SOMIEX has retail shops. In detail, the benefits of ULB price setting exclusively accrue to consumers in Bamako. The net loss due to the policies affecting SOMIEX imparts (dry and condensed milk) is shared by consumers in Bamako— with 60% according to our estimate—as well as in other areas. For consumers fn areas which are to the north and east of Bamako, e.g. Mopti and Segou, the welfare calculation has to take into account that transport costs are higher to these areas thaw to Bamako. The comparable border price, which is the basis for the calculation of consumers' surplus, increases with increasing distance from the border. Welfare gains for consumers of condensed milk who are further north and east are thus higher than those for consumers in Bamako. The losses for consumers of dry milk in these areas are reduced respectively and may even turn into welfare gains.

4.20 Another important distributional aspect originates in the fact that, despite their high nutritional value, milk and dairy products are not considered as the most basic foodstuff. The poorest parts of the population mostly depend on grains and rice rather than on dairy products as their staple food. This is certainly true for urban areas and for those areas, mainly in the south and west of the country, where cropping rather than livestock is the basis of subsistence. The implication for calculations of the distribution of welfare gains or losses is that the people at the bottom of the income scale are not likely to be at all affected by the Government's dairy import policy. The concern of the Malian Government, and of many others throughout Africa, that price rises for foodstuffs cause particular hardship among the very poorest therefore needs careful examination in the case of dairy products.

Chapter Five: The special role of ULB in dairy development

5.01 ULB's mandate reflects the ambivalence of the Malian Government's objectives of dairy policy. Its role as a supplier of cheap dairy products for consumers in Bamako has been discussed and we have provided some empirical evidence regarding the welfare effects of ULB price setting. The other side of ULB's activities concerns the support of dairy development in Mali. In its present organisational form, ULB can only fulfill this role in the Bamako area. The balance to be maintained between ULB's two- possibly conflicting-functions is nowhere specified. We assume in the following that both objectives are of equal importance, i.e. ULB must give equal attention to producers' as to consumers benefit.

5.02 The Malian strategy to promote dairy development includes ULB as a recipient of food aid. The revenues from sales of processed dairy food aid are to be used for development projects in the dairy sector. A similar strategy is being followed in several African countries and it has :host successfully been implemented in India. Its problems as well as eventual successes can thus be compared with and studied on the basis of other countries' experience. The main instrument to develop dairy production around Bamako is the provision of inputs. ULB revenues support the Sotuba dairy research station (CRZ) which carries out research on the improvement of the genetic potential of the local herd. At a later stage, the station will distribute an improved standard breed-the result of its research. The station has identified a standard breed (50% Montbelliard, 25% Zebu Maure, 25% N'dama) but could not yet build up a sufficiently large herd for testing on station, let alone for distribution of semen or breeding stock to dairy farmers. The Sotuba station being over 50 years old, ULB's recent involvement (since 1978) does not seem to have had any measurable effects.

5.03 The following questions have to be answered concerning dairy development in the Bamako area: first, what is the potential for increased dairy production, both at farm level and with regard to ULB's collection and processing capacity; can the potential be realised at an appropriate level of overall economic costs; and can it be realised while maintaining ULB's financial viability? Second, and if the answers to the first questions indicate such a potential for increased milk production. What is the best set of policy instruments to stimulate the realisation of this potential and what role do dairy imparts have to play in that policy?

The potential for increased milk production

5.04 The potential for increased milk production in the Bamako area must be assessed at two different levels. On the macro-level, the economic costs of domestically producing milk must be compared with the price-undistorted by Government policy-at which milk produced in other countries can reach the consumer in Bamako. On the micro-level, the technical conditions for and profitability of increasing milk production must be assessed. Summarising the discussion of comparative advantage in the previous chapters, further support for increased domestic dairy production cannot be ruled out from a macro-economic point of view. This conclusion becomes stronger if one believes that intensified dairy production implies positive spillover effects on smallholder agriculture in general.

5.05 The question now is whether there is sufficient potential for increased production. The evidence given in Chapter One (para 1.04 f.) is not sufficient to quantify the potential for increased milk production in the Bamako area. The results of von Massow and Kone (1985) indicate that milk production in the traditional system presently yields positive rates of return. The profits, however, are, in most herds, not sufficient to accumulate enough capital for additional investment. The other major constraints to increased milk production and supply to Bamako appear to be the availability of feed complements, an effective extension service, and the marketing possibilities. Experience in other countries, particularly in India, has shown how important an efficient marketing system is in stimulating milk production. The most important criteria of efficiency are frequency of collection, reliability of services and prices offered (see also Mbogoh, 1984). In the preset marketing system, there are major shortcomings with regard to all three efficiency criteria. We thus cannot finally decide—on the micro-level as well as on the macro-level—whether there is a potential for increased dairy production. But we have strong evidence that there is.

ULB's options and financial situation

5.06 ULB is supposed to play a key role in the realisation of any dairy production potential in the Bamako area. Its collection centres, however, are currently utilised far below their capacities. Instead petty traders and the producers themselves supply milk directly to Bamako. Differences in effective farm-gate prices, i.e. FCFA 150 (FM 300) per litre from petty traders as against FCFA 110 (FM 220) from ULB collection centres (1984/85), and the fact that ULB collects milk in the rainy season only, can explain this situation (see von Massow and Kone, 1985). But petty trade and direct marketing can provide neither the capacity nor the service and reliability needed for a substantial increase in milk sales and production. The recent coming together of (potentially) large-scale dairy producers within Collaiba (Collective Laitiere de Bamako) demonstrates producers' need for better outlets. One of Collaiba's major objectives is to ensure an efficient market outlet for milk Quantities of 200, and potentially much more, litres per day per producer can not economically be handled by petty traders or through direct sales to consumers. The other two major constraints, i.e. feed availability and extension service, become less restrictive once an efficient marketing system provides for a sufficient flow of cash from milk sales. It would nevertheless be desirable to study in detail the markets for feed supplements in Mali.

5.07 The potential for expanding ULP's activities in marketing and processing fresh milk needs to be assessed in technical as well as in economic terms. ULB. can, through pasteurising it, turn raw milk into a higher valued product. ULB's retailing system can meet a bigger demand for milk and milk products than the petty traders can. The annual processing capacity of 7 to 8 million litres is sufficient for the years to come. The economic question is, at what prices ULB could offer to buy raw milk and still be financially viable. The collection centers—at present levels of throughout—operate well below capacity. Total collection costs (for mid 1983*)* per litre of milk collected are given at FM 130 (FCFA 65*)* up to and including delivery at ULB's factory-gate for Bankoumana and at FM 96 (FCFA 48) for Dialakoroba (ULB personal information; the costs apply for the rainy season only). In order to compare these costs with those of petty traders, ULB processing costs of about FCFA 50/1 (see Table 5) have to be added. It emerges that ULB, at a margin between producer and consumer prices of FCFA 100–115, cannot cooperate with

petty traders whose marketing margin (in the rainy season) is FCFA 50–75 per litre (see the calculation in App. 7). ULB's actual collection costs, however, include a high ratio of fixed costs. Costs per litre would be about half their ratio present level if the collection centres could fully use their facilities (see also FAO, 1983, p· 21).

5.08 Given the economic feasibility for ULB to increase its collection efforts on the local market, the question still arises as to why it should be encouraged to do so. The arguments in favour of ULB's stronger involvement in local milk trade are, first, its higher collection capacity in comparison to direct sales and petty trade. Second, consumers can be provided with a more hygienic product, the quality of which can easily be controlled. Producers will in the long run benefit from this control since a higher price can be demanded for a qualitatively homogenous product. Eventually, ULB could introduce a price differentiation according to different quality standards.

5.09 Turning to ULB's financial situation we shall now assess how ULB can best follow its objectives of giving equal benefit to producers and consumers. ULB must continue to generate revenues from the reconstitution of food aid. On the other hand, ULB must increase its collection efforts in order to provide an efficient market outlet to more producers and thereby to contribute directly to dairy development. The collection of local milk may initially incur financial losses while reconstituting food aid yields profits. That means, the collection activities may have to be subsidised with the revenues from food aid until the producers have responded to the better service by increasing their output to the point where economies of scale reduce ULB's collection costs. The task is to find out a financially feasible combination of collection and reconstitution for ULB. The food aid is bought from the Government at FCFA 95 (FM 190) per kg skim milk powder and FCFA 235 (FM 470) per kg butter-oil. ULB received 600 t of skim milk powder and 200 t butter-oil per year in the recent past, which is equivalent to roughly 6 million litres of reconstituted milk (this and all following information stems from ULB, personal information). ULB's total production has gone up to 6.9 million litres in 1983. The monthly highest of 675,000 litres indicates a feasible annual output of up to 8 million litres. Table 5 gives ULB's financial situation for different combinations of fresh and reconstituted milk at output levels of 7, 7.5 and 8 million litres per year:

Table 5. *ULB's financial situation at different levels of fresh milk intake and total output.*

	million litres			
Total output –from	7.0	7.5		8.0
a) food aid	6.0	6.0		6.0
b) local collections	0.2	0.5	1.0	1.5
c) commercial imports	0.8	1.0	0.5	0.5
	FCFA per litre output			
Costs of raw material – consisting of				

a) food aid	20	20	20	20
b) local collections[1]	175	175	175	175
e) commercial imports	75	75	75	75
Operating costs				
– fixed costs	29	27	27	25
– variable costs	5-	5	5	5
– packing materials	15	15	15	15
Retail price				
– reconstituted milk	110	110	110	110
– local fresh milk	225	225	225	225
Net revenue for ULB				
– total (million FCFA)	235	248	255	273
– per litre output (FCFA)	34	33	34	34
Dairy development fund (30% of total net revenue)[2]				
(million FCFA)	71	74	77	82

1. Collection cost included

2. The 30% of total net revenues is based on a tax rate of 50%, i.e. the rate which is applicable in the long run (see Chapter Two, para 2.14). For further explanations see text.

Source: Own calculation based on ULB, personal information.

5.10 ULB has to calculate with different cost levels for its raw product. They are FCFA 20 per litre of output for the 6 million litres which stein from food aid; FCFA 75 for commercial imports of skim milk powder and butter-oil; and FCFA 175 for collections of fresh milk. The costs of FCFA 175, free factory-gate ULB, include a producer price of FCFA 125 and collection costs of FCFA 50 per litre. Collection costs are assumed to be half their present level, reflecting both the economies of scale discussed above and the contribution of Collaiba milk which is delivered free factory. The quantities collected locally are assumed to range between 0.2 and 1.5 million litres per year. The argument behind such a wide range is to show that even at a level of fresh milk intake far beyond present collections, there is a profit for ULB and thus some funds to spend for dairy development. The isolated calculation for local milk just about breaks even at the prices and costs assumed in Table 5. At present, however, Collaiba producers receive more than FCFA 175/l and the cost per litre of fresh milk from the collection centres is higher due to a low intake. ULB would thus initially have to subsidise the collection of fresh milk.

5.11 On the retail side, ULB needs to exploit different demand potentials for its products by charging differential prices in future. In Table 5, the price for reconstituted milk has been assumed at its present level of FCFA 110/l while the price for local milk has been set equal to present market prices of between FCFA 200 and 250/l. ULB's contribution to dairy development

— in addition to an improved service on the marketing side — amounts to about FCFA 75 million, calculated as 30% of total net revenues (sea Chapter Two, para 2.14). The Malian Government, together with the EC as the donor of the food aid, may decide, however, to add to this the 'fonds de contre partie', i.e. ULB's payments to the Government which in the past have been paid into a drought relief fund but which become available for reallocation in 1986 (see para 2.13). The fonds amounts to another FCFA 104 million for 600 t of skim milk powder and 200 t of butter-oil.

Instruments to stimulate dairy development

5.12 We have discussed the economic background for milk production in the Bamako area and for ULB's marketing and processing activities. Increasing milk production appears feasible both in terms of overall economic welfare and of the revenues on the farm level. The actual production potential, however, is difficult to quantify. ULB can pay higher prices to producers, extend its collection activities and would still be able to contribute financially to new investment in dairy development projects. What are the implications of these results for dairy policy in Mali and how can ULB revise its activities in order to be more successful in stimulating local dairy production?

5.13 The calculation of ULB's revenues in Table 5 is based on an average producer price of FCFA 150 per litre. ULB presently pays FCFA 110 at the collection centres while petty traders appear to offer up to FCFA 150, depending on the season. The increase in buying prices to FCFA 150 would put ULB in a more competitive position. In addition to that, a premium for bulk deliveries similar to that for Collaiba and/or for milk which is delivered at a constant high quality could be paid to all producers. The idea of contracts between ULB and producers, who receive inputs for milk production and commit themselves to a certain delivery of fresh milk in return, will become attractive for producers if ULB's prices are competitive. ULB, in theory, already pursues such a strategy, but in practice producers are not willing to cooperate unless they receive competitive, prices and a reliable service. ULB's role is to provide inputs for increased dairy production *and* an attractive market outlet simultaneously. A further instrument to stimulate dairy development from the demand side is the differentiation of retail prices. ULB looses by simply mixing-fresh milk from local producers with reconstituted milk and selling it at one uniform price, i.e. FCFA 110 per litre as at present. A better strategy is to make use of the potential division of the consumer market into buyers of cheap reconstituted milk and buyers of more expensive, pasteurised fresh milk. Such a differentiation of retail prices has been assumed in the calculation in Table 5. Prices could be varied seasonally in order to take into account the fluctuations of demand and supply.

5.14 Increased efforts in providing an efficient milk collection processing and retail system will alleviate Borne of the constraints to dairy development identified by von Massow and Kone (1985). Provision of feed supplements and general extension service appear to be most urgently needed. There is some argument for ULB to provide at least some of these services since the collection centres and their staff are so far lying idle in the dry season. Further investigations are needed, however, in order to determine what is the best way of providing inputs for sustained dairy development around Bamako.

5.15 Two basic instruments of dairy policy to be executed by ULB have been discussed: producer prices can be differentiated by quantities delivered and/or by quality control and may, initially, be subsidised; retail prices can be different for reconstituted and for fresh milk and may also be subsidised. We have shown that by using the benefits from food aid ULB can fulfill its role in favour of producers as well as of consumers. The Government needs to decide on an intensified scheme for the provision *of* inputs for milk production. At present, consumer prices for milk are subsidised. It must be decided at which level ULB retail prices should be fixed in the future. There is no straightforward economic answer to this question since any subsidy to consumers can only be justified by political objectives. The level of subsidy accordingly requires a political decision. Any further lowering of consumer prices, however, cuts back on the funds that are available for dairy development. The Government must thus strike the balance between consumers, and producers' benefits. So far, hardly anything has been achieved by the instruments which are aimed towards increasing production. The intended provision of inputs has not yet show—and could not at the present ULB pricing policy—any success. It needs to be reinforced and must be completed by an increase in ULB collection prices and by more competitive collection activities in general.

Chapter Six: Summary and conclusions

6.01 Imports of dairy products into Mali are not yet of a size to cause special concerti, but it is obvious that domestic supply will not be able to meet the ever growing demand for milk and dairy products, particularly in Bamako, unless more effort is put into dairy development. This report has discussed the economic relationship between dairy imports and milk production for the area around Bamako where the deficit in supply and the importance of imports are most striking. The emphasis in the report is on the macro- rather than on the micro-economic aspects of dairy imports and dairy development. Government policies and their effects on dairy imports and dairy development are accordingly the main focus of the analysis.

6.02 The discussion of milk production, consumption and trade has shown that dairy imports and import policy have only regional importance in Mali. The potential for increased production in the Bamako area could not finally be quantified but some further research concerning the economics of producing milk has been started and some preliminary results (von Massow and Kone, 1985) have been included in this paper. It is evident that several milk producers depend on petty traders for their only market outlet, particularly in the dry season. The Union Laitiere de Bamako (ULB), through two collection centres, only collects milk in the rainy season, and only recently have the prices to producers become more competitive. The well-known problems of milk marketing, i.e. the handling of a liquid and highly perishable product, which for its sales value is strongly dependent on the consumers' assessment of quality, are prevalent also in the area around Bamako. The present marketing system does not provide for sufficient service to either producers or consumers. Hence the potential role of a better equipped agency like ULB needs further attention. The comparative performance of petty traders and ULB in terms of cost efficiency, service and handling capacities is a critical issue for further recommendations. The observations at hand, concerning trade margins for fresh milk sold directly to consumers in Bamako, suggest that there is some room for ULB to improve substantially its collection and marketing efforts.

6.03 Dairy imports fill the gap between domestic supply and demand. In Mali, they partly come in as food aid for industrial reconstitution. The Government interferes with these and other imports by way of a dairy import policy which is analysed on the assumption that it pursues two main objectives: first, to provide consumers with dairy products at "reasonable prices" and second, to stimulate an increase in local milk production. The generation of revenues for the national budget can be assumed as a third objective although it does not explicitly appear in official statements. None of the three objectives has further been specified or even been defined in quantitative teems by the Government. The respective instruments in pursuit of these objectives turn out mostly to be well conceived. The legislation concerning imports of the parastatal SOMIEX, however, and ULB's role in dairy development appear to involve inconsistencies.

6.04 The combination of the SOMIEX monopoly and retail price fixing in its present form cannot be justified on economic grounds. Only under very special assumptions is there a need to maintain the SOMIEX monopoly. Even then, it would have to be confined to imports destined for those parts of the country which are closer to the import ports than Bamako. ULB's role of serving both consumers' and producers' needs is economically feasible as long as food aid is

included. The present practice, however, only benefits consumers and neglects the producers' interests. The necessary changes in ULB's policy are discussed below.

6.05 The study provides an analysis of dairy import policies in Mali and assesses their effects on the development of dairy imports. Import policies can reinforce or offset trends in domestic demand and supply. In the analysis, different approaches have been used in order to evaluate dairy import policy in Mali. Firstly, some exogenous factors on the demand side and changes in production, if also taken as exogenous, can partly explain the development of dairy imports. The residual change in imports is attributed to import policy among other things. By that measure, the effects of Government policy in Mali have been to curb dairy imports slightly. Secondly, more detailed analysis reveals that retail prices for dairy products as fixed by the Government have in general followed world market trends. Absolute prices for different dairy. products, however, diverge at different levels from international prices. At the retail level, condensed and reconstituted milk are subsidised. Whereas canned dry milk is taxed in comparison to international prices, SOMIEX seems to have handled the import monopoly for dry and condensed milk in cans so as to follow the overall development of demand, i.e. changes in population and incomes.

6.06 By influencing the prices and quantities of imported dairy products the Government also affects the allocation of consumption of different dairy products. Comparative prices at the retail level favour the consumption of canned dry milk over that of other dairy products, including local fresh milk. In comparison to a free trade situation without Government interference, consumers in Bamako have lost, however, through the price setting for dry milk. They have benefited from the consumption of condensed and reconstituted milk. The total change in consumers' welfare due to the distortion of dairy prices from world market levels has not been dramatic throughout the seventies. The Government has not achieved its overall objective, to benefit consumers through dairy import policy, despite the resources used for it. Subsidising consumer prices for dairy products can, in any case, not be justified by the argument of caring for the very poorest, since the real poor can hardly afford to buy milk at present prices. Other arguments are thus needed to justify why prices for dairy products should not be allowed to move freely.

6.07 The quantification of the effects of dairy import policy on producers leaves us with a severe data problem. There is no information about changes in the production and supply of locally produced milk. The little evidence we have about the influence of dairy imports on market prices for fresh milk in Bamako suggests that producer prices would not increase substantially if dairy imports were less. There is no doubt, however, that ULB does not fulfill the role it could play in providing producers with an improved outlet for their milk. The present neglect of collection efforts appears to tie facilitated by the availability of food aid. There is no valid economic argument why ULB should not expand its collection activities and raise the buying price to producers. The calculation of actual prices and costs of ULB activities shows that the revenues from food aid are sufficient both to provide consumers with comparatively cheap milk and to pay remunerative prices to producers. There is even room to improve the provision of inputs to producers or to continue with the cross-bred project at the Sotuba research station. Nevertheless, more information is needed concerning the potential for milk production and the efficiency of the

internal dairy marketing system. Such information would greatly improve the basis for policy decisions.

6.08 The Malian Government, in conclusion, has designed instruments of dairy policy which have a potential for success on the producers' more than on the consumers' side. As concerns the consumers, the total effects appear to be rather close to what would be expected in a situation without any Government interference. The SOMIEX import monopoly can hardly be justified on economic grounds. On the production side, the creation and operation of ULB presents a difficult, but feasible policy. If ULB's activities are to be successful, however, the present policy must change on both the consumers' and the producers' side. Much more. emphasis must be put on producer prices and collection services in addition to aiming at input provision: A more detailed analysis of ULB's economic and financial situation is required in order to design the details of its policy. The assessment of present and future activities of this key institution in Malian dairy development must be given highest priority.

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Appendices

Appendix 1. Factors to convert different dairy products into whole liquid milk equivalents (LME)

Commodity	Conversion factor
Fresh milk	1.0
Dry milk (skim or whole)	7.6
Milk, condensed or evaporated	2.0
Cheese and curd	4.4
Butter	6.6
Butter-oil	8.0
Other dairy products	2.0

Note: The conversion reflects technical ratios between the different products. For example, 1 kg of dry milk equals 7.6 kg of whole liquid milk. The process of industrial reconstitution is calculated as 9.5 kg dry skim milk (9.5 * 7.6 = 72 LME) plus 3.5 kg butter-oil (3.5 * 8 = 28 LME) plus water equals 100 1 of milk (72 LME + 28 LME = 100 LME) at 3.5% fat content.
Source: FAO, 1978 a.

Appendix 2: Estimated supply of cow's milk in the area around Bamako, 1982/83

1)	Number of bovine animals		
	– "cercle de Kati"		122,000 head
	– "district de Bamako"		15,000 head
		total	137,000 head
		OMBEVI[1]	von Massow/Kone[2]
2)	Reproductive females (>4 years)		
	–as % of total herd	38%	41%
	–total number	52,060	56,170 head
3)	Fertility (i.e. females actually in reproduction)		
	–as % of breeding females	65%	41%
	–total number	33,839	23,030 head
4)	Average annual milk yield[3]		

	–daily yield per productive female	1.5	0.83 litres
	–total yield for Bamako area =	10,659	4,014 tons
5)	Milk marketed per year		
	–marketed as % of yield	45%	56%
	–total quantity	4,797	2,248 tons

1. OMBEVI, 1983 a and b
2. von Massow and Kone, 1985
3. milk yield = offtake for human use, i.e. excludes milk consumed by calves. A 210-day lactation period is assumed.

Note: All these parameters can be challenged from various angles. The differences between the OMBEVI figures and those by von Massow and Kone demonstrate the point although the latter are not statistically representative. To briefly discuss some issues: official herd numbers are generally considered to be too low because there are many reasons (tax etc.) for owners to hide their real numbers. On the other hand, the area around Bamako is relatively well monitored. Average daily milk yields per cow of 1.5 litres must be considered the upper limit for traditional herds. It can be argued, however, that there are certain herds in the area which have much higher average yields. The OMBEVI rate of commercialisation of 45% is a conservative estimate as the figure of von Massow and Kone shows. For further explanation see the text Chapter One, para 1.04 f..

Appendix 3. Basic figures on Mali and the Malian dairy sector, 1968-83

	Population		Cow milk production		Dairy imports	Dairy consumption
Year	Human ['000 hd)	Cattle ['000 hd)	Total ['000 t]	per caput [kg]	Total [t ME]	per caput [kg]
1968	4,830	5,067	101	21	838	21
1969	4,930	5,310	105	21	1,112	22
1970	5,050	5,510	108	21	2,848	22
1971	5,140	4,040	105	20	2,648	21
1972	5,260	5,000	63	12	15,640	15
1973	5,380	4,750	52	10	35,987	16
1974	5,660	3,700	55	10	53,695	19
1975	6,070	3,886	65	11	54,889	20
1976	6,230	4,080	68	11	30,651	16

1977	5,390	4,076	80	13	32,960	18
1978	6,560	4,263	84	13	32,941	18
1979	6,730	4,342	85	13	26,936	17
1980	6,910	4,960	88	13	21,824	16
1981	7,160	5,134	102	14	27,751	18
1982	7,350	5,134	107	15	29,400	19
1983	7,540	5,134	107	14	27,122	18

Total dairy imports are calculated from Appendix 4 and 5
Source: FAO Production Yearbooks; Annuaire Statistique, Mali

Appendix 4. Commercial dairy imports into Mali, 1868-1983

	Milk condensed and evaporated		Skimmed milk powder		Fresh milk	
Year	[t]	[$/t]	[t]	[$/t]	[t]	[$/t]
1968	276	533	0	0	40	875
1969	353	864	0	0	58	586
1970	1108	448	0	0	42	571
1871	1000	450	0	0	45	556
1972	937	836	700	1000	32	1000
1973	1460	1038	2000	950	54	1110
1974	5510	983	2506	960	16	1688
1975	2927	1060	3500	857	38	1158
1976	1500	733	3500	943	19	1579
1977	1200	750	3000	833	18	1833
1978	322	932	2300	1391	104	1144
1979	1300	962	2000	1000	20	2500
1980	500	1000	1700	1294	20	2500
1981	1400	929	1600	1313	50	2200
1982	1000	800	2100	1143	100	2000
1983	700	786	2000	1100	200	1900

	Butter		Cheese and Curd		Total dairy products (LME)[1]	
Year	[It]	[$/t]	[t]	[$/t]	[t ME]	[$/t ME]
1968	36	639	2	1300	838	248
1969	52	673	1	1325	1,112	338

1970	88	693	2	1350	2,848	205
1971	90	778	2	1400	2,648	207
1972	90	778	50	1400	8,040	206
1973	69	1203	45	1267	18,827	192
1974	92	1120	30	2300	30,775	260
1975	198	1402	28	2536	33,929	181
1976	118	1126	56	2089	30,651	153
1977	110	1709	31	3258	26,080	143
1978	148	2148	24	4708	19,317	210
1979	220	2000	50	3600	18,492	201
1980	250	2200	60	3333	15,854	221
181	230	2478	40	3500	16,704	253
1982	380	2500	20	3250	20,656	214
1983	150	2333	30	3000	17,922	199

1. for the conversion into Ltd see Appendix 1

Source: FAD Trade Yearbooks

Appendix 5. Dairy food aid into Mali, 1968-83

Year	Skimmed milk powder [t]	Butter-oil [t]	Total dairy food aid (LME)[1] [t LME]
1968	0	0	0
1959	0	0	0
1970	0	0	0
1971	0	0	0
1972	1000	0	7600
1973	2100	150	17160
1974	2700	300	22920
1975	2600	150	20960
1976	0	0	0
1977	800	100	6880
1978	1740	50	13624
1979	869	105	7444
1980	575	200	5970

1981	1243	200	11047
1982	940	200	8744
1983	1000	200	9200

1. for the conversion into LME see Appendix 1.

Source: FAO, 1984

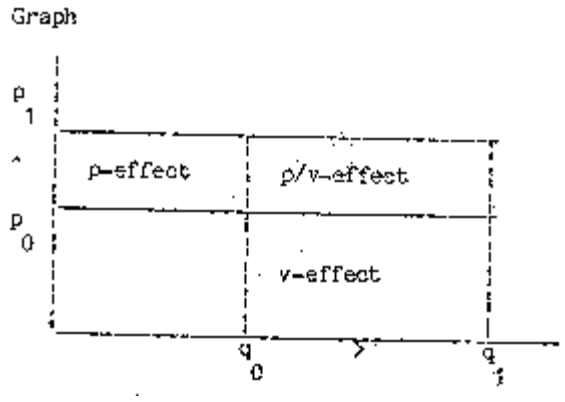
Appendix 6. Formula to identify price and volume effects as causes for increased import values

$$\frac{q_0 * (p_1 - p_0)}{p_1 * q_1 - p_0 * q_0}$$ = the effect due to mere price increases (p-effect)

$$\frac{p_0 * (q_1 - q_0)}{p_1 * q_1 - p_0 * q_0}$$ = the effect due to mere volume increases (v-effect)

$$\frac{(p_1 - p_0) * (q_1 - q_0)}{p_1 * q_1 - p_0 * q_0}$$ = the effect due to the combined impact of price volume increases (p/v-effect)

With p = price of imports, q = quantity of imports, and subscripts '0' and `1' denoting the beginning and end of the period.



Appendix 7. An exemplary calculation of the profit of trading milk into Bamako, 1984/85

Revenues		Dry season (7 months)	Rainy season (5 months)	Total/year [FCFA][1]
Milk sales	[1/day]	20	120	
Sales price	[FCFA/1]	225	200	
Total revenues	[FCFA/day]	4,500	24,000	+ 4,545,000
Costs				
Milk purchase	[1/day]	20	120	
Buying price	[FCFA/1]	200	150	
Total milk value	[FCFA/day]	4,000	18,000	– 3,540,000
Fuel (FCFA 290/I)	[1/day]	2	4	– 295,800
25 cc motorbike "Mobylette"				
· buying price		209,000		
· sales price (after 2 years)		100,000		
– depreciation			54,500	
– tyres			19,000	
– miscellaneous (repairs etc.)			6,500	– 80,000
Firewood (25 horsecart lads at FCFA 1,000/cart)				– 25,000
Other material				
– boiling pots (depreciated 10 years)		2,500		
– transport containers		12,000		
– miscellaneous (soap etc.)		21,000		– 35,500

Contingencies, losses etc.			– 23,700
Total costs			– 4,000,000
Net profit			+ 545,000

1. FCFA 1,000 = $ US 2.10

Source: see text Chapter One, para 1.18

Appendix 8. Collections, imports and production of ULB, 1970-1983

	Collections of locally produced milk		Production from imported raw materials		Total production
Year	['000 l]	[%]	['000 l]	[%]	['000 l]
1970	60.9	9.2	598.2	90.8	659.1
1971	314.4	35.3	576.3	64.7	890.7
1972	375.8	28.0	868.7	72.0	1344.5
1973	148.6	8.4	1626.4	91.6	1775.0
1974	291.1	12.1	2122.2	87.9	2413.3
1975	331.9	12.9	2247.4	87.1	2579.3
1976	218.2	6.1	3364.5	93.9	3582.7
1977	68.8	1.7	3992.8	98.3	4061.8
1978	83.5	2.0	4194.7	98.0	4278.2
1979	61.6	1.8	3437.1	98.2	3498.7
1980	1.2	0.0	3840.6	100.0	3841.8
1981	0.5	0.0	4779.4	100.0	4779.9
1982	60.6	1.1	5572.7	98.9	5633.3
1983	1.0	0.0	6881.1	100.0	6882.1

Source: ULB, personal information

Appendix 9. Basic data for a regression analysis of dairy consumption in Bamako, 1972-1983

Year	SMIG index[1] (real)	Price index[2] (real)	Border price for dry milk [FM/kg]	Retail price for dry milk [FM/kg]
1972	103.1	100.0	504.43	504

1973	136.1	89.1	423.13	423
1974	170.5	97.5	461.75	477
1975	198.0	119.3	367.34	670
1976	201.6	1o6.7	450.72	670
1977	161.2	86.2	409.29	670
1978	124.1	68.8	627.73	670
1979	132.5	73.2	425.45	670
1980	112.8	61.1	546.84	670
1981	100.4	63.6	713.56	750
1982	96.6	77.6	747.05	870
1983	86.9	77.0	857.25	990

	Border price for cond. milk [FM/kg]	Retail price for cond. milk [FM/kg]	Retail price for ULB milk [FM/kg]	Dairy consumption per caput [FM/kg]
1972	421.70	168	140	16.4
1973	462.33	185	140	27.5
1974	472.81	200	140	37.6
1975	454.36	275	140	40.3
1976	350.34	275	140	36.8
1977	368.51	275	140	31.8
1978	420.59	275	180	24.6
1979	409.28	215	180	23.0
1980	422.66	275	180	19.8
1981	504.87	375	180	21.0
1982	522.87	500	260	25.1
1983	600.00	440	260	25.6

1. base year 1967 = 100.

2 includes the prices for dry, condensed and ULB milk and for butter, each weighted with their respective shares in total dairy consumption in Bamako (base year 1972 = 100)
Source: Annuaire Statistique and Table d, Chapter One, para 1.16

Appendix 10: Consumption of dairy products and effects of dairy import policy in Mali-regression results, 1972-1983

Per caput consumption of dairy products in Bamako (log-linear)		
	Mean	Regression coefficient
Dependent variable:		
– consumption per caput	0.5441	–
Explanatory variables:		
– price index (real)	1.9206	+ 0.9740 ***
– SMIG index (real)	2.1151	+ 0.4400 ***
– drought dummy 1973-74	0.1667	+ 0.1267 ***
– time trend	0.7234	+ 0.2964 ***
Constant: – 2.4926		
R^2 = 97 Durbin-Watson = 2.22		
Transmission elasticities, dairy imports (linear)		
Dependent variable:		
– SOMIEX price dry milk	669.5000	–
Explanatory variables:		
– import price	544.5457	.5790 ***
– drought dummy 1972–74	.2500	–205.7911 ***
Constant: 405.6449		
R^2 = .89 Durbin-Watson = 1.80		
Dependent variable:		
– SOMIEX price condensed milk	293.1667	–
Explanatory variables:		
– import price	450.8560	.9066 ***
– drought dummy 1972–74	.2500	–146.8333 ***
Constant: – 78.8894		
R^2= .83 Durbin-Watson =	2.36	
Dependent variable:		
– ULB price	173.333	–
Explanatory variables:		
– import price milk powder	544.5457	.1487 **
– time trend	1977.5000	5.6371 **
Constant: – 11055.0944		
R^2 = .85 Durbin-Watson = 2.41		

*** significant at the 1% level

** significant at the 5% level

All calculations were done on a HP 150 Micro-Computer using the Micro-Stat Regression Package