WORLD BANK OPERATIONS EVALUATION DEPARTMENT

OED

India: The Dairy Revolution



ABBREVIATIONS AND ACRONYMS

AI	Artificial Insemination
AMUL	Anand Milk Union Limited
ARC	Agricultural Refinance Corporation
BCT	Bhagavatula Charitable Trust
DAHD	Department of Animal Husbandry and Dairying
DANIDA	Danish Agency for International Development
DCS	Dairy Cooperative Society (village level cooperative)
EC	European Community
EPC	Effective Protection Coefficient
ERR	Economic Rate of Return
FRAC	Food and Research Analysis Centre
GDP	Gross Domestic Product
GOI	Government of India
IAS	Indian Administrative Service
ICDP	Intensive Cattle Development Project
ICR	Implementation Completion Report
IDA	International Development Association
IDC	Indian Dairy Corporation
IER	Impact Evaluation Report
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IRMA	Institute for Rural Management, Anand
KDDC	Karnataka Dairy Development Corporation
MIS	Management Information System
MMPO	Milk and Milk Products Order
MPDDC	Madhya Pradesh Dairy Development Corporation
MPU	Milk Producer's Union (regional cooperative society)
MUV	Manufactured Goods Unit Value Index
NDDB	National Dairy Development Board
NDP	National Dairy Project
NDPII	Second National Dairy Project
NEP	New Economic Policy
NGO	Nongovernmental organization
NPC	Net Protection Coefficient
ODA	Overseas Development Administration (U.K.)
OED	Operations Evaluation Department (of the World Bank)
OF	Operation Flood
OFI	Operation Flood I
OFII	Operation Flood II
OFIII	Operation Flood III
PAR	Performance Audit Report
PCR	Project Completion Report
RDDC	Rajasthan Dairy Development Corporation
RERR	Re-estimated Internal Economic Rate of Return
Rs	Rupee(s)
SAR	Staff Appraisal Report
SDR	Special Drawing Rights
SEWA	Self-employed Women's Association
SFDA	Small Farmer Development Agencies
SMP	Skim Milk Powder
SNF	Solids-non-fat
TMDD	Technology Mission for Dairy Development
US	United States of America
WDCS	Women's Dairy Cooperative Society
WFP	World Food Program
WID	Women in Development

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India: The Dairy Revolution

The Impact of Dairy Development in India and the World Bank's Contribution

Wilfred Candler
Nalini Kumar

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vii **Acknowledgments**
ix **Foreword, Prefacio, Préface**
xiii **Executive Summary, Resumen, Résumé Analytique**

1 **1. Introduction**
1 Design Features of Bank Dairy Projects
2 Operation Flood Project Context
2 Getting It Right Eventually
3 The Bank Enters the Picture
4 Literature Review
5 Some Numbers to Think About
5 The Horizon Widens
7 Report Structure

9 **2. Project Design**
9 Karnataka
10 Rajasthan
10 Madhya Pradesh
11 The National Dairy Project
11 The Second National Dairy Project
12 Changed Paradigm

13 **3. Impact of the First Four Projects at Completion**
13 Targets
13 Organization
13 Impact
14 Milk Production
15 Milk Consumption
16 Importance of Milk Income
16 Profitability of Dairying
17 Benefits
17 Summary

19 **4. Developments Under National Dairy II**
19 Expansion and Nonfunctional Cooperatives
20 The Changing DCS Picture
22 Milk and Water?
24 Ownership, Managers and Equity

29 **5. Village-level Impact**
29 Karnataka
30 Madhya Pradesh
31 A Shift in Suppliers

33 **6. Economic Impact of the Projects**
33 Milk Production
34 Supply or Demand Shift?
38 Economic Performance
38 How Big Was the Bill?

40 Producer and Consumer Surplus
43 Further Examination of the Free Trade Option

47 **7. Social and Institutional Impact of the Projects**
47 Industrial Structure
48 Farmer Incomes
48 Credit
50 Women
50 Employment Generation
51 Improved Technology
51 Adulteration of Milk
52 Education
53 Cooperative as NGO

55 **8. Recommendations and Lessons**
55 Findings
59 Recommendations
60 Lessons

61 **Endnotes**

67 **References**

Tables
1 1.1: Bank-Supported Loans and Credits with “Dairy” in the Title
13 3.1: DCSs and MPUs Formed
15 3.2: Karnataka: Daily Household Milk Production
15 3.3: Madhya Pradesh: Average Milk Production and Disposal
15 3.4: Madhya Pradesh: Average Milk Prices, Landless and Large Farmers
16 3.5: Karnataka: Home Consumption of Liquid Milk
16 3.6: Karnataka: Ratio of Milk Sales to Total Expenditure
17 3.7: Madhya Pradesh: Milk as a Proportion of Average Annual Income
17 3.8: Madhya Pradesh: Gross Margins in Milk Production
18 3.9: Madhya Pradesh: Opinions on Impact of DCSs on Beneficiaries
18 3.10: Madhya Pradesh: Farmers’ Opinions of the DCSs and Their Reason for Joining
19 4.1: Formation of Dairy Cooperative Societies
21 4.2: Milk Procurement, Production, Cooperative Membership
22 4.3: Water in 200 Milk Samples Submitted for Testing
26 4.4: Loan Repayments on Bank Projects to NDDB
26 4.5: Profitability of the Cooperative Sector
27 4.6: Revised Effective Protection of the Indian Dairy Industry
28 4.7: Indian and World Market Prices for Selected Dairy Products, 1991–95
32 5.1: Survey Results: Need for Veterinary Services
32 5.2: Survey Results: Sources of Veterinary Services
34 6.1: Milk: National Production and Operation Flood Procurement and Sales
36 6.2: Nominal and Real Processor Prices for Cow Milk
38 6.3: Price and Production Changes in Wheat, Rice, and Milk
38 6.4: Estimates of Economic Benefits of Bank-Assisted Projects

39 6.5: Impact Estimates of Cost of Operation Flood
39 6.6: Alternative Estimates of Capital Costs of Operation Flood per Beneficiary
41 6.7: Producer and Consumer Surplus with Unit Elasticity Short-Run Supply Function
46 6.8: Estimation of Impact of Free Trade in Dairy Products, 1977–78
46 6.9: Costs and Benefits of Alternative Policies for Urban Milk Supply, 1993–94
46 6.10: Costs and Benefits of Alternative Policies for Urban Milk Supply, 1996
48 7.1: National Milk Procurement by Operation Flood, Other Organized and Informal Sectors
51 7.2: Punjab: Milk Samples Drawn and Found Adulterated
52 7.3: Progress Toward Anand Principles
59 8.1: Projected Sources of Expenditures for Operation Flood III, 1992–93

Boxes

3 1.1: Evidence of Early Bank Interest in Operation Flood as Revealed by Bank Documents
14 3.1: Establishment of the Anand-Pattern Structure
23 4.1: Milk Assembly at Its Worst
24 4.2: Artificial Milk
49 7.1: A Level Playing Field?

Figures

22 4.1: India: Operation Flood Milk Procurement, 1970–95
35 6.1: India: Milk Production, 1951–94 (Linear Fit)
35 6.2: India: Milk Production, 1951–94 (Exponential Fit)
37 6.3: Time Series of Total Milk Production and Real Price of Milk
37 6.4: Demand and Supply Shifts
40 6.5: "With/Without" Benefits of Operation Flood
42 6.6: Consumer Surplus with Perfectly Inelastic Short-Run Supply Function
43 6.7: Consumer and Producer Surplus with Unit Elasticity Short-Run Supply Function
44 6.8: Estimation of Impact of Free Trade in Dairy Products (1977–78)
45 6.9: Estimation of Impact of Alternative Policies for Urban Milk Supply (1993–94)
58 8.1: India: Milk Production, 1951–94, and Operation Flood Milk Procurement, 1980–94



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ENGLISH

FOREWORD

Operation Flood, which was supported by the five projects now evaluated, is a huge undertaking. In 1996, it involved 9.3 million farmer-members supplying an average of 10,900 metric tons of milk per day through 55,042 functional village cooperative societies to 170 milk producers unions (MPUs) who sold it as liquid milk and processed products. This vast organization grew out of a single small cooperative society in the state of Gujarat established in 1946. This growth has been supported by US$0.69 billion (1996 dollars, 25 percent of project cost), disbursed by the Bank, and US$1.1 billion (1996 dollars) of food aid from the World Food Program and the European Community. Even so, Operation Flood represents only 6.3 percent of total milk production and 22 percent of marketed milk in India. Total milk production has also grown rapidly since the inception of Operation Flood.

In India's dairy industry, the Bank has followed a simple, consistent, and transparent development strategy: to support the expansion of dairy production by small producers through a successful indigenous development program. This program, despite substantial government assistance, enabling legislation, and government control of some apex organizations, is now dominated by farmer-controlled village-level dairy cooperative societies (DCSs) and some regional MPUs.

An initial IDA credit of US$30.0 million was approved in March 1974, and two further IDA credits of US$27.7 and US$16.4 million were approved in December 1974, all supporting projects in various states. A fourth IDA credit of US$150.0 mil-

ESPANOL

PREFACIO

La Operación Abundancia, que contó con el respaldo de los cinco proyectos que se están evaluando, es de enormes dimensiones. En 1996 participaban en ella, en calidad de miembros, 9,3 millones de agricultores que entregaban un promedio de 10.900 toneladas de leche al día, por medio de 55.042 cooperativas campesinas funcionales, a 170 uniones de productores de leche, las cuales vendían la leche en forma líquida y como productos elaborados. Esta vasta organización surgió de una pequeña cooperativa establecida en 1946 en el estado de Gujarat. El crecimiento registrado se ha financiado con US$690 millones (dólares de 1996, 25% del costo del proyecto) desembolsados por el Banco Mundial y US$1.100 millones (dólares de 1996) en ayuda alimentaria del Programa Mundial de Alimentos y la Comunidad Europea. Aun así, la Operación Abundancia representa tan sólo el 6,3% de la producción total de leche y el 22% de la leche que se comercializa en la India. La producción total de leche también se ha incrementado rápidamente desde la puesta en marcha de la Operación Abundancia.

En lo que respecta a la industria lechera de la India, el Banco ha seguido una estrategia de desarrollo sencilla, congruente y transparente: apoyar la expansión de la producción de leche de los pequeños productores por medio de un exitoso programa de desarrollo autóctono. A pesar de haber recibido una asistencia considerable del Gobierno y de ampararse en una legislación favorable, y si bien el Gobierno controla algunas de las organizaciones principales, este programa está dominado actualmente por cooperativas lecheras campesinas controladas por los agricultores, y por algunas uniones regionales de productores de leche.

En marzo de 1974, la AIF aprobó un crédito inicial de US$30,0 millones y en

FRANCAIS

PRÉFACE

L'opération « Flood », qui a bénéficié de cinq projets actuellement en cours d'évaluation, est une entreprise de grande envergure. En 1996, elle touchait 9,3 millions de producteurs qui fournissaient en moyenne 10 900 tonnes de lait par jour, par l'entremise de 55 042 coopératives villageoises, à 170 unions de producteurs laitiers (UPL) qui le revendaient sous forme de lait ou de produits laitiers. Cette vaste organisation est née d'une petite société coopérative de l'État de Gujarat, fondée en 1946. Cette croissance a été appuyée par un apport de 0,69 milliard de dollars (en dollars de 1996), qui représentait 25 % du coût du projet, décaissé par la Banque et par un montant de 1,1 milliard de dollars (en dollars de 1996) d'aide alimentaire du Programme alimentaire mondial et de la Communauté européenne. Néanmoins, l'opération « Flood » ne représente que 6,3 % de la production laitière totale et 22 % du lait commercialisé en Inde. La production totale de lait a également progressé rapidement depuis le lancement de cette opération.

À l'égard de l'industrie laitière indienne, la Banque a suivi une stratégie de développement simple, cohérente et transparente : appuyer l'expansion de la production laitière des petits producteurs grâce à un programme réussi de développement indigène. Ce programme, malgré une aide substantielle de l'État, des textes de loi favorables et le contrôle par l'État de certaines organisations faîtières, est à présent dominé par les coopératives laitières villageoises contrôlées par les producteurs et certaines UPLs.

Un premier crédit de 30 millions de dollars a été approuvé par l'IDA en mars 1974, suivi de deux autres crédits de 27,7 et 16, 4 millions de dollars, approuvés en décembre 1974, qui appuyaient tous des projets dans divers États. Un quatrième crédit de l'IDA, de 150 millions de dol-

ENGLISH

lion approved in June 1978 supported a first national project, and a further IDA credit of SDR 121.2 million and loan of US$200.0 million approved in December 1987 supported a second national project.

The first four projects were audited by the Operations Evaluation Department (OED) in 1987, and studies were sponsored by the Bank, the Danish International Development Agency (DANIDA), and the International Food Policy Research Institute (IFPRI) on the impact of the Bank-supported projects in Karnataka (Alderman 1987) and Madhya Pradesh (Mergos and Slade 1987). The final project, which closed on April 30, 1996, was audited in November 1996.

This report is based on these audits and studies, the associated Project Completion Reports and Implementation Completion Reports, examination of other Bank documents, and interviews with Bank staff. OED missions also visited India in January and November 1996. As part of the study, a participatory farmer survey was undertaken in Karnataka, and a resurvey of villages, originally studied in 1983, was organized in Madhya Pradesh. A study of the level of protection of the Indian dairy industry was also undertaken. A workshop at the Institute of Rural Management, Anand, Gujarat state, with 43 Indian participants was held to discuss a draft of this report in March 1997. The generous assistance of the Swiss Development Corporation in financing this workshop is gratefully acknowledged.

The valuable assistance provided to OED staff in the preparation of this report by the government of India and the state governments of Karnataka, Rajasthan, Gujarat,

ESPANOL

diciembre de ese mismo año aprobó otros dos créditos de US$27,7 millones y US$16,4 millones, todos ellos para financiar proyectos en diversos estados. En junio de 1978, la AIF aprobó un cuarto crédito, esta vez por US$150,0 millones para apoyar un primer proyecto nacional y, en diciembre de 1987, aprobó otro crédito de DEG 121,2 millones y un préstamo de US$200,0 millones para financiar un segundo proyecto nacional.

En 1987 el Departamento de Evaluación de Operaciones (DEO) evaluó los resultados de los cuatro primeros proyectos. Además, el Banco Mundial, el Organismo Danés de Desarrollo Internacional (DANIDA) y el Instituto Internacional de Investigaciones sobre Políticas Alimentarias (IIPA) patrocinaron estudios sobre las repercusiones de los proyectos respaldados por el Banco en Karnataka (Alderman 1987) y Madhya Pradesh (Mergos y Slade 1987). La evaluación de resultados del último proyecto, que se cerró el 30 de abril de 1996, tuvo lugar en noviembre de ese año.

El presente informe se basa en estas evaluaciones y estudios, en los informes de terminación de proyectos y los informes finales de ejecución conexos, en el examen de otros documentos del Banco y en entrevistas con funcionarios del Banco. Además, el DEO envió misiones a la India en enero y noviembre de 1996. Como parte del estudio, en Karnataka se realizó una encuesta sobre la participación de los agricultores y en Madhya Pradesh se organizó una nueva encuesta de los poblados estudiados originalmente en 1983. También se efectuó un estudio sobre el grado de protección de la industria lechera en la India. En marzo de 1997 se organizó un seminario en el Instituto de Administración Rural de Anand, en el estado de Gujarat, al que asistieron 43 participantes indios para analizar un borrador de este informe. Se agradece sinceramente el generoso aporte

FRANCAIS

lars a été approuvé en juin 1978 pour un premier projet national, et un autre crédit de l'IDA de 121,2 millions de dollars et un prêt de 200 millions de dollars ont été approuvés en décembre 1987 pour un deuxième projet national.

Les quatre premiers projets ont fait l'objet d'un audit de la part du Département de l'évaluation des opérations en 1987, et des études ont été parrainées par la Banque, l'Agence danoise de développement international (DANIDA), et l'Institut national de Recherche sur les politiques alimentaires (IFPRI) sur l'impact des projets appuyés par la Banque dans les États de Karnataka (Alderman 1987) et de Madhya Pradesh (Mergos et Slade 1987). Le projet final, dont la clôture a eu lieu le 30 avril 1996, a fait l'objet d'un audit en novembre 1996.

Le présent rapport repose sur ces audits et études, sur les rapports d'achèvement de projet et les rapports de fins d'exécution correspondants, sur les examens d'autres documents de la Banque et sur des interviews de fonctionnaires de la Banque. Des missions de l'OED se sont également rendues en Inde en janvier et novembre 1996. Dans le cadre de cette étude, une enquête participative auprès des producteurs a été effectuée dans l'État de Karnataka, et une nouvelle enquête a été effectuée sur les villages qui avaient été étudiés à l'origine en 1983 dans l'État de Madhya Pradesh. Une étude a été également consacrée au niveau de protection de l'industrie laitière indienne. Un atelier a été organisé à l'Institut de gestion rurale Anand, dans l'État de Gujarat, au cours duquel 43 participants indiens se sont penchés sur une version préliminaire du présent rapport en mars 1997. Nous sommes vivement reconnaissants à la Société suisse de développement de sa généreuse assistance pour le financement de cet atelier.

Nous remercions le Gouvernement de l'Inde et les Gouvernements des États

ENGLISH

Bihar, and the Punjab is gratefully acknowledged. The hospitality and generous commitment of time by the staff of Operation Flood, the National Dairy Development Board (NDDB), and other participants in the Indian dairy industry too numerous to mention also contributed greatly to the success of the evaluation.

A draft version of the impact evaluation report was sent to the government of India, the governments of Karnataka, Rajasthan, Gujarat, Bihar, and the Punjab, and the NDDB for comments. Where appropriate, the text has been changed to reflect these comments.

The report has also benefited from extensive comments from the South Asia Regional Office of the Bank: most of the comments have been incorporated. However, three areas of disagreement remain; these are footnoted in the text.

ESPANOL

de la Sociedad Suiza para el Desarrollo para financiar ese seminario.

Asimismo, se reconoce y agradece profundamente la valiosa colaboración prestada a los funcionarios del DEO en la elaboración de este informe por el Gobierno de la India y los gobiernos de los estados de Karnataka, Rajastán, Gujarat, Bihar y Punjab. La hospitalidad y la generosa dedicación de tiempo del personal de la Operación Abundancia, la Junta Nacional de Fomento Lechero y otros participantes de la industria lechera de la India, cuya enumeración sería demasiado extensa, también fueron muy valiosas para el éxito de la evaluación.

Se envió una versión preliminar del informe sobre las repercusiones del proyecto al Gobierno de la India, a los gobiernos de Karnataka, Rajastán, Gujarat, Bihar y Punjab y a la Junta Nacional de Fomento Lechero, solicitándoles sus comentarios. En los casos pertinentes se han hecho las modificaciones necesarias para tener en cuenta los comentarios recibidos.

En la redacción de este informe se han aprovechado los extensos comentarios formulados por la Oficina Regional de Asia Meridional del Banco Mundial; la mayoría de ellos han sido incorporados al texto. No obstante, sigue habiendo tres esferas de desacuerdo, indicadas en el texto por medio de notas al pie de página.

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de Karnataka, du Rajasthan, de Gujarat, du Bihar et du Pendjab de l'aide précieuse qu'ils ont apportée au personnel de l'OED pour la préparation du présent rapport. L'accueil offert et l'intérêt manifesté par le personnel de l'opération « Flood », de la Commission nationale du développement de l'industrie laitière (National Dairy Development Board, NDDB) et d'autres participants de l'industrie laitière indienne, trop nombreux pour pouvoir être mentionnés, ont grandement contribué au succès de cette évaluation.

Une première version du rapport d'impact a été communiquée au Gouvernement indien, ainsi qu'aux Gouvernements des États de Karnataka, du Rajasthan, de Gujarat, du Bihar et du Pendjab, ainsi qu'à la NDDB, pour commentaires. Dans certains cas, le texte a été modifié en fonction de ces commentaires.

Le rapport a également bénéficié des observations détaillées du bureau régional Asie du Sud de la Banque : il a été tenu compte de la plupart de ces observations. Toutefois, il reste trois points de désaccord, qui font l'objet de notes de bas de page dans le texte.



Robert Picciotto
Director-General, Operations Evaluation Department

ENGLISH

EXECUTIVE SUMMARY

Operation Flood is not an all purpose poverty removal program. It cannot be, because it focuses clearly on a single productive activity, dairying, while the ranks of the rural poor include many different categories of the disenfranchised: the old, the infirm, the tribals, the landless, the small farmers, the artisans and so forth. [Similarly, Operation Flood] is not an all purpose development program, aimed at removing economic and social inequalities existing in rural India for centuries at one stroke.

Dr. V. Kurien
(quoted in Doornbos and Nair 1990)

The first of the five Indian dairy projects included in this study was approved by the Board in March 1974. At that time India was following a self-reliant macroeconomic development policy with heavy emphasis on import substitution (a policy which remained essentially unchanged until 1991). In the dairy sector, a policy decision had been made to utilize farmer-controlled cooperatives to develop the dairy industry and to make the import substitution as efficient as possible. The government also decided to withdraw from its own direct efforts to develop the dairy industry (indirect efforts via extension, research, artificial breeding, etc., continued). Dairy commodity food aid was to be sold at commercial prices with the proceeds being earmarked for support of Operation Flood.

ESPANOL

RESUMEN

La Operación Abundancia no es un programa de eliminación de la pobreza para todo propósito. No puede serlo porque se centra claramente en una sola actividad productiva, la producción lechera, en tanto que entre la población pobre de las zonas rurales hay muchas categorías diferentes de personas en situación desfavorable: los ancianos, los enfermos, los pueblos tribales, los campesinos sin tierras, los pequeños agricultores, los artesanos, etc. [Por lo mismo, la Operación Abundancia] tampoco es un programa de desarrollo para todo propósito encaminado a eliminar de una vez las desigualdades económicas y sociales que existen desde hace siglos en las zonas rurales de la India.

Dr. V. Kurien
(citado en Doornbos y Nair 1990)

El primero de los cinco proyectos de fomento lechero en la India que se incluyen en este estudio fue aprobado por el Directorio en marzo de 1974. En esa época la India estaba aplicando una política de desarrollo macroeconómico autosuficiente que hacía mucho hincapié en la sustitución de importaciones (política que se mantuvo prácticamente sin cambios hasta 1991). En el sector lechero se había tomado la decisión de recurrir a cooperativas controladas por los agricultores a fin de desarrollar la industria lechera y para que la sustitución de importaciones fuese lo más eficiente posible. Además, el Gobierno decidió suspender sus propios esfuerzos directos de fomento a la industria lechera (aunque continuaron los esfuerzos indirectos por medio de servicios de extensión, la investigación, la reproducción artificial, etc.). Los complementos alimenticios lácteos se venderían a precios comerciales, y las utilidades se consignarían al respaldo de la Operación Abundancia.

FRANCAIS

RÉSUMÉ ANALYTIQUE

L'opération « Flood » ne cherche pas à combattre la pauvreté sur tous les fronts. Elle se concentre plutôt sur une activité, la production laitière, étant entendu que la population rurale pauvre comprend diverses catégories de laissés pour compte : les vieux, les infirmes, les populations tribales, les paysans sans terre, les petits agriculteurs, les artisans et autres. [Dans le même ordre d'idées, l'opération « Flood »] n'est pas non plus un programme général de développement, destiné à supprimer d'un trait les inégalités économiques et sociales qui existent depuis des siècles en Inde.

M. V. Kurien
(cité dans Doornbos et Nair 1990)

Le premier des cinq projets laitiers en Inde examiné dans la présente étude a été approuvé par le Conseil en mars 1974. À l'époque, l'Inde suivait une politique de développement économique autonome qui privilégiait fortement la substitution aux importations (politique qui est restée essentiellement la même jusqu'en 1991). Dans le secteur laitier, il a été décidé de faire appel à des coopératives de producteurs pour développer l'industrie laitière et rendre la substitution aux importations aussi efficace que possible. Le gouvernement a également décidé de renoncer à intervenir directement dans le développement de l'industrie laitière (mais il a poursuivi l'action indirecte qu'il menait à travers la vulgarisation, la recherche, l'insémination artificielle, etc.). Les produits laitiers subventionnés au titre de l'aide alimentaire devaient ensuite être vendus aux prix du marché et le produit de la vente devait être affecté au financement de l'opération « Flood ».

ENGLISH

The inauguration of Operation Flood corresponded to a turnaround in per capita incomes which had been falling to a period of sustained, if modest, growth. Rising per capita incomes, together with rising population and a high income elasticity of demand for milk, resulted in a rapid growth in the demand for milk (technically, a rapid shift in the demand function for milk). In the absence of supply side adjustment, this would have led to a rapid escalation in the price of milk or the need for extensive imports. In fact, the shift in the supply function from the policy changes introduced with Operation Flood resulted in an even larger shift in the supply (function) and declining real prices. The South Asia Regional Office in the Bank deemphasizes the supply-side effects.

Revolution: From Green to White

The overall expansion of the dairy industry from the early 1970s has been comparable to the more widely recognized Green Revolution crops of wheat and rice. Two key policy changes which accompanied the decision to provide direct financial assistance to the cooperatives to develop the dairy industry were the ending of direct efforts by the public sector to promote dairy production and the decision to sell dairy food aid at commercial prices within India. Both of these changes reduced the price risks for farmers, small-scale traders (*dudhiyas*), and private processors. Crossbreeding of local cows with specialized dairy breeds provided the technology for rapid increases in milk production, and Operation Flood provided the example of large-scale modern milk processing fed by a well-organized milkshed procuring milk from a large number of produc-

ESPANOL

La puesta en marcha de la Operación Abundancia coincidió con un punto de inflexión en la evolución del ingreso per cápita, que pasó de una tendencia descendente a un período de crecimiento sostenido aunque moderado. El aumento del ingreso per cápita, junto con el aumento de la población y una mayor elasticidad-ingreso de la demanda de leche, dieron como resultado un crecimiento acelerado de dicha demanda (técnicamente, un cambio rápido en la función de demanda de leche). Al no haber un ajuste del lado de la oferta, esto hubiera conducido a una rápida subida del precio de la leche o a la necesidad de efectuar cuantiosas importaciones. De hecho, la variación en la función de la oferta a partir de los cambios de política introducidos con la Operación Abundancia dieron como resultado una variación aún más marcada en (la función de) la oferta y un descenso de los precios reales[1].

Revolución: de verde a blanco

La expansión global que registró la industria lechera desde principios de los años setenta es comparable a la Revolución Verde, más ampliamente reconocida, de los cultivos de trigo y arroz. Dos de los cambios de política fundamentales que acompañaron la decisión de proporcionar asistencia financiera directa a las cooperativas para fomentar la industria lechera fueron la suspensión de los esfuerzos directos del sector público para promover la producción de leche y la decisión de vender los complementos alimenticios lácteos a precios comerciales en la India. Ambos cambios redujeron los riesgos de fluctuaciones de precios para los agricultores, los comerciantes en pequeña escala (*dudhiyas)*, y las plantas privadas de procesamiento. El cruce de vacas con razas lecheras especializadas proporcionó la tecnología para incrementar rápidamente la producción de leche, y la Operación Abundancia sirvió de

FRANCAIS

Le lancement de l'opération « Flood » a coïncidé avec un revirement des revenus par habitant, qui sont passés d'une période de baisse à une période de croissance modeste mais soutenue. Cet accroissement des revenus par habitant, conjugué à l'accroissement de la population et une forte élasticité de la demande de lait aux revenus, a entraîné une croissance rapide de la demande de lait (en termes techniques, un rapide déplacement de la fonction de la demande de lait). En l'absence d'ajustement de l'offre, cela aurait entraîné une rapide escalade des prix du lait ou la nécessité d'importations massives. En fait, le déplacement de la fonction de l'offre entraîné par les changements de politique introduits par l'opération « Flood » s'est traduit par un déplacement encore plus grand de la fonction de l'offre et par un fléchissement des prix réels[1].

De la révolution verte à la révolution blanche

L'expansion générale de l'industrie laitière qui a commencé au début des années 70 est comparable à l'expansion des productions de blé et de riz de la révolution verte plus connue. La décision d'apporter une aide financière directe aux coopératives pour le développement de l'industrie laitière s'est accompagnée de deux profonds changements de politique, à savoir la décision de mettre fin à l'intervention directe du secteur public pour promouvoir la production laitière, et la décision de vendre les produits laitiers de l'aide alimentaire aux prix du marché en Inde. Ces deux mesures ont permis de réduire les risques de fluctuation des prix pour les producteurs, les petits négociants (*dudhiya*), et les établissements privés de traitement du lait. Le croisement des vaches locales avec des espèces élevées spécifiquement pour la production laitière a fourni la technologie qui a permis un accroissement rapide de la production

ENGLISH

ers in very small amounts (1 and 2 liters). As shown in Figure 8.1, the actual volume of milk handled by Operation Flood remains a small fraction of the increased supply. It is thus not possible to attribute increased production simply to the dairy processing, marketing infrastructure, and technical support provided by Operation Flood directly (important though these contributions have been). Rather, one has to look to the changed dairy policy environment which accompanied the decision supporting Operation Flood. This was not "policy based lending" in the sense of an operation rich in policy conditionality. The Bank saw an ongoing policy that it felt was promising and could usefully be supported. The policy was promising because of its probable production impact, but even more because of its capacity to reach the poor.

Expanded Indigenous Expertise and Manufacturing

A byproduct impact of Operation Flood and the accompanying dairy expansion has been the establishment of an indigenous dairy equipment manufacturing industry (only 7 percent of dairy equipment is now imported) and an impressive body of indigenous expertise that includes animal nutrition, animal health, artificial insemination (AI), management information systems (MIS), dairy engineering, food technology, and the like. For AI, milk-testing, and village society secretarial services, Operation Flood trained villagers to a high degree of competence and thus controlled costs. It capitalized on rural India's ample supply of very low-cost labor. This indigenous infrastructure explains in large part why milk pro-

ESPANOL

ejemplo de un moderno método de procesamiento en gran escala abastecido por un sistema bien organizado de adquisición de leche a un gran número de pequeños productores en muy pocas cantidades (1 y 2 litros). Como puede observarse en la Figura 8.1, el volumen real de leche que maneja la Operación Abundancia sigue siendo una pequeña fracción de esta mayor oferta. Por consiguiente, no es posible atribuir el aumento de la producción simplemente al procesamiento de la leche, a la infraestructura de comercialización ni al respaldo técnico proporcionado directamente por la Operación Abundancia (pese a la importancia que han tenido estas contribuciones). En cambio, es necesario considerar la modificación del entorno de políticas sobre la producción lechera que acompañó a la decisión de apoyar a la Operación Abundancia. No se trató de "préstamos en apoyo de reformas de políticas", en el sentido de que la operación estuviese sujeta a una alta condicionalidad respecto a las políticas. El Banco consideró que la política que se estaba aplicando era prometedora y que podía respaldarse con buenos resultados. La política era prometedora debido a sus probables repercusiones sobre la producción, pero aún más por su capacidad de llegar hasta los sectores pobres.

Ampliación de los conocimientos técn icos y la manufactura de equipo en el país

Una de las repercusiones secundarias de la Operación Abundancia y de la expansión paralela de la industria lechera ha sido el establecimiento de una industria manufacturera autóctona de equipo para producción lechera (actualmente sólo se importa el 7% de este tipo de equipo) y un gran cúmulo de conocimientos autóctonos que incluyen nutrición animal, sanidad animal, inseminación artificial, sistemas de información para la gestión, ingeniería de fabricación de productos lácteos, tecnología de alimentos y campos

FRANCAIS

de lait, et l'opération « Flood » a donné l'exemple de grands établissements modernes de traitement du lait recevant la matière première d'un grand nombre de petits producteurs bien organisés fournissant chacun une petite quantité de lait. Comme le montre la figure 8.1, le volume effectif de lait traité dans le cadre de l'opération « Flood » ne représente qu'une fraction modeste de l'accroissement de l'offre. Il n'est donc pas possible d'attribuer l'accroissement de la production uniquement au traitement et à la commercialisation du lait, à l'infrastructure et à l'appui technique fourni directement par l'opération « Flood » (quelle qu'ait été l'importance de ces contributions). Il faut plutôt considérer les modifications de la politique laitière qui ont accompagné la décision d'appuyer cette opération. Il ne s'agissait pas de « prêts à l'appui de réformes » au sens d'une opération assortie de nombreuses conditions. La Banque a vu dans cette opération l'annonce d'une nouvelle orientation qui lui a paru prometteuse et de nature à mériter son appui. Cette nouvelle politique était riche de promesses par l'impact probable qu'elle aurait sur la production, mais plus encore par sa capacité à profiter aux pauvres.

Développement des compétences et de la capacité de production manufacturière des populations locales

L'un des effets indirects de l'opération « Flood » et de l'expansion qu'elle a entraînée de la production laitière a été l'établissement d'une industrie locale de fabrication d'équipements pour l'industrie laitière (7 % seulement de ces équipements sont à présent importés) et d'une masse impressionnante de compétences locales en matière de nutrition animale, de santé animale, d'insémination artificielle, de systèmes d'information de gestion, d'ingénierie laitière, de technologie

ENGLISH

cessing and marketing costs of Operation Flood have not exploded in the face of having to procure and account for minute quantities of milk.

Benefits to Women and Children

Operation Flood is unusual in that it is a single-commodity "integrated development project." There was an obvious production impact of the policy changes associated with Operation Flood (40 million tons more of milk were produced in 1995 than would have been produced if the pre-1971 growth rate had continued). Under the new policy, per capita milk consumption has risen from 107 grams/ head/day in 1970 to 193 grams/ head/day in 1994. Operation Flood has also had clear benefits for the poor and women. For those landless people who own or have been able to purchase a milch animal (a cow or buffalo), it has been a boon. Of course, those who are both cowless and landless have only been slightly affected by some of the social programs supported by the village Dairy Cooperative Societies (DCSs) out of their profits and by the increased prosperity of the village economies. Operation Flood, in collaboration with NGOs, has established 6,000 women's dairy cooperative societies (WDCSs) and generated higher incomes for some women. Indirectly, it has expanded the number of children attending school because of the high income elasticity of demand for education in Indian villages. This project has produced diverse "results on the ground."

Return on the Investment

Viewed as lending to sustain and help implement a new policy, Bank investments need to account for only 0.6 percent of the observed accelera-

ESPANOL

afines. Para poder contar con servicios de inseminación artificial, pruebas de la leche y servicios secretariales en las cooperativas campesinas, en el marco de la Operación Abundancia se impartió capacitación a los pobladores, lo que les permitió alcanzar un alto grado de competencia a un costo controlado. Se aprovechó la oferta de mano de obra a muy bajo costo que abunda en las zonas rurales de la India. Esta infraestructura autóctona explica en gran medida por qué el procesamiento de la leche y los costos de comercialización de la Operación Abundancia no se han disparado al tener que comprar y contabilizar cantidades muy pequeñas de leche.

Beneficios para las mujeres y los niños

La Operación Abundancia es singular en el sentido de que se trata de un "proyecto de desarrollo integrado" con un sólo producto básico. Hubo repercusiones obvias sobre la producción a raíz de los cambios de política vinculados con la Operación Abundancia (en 1995 se produjeron 40 millones de toneladas más de leche que las que se habrían producido si se hubiese mantenido la tasa de crecimiento previa a 1971). En el marco de la nueva política, el consumo de leche per cápita aumentó de 107 gramos/persona/día en 1970 a 193 gramos/persona/día en 1994. La Operación Abundancia redundó además en evidentes beneficios para los pobres y las mujeres. Para los campesinos carentes de tierras que poseen o han podido adquirir un animal lechero (una vaca o una búfala), ha representado una excelente fuente de ingresos. Por supuesto, las personas que no tienen ni animales ni tierras han recibido beneficios muy superficiales de algunos de los programas sociales que las cooperativas lecheras campesinas financian con sus propias utilidades, y de la creciente prosperidad de las economías de los poblados. La Operación Abundancia, en colaboración con algunas ONG,

FRANCAIS

alimentaire et autres. Pour l'insémination artificielle, l'analyse du lait et les services de secrétariat des sociétés villageoises, l'opération « Flood » a donné un haut niveau de compétence aux villageois, limitant ainsi les coûts. Elle a su tirer parti de l'abondante main-d'oeuvre rurale à bon marché dont dispose l'Inde. Cette infrastructure locale explique en grande partie pourquoi les coûts de traitement et de commercialisation du lait dans le cadre de l'opération « Flood » ne sont pas montés en flèche face à la nécessité de réunir et d'enregistrer une multitude d'apports représentant chacun un très petit volume de lait.

Les avantages pour les femmes et les enfants

L'opération « Flood » présente la caractéristique inhabituelle d'être « un projet de développement intégré » fondé sur un seul produit. Les réformes associées à cette opération ont eu un impact évident sur la production (en 1995, la production laitière a été de 40 millions de tonnes supérieure au niveau qu'elle aurait atteint si le taux de croissance s'était maintenu à son niveau d'avant 1971). Grâce à la nouvelle politique, la consommation de lait par habitant est passée de 107 grammes par habitant et par jour en 1970 à 193 grammes par habitant et par jour en 1994. L'opération « Flood » a également présenté des avantages très clairs pour les femmes et les enfants. Pour les paysans sans terre qui possèdent ou ont pu acheter une vache (ou buffle) laitière, cette opération a été une aubaine. Bien entendu, ceux qui ne possèdent ni vache ni terre n'ont bénéficié qu'accessoirement de cette opération, à travers quelques programmes sociaux financés par les sociétés coopératives laitières villageoises sur leurs bénéfices, et à travers la prospérité accrue de leur village. En collaboration avec des ONG, l'opération « Flood » a permis de créer 6 000 sociétés coopéra-

ENGLISH

tion in the growth of dairy production to yield an estimated economic rate of return (ERR) of 10 percent. If 2 percent of the observed increase was due to the policy change, then this would return 10 percent on the entire Operation Flood investment by the WFP, EC, government of India, and the Bank.

Operation Flood is an Indian program; the basic institutional structure was put in place during the first phase, when the Bank was supporting parallel dairy development in three states. Thus, when the program was massively expanded under Operation Flood II, there was an already existing indigenous institution ready to implement the project. Bank institutional support thus involved genuine institution building, as distinguished from the institution *creation* characteristic of many Bank projects.

Regulation Is Needed

The perishability of milk (it will spoil if not cooled within four hours of milking) and the impossibility for consumers to know whether a given sample of milk is a health hazard dictates a public interest in milk marketing. It is a simple matter to adulterate milk by adding water (and thus perhaps fecal matter and associated health hazards); to correct for spoilage by the addition of caustic soda; to replace easily cleaned stainless steel equipment with plastic and mild steel; or indeed to bypass the cow entirely, relying on a mixture of vegetable oil, soap, and urea to produce "artificial milk." Since these devices can be used to reduce both marketing margins and milk quality, there is a Gresham's Law of Dairying that states "poor milk drives out good." To rely on the beneficial results of unregulated competition in

ESPANOL

ha establecido 6.000 cooperativas lecheras atendidas por mujeres, y ha elevado los ingresos de algunas mujeres. Indirectamente, ha aumentado el número de niños que asisten a la escuela debido a la mayor elasticidad-ingreso de la demanda de educación en las aldeas de la India. Este proyecto ha producido diversos "resultados sobre el terreno".

Rentabilidad de la inversión

Las inversiones del Banco, si se consideran como financiamiento destinado a sostener y ayudar a poner en práctica una nueva política, deben representar tan sólo el 0,6% de la aceleración observada en el crecimiento de la producción lechera y dar lugar a una tasa de rentabilidad económica estimada de 10%. Si el 2% del incremento observado se debió al cambio de las políticas, esto representaría una rentabilidad del 10% de toda la inversión en la Operación Abundancia realizada por el Programa Mundial de Alimentos, la Comunidad Europea, el Gobierno de la India y el Banco.

La Operación Abundancia es un programa de la India; la estructura institucional básica fue creada durante la primera etapa, cuando el Banco estaba respaldando el fomento lechero paralelamente en tres estados. Por consiguiente, cuando el programa se amplió en forma masiva en el marco de la Operación Abundancia II, ya existía una institución autóctona en condiciones de ejecutar de inmediato el proyecto. Por lo tanto, el respaldo institucional del Banco constituía un genuino fortalecimiento institucional, distinto de la *creación* de instituciones que caracteriza a muchos de los proyectos del Banco.

Necesidad de regulación

Dado que la leche es un producto perecedero (se echa a perder si no se refrigera en un plazo de cuatro horas desde la ordeña) y es imposible que los consumi-

FRANCAIS

tives laitières de femmes et de dégager des revenus plus élevés pour certaines d'entre elles. Indirectement, elle a permis d'accroître le nombre d'enfants scolarisés, en raison de la forte élasticité de la demande d'éducation au revenu dans les villages indiens. Ce projet a produit divers résultats sur le terrain.

Rentabilité de l'investissement

Les investissements de la Banque, qui sont perçus comme des prêts destinés à soutenir et à faciliter l'application d'une nouvelle politique, n'ont besoin de compter que pour 0,6 % de l'accélération observée de la croissance de la production laitière pour présenter un taux de rentabilité économique estimé à de 10 %. En apportant une contribution de 2 % à l'accroissement observé, le changement de politique permettrait d'obtenir un taux de rentabilité de 10 % de l'ensemble des investissements du Programme alimentaire mondial, de la Communauté européenne, du Gouvernement indien et de la Banque dans l'opération « Flood ».

L'opération « Flood » est un programme indien ; sa structure institutionnelle de base a été mise en place pendant la première phase, lorsque la Banque appuyait des projets de développement laitier parallèles dans trois États. Ainsi, lorsque le programme a fait l'objet d une expansion massive dans le cadre de l'opération « Flood II», il existait déjà une institution locale prête à exécuter le projet. La Banque a donc aidé à un véritable renforcement des institutions, à la différence de la création d'institutions qui caractérise un grand nombre de ses projets.

Nécessité d'une réglementation

Le fait que le lait soit une denrée périssable (qui tourne s'il n'est pas refroidi dans les quatre heures qui suivent la traite) et qu'il est impossible aux consommateurs de savoir si le lait qu'ils se disposent à

ENGLISH

such circumstances is not in the public interest.

In the villages, there are many milk producers and few buyers. This is inherent in the very small volume of milk produced by any one farmer. Without an adjacent urban center to ensure that depressed prices are countered by the entry of new buyers or a cooperative society able to ensure a benchmark milk price, the market structure involves many weak sellers with only a few discretionary buyers. An individual trader can easily choose not to buy on a particular day. This situation is a recipe for market failure. Traders can be expected to act oligopolistically. They will maximize their short-term profits, even as they drive the suppliers down their long-run supply curves and thus jeopardize long-term profits. At a distance from urban centers and in the absence of a cooperative, there is no reason to expect milk traders to act competitively. Policies predicated on competitive behavior are thus unlikely to yield expected benefits.

Ensuring Fair Competition

The Anand principles call for a three-tier system of cooperatives owned and controlled by farmers, with professional management. They are to be free of government or political interference and are to have the right to set purchase and selling prices, hire and fire staff, and go bankrupt. A major rationale of the Bank-supported Second National Dairy project (NDPII) was the conversion of cooperatives to the Anand pattern. All states that benefited under this follow-on project signed undertakings to convert their cooperatives to the Anand pattern. Actual compliance has been mixed, with many states still appointing civil servants as

ESPANOL

dores sepan si una muestra dada de leche representa un peligro para la salud, la comercialización de este producto representa un interés público. Es muy fácil adulterar la leche agregándole agua (y posiblemente con ella, materia fecal y otras sustancias nocivas para la salud); corregir la descomposición de la leche agregando sosa cáustica; sustituir equipo de acero inoxidable, que es fácil de limpiar, por equipo de plástico y acero dulce, o prescindir totalmente de la vaca, y preparar una mezcla de aceite vegetal, jabón y urea para producir "leche artificial". Puesto que estos artilugios pueden utilizarse para reducir los márgenes de comercialización y la calidad de la leche, existe una Ley de Gresham en materia de producción lechera que señala que "la leche mala quita siempre el puesto a la buena". En esas circunstancias, no sería en interés del público esperar resultados beneficiosos de una competencia no regulada.

En los poblados hay muchos productores de leche y pocos compradores. Esto es inherente al reducido volumen de leche que produce cada productor. Al no haber un centro urbano adyacente que asegure que los bajos precios sean contrarrestados por la incorporación de nuevos compradores, o una cooperativa que pueda asegurar un precio de referencia para la leche, la estructura del mercado está formada por muchos vendedores en situación desventajosa y sólo unos pocos compradores discrecionales. Un día un comerciante individual puede decidir no comprar leche. Tal situación es la receta para la falla del mercado. Cabe esperar que los comerciantes actúen de manera oligopolística. Tratarán de maximizar sus utilidades a corto plazo, incluso desplazando a los proveedores hacia la pendiente descendente de sus curvas de oferta a largo plazo y, de esta manera, poniendo en peligro las utilidades a largo plazo. Al encontrarse a cierta distancia de los cen-

FRANCAIS

consommer représente un danger pour leur santé oblige les pouvoirs publics à s'intéresser à la commercialisation du lait. Il est facile de frelater le lait en lui ajoutant de l'eau (et peut-être, ce faisant, des matières fécales ou autres substances comportant un risque sanitaire) ; de chercher à remédier à l'altération en ajoutant de la soude caustique ; de remplacer des cuves en acier inoxydable faciles à nettoyer par des cuves en plastique ou en acier doux ; ou en fait, de circuiter la vache en créant un « lait artificiel » à partir d'un mélange d'huile végétale, de savon et d'urée. Comme ces artifices peuvent contribuer à la fois à réduire les marges commerciales et la qualité du lait, on peut dire, en appliquant la loi économique de Gresham à la production laitière, que « le lait de mauvaise qualité fait baisser la consommation de bon lait ». Dans ces conditions, il est contraire à l'intérêt public de compter sur les bienfaits d'une concurrence non réglementée.

Dans les villages, il y a beaucoup de producteurs de lait et peu d'acheteurs. Cela tient au très petit volume de lait produit par chaque producteur. En l'absence d'un centre urbain voisin qui permette de contrer le fléchissement des prix par l'arrivée de nouveaux acheteurs ou d'une société coopérative capable d'établir un prix repère pour le lait, le marché se trouve structuré autour d'une multitude de petits vendeurs qui se disputent un nombre très limité d'acheteurs jouissant d'un pouvoir discrétionnaire. Un négociant peut facilement choisir de ne rien acheter un jour donné. Cette situation ne peut que mener à la défaillance du marché. Les négociants risquent fort d'adopter un comportement oligopolistique. Ils peuvent ainsi maximiser leurs bénéfices à court terme, mais en entraînant en même temps les fournisseurs sur une courbe descendante de l'offre à long terme, compromettant ainsi leurs profits à plus longue échéance. Lorsqu'ils sont éloignés des centres urbains

ENGLISH

managing directors of the federations or even MPUs and government nomination of at least some of the directors to the federations and unions. By and large, farmers control the village DCSs. Factionalism can be a problem but is not often serious. Even so, arbitrary and unhelpful rulings by the local representative of the Registrar of Cooperatives occur. At the MPU and federation level, the effects of government appointments are reflected in poor pricing decisions that sometimes lead to losses. These problems are not inherent in the cooperative structure but rather reflect the failure of the projects to achieve the full Anand structure for cooperatives in the states concerned.

Recommendations

The policy recommendations that follow from the analysis in this impact study differ slightly in content, and certainly in sequencing, from current Bank proposals:

- *Elimination of all state intervention in Operation Flood cooperatives.* Where this involves the transfer of state-owned assets to the cooperatives, the cooperatives could issue bonds to the state to be retired over a suitable period of time.
- *Elimination of all government incentives for investment in the dairy industry*. In the absence of such a change, and as a distinct second best solution, any incentives should be equally applicable to cooperative or corporate investments.
- *A renewed effort to enforce the provisions of the Prevention of Food Adulteration Act of 1954*. This should include inspection and approval of quality control/ milk testing

ESPANOL

tros urbanos y en ausencia de una cooperativa, no hay razón para esperar que los comerciantes de leche actúen de manera competitiva. Por consiguiente, es improbable que las políticas que se sustentan en un comportamiento competitivo produzcan los beneficios esperados.

Competencia leal

Los principios aplicados en Anand exigen un sistema de tres niveles de cooperativas que sean propiedad de los agricultores y estén controladas por ellos, con administración profesional. Deben estar libres de interferencias gubernamentales o políticas y deben gozar del derecho de fijar los precios de compra y de venta, de contratar y despedir personal y de declararse en bancarrota. Una de las principales justificaciones del segundo proyecto nacional de fomento lechero respaldado por el Banco fue la conversión de cooperativas según la estructura de Anand. Todos los estados que se beneficiaron de este proyecto de seguimiento se comprometieron a convertir sus cooperativas a la estructura de Anand. El cumplimiento de este compromiso no ha sido uniforme, y muchos estados siguen nombrando a empleados públicos como directores administrativos de las federaciones, o incluso de las uniones de productores de leche, y el Gobierno nombra por lo menos a algunos de los directores de las federaciones y las uniones. En gran medida, los agricultores controlan las cooperativas lecheras campesinas. Pueden proliferar las facciones, pero esto no suele ser un problema grave. Aun en esos casos, el representante local del registro de cooperativas puede tomar disposiciones arbitrarias y perjudiciales. A nivel de las uniones de productores de leche y de las federaciones, los efectos de los nombramientos gubernamentales se reflejan en decisiones poco acertadas sobre fijación de precios que a veces provocan pérdidas. Estos problemas no son inherentes

FRANCAIS

et ne disposent pas d'une coopérative, les négociants n'ont aucune incitation à adopter un comportement concurrentiel. De ce fait, les politiques qui misent sur un tel comportement ont peu de chances de produire les avantages attendus.

Assurer une concurrence loyale

Les principes d'Anand préconisent un système de coopératives à trois étages détenues et contrôlées par les producteurs, sans direction professionnelle. Ces coopératives doivent être à l'abri des ingérences gouvernementales ou politiques et avoir le droit de fixer leurs prix d'achat et de vente, de recruter et de licencier, et de se déclarer en faillite. L'une des grandes aspirations du deuxième projet laitier national appuyé par la Banque était la conversion des coopératives au modèle d'Anand. Tous les États qui ont bénéficié de ce projet relais ont signé l'engagement de convertir leur coopérative à ce modèle. Celui-ci a été plus ou moins appliqué : de nombreux États nomment encore des fonctionnaires aux postes de directeurs généraux des fédérations ou des unions de producteurs laitiers (UPL) et au moins certains de ces directeurs sont nommés par le gouvernement. Dans l'ensemble, les producteurs contrôlent les sociétés coopératives laitières villageoises. L'existence de factions peut poser un problème, mais rarement un problème grave. Néanmoins, le représentant local de l'agent chargé de la tenue des registres des coopératives prend souvent des décisions arbitraires et malavisées. Au niveau des UPL et des fédérations, les nominations par le gouvernement se traduisent par de mauvaises décisions de prix qui entraînent souvent des pertes. Ces problèmes ne sont pas inhérents à la structure des coopératives, mais plutôt au fait que les projets ne mettent pas totalement en place une structure établie selon les principes d'Anand dans les États concernés.

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procedures of processors, inspection of processing facilities, and testing *dudhiya* milk supplies for adulteration. This would require increased state expenditures. However, the sums involved are dwarfed by the savings which would follow from the withdrawal of government incentives. The livestock sector review suggests that states could experiment with paying private sector organizations to carry out the inspection and enforcement function.

Without successful implementation of these three conditions, repeal of the Milk and Milk products order (MMPO) would be premature. This is an issue of sequencing of reforms. The MMPO provides a (weak) bulwark against overinvestment, substandard equipment, and unhygienic operating conditions.

Continued support for the Indian dairy industry can be justified by the intention to bring about the policies recommended here and perhaps afterward, depending on whether a tilt towards cooperatives is felt to be appropriate.

At the very least, *there should be no further lending to the dairy sector in states which have not yet adopted the full Anand pattern for Operation Flood cooperatives or which do not treat these cooperatives equally with private corporations.*

Lessons

The first lesson stands out:

Lesson 1: A well conceived investment project in support of an already adopted and appropriate policy change can be associated with results out of all proportion to the investment involved. This occurs in part

ESPANOL

a la estructura de la cooperativa, sino que se deben a que los proyectos no pueden lograr plenamente la estructura de Anand para las cooperativas en los estados interesados.

Recomendaciones

Las recomendaciones en materia de política que se derivan del análisis de este estudio difieren ligeramente de las propuestas actuales del Banco en cuanto a su contenido, y definitivamente en lo que respecta a su secuencia:

- *Eliminación de toda intervención estatal en las cooperativas de la Operación Abundancia*. Si bien esto implica la transferencia de activos de propiedad estatal a las cooperativas, éstas podrían emitir al Estado bonos que serán rescatados en un período adecuado.
- *Eliminación de todos los incentivos gubernamentales a la inversión en la industria lechera*. Si no se eliminan esos incentivos, la solución que sigue en eficacia sería la aplicación equitativa de todos los incentivos a las inversiones cooperativas o corporativas.
- *Un esfuerzo renovado para hacer cumplir las disposiciones de la Ley sobre prevención de la adulteración de los Alimentos de 1954*. Esto debería incluir la inspección y la aprobación de los procedimientos de control de calidad y de pruebas de la leche que emplean las plantas de procesamiento, la inspección de los establecimientos de procesamiento y pruebas de la leche que abastecen los *dudhiya* para verificar si ha habido adulteración. Para ello, el Estado debería incrementar su nivel de gastos, pero esos montos serían compensados con creces por los ahorros que se derivarían de la eliminación de los incentivos gubernamentales. El examen del sector ganadero sugiere que los estados

FRANCAIS

Recommandations

Les recommandations de politique générale qui découlent de l'analyse de cette étude d'impact s'écartent légèrement par leur contenu, et sans aucun doute par leur enchaînement, des propositions actuelles de la Banque :

- *Élimination de toute intervention des États dans les coopératives de l'opération « Flood ».* Lorsque cela implique le transfert d'actifs détenus par les États aux coopératives, celles-ci pourraient émettre des obligations au profit de l'État, à rembourser sur une période appropriée.
- *Élimination de toutes les incitations du gouvernement à l'investissement dans l'industrie laitière.* En l'absence d'un tel changement, le mieux serait que toute incitation soit applicable sans distinction aux investissements dans les coopératives ou les sociétés.
- *Nouvel effort pour assurer l'application des dispositions de la loi de 1954 relative à la prévention du frelatage des aliments.* Ces efforts devraient comprendre l'inspection et l'approbation des procédures de contrôle de qualité/analyse du lait sortant des établissements de traitement, l'inspection des installations de traitement et l'analyse des approvisionnements en lait par les *dudhiya* pour éviter le frelatage. Cela impliquerait un accroissement des dépenses de la part des États. Toutefois, les sommes en question sont minimes en regard des économies que représenterait la suppression des incitations du gouvernement. Il ressort de l'examen du secteur de l'élevage que les États pourraient essayer, à titre expérimental, de payer des organismes privés pour exercer les fonctions d'inspection et de contrôle de l'application des dispositions de la loi.

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because it solves the "ownership" problem, in part because it avoids having to create an institution at the same time that the new institution is being expected to implement the project, and in part perhaps for a number of reasons not yet well understood.

This lesson intentionally finesses the exact extent of causation involved.

A second lesson concerns the multidimensional impact of the project:

> **Lesson 2:** By raising incomes, an apparently simple single-commodity project can have multiple beneficial effects, including nutrition, education (especially of girls), and job-creation.

This poses a question as to the relative efficiency of production projects that aim to reduce poverty directly, as compared to health, nutrition, and education projects designed to remove poverty indirectly or area development projects designed to intervene in many ways simultaneously.

Though not explicitly a "targeted" project, nevertheless 60 percent of the beneficiaries were marginal or small farmers and landless.

> **Lesson 3:** By focusing a project on a predominant activity of the poor, "self-selection" is likely to result in a major portion of the beneficiaries being poor.

This provides an alternative to "targeted" projects for reaching the poor.

The South Asia Regional Office has reservations about some aspects of the report's coverage. These reservations are also noted.

ESPANOL

podrían hacer la prueba de contratar a entidades privadas para que se ocupen de la inspección y del cumplimiento de las disposiciones.

Si no se ponen en práctica satisfactoriamente estas tres condiciones, sería prematuro revocar las disposiciones relativas a la leche y los productos lácteos. Se trata de aplicar las reformas en una secuencia adecuada. Estas disposiciones constituyen una defensa muy débil contra el exceso de inversión, el equipo deficiente y las condiciones de operación antihigiénicas.

Puede justificarse el respaldo continuo a la industria lechera de la India mediante la intención de poner en práctica las medidas recomendadas en el párrafo 11, y quizás después, si se considera apropiada la tendencia en favor de las cooperativas.

En cualquier caso, *no deberían concederse nuevos créditos al sector lechero en los estados que no hayan adoptado plenamente la estructura de Anand para las cooperativas de la Operación Abundancia o que no traten a estas cooperativas en pie de igualdad con las empresas privadas.*

Enseñanzas

Se extraen tres enseñanzas, entre las que se destaca la siguiente:

> **Enseñanza No. 1:** Un proyecto de inversión bien concebido en respaldo de un cambio de política acertado que ya ha sido adoptado puede asociarse a resultados que no guardan proporción con la inversión en sí. Esto ocurre en parte porque resuelve el problema de la identificación con los objetivos del proyecto, en parte porque evita tener que crear una institución al mismo tiempo en que se espera que la nueva institución lleve a cabo el proyecto, y en parte tal vez por diversas razones que aún no se comprenden claramente.

En esta lección se aplica intencionalmente

FRANCAIS

Si ces trois conditions ne sont pas dûment remplies, l'abrogation de l'ordonnance sur le lait et les produits laitiers serait prématurée. Le problème tient essentiellement à l'enchaînement des réformes. Cette ordonnance est un faible rempart contre le surinvestissement, l'utilisation d'équipements ne répondant pas aux normes et des conditions d'exploitation non hygiéniques.

Le maintien de l'appui à l'industrie laitière indienne peut se justifier par l'intention de favoriser l'adoption des mesures recommandées au paragraphe 11 et, par la suite, s'il semble opportun de favoriser les coopératives.

Pour le moins, *il ne devrait plus être accordé de prêts au secteur laitier dans les États qui n'appliquent pas encore pleinement les principes d'Anand pour les coopératives de l'opération « Flood » ou qui ne traitent pas ces coopératives sur un pied d'égalité avec les entreprises privées.*

Les leçons

La première leçon est claire :

> **Leçon 1 :** Un projet d'investissement bien conçu à l'appui d'une réforme déjà adoptée et judicieuse peut donner des résultats hors de proportion avec l'investissement en question. Cela s'explique en partie parce qu'un tel investissement résout le problème de « l'adhésion » des participants, et en partie parce qu'il permet d'éviter de créer une institution qui soit d'emblée tenue d'exécuter le projet, et peut-être pour un certain nombre d'autres raisons qui ne sont pas encore bien comprises.

Cette leçon passe intentionnellement sous silence l'ampleur exacte de la relation de cause à effet.

La deuxième leçon a trait aux aspects multiples de l'impact du projet :

> **Leçon 2 :** En relevant les revenus, un projet apparemment simple fondé

ESPANOL

gran sutileza en respecto a la magnitud exacta de los factores causales.

La segunda lección se refiere a las repercusiones multidimensionales del proyecto:

> **Enseñanza No. 2:** Al elevar el ingreso, un proyecto aparentemente sencillo sobre un sólo producto básico puede tener muchos efectos benéficos, incluida la nutrición, la educación (especialmente de las niñas) y la creación de empleos.

Esto plantea un interrogante con respecto a la eficiencia relativa de los proyectos de producción que tienen por objeto reducir directamente la pobreza, en comparación con los proyectos sobre salud, nutrición y educación encaminados a eliminar indirectamente la pobreza, o los proyectos de desarrollo subregional diseñados para intervenir simultáneamente de muchas maneras.

Si bien este proyecto no está explícitamente “focalizado”, el 60% de los beneficiarios fueron agricultores marginales o pequeños productores y campesinos sin tierras.

> **Enseñanza No. 3:** Al centrarse en un proyecto sobre una actividad predominante de los pobres, es posible que debido a la “autoselección” la mayor parte de los beneficiarios sean pobres.

Esto constituye una alternativa a los proyectos “focalizados” hacia los pobres.

Como se indica en las notas 1 y 2, la Oficina Regional de Asia Meridional tiene sus reservas acerca de ciertos aspectos de la cobertura del informe. Esas reservas se indican en el texto principal como notas al pie de página.

1. La Oficina Regional de Asia Meridional del Banco resta importancia a los efectos del lado de la oferta.

FRANCAIS

sur une seule denrée peut avoir de multiples effets bénéfiques, notamment sur la nutrition, l’éducation (en particulier pour les filles), et la création d’emplois.

Cela pose le problème de l’efficacité relative des projets de production qui visent à réduire directement la pauvreté par comparaison aux projets de santé, de nutrition et d’éducation, conçus pour combattre indirectement la pauvreté ou aux projets de développement communautaire, qui tendent à intervenir simultanément sur plusieurs fronts.

Bien que le projet n’ait pas été explicitement « ciblé », 60 % de ses bénéficiaires étaient des marginaux, de petits exploitants ou des paysans sans terre.

> **Leçon 3 :** En axant un projet sur une activité menée principalement par les pauvres, on parvient automatiquement à un phénomène de sélection en ce sens que la majeure partie des bénéficiaires sont des pauvres.

Cela offre un autre moyen d’atteindre les pauvres que par des projets « ciblés ».

Comme il est indiqué aux notes 1 et 2 de bas de page, le bureau régional Asie du Sud exprime des réserves sur certains aspects de ce rapport. Ces réserves font également l’objet de notes de bas de page dans le texte du rapport.

1. Le Bureau régional Asie du Sud de la Banque tend à minimiser les effets sur l’offre.



1 Introduction

Design Features of Bank Dairy Projects

Bank dairy projects have adopted two distinct strategies (Table 1.1). The first focuses on *remedying a production shortage* by providing new and genetically superior purebred dairy stock, often imported. The second (the Operation Flood model) involves *providing a reliable market for existing producers.* There is overlap in these designs in that both provide for milk processing. The first model includes milk collection, but primarily from its "own" farmers: the second model includes access to inputs, veterinary services, and crossbred cattle. Despite this overlap, the models are clearly distinct.

Only in Turkey was the production strategy unambiguously successful (with a re-estimated economic rate of return (ERR) of 19 percent). The Zambian project is of particular interest, since it was designed as a "production" project but implemented as a "marketing" project. The project was appraised on the assumption that crossbred cattle could be freely imported from Zimbabwe. However, the 1980–81 drought led to a ban on cattle exports from Zimbabwe, and transport costs made it uneconomic to purchase cattle from further afield. This led to a redesign and sharp contraction of the milk production component. Nevertheless, milk collections exceeded the original projections;

TABLE 1.1: BANK-SUPPORTED LOANS AND CREDITS WITH "DAIRY" IN THE TITLE

CREDIT	TITLE	COUNTRY	APPROVED	AMOUNT/LOAN *(Million US$)*
Cr. 0234	Integrated dairy-beef development	Korea	1/71	7.0
Cr. 0236	Intensive dairy production	Turkey	2/71	4.5
Cr. 0269	Addis Ababa dairy development	Ethiopia	7/71	4.4
Cr. 0482	Karnataka dairy development[a]	India	6/74	30.0
Cr. 0504	Dairy development[a]	Sri Lanka	7/74	9.0
Cr. 0521	Rajasthan dairy development[a]	India	12/74	27.7
Cr. 0522	Madhya Pradesh dairy development[a]	India	12/74	16.4
Cr. 0580	Dairy development	Tanzania	7/75	10.0
Ln. 1193	Second international dairy development	Korea	10/75	15.0
Cr. 0824	National dairy[a]	India	6/78	150.0
Cr. 1196	Smallholder dairy development	Zambia	12/81	7.5
Ln. 2576	Second dairy development	Sri Lanka	6/85	38.0
Cr. 1859	Second national dairy[a]	India	12/87	121.2[b]
Ln. 2893	Second national dairy[a]	India	12/87	200.0

a. Designed as a marketing project.
b. SDR, million.
Source: World Bank.

about half the milk collected was from existing small producers. At audit, the five projects that are the subject of this impact evaluation were considered satisfactory. However, before concluding that "marketing is the way to go," it should be noted that an attempt to redesign the first Sri Lankan dairy project from a production project (which was proving unsatisfactory) to a cooperative marketing (Anand-type) project was not successful, and that the dairy component of the Pakistan Livestock project (Ln. 1366), which was modeled on Operation Flood, was also judged unsatisfactory.

Operation Flood Project Context

The first of the five Indian dairy projects included in this study was approved by the Board in March 1974. At that time, India was following a self-reliant macroeconomic development policy with heavy emphasis on import substitution (a policy which remained essentially unchanged until 1991). In the dairy sector, a policy decision had been made to use farmer-controlled cooperatives to develop the dairy industry and to make the import substitution as efficient as possible. The government also decided to withdraw from its own direct efforts to develop the dairy industry (indirect efforts via extension, research, artificial breeding, etc., continued). Dairy commodity food aid was to be sold at commercial prices with the proceeds being earmarked to support Operation Flood.

The inauguration of "Operation Flood" corresponded to a turnaround in per capita incomes, which had been falling, to a period of sustained, if modest, growth. Rising per capita incomes, together with rising population and a high income elasticity of demand for milk, resulted in a rapid growth in the demand for milk (technically, a rapid shift in the demand function for milk). In the absence of supply-side adjustment, this would have led to a rapid escalation in the price of milk or the need for extensive imports. In fact, the shift in the supply function from the policy changes introduced with Operation Flood resulted in an even larger shift in the supply (function) and declining real prices towards international prices, thus reducing the implicit taxation of consumers.

Getting It Right Eventually

Operation Flood is an Indian program fostering a farmer-controlled cooperative dairy industry capable of paying an attractive price for very small quantities (1 or 2 liters) of milk without operational subsidies. Operation Flood was developed in the context of less successful policies.

In 1959, the government of India set up the Delhi Milk Scheme, starting a new pattern for dairy development.[1] This pattern was based on the government milk plants collecting milk at chilling centers through traditional middlemen, pasteurizing it, and marketing it in glass bottles through specially set up milk booths all over the city. This pattern was followed until the 1960s in almost 100 cities of the country where similar "Milk Schemes" were set up under state development programs. During this period, the government also started Intensive Cattle Development Projects (ICDPs) which focused on providing artificial insemination and veterinary services to the milk producers. Such programs were further supported with credit to the farmers through Small Farmer Development Agencies (SFDAs).

The government milk schemes ran into serious problems. When a milk scheme was started, it paid a reasonable price to the farmer, charged its overheads to the consumers, and the consumer was provided with good quality milk at reasonable prices. However, during the summer months, when supplies dwindle and prices go up, the milk schemes were unable to raise the producer prices and their supplies dwindled. The milk schemes then resorted to importing milk powder to augment their meager supplies. Since the imported powder was rather cheap, the milk schemes were able to maintain low prices in the cities. This removed the incentive of the urban markets for rurally produced milk, and India's milk production remained stagnant, and its dependency on imports gradually increased.

Providing credit for the purchase of milch[2] animals also did not work as it did not contribute to bringing in any additional milch animals to the production system and was merely a transfer of resources—many times only on paper. This, however, brought a bad name to the dairy cooperative movement in many parts of the country as the loans were provided through cooperatives who were supposed to recover the loans through milk money. Many of those who took loans did not bring their milk to the cooperatives and instead sold it directly to the traditional traders. Large amount of loans, therefore, had to be written off. The mid-1960s was a trying period in the history of Indian dairying: the dairy development schemes of the government did not seem to work, and the milk supply in the cities had to be rationed, and imports of as much as 60,000 tons per year had to be resorted to, to feed the milk supply schemes which were handling less than 1 million liters of milk per day. Above all, the dumping of cheap imported milk powder was working against the interest of indigenous milk producers (Aneja 1994, pp. 13 and 14).

In October 1964, on the occasion of the inauguration of AMUL's cattle feed plant, the then-Prime Minister of India, Lal Bahadur Shastri, spent the night as the guest of a

village milk cooperative society near Anand. Impressed by the socioeconomic changes brought about by the milk cooperatives, he expressed the desire for a national-level organization to replicate the Anand-model[3] dairy cooperatives throughout the country.... Thus, in 1965, the National Dairy Development Board (NDDB) was registered (Banerjee 1994, p. 11).

The Bank Enters the Picture

Ten years of staff work from the Delhi office culminated in a visit to Anand in 1978 by the Bank's then-President, Robert McNamara (Box 1.1). This visit resulted in an offer to support an extension of the program with funding from the International Development Association (IDA). At the same time, the European Community (EC) decided to use a significant portion of its dairy surplus to support Operation Flood directly, rather than indirectly through the WFP. The result was Operation Flood II (OFII) funded by the NDDB, the government of India, the World Bank (through National Dairy I, Cr. 824), the EC (through food aid), and the farmer-owners of the village dairy cooperative societies (DCSs). The earlier Bank-sup-

BOX 1.1: EVIDENCE OF EARLY BANK INTEREST IN OPERATION FLOOD AS REVEALED BY BANK DOCUMENTS

October 1968: AMUL's milk collection system is efficient and businesslike. Villagers line up twice a day at village collection centers where they receive a uniform price. The contribution of each farmer is tested for fat content on the spot. Quality tests are also conducted upon arrival at the factory. Cash payment for the morning milk is paid in the evening and payment for the evening milk is paid the following morning. Several private trucking firms (selected by competitive tender) carry the milk from the village to Anand. Collection and delivery follow a rigorous schedule. Bulk transport of pasteurized milk to Bombay, a 270 mile haul, is done by refrigerated rail car.

October 1968: When we last talked of the possible staff contribution of the Agricultural Division to the Fourth Plan Review.... I suggested that livestock development with special emphasis on "dairy" might be one of the subsectors deserving additional study by the Bank.... Besides reviewing research results and Government and cooperative dairy schemes and plans, a dairy man would need to look into the activities of private firms such as Hindustan Lever, Nestle, Polsons, and Glaxo, also active in the dairy field.

March 1969: Anand is, statistically, all that was reported and what Kurien said at Reading. What you have to experience to believe is the enthusiasm of a highly skilled team of technologists and marketers working in an atmosphere that is modern and delightful. [Dr. Kurien] takes a great interest in the architecture of his factories and the "surrounds" are like a Garden City.

The future lies with the hybrid cow—in the beginning a first cross of European milk breed (mainly Jersey) on the native cow which in one generation will double production and about halve costs of production. It's the most exciting cattle development prospect in the world at the present time. It has possible repercussions beyond India along the lines, for Southeast Asia, I discussed with you…last year.

In my view, the prospect is the animal equivalent of the rice and wheat story with the possibility of even greater initial gains and impact upon costs of production which, with the buffalo, can only remain high.

January 1970: One key organizational issue concerns the relationship between state livestock departments (largely veterinary-oriented) and the National Dairy Development Board.... The technical side (of any project proposal) will also call for detailed review so as to bring a rational nutritional and breeding policy to bear on any project put to the Bank for support. Dairy Engineering, on the other hand, is a field in which India has built up considerable expertise. The bottlenecks [are] mostly on the farm.

June 1971: I have now been to Anand.... I do not think we have a project here in the near future, but I would consider it a possibility for FY74. In the meantime I think it will be worthwhile to take more than a passing interest in the way Operation Flood develops.

ported state projects continued to be supported, but as integral parts of OFII.

The National Dairy Project (NDP, or OFII) significantly exceeded the target number of milk producers unions (MPUs) to be formed (125 new MPUs versus a target of 50) and DCSs (29,400 new DCSs versus a target of 20,000). Despite the more rapid growth rate, the DCSs formed conformed to the Anand pattern of farmer control. The same could not be said for the federations and MPUs. Though the details varied from state to state, farmer control was diluted or usurped by the appointment of civil servants and politicians and NDDB or federation cadres to the boards of the federation and MPUs. Most MPUs had elected farmer representation, and in many, farmer representatives were in the majority, but the Anand principles of farmer control, including the right to set prices, hire and fire, and go bankrupt, had been undermined.[4]

This set the stage for the second National Dairy Project (NDPII) or Operation Flood III (OFIII), where the first nominated project objective was:

> (a) *Adjustment in cooperative institutional structures* towards characteristics of the OF model (elected boards for DCSs, MPUs, or Federations; model bylaws ensuring democratic and accountable operations; professional management answerable to the cooperative boards; management and ownership by the cooperatives of dairy infrastructure; autonomy for each cooperative in pricing, marketing, appointment of key personnel, and employment of labor).

This project also involved major investments in dairy processes and transport equipment, help in the formation of additional MPUs (in the event unused) and DCSs, staff training, and improved dairy technology, but the key project objective was to restore the full Anand pattern of farmer control, which had been eroded under the "too-fast" growth that had occurred under the NDP.

The NDP could have followed either of two growth strategies. A *slow growth* strategy would have extended the project only to those states willing to adopt the full Anand model as a precondition for Bank-supported investments. The alternative *fast growth* strategy involved setting up federations and MPUs even in states that were not willing to relinquish all control to boards elected by farmers. The expectation in this latter case was that Operation Flood could "work from within" and persuade state politicians of the value of full farmer control and the Anand principles. In the event, the fast growth strategy was adopted, and even with hindsight, it is not possible to fault this decision. The hope of correcting the deviations from Anand principles that had occurred during the implementation of the NDP provided the rationale for NDPII.

The NDDB does not fit easily into any of the pigeonholes that constitute the Bank's normal institutional typology. Described by Liana Gertsch (1990) as "corporatism," the NDDB can perhaps best be described in the Bank lexicon as "a parastatal operating in the producer's interests" (almost paradoxical in Bank experience). Formally a parastatal (with all its board members appointed by the government), it has "sworn an affidavit before the Bombay High Court that it is not a government agency.… Perhaps a better indication that it leaned more towards the private sector is that in order to gain access to funds generated by the sale of commodities, it had to create a wholly public institution, the Indian Dairy Corporation (IDC) with legal right to engage in commercial activity on behalf of government" (Gertsch 1990). In practice, the NDDB established its financial independence (and hence managerial autonomy) through the sale of concessionally-priced dairy imports. Not being beholden to the government for funding, the NDDB acts as the technocratic (and policy) apex organization for the dairy cooperative movement.[5]

Literature Review

There has been a great deal of literature on Operation Flood and the dairy sector in India (Alderman, Mergos, and Slade 1987; Kumar 1997). An important and critical strand of this literature has been generated by the Indo–Dutch Program on Alternatives in Development, sponsored by Dutch Aid. The work of these Indo–Dutch authors is summarized in two books that, while critical of Operation Flood, offer few alternative policy prescriptions (Doornbos and Nair 1990; Doornbos and others 1990). Recently, the Bank has also criticized the cooperative sector (World Bank 1996c). Ranged on the other side are indigenous authors such as Somjee and Somjee (1989), Mascarenhas (1993, 1988), and T. Shah (1991).

Topics discussed at length in the literature are:

- *Production Impact.* It is generally agreed that the rate of growth in Indian milk production has increased significantly during the lifetime of Operation Flood (Fulton and Bhargava 1994; Kumar and Singh 1993). But even this has been challenged (Mishra and Sharma 1990). However, the critics emphasize, quite correctly, that this increase in milk production should not be attributed exclusively to Operation Flood (Doornbos and others 1990; Nair 1985; Aneja 1994).
- *Socioeconomic Impact.* The apologists emphasize

that some landless, tribal, and marginal farmers have benefited: nearly 60 percent of milk producers are landless or marginal farmers (Fulton and Bhargava 1994). The critics argue that much of the increased milk income went to large farmers and that many landless and otherwise disadvantaged people were unable to benefit from Operation Flood.[6]

- *Women.* Apologists point to the efforts made to include women in DCSs, even to the point of establishing women-only DCSs. Critics emphasize the number of mixed (that is, male-dominated) DCSs. Somewhat confused messages emerge from the debate, since there is no consensus as to whether more or less work for women is to be welcomed. Certainly, some critics cite the withdrawal of women from the domestic manufacture of *ghee* in order to sell whole milk as a loss for the "subordinate gender" (George 1991).
- *Implementation.* Critics have pointed to a contradiction between the development of the initial Anand village cooperatives, which were formed by farmers on their own initiative, and Operation Flood, which is seen as a "top-down" program dedicated to persuading villagers to form DCSs. These critics also doubt the realism of attempting to replicate the Anand pattern nationwide, given the diversity of states in India (Joshi 1990; Shekhawat 1990). Apologists acknowledge that progress toward the Anand pattern differs markedly among states and cite various modifications to the structure of DCSs and the services provided to show that Operation Flood has been implemented adaptively. Although "spearhead" teams attempt to interest villages in the formation of DCSs, the final decision rests with the villages, not the spearhead team.[7]
- *Sustainability.* Critics concerned about the level of assistance provided to Operation Flood in the period of its most rapid expansion doubted whether it would be able to survive without such assistance (Doornbos and others 1990). Other writers pointed to the rapid decline and phasing-out of this assistance as evidence that this problem has not eventuated (Chaterjee and Acharaya 1992).

Some Numbers to Think About

Total project cost was US$2.7 billion, if the estimated value of state milk plants transferred or leased to Operation Flood (US$0.8 billion) is included. The other US$1.9 billion was composed primarily of grants (US$1.1 billion of food aid) and loans (US$0.7 billion from the Bank), all in 1996 dollars (Table 6.5). These resources were channeled predominantly through NDDB. Most of the money was passed on to MPUs for construction of milk processing plants with a 30 percent grant element. It also paid for development of the national milk grid, establishment of DCSs, and some of the costs of the development of NDDB's support capacity. Currently, NDDB receives no operational subsidies. Even though Operation Flood handles only 6.3 percent of Indian milk production, it is a huge undertaking. It operates in 22 states, but the bulk of its procurement (46 percent) is obtained from two states—Gujarat and Maharashtra (Table 4.2). In 1996, it had 9.3 million members and, NDDB estimates, 6.3 million "pouring" members,[8] who supply 10,900 metric tons of milk per day through 55,042 village-level DCSs to 170 MPUs for processing and sale. Some of the expansion of Operation Flood does not represent new milk production but rather a switch from home manufacture of *ghee* and other products or from milk previously sold to informal milk buyers (*dudhiyas*). Fortunately, there is a rich Indian literature on Operation Flood. This has been examined together with Bank internal reports and files. The evaluator visited a total of 40 villages in five states to discuss with farmer members and managing committees their experiences with Operation Flood. This included women-only DCSs, DCSs which were thriving, DCSs which had closed and reopened, and even a DCS which had closed and stayed closed. Discussions were held with academics, formal sector milk processors, and the small-scale, informal *dudhiya* milk collectors who provide keen competition for the cooperatives in peri-urban areas. A two-day workshop was held at the Institute of Rural Management at Anand, Gujarat state, in March 1997, to discuss the draft report with academics and managers in the dairy industry.[9] The project's impact on the intended beneficiaries was studied more formally through participatory evaluations in nine villages in Karnataka and a repeat survey in Madhya Pradesh to capitalize on "semi-baseline" data available from 1983.

> Even though Operation Flood handles only 6.3 percent of Indian milk production, it is a huge undertaking.

The Horizon Widens

The evaluation originally intended to focus on five questions:

1. What have other commentators, both national and foreign, said about the program? In responding to

this question, the evaluation has been fortunate in having only to extend a literature review published in 1987 (Alderman, Mergos, and Slade 1987; Kumar 1997).

2. How has the expansion of Operation Flood compared with the growth of the rest of the Indian dairy industry? Did the rate of growth of the dairy industry change perceptibly with the introduction of Operation Flood? What role, if any, can be attributed to the Bank's assistance in the growth of Operation Flood? (See Figure 8.1).
3. How competitive is the Indian dairy industry? Is this a case where an "infant industry" that initially had to be supported with grant and concessional funds has finally reached the point where support is no longer required? If not, how significant is the support required?
4. What was the impact on the poor?
5. Can the impact be improved?

In the event, as described in Chapter 7, a wide range of other unforeseen benefits were associated with Operation Flood. These included impact on each of the Bank's four overarching objectives of poverty alleviation, women in development, governance, and the environment. Findings with respect to these four objectives are summarized in the next sections.

Poverty. Operation Flood was not designed as a production or poverty project. However, by virtue of providing a market to very small milk producers, the majority of its beneficiaries were marginal or small farmers and landless people. This did not exclude the "better-off" (many of whom are poor in any absolute sense), but it did include a majority of poor beneficiaries (albeit poor who happen to have, or are able to obtain, at least one milch animal). As a Bank report said:

> Not only are the level and nature of the benefits flowing to members of the established DCSs impressive overall, but the extent to which such benefits are reaching the extremely poor and needy (destitute, widows, landless, and near-landless) in certain 'spearhead' villages is unusually noteworthy; and also indicative of the AMUL (Anand Milk Union Ltd.) model's potential to benefit a target group which is widely espoused by all donors, including especially the Bank, but which has proved elusive to reach in practice.

Operation Flood turned out to be a major income and employment-generating project.

Women. "Women's issues" are touched on in the preceding quotation by the mention of "widows." However, Bank reports on this project do not explicitly mention women. Anecdotal evidence suggests that not only widows but also wives have benefited disproportionately from Operation Flood. Not only do women often look after the dairy animal(s), but the money received is typically used for running the household (cattle feed, food, clothes, and educational requirements). Operation Flood has cooperated with NGOs, notably the Self-employed Women's Association (SEWA) and Bhagavatula Charitable Trust (BCT), to establish, in some cases with Ford Foundation support, 6,000 women-only dairy cooperative societies. These are generally thought to operate more smoothly than the male-dominated DCSs.[10]

Privatization and Governance. The projects were not consciously designed to be innovative with respect to privatization and governance. Nevertheless, their emphasis on village-level DCSs and farmer control of MPUs and state cooperative dairy federations broke new ground in supporting membership-based nongovernmental organizations (in this case cooperatives) development, and project administration (World Bank 1996c). Because DCSs are, in principle at least, open to all, they represent a major addition to village social capital.[11] The difficulty in getting true independence for the cooperative movement is one of the themes/issues explored in this evaluation.

Both cooperatives and companies can exist in the public or private sector. Public sector companies are generally referred to as parastatals. Private sector cooperatives are referred to in India as farmer-controlled or (full) Anand-pattern cooperatives. In most states the dairy cooperatives are to some degree mixed, with the state imposing decisions on pricing or staffing, often with some state ownership of productive assets. It is thus a false dichotomy to talk of public sector cooperatives versus private sector companies.

As between private sector cooperatives and companies, there is no difference in the managerial objectives; in both cases, management aims to maximize the return to the owners. The difference is in the owners. In a private company, the owners are the suppliers of capital, while in a producer cooperative, the owners are the input suppliers (milk suppliers in the case of Operation Flood). This has important behavioral implications with respect to the exercise of monopsony power. A private single buyer will seek to minimize procurement price, since this will maximize the return to the owners. Cooperatives have no such incentive to lower prices excessively, since any profit from a lower price will only need to be returned to the producers, who are the owners.

In the villages, there are many milk producers and few buyers. (This is inherent in the very small volumes of milk produced by any one farmer). Without an adjacent urban center to ensure that depressed prices are countered by the entry of new buyers, or a cooperative society that ensures a benchmark milk price, the market structure involves many weak sellers with only a few discretionary buyers. Farmers are the weak sellers, since their cows produce highly perishable milk twice a day.[12] An individual trader can easily choose not to buy on a particular day. This situation is a recipe for market failure. Traders can be expected to act oligopolistically. They will maximize their short-term profits, even as they drive the suppliers down their long-run supply functions and jeopardize long-term profits. Without a cooperative and at a distance from urban centers, there is no reason to expect milk traders to act competitively. Policies predicated on competitive behavior are thus unlikely to yield expected benefits.

The Environment. Untreated dairy plant effluent has a high biological oxygen demand and can be a serious pollutant of surface water and aquifers. Effluent treatment plants were an integral part of Bank-financed processing plants. However, the high cost of operating these plants tempted some MPUs to bypass or underutilize their plants. This was identified as a problem in project supervision in the early and mid-project stages. Current operation is believed to be satisfactory, but because of high cost, proper effluent treatment needs to be monitored by an independent authority.

Report Structure

The next chapter reviews project design, and the third chapter discusses the impact of the first four projects. Chapter 4 describes developments under the most recently completed project. Chapter 5 reports the major findings from participatory village studies commissioned in Karnataka and Madhya Pradesh. Economic impacts are discussed in Chapter 6, and social and institutional impacts follow in Chapter 7. An eighth and final chapter contains findings and recommendations.



2 Project Design

Karnataka

The first of the three state projects was in Karnataka, where dairying was already fairly advanced. There were 400 existing dairy cooperatives at the village level, the Bangalore Dairy Milk Producers Cooperative Society Union (serving Bangalore), and many multipurpose cooperative societies. A key thrust of the project was to incorporate the existing dairy cooperatives into an Anand-type three-tier cooperative structure. The project also planned to open about 500 dairy "wings" within the multipurpose cooperatives, which would be converted to single-purpose Anand-type cooperatives when volume and experience justified doing so. New DCSs were to be established in villages without cooperatives to bring the total number of project-sponsored DCSs to 1,800. The DCSs would be organized into four MPUs, which would own the Karnataka Dairy Development Corporation (KDDC). The DCSs were projected to serve a total of 450,000 farm families. Production would be stimulated by an artificial insemination (AI) program of crossbreeding native village cattle with high-producing exotic breeds, help with fodder production, veterinary services supported by two regional diagnostic laboratories, consultant services to assist the KDDC with demonstration farms, applied research trials on pastures, and milk marketing studies. Hardware was to include the renovation of two processing plants, the construction of two new processing plants and four cattle feed mills, and the establishment of milk collection routes and centers. Provision was also made for the importation of 500 in-calf heifers to stock three KDDC farms to produce purebred exotic breeding stock.

The KDDC was set up as a parastatal. (The central government was to contribute Rs 2.5 million and the state government Rs 0.8 million of equity plus Rs 3.2 million of working capital to be shared, in unspecified proportions, between the governments). As part of this transaction, the state government was to transfer its dairy plants and other assets to KDDC. The governments undertook to gradually sell their equity to the MPUs at cost, starting in the sixth project year, with the expectation that by the tenth year the MPUs would be majority shareholders in KDDC. In the event, the governments did not sell their equity to the MPUs. Under NDP, the name of KDDC was changed to the Karnataka Milk Federation, but its parastatal structure remained unchanged. In Karnataka, significant progress has been made towards professionalizing the management of the dairy industry, but ownership of state dairy plants has still not been legally transferred to the Federation. Thus, the state still has residual powers flowing from its initial investment in KDDC and its failure to transfer title as expected. With hindsight, and recognition of the debilitating effects of government interference in management, it would probably have been better to insist on a fully cooperative structure from the start. Similar design difficulties have affected the other two state projects.

The project was to be guided by the NDDB, which would provide "spearhead" teams to assist with the establishment of MPUs and the village-level DCSs that would supply them. DCS membership was to be limited to cattle owners, 10 percent of whom were expected to be landless.[1] A further 50 percent were to be marginal farmers with less than 2 ha. of land.

A very rapid expansion of milk production was projected, mainly based on the replacement of local dairy and buffalo breeds with crossbred dairy cows. The semen used in the AI program was to come mainly from Jerseys and Friesians. As a result of this breed change, which would be supported by readily available veterinary services and improved concentrate supply, milk production in a typical DCS was expected to rise from 60,000 liters/year (l/year) to 290,000 l/year in the fifth year of the project.

A very rapid expansion of milk production was projected, mainly based on the replacement of local dairy and buffalo breeds with crossbred dairy cows.

The bulk of International Development Association (IDA) funds (US$26.4 million) was to be channeled through the Agricultural Refinance Corporation (ARC), a parastatal bank, to the KDDC and MPUs. Loans for dairy plant construction were to be supported by a 20 percent equity participation from the central and state governments to retain a 4:1 debt-to-equity ratio in the MPU. This financing arrangement applied also to the two other state projects. Parallel arrangements were made for local banks to provide credit for the purchase of cattle and feed. The ARC would stand ready to refinance these loans, giving the banks a 2 percent margin under their lending rate.

The major foreign exchange costs of the project were the expansion of the Bangalore and Mysore milk processing plants, the construction of new processing plants at Hassan and Tumkur, four new feed mills, and investments in KDDC farms and technical services.

Rajasthan

The Rajasthan credit was for US$27.7 million. Rajasthan had a government milk scheme that subsidized urban milk prices but had failed to stimulate the emergence of a cooperative sector. This failure was recognized in 1972, and the Rajasthan Animal Husbandry Department then began to organize dairy cooperative societies based on the Anand pattern. At appraisal, there were some 100 such societies organized into two unions, which were to form part of the project.

The project also called for the creation of a new apex organization, the Rajasthan Dairy Development Corporation (RDDC), to foster the development of five MPUs, which would process and market milk from a total of 1,800 DCSs which would collect milk from a total of 240,000 families, most having less than 2 ha. of land or being entirely landless.

Provision was also made for the importation of 100 exotic in-calf heifers and 33 bulls, construction of dairy plants and feed mills for the MPUs, and a regional diagnostic laboratory, production of vaccines, provision of consulting services, and construction of a training center for each MPU. There was no provision for direct farm-level credit, since the ARC already operated a credit scheme for wells and minor irrigation.

The NDDB was again to be relied upon to provide key staff and spearhead teams to help establish the MPUs and DCSs. All procurement of Bank-funded items would be by the RDDC; and Bank funds would flow to the MPUs and RDDC through the government of India and ARC.

Madhya Pradesh

The Madhya Pradesh credit was for US$16.4 million. The dairy industry, like the cooperative movement, was underdeveloped in Madhya Pradesh. Started in 1960 to supply the government of Madhya Pradesh's milk plants, the cooperative movement suffered from low official milk prices; at appraisal only 100 dairy cooperative societies were active.

At project inception, the government milk scheme was in disarray. It provided about 10 percent of urban demand at Rs 1.70 per liter (compared with Rs 1.50–2.50 per liter in the private market). Producer prices were not competitive. The government-operated milk plants had a capacity of 20,000 liters/day (l/day) in Bhopal and Indore, and 2,000 l/day in Ratlam, Ujjain, and Hoshangabad. The project called for a complete revamping of supply with the construction of three 100,000 l/day plants, each capable of expansion to 200,000 l/day. These plants would each be the center of three MPUs under the auspices of a new umbrella organization, the Madhya Pradesh Dairy Development Corporation (MPDDC). Each MPU would have 400 newly-formed DCSs with memberships of about 130 farm families (predominantly small farmers and the landless) for a project total of 160,000 families. Equipment for the milk-processing plants and associated feed mills would take about 80 percent of the foreign exchange costs of the project.

Other important project components were the importation of 100 exotic cattle for crossbreeding, the provision of consulting services, and the construction of a training center for each MPU. The NDDB was to be contracted to supply at least some of the consulting services and spearhead teams to facilitate the establishment of the MPUs and to lead in the formation of village-level DCSs. In accord

with the Anand principles, the DCSs, MPUs, and MPDDC would be farmer-controlled. Initial working and start-up capital, to be provided by the governments of India and Madhya Pradesh, would be repaid out of profits, so that eventually both ownership and control would be in the hands of farmers. The MPUs and MPDDC would employ professional managers and technicians, again in accord with the Anand principles; they would also be free to set retail and farm-gate milk prices.

Funds would flow from the Bank to the government of India, which would channel US$2.75 million to the state government for training and extension services, and the balance through the ARC to participating local banks and hence to the MPDDC and MPUs. The MPDDC was to be the sole procurement agent for all items financed by the Bank.

The National Dairy Project

This fourth dairy project was an integral part of OFII, which was to be jointly funded by the Bank (US$150 million from the IDA), the EC (US$100 million in the form of food aid), and the government of India (Rs 94 million, or US$10.9 million as a grant, and a further Rs 670 million ($77.7 million) as a loan);[2] farmers were to contribute Rs 48 million (US$5.6 million). This relatively large project followed a visit in 1978 by then-President of the Bank Robert McNamara to Anand and his offer to Dr. Kurien to provide major funding for a successor project to OFI.

Conceptually, the NDP was a follow-on project aiming to extend the Anand model to additional states, bring the three states assisted earlier by the Bank fully into the Operation Flood system, and provide further resources for expansion in those states that had benefited from OFI and the earlier state projects. An important design difference was that the specific investments to be made in OFII were not spelled-out in the SAR, nor indeed were they appraised by the Bank. Rather, a line of credit was to be provided to the IDC for on-lending to state dairy cooperative federations and MPUs.[3] The NDDB was expected to appraise investment proposals on behalf of the IDC; satisfactory proposals would be funded. The first five appraisals were to be vetted and approved by the Bank, but subsequent appraisals would merely be sent to the Bank for information.

As part of a process of bringing the state projects into line with the Anand model, the state dairy development corporations were to be wound-up and replaced with state cooperative milk producers federations, to be owned in due course by the MPUs, which were to be eventually owned by their supplying DCSs.

Though the *intention* of the project was clearly to replace state-owned apex organizations with state cooperative federations owned by their constituent MPUs, and though relevant Bank documents included a model agreement between IDC and a state government to introduce the three-tier Anand model, adoption and implementation of these model agreements were not included in project conditionality. The consequence at project completion of this apparent oversight is described in Box 3.1 and unfortunately continues to plague Operation Flood. Progress is being made in the assertion of farmer control, but state domination of the apex "cooperatives" is still widespread.

The Anand model clearly started from the ground up. Despite attempting to follow this model, Operation Flood and the Bank projects were "top down," at least to the extent that target rates of growth were set in the Bank projects. In the event, the apex federations and MPUs were less independent of government than the Anand model stipulates. This is not to say that DCSs were ever organized without proper grassroots support. But the spearhead teams served to mobilize farmer support, not to substitute for it. Some villages rejected the organizing efforts of the spearhead teams. This mobilization effort was the key to the rapid growth in number of DCSs. But there was a certain tension implicit in setting *targets* for how many villages would *voluntarily* decide to form a DCS.[4]

The Second National Dairy Project

The managements of both Operation Flood and the Bank were acutely aware that the rapid expansion achieved under the NDP had, to a significant extent, sacrificed at the federation and MPU level the Anand principles of farmer control (Box 3.1). The follow-on project, NDPII, was proposed to restore the Anand principles, serve additional DCSs, and allow for further expansion of milk processing capacity.

External assistance of US$510 million was to be provided (US$360 million from the Bank and US$150 million in the form of food aid from the EC). Domestic resources equivalent to US$164 million were to be provided by NDDB. Seventy percent of project costs would go for hardware to facilitate milk collection, transportation, testing, processing, and retailing. Another 24 percent of project cost was for the development of DCSs and productivity enhancements at the farm and village level. Institutional strengthening was to take 6 percent. The bulk of these funds was to flow through the NDDB to MPUs and federations, but this would be subject to tight conditions on

progress toward adopting the full Anand principles, thus remedying the defect of the previous project design. The first condition agreed was:

> Operation Flood (OF) model criteria to be adopted by a cooperative, or to be in meaningful progress towards adoption, as a *condition of NDDB funding* under the project:
>
> (i) Adoption by Federations, MPUs, and DCSs of the Operation Flood cooperative model bylaws to ensure democratic and accountable operations;
>
> (ii) Elected boards of producer members for DCSs, MPUs, and Federations;
>
> (iii) Autonomy for the Federations and MPUs in the appointment of professional management, employment of staff, pricing, and marketing;
>
> (iv) Ownership and management of plants (dairies, chilling centers, feed plants, etc.) by the MPUs, or in areas where the plant serves a central purpose (city dairy or central feed plant) by the Federations; and
>
> (v) Proper internal control procedures and accounting and auditing of the Federation, MPUs, and DCSs involved, including a system whereby this information is regularly reviewed by the respective Boards and General Body Meetings.

As was later observed: With hindsight, the project design was unrealistic

> ". . . It is now evident that the amount of money provided could not be productively invested in states willing to implement the Anand principles in full. Entrenched political and bureaucratic interests were extremely reluctant to relinquish their influence over the industry. In practice, in order to achieve target levels of disbursement, in many cases, it has proved necessary to waive these conditions."

Changed Paradigm

With the preparation of the Bank's Livestock Sector Review in 1996, the Bank's paradigm for the development of the Indian dairy industry changed. Although early Bank documents on NDPII reported that the Indian dairy industry was competitive and provided resources to be on-lent to the cooperative sector, the sector review reported that the industry was not competitive and recommended that funding of loans to Operation Flood be phased-out (World Bank 1996c, para. 6.10). In large measure, this change seems to have been triggered by a belief that the private sector might be more efficient than the cooperative sector and by a serious misreading of the cost of Operation Flood. The Livestock Review (World Bank 1996c, Table 4.2) estimated this cost as US$4.26 billion in 1990 dollars (US$5.06 billion in 1996 dollars) versus a re-estimate by this study of US$2.98 billion in 1996 dollars.[5] Whatever the reason, the Bank ceased to believe in the project design to the point that, in recommending that the Bank reverse itself on an extension of the project, an internal memorandum (October 4, 1995) could say:

> "However, the key argument [for no extension of the project beyond December 1995] is that the project design is not consistent with the present GOI (Government of India) and Bank strategy of leveling the playing field for agroindustrial development between cooperative and private entrepreneurs, thus putting the project at odds with the recommendations of our macroeconomic work as well as the recent livestock sector review."



3

Impact of the First Four Projects at Completion

Karnataka

The Bank's project documents are silent as to any benefits to the beneficiaries under these four projects. Rather, they report on progress in establishing DCSs, expanding milk procurement, installing milk processing and feed production capacity, introducing crossbred cattle, and the like. As to how and whom these changes benefited, there is little to be gleaned in the reports themselves. However, two joint studies between the Bank and the International Food Policy Research Institute (IFPRI) (Alderman, Mergos, and Slade 1987; Alderman 1987) and a study sponsored by the NDDB (Singh and Acharya 1986) undertaken about the time of project completion throw some light on the projects' immediate impact.

Targets

After some delay, the four projects came close to their intended targets in terms of DCSs and MPUs formed (Table 3.1), dairy processing and feed plants constructed, and AI. However, with respect to milk procurement and importation of dairy stock, they fell far short.

Organization

The three state projects provided for *parastatal* dairy development corporations to be created as apex organizations. The boards of directors were to be a mix of farmer-elected, *ex officio*, and government-appointed members; the same pattern applied to MPUs. OFII provided for the apex organizations to be reconstituted as cooperative milk federations. However, this turned out to be simply a change in corporate name. The constitution of the boards of directors and the operating style were unaffected by the change. This was a problem at completion and continues to be a problem to this day.

TABLE 3.1: DCSs AND MPUs FORMED

	DCSs		MPUs	
PROJECT	TARGET	ACTUAL	TARGET	ACTUAL
Karnataka	1,800	1,803	4	4
Rajasthan	1,084	3,148	5	5
Madhya Pradesh	1,200	849	3	12
NDP	33,300	42,700	89	164
NDPII	70,000	69,675	190	170

Source: World Bank and study estimates.

The transfer or lease by states of government-owned milk plants and farms to the new dairy development corporations was to be a condition of project funding at the state level. This condition was waived, however, and had not been implemented at project completion, nor has it yet been finalized. Ten years after project closing and despite a further follow-on project focused exactly on this issue, not all the agreed conditions for lending to the states have been met, although there has been significant movement. Great progress was made in creating a cadre of dairy professionals and organizing them into spearhead teams to mobilize milk producers and to run the resulting MPUs and the support services of the NDDB.

Impact

The NDDB-sponsored management information system (MIS) provides comprehensive feedback to all levels of Operation Flood on the business and procurement aspects

BOX 3.1: ESTABLISHMENT OF THE ANAND-PATTERN STRUCTURE

A three-tier Anand-pattern structure has generally been established throughout India. As established, however, this structure needs to be further rationalized in a number of directions if the objective of establishing an Anand-pattern structure owned and controlled by the farmers is to be achieved. In Gujarat, the federation was essentially established as a result of the felt need of the individual union to establish a common brand name and a common marketing platform for unions and to enable unions to coordinate various activities. In most other states, however, the federation was established as an instrument for implementing Operation Flood II in order to establish unions and DCSs in an effort to create a farmer-owned and -controlled organization. In many states—particularly the earlier IDA-aided projects in the states of Rajasthan, Karnataka, and Madhya Pradesh—existing government dairy development corporations were converted into federations.

Whereas the unions in Gujarat were essentially strong, viable, and owned and controlled by farmers through elected boards, the federations and unions formed in many parts of India were established with government-nominated boards and controlled by government. In many cases, competent professionals employed by the federations ensured that they were building a system which would ultimately lead to the emergence of an Anand-pattern structure. In certain cases, however, the systems developed were essentially aimed at providing benefits to the consumer, sacrificing the milk producer. In many cases, the feeder balancing dairies at the union level have remained the property of the federation and not of the union, resulting in a strong federation and a weak union with the farmer losing control of the system. Nowhere, except in Gujarat, Kerala, and Pondicherry, is the federation actually controlled by an elected board.

During the initial years as Operation Flood was being introduced, it was necessary to establish an organization (i.e. federation) responsible for implementing the program in the states. As milk collection and sale have expanded, and DCS and unions have been established, it is now necessary to effectively transfer ownership control and effective power to the elected boards at the union level. In an effort to strengthen unions, Operation Flood III now aims at transferring feeder dairies and balancing plants to the concerned unions and ensuring the establishment of elected boards at the union and federation level. Initial difficulties are expected as bureaucratic structures already established at the federation level may impede the transfer of power to the unions and their elected leadership.

Source: World Bank.

of the program. No such comprehensive monitoring system is in place to measure other dimensions of the projects' impacts on the intended beneficiaries. As a result, even well-designed, but geographically constrained, statistical samples must be seen as anecdotal information, given the huge size, vast spread (and hence diverse climatic and social conditions) of Operation Flood as a whole.

Milk Production

Karnataka

A Bank-sponsored study of the impact at completion of the Bank's project in Karnataka compared conditions in Operation Flood villages with those in non-Operation Flood villages (Alderman 1987). The study involved 42 villages with cooperatives and 20 without, divided equally into two climatic zones. Thirteen households were interviewed in each village in five successive rounds of interviews. This study showed that milk production per family was from one and a half times to twice as high in Operation Flood as in non-Operation Flood villages (Table 3.2). The higher production in Operation Flood villages was due primarily to herd composition, not numbers of animals and not yield per animal. Operation Flood villages had a higher proportion of buffalo and crossbred milch animals and fewer local cows. A multiple regression that controlled for (among other things) literacy, household size, farm size, and number of children estimated that 2.56 more l/household/day of milk were produced from Operation Flood villages than from non-Operation Flood villages (Alderman 1987, p. 18). A multiple regression analysis showed that the nominal price of milk was 3.2 percent higher in Operation Flood villages;

TABLE 3.2: KARNATAKA: DAILY HOUSEHOLD MILK PRODUCTION (l/HOUSEHOLD/DAY)

	VILLAGE		
ROUND (DATE)	FLOOD	NON-FLOOD	RATIO
1 (January–April 1983)	3.61	1.80	2.00
2 (May–July 1983)	2.56	1.57	1.63
3 (August–October 1983)	2.95	1.57	1.88
4 (November–January 1984)	3.07	1.93	1.60
5 (March–April 1984)	2.91	1.77	1.64

Source: Alderman 1987, Table 1.

deflated by a village cereal price index, it was 1.9 percent higher (Alderman 1987, Table 9 and p. 29). This raises some questions: Is the elasticity of supply very high? Or does the introduction of Operation Flood shift the supply function? Or were DCSs established mainly in villages with high levels of dairy activity? Perhaps some of all three, but probably more of the latter.

Madhya Pradesh

By contrast, a Bank-sponsored study in Madhya Pradesh found no such increase[1] in milk production, as summarized in Table 3.3. Indeed, in *rabi*, DCS villages averaged 14 percent less milk production (a "decrease") than non-DCS villages. (The *rabi* growing season often begins in November and runs through the middle of the next year. The *kharif* growing season runs from mid-year through December. These two growing seasons fluctuate greatly with the monsoonal year.) This is confirmed by Mergos and Slade (1987, Table 6.1) who reported an average milk production of 2.91 liters per day in DCS villages against 2.83 liters per day in non-Operation Flood villages. However, after controlling for area of land, percent irrigated, number of milk animals, value of milk animals, and several inputs, Mergos and Slade (1987, Table 6.3) found a 13.4 percent higher production in DCS villages.

Another concern is the *distributive effect* of Operation Flood. Some inconclusive results from the Madhya Pradesh sample are reported in Table 3.4. The rows of Table 3.4 refer to the season and whether milk was sold to a DCS or other buyer (usually a *dudhiya*). The DCS column refers to whether there was a DCS in the village. These results are difficult to interpret. Presumably, the difference for landless and large farmers supplying the DCS is due to large farmers providing higher-testing milk, since the DCSs use a test-based formula to determine payout. There is no reason to suppose that this quality differential also characterizes milk supplied to non-DCS purchasers, whether in a DCS or non-DCS village. Indeed, as Singh and Acharya (1986) note:

> One must note here that the formal price figures, taken as such without other considerations in a non-DCS context, are deceptive in the sense that they are purely nominal. The private vendors invariably cheat the producers not only in the measurement of milk but also in the determination of unit price level, which is supposed to be based on '*mawa*' (total solids) content (p. 93–94).[2]

TABLE 3.3: MADHYA PRADESH: AVERAGE MILK PRODUCTION AND DISPOSAL (l/HOUSEHOLD/DAY)

SEASON	PRODUCED	SOLD	CONSUMED	CONVERTED
Rabi				
DCS villages	3.59	1.95	1.53	0.11
Non-DCS villages	4.16	2.40	1.54	0.22
Kharif				
DCS villages	4.31	2.68	1.45	0.18
Non-DCS villages	4.34	2.54	1.53	0.27

Source: Singh and Acharya 1986, Tables 5.8 and 5.9.

TABLE 3.4: MADHYA PRADESH: AVERAGE MILK PRICES, LANDLESS AND LARGE FARMERS (Rs/l)

MILK BUYER	DCs IN VILLAGE	LANDLESS	LARGE	RATIO
Rabi				
DCS	Yes	2.41	2.66	1.10
Other	Yes	2.42	3.04	1.26
Other	No	2.57	2.78	1.08
Kharif				
DCS	Yes	2.37	2.47	1.04
Other	Yes	2.46	2.36	0.96
Other	No	2.43	2.46	1.01

Source: Singh and Acharya 1986, Tables 5.10.

Milk Consumption

Karnataka

The study of project impact in Karnataka addressed the crucial issue of the impact of Operation Flood on milk consumption (Alderman 1987). Multiple regression analysis was used to explain the budget shares of milk, *ghee*, and other dairy products in the consumption of Operation Flood and non-Operation Flood villages. A key conclusion was that "the average budget share of milk was 9 percent higher in the control (that is, non-Operation Flood) villages than in the cooperative (Operation Flood) villages, given equal income and production" (Alderman 1987). Unfortunately, this is difficult to interpret since production (and incomes) were higher in Operation Flood villages. Taken at face value, the quote seems to support the substantial (but

not well documented) literature that claims Operation Flood has led to the sale of milk which producers used to consume themselves. However, the raw consumption data in Table 3.5 are more reassuring. They suggest a slightly higher average consumption in Operation Flood than in non-Operation Flood villages, despite the fact that a much lower proportion of milk is being retained in Operation Flood villages because milk production there is substantially higher. But the real issue, as Alderman (1987) notes, is the net effect on nutritional status. A rise in the price of any (non-inferior) good should lead to lower consumption of the good and higher consumption of substitutes. In the study sample, it appears that the income effect just about compensated for the substitution effect, leaving total consumption of milk per household substantially unaffected.

Madhya Pradesh

Levels of milk consumption in the Madhya Pradesh study have already been reported in Table 3.3. Even though milk consumption was 5 percent less in DCS villages in *kharif*, than in non-DCS villages, overall one would have to conclude, as for Karnataka, that on the basis of these samples, *there was little reason to be concerned about a wholesale diversion of milk from consumption to the market*. Rather, the concern in Madhya Pradesh should be that dairy income in DCS villages may not have increased significantly. Multiplying average price by average output gives a 6.25 percent higher dairy income in non-DCS villages.

Importance of Milk Income

Karnataka

The ratio of the value of milk production to total expenditures in the Karnataka sample is given in Table 3.6 for a range of farm sizes. All landholder classes had higher ratios of milk sales to total expenditure in Operation Flood villages. In both Operation Flood and non-Operation Flood villages, the larger farmers got a larger proportion of their income from milk sales than smaller farmers. However, the spread was less in Operation Flood villages (6.8 percent instead of 8.4 percent).

TABLE 3.6: KARNATAKA: RATIO OF MILK SALES TO TOTAL EXPENDITURE (PERCENT)

	VILLAGE	
LANDHOLDER CLASS	FLOOD	NON-FLOOD
Landless	16.4	10.7
Marginal	16.0	12.0
Small	21.8	12.5
Other (large)	22.8	19.1

Source: Alderman 1987, Table 19.

Madhya Pradesh

The Madhya Pradesh sample confirms this relationship. As shown in Table 3.7, the ratio of milk sales to other income is higher in Operation Flood villages for all classes except the landless and slightly higher on average. When dairy income is regressed on other income and a dummy variable for a DCS village, the presence of the DCS is estimated to raise dairy income by Rs 527. The t-statistic of 1.43 is significant at the 10 percent level. On the basis of these two studies, one could say that, with the important exception of the landless in Madhya Pradesh, Operation Flood appears to have raised the proportion of income gained from dairying. However, the increase has been modest.

Profitability of Dairying

Only the *Madhya Pradesh* study addressed profitability (Singh and Acharya 1986). This study provides impressive evidence of the profitability of dairying. After all costs have been accounted for, the profit percentages are as given in Table 3.8. The gross margins reported are so high that they raise some question as to whether all variable costs have indeed been taken into account.[3] Only in the case of the landless in *rabi* is it reported that milk production fails to cover "variable costs" (which include the opportunity cost of all nonpurchased inputs and services used in milk production), and then the loss is only 5 percent, suggesting that

TABLE 3.5: KARNATAKA: HOME CONSUMPTION OF LIQUID MILK (l/HOUSEHOLD/DAY)

	VILLAGE		PROPORTION (%)	
ROUND (DATE)	FLOOD	NON-FLOOD	FLOOD	NON-FLOOD
1 (January–April 1983)	0.81	0.83	22.4	46.1
2 (May–July 1983)	0.64	0.60	24.9	38.6
3 (August–October 1983)	0.81	0.62	27.3	39.6
4 (November–January 1984)	0.79	0.72	25.7	37.2
5 (March–April 1984)	0.71	0.56	24.3	31.5

Source: Alderman 1987, Tables 1 and 10.

TABLE 3.7: MADHYA PRADESH: MILK AS A PROPORTION OF AVERAGE ANNUAL INCOME

LAND HOLDING		DCS VILLAGE			NON-DCS VILLAGE		
DESCRIPTOR	SIZE	MILK	TOTAL	RATIO	MILK	TOTAL	RATIO
	Bighas[a]	<—*Rs/household*—>		%	<—*Rs/household*—>		%
Landless	0	1,015	4,151	24.5	1,469	4,702	31.3
Marginal	0–6	1,433	5,184	27.7	999	5,787	17.3
Small	6–11	1,785	6,061	29.5	1,086	5,164	21.0
Low middle	11–21	2,131	6,612	34.3	3,022	9,500	31.8
High middle	21–31	2,290	10,273	28.4	1,747	11,161	15.6
Large	31+	3,829	13,558	28.2	3,680	14,573	25.3
All classes		2,135	8,144	26.2	2,193	9,407	23.3

a. 1 Bighas = 0.23 hectares.
Source: Singh and Acharya 1986, Table 7.1.

even in this case dairying may be a useful way of using spare labor, albeit at a slight discount.

Benefits

Only the *Madhya Pradesh* study asked directly about benefits (Singh and Acharya 1986). The reaction was remarkably positive, as shown in Table 3.9. This provides evidence of substitution of grains for milk and milk products in consumption (more than would seem reasonable on the basis of the village comparisons discussed earlier). Remarkably, *the second and third biggest increases are attributed to the increased education of girls and boys, respectively.* If this claimed increase is indeed causal, this would be a major positive impact of Operation Flood.

The reported increase in indebtedness is ambiguous. If it represents increased creditworthiness that has been used profitably, then it should be counted as a benefit. If it has been used unwisely, or is simply indebtedness without augmented creditworthiness, then it should be counted as a cost.

The companion study (Mergos and Slade 1987), for which results are given in Table 3.10, was less specific about the nature of benefits received from the cooperative system. Of those with an opinion, 86 percent believed that the operation of the DCSs was good or satisfactory. The primary reason for membership in the DCSs was to sell milk and take advantage of the year-end bonus. Despite this focus on milk price and collection, over 70 percent of those with an opinion thought that the DCSs provided additional benefits. Perhaps the best testimony to the good reputation of the DCSs is that 63 percent of those interviewed in the non-DCS villages said that they would join a DCS if one was formed in the village.

TABLE 3.8: MADHYA PRADESH: GROSS MARGINS IN MILK PRODUCTION (PERCENT)

SEASON	OPERATION FLOOD VILLAGE	NON-OPERATION FLOOD VILLAGE
Rabi	30.0	42.0
Kharif	83.6	72.0

Source: Singh and Acharya 1986, Tables 5.11 and 5.12.

Summary

At completion, the growth of production of the industry as a whole had received a jolt and had started to grow significantly faster. At the same time, the rationing of milk in the major cities had been dropped, and the formal sector market for milk had been put on to a new fast-growth path. Literally millions of small farmers were being drawn into the cooperative system, and vast new programs in veterinary services, AI, improved animal nutrition, crossbreeding, and vaccination were being introduced. Yet the three village-level studies for which results are readily available show relatively little difference between Operation Flood and non-Operation Flood villages. Certainly the studies do not show the degree of difference one would expect if these village-level differences were to be used to explain the national-level phenomena observed. The easiest escape from this apparent paradox is the likelihood that dairying was growing vigorously in both Operation Flood and non-Operation Flood villages. At the same time, demand was growing vigorously due to rising per capita incomes, population growth, and the high income elasticity of milk (1.1 urban, 1.6 rural). That this increase in demand did not result in rapidly escalating real prices or heavy imports of milk solids[4] is best explained by the removal (or at the very least the relaxation) of the dead hand of the public sector from dairy development (a removal that was part and parcel of Operation Flood, the program being supported by the Bank projects) and the continuation of the import-substitution strategy which provided high protection levels to dairying and thus an incentive for domestic production to grow.

TABLE 3.9: MADHYA PRADESH: OPINIONS ON IMPACT OF DCSs ON BENEFICIARIES (PERCENT)

QUERY	INCREASE	NO CHANGE	DECREASE
For household:			
Food consumption	43.2	52.5	4.3
Coarse grain consumption	30.1	59.1	10.6
Wheat and rice consumption	38.3	53.1	8.6
Milk consumption	28.6	36.2	35.0
Curd consumption	7.2	46.0	46.0
Buttermilk consumption	6.6	45.7	47.1
Ghee consumption	11.8	51.4	35.9
Home milk processing	8.3	39.2	50.9
Family income	36.7	42.7	19.7
Intensity of labor in dairy work:			
Family	36.1	37.4	26.5
Adult male	37.9	39.0	23.0
Adult female	34.8	43.6	21.5
Family labor in agricultural work	32.3	61.6	5.9
Clothing for family	47.8	48.5	3.7
School attendance of:			
Boys	62.8	29.1	8.1
Girls	67.4	29.7	2.9
Use of fertilizer	52.1	42.0	5.6
Indebtedness	58.7	28.9	11.9
Availability and use of:			
Veterinary services	68.1	26.5	4.5
Fodder supplies	58.1	31.6	9.9
Household status	17.0	80.8	2.0
Health awareness	43.7	50.5	2.0

Source: Singh and Acharya 1986, Table 7.19.

TABLE 3.10: MADHYA PRADESH: FARMERS' OPINIONS OF THE DCSs AND THEIR REASON FOR JOINING[a]

	A) PERFORMANCE OF DCSs (%)				B) ADDITIONAL BENEFITS RECEIVED BY MEMBERS[b](%)		
	MEMBER	NON.	ALL		MEMBER	NON.	ALL
Good	43	28	34	Yes	67	52	58
Satisfactory	43	34	38	No	29	19	23
Bad	12	10	11	Don't know	4	29	19

	C) REASON FOR JOINING MEMBERS (%)		D) REASON FOR NOT JOINING NONMEMBERS (%)
Sell milk	76	Could not buy shares	17
Get bonus	9	No spare time	13
Obtain veterinary services	7	DCS "not useful"	19
Other	8	No specific reason	51
Total	100	Total	100

a. Households with milch animals in DCS villages.
b. In addition to milk price and milk collection.
Source: Mergos and Slade 1987, Table 2.7.



4

Developments Under National Dairy II

Expansion and Nonfunctional Cooperatives

The Indian dairy industry went through extraordinary expansion under Operation Flood II. This totalled 25 apex organizations, 125 new milk producers unions and over 32,000 new dairy cooperative societies.[1]

Operation Flood III added 20 milk producers unions and 27,000 dairy cooperative societies.[2]

Remarkable as this growth seems, it must be noted that some of these organizations failed to take root: others were in fact redundant, given the conditions then prevailing.

But the lasting phenomenon is the continuing growth and gradual consolidation of the cooperative sector of the dairy industry in India.

Table 4.1 provides quantified data.

The NDP closed in November 1985, when about 42,000 DCSs had been organized and 36,000 were functional in 164 MPUs. OFIII has seen a further 30,000 DCSs organized (functional DCSs have risen by 19,000) in 170 MPUs. (MPUs peaked at 173 in 1988–89). There are no separate statistics on DCSs formally wound-up by the state Registrar of Cooperatives, DCSs waiting to be wound-up, or on DCSs that did not supply in June but are active at other times of the year. This means that the "disbanded" figures in Table 4.1 are something of an overestimate. To further complicate matters, there are examples where mixed (that is, male-dominated) DCSs were disbanded in a village, only to be replaced by a women's dairy cooperative society (WDCS) and even cases where a mixed DCS and a WDCS coexist in the same (large) village.

The bottom line is that Operation Flood has continued to expand. There are now 20,000 more active DCSs "pour-

TABLE 4.1: FORMATION OF DAIRY COOPERATIVE SOCIETIES

YEAR	CUMULATIVE ORGANIZED	CUMULATIVE DISBANDED[a]	FUNCTIONAL BALANCE[b]	DISBANDED (%)
1980–81	13,284	1,639	11,645	12.3
1985–86	42,692	6,973	35,719	16.3
1988–89	58,883	12,941	45,942	22.0
1991–92	64,057	13,674	50,383	21.3
1992–93	65,469	14,622	50,847	22.3
1993–94	67,247	15,048	52,199	22.3
1994–95	69,771	16,795	53,066	24.1
1995–96	72,744	17,702	55,042	24.3
1996–97 (Prov.)	73,931	18,268	55,663	24.7

a. Includes both DCSs for which the Registrar of Cooperatives had officially acknowledged the winding-up of the cooperatives, and cooperatives which may pour at other times of year.
b. DCSs that "poured in June."
Source: NDDB (Anand) and study data.

ing in June" than there were at the completion of OFII. Average procurement has also risen, but less quickly. Average daily milk procurement per functional DCS has fallen from 220 l/day to 194 l/day, and average daily milk procurement per member has dropped from 2.1 l/day to 1.5 l/day.[3] Like DCSs themselves, some of the 9.3 million farmer members of DCSs have become "nonfunctional" either because the DCS is nonfunctional or because they have ceased to "pour" to the DCS. Allowing for nonfunctional DCSs and multiple memberships, NDDB estimates that there are about 6.3 million "pouring members" who supply milk to a DCS at some time during the year.

The Changing DCS Picture

The reasons why a quarter of the DCSs are classified as "nonfunctional" are not well documented. Many will simply be "in recess" in June with milk being poured at different times of the year. Others have been officially disbanded by the Registrar of Cooperatives, and others are awaiting this action. Five major causes seem to explain the closure of DCSs:

- *Active price competition*, especially in peri-urban villages. With only a small distance to transport milk[4] and negative milk processing costs, small traders can offer prices higher than the cooperative. As urban areas expand, the area served by small traders expands. To the extent that farmers get more for their milk than they would from the cooperative, this expansion is to be welcomed. Whether the consumer is better served by informal traders is an open question, since there is evidence that watering of milk is widespread (Table 4.3).
- *Changed needs of milk producers*. Where villages become more decentralized, the single DCS pouring site may cease to properly meet farmers' needs. Itinerant buyers who will come to the farm might then provide a service the DCS does not match. (In some large villages, DCSs have established one or more satellite pouring points to reduce waiting lines and travel times).
- *Village politics*. Though the Anand principles call for the DCSs to be open to all without discrimination, this may not be honored, leading to tensions within the village that can eventually undermine the DCS.
- *Dishonesty*. Despite a sophisticated system of checks and balances and "double-entry" checks on physical quantities and payments, embezzlement does occur, often followed by the collapse of the DCS.
- *Higher income*. In a Madhya Pradesh study, several DCSs were found to have closed because of the introduction of soybeans. These provide a higher income than dairying but fewer byproducts for cattle feed than the cotton and groundnuts they replace.

If the volume of milk supplied by a DCS falls, for whatever reason, below an economic level, then the MPU will cease collecting. A DCS may thus become "nonfunctional" not because of explicit dissension or a wish of the membership to disband, but because the volume of milk supplied falls to a level that makes collection uneconomic.

With almost a quarter of DCSs that have been formed nonfunctional in June, this is a serious problem for Operation Flood. MPU staff were well informed about the range of circumstances that can lead to the collapse of a DCS, but the causes of collapse are not routinely documented. Under OFIII, the NDDB initiated a Cooperative Development Program to help deal with this problem. This is a multidimensional program aimed at in-service training of all participants in the cooperative system from farmers to boards of directors and professional staff, with particular emphasis on women. The training includes village-level discussions of cooperative principles and rights and responsibilities, organizing discussions among management committees of neighboring DCS on problems and procedures, visits by DCS chairmen (and chairwomen) to Anand to see the support infrastructure that has been built up and for them to be indoctrinated in their rights and responsibilities, technical training for secretaries on AI and accounting procedures. In principle, this program funded all the expenses for one five-member team in each MPU and the nonsalary expenses of another team. The program is active in 89 MPUs, some of which have financed a total of five teams. The impact of this educational program has been twofold: first, a greater sense of belonging and ownership of DCSs by their members, and second, better performance, particularly at the DCS level.[5] The result has been an increase in milk poured in villages under the program compared with other villages. Since higher procurement helps spread overhead costs, this increased milk production suggests that the program has a one to two-year payback period. While the Cooperative Development Program is intended to be preventative, the Technology Mission for Dairy Development (jointly funded by the central government, state governments, and NDDB) has been active in reviving nonfunctional DCSs.

It is Operation Flood policy not to receive milk from small traders or *dudhiyas*. This is very largely driven by quality concerns (i) that the milk may have been watered and (ii) that elapsed time since milking may have allowed souring to commence. In addition, cooperative ideology puts a high value on a direct link to the producer. This said,

it may be noted that where a *dudhiya* is collecting from producers not otherwise served by the DCS (say from a village several miles distant) or by direct pick-up from farmers, there might be a case for collaboration, especially if the cans supplied by the *dudhiya* were kept separate and individually tested on receipt at the factory or cooling center.

As reported in Table 4.2, the investments under NDPII turned out to be fairly evenly distributed with the exception of Gujarat, which received 40 percent of funds released by NDDB. However, because of the high level of milk procurement in Gujarat, the investment per kilogram of milk procured turns out to be only 36 percent above the average for the project as a whole. More extreme is the underinvestment in Maharashtra, which received only 24 percent of the average investment per kilogram procured. That the investment in Gujarat was not excessive relative to milk procurement is suggested when it is observed that the data on rated capacities and actual utilization in the Operation Flood dairies showed considerable inter-and intra-state variation. Gujarat and Maharashtra do better than most. It appears that on efficiency grounds Gujarat was not overbuilt. However, the high proportion of milk production procured by the cooperative system in Gujarat relative to other states means that investment per kilogram of production (not procurement) was four times as high in Gujarat as in almost any other state. Similarly, the investment per member was higher in Gujarat than elsewhere.

The history of milk procurement by Operation Flood is summarized in Figure 4.1. There was an initial period (1970–80) of rapid growth (15.2 percent per annum) from a small base under OFI. Five years (1980–85) of extraordinary growth of 22.5 percent per annum followed under OFII, and subsequently more modest growth of about 4.2 percent per annum (from a much larger base) under OFIII. Under OFII, procurement by Operation Flood has grown slightly less quickly than production. Two factors may help explain this. In the early period, there was an 18-month to two-year hiatus in implementation due to the reorganization of NDDB and delays in state governments' willingness to adopt the Anand principles. In the later years, competition from the private sector has slowed deliveries to the cooperative sector.

Retail Sales. Retail sales by Operation Flood have risen from an average of 1 million l/day in 1970 to 5 million l/day in 1985–86 to 9.4 million l/day now.

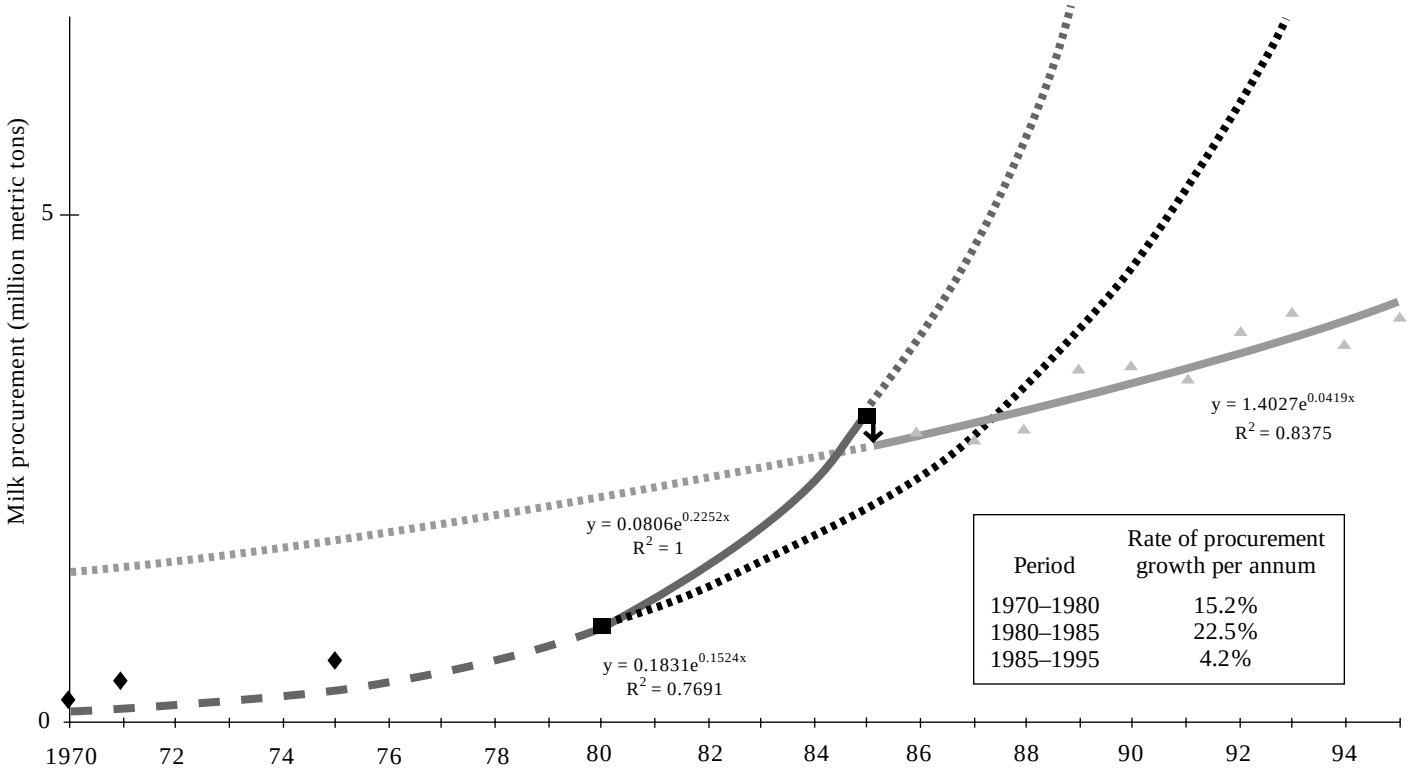
Quality and Competition. Competition both for milk procurement and sales is lively. There is no restriction on informal traders purchasing milk, and the demise of some DCSs testifies to the vigor of this competition. Tales of "unfair competition" from these traders abound, including tying suppliers by either a loan from traders to farmers or paying 30 or 60 days in arrears so that if suppliers leave, they will lose one or two months of milk income. Failure to test milk, falsification of test results, refusal to take milk (or setting a giveaway price) during the flush season, and long measures are repeatedly mentioned. Urban milk demand is met by cooperatives (60 percent), informal urban producers (30 percent), and informal milk traders and new private suppliers (25 percent). Estimated market shares add to over 100 percent, reflecting different market shares between markets.

TABLE 4.2: MILK PROCUREMENT, PRODUCTION, COOPERATIVE MEMBERSHIP

	MILK PROCUREMENT *(Volume in 000s) (Kg/day)*	**RELEASE OF FUNDS BY NDDB** *(Rs Million)*	**Rs/KG PROCUREMENT**	**MILK PRODUCTION IN 1990** *(Volume in 000s)*[a] *(Kg/day)*	**Rs/KG PRODUCTION**	**PRODUCER MEMBERS OF COOPERATIVES** *(000s)*[b]	**Rs/MEMBER**
Gujarat	3,313	3,843	1.16	9,657.5	0.40	1,847	2.08
Uttar Pradesh	819	806	0.98	26,553.4	0.03	478	1.69
Karnataka	1,098	860	0.78	6,545.2	0.13	1,294	0.66
Tamil Nadu	1,203	602	0.50	9,246.6	0.07	1,884	0.32
Maharashtra	1,908	391	0.20	10,235.6	0.04	1,069	0.37
Andhra Pradesh	848	628	0.74	8,246.6	0.08	701	0.90
Other states	2,091	2,472	1.18	77,290.4	0.03	1,719	1.44
All India	11,280	9,602	0.85	147,775.3	0.06	8,992	1.07

a. Basic data from Dairy India 1997, p. 160.
b. Basic data from Dairy India 1997, p. 185.
Source: ICR, p. 13.

FIGURE 4.1: INDIA: OPERATION FLOOD MILK PROCUREMENT, 1970–95 (EXPONENTIAL FIT TO 1970–80, 1980–85, 1985–95 SUBSAMPLES)



Milk and Water?

There is also frequent reference to the watering of milk by informal traders and by farmers. Some farmers interviewed mentioned the ability to add water to the milk as one of the advantages of selling to informal traders. Data on the watering of milk are difficult to obtain. An exception is in Jaipur, where for a number of years Jaipur Dairy has had a free service that tests milk for added water at consumers' request. (Actually the test is for solids-non-fat (SNF), and it is assumed that any SNF level below 8.5 percent is due to the addition of water.) This is a "self-selected sample," and as such is representative of milk that consumers suspect may have been watered (not the informal milk supply as a whole). The relevant data are given in Table 4.3. With their low overheads and a rather simple approach to milk processing, informal traders provide vigorous competition.

Private companies do not generally procure their milk directly from farmers. Rather they buy from contractors at the factory. Contractors usually employ informal traders to buy from farmers, thus perpetuating unfair trading practices. By using contractors, private companies minimize costs but have no control over quality between the farm gate and the receiving platform (Box 4.1). This extreme example should not be taken as typical; rather, it warns of the existence of a problem.

Problems with effluent treatment have already been alluded to, and a review of Bank supervision reports shows intermittent concern with nonfunctioning control equipment and poor maintenance in some factories at some times. NDDB itself operates a Quality Assurance Group which is designed to help MPUs remedy weaknesses in equipment or standard procedures. This is a continuing challenge, even as factories are being prepared for certification by the International Standards Organization for export quality production.

TABLE 4.3: WATER IN 200 MILK SAMPLES SUBMITTED FOR TESTING

	PERCENT
No adulteration	17
0.1–20.0% water added	40
20.1–40.0% water added	35
40.1% and up water added	8

Source: Jaipur Dairy for year 1995.

BOX 4.1: MILK ASSEMBLY AT ITS WORST

The following account of a private sector milk assembly center is not intended to reflect the hygiene standards of the subsector as a whole, but it does suggest that enforcement of the Prevention of Food Adulteration Act of 1954 is a major challenge, at least in the Punjab (Table 7.2 shows that 16 percent of milk samples drawn and tested by the Punjab Ministry of Health in 1994 were judged to be adulterated as were 24 percent in 1995.)

The center was used to transfer milk from cans to bulk storage in order to cool it, correct for excess acidity, and transfer it to a small bulk tanker for transport to a manufacturing plant. The building used was a former ice plant that opened directly on to a main road, with the exception of a dirt parking area 100 feet wide. The building had a high roof and a row of windows high up, but these were so dirty that the building appeared quite dark inside. The darkness was accentuated by dirty walls and an apparently dirt floor, which may have overlain a concrete floor at some depth.

Milk delivered in cans was first poured into large (6 feet in diameter) steel (not stainless steel) drums. There was an open 100 kg. sack of caustic soda on the floor, which was evidently used to correct the pH of any milk that had got too acidic or sour. After this adulteration (if needed) of the milk, the liquid was pumped through plastic piping (again no stainless steel, no cleaning in place) to rectangular steel containers. These looked to be holdovers from the ice plant, since many were severely rusted and stained; some were rusted right through at the top. These containers, at 4 feet high, would have been extremely difficult to clean, and there was no evidence that this was even attempted. The milk was cooled in these rusted steel containers until a small tanker truck was available, at which stage it was pumped into the tanker for onward transport to a non-cooperative processing plant. New mild steel containers were in the process of construction.

Apart from the electric motor, pump and plastic piping, it was a Dickensian scene.

Source: Field Visit.

Increasingly, both the corporate and cooperative sectors have been plagued by contractors and transporters adding "artificial milk" to their deliveries (Box 4.2). Since this "milk" satisfies the normal butterfat and SNF tests, improved testing procedures are needed for bulk milk delivered to the factory. Although these comments are not based on extensive empirical investigation, they were not seriously challenged by leading Indian dairy academics and others when presented at a workshop on a draft of the study held in Anand, Gujarat state, in March 1997. Since we want to know village-level impact, evidence has to be drawn from disparate studies, and comprehensive evidence is unlikely to become available.[6]

Working Capital. 1993–94 was a trying year for Operation Flood. High procurement levels coincided with low world prices for dairy products. This led to depressed prices in India (as low as Rs 36,500[7] or US$1,160 a ton for SMP versus US$1,569 on the world market) and precluded export except at a substantial loss. Many MPUs ran out of working capital as inventories of dairy products (which could only be disposed of at depressed prices) locked up working capital. Many unions fell behind in making payments to farmers and had to declare "milk holidays" on which they would not receive milk. NDDB provided substantial interest-free loans to help with this crisis. This facility was withdrawn when the crisis abated, and NDDB found that some MPUs were using the credit facility to avoid painful, but needed, decisions. Some of these loans have yet to be repaid.

Cooperative Structure. A continuing problem for Operation Flood is the rejection by politicians and bureaucrats of the full Anand principles of farmer control. Even in Gujarat, where the existing system is farmer-controlled at all three levels, politicians continue to harass the cooperative system in the hope of forcing it to accept government assistance and hence political appointees on boards of directors. This is a continuing war of attrition, with the public sector giving ground reluctantly to increased control by the NDDB and farmers when the cost of supporting governmental-dominated cooperatives becomes too high, only to attempt to regain control once financial equilibrium is restored.

The issues of government interventions, cost control, and subsidies are confusingly intertwined. The question then arises as to when a payment by government to cover excess operating costs by the cooperative system is a subsidy. A clear distinction needs to be made between a government subsidy to an Anand-pattern cooperative in which all tiers are farmer-owned and controlled, and payments to cooperatives with "mixed ownership and control." Typi-

BOX 4.2: ARTIFICIAL MILK

Problems with the supply of artificial milk have been reported in both the corporate and cooperative sectors. An article in the *New Delhi Statesman* (July 8, 1995) reported on the seizure from a contractor of "artificial milk" and goes on to explain that "the ingredients used in the manufacture of synthetic milk are caustic soda, water, refined oil, common salt, sugar and urea." This artificial milk was destined for delivery to a large corporate processor.[a]

Similarly, an article in the *Asian Age* (March 12, 1997) says:

> Delhites Panic Over Synthetic Milk… The large-scale supply of synthetic milk in Delhi and adjoining districts in Haryana and Uttar Pradesh has become the cause of serious concern for consumers in the region.
>
> Spurred to action by a deluge of complaints, the Food and Research Analysis Centre (FRAC), a voluntary organization, collected samples of milk from various outlets in and around New Delhi last year. Of the 33 milk samples collected by FRAC, almost 60 percent of the samples were found to stray from specified standards laid down by the Prevention of Food Adulteration Act.
>
> "The samples were not adulterated but merely substandard," says Mr. S.P. Virmani, founder-president of FRAC, admitting however that some samples…had been found to contain synthetic adulterants…
>
> In January this year the Gurgaon administration busted a large milk adulteration racket that involved supplies from the Rajasthan Government Milk Cooperation, SARAS.
>
> According to the Gurgaon police, at least three quintals of milk were siphoned off from the tankers every day, and replaced with adulterated supplies. SARAS tankers from Bhilwara, Ajmer, Jogpur, and other areas of Rajasthan would collect at a destination in Binaulla village in Gurgaon district, where the fraud was perpetrated.
>
> Local administration sources reveal that a large number of private as well as government [people] were involved in the racket.

a. In a letter to the editor (August 4, 1995), the Manager of Corporate Communications understandably took exception to the article, mentioning "25 different tests and analysis.… These checks rule out any possibility of adulteration of liquid milk going undetected." The letter stopped short of denying that the culprit was a supplier to the company or that the material had been seized. It seems unlikely that the contractor was caught by officials on his very first use of the recipe.

cally, mixed-control cooperatives have higher costs or lower revenues owing to government interventions, including the inability to dispense with redundant staff or inappropriate appointments, salaries inadequate to retain key staff, and prices that are fixed too high for farmers or too low for consumers. There is a more subtle and corrosive effect of (state) government intervention. If management knows that at the end of the day the government will bail out the organization, the incentive to efficient management is fundamentally undermined. (This is the key reason that insistence on the independence and the Anand principles is so important.) Nothing focuses the mind of a manager or a board director like the prospect of the organization going bankrupt. A clear conceptual distinction needs to be made between payments needed to compensate for governmental managerial interventions and a genuine subsidy to an Anand-pattern cooperative that has full discretion to manage its affairs. Operation Flood officials were adamant that no subsidies, in this narrower sense, had been received by (fully) Anand-pattern cooperatives. There may have been a subsidy element in the first two phases of Operation Flood, but in OFIII (and NDPII) all funding was provided by loans from the Bank, profits on concessional dairy imports, and the NDDB. There was no contribution from the central government and hence no subsidy from the central government directly to Operation Flood.[8] Both the central and state governments provide support to the dairy industry generally (including Operation Flood areas), such as veterinary and extension services and AI.

Ownership, Managers and Equity

Much of the reluctance of state governments to relinquish their influence over cooperatives is because some of the physical plants used still belong to the state and loans to the dairy sector are guaranteed by the state (as required by the Bank). State intervention is then rationalized as a legit-

imate concern to assure the value of the state's assets, even when the net result of an intervention is to reduce system efficiency, raise cooperative costs, and hence undermine the value of the state's assets.

The continued appointment of *civil servants* as managing directors of milk federations and MPUs is one symptom of this conflict.[9] Only in Gujarat, Karnataka, and Rajasthan has it been possible to appoint dairying professionals to managing directorships.

Even in Karnataka and Rajasthan, the professional managers are not direct employees of the MPU but are seconded to the MPU from a cadre of professionals employed by the milk federation or NDDB. The result is that appointments tend to be for a few years without the expectation of having to make a career in the service of the MPU. In Bihar the Anand principles have been accepted to the point that professional staff are employed directly by the MPUs.

Cooperatives have to operate in accordance with the Cooperatives Act of the relevant state. In almost all cases, these Acts are antiquated holdovers from pre-Independence days with a markedly paternalistic bent. The result is a bias that allows the Registrars of Cooperatives much more leeway in cooperative affairs than is open to the Registrars of Companies. In addition, the Acts usually require cooperatives to have their accounts audited by the Auditor General, a requirement that may well involve a delay of several years.[10]

A fundamental problem for cooperatives is *the conflict between efficiency and equity*. Mention has already been made of the greater efficiency of milk collection from large farmers. The same issue applies to the collection of milk from small DCSs and the servicing of remote villages.[11] Economic efficiency would dictate either not collecting from these more expensive sites, or at the very least paying a lower price to reflect the higher cost of providing service. Typically, cooperatives prefer to provide service equally to all suppliers at the same cost on grounds of equity (and to some extent simplicity), but subject to receiving a sufficient volume of milk to cover variable costs. Cooperatives typically provide for some cross-subsidization from the better-off to the poor.[12] Given the Bank's overarching objective of reducing poverty, careful thought needs to be given before the Bank advocates an increase in efficiency if efficiency is to be obtained by paying lower prices to the poor or withdrawing service altogether. In the final analysis, MPUs will decide how much cross-subsidization they wish to provide. Their decision will, of course, be constrained by the need to operate profitably. Where the volume of milk and existing route pattern do not allow variable costs to be covered, MPUs withdraw service to DCSs as is witnessed by the number of DCSs which have become nonfunctional.

As argued earlier, cooperatives and private traders are likely to behave differently in a monoposonistic relationship with milk producers. A similar difference in behavior can be expected between cooperative and private companies at the corporate level. Private companies, in attempting to assure their profitability and survival, are unlikely to distribute profits to the point that working capital is seriously eroded. Cooperatives, on the other hand, may be tempted to return too much to producers to the point that too little money is retained as working capital. Political considerations may lead boards of directors to authorize over-generous payments to producers. In India the asymmetry between the tax treatment of farmers, who do not have to pay income tax, and companies (including cooperatives) that have to pay income tax at the 35 percent rate on profits is an additional powerful argument for maximum producer payout to reduce tax liability.

The temptation for cooperatives to pay too much to their producers is reflected in slow repayment of project loans by MPUs as shown in Table 4.4. Ironically, two of the three states (out of 20) that were helped by specific Bank projects have double the rate of arrears compared to OFI and OFII. The most significant arrears are from Rajasthan, where the state government has asked the NDDB to take over management of the cooperative sector until financial profitability can be restored. The NDDB is confident of resolving the financial problems in Rajasthan within five years.

Some cooperatives have developed the device of *part payment in equity*. In this case, a part of the final (bonus) payment for milk is in the form of equity in the DCS, which in turn is reflected in DCS equity in the MPU.[13] The result is that the MPU limits its tax payment, and the cooperative members increase their equity in the MPU, thereby increasing working capital or allowing the government's loans or equity to be reduced.

Financial Sustainability. This is an extremely complex topic in the context of Operation Flood. Just as the Bank insists that the central government guarantee funds made available to the NDDB, the NDDB requires that state governments guarantee loans to the federations and MPUs. Thus, nominally at least, the NDDB's financial security depends on the creditworthiness of the state governments rather than on individual projects. This reliance on the states' creditworthiness is particularly important in states that continue to interfere with the pricing and staffing decisions of federations and MPUs (Table 7.3). The Bank-supported projects aimed to free the cooperative sector from

TABLE 4.4: LOAN REPAYMENTS ON BANK PROJECTS TO NDDB (Rs MILLION)[a]

				OUTSTANDING	
PROJECT	LENT	DUE[b]	RECEIVED[c]	AMOUNT	PERCENT OF DUE
Karnataka	244.4	321.6	312.6	9.0	3
Madhya Pradesh	142.4	257.5	142.5	114.9	44
Rajasthan	169.2	254.6	85.1	169.5	67
National Dairy I and II	8,054.1	2,781.2	2,098.3	682.9	25
Total	8,610.1	3,614.9	2,638.6	976.3	
Percent		100.0	73.0	27.0	

a. To March 31, 1996.
b. Includes interest.
c. Loan repayment data relate to IDA funds in the case of Karnataka, Rajasthan and Madhya Pradesh and relate to World Bank, EC and NDDB/IDC funds in the case of National Dairy I and II.
Source: NDDB.

state interference. Had they succeeded, direct lending without a state guarantee would have made sense. But the project was unable to eliminate state interference altogether. Many states take the position that as long as they are guaranteeing loans to federations and MPUs and as long as they own part of the assets, they have the right to appoint directors and managers and to have a say in pricing and staffing decisions.

The profitability of federations and MPUs improved markedly in the three years before the NDPII closed. As Table 4.5[14] shows, loss-making MPUs and state federations were reduced from 73 to 46 (13 of them in Karnataka and Andhra Pradesh) over two years, and the increase in profits and reduction in losses has been spectacular: overall losses of Rs 584 million in 1992–93 have been converted into profits of Rs 285 million in 1994–95. Even so, accumulated losses over this period were Rs 627 million or about US$18 million.

While payments to the NDDB are still often in arrears, the rate of increase in these arrears has slowed substantially. The NDDB is taking steps to correct the problem, which is not currently a threat to the survival of the dairy cooperative system. Total overdue loan installments increased 27.5 percent (from Rs 796 million to 1,020 million) from March 1995 to March 1996 and represented about one-third of repayments due at the end of March 1996.[15] From 1990–91 to 1994–95, these arrears grew at an annual rate of 180 percent from a very modest base of Rs 82 million.

TABLE 4.5: PROFITABILITY OF THE COOPERATIVE SECTOR (132 STATE FEDERATIONS AND MPUs)

	1992–93			1993–94			1994–95		
	NO. OF MPUs			NO. OF MPUs			NO. OF MPUs		
STATE	NET PROFIT	NET LOSS	PROFIT OR LOSS (*Million Rs*)[a]	NET PROFIT	NET LOSS	PROFIT OR LOSS (*Million Rs*)[a]	NET PROFIT	NET LOSS	PROFIT OR LOSS (*Million Rs*)[a]
Gujarat	15	—	57	13	2	28	12	3	36
Uttar Pradesh	9	14	(33)	11	12	(49)	12	11	(26)
Karnataka	2	11	(131)	3	10	(125)	10	3	115
Tamil Nadu	5	6	(171)	6	4	53	6	5	(3)
Maharashtra	9	2	(7)	10	1	28	10	1	112
Andhra Pradesh	2	9	(168)	2	9	(121)	6	4	(58)
Other states	17	31	(131)	26	22	(142)	29	19	119
All India[b]	59	73	(584)	71[c]	60	(328)	85[c]	46	285

( ) = a loss.
— = not available.
a. After tax.
b. Includes unaudited accounts. Losses were Rs 581 and 254 million in FY93 and FY94, respectively, converting to an after-tax profit of Rs 285 million in FY95.
c. Totals to 131.
Source: ICR and mission data.

To put the numbers in perspective, the NDDB's surplus (excess of income over expenditure) was Rs 466 million in FY95. Its total assets were Rs 27.8 billion, and its equity was Rs 14.1 billion. Thus, total arrears were equal to around three years' surplus, and total loans outstanding (Rs 10.7 billion)[16] could in extreme circumstances be written off and still leave the NDDB with about 30 percent of its equity.

These figures are subject to various interpretations. Some will fix on the first derivative and emphasize that Rs 627 million accumulated losses over three years, arrears are continuing to increase, and 46 MPUs and federations continued to make losses in 1994–95. Others will look at the second derivative and note that the rate of increase of arrears has slowed, the number of MPUs and federations making losses had been reduced, and, for the first time in three years, 1994–95 saw MPUs and federations, as a whole, make a profit. This looks more like a "turn-around" situation than the threat of a pending financial crisis; however, others may read the data less optimistically, and for the 46 loss-making MPUs, it is to be expected that loan recovery will be difficult.

International Competitiveness of the Indian Dairy Industry. Empirical research undertaken as part of the impact study shows that the protection of the Indian dairy industry has declined remarkably over the last 20 years (Table 4.6). The initially high protection has now been significantly reduced. Indeed, for skim milk powder (SMP) in 1994–95 and 1995–96, protection was negative, as the effective protection coefficients (EPCs) are less than 1.00. In large measure, this reflects a recovery of world prices, though the stable environment (and assistance with invest-

TABLE 4.6: REVISED EFFECTIVE PROTECTION OF THE INDIAN DAIRY INDUSTRY (AT SHADOW EXCHANGE RATES)

	NET PROTECTION COEFFICIENTS			EFFECTIVE PROTECTION COEFFICIENTS			REAL WORLD PRICES (FOB NETHERLANDS) US$/TON		
YEAR	SMP	*GHEE*	MILK	SMP	*GHEE*	MILK	SMP	BUTTER OIL/*GHEE*	RATIOS REAL SMP/ REAL/ BUTTER
1975–76	2.03	1.67	2.42	2.37	1.89	3.27	1834.63	3617.57	0.507
1976–77	4.27	2.20	4.16	7.27	2.67	9.29	1035.29	3117.65	0.332
1977–78	5.16	1.69	3.13	10.96	1.93	4.76	736.20	3144.17	0.234
1978–79	3.92	1.47	2.30	6.22	1.61	2.93	830.32	3294.22	0.252
1979–80	3.15	1.41	2.46	4.35	1.54	3.20	906.10	3006.59	0.301
1980–81	1.50	1.14	1.73	1.64	1.21	1.97	1741.80	3493.85	0.499
1981–82	1.68	1.13	1.49	1.87	1.20	1.65	1764.58	4425.00	0.399
1982–83	1.93	1.25	1.83	2.21	1.34	2.12	1588.59	4064.11	0.391
1983–84	2.02	1.76	2.47	2.34	2.03	3.14	1326.22	3275.26	0.405
1984–85	2.83	2.19	2.87	3.70	2.69	3.95	1165.80	2722.37	0.428
1985–86	2.20	4.42	5.81	2.62	5.42	7.80	1103.05	1903.37	0.580
1986–87	2.05	2.75	2.98	2.40	3.67	4.05	1021.67	1600.00	0.639
1987–88	1.67	3.27	2.95	1.87	4.79	4.01	1321.52	1539.18	0.859
1988–89	1.12	1.97	1.70	1.17	2.32	1.93	2263.77	2158.95	1.049
1989–90	1.15	1.62	1.47	1.21	1.82	1.61	2154.92	2477.05	0.870
1990–91	1.11	2.05	1.86	1.15	2.45	2.19	1693.22	2022.02	0.837
1991–92	1.12	1.92	1.65	1.17	2.25	1.89	1694.44	2027.78	0.836
1992–93	1.02	1.71	1.33	1.05	1.94	1.44	2068.00	1995.54	1.036
1993–94	1.13	2.12	1.55	1.19	2.58	1.72	1747.31	1825.27	0.957
1994–95	0.86	1.92	1.28	0.88	2.24	1.38	1844.78	1972.74	0.935
1995–96	0.93	1.52	1.01	0.95	1.69	1.04	2195.00	2525.00	0.869

Notes:
1. This table provides a summary of information from the report sponsored by OED (Gulati and Bhide 1997).
2. Annex 5.1 of Gulati and Bhide (1997) uses a conversion for milk of 910 grams per liter rather than 1,020 per liter. Data have been corrected for this error by multiplying by 0.9.
3. Net Protection Coefficients (NPC) for SMP for each year are calculated from Tables 5.1 and 5.5 taking the SER values for that year for the different regions under the Importable and Exportable Hypothesis and then averaging them. The NPC for *ghee* and milk are similarly calculated from Tables 5.3, 5.7 and 5.4, 5.8, respectively.
4. The Effective Protective Coefficients (EPC) for SMP are similarly calculated from Tables 5.9 and 5.13. For *ghee* and milk, similar calculations are made on the data from Tables 5.11, 5.15 and 5.12, 5.16, respectively.
5. Real World Prices for SMP are calculated by deflating the World Prices from Table A 5.3 by the MUV series for 1996. Real World Prices for *ghee* are similarly calculated from Table A 5.7.

ment in processing plants) the Indian industry has enjoyed undoubtedly contributed to this.

It is worth pausing for a moment to consider the data in Table 4.6 in more detail, especially since the results for the final year 1995–96 are atypical. Looking just at milk, had the time-series stopped in 1994–95, it would have been appropriate to conclude that the Indian dairy industry has been very successful in reducing initially very high levels of protection, but protection was still about 30 percent. The last row of Table 4.6 is somewhat misleading since it is a peak in world prices of SMP and butter which explains the low protection in 1995–96. The real world price for SMP was the second highest on record (the highest price occurred in 1988–89), and butter was at its highest real price since 1989–90. As shown in Table 4.7, the latest estimate of world prices for SMP and butter suggest a 10 percent fall for SMP and perhaps 30 percent for butter, implying roughly an 18 percent level of protection for India on the basis of the latest world prices.

The protection figures in Table 4.6 refer to processed milk products. Since milk itself and collection, transport, and processing are "non-tradables," it is not possible to infer how protection is allocated among these non-tradables. What is clear is that the Indian system of getting milk from the farmer's pail to the point where it has been cooled and can be handled in bulk is both organizationally sophisticated and technically inefficient. Indian producers get about 63 percent of the total cost of wholesale urban milk (Gulati and Bhide 1997, Table A3.10) for supplying warm milk in small quantities. The share of wholesale cost going to chilling centers which supply bulk chilled milk is 81 percent (this includes the 63 percent to producers as one of its costs). The processing margin, starting with chilled bulk milk at rural centers is thus 19 percent. It is this figure which needs to be compared with developed-country processing margins, since they pick up bulk chilled milk from the farm.

A byproduct impact of Operation Flood and accompanying dairy expansion has been the establishment of an indigenous dairy equipment manufacturing industry (only 7 percent of dairy equipment is now imported) and an impressive body of indigenous expertise that includes animal nutrition, animal health, AI, management information systems, dairy engineering, food technology, and the like. The Bank's insistence on International Competitive Bidding means that, as far as Operation Flood goes, India's dairy manufacturing industry has been established in competition with international suppliers. However, supplies of Indian equipment to non-Flood dairy processors may have benefited from the artificial stimulus of "self-reliance" which ruled in many industries before 1991 and raised the cost of those processors. This indigenous infrastructure explains in large part why milk processing and marketing costs of Operation Flood have not exploded in the face of having to procure and account for minute quantities of milk.

TABLE 4.7: INDIAN AND WORLD MARKET PRICES FOR SELECTED DAIRY PRODUCTS, 1991–95 (US$/METRIC TON)

ITEM	1991	1992	1993	1994	1995	1996
Milk: Producer price						
India: cows (4% fat)	154	n.a.	n.a.	153	191	
India: buffalo (7% fat)	242	n.a.	n.a.	223	255	
Germany	360	393	n.a.	n.a.	n.a.	
United Kingdom	329	344	n.a.	n.a.	n.a.	
United States	270	289	n.a.	285	275	
Milk: Wholesale price						
India	336	360	n.a.	n.a.	n.a.	
United Kingdom	438	435	n.a.	n.a.	n.a.	
Butter: Wholesale price						
India	1,832	3,788	n.a.	n.a.	2,868	
World	1,413	1,363	1,350	1,294	2,215	1,546[b]
Whole milk powder: Wholesale price						
India	3,089	n.a.	n.a.	n.a.	2,186	
World	1,388	1,638	1,488	1,520	2,075	
Skim milk powder: Wholesale price						
India[a]	1,620	1,907	1,782	1,712	2,045	
World	1,425	1,681	1,569	1,563	2,075	1,795[b]

a. Converted to dollars from Gulati and Bhide (1997), Annex Table 5.1AB, using market exchange rate.
b. USDA, 1996–97 (North Europe Low).
Source: World Bank Reports 1996, Table 5.5.



5 Village-level Impact

Two village-level participatory studies were undertaken as a part of the evaluation. The first of these was in nine villages in the Mysore district of Karnataka state (Sampark 1997) and the second in 12 villages in three milksheds in Madhya Pradesh (Hiremath, Singh, and Mergos 1997). The villages in this latter study had been surveyed in 1983, and the in-depth village studies were supported by a survey of secondary data on two hundred villages in the same milksheds.

Both studies covered villages with and without a DCS. In the Madhya Pradesh sample, there were villages that had had a DCS in 1983 and still had one in 1996, villages in which the DCS had ceased to operate, a village where a DCS had been opened after 1983, and a village that had never had a DCS. Both studies administered questionnaires to individual families and used a participatory approach. In Madhya Pradesh, this took the form of focus group discussions; in Karnataka, social mapping and group validation of survey findings were used.

Despite the similarity of approach, quite different pictures emerged from the two studies. The Mysore MPU in Karnataka appears to have substantial operational independence.[1] Certainly it is free to set producer prices and, with the support of an integrated business plan, it lowers producer prices in the flush and raises them in the lean period. The MPU appears to have satisfactory relations with the supplying DCSs and has not been substantially adversely affected by the entry of private companies under the liberalization policy. The three MPUs studied in Madhya Pradesh appear to suffer from greater governmental interference that prevents them from raising producer prices to be fully competitive with small traders and private companies.[2] This, and the withdrawal of MPU-subsidized animal health services, has led to a decline in relations between the MPUs and their supplying DCSs. In addition, the introduction of soybeans in Madhya Pradesh has revolutionized agriculture with large declines in the area under cotton and groundnuts. Since soybeans provide less feed residue than cotton and groundnuts, this has adversely affected dairying. In addition, the higher incomes from soybeans have boosted prosperity to the point that wage labor provides incomes competitive with those from dairying. The Mysore district has not enjoyed a similar technological change.

Karnataka

The nine villages included in the Karnataka survey comprised five with operating DCSs (the DCS villages), two where a DCS had closed (the "defunct Flood" villages) and two that had never had a DCS (the "never Flood" villages). In addition to the participatory activities, the survey interviewed a stratified random sample[3] of 451 people.

Depending on how benefits are measured, quite different conclusions can emerge as to who benefits most from the cooperative system. Thus DCS membership substantially exceeds the number of people "pouring" to the DCS. In an effort to open up the DCS to women, membership rules have been revised in several villages to allow

two members per family. In addition, some families that have ceased to own cattle have retained their membership. Membership may thus not be a good measure of "beneficiaries" as usually understood. Small and marginal farmers dominate the people pouring (74 percent of pourers contributing 74 percent of milk to DCSs).[4] Landless[5] contributed another 15 percent of pourers (pours 11 percent of milk). Large farmers were 11 percent of pourers (pours 15 percent of milk).

Important though dairying is to the landless, not all of them can participate because of the cost of cattle and the need to purchase feed. Though the direction of causation may be in doubt (Are people wealthier because they own milch animals, or can only the wealthier afford to own milch animals?) dairying families earn more money in DCS villages than dairying people in defunct- and never-Flood villages. In DCS villages dairy families have higher incomes than non-dairy families, and in all villages the landless with dairy cattle are better-off than those without.

There was a general preference for selling to the DCS rather than to a private vendor. Vendor prices tend to be higher than DCS prices close to an urban center and lower (if a vendor is even active) in more remote villages. Women who have no access and control over the family's total income do have some control in the case of milk money. The amount is small when it comes in daily or every week, and the expenditure can be on small items. Leaving such small amounts of money to their wives is not seen as a problem by some men.

The closure of the DCSs in the two defunct-Flood villages followed embezzlement by the secretaries, irregular committee meetings, and interference from state-level authorities. This resulted in poor cash returns to producers, falling milk procurement, and eventually a decision by the MPU that the DCSs were no longer viable (and hence the MPU would cease to pick up milk from the villages). Closure affected the landless and scheduled castes and tribes most adversely. Without the DCSs, there was no alternative market, and cattle often had to be sold. The villagers were not in a position to reactivate the DCS.

If the impact is to be evaluated from the viewpoint of equity, the study (Sampark 1997) concludes that there is definitely a positive impact on those who are at the lower end of the economic ladder, both in terms of landholding and caste to which they belong. However, those who do not have access to resources to own cattle are left out of the fold of the dairy cooperative and have not had this opportunity for augmenting incomes.

Madhya Pradesh

The 12 villages surveyed were initially surveyed in 1983 in connection with the completion of the NDP (Mergos and Slade 1987). In 1983 nine of the villages had DCSs, and in four of these (the defunct-Flood villages) the DCSs had closed. Three villages had no DCSs in 1983, although one had formed a DCS in the meantime. Thus, in 1996 there were five DCS villages, four defunct-Flood villages, and two never-Flood villages. Although the data were available from the earlier study, the names of the respondents could not be recovered. Accordingly, a new stratified random sample of 30 families from each village (360 interviews) and a supplementary survey of village-level data was conducted in 200 villages to check the generality of the village-level observations in the 12 resurveyed villages.

In general, Madhya Pradesh emerged as having a much more fluid dairying situation than Karnataka. Price controls prevented the cooperative sector from raising prices to compete fully with private companies, and the rapid expansion of the area under soybeans reflects a more profitable farming system that provides fewer crop residues for ruminants. This, together with a fairly widespread rash of dishonesty amongst DCS secretaries, had led to the collapse of a significant number of DCSs. For the MPU as a whole, the proportion of functional DCSs has dropped from 77 percent of those organized in 1983 to 55 percent in 1996. Hiremath, Singh, and Mergos (1997, p. 91) note, "Our survey of 200 DCS villages indicated that DCSs were functioning in 184 villages and in the remaining 16 villages the DCSs had become dysfunctional. The reasons for DCS closure include declining milk production, poor leadership in the village, bad choice of secretary and complaint against the DCS's operations. Nearly 31 percent of DCS's closure was attributed to competition from the private sector as a result of the new economic policies. Some 38 percent of the DCS closure was mainly the results of declining milk production in villages that may be due to the impact of changing cropping patterns. Among the remaining dysfunctional DCSs, 25 percent had closed due to both private competition and internal reasons and 6 percent due to internal reasons alone."[6]

The high proportion of internal reasons for DCS collapse is disturbing. A key assumption of the Anand system is that villages can manage their own affairs themselves.[7] In part, the recent Bank-sponsored withdrawal from the provision of preventative animal health care seems to have resulted in less frequent contact between villages and representatives of the MPU with a growing feeling of estrangement on the part of individual producers and less opportu-

nity for MPU staff to monitor emerging difficulties in the operation of DCSs. This is probably the most serious concern as to the sustainability of some MPUs.

A Shift in Suppliers

Part of the loss of suppliers to small-scale *dudhiyas* around urban centers is to be welcomed. With short distances from farm to consumer, the *dudhiyas* can be economically efficient. In practice, part of their competitive edge may be due to the routine adulteration of milk by farmers or in transit. *Dudhiyas* also provide credit and, in doing so, provide an additional service not available from DCSs. Competition with private companies represents a different issue. To the extent that companies can operate more efficiently because they are not subject to price fixing and overstaffing mandated by the state, the solution is in the hands of the state and the cooperative sector.[8] If excessive debt in the cooperative sector is the problem, then some financial restructuring may be required. To the extent that private companies are able to pay more to convenient villages with low transport costs, the cooperatives may eventually be forced to reconsider their pan-territorial pricing policy.

The loss of DCSs due to declining milk production is to be welcomed if it represents the realization of new opportunities for farmers to use their resources more profitably, or rising incomes that will ultimately lead to higher home consumption.[9] In the Bhopal milkshed, it appears that much of the decline in milk availability is the result of the introduction of soybeans.

As for Karnataka, the surveyed relationships between wealth and dairying need to be interpreted cautiously. A striking change for all villages from 1983 to 1996 has been the increase in the years of education for the head of household which had doubled and in some cases almost tripled. Within this general trend, the households without milch animals (with or without a DCS) have increased their educational levels faster than the dairying households. This may reflect the reliance of non-dairy households on non-farm jobs that require education at higher levels.

In 1983, incomes were higher in non-DCS villages than in DCS villages, but by 1996 this relationship had been reversed. In the period between the two surveys, real income rose at 6.5 percent per annum in the DCS villages but at only 3.5 percent in the non-DCS villages. Despite this, the defunct-Flood villages were reported to be the most developed in terms of educational and income levels, agricultural land owned and irrigated, numbers of milch animals owned, and milk sold. This suggests that these villages were close to town and thus able to capitalize on their locational advantage to get high milk prices from *dudhiyas* even in the absence of a DCS.

In those villages with a DCS in 1996, the DCS's performance was rated highly with respect to milk price, provision of a reliable market for milk, and regularity of payment. Respondents were much less satisfied with the provision of veterinary services and fodder. In large measure, this more critical view of veterinary services was the correct reflection of a new "unbundling" policy introduced at the Bank's urging by OFIII. Under OFI and OFII, both regular health camps and emergency veterinary services had been provided free or at highly subsidized rates by the MPU. In part, this represented a view that "prevention is better than cure" and that farmers were better-off paying a compulsory insurance premium through a slightly lower milk check than remaining uninsured. The Bank argued that this undermined the market for the private supply of veterinary services and by implication that the risk element could be ignored. It was agreed that the health camps would be discontinued and even emergency service moved toward full cost recovery. The results of this policy can be seen in Table 5.1 and Table 5.2. The need for veterinary services increased substantially, and the proportion of cases where the need was satisfied fell.[10] This was particularly marked for members of a DCS, but also applied to nonmembers and non-DCS villages. There was a slight rise in the proportion of cases where needs were met in non-DCS villages.

As shown in Table 5.2, there was a switch by DCS members from DCS-supplied services to government and private sources, with a fall in the ability of nonmembers and non-DCS villages to have access to these alternative services.

An unappreciated benefit of the MPU's provision of veterinary services was the resulting increased contact between MPU staff and the village. The loss of this contact probably explains some of the deterioration in the performance of DCS secretaries and the lethargic work of the management committees.

Since farmers attitudes may well differ from state to state (or even MPU to MPU), the decision on bundling or unbundling services is probably best left to the management of individual MPUs.

TABLE 5.1: SURVEY RESULTS: NEED FOR VETERINARY SERVICES (PERCENT)

	DCS VILLAGE									NON-DCS VILLAGE		
	MEMBERS			NONMEMBERS			ALL					
	1983	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*
Need for veterinary service	15	55.36	269.1	27	30.88	14.4	20	46.11	130.6	13	44.44	241.8
Need was satisfied	96	43.55	(54.6)	88	71.43	(18.8)	93	50.60	(45.6)	55	56.25	2.3

Source: Hiremath, Singh, and Mergos 1997, Table 6.5.1.

TABLE 5.2: SURVEY RESULTS: SOURCES OF VETERINARY SERVICES

	DCS VILLAGE									NON-DCS VILLAGE		
	MEMBERS			NONMEMBERS			ALL					
	1983	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*	*1983*	*1996*	*Change (%)*
DCS	64	11.30	(82.3)	45	0.00	(100.0)	60	8.43	(85.9)	..	..	—
Private veterinary doctors	7	19.35	176.4	10	4.41	(55.9)	6	18.07	201.2	25	16.25	(35.0)
Government veterinary hospital	29	69.35	139.1	45	26.47	(41.2)	34	73.50	116.7	75	73.75	(1.7)
Indigenous treatment	—	0.00	—	—	0.00	—	—	0.00	—	—	4.44	—

— Not applicable.
.. Not applicable.
Source: Hiremath, Singh, and Mergos 1997, Table 6.5.1.



6 Economic Impact of the Projects

Caveat #1. As argued earlier, "project," and hence project impact, is here interpreted as relating to the fundamental policy change supported which both largely terminated direct new public sector support for dairy development and launched Operation Flood. Indirect assistance to the dairy industry as a whole through animal health, AI, research, extension, and miscellaneous credit programs continued unabated.

Caveat #2. The impact of the Bank's assistance is evaluated relative to the pre-existing low-growth policies with direct government involvement in milk procurement, pricing, and distribution. The evaluation takes India's highly protectionist self-reliant policy as given.[1] This imposed high costs on consumers as indicated by the high Net Protection Coefficient of about 3 in 1975 (Table 4.6). In the event, this "second best" policy has brought India close to a "first best" result. Currently the industry is subject to only modest effective protection, say about 18 percent, in large part due to rising world prices and a real devaluation of the rupee.

Milk Production

Milk production and Operation Flood milk procurement and sales are shown in Table 6.1 and Figures 6.1[2] and 6.2. These show a change in national milk production from a growth rate of 0.7 percent per annum until 1969[3] and 4.7 percent per annum cumulative since. Though this change occurred prior to the approval of the Bank's first project (March 1974), it can best be attributed to the policy changes accompanying the launching of Operation Flood in 1970. This change in government dairy policy abandoned government schemes that underpaid producers and tried to compensate by providing improved technology and credit, and replaced this policy with a dairy cooperative scheme that was allowed to capture the rents generated by sale of milk powder and butter-oil supplied as food aid.

Had the first dairy credit been approved in 1994, rather than 1974, it might have been recognized as a new-style sector adjustment credit, albeit in support of policies already in process of implementation. The projects being evaluated represent a series of five investment credits predicated upon a major policy change made, "owned," and persisted with by government.

Given the extensive time-lag from policy decision to project approval, one might well ask how Bank projects could be credited with any of the benefits from the policy change. The projects supported the policy change long before they were approved by the Board. This support should be dated from the first time the Bank indicated its willingness to consider appraising the first project (Box 1.1). Not only was this indication of Bank support helpful in endorsing the wisdom of the government's policy change, but it helped validate the EC's and WFP's decision to provide generous amounts of dairy products to India to support Operation Flood. As the credits took shape, they could have become a potent argument against policy reversal had the bureaucratic beneficiaries of the old policy ever been in a position to mount a counterrevolution. Moreover, the Bank projects allowed the government to support the major investments needed for the

TABLE 6.1: MILK: NATIONAL PRODUCTION AND OPERATION FLOOD PROCUREMENT AND SALES

	MILK PRODUCTION *(Million Metric Tons)*	OPERATION FLOOD MILK SALES	OPERATION FLOOD MILK PROCUREMENT	PERCENTAGE
1951	17.41			
1956	19.72			
1961	20.38			
1966	19.37			
1969/70	20.74			
1970/71		0.37	0.14	
1971/72	22.50	0.39	0.41	1.8
1975/76		0.58	0.43	
1977/78	28.40	0.81		
1980/81		1.05	0.96	
1981/82	34.30	1.22		
1985/86	44.00	2.23	2.96	6.7
1988/89		2.65	2.99	
1990/91	54.90	3.02		
1991/92		3.16	3.52	
1992/93		3.16	3.98	
1993/94	60.80	3.23	4.17	6.9
1994/95	63.31[a]	3.52	4.05	6.4
1995/96	66.31[b]			

a. Dairy India 1997, p. 160, "anticipated."
b. Dairy India 1997, p. 160, "target."
Notes:
1. The production estimates are total production and are based on a sample survey. Purchases and sales are from NDDB.
2. For some reason the production survey does not include the amount marketed, so there are no official estimates of total marketings.
3. To some extent this compares different things, since the fat content of milk can vary from say 3.0 percent in a poor Friesian to 12 percent in a good buffalo. A proper accounting would include data on butterfat and solids-not-fat (SNF) produced.
Source: Aneja 1994; NDDB undated; and Gupta 1997, Table 108, and study data.

new policy without the government having to bear the immediate pain of finding all the resources.

Given the policy decision that had been made and the dynamic nature of Operation Flood management, the most likely "counterfactual" if the Bank had failed to support Operation Flood is that one or more other donors would have stepped into the breach. However, without any donor support, it is reasonable to suppose that the expansion involved in Operation Flood would have had to be implemented more slowly. This slower expansion would have forced increased reliance on imported milk powder, urban milk shortages, or significantly higher milk prices. Any of these alternatives would have invited a return to more interventionist and managed (more strictly, *mismanaged*) dairy policy. Such a policy reversal would then have undermined the expansion of the whole dairy industry, which was the real payoff from the policy change.

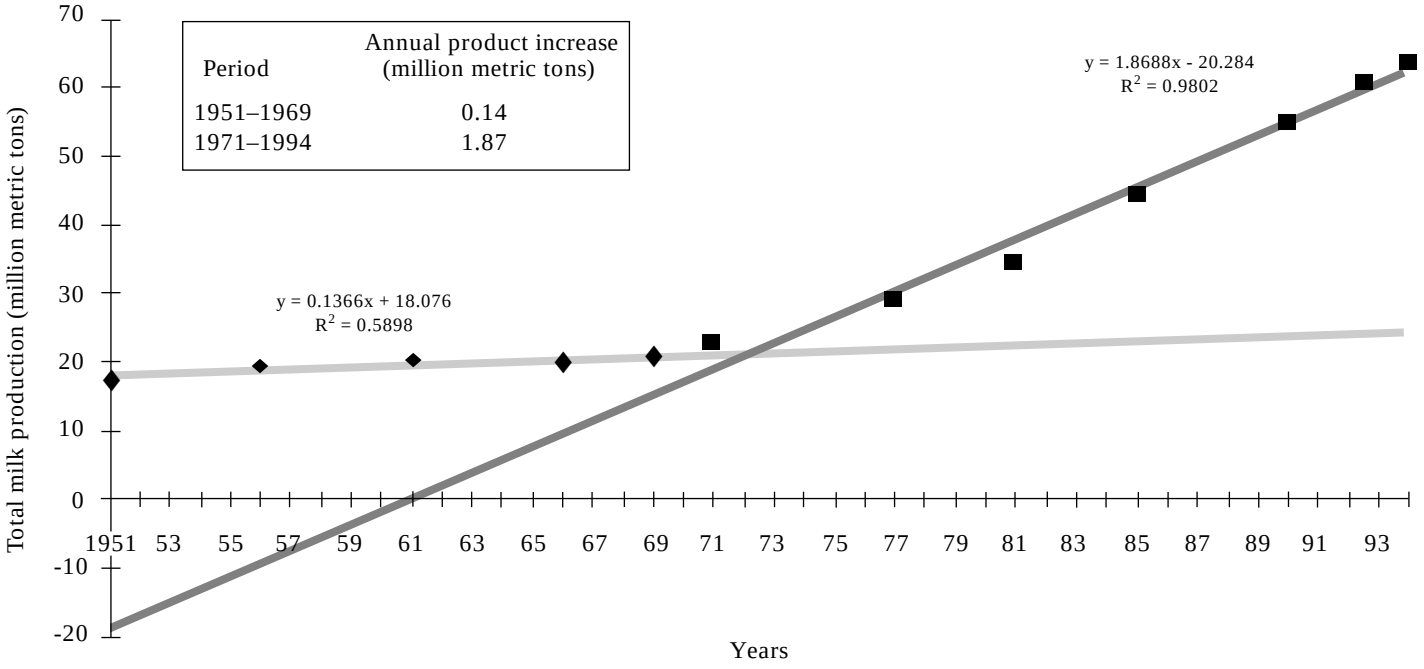
It takes nothing from the achievements of Operation Flood to suggest that *its biggest contribution may have been to ensure that the non-Operation Flood portion of the industry was allowed to grow.* This was excellent policy-based lending—not to achieve a change in policy but rather in support of a policy change that was already being implemented.[4]

Two key policy changes were involved with this series of projects. The first was to stop direct (especially central) government support for intervention to provide low-cost milk by the importation of skim milk powder and butterfat and direct milk collection and processing. This policy change had already been adopted when the first Bank project was approved, and Bank lending can thus be seen as supportive of this changed policy. The second policy change was to get state governments to stop implementing dairy policy through the cooperatives by interfering with pricing or staffing. Table 7.3 shows that progress was made in this direction, but it was incomplete. NDPII was predicated on attaining independence of dairy cooperatives; this goal was not fully achieved.

Supply or Demand Shift?

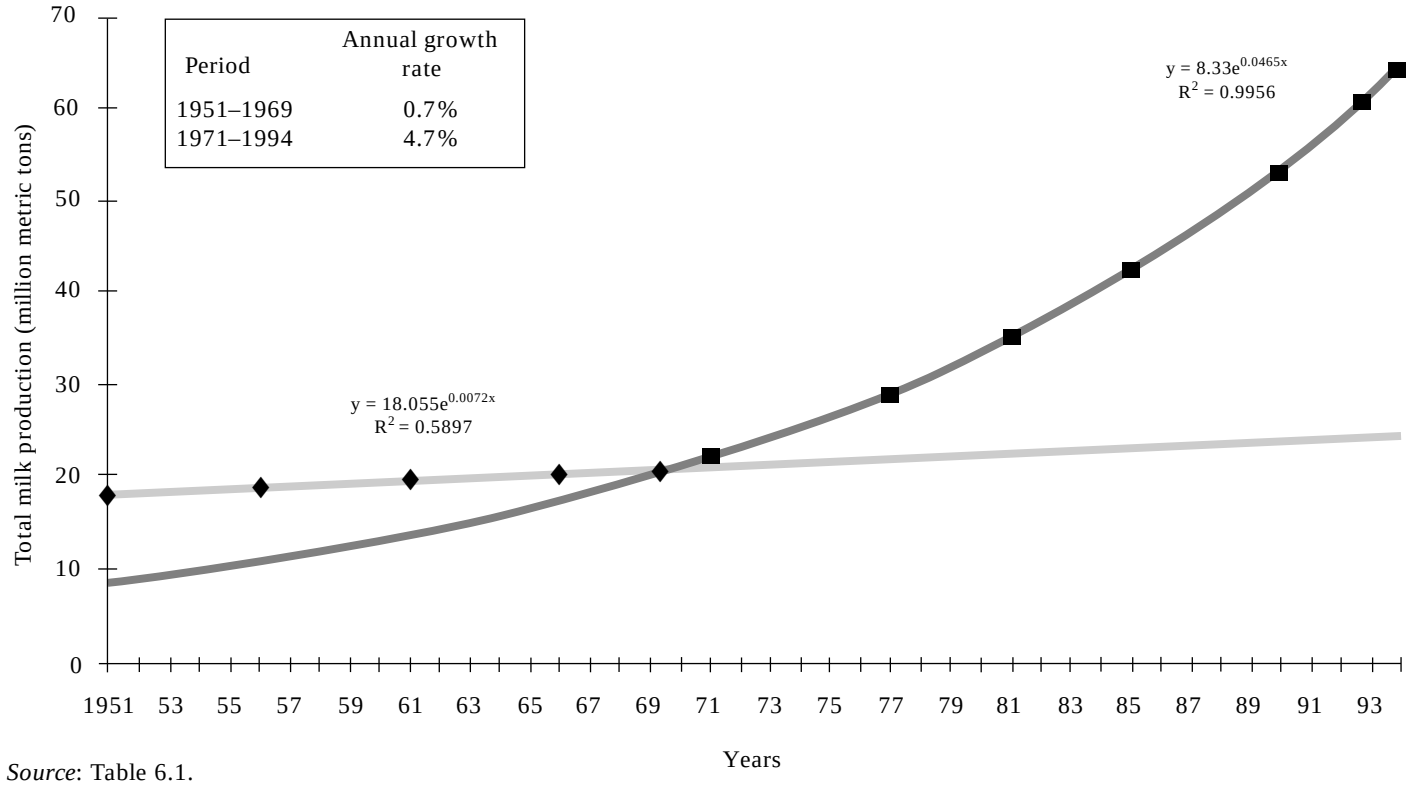
An increase in production (or consumption) over time can be brought about in two ways, either by a movement along the supply (or demand) curve or by a shift in the relevant

FIGURE 6.1: INDIA: MILK PRODUCTION, 1951–94 (LINEAR FIT TO 1951–69, 1971–94 SUBSAMPLES)



Source: Table 6.1.

FIGURE 6.2: INDIA: MILK PRODUCTION, 1951–94 (EXPONENTIAL FIT TO 1951–69, 1971–94 SUBSAMPLES)



Source: Table 6.1.

curve. These have very different developmental implications and are at the core of the attribution of benefits in this impact study. An increase in production due to a shift along the supply curve implies that higher prices are being paid for the product (due to the demand curve having shifted to the right). No technical progress has been achieved and, should prices decline to their former level, then production would also decline to its original value. If this happened, the observed increase in production would be brought at the cost of higher prices and be caused primarily by changes in the economy generally. A (rightwards) shift of the supply function itself, however, represents a willingness by producers to supply a larger quantity at the old price (or the same quantity at a lower price). This is "economic progress" or "development" and represents improved technology, costs reductions, and accumulated investments in production (or just possibly a price decline in alternative products). To the extent that the demand curve has shifted to the right, this represents a stimulus to the dairy industry due to macroeconomic factors such as population growth, higher incomes, and reduced transaction costs in a liberal economy. To the extent that the supply curve has shifted to the right, this represents technical progress and development. It is important in interpreting an observed increase in production to know to what extent it is the result of macroeconomic factors at work in the economy and to what extent it represents development on the supply side.

Over a twenty-five year period, it is to be expected that both demand and supply functions will have shifted. Demand will have shifted under the influence of macroeconomic variables such as population and income increase and lowered transaction costs, while the supply function will have shifted due to changed technology (such as crossbred cows) and accumulated investment in the industry. These variables cannot (or certainly have not) been observed directly. As shown in Table 6.2, the real price of producer milk has fallen from Rs 7.77 per liter in 1975–76 to Rs 5.29 per liter in 1993–94 (both in 1990–91 Rs). Real urban processed milk prices are graphed against total milk production over the life of Operation Flood in Figure 6.3. This clearly shows that the real price of milk has *fallen* even as production has *increased*. This fact argues that the shift in the supply function has been larger than the shift in the demand function. The first and last year's observations from Figure 6.3 have been transposed to Figure 6.4 in order to consider the relative magnitude of the shifts. Point A1 in Figure 6.4 represents 1977–78, and A2 represents 1993–94. The price elasticity of demand for milk in India has been estimated at -1.077 (Dairy India 1997, p. 59). As shown in Figure 6.4, this implies a shift from demand function D1 to D2. This is a shift in quantity demanded from Q1 to Q2. If short-run supply were perfectly inelastic, the shift in supply would be from Q1 to Q2. In the less extreme case where supply elasticity[5] is taken to be 1, represented by supply function S1, the shift in the supply function is from Q1" (the amount which would have been supplied at the lower price in 1993–94 using the original S1 supply timeline) to Q2 (the amount which actually was supplied). In either case, the shift in supply exceeds the shift in demand. Both have shifted—supply more than demand.[6]

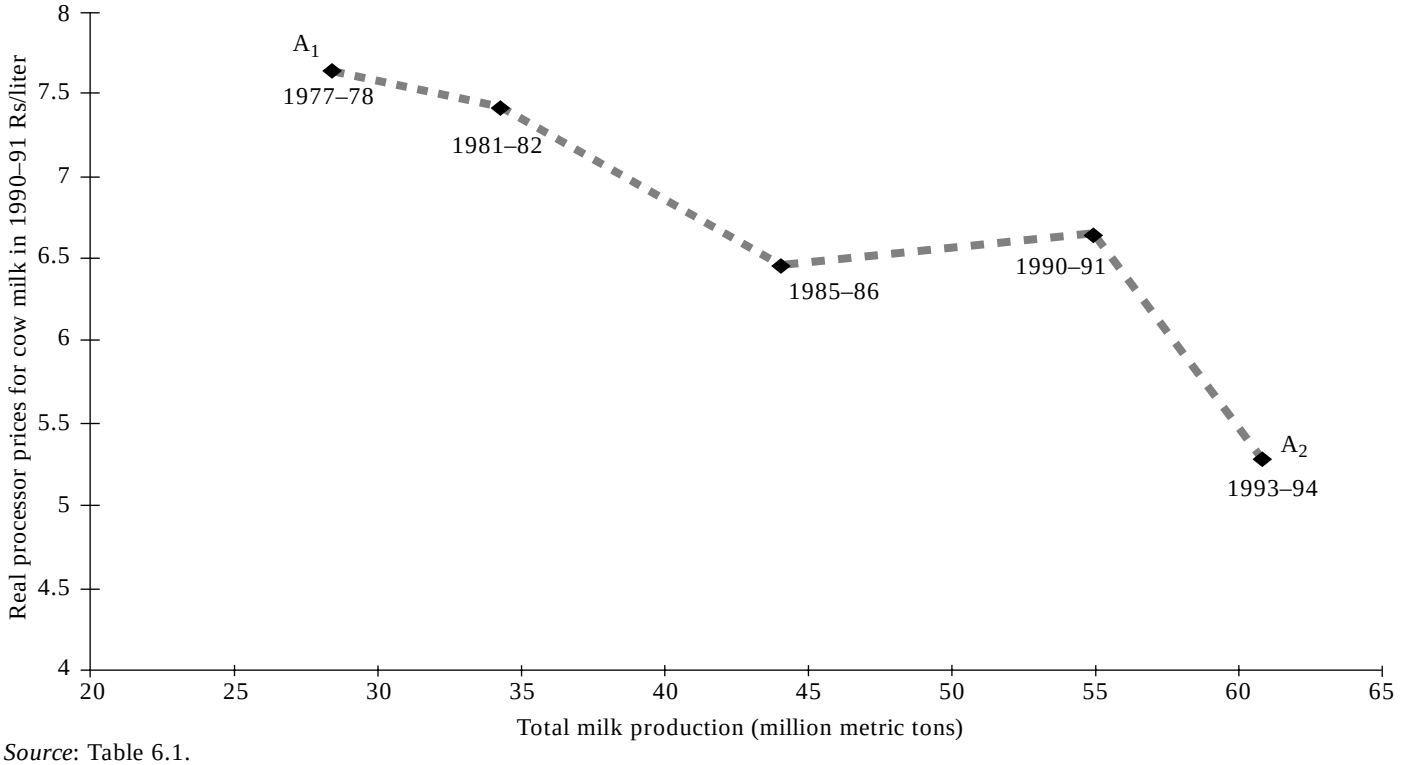
TABLE 6.2: NOMINAL AND REAL PROCESSOR PRICES FOR COW MILK

	NOMINAL PRICE OF COW MILK	GDP DEFLATOR	REAL PRICE[a]
1975–76	2.395	30.8	7.775974
1976–77	2.500	32.7	7.645260
1977–78	2.500	34.2	7.309942
1978–79	2.230	34.8	6.408046
1979–80	2.870	40.2	7.139303
1980–81	3.330	44.9	7.416481
1981–82	3.820	49.5	7.717172
1982–83	4.000	53.1	7.532957
1983–84	4.000	57.7	6.932409
1984–85	4.000	62.0	6.451613
1985–86	5.000	66.6	7.507508
1986–87	5.000	70.9	7.052186
1987–88	5.580	77.0	7.246753
1988–89	6.000	83.2	7.211538
1989–90	6.000	90.1	6.659267
1990–91	6.000	100.0	6.000000
1991–92	6.380	114.5	5.572052
1992–93	8.000	124.9	6.405124
1993–94	8.000	151.2	5.291005

a. 1990–91 Rs.
Source: Gulati and Bhide 1997, Table A5.36.

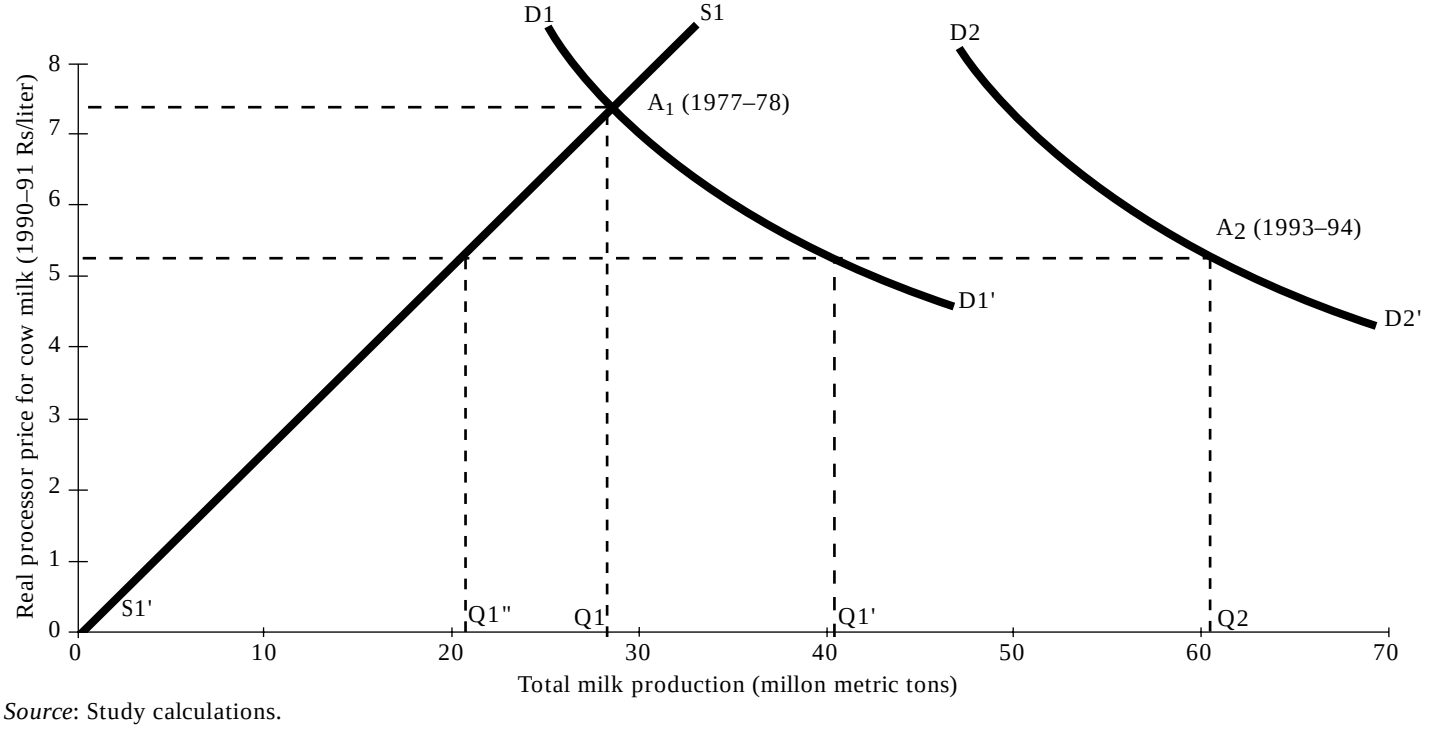
As shown in Figure 6.4, there appear to have been both supply and demand shifts. The annual rate of production increase (i.e., shift of the supply function at constant prices) for Operation Flood (4.7 percent) exceeds that for rice and wheat from the commencement of the green revolution (3.4 percent). For wheat alone, the rate of increase (5.6 percent) has been slightly higher than for milk, while for rice, the rate (2.7 percent) has been significantly lower (see Table 6.3). *Thus, the supply function shift for milk under Operation Flood and associated policy changes*[7] *has been quite comparable (even greater than) the supply shift for the green revolution grains in India.*

FIGURE 6.3: TIME SERIES OF TOTAL MILK PRODUCTION AND REAL PRICE OF MILK (NOTE SHIFT OF ORIGIN)



Source: Table 6.1.

FIGURE 6.4: DEMAND AND SUPPLY SHIFTS (1977–78 AND 1993–94)



Source: Study calculations.

TABLE 6.3: PRICE AND PRODUCTION CHANGES IN WHEAT, RICE, AND MILK

	GROWTH RATE (%)	RATE OF PRICE (%)	FARM GATE VALUE OF PRODUCTION (1991)
Wheat	5.6	(2.3)[a]	Rs 172 billion
Rice	2.7	(1.1)	Rs 356 billion
Milk	4.7	(1.4)	Rs 242 billion

a. Parentheses indicate a decline, i.e., real wheat prices declined at 2.3 percent per annum.

Notes:

1. The growth rates for rice and wheat are calculated for the period 1961–94. The data are from the World Bank database.
2. The growth rate for milk is for the period 1971–94 (see Figure 6.2).
3. The rate of price change for wheat and rice is calculated for the period 1966–91 (for producer price in constant 1990 Rs). The producer price data are from the World Bank database. The GDP deflator for India is from the International Financial Statistics Yearbook (1995).
4. The rate of price change for milk is calculated over the period 1975–96 (for cow milk at processor level in constant 1990 Rs). The data for cow milk are from Gulati and Bhide (1997), Table A5.36. The GDP deflator for India is from the International Financial Statistics Yearbook (1995).
5. The farm gate value of production for milk is calculated using the producer price of milk from Gulati and Bhide (1997), Table 3.1.

Economic Performance

Total Bank investment in the five projects was $500 million nominal, which converts after compounding at 10 percent and allowance for inflation to $1.9 billion in 1996 dollars. By 1996, the higher growth rate associated with the Operation Flood period (especially the associated policy changes) was resulting in an extra 43 million metric tons of milk per annum. Since the start of the faster growth trend, and using a 10 percent rate to compound its value to 1996, the total increment was 1,086 million metric tons. Each ton would require about $310 of imported ingredients if it were to be replaced with recombined milk. If even 0.56 percent of the observed increase in milk production were due to Bank investments, the projects would return an economic rate of return (ERR) of 10 percent; if all investments (from the WFP, EC, and government of India) are taken into account, at most 2 percent of the increased production would need to be attributable to the project to yield an ERR of 10 percent. It seems highly likely that at least these modest increases can be attributed to the projects. Two cost headings not included in these calculations are (i) state reimbursement to state federations and MPUs for losses incurred on the instructions of government or under state-appointed managers and (ii) general assistance to the dairy industry, since these expenses would have been incurred even without a change in policy.

Using a narrower definition of project impact (i.e., direct nonpolicy impact), the PARs for the first four projects and the ICR of the final project provide the estimates of economic benefits listed in Table 6.4.

How Big Was the Bill?

The cost of Operation Flood depends on what items are included. Table 6.5 provides the impact's estimates of these costs. One item which is missing from Table 6.5 is direct assistance from state governments to MPUs and state federations. It has not been possible to obtain estimates of these transfers. Typically they are made to compensate for losses made by MPUs or federations. However, such losses occur in two quite different ways. The first is where a fully independent, farmer-controlled MPU or federation makes losses in the normal course of its business. Government transfers to make up for such losses can clearly be described as "subsidies." A second situation is where the losses are directly due to government-dictated pricing decisions or losses made under government-nominated management or due to government-mandated overstaffing. Government transfers in such circumstances are better described as "reimbursement" to the cooperatives, even though they may (in the case of pricing directives) be subsidies to consumers or producers. Since it has not been possible to derive these costs, it has not been necessary to try to partition them into subsidies and reimbursements.

A further cost which has not been included is the general support that state governments extend to the dairy industry in general through extension, research, animal health, AI, and regulatory services. Again, it was not possible to assemble the necessary cost data. Though provided to both Flood and non-Flood areas, these costs still enter the overall envelope of financial assistance to the dairy industry as a whole.

TABLE 6.4: ESTIMATES OF ECONOMIC BENEFITS OF BANK-ASSISTED PROJECTS

	ESTIMATOR	RESULT
Karnataka (Cr. 482)	ERR	22%
Rajasthan (Cr. 521)	ERR	28%
Madhya Pradesh (Cr. 522)	ERR	small or negative
National Dairy I (Cr. 824)	ERR	17–37%
National Dairy II (Cr. 1859)	ERR	21%

Source: World Bank Reports 1987c, p. 54, and World Bank Reports 1997a, Table 9.

TABLE 6.5: IMPACT ESTIMATES OF COST OF OPERATION FLOOD (1996 US$ BILLION)

ITEM	AMOUNT
Real direct subsidies	
Central government	0.033
State government	0.054
State governments (processing plant transfers)[a]	0.799
Commercial banks	0.006
Farmers	0.001
Food aid (through consolidated revenue)	0.962
Food aid (direct to IDC)	0.184
Total real direct subsidies	2.039
Bank loans and credit	0.694
Total loans and subsidies for Operation Flood	2.733
Other central government dairy expenditures	0.250
Total government assistance to dairy industry[b]	2.983

a. Budget-based figure.
b. Includes food aid and Bank support but is net of some state government assistance.
Source: NDDB, World Bank, and Government of India Budget Documents for various years.

A cost which is included, but is not well-documented, is the value of government dairy plants (and sometimes associated debts) transferred to dairy cooperatives or leased to them without charge or for a peppercorn rent. This has been set at US$0.8 billion in 1996 dollars.

The costs in Table 6.5 refer to the total value of assistance over the period 1971–72 to 1996–97, expressed in 1996 US dollars. It is important to note that for the costs covered, these cost elements cover both capital and recurrent costs. Annual central government expenditures on animal health, for example, have been converted to 1996 US dollars and summed.

The most general level of assistance is total central government assistance to the dairy industry in general, including Operation Flood. Much of this assistance (especially for Operation Flood) was provided from food aid and Bank loans and credits. Most of this assistance flowed through the government's consolidated accounts, appearing first as consolidated revenues and then as consolidated expenditures. The total cost of central government, including transfer of state assets to cooperatives, is estimated to be US$2.98 billion.

Of this, US$250 million was for identifiably non-Flood central government support to the industry in general, leaving US$2.73 billion as the assistance to Operation Flood (strictly assistance to NDDB/IDC and Operation Flood). The sources of this funding are shown in Table 6.5.

This leaves two possible sources of overestimation. First, there is the very shaky estimate of US$0.8 billion for the value of plant transfers. If this is deleted, the estimated expenditure falls to US$1.93 billion (now probably an underestimate).

Another possible source of overestimation is the inclusion of all payments to NDDB/IDC from the central government as costs of Operation Flood. Starting in 1979–80, the consolidated accounts itemize expenditures on NDDB/IDC. How much of this was for Operation Flood? Earlier this break-out was not made. It was felt that some of the payments to NDDB/IDC might be for closely related dairy activities which were highly supportive of Operation Flood. Accordingly, the above estimates have included all central government payments to NDDB/IDC.

Finally, we need to know the number of beneficiaries. Since many farmers have only one or two cows, they will be able to supply milk at some times of year, while not at others. NDDB has provided estimates that 6.3 million members supply milk at some time in the year, but only 3.5 million poured milk in December 1996. Accordingly, costs per beneficiary are also provided on the basis of the 6.3 million members who supplied at some time in the year and the 3.5 million farmers who supplied in December 1996.

These alternative cost and beneficiary estimates have been consolidated in Table 6.6 into a range of estimates of per beneficiary capital costs. Even though some state assistance to the dairy industry is excluded, the first row of Table 6.6 is clearly an overestimate, since total assistance to the dairy industry has been divided by the producers of only 6.3 percent of total production. The second and last rows probably provide good upper and lower bounds on the cost of Operation Flood. Remembering that this covers capital and recurrent costs, the annual cost per member (who pours at some time in the year) for capital and recurrent expenditures is between US$12 and US$17.[8]

TABLE 6.6: ALTERNATIVE ESTIMATES OF CAPITAL COSTS OF OPERATION FLOOD PER BENEFICIARY (IN CONSTANT 1996 US$)

	PER MEMBER[a]	PER POURER[b]
Total assistance to industry	473	851
Assistance to Operation Flood	433	780
Assistance net of plant transfers	306	551

a. 6.3 million members.
b. 3.5 million members who supplied in December 1996.
Source: Study calculations.

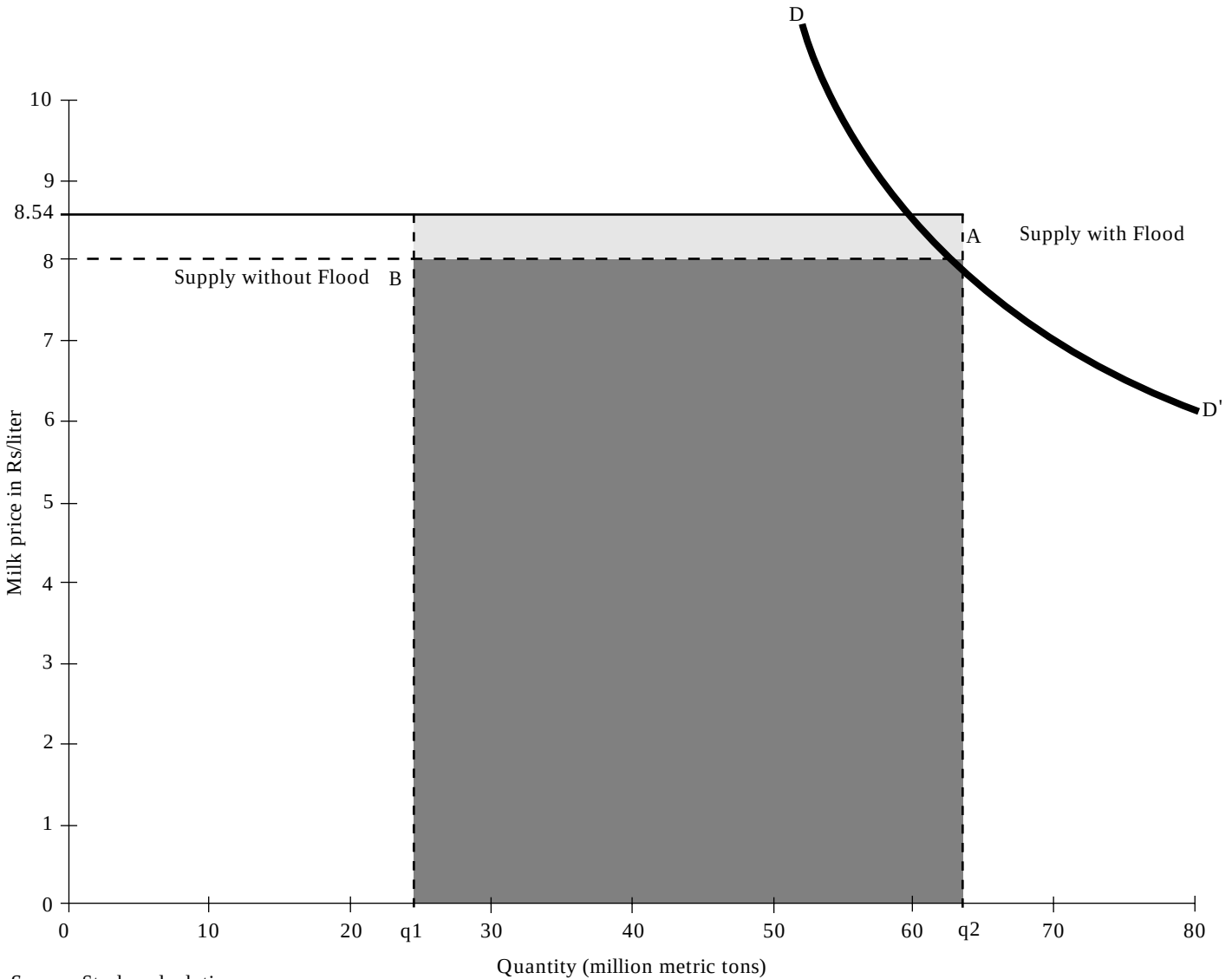
Another way of looking at economic performance is to consider how the same outcome (consumption and price level but not income effects) could have been achieved by alternative means—trade, in this case. To evaluate the free trade option, we need to consider both foreign exchange impacts and the effects on producer and consumer surplus. We turn first to the analysis of these surpluses.

Producer and Consumer Surplus

The following estimates are offered principally for illustrative purposes. However, they do give general orders of magnitude of producer and consumer surplus in 1994–95 arising from Operation Flood and associated policy changes on the *basis of one interpretation of the data*. No pretense is made that this interpretation is unique or even best. The most that is claimed is that it is clear.

The analysis is based on the known urban wholesale price for milk (Rs 8 per liter) and quantity expected to be produced (63.3 million tons per annum) (see Table 6.1) in 1994–95 under Operation Flood (and associated policy changes). Point A in Figure 6.5 thus represents the "with-Flood (and associated policy changes)" scenario.[9] No esti-

FIGURE 6.5: "WITH/WITHOUT" BENEFITS OF OPERATION FLOOD



Source: Study calculations.

mates are available of the long-run supply elasticity of milk in the absence of Operation Flood; hence, we are forced back on the pre-Flood growth rate for milk production which implies that 24.8 million tons of milk would have been produced in 1994–95 (see Figure 6.2). Point B in Figure 6.5 thus represents the "without Flood" milk production.[10]

There is a large gap between the amount of milk produced in the with-Flood case (63.3 million tons per annum) and the amount produced in the without-Flood case (24.8 million tons per annum). We present three without-Flood scenarios:

(i) *Trade.* It is assumed that the shortfall in milk production is met by recombined milk manufactured from imported milk solids. This leaves consumers equally well-off,[11] so there is no change in consumer surplus. The price at which recombined milk based on imported ingredients could have been sold was Rs 8.54 per liter. By selling at Rs 8.00 per liter, the government would have had to provide a subsidy of Rs 0.54 per liter or Rs 20.4 billion per annum (the shaded area in Figure 6.5, or US$699 million in 1996 dollars[12]). We also need to consider producer surplus.[13] If we assume a perfectly inelastic (vertical) short-run supply function, then producer surplus in the with-Flood situation is Rs 496 billion and in the without-Flood situation is Rs 194 billion, a gain for Operation Flood of Rs 302 billion (US$10.4 billion) per annum.[14] These data are assembled in the first line of Table 6.7.

(ii) *Autarky with Perfectly Inelastic Short-run Supply.* An alternative policy regime would have been to ban imports, thus making India self-sufficient in milk (albeit at the cost of substantially higher consumer prices and reduced *per capita* consumption). This situation can be analyzed with the help of Figure 6.6. Point A again corresponds to the actual price and quantity in 1994–95. The Curve DD' is the demand function for milk (with elasticity -1.077 (Dairy India 1997, p. 59)), which passes through A. With perfectly inelastic short-run supply, there is no increase in domestic milk production with higher prices. Thus, the short-run supply curve is a vertical line through B which intersects the demand function at C. The projected urban retail price for this scenario is Rs 18.7 per liter. The shaded area p1CAp2 (Rs 414 billion or US$14.2 billion) is the increase in consumer surplus with-Flood. Producer surplus without-Flood is p1Cq10 (Rs 454 billion) versus the producer surplus with-Flood of p2Aq20 9 (Rs 496 billion). There is thus an increase of Rs 42 billion (US$1.4 billion) in producer surplus in the with-Flood situation. These data are summarized in the second line of Table 6.7.

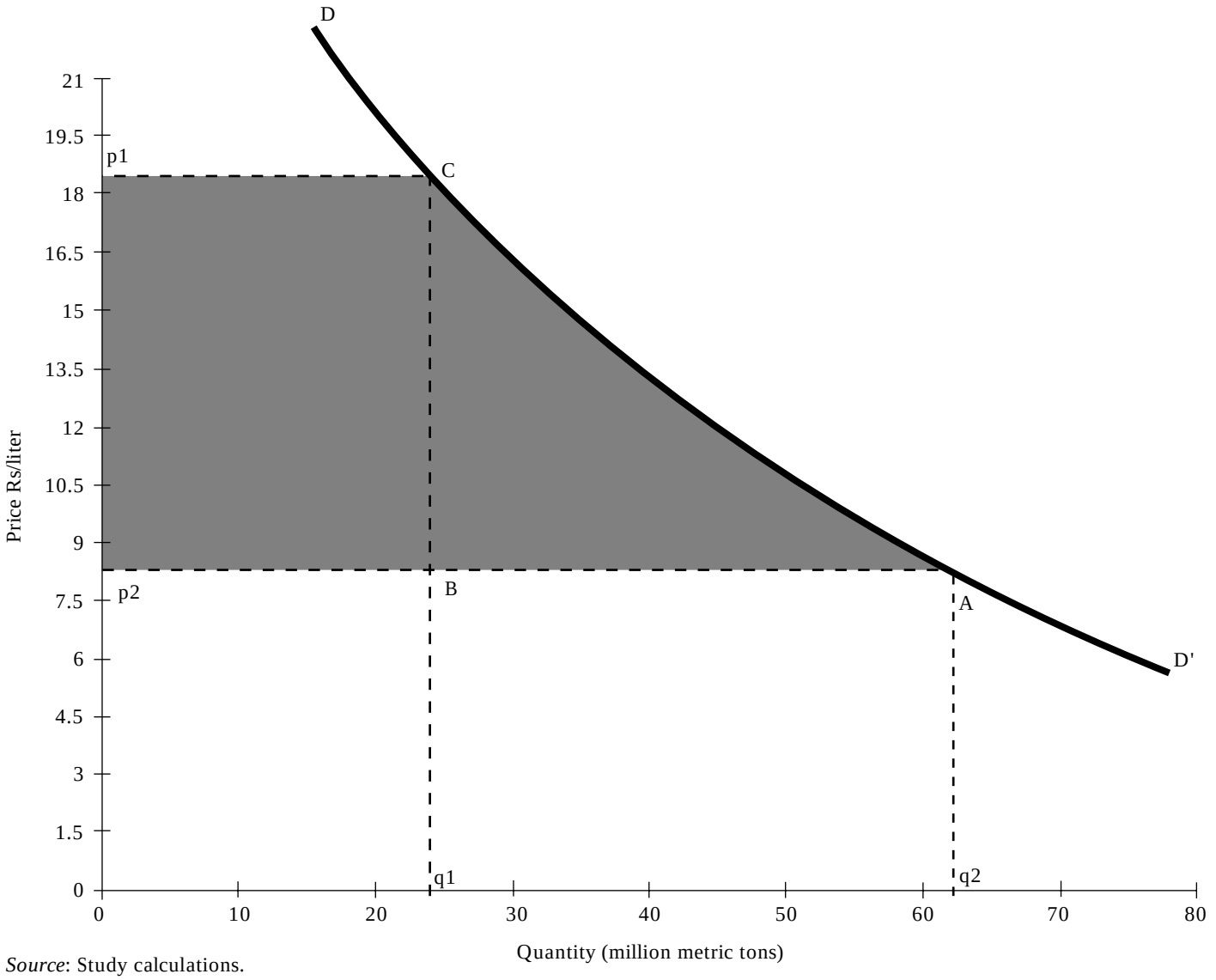
(iii) *Autarky with Unit Elasticity Short-run Supply.* This scenario holds to the assumption of no imports, but assumes that the short-run supply function has unit elasticity (i.e., a straight line passing through the origin). This possibility can be analyzed with the help of Figure 6.7. Point A is again the observed actual price and quantity in 1994–95. DD' is the demand function passing through A. S2S2' is the 1994–95 unit elasticity short-run supply function passing through A and the origin. S1S1' is the short-run (without-Flood) unit elasticity supply function passing through B and the origin. E at the intersection of the supply and demand functions represents production and price under this without-Flood scenario. The increase in consumer surplus as a result of Operation Flood (and associated policy changes) is the area p1EAp2 or Rs 218 billion (US$7.5 billion). Producer surplus without-Flood is the triangular

TABLE 6.7: PRODUCER AND CONSUMER SURPLUS WITH UNIT ELASTICITY SHORT-RUN SUPPLY FUNCTION

	CONSUMERS *(Rs Billion)*	PRODUCERS *(Rs Billion)*	SUBSIDY *(Rs Billion)*	TOTAL *(Rs Billion)*	TOTAL *(US$ Billion)*
Without-Flood and with-trade	0.0	302.0	20.4	322.4	11.0
Autarky with perfectly inelastic short-run supply	414.0	42.0	0.0	456.0	15.6
Autarky with unit elasticity short-run supply	218.0	14.0	0.0	232.0	8.0

a. And associated policy changes.
b. 1994–95 Rs and 1996 dollars.

FIGURE 6.6: CONSUMER SURPLUS WITH PERFECTLY INELASTIC SHORT-RUN SUPPLY FUNCTION



Source: Study calculations.

area p1E0 (Rs 234 billion) and with-Flood is the triangular area p2A0 (Rs 248 billion). The increase in producer surplus with-Flood is thus Rs 14 billion (US$480 million). These results are also summarized in the last line of Table 6.7.[15]

The benefits of Operation Flood (and associated policy changes) as compared to the three alternative policy scenarios discussed are summarized in Table 6.7. Positive numbers represent the benefits from the Operation Flood policy option compared to the three others. Thus, in the left-hand column, there is no change in consumer surplus as between Operation Flood, and a policy which left producer and consumer prices unaffected, but filled the gap between demand and supply by importation of milk solids to make recombined milk. The second row says that if short-run supply was perfectly inelastic, then Operation Flood (which resulted in a rightward shift of the supply function) yielded a consumer benefit of Rs 414 billion as compared to autarky in the face of a completely inelastic short-run supply function. If the short-run supply function

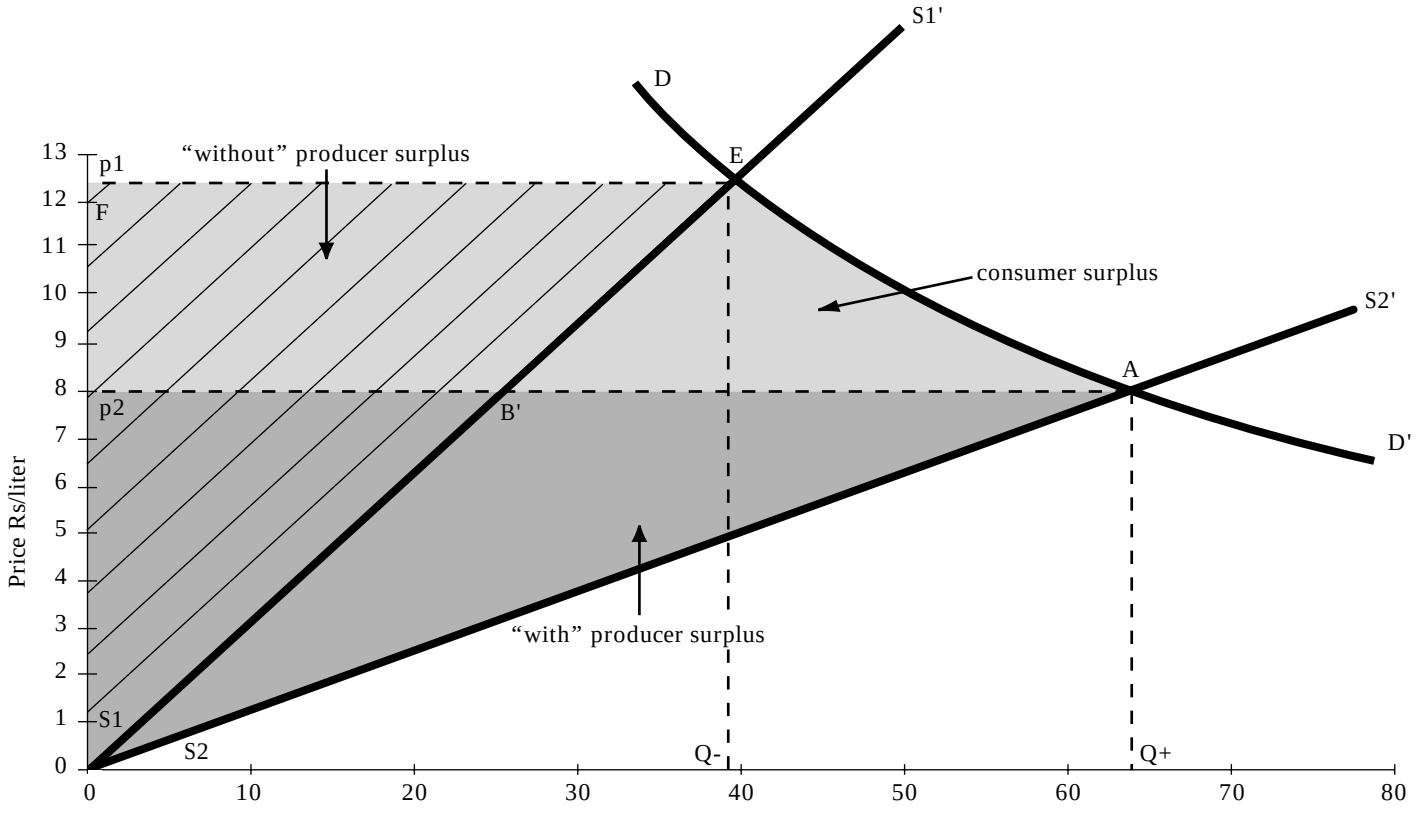
had unit elasticity, then the increased consumer surplus from Operation Flood rather than autarky would drop to Rs 218 billion.

In the import replacement case, the shift of the supply function means that with a perfectly inelastic supply function, Operation Flood has increased producer surplus by Rs 302 billion.[16] Under autarky, there is a modest change in producer surplus, since the higher prices under autarky almost compensate for the larger amount produced with Operation Flood. In addition to producer and consumer surplus, the import replacement policy has implications for subsidies. In order to sell recombined milk at Rs 8 per liter when made from imported milk solids, the government would have had to pay a direct consumer subsidy of Rs 20.4 billion. This direct consumer subsidy was not required under Operation Flood and hence its avoidance counts as a benefit for the Operation Flood option. Totaling the benefits, it appears that Operation Flood yielded large gains as compared to the three alternative policy scenarios examined. Translated into 1996 dollars, the calculated benefits in one year greatly exceed the total cost of Operation Flood (US$2.7 billion) (see Table 6.5). Note, however, that consumer and producer surpluses are somewhat tenuous concepts. Playing it safe, we can say that there is little reason to believe that alternative policy options would have yielded better results for producers and consumers than were achieved under Operation Flood.

Further Examination of the Free Trade Option

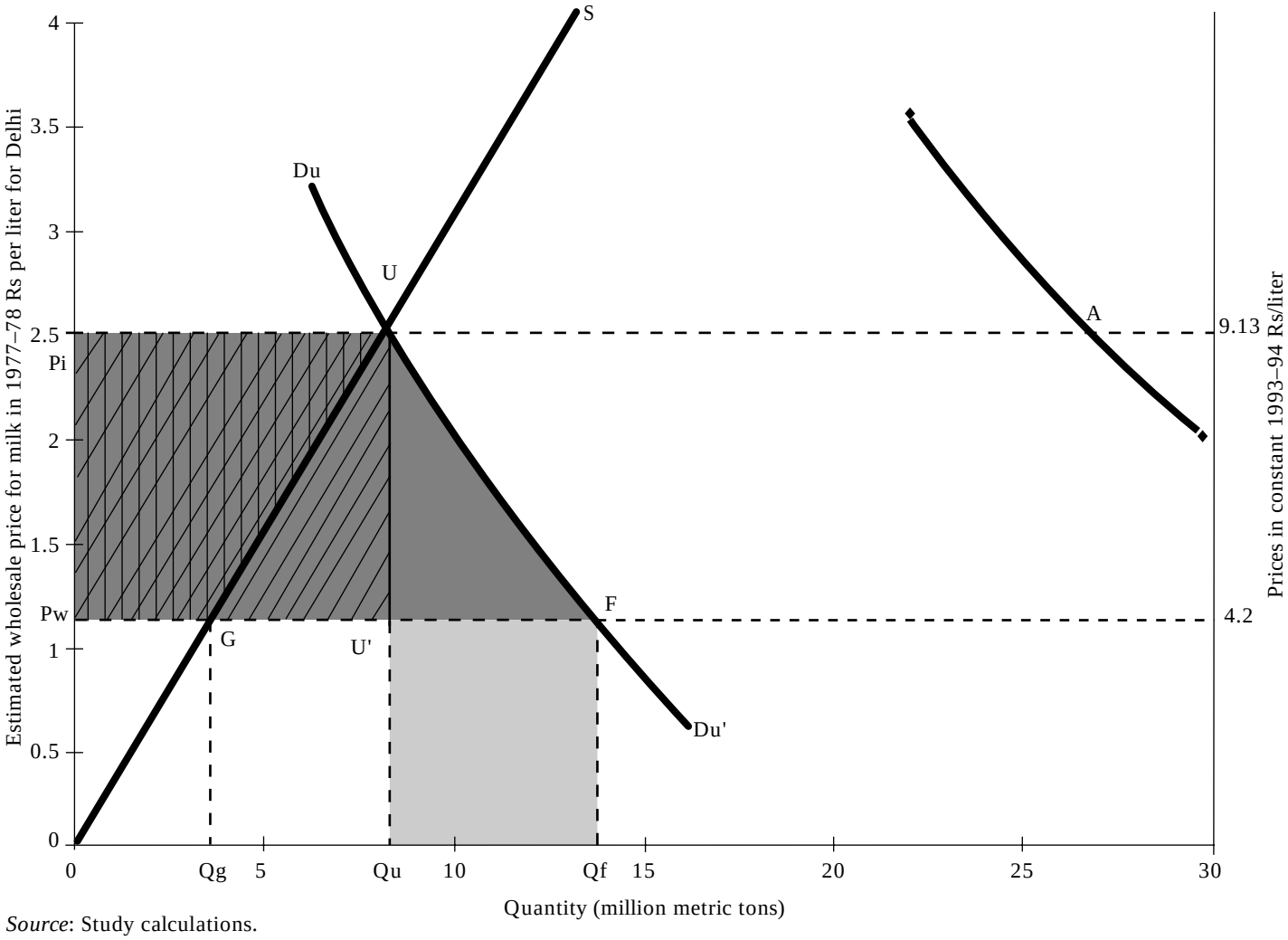
The preceding discussion estimated costs and benefits in 1994–95 when India dairy prices were approaching world levels. At the inception of Operation Flood, India dairy prices were substantially above world prices.[17] It is relevant to compare Operation Flood with what might have happened under an open import policy in the more protected period, at least for urban milk supplies (estimated about one-third of production). Figure 6.8 provides estimates of the situation in 1977–78. Point A is the observed national

FIGURE 6.7: CONSUMER AND PRODUCER SURPLUS WITH UNIT ELASTICITY SHORT-RUN SUPPLY FUNCTION



Source: Study calculations.

FIGURE 6.8: ESTIMATION OF IMPACT OF FREE TRADE IN DAIRY PRODUCTS (1977–78)



Source: Study calculations.

milk production (28.4 million metric tons per year) at an urban wholesale price of Rs 2.50 per liter (in 1977–78 Rs or Rs 9.13 per liter in 1993–94 Rs).[18] Point U then represents the amount of milk supplied to urban centers (8.5 million metric tons per year, 30 percent of production). The demand curve DuDu' passes through point U and reflects the urban milk demand elasticity of -0.535 (Dairy India 1997, p. 58). Pw is then the much lower urban wholesale price (Rs 1.16 per liter in 1977–78 Rs or Rs 4.2 per liter in 1993–94 prices) based on the use of imported milk solids. Under free trade, the wholesale price would be determined by world prices rather than domestic Indian cost structures. Regardless of the supply elasticity, there would have been an increase in consumer surplus corresponding to the dotted area PiUFPw or about Rs 50.0 billion in 1993–94 Rs.

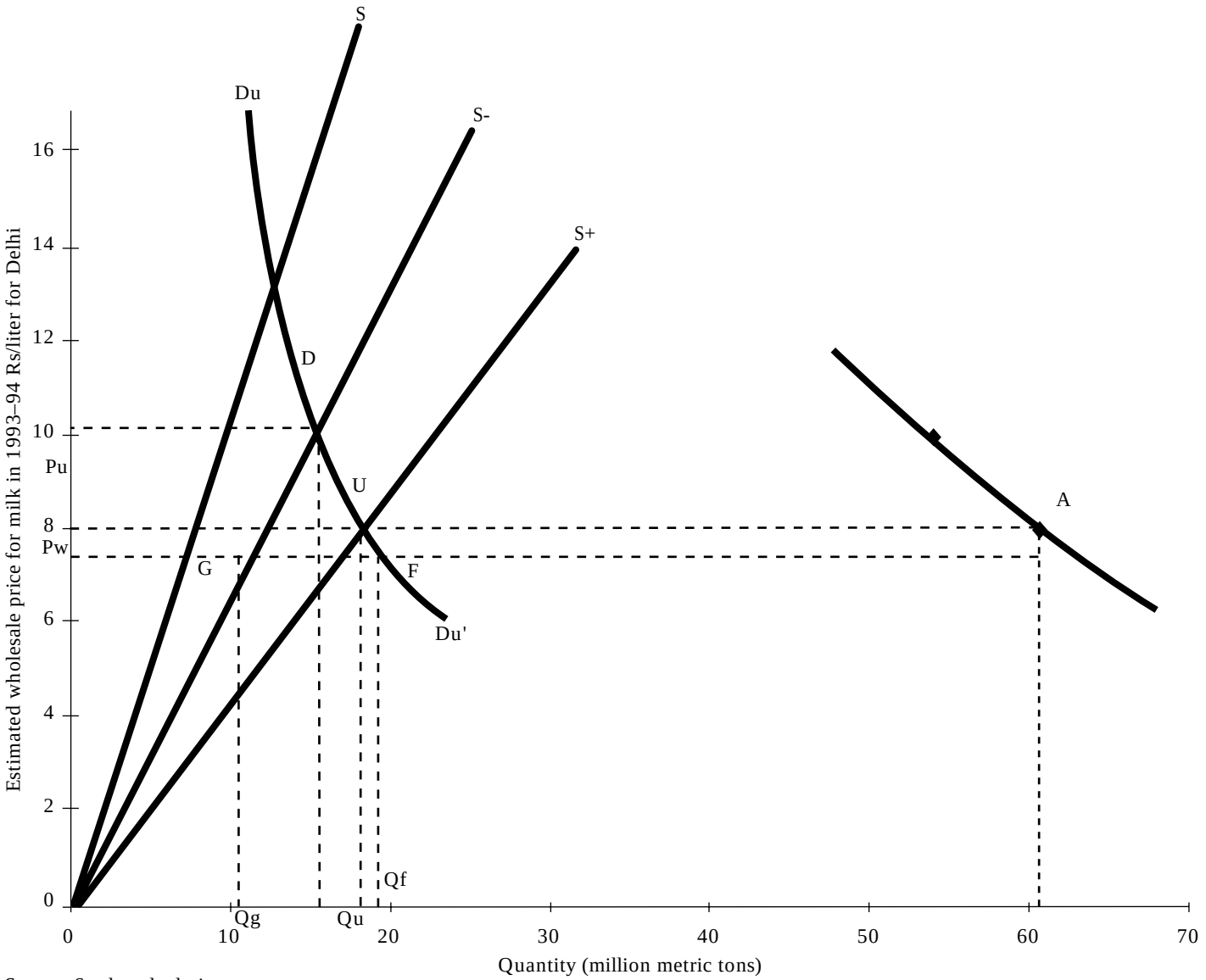
Producer surplus and foreign exchange cost depend on the assumed price elasticity. If we assume a completely inelastic short-run price elasticity, then the supply function is a vertical line through U. Producer surplus with-Flood is the area PiUQu0 or about Rs 76.3 billion. Without-Flood (i.e., with free imports of milk solids to meet urban demand), the wholesale price would be determined by the world price, and the producer surplus would be the area PwU'Qu0 or about Rs 35.1 billion in 1993–94 Rs. Free

trade would thus have reduced producer surplus by Rs 41.2 billion.

Alternatively, if we assume that the short-run supply function had unit elasticity, then in Figure 6.8 it can be represented by the line SUG0. The loss of producer surplus is the area PiUGPw or about Rs 30.4 billion. These data are summarized in Table 6.8 in both 1993–94 Rs and 1996 U.S. dollars.

A similar analysis for 1993–94 is depicted in Figure 6.9. The left axis gives urban wholesale prices in 1993–94 Rs. The observed urban price and total production is again point A. This defines the Indian urban wholesale price Pi (Rs 8.00 per liter) as occurred with Operation Flood (and associated policy changes). Point U is the urban demand at this price (30 percent of total production or 18.2 million metric tons). DuDu' is the urban demand function (elasticity -0.535) which passes through U. Pw (Rs 7.66 per liter) is the urban price of milk based on reconstituted imported ingredients, and F is the price and quantity (Qf or 18.7 million metric tons) for urban consumption which would have occurred under free trade.

FIGURE 6.9: ESTIMATION OF IMPACT OF ALTERNATIVE POLICIES FOR URBAN MILK SUPPLY (1993–94)



Source: Study calculations.

TABLE 6.8: ESTIMATION OF IMPACT OF FREE TRADE IN DAIRY PRODUCTS, 1977–78

	1993–94 *(Rs billion)*	1996 *(US$ billion)*
Costs/Benefits consumer surplus	50.00	1.71
Supply elasticity = 0 producer surplus	(41.2)	(1.41)
Supply elasticity = 1 producer surplus	(30.40)	(1.04)

Supply is more complex. This is because we "know" the with-Flood unit elasticity supply function and the supply function which characterized the pre-Flood situation. However, we have little basis for estimating how much of the supply function shift which occurred with-Flood would have occurred under free trade. For simplicity, we assume that half this shift would have occurred.[19] In Figure 6.9, 0S+ is the with-Flood unit elasticity supply function, 0S is the original (unshifted) supply function and 0S- (halfway between 0S and 0S+) is the assumed shift in the supply function due to technical progress even in the face of the lower prices which would have ruled under free trade. The numerical values of consumer and producer surplus of shifting to free trade are given in Table 6.9 and Table 6.10—the first in 1993–94 Rs and the second in 1996 U.S. dollars.

As is to be expected, Table 6.8 shows that free trade under the highly protected environment of 1977–78 would have resulted in a major transfer of welfare ("surplus") from producers to consumers—the gain to consumers exceeding the loss to producers (both of whom for the most part are poor).

Table 6.8 compared free trade and Operation Flood in 1977–78. The next two tables compare the three policy options considered: continued autarky as practiced prior to Operation Flood, Operation Flood and associated policy changes, and free trade. The first two columns of Table 6.9 and Table 6.10 compare Operation Flood and free trade to the counterfactual of continued autarky. The third compares Operation Flood to free trade. The two tables are identical, except that Table 6.9 is expressed in 1993–94 Rs, and Table 6.10 is in 1996 U.S. dollars. We will focus on Table 6.9—the rupee version.

Using the first two columns of Table 6.9, we can compare Operation Flood and the hypothetical option of free trade to the counterfactual of continued autarky without Operation Flood and associated policy changes. The key feature of the table is that Operation Flood transfers substantial surplus from producers to consumers and that the gain in consumer surplus is from almost two to almost four times as large as the loss of producer surplus, depending on whether the completely inelastic or unit elastic supply assumption is adopted. The right hand column of Table 6.9 compares Operation Flood to the counterfactual of free trade. As compared to free trade, there is a significant (Rs 6.0 billion) loss of consumer surplus but far larger gains in producer surplus. These calculations suggest that Operation Flood as compared to free trade, transferred welfare to producers, and that the gain by producers substantially exceeded the loss by consumers. The basis for this analysis is sufficiently tenuous that it can only be used to underpin a conclusion such as: Although free trade would have benefited consumers in 1977–78, when equal weight is given to producers (most of whom are below the poverty line), there is little evidence on welfare grounds to show that Operation Flood is inferior to free trade as a policy option.

TABLE 6.9: COSTS AND BENEFITS OF ALTERNATIVE POLICIES FOR URBAN MILK SUPPLY, 1993–94 (Rs BILLION)

	OPERATION FLOOD-AUTARKY	FREE TRADE-AUTARKY	OPERATION FLOOD-FREE TRADE
Consumer surplus	37.00	42.96	(5.96)
Supply elasticity = 0 producer surplus	(22.10)	(39.70)	17.60
Supply elasticity = 1 producer surplus	(11.07)	(36.17)	25.10

TABLE 6.10: COSTS AND BENEFITS OF ALTERNATIVE POLICIES FOR URBAN MILK SUPPLY, 1996 (US$ BILLION)

	OPERATION FLOOD-AUTARKY	FREE TRADE-AUTARKY	OPERATION FLOOD-FREE TRADE
Consumer surplus	1.27	1.47	(0.20)
Supply elasticity = 0 producer surplus	(0.75)	(1.36)	0.61
Supply elasticity = 1 producer surplus	(0.37)	(1.23)	0.86



Social and Institutional Impact of the Projects

Industrial Structure

Economic impacts of the size discussed in the last chapter have consequences. The massive physical investment funded by Food Aid receipts and Bank loans resulted in a fundamental change in the structure of the Indian dairy industry. Massive new state-of-the-art, cooperatively-owned dairy factories and transport infrastructure permitted the supply of urban consumers from remote dairy surplus areas and provided a significant competitive challenge to the existing private dairy processing industry. The higher incomes available at the village level had a powerful impact on consumption patterns, and the DCSs provided a significant addition to village social capital. These "noneconomic" or "second order" impacts are discussed in this chapter.

The industrial structure which emerged as a result of Operation Flood involved an organized sector composed of Operation Flood cooperatives, private companies, and "other cooperatives and government schemes," and an informal sector composed of small traders (*dudhiyas*), urban milk producers, and intra-village trade directly from producer to consumer. Both the small traders and urban milk producers sell directly to urban consumers without pasteurization or other factory treatment.

Although Operation Flood cooperatives comprise the largest single dairy organization, it is engaged in active competition with small traders in peri-urban villages and with some private companies in urban milk sales. Relative milk procurement is given in Table 7.1.

Until the New Economic Policy (NEP) was announced in the 1992–93 budget, competition within the dairy industry was controlled in two ways. First, NDDB had a monopoly on the importation of dairy products. Second, construction of new processing capacity was subject to industrial licensing. Repeal of industrial licensing under the NEP resulted in a boom in investment in new processing capacity, since this was obviously a growth industry. This investment also enjoyed a large number of incentive payments and tax holidays as described in Box 7.1. The well-known case for the economic efficiency of private investment and competition rests on the assumption of an absence of significant subsidies and taxes. Clearly, this condition is not currently met in the Indian dairy sector. As a result of the NEP (liberalization accompanied by subsidies), significant excess processing capacity has been created. Thus, prior to liberalization, the Operation Flood cooperatives had about 58 percent of the processing capacity in the Punjab, the balance being in the rest of the organized sector.

Since liberalization, the supply of milk to the organized sector is expected to rise by 0.56 million l/day. The Operation Flood cooperatives have raised their processing capacity by 0.28 million l/day (roughly in line with a 50 to 60 percent market share). The balance of the organized sector has raised installed capacity by 1.1 million l/day and applied for a capacity expansion of 2.71 million l/day.[1] Thus, the relatively orderly, low-cost, and competitive expansion of the dairy industry which characterized the Operation Flood period has been succeeded by a rapid and excessive expansion of processing capacity under the NEP, driven by subsidies far in excess of anything offered in the Flood period.

TABLE 7.1: NATIONAL MILK PROCUREMENT BY OPERATION FLOOD, OTHER ORGANIZED AND INFORMAL SECTORS (MMT AND PERCENT)

	1961	1972	1980/81	1988/89	1992/93	1994/95	1995/96	1996/97
1. Total production of milk MMT	20.40	23.00	31.60	53.70	59.00	64.10	66.10	70.10
2. Organized sector	0.80	1.30	3.10	5.80	n.a.	6.40	n.a.	n.a.
	3.68%	5.55%	9.93%	10.88%	n.a.	10.10%	n.a.	n.a.
3. Operation Flood cooperatives	n.a.	0.24	1.01	3.58	3.85	3.75	4.00	4.40[a]
		1.03%	3.21%	6.67%	6.53%	5.85%	6.05%	6.28%[a]
4. Non-Flood organized sector		1.04	2.12	2.46		2.63		
		4.52%	6.72%	4.20%		4.16%		
5. Handled by Operation Flood cooperatives as percentage of organized sector		18.56%	32.33%	61.33%		58.77%		
6. Handled by the informal sector	19.65	21.72	28.46	47.87		56.72		
	96.30%	94.44%	90.07%	89.12%		89.88%		

a. Provisional.
Notes:
1. Data for rows 1, 2, and 3 are from Shah and others, undated draft, Table 3.1.
2. Rows 4, 5, and 6 have been calculated from the data in rows 1, 2, and 3.
3. Data for rows 1, 2, and 3 for the years 1994–95 to 1996–97 are supplied by the NDDB, Anand.

A Milk and Milk Products Order (MMPO) was introduced eight months after the 1992–93 budget to dampen the "irrational exuberance" of private sector dairy processing investors. This again requires licensing of large plants (over 50,000 l/day) but has not been very effective.

Most private processors rely on contractors and informal traders to procure milk from farmers, only taking possession of the milk at the factory receiving dock. They thus have no direct contact with producers and no control over the treatment of milk before it reaches the factory (Box 4.1) or the prices paid to farmers. Milk is, of course, tested on receipt.

Farmer Incomes

We have already seen that milk production has grown at over 4 percent annually since the inception of Operation Flood. In constant (1995) Rs, the annual payment by the cooperative system dairy farmers has risen from Rs 2.1 billion in 1972[2] to Rs 34.0 billion in 1995.[3] Village interviews during the evaluation mission brought out two key points. First, dairying is shifting, in a few cases, from a sideline activity to a serious economic enterprise and, in some cases, even becoming the main source of farm income. Second, dairying was particularly valued because of the reliability and regularity of payments. In many families, dairying is relied upon to pay recurrent household expenditures, leaving the crop income to finance investments and major social events. A cost of production study carried out by the Punjab Agricultural University in two milksheds in the Punjab (Gill and others 1995) reported an average gross revenue of 9.30 Rs/l in 1994–95, with a gross margin of 3.61 Rs/l and a net return of 3.06 Rs/l, or 33 percent. The study correctly included imputed costs of labor, capital, and land. Rates of return and payback periods were correspondingly high (45 percent) and low (2.5 years), respectively.

This high return to dairying is in part borne out by reports that milk vendors continue to be able to purchase milk from some non-DCS villages at discounts of as much as 30 percent off the cooperative price.

Credit

The impact of a DCS on credit arrangements in a village is very complex. In the first place, neither a DCS nor an MPU will extend credit officially. However, some DCS secretaries may informally provide advance payments, though this is discouraged because of the possibility of embezzlement or discrimination in favor of an elite. Some MPUs visited have acted as brokers, putting DCSs or individuals in touch with private banks or official credit schemes.

Membership in a DCS often improves a person's creditworthiness with retailers and others (Table 3.9). However,

BOX 7.1: A LEVEL PLAYING FIELD?

India is a very diverse, federal republic, meaning that much industrial policy is constitutionally determined by the state governments. Both before and after the NEP, the most rapid growth of private sector dairying has been in the Punjab. Even before the NEP, one multinational had a plant with 0.8 million l/day processing capacity, compared to a total cooperative capacity in the state of 1.5 million l/day.

Since the NEP, the private sector has added about 1.1 million l/day nominal capacity. It is nominal since reporting requirements are lax, and investors have an incentive to overstate intended processing capacity in order to attract larger state equity investments.

Incentives available to attract new industrial investment (including private corporate[a] dairy processing) in the Punjab include:

- A 49 percent state equity in large companies as a joint venture, thus halving the capital an investor must put up. State equity is contributed in cash, whereas the entrepreneur's contribution can include assets and good will, possibly valued quite arbitrarily.
- Reduction for seven years of 8.8 percent state sales tax to 4.4 percent.
- Exemption from a 20 percent surcharge on power consumption.
- An income tax holiday for seven years.

In addition, any milk described as originating from outside the state is exempt from a 4 percent tax on milk for processing. Since the cooperative system is organized on an intra-state basis, this results in a *de facto* concession to the private sector.[b] The sales tax concession alone far exceeds a reasonable profit margin for milk processing.

Forced to register under the Registrar of Cooperatives, cooperatives have to operate in a much more paternalistic and interference-prone environment than companies that answer to the Registrar of Companies.

Though perhaps partially self-imposed, cooperatives relate their salary scales to those within the public service. Managerial and professional staffs can typically at least double their salaries on joining a private company.[c]

It is possible to argue about the level of assistance provided to the cooperative sector in the past,[d] but today, the "playing field," in Punjab at least, is heavily tilted in favor of the private corporate sector, which can only lead to serious misallocation of resources.

In the milkshed for the Ropar District Cooperative Milk Producers' Union, 0.9 million l/day (nominal) capacity was added by private investors in the eight-month period following the announcement of the NEP and before the introduction of the MMPO. The Ropar MPU has a capacity of 0.1 million l/day. Though the five plants that resulted draw from a wider area than the Ropar MPU, the probability that they could all survive was low *ex ante*, and in fact one has already closed, and others may do so. Capital investment cost is about Rs 1,000 (US$27) per liter. The investment has been about US$25 million, some of it now of little more than scrap value.

a. But not cooperative investment, since this falls under the Registrar of Cooperatives.
b. Similarly, D.M. Attwood and B.S. Baviskar (1987) remark in the context of sugar "…although the [sugar] cooperatives receive some helpful subsidies from the government, much larger subsidies are directed to the private factories at the expense of the more efficient cooperatives."
c. Indeed, the managerial and professional staffs may well prove to be the main beneficiaries of the liberalization in the dairy industry, as cooperatives are forced to go some way toward meeting private sector salary scales for key staff.
d. The activities of the NDDB have been almost entirely self-financed, albeit including substantial profits generated by the sale of concessionally-priced food imports. Bank assistance was advanced in the form of loans, which are being repaid on agreed terms. The government accepted, as it should, the foreign exchange risk of borrowing externally, and inflation has substantially eroded the real cost of the NDDB's debt, as it has for all debtors. It is clear that any debate as to subsidy levels is unlikely to be fruitful, unless it starts with a conceptually clear definition of the subsidy element to be estimated.

the willingness of *dudhiyas* to extend credit quietly, quickly, and in confidence in times of need is highly valued and in part explains their persistence even in villages with DCSs (George 1991, p. 284). The high real rate of interest charged is still preferable to borrowing from a money lender, since future milk income can be used as security.

Women

Women in most Indian villages have a strongly socially-constructed role.[4] They run the household and are employed outside the home only in very poor families where the husband is unable to earn even a minimum survival income.[5] They are traditionally dependent on their husbands for even quite modest and essential expenditures. They play virtually no visible role in village politics or social organizations and are understandably shy. Their household tasks include the care and feeding (and dung utilization) of dairy animals. In a male-dominated DCS, the husband may or may not collect the milk income.[6] Who collects milk money is less important than for what it is used. Provided it is used for current household expenditures, food, and education, the woman's practical needs are met. Empirical data on this point are weak.[7]

The social (and production) impact of women's DCSs (WDCSs) is dramatic. In such DCSs only women members are accepted, the management committees are composed exclusively of women, and the secretary and AI worker can be women. Women thus find themselves empowered, since they are "authorized" to meet collectively outside the home and explicitly make their own decisions. Latent leadership talents emerge, and self-confidence is built and reinforced, even among the followers.

The Bank's study of Gender and Poverty in India (World Bank 1991, para. 4.18–4.31) emphasizes the lead role played by NGOs (notably, the Self-employed Women's Association and Bhagavatula Charitable Trust), in some cases with Ford Foundation support, in establishing WDCSs. Increasingly, WDCSs are being mainstreamed in Operation Flood's expansion. There is, of course, no compulsion for NGO-organized village women's dairy societies to join Operation Flood. For the most part, they have chosen to do so and have been welcomed.

Because dairying is often their primary commercial activity, women, when empowered, prove more adept at the utilization of improved husbandry methods than their husbands. At home all day, they are better able to identify when an animal comes into heat, for instance, and thus to get it to the AI worker in a timely fashion.

When women get the milk income (by far the dominant pattern in a WDCS), it enables them to make most household expenditures without having to ask their husbands for money and even to save small amounts for emergencies. Women report much reduced domestic tension from having an independent, if modest, income.

Discussion with WDCS members reported some initial opposition from the village men in some cases, but when the women demonstrate their ability to increase production, and a reduced need for income from the husband, opposition changes to support. The man who had recently been ashamed to have his wife be seen taking an active role outside the house switched almost unconsciously to taking pride in her leadership qualities as demonstrated within the WDCS. As for the women, they are excited by their achievements.

Visits to the dairy factory and feed plant and interstate travel to Anand (for WDCS chairwomen) get women out of the village as a group and widen their horizons. And the thorough understanding of the cow's reproductive cycle, which is part and parcel of the effective use of AI, provides a compulsory tutorial on the possibilities for family planning.

No doubt Operation Flood will be criticized by some for not promoting a "gender-neutral" approach to cooperative development.[8] As their name suggests, WDCSs do imply a gender-differentiated role for women. Because it provides social endorsement for women to meet outside the home, to develop leadership skills, and to take business responsibility, it changes significantly the socially-constructed pattern by which women expect to live their lives. It is a vastly improved pattern, and that should be enough.

Nominally gender-neutral, the original project design resulted in male-dominated management committees for the DCSs and male articulation of needs to the MPU and Operation Flood. The dominant productive role of women was not reflected in the management of the DCS, nor was technical information extended to them directly. The Cooperative Development program, especially in the context of WDCS, has increasingly emphasized the role of women and has organized visits to the dairy factory and encouraged opportunities to discuss the rights and responsibilities of (women) members as well as AI, animal feeding, and improved husbandry. With something like 6,000 WDCSs (and more to come) or approximately 300,000 active members of WDCSs, *Operation Flood provides an example of large-scale program redesign to address gender issues.*

Employment Generation

One of Operation Flood's key impacts was to allow women to give up coolie (laboring) work outside the home. In

addition to releasing children to go to school, this also translated into "employment creation." With 3.5 million pourers, it is reasonable to assume that 5 percent represented women who were able to stay home rather than go out to work. This withdrawal of women from the labor force will have opened up an additional 175,000 laboring jobs (admittedly ill-paid jobs), predominantly for the very poor. *Operation Flood has been a major employment-generating project.*

Improved Technology

Operation Flood has been assiduous in promoting improved technologies, including AI; crossbred cows; vaccinations; improved feeds and forage seeds; urea treatment of straw, fan and sprinkler cooling of cows in summer; and biogas plants.[9] In particular, the program has provided training to villagers in AI, elementary animal health, and first aid. Far more animals are inseminated, at higher conception rates, by these Operation Flood technicians than by the professional veterinarians stationed at government expense at AI centers, even when the density of the government system reaches as high as one center to six villages. The changes promoted by Operation Flood have been widely adopted by other farmers and villages. Anecdotal information suggests that maximum yield per animal is rising quite fast, but none of the available statistics is in a form that allows for checking yields within the cooperative system. And indeed, village level time-series data only hint at the trend in procurement per farmer that might have been expected to follow from the higher yields reported in interviews.

Adulteration of Milk

This is a long-standing problem in India, as it is elsewhere in the developing world. As incomes increase, consumers can be expected to become more discriminating, and hygiene regulations are likely to be enforced more strictly. In their 1986–87 study, Kaur and Gill (undated) make the throwaway comment that "the share of creamery in the consumer's rupee was 15.18 percent which was apparently low but they earned more by way of adulterating milk." In a 1993 study, Gill and Kaur report that 70 percent of the 90 consumers interviewed mentioned problems with adulterated milk, while 68.8 percent mentioned unhygienic milk and problems of taste. Middlemen (*dudhiyas*) in 32 percent of cases mentioned problems with adulteration of milk by farmers. However, the *dudhiyas*' most frequent complaint was that they were "harassed by the staff of the Health Department who took bribes by threat of taking milk samples" (Gill and Kaur 1993). Box 4.1 describes one unhygienic noncooperative milk-cooling center; Box 4.2 documents problems with "artificial milk," and Table 7.2 reports that 16 percent of the milk samples drawn by the Health Department in the Punjab showed adulteration[10] in 1994 and 24 percent in 1995. *More significant is the very small number of samples taken*. In 1994, the number was less than 600, and in 1995 it will be less than 500 if the few non-reporting villages are sampled at the same rate as in

TABLE 7.2: PUNJAB: MILK SAMPLES DRAWN AND FOUND ADULTERATED

	1994			1995		
	DRAWN	ADULTERATED	PERCENTAGE	DRAWN	ADULTERATED	PERCENTAGE
Jalandhar	10	3	30	17	3	18
Hoshiarpur	16	1	6	51	20	31
Gurdaspur	16	11	69	n.a.	n.a.	n.a.
Amritsar	17	3	18	60	31	52
Ferozepur	47	7	15	24	6	25
Faridkot	100	2	2	12	1	8
Bathinda	64	9	14	61	10	16
Sangrur	79	15	19	n.a.	n.a.	n.a.
Patiala	51	0	0	27	10	37
Ropar	43	23	3	36	9	25
Ludhiana	52	6	12	n.a.	n.a.	n.a.
Kapurthala	33	10	30	9	3	33
Mansa	28	3	11	n.a.	n.a.	n.a.
Artihgarhsahib	9	0	0	n.a.	n.a.	n.a.

Notes:
None of the samples drawn from the cooperative sector was found to be adulterated.
n.a. = District data not yet reported for 1995.
Source: Punjab Ministry of Health, Study Data.

1994. Two large DCSs (of the 5,100 DCSs in the Punjab) would take this many samples in a single day. The conclusion from Table 7.2 is that in the last two years little has been done to prevent adulteration of milk in the Punjab, and the same conclusion may apply to other states. As reported in Box 4.2, when consumers in Delhi became dissatisfied with the quality of the milk on offer, they turned to an NGO (FRAC) rather than the Health Department. An Indian reviewer has commented that this study's concern with adulteration of milk may be misplaced:

> My experience suggests that consumers generally pay for what they buy. In the Indian context, normally each *dudhiya* supplies not one kind of milk but 3 or 4 kinds. The consumers are aware which kind they are buying—namely they pay a lower price for adulterated milk, still lower for much more adulterated milk, and a fairly high one for 'pure' milk. Also, contamination (which arises because of dilution with impure water) is taken care of in the Indian household by simply boiling the milk.

This relaxed view overlooks the energy cost of having to boil milk and the plight of less well-informed consumers. And where there is chemical adulteration and the milk is used for processing, there may be a low-level but widespread public health hazard, even before identifiable symptoms occur.

Improved hygiene was never an explicit objective of the Bank-supported projects. It never appeared in project conditionality, presumably because the projects confined themselves to supporting Operation Flood where cooperative control of milk from producer to factory stage, together with milk-cooling stations and routine pasteurization of all milk, ensured high standards of hygiene. In principle, the cooperative system has a "double-entry" accounting system for milk solids, whereby the individual producer's milk is tested for SNF and butterfat. This allows estimation of the total SNF and butterfat in each delivery of milk by the DCS, which is independently checked by the MPU. Recently, the problem of artificial milk has reared its head within the cooperative system (Box 4.2), as some transporters have replaced the milk in their bulk tankers with artificial milk prior to delivery at the dairy. This will require much more sophisticated testing of milk receipts by dairies than has been customary in the past.

Most non-cooperative milk processors hold down costs by "out-sourcing" milk procurement. This means that they have no direct control over milk adulteration between the producer and the factory stage. Weak operation of public milk testing services thus affects most adversely the quality of milk processed in the corporate sector.

Education

Education was a high priority in all villages visited. For the poorer villages, milk income meant the difference between going to primary school and not being able to attend. For slightly wealthier villages, it helped children stay in high school or allowed those who would have dropped out to be able to afford to stay in school. In still wealthier villages, where school attendance was universal, some of the earnings of the cooperative had been set aside to help the local schools and, in one case, a local private university.

The field observations are reinforced by the survey results reported in Table 3.9. The survey shows that increased school attendance for girls is the second most frequently mentioned effect of a DCS, and increased school attendance for boys the third. Significantly, the impact on education for girls is listed more frequently. This is confirmed by OED's recent study in Karnataka (Sampark 1997, p. 67):

> Women and Education of Children: Among the landless and marginal farmers, women go for coolie work. The main reason for girls dropping out of school is household chores along with care of siblings. Dairying enables women to stay home and supplement their income. They shoulder the responsibilities, thus enabling their young children (8–15 age group) to attend school.

In some families, several children were in school who would not otherwise have been, and in others children were staying in school. Unfortunately, there are no direct quantitative data on extra school attendance. However, the likely scale of the impact can be gauged by noting that if even one family in three had an extra child in school, with 3.5 million pouring members this would be 1.1 million extra children. Even one family in ten having an extra child

TABLE 7.3: PROGRESS TOWARD ANAND PRINCIPLES

	COMPLIANCE			
	1991[a]		1995[b]	
	States		*SFs*	*MPUs*
	No.	*%*	*%*	*%*
Free to set consumer prices	8	36	80	80
Free to set producer prices	7	32	87	87
Elected boards	14	64	75	87
Autonomy in staff recruitment	—	—	93	76

Notes:
a. By state, from NDDB, April–September 1991, "Progress Report on Operation Flood."
b. Data on MPUs and federations data from Supervision Letter, November 28, 1995.

in school yields 350,000 extra children in school. Including the indirect effect of higher dairy incomes in general, the impact is even bigger. Of course, this extra enrollment does not come free. Extra teachers and extra school rooms have had to be provided, but given the high income elasticity of demand for education in India, *Operation Flood can be seen as a major "demand side" educational project*.

Cooperative as NGO

Cooperatives are included in the Bank's definition of non-goverment organizations (NGOs) as membership NGOs (World Bank 1995, p. 14). As we have seen, the degree of autonomy for the MPUs and state federations is mixed. Significant progress has been made (Table 7.3) towards organizational autonomy and the full Anand cooperative principles.

At the village level, the DCS clearly is farmer-controlled and autonomous. The project thus supports 53,000 NGOs and is probably *the largest program involving membership NGOs in program delivery supported by the Bank*.



8 Recommendations and Lessons

Findings

Operation Flood can be viewed as a twenty-year experiment confirming the Rural Development Vision (World Bank Reports 1997c). It does this in several dimensions.

It demonstrates:

- The role of agriculture in poverty reduction
- The fact that rural development involves more than agricultural production
- The value of national "ownership" in development
- The beneficial effects of higher incomes in relieving the worst aspects of poverty
- The capacity of agriculture to create jobs
- The capacity of agriculture to benefit the poor at low cost
- The importance of a commercial approach to development
- The capacity of single-commodity projects to have multidimensional impacts
- The importance of getting government out of commercial enterprises
- The importance of market failure in agriculture
- The power and problems of participatory organizations
- The importance of policy

But it warns:

- This is not easy, and
- The Bank has difficulty in recognizing success

The Role of Agriculture in Poverty Reduction. We have seen that not all of Operation Flood's procurement represents new production; some of it represents switching from other purchasers or uses to Operation Flood. By the same token, not all the payments made by Operation Flood represent new income to villagers. Nevertheless, the income flows from Operation Flood to villages are now massive. We have already seen that annual payments by the cooperative system to farmers now average about Rs 34.5 billion (or US$1.0 billion per annum). Allowing for both cash costs of milk production (especially cattle feed) and switching, perhaps a quarter of this, say US$250 million per annum, is net increased income. Faster growth of incomes in Operation Flood villages and higher levels of milk production have been identified in village studies.[1]

For milk production as a whole, the switching problem is irrelevant since this is, by definition, extra production. About 10 percent of the increased production is handled by the formal sector, and the rest is either consumed within the village or handled by the informal sector (Table 7.1). This is extra value created, regardless of how it is marketed. Since Operation Flood only handles about 6.3 percent of production, the extra cash flow to villagers from the higher dairy growth rate approximates about US$16 billion per year. Investment in dairy stock and recurrent cash costs are involved in the generation of this gross revenue at the village level, but clearly, cash flows of this magnitude can be expected to generate real poverty alleviation and linked benefits. Studies have shown that as many as 70 percent of suppliers are from the marginal and small farmers, together with some landless, so a large part of these benefits is reaching the very poor.

More than Agricultural Production. As pointed out in the introduction, Operation Flood is only incidentally a production project. Primarily, it is a marketing project. It has also been demonstrated in Zambia that provision of a market may be enough to stimulate production. Theorists, in illustrating the non-agricultural dimension of rural development, are inclined to cite the value of rural road

building in reducing transport costs and, hence, opening villages to the cash economy. What Operation Flood provided was a reliable buyer in the village. In many cases, this demonstrated need for a better road resulted in either road construction by villagers or political agitation to get a road built by the *panchayat*. This raises an interesting question as to whether development is more effectively promoted by supply- or demand-side interventions. Is it better to build a road in the expectation that this will attract trade, or to promote trade in the hope that it will result in the construction of needed infrastructure?

National Ownership. Operation Flood was an Indian project long before the first Bank-supported project was approved by the Board. Operation Flood reflected the political/developmental insight in 1964 of Lal Bahadur Shastri, a farm boy who rose to be Prime Minister. The Bank was most constructive when it simply assisted the program.

Higher Incomes Reduce the Worst Aspects of Poverty. Unfortunately, only anecdotal information is available on the impact of Operation Flood on education (Table 3.9). However, in every one of the approximately 40 villages visited, improved education for children was cited as among the most important impacts of higher dairy income. One of the key reasons very poor women prefer to stay home to look after a cow, rather than go out for wage labor (apart from it being a lot easier), is that this allows a child (usually a daughter) to go to school rather than having to stay home to look after younger siblings. For the very poor, education seems to be nearly as important as being able to buy enough to eat.

Health services are more of a public good than education. Parents know how much education they are able to provide for their children. With health, the issue is the availability of service whether it is used by an individual respondent or not. Accordingly, the health impacts of improved prosperity were less salient than the educational impact. However, a recurrent theme in DCSs visited was that they had used profits from the DCS to support some improvement in the health services available to the village.

This finding poses a major question: Are the "worst symptoms of poverty" best reduced by the provision of "supply-driven," single-purpose health, education, and nutrition projects or by "demand-driven," income-generating projects? The new growth economics would assure us that both demand and supply have their own separate effects (and that there is an interaction term) in determining both the level of education, health, and nutrition enjoyed and the further growth in incomes. However, this generalized advice is not very helpful without quantification. It is probably a fair comment that neither OED nor development researchers, more generally, nor indeed hard-headed field workers[2] engaged in implementing projects can quantify separately supply and demand side effects.

Capacity of Agriculture to Create Jobs. Much of the milk collected by Operation Flood would otherwise have been processed in the village, but some comes from one or more additional cows being kept by farmers (or, more accurately, their wives) or as a result of better husbandry. However, a proportion of the extra production came from women who were enabled to stay home to look after a newly-purchased cow and thus avoid the necessity to go out for work. Each such change opened up a job for someone else needing work. If even 5 percent of producers made this switch (unfortunately, we lack data to properly quantify this point), this would represent the creation of 175,000 jobs.

Benefiting the Poor at Low Cost. Taking the NDDB estimate of 6.3 million direct beneficiaries and the identifiable costs of Operation Flood, Table 6.6 shows that cost per beneficiary over the life of the project was from US$306 (1996 dollars) to US$433. If, however, beneficiaries were taken to include the families of these pourers, the number of beneficiaries would be about 32 million, and the cost per family member would be in the range of US$60 to US$80.

Some of the benefits were undoubtedly enjoyed by larger farmers (still in most cases poor by any absolute standard), but there is strong evidence that the majority of beneficiaries were small and marginal farmers and were from "other backward castes."[3] Since the Bank does not routinely calculate the unit costs of reaching the poor, it is not possible to say whether those costs are low in any comparative sense.

A Commercial Approach. Operation Flood has had a remarkably hard-headed and commercial attitude to the supplying DCSs. If a DCS cannot supply sufficient milk to cover the variable costs of collection, then after appropriate discussion, the MPU withdraws its collection service. Of 72,700 DCSs formed, MPUs were collecting from only 55,000 in June 1996. This is a very substantial attrition, driven by commercial realities. NDDB has also been active in supplying managerial staff, if requested, to MPUs that are in financial difficulties. Three of 173 MPUs have been closed or merged with other MPUs when it became evident that they were not independently financially sustainable.

Multidimensional Impacts. The multidimensional impact of this single-commodity project has been illustrated. These effects include, education, employment, income, and contributions to village-level social amenities.

Thus, although a project may be quite narrow in its interventions, it may still have a wide range of impacts.

Getting Government Out of Commerce. Operation Flood had two major thrusts. The first was to expand the geographical range of villages from which milk could be collected and processed. The second was to provide these services in the context of Anand-pattern cooperatives. As shown in Table 7.3, considerable progress has been made in this regard. Those states which have not yet adopted the Anand pattern have Cooperative Federations with the most severe financial problems.

Market Failure. The dairy industry is particularly vulnerable to market failure which in part explains the prevalence of cooperatives in the dairy industry worldwide.[4] By maximizing the return to producers rather than the suppliers of capital, cooperatives avoid the tendency to market failure in dairy processing.

Participatory Organizations. The DCSs are farmer-controlled, village-level organizations. By and large they have functioned well. However, there have been problems or organizational breakdown caused by caste rivalries within the village, reflecting state-level political conflicts, malfeasance by DCS secretaries (often in apparent complicity with the board of the DCS), and simple incompetence of the secretary. NDDB has supported an aggressive program of Cooperative Development designed to inform members of their rights and responsibilities, to instill a sense of pride and "privilege to serve" in DCS board members, and to train secretaries and milk-testers. Villagers have a great capacity to organize themselves but they need help with this activity.

It is significant that most villages prefer to select, rather than elect, their board members. Obviously, this leaves room for power to be seized by the village elite. However, it also reflects a desire to avoid the divisive effect in the village of electoral campaigns, and a desire to avoid the cost of an election. The process of selection (consensus among DCS members) does not mean that less thought has gone into who will be the board members than would occur with a multi-candidate election.

The Importance of Policy. The study has focused on Operation Flood; however, Operation Flood has grown quickly but not significantly faster than the dairy industry as a whole. The magic of Lal Bahadur Shastri's decision to endorse Operation Flood was that this same policy protected the whole dairy industry from dumped imports of dairy products and arrested the proliferation of government schemes designed to develop the industry. Figure 8.1 illustrates the quite modest share of increased dairy production which was procured by Operation Flood.

This is Not Easy. Four characteristics of Operation Flood warn of some difficulties in going from Vision to Action (let alone Results). The first is that NDDB is a financially-independent parastatal. Second, this was an indigenous program enjoying top-level political support before the Bank indicated its interest. Third, Operation Flood has been very economical in the use of foreign technical assistance, and fourth, this is a project which has been steadily supported for over two decades.

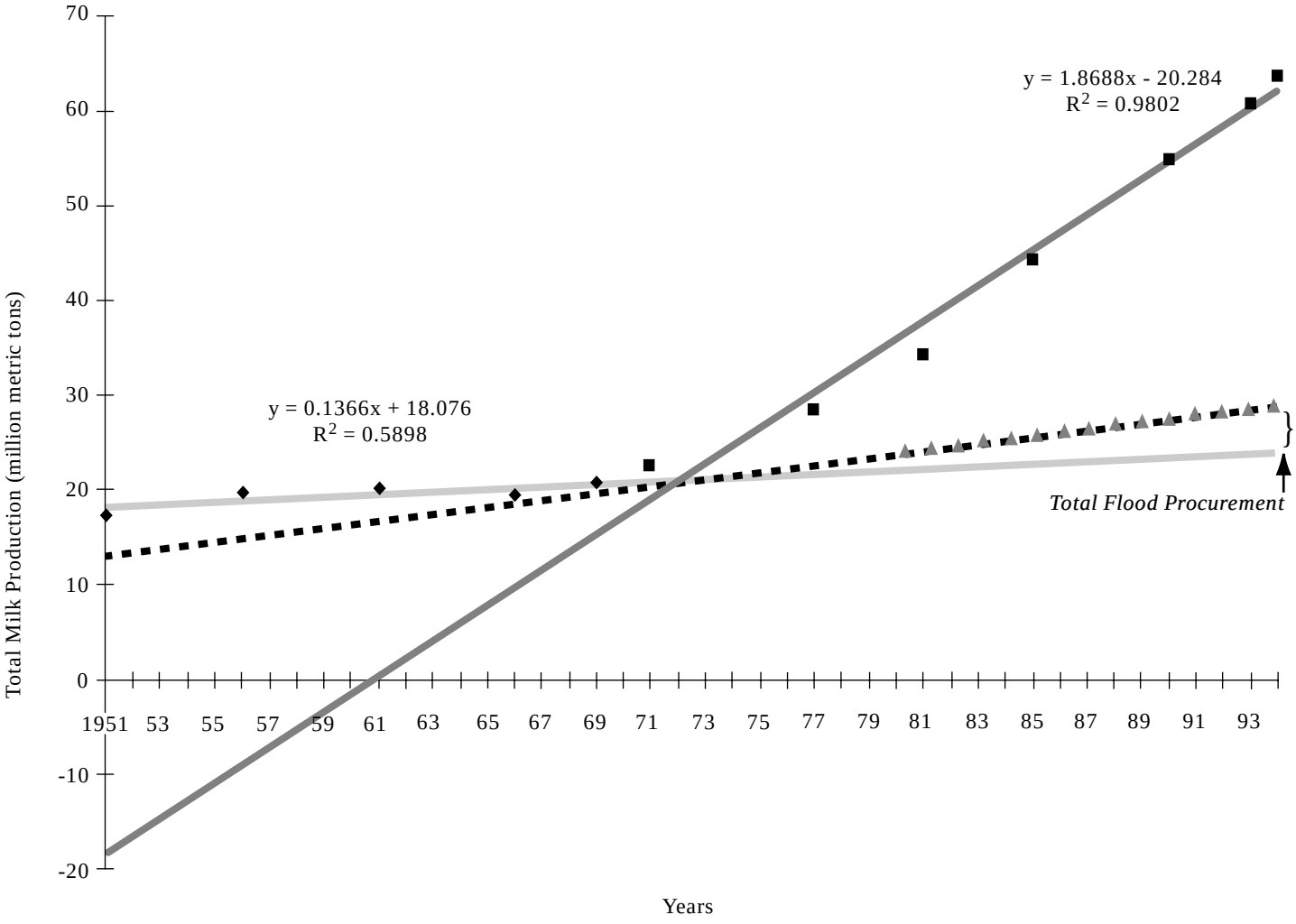
Financial independence, together with an assertive and talented leadership, meant that NDDB could operate on a wide canvas more decisively and independently than normal parastatals. This combination cannot easily be found in the public sector (nor indeed among NGOs which are predominantly small-scale operations).

Such projects require identification by donors of indigenous initiatives which are producing results, albeit perhaps on a small scale. It argues also for being careful not to "drown" such local initiative in excessive resources or excessive technical assistance and for being willing to "grow the project" over a significant time span. It may also argue for more encouragement of south-south transfers of technology and managerial practices.

Recognition of Success. One of the most curious features of the present impact study is the extent to which its findings seem to run counter to current views in the Bank. Thus, in recommending against a further extension of the final project, an internal memo said "the key argument [for no extension beyond December 1995] is the project design is not consistent with GOI and Bank strategy of leveling the playing field for agroindustrial development between cooperatives and the private entrepreneurs, thus putting the project at odds with the recommendations of our macroeconomic work as well as the recent livestock sector review" (World Bank Reports 1997b, box 3.2).[5]

In part, the Bank's new paradigm, enunciated in the livestock sector review, was based on the observation of the restrictions imposed by the MMPO which had been introduced to compensate for NEP's repeal of the Industry Licensing Act. It seems to have been assumed that repeal of MMPO would immediately transform the Indian dairy industry into a "first-best world" of private investment, easy entry, and competition. The use of private resources was expected to guarantee against overinvestment, and easy entry and competition were expected to guarantee that monopoly positions would be quickly eroded. But the present study interprets the MMPO as an attempt to escape a third-best world of heavy state subsidies to the private (but not cooperative) sector for new processing investments,

FIGURE 8.1: INDIA: MILK PRODUCTION, 1951–1994 (LINEAR FIT TO 1951–69, 1971–1994 SUBSAMPLES), AND OPERATION FLOOD MILK PROCUREMENT, 1980–94



Source: Study calculations.

and a moribund public testing and inspection system for ensuring milk quality and hygienic operating conditions which does not protect milk quality in the corporate sector.

The overestimation of project cost (and particularly the central government's contribution of its own resources) seems to have confirmed the view that Operation Flood was primarily a public sector activity and an extremely expensive one at that. Thus the livestock sector review says

An analysis of the 1992–93 expenditures indicates that:

- Activities which could be taken over by the private sector, such as poultry development, cattle breeding and dairying (especially Operation Flood), receive about 60 percent of total agriculture funds. Funding of such activities should be phased-out.

Operation Flood is quoted as having actual government of India expenditures of Rs 805 million in 1992–93 (51 percent of total expenditures on Animal Husbandry and Dairying). This agrees exactly with the *budget estimate figure* for 1992–93 given in Annual Plan 1993–94 for the Department of Animal Husbandry and Dairying (page 28).[6] The Annual Plan document also gives the projected source of these expenditures (Table 8.1).

Since the loan to NDDB represents on-lending from the Bank, and the EEC assistance is a grant, at most Rs 20 million (about US$750,000 at the official exchange rate) of

the Rs 805 million is a direct charge on Indian resources.[7]

As has been brought out earlier, this study concludes that even though Operation Flood is apparently an "old-style" project dedicated to improving the marketing channels for a single commodity through the nexus of increased incomes, the projects have had a strong impact on employment; support of membership NGOs; increased leadership opportunities for women; education, nutrition, and poverty reduction—sometimes in excess of newer-style projects dedicated to just one of these objectives. The study concludes that the impact of the Bank's dairy assistance to India has been large and positive. Yet operations concluded that, even after an extensive review of the livestock sector in India, the project was at odds with Bank strategy. It is unusual for an OED report to find that the Bank has an unrecognized success story.

Recommendations

The Bank's livestock sector review concluded that Bank policy should be to "level the playing field" between the cooperative and companies[8] by (i) eliminating all state intervention in cooperatives, (ii) repealing the MMPO, (iii) establishing a mechanism to monitor the milk market to ensure fair competition, and (iv) strengthening public monitoring and enforcement of hygiene standards. This omits reference to the need to remove tax concessions and other incentives provided to private investors.

Both "ensuring fair competition" and "enforcing hygiene standards" are easier said than done. Effective mechanisms for achieving these desirable objectives would very largely remove the need for the MMPO. As argued earlier, private companies and full Anand-pattern cooperatives can be expected to behave quite differently in a monopsony situation, with cooperatives treating farmers (their owners) more generously than would private companies. Thus, cooperatives should be treated no worse than private companies.

The problem of ineffective enforcement of hygiene standards has already been discussed (Boxes 4.1 and 4.2). The legislative and administrative basis for enforcing hygiene standards is already in place. The problem is the political and bureaucratic will to enforce the Prevention of Food Adulteration Act of 1954. Pending proper enforcement of the Act, retention of the MMPO provides another avenue for enforcement of hygiene standards.

Similarly, pending removal of incentives for dairy plant investment by companies, the retention of the MMPO provides some protection against the waste of public resources from the overexpansion of processing capacity by the private sector (using large amounts of public direct investment and tax concessions).

The policy recommendations that follow from the analysis in this impact study differ slightly in content, and certainly in sequencing, from current Bank proposals:

(i) *Elimination of all state intervention in Operation Flood cooperatives*. Where this involves the transfer of state-owned assets to the cooperatives, the cooperatives could issue bonds to the state to be retired over a suitable period.

(ii) *Elimination of all government incentives for investment in the dairy industry*. In the absence of such a change, and as a distinct second best solution, any incentives should be equally applicable to cooperative or corporate investments.

(iii) *A renewed effort to enforce the provisions of the Prevention of Food Adulteration Act of 1954*. This would include inspection and approval of quality control/milk testing procedures of processors, inspection of processing facilities, and testing of *dudhiya* milk supplies for adulteration. This would require increased state expenditures. However, the sums involved are dwarfed by the savings which would follow from the withdrawal of government incentives (Box 7.1). The livestock sector review has suggested that states could experiment with paying private sector organizations to carry out the inspection and enforcement function.

Pending successful implementation of these three conditions, repeal of the MMPO would be premature. This is an issue of sequencing of reforms. The MMPO provides a (weak) bulwark against overinvestment, substandard equipment, and unhygienic operating conditions.

Continued support for the Indian dairy industry can be justified by the intention to bring about the policies recommended (and perhaps afterwards), depending on whether a tilt towards the cooperatives is considered to be appropriate.

At the very least, *there should be no further lending to the dairy sector in states which have not yet adopted the full Anand-pattern for Operation Flood cooperatives or which do not treat these cooperatives equally with private*

TABLE 8.1: PROJECTED SOURCES OF EXPENDITURES FOR OPERATION FLOOD III, 1992–93 (Rs MILLION)

Loan to NDDB	620
Assistance from EC	165
Funds-in-Trust	20
Total	805

Source: Annual Plan 1993–94, Statement II.2.

corporations.[9] Implementation should be required, *ex-ante*, since NDP and NDPII have shown that formal adoption of the Anand principles is not necessarily followed by their implementation.

Lessons

As has been hinted at earlier, the very success of the expansion of the Indian dairy industry poses in a stark fashion the question of attribution. To what extent was this a reaction to increased demand, itself a function of rising incomes and population increase? To what extent can it be attributed to technology, such as increased straw from the Green Revolution and the adoption of crossbred cattle? How much did the removal of the risk of price declines based on massive imports of milk products affect the willingness of farmers and private processors to invest? What part was played by Operation Flood's demonstration to other investors of the potential viability of well-organized and modern processing of milk collected from a large number of small producers? What role did individual and prescient personalities play? (Neither the visit of the Prime Minister of India nor the visit of the President of the Bank was an entirely unorchestrated event.)

Despite these attribution problems, a first lesson stands out:

Lesson 1: A well-conceived investment project in support of an already adopted and appropriate policy change can produce results out of all proportion to the investment involved. This occurs in part because it solves the "ownership" problem, in part because it avoids having to create an institution at the same time that the new institution is being expected to implement the project, and in part perhaps for a number of reasons not yet well understood.

This lesson intentionally finesses the exact extent of causation involved.

A second lesson concerns the multidimensional impact of the project:

Lesson 2: By raising incomes, an apparently simple single-commodity project can have multiple beneficial effects, including nutrition, education (especially of girls), and job-creation.

This poses a question as to the relative efficiency of production projects that aim to reduce poverty directly, as compared to health, nutrition, and education projects designed to remove poverty indirectly, or area development projects designed to intervene in many ways simultaneously.

Though not explicitly a "targeted" project, yet 60 percent of the beneficiaries were marginal or small farmers and landless.

Lesson 3: By focusing a project on a predominant activity of the poor, "self-selection" is likely to result in a major portion of the beneficiaries being poor.

This provides an alternative to "targeted" projects for reaching the poor.

ENDNOTES

Chapter 1

1. More accurately, "stagnation."

2. That is, a cow or buffalo.

3. Among the key principles of the Anand model were village dairy cooperative societies (DCSs) organized into milk producers unions (MPUs) at the district/regional level, which in turn were members of a statewide dairy cooperative federation. This three-tier structure, which was farmer-owned and employed professional managers, formed a single-purpose dairy cooperative that provided a guaranteed market for milk (paid for in cash at approximately weekly intervals) and provided help with modern inputs such as artificial insemination (AI), veterinary services, and concentrates. Farmer ownership meant that these cooperatives, like other private sector organizations, could go bankrupt, since there were no state guarantees.

4. This failure to get adoption of the full Anand principles underlies much of the academic literature critical of Operation Flood.

5. It has also taken on, or been assigned, a number of other cooperative tasks not directly related to dairying.

6. A number of schemes have tried to give the poor access to Operation Flood by providing milch animals (often on credit). In fact, the more binding constraint for the landless is often a lack of free or cheap fodder, a problem that cannot be remedied by a single capital injection.

7. More precisely, both the village and the MPU have a veto. Both must agree on the desirability of a DCS, since the MPU will collect milk only from a DCS with sufficient volume (or the promise of sufficient volume) to cover the variable costs of milk collection.

8. Originally, there was only one member per family, and only families supplying (or "pouring") milk could be members. Thus, members and "pouring members" were synonymous. Over time, in part to give greater access to women, some DCSs have come to allow two members per family, some members who have ceased to pour have been allowed to retain their membership, and members in DCSs which have closed have not been removed from the books. NDDB estimates that about 68 percent of members (that is, 6.3 million people) supply milk to a DCS at some time during the year.

9. This workshop was dominated by representatives of the cooperative sector. However, the list of invitees included donor organizations, the private sector, and government policymakers. Representation was diverse enough to encompass a wide range of views on the industry and the draft report. The assistance of the Swiss Development Corporation in providing funds for this workshop is gratefully acknowledged.

10. A much less sanguine view has been expressed in the Bank's study of gender in India (World Bank 1991):

> All the constraints to women's access to public programs and commercial transactions with the 'outside' which have been outlined earlier are operative in the dairy sector. The common pattern is for women to handle most of the production aspects and for the men to assume the cooperative membership and control the cash income. There are a number of problems associated with this traditional 'inside/outside' division of labor. Some affect the overall efficiency of dairy production, others affect the welfare returns to the family and to the woman producer herself. Women, for example, do not usually gain access to training in modern livestock management and dairying techniques which is available to men through the coop structure. Instead, they must learn secondhand through the men or continue with traditional practices, both of which lower their efficiency and reduce returns to investments in training. Nonmember producers also miss the chance to be trained in the responsibilities and rights associated with cooperative membership and to benefit from the exposure provided by Farmers Induction Training and other member activities.
>
> For women from poor households the greatest disadvantage is, however, that they have no control over dairy income which is collected by the male household member. In cases where the women used to deal with traditional milk traders who came to the household compound, they lose what small degree of economic autonomy they had when marketing arrangements are formalized through the cooperative structure. The fact that milk payments to cooperative members in many villages are, for efficiency reasons, now made less frequently and, hence, in larger sums, has apparently increased the likelihood that at least some of the money is diverted by the men before essential household expenses are met. In short, for nonmember women producers, Operation Flood has too often meant more dairy work but no increase, and sometimes even a decrease, in their access to dairy income.
>
> See also paras. 4.18–4.22 of the gender study.

Since India is a big and diverse country, both views may be right. The evaluation team met many women in the field who had been greatly advantaged by Operation Flood.

11. The Bank's Social Development Task Force has described social capital "…not just the sum of institutions which underpin society, it is also the glue that holds them together. It is the shared values and rules for social conduct expressed in personal relationships, trusts, and a common sense of 'civic' responsibility that makes society more than a collection of individuals. Without a degree of common identification with forms of governance, cultural norms, and social rules, it is impossible to imagine a functioning society."

The promotion of DCSs, which are male-dominated, is viewed by some as a missed opportunity. They argue that given the dominant role of women in dairy production, the DCSs (and extension services) should have been designed to give women a dominant role. Where they have emerged, WDCSs have vitally changed the role of women within the village and thus added significantly to social capital.

12. Milk can be processed into *ghee* (butter oil), *chenna* (homemade cottage cheese), or *mithai* (traditional sweets). All of these byproducts are highly fuel- and labor- (women's) intensive. These options do not substantially strengthen the farmers' bargaining position.

Chapter 2

1. In later years the prestige of DCS membership, and the desire to allow both husband and wife to belong, has led to a breakdown of this criterion in some DCSs. A survey in Karnataka found, in addition to double (husband and wife) membership, members who did not supply milk to the DCS and some who did not even have milk animals.

2. In the event, the government of India's projected contribution was not needed.

3. By the time the NDP was appraised, the earlier projects had found that channeling funds from the ARC through participating banks to the MPUs was too cumbersome and had replaced the procedure with direct lending from the Indian Dairy Corporation (IDC) to the MPUs (with loans guaranteed by both the federations and the state governments). Originally, the IDC and NDDB were set up as twin institutions with a common chairman and board of directors. The IDC was responsible for the financing of cooperative dairy processing plants and acted as project unit for implementation, including letting tenders and bid evaluation. NDDB was a purely technical organization responsible for plant design, consultancy services, staffing of spearhead teams, and research. Under NDPII, the IDC was folded into NDDB to reduce overheads and streamline project implementation.

4. Thus one investigator reported: "In the Bhopal region…the village farmers have had almost no hand in the planning or implementation of the new dairy scheme. Inquiries in three (sampled) DCS villages…established that the DCSs were organized as follows: some officials from Bhopal came to each village, offering to show a film about the benefits of cooperative dairying and then urged village leaders to sign up members of a DCS. The selection of which villages to include in this process, and when to approach them, was made entirely in the dairy offices in Bhopal. Moreover, the Bhopal Dairy Union (not to mention the Madhya Pradesh Cooperative Dairy Federation) was not formed by a process of unifying leaders and initiatives from among the village DCSs. Instead, it worked the other way around: the DCSs were formed at the behest of the Union and the Federation. Consequently, in the Union's annual reports, members of the Board of Directors, consisting of representatives from the component DCSs, are not even mentioned by name. They are probably irrelevant to the decision making process within the Union.…" (Attwood 1985).

5. The impact estimate includes an allowance for state government assistance and central government assistance to the dairy industry as a whole. If these factors are subtracted, then the impact estimate (for costs included in the Livestock Review) is US$1.87 billion (1996 dollars) versus US$5.06 billion.

Chapter 3

1. Strictly, not "increase" but "difference between Operation Flood and non-Operation Flood villages." There are no "before project" baseline data, so that relative changes cannot be measured. We cannot tell whether the difference should be attributed to Operation Flood or to a sampling error. This applies equally to the Karnataka and Madhya Pradesh studies; the "increase" reported in Karnataka could reflect sampling error.

2. This quote is, of course, merely an assertion, though a very widely believed one. Jaipur dairy now provides a service by which consumers who suspect that water has been added can have milk samples checked (Table 4.3). Though not a random sample, this service has clearly demonstrated that some vendors certainly sell watered milk.

3. "The variable cost includes the actual cost of all purchased inputs and services such as fodder, concentrate feed, animal health care, breeding, hired labor, etc. and the opportunity cost of all non-purchased inputs and services used in milk production" (Singh and Acharya 1986, p. 94).

4. A reviewer has emphasized the "self-reliant" development model being followed at the time. As shown in Table 4.6, effective protection was very high so that, in the absence of these macroeconomic policies, it is likely that imports would have been substantial.

Chapter 4

1. Sixteen state-level federations and nine "apex MPUs" in small states where only one MPU was needed.

2. In fact, only eight new MPUs were formed.

3. Calculated from NDDB data. This is an ambiguous statistic, since farmers who have joined a DCS are often reluctant to drop their membership even if they cease to own a milch animal. Some DCSs allow two members per family, and some even allow membership from families who do not own a milch animal. There are no national statistics on pouring members in earlier years. Case studies provide examples of villages where only half the membership actually pours (Sampark 1997).

4. With many buyers (since it is a short distance to town) as well as many sellers, there is a better chance of a truly competitive market for milk than in remote villages where market failures are to be expected in the absence of a DCS.

5. Though not by any means widespread, abuses that have been identified and corrected (as farmers have better understood the system and their rights) include (i) failure to actually test milk (that is, an arbitrary assignment of fat content by the DCS secretary); (ii) acceptance of milk from a milk trader; (iii) misconduct by the managing committee or chairman, who has been forced to resign; and (iv) refusal of membership on the basis of caste or "politics." By contrast, a DCS chairman who had been on the Cooperative Development Program, responding to a question posed during a group interview, said spontaneously: "The village cooperative has to follow the Anand principles. Firstly, just as we treat all milk the same in the society, we should treat all people the same. Secondly, there should be no politics within the society. The society should be like a Hindu Temple. You take your shoes off before entering and no politics within the Temple."

6. A reviewer has put this caution more strongly: "The data on private sector quality is weak. Data from one state—Punjab (with one table, Table 4.3, subject to self-selection problems)—and one visit to a single milk plant (Box 4.1) are insufficient to draw general conclusions about the whole industry and country. Assertions of knowledgeable observers are not a good substitute. Several references are made throughout the text about unfair trade practice by the private sector. However, no evidence is provided: Instead, this is based solely on references to 'tales,' conclusions made by observers, and Box 4.2 on artificial milk. With thin evidence, one cannot generalize as to the extent of unfair trade practices in the whole dairy industry and country." For readers unfamiliar with the Indian dairy market, the text has cited enough examples to alert them that quality and competition can be problems in India. Those familiar with the industry will be able to make their own judgments.

7. Gulati and Bhide (1997) report SMP quotations in 1993–94 ranging from Rs 36,500 per ton to an inferred price of Rs 71,400 per ton (Annex Table 5.1). This latter estimate involves assuming 910 grams per liter of milk versus the more usually accepted estimate of

1,020 grams per liter. Correcting for this error, the high price drops to Rs 64,600 per ton. In any case, the high price is an inferred price, from consumer milk prices, which may not have adjusted downwards fully to reflect the lower cost of raw materials. The average price used for estimating protection coefficients in 1993–94 was Rs 56,000 per ton. Had the lowest price been used, the protection estimate would have been reduced by about a third.

8. Doornbos and others (1990) identified both input and investment subsidization and expressed the fear that NDDB would be unsustainable if these subsidies ceased. A close reading of this data shows that the input subsidy (farmers being paid more for their milk than was recovered from consumers) is better described as a consumer subsidy and that this was financed by profits from concessional imports of dairy products, not from the central government. In the event, the dairy cooperative system as a whole is currently profitable, though individual MPUs and even federations are still unprofitable where state governments control milk prices or limit the ability of cooperatives to correct overstaffing.

9. It is incorrect to refer to a government payment to an organization with a government-appointed managing director as a subsidy, just as the concept of a cooperative with a government-appointed managing director is a seeming contradiction.

10. Cooperatives can get their accounts audited privately, but this does not exempt them from the requirement to also have their accounts audited by an Auditor General. This option results in a double dose of audit fees. Understandably, it is seldom used. Again, Bihar provides an exception. It has recently been permitted to substitute private auditors for the services of its Auditor General.

11. It is interesting to see how this is described in the literature critical of Operation Flood (OF):

> OF authorities have shown a preference for establishing cooperatives in regions which were far away from the main metropolitan centers thereby avoiding tough price competition with the many small traders near cities.… The infrastructural investment for organizing this type of procurement is, however, sizable, especially when milk has to be marketed in metropolitan cities. (Doornbos and others 1990, p. 117).

The reader is left with an impression of a lack of competitiveness of the cooperative system and excessive investment, as if it would somehow have been better to leave remote villages unserved in order to compete successfully with the small peri-urban traders who are already providing an economic and low-cost service.

12. The extent of the subsidy, if any, is open to debate. It is standard practice worldwide for cooperatives and private milk processors to pay all suppliers to the plant the same amount, regardless of transport costs. In part, this is a matter of simplicity and goodwill; even more importantly, though the marginal transport cost of additional milk collected from remote villages exceeds average transport costs, the marginal processing cost for the additional milk falls below average processing cost, leaving net impact on profitability moot.

13. Strictly, the final payment has to be described as an adjustment to the price of milk paid during the year, since a bonus would need to be paid out of profits which would first have to be declared and taxes paid.

14. India has 170 Milk Producer's Unions and 20 federations. For those not covered in Table 4.5 (58 organizations), either audited accounts were not available (some states require a state or cooperative auditor to do the auditing, often resulting in delays of up to several years), or there was an amalgamation of units.

15. The Implementation Completion Report (ICR) for NDPII, para. 50, puts arrears at 1 percent of NDDB's loan portfolio, but this is presumably a misprint. Total overdue loans (Rs 1,020 million) exceed total overdue on Bank projects (Rs 976.3 million) since some loans were advanced using NDDB's own funds.

16. Rs 7.3 billion committed to subborrowers and 2.8 billion of accrued interest as of March 1995, plus 564 million of capital and interest outstanding under the Working Capital facility in March 1996.

Chapter 5

1. A reviewer has commented that this may be indicative of the Mysore MPU being "one of the better ones," and while the results will be representative for Mysore Union they may be unrepresentative for India as a whole. This comment applies to *all* village studies, since a sample of even 40 villages in one state or milkshed, however carefully selected and however representative of the area being sampled, is bound to be unrepresentative of the 50,000 plus villages with DCSs. However, an evaluation interested in impact is compelled to look for evidence at the village level.

2. The village-level focus of these studies meant that the operations of the MPUs were not studied in detail. Comments thus primarily reflect the "view from the village" and may appear differently at the regional level.

3. Stratified by landless and farm size and to include dairying and non-dairying families and, in DCS villages, dairy producers who poured and did not pour to the DCS.

4. Sampark 1997, Tables VI.B.1 and VI.B.2.

5. The landless in non-DCS villages had no dairy income (and presumably no cows). Actual consumption in DCS villages was 0.8 l/day for landless, 0.9 l/day for marginal farmers, 1.3 l/day for small farmers, and 1.59 l/day for large farmers.

6. Poor leadership in the village and bad choice of secretary.

7. NDDB supports a Cooperative Development Program to improve farmers' understanding of the cooperative system and their rights and responsibilities. This recognizes that tensions within the village can undermine the operations of the DCS. See Attwood 1985, p. 37.

8. To the extent that corporate competition is based upon government equity and tax holidays not available to the cooperative sector, the solution is the withdrawal of this assistance to private companies (Box 7.1).

9. If reduced supply is due to price controls holding prices at levels below what the market could bear, it is not to be welcomed, but is evidence of the need to remove state interference from pricing decisions.

10. A reviewer reports: "Vets in Anand interviewed during a visit said that increased cost recovery reduced emergency calls from farmers for non-emergency matters. Since the visits were practically free, farmers tended to seek more help than necessary since the cost of vet visits was undervalued." The reviewer also criticized the survey reported in Table 5.1 as not adequately answering the question of

whether farmers are better or worse-off. Perhaps a question that should have been asked was: "Do you prefer the present system where you pay for veterinary services directly or the old system where these services were 'subsidized,' but at the cost of receiving less money for every liter of milk?" Unfortunately, we cannot go back and rerun the survey. In fact, both questions are needed. The indications from the questions in Table 5.1 are that farmers would probably be willing to pay *something* to revert to the old system. The reviewer is right to question whether they would be willing to have their milk money docked enough to pay the full cost.

Chapter 6

1. The South Asia Regional Office believes that Operation Flood should have been compared to the "first-best" policy of free trade.

2. Table 6.1 corresponds almost exactly with Figure 2.1 "Measurement of Project Impact," in Mergos and Slade (1987). This figure is used by the authors as the basis for a methodological discussion of the measurement of project impact. As they say: "We assume that there is an underlying upward trend.… We are concerned with the additional change, attributable to the project, over and above the underlying secular trend" (p. 23).

3. Linear regression suggests the change occurred almost simultaneously with project approval. The exponential model suggests 1971, five years after the decision to rely on the cooperative sector for dairy development.

4. The rapid (4.7 percent) growth of milk production has been challenged as "biologically impossible" (Mishra and Sharma 1990). They estimate milk yield would have to increase "7.6 percent a year during 1971–72 to 1977–78" and in 1985–86 by 18 percent. They make no allowance for the crossbreeding of local cows (which triples the yield). When this is factored in, even mating no more than 3 percent of local cows to exotic breeds leads to a cumulative improvement in yield of 2.2 percent per annum which, while high, is not biologically impossible.

5. It has not been possible to identify an estimate in the literature of the supply elasticity for milk in India.

6. The South Asia Regional Office de-emphasizes the supply-side effects.

7. Government production support to the dairy industry (animal health, AI, extension, and credit schemes for the purchase of cows) has been provided both before and after the period of accelerated growth in both Operation Flood and non-Flood areas.

8. These figures represent the total cost per member divided by 25 years. If one wanted to express this for "an average year of the project," this could be doubled since there has been a build-up in membership. On the other hand, the industry still has substantial assets; not all these resources have been used up.

9. The inception of Operation Flood corresponded to a complete change in the paradigm for Indian dairy development. Thus, all references to with- or without-Flood should be taken to include the parenthetical qualifier "and associated policy changes."

10. Economists will note that the quantity produced in the "without situation" is extrapolated from the pre-Flood production trend and not from a supply function. For such an extrapolation which is a function of time, price is immaterial.

11. Assuming, of course, that recombined milk is a perfect substitute for fresh milk.

12. 1996 dollars are used to conform with dollar values elsewhere in the report.

13. Measured as the area above and to the left of the (short-run) supply function.

14. Calculation of producer surplus with a completely inelastic supply function results in *gross revenue* being attributed to "producer surplus." These calculations were not included in the initial draft of the study, but reviewers pushed the authors to try to distinguish the benefits going to producers and consumers. If we assume a unit elasticity short-run supply function (this represents production increasing proportionately with price, represented by a straight line through the origin), the without-Flood producer surplus is Rs 97 billion; with-Flood producer surplus this is Rs 248 billion, a gain for Operation Flood of Rs 151 billion (US$5.2 billion).

15. The South Asia Regional Office believes that this analysis should have been presented for each year that data were available.

16. With unit elasticity of supply in the short run, this producer surplus would drop to Rs 150 billion.

17. Net protection for liquid milk in the major cities was about 2.42 in 1975–76 versus 1.28 in 1994–95 (see Table 4.6).

18. Prices are shown in 1977–78 Rs on the left-hand axis and in 1993–94 Rs on the right-hand axis. To avoid confusion, the section will now express prices and amounts in 1993–94 Rs. The analysis has not been extended to 1994–95 since the Indian GDP deflator for this year is not yet available.

19. This is a generous assumption since it might be more realistic to assume that a third of the shift was due to purely technical factors, a third due to the higher and more assured price regime assured by Operation Flood, and a third due to the interaction between OF and technical progress.

Chapter 7

1. "Fears about over-capitalization were further reinforced because many state governments were reckless in announcing all manner of concessions and subsidies in order to attract private capital to their state. In Haryana, for example, some 40 new plants were proposed to raise processing capacity to a total of 40 lakh liters per day (lld) from the existing 15 plants which had a capacity of 10 lld. This looked ridiculous because a majority of the existing plants were hardly viable; the Haryana Cooperative Federation, which has been operating for nearly two decades, had never been able to collect more than 2 lld in flush and 50,000 liters in lean seasons. There seemed no way the new plant could become viable. Vij has suggested that the private businessmen were interested more in the tax breaks and subsidies which they could claim under the present regime. In his estimate, the 11 new plants proposed would earn, by way of tax exemptions alone, nearly Rs 100 crores by making disproportionate investment in land and machinery expressly for claiming these concessions; there would be additional subsidies and concessions from both the state as well as the central governments, most of which were not available to co-operatives" (Tushaar Shar and others, Institute for Rural Management (IRMA), Undated, "Institutional Structures for Dairy Development: India's Post-Independence Experience," Draft, p. 47.)

2. Dairy India (1997, p. 18a) gives the price of milk as 9 Rs/kg. Volume is from Table 7.1.

3. Dairy India (1997, p. 5). This agrees closely with the estimate of Rs 30.0 billion given in the ICR, Appendix D, p. 6.

4. India is, of course, a highly diverse country. The generalizations expressed in this section undoubtedly have many exceptions. However, they are useful in emphasizing the revolutionary impact women-dominated DCSs can have on women, at least in some villages.

5. The Bank's study of Gender and Poverty in India (World Bank 1991, p. viii) emphasizes the inside/outside dichotomy with most women's tasks being confined within the household, resulting in conscious or unconscious female seclusion. This dichotomy is one which both boys and girls are led to expect almost from birth—hence, the reference to a socially-constructed role.

6. The women's literature emphasizes the collection of milk money by men, even though the money may be given to the wife for safekeeping (Rangnekar, Vasini, and Rangnekar 1994 and Sinha undated).

7. NDDB notes that the absolute number of women members of DCSs increased from approximately 66,000 in 1984–85 to approximately 1.70 million in 1995–96.

8. The normal DCSs are gender-neutral according to their bylaws. Membership is open equally to men and women (but only one person per family, a rule relaxed in some DCSs). The only gender-specific requirement is that at least one woman be on the management committee. But in practice, such societies are usually run by the men of the village, with the token woman making no significant contribution to decisions made by the committee.

9. Biogas certainly beats handmade cow-dung patties as a cooking medium, especially for the women, who traditionally not only have to cook but also make the dung patties. Many programs promote biogas plants. Indeed, the key way Operation Flood promotes them is to broker farmer access to such programs.

10. Actual adulteration was probably even higher, since milk can be declared as "cow milk" even though it originated with a buffalo. This results in more lenient standards for judging milk to be adulterated.

Chapter 8

1. A reviewer cautions against a too facile acceptance of these sections since (i) the three-village studies show relatively little difference between Operation Flood and non-Operation Flood villages; (ii) possible sampling error and the absence of baseline studies make the conclusions based on the Madhya Pradesh and Karnataka village studies questionable; (iii) available evidence indicates that the proportion of income from Operation Flood is modest; (iv) a re-survey in 1996 of the villages in Karnataka found that defunct Flood villages were reported to be the most developed in terms of educational and income levels, number of milk animals owned, and milk sold.

2. Those Keynes so unkindly described as "the slaves of long dead philosophers."

3. In all DCS villages surveyed, marginal farmers make up the largest group of the pourers, followed by small farmers. Marginal and small farmers together constitute more than 70 percent of total pourers, and there is a gradual increase in the representation of these groups (Sampark 1997). Fulton and Bhargava (1994) estimate that 60 percent of members are landless or marginal farmers.

4. Even where there is no technical basis for market failure, monopoly marketing organizations are an almost ubiquitous developmental tool with adverse effects on small farmers and agricultural development generally (Bauer and Paish 1952).

5. In fact, no sooner had the Bank conveyed to the government the decision not to extend the project, than the Secretary of the Treasury wrote assuring the Bank that project extension was highly consistent with the government of India's strategy for development of the dairy industry.

6. Real expenditure is given as Rs 850 million.

7. Total central government's own resources (net of Bank credits and food aid) over the period 1971–72 to 1996–97 are estimated to have been US$33 million, in 1996 dollars, or Rs 1.15 billion which comes to about US$1.32 million per year.

8. World Bank Reports 1996, para. 4.52.

9. This requirement should also be incorporated in the up-front conditionality of statewide adjustment lending.

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